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INVITATION TO BID

Construction of Waste Water Treatment Plant in Hassa/Hatay

ITB No.: UNDP-TUR-ITB(MC2)-2018/06

Project: Turkey Resilience Project in Response to the Syria Crisis; Municipal Service Delivery

Country: Turkey

Issued on: 28 September 2018

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SECTION 1. LETTER OF INVITATION

The United Nations Development Programme (UNDP) hereby invites you to submit a Bid to this Invitation to Bid (ITB) for the above-referenced subject.

This ITB includes the following documents and the General Terms and Conditions of Contract which is inserted in the Bid Data Sheet:

- Section 1: This Letter of Invitation
- Section 2: Instruction to Bidders
- Section 3: Bid Data Sheet (BDS)
- Section 4: Evaluation Criteria
- Section 5: Schedule of Requirements and Technical Specifications
- Section 6: Returnable Bidding Forms
 - o Form A: Bid Submission Form
 - o Form B: Bidder Information Form
 - o Form C: Qualification Form
 - o Form D: Format of Technical Bid
 - o Form E: Price Schedule
 - o Form F: Form of Bid Security

If you are interested in submitting a Bid in response to this ITB, please prepare your Bid in accordance with the requirements and procedure as set out in this ITB and submit it by the Deadline for Submission of Bids set out in Bid Data Sheet.

Please acknowledge receipt of this ITB by sending an email to tr.procurement@undp.org, indicating whether you intend to submit a Bid or otherwise. You may also utilize the "Accept Invitation" function in eTendering system, where applicable. This will enable you to receive amendments or updates to the ITB. Should you require further clarifications, kindly communicate with the contact person/s identified in the attached Data Sheet as the focal point for queries on this ITB.

UNDP looks forward to receiving your Bid and thank you in advance for your interest in UNDP procurement opportunities.

Issued by



Name: Ersin Dağdur
Title: Procurement Officer
Date: **September 28, 2018**

Approved by:



Name: Sukhrob Khojimatov
Title: Deputy Country Director
Date: **September 28, 2018**

SECTION 2. INSTRUCTION TO BIDDERS

GENERAL PROVISIONS	
1. Introduction	<p>1.1 Bidders shall adhere to all the requirements of this ITB, including any amendments made in writing by UNDP. This ITB is conducted in accordance with the UNDP Programme and Operations Policies and Procedures (POPP) on Contracts and Procurement which can be accessed at https://popp.undp.org/SitePages/POPPBSUnit.aspx?TermID=254a9f96-b883-476a-8ef8-e81f93a2b38d</p> <p>1.2 Any Bid submitted will be regarded as an offer by the Bidder and does not constitute or imply the acceptance of the Bid by UNDP. UNDP is under no obligation to award a contract to any Bidder as a result of this ITB.</p> <p>1.3 UNDP reserves the right to cancel the procurement process at any stage without any liability of any kind for UNDP, upon notice to the bidders or publication of cancellation notice on UNDP website.</p> <p>1.4 As part of the bid, it is desired that the Bidder registers at the United Nations Global Marketplace (UNGM) website (www.ungm.org). The Bidder may still submit a bid even if not registered with the UNGM. However, if the Bidder is selected for contract award, the Bidder must register on the UNGM prior to contract signature.</p>
2. Fraud & Corruption, Gifts and Hospitality	<p>2.1 UNDP strictly enforces a policy of zero tolerance on proscribed practices, including fraud, corruption, collusion, unethical or unprofessional practices, and obstruction of UNDP vendors and requires all bidders/vendors observe the highest standard of ethics during the procurement process and contract implementation. UNDP's Anti-Fraud Policy can be found at http://www.undp.org/content/undp/en/home/operations/accountability/audit/office_of_audit_andinvestigation.html#anti</p> <p>2.2 Bidders/vendors shall not offer gifts or hospitality of any kind to UNDP staff members including recreational trips to sporting or cultural events, theme parks or offers of holidays, transportation, or invitations to extravagant lunches or dinners.</p> <p>2.3 In pursuance of this policy, UNDP:</p> <p>(a) Shall reject a bid if it determines that the selected bidder has engaged in any corrupt or fraudulent practices in competing for the contract in question;</p> <p>(b) Shall declare a vendor ineligible, either indefinitely or for a stated period, to be awarded a contract if at any time it determines that the vendor has engaged in any corrupt or fraudulent practices in competing for, or in executing a UNDP contract.</p> <p>2.4 All Bidders must adhere to the UN Supplier Code of Conduct, which may be found at http://www.un.org/depts/ptd/pdf/conduct_english.pdf</p>
3. Eligibility	<p>3.1 A vendor should not be suspended, debarred, or otherwise identified as ineligible by any UN Organization or the World Bank Group or any other international Organization. Vendors are therefore required to disclose to UNDP whether they are subject to any sanction or temporary suspension imposed by these organizations.</p> <p>3.2 It is the Bidder's responsibility to ensure that its employees, joint venture members, sub-contractors, service providers, suppliers and/or their employees meet the eligibility requirements as established by UNDP.</p>

4. Conflict of Interests	<p>4.1 Bidders must strictly avoid conflicts with other assignments or their own interests, and act without consideration for future work. Bidders found to have a conflict of interest shall be disqualified. Without limitation on the generality of the above, Bidders, and any of their affiliates, shall be considered to have a conflict of interest with one or more parties in this solicitation process, if they:</p> <ul style="list-style-type: none"> a) Are or have been associated in the past, with a firm or any of its affiliates which have been engaged by UNDP to provide services for the preparation of the design, specifications, Terms of Reference, cost analysis/estimation, and other documents to be used for the procurement of the goods and services in this selection process; b) Were involved in the preparation and/or design of the programme/project related to the goods and/or services requested under this ITB; or c) Are found to be in conflict for any other reason, as may be established by, or at the discretion of UNDP. <p>4.2 In the event of any uncertainty in the interpretation of a potential conflict of interest, Bidders must disclose to UNDP, and seek UNDP's confirmation on whether or not such conflict exists.</p> <p>4.3 Similarly, the Bidders must disclose in their Bid their knowledge of the following:</p> <ul style="list-style-type: none"> a) If the owners, part-owners, officers, directors, controlling shareholders, of the bidding entity or key personnel who are family members of UNDP staff involved in the procurement functions and/or the Government of the country or any Implementing Partner receiving goods and/or services under this ITB; and b) All other circumstances that could potentially lead to actual or perceived conflict of interest, collusion or unfair competition practices. <p>Failure to disclose such an information may result in the rejection of the Bid or Bids affected by the non-disclosure.</p> <p>4.4 The eligibility of Bidders that are wholly or partly owned by the Government shall be subject to UNDP's further evaluation and review of various factors such as being registered, operated and managed as an independent business entity, the extent of Government ownership/share, receipt of subsidies, mandate and access to information in relation to this ITB, among others. Conditions that may lead to undue advantage against other Bidders may result in the eventual rejection of the Bid.</p>
B. PREPARATION OF BIDS	
5. General Considerations	<p>5.1 In preparing the Bid, the Bidder is expected to examine the ITB in detail. Material deficiencies in providing the information requested in the ITB may result in rejection of the Bid.</p> <p>5.2 The Bidder will not be permitted to take advantage of any errors or omissions in the ITB. Should such errors or omissions be discovered, the Bidder must notify the UNDP accordingly.</p>
6. Cost of Preparation of Bid	<p>6.1 The Bidder shall bear all costs related to the preparation and/or submission of the Bid, regardless of whether its Bid is selected or not. UNDP shall not be responsible or liable for those costs, regardless of the conduct or outcome of the procurement process.</p>
7. Language	<p>7.1 The Bid, as well as any and all related correspondence exchanged by the Bidder and UNDP, shall be written in the language (s) specified in the BDS.</p>

8. Documents Comprising the Bid	<p>8.1 The Bid shall comprise of the following documents and related forms which details are provided in the BDS:</p> <ul style="list-style-type: none"> a) Documents Establishing the Eligibility and Qualifications of the Bidder; b) Technical Bid; c) Price Schedule; d) Bid Security, if required by BDS; e) Any attachments and/or appendices to the Bid.
9. Documents Establishing the Eligibility and Qualifications of the Bidder	<p>9.1 The Bidder shall furnish documentary evidence of its status as an eligible and qualified vendor, using the Forms provided under Section 6 and providing documents required in those forms. In order to award a contract to a Bidder, its qualifications must be documented to UNDP's satisfaction.</p>
10. Technical Bid Format and Content	<p>10.1 The Bidder is required to submit a Technical Bid using the Standard Forms and templates provided in Section 6 of the ITB.</p> <p>10.2 Samples of items, when required as per Section 5, shall be provided within the time specified and unless otherwise specified by the Purchaser, at no expense to the UNDP. If not destroyed by testing, samples will be returned at Bidder's request and expense, unless otherwise specified.</p> <p>10.3 When applicable and required as per Section 5, the Bidder shall describe the necessary training programme available for the maintenance and operation of the equipment offered as well as the cost to the UNDP. Unless otherwise specified, such training as well as training materials shall be provided in the language of the Bid as specified in the BDS.</p> <p>10.4 When applicable and required as per Section 5, the Bidder shall certify the availability of spare parts for a period of at least five (5) years from date of delivery, or as otherwise specified in this ITB.</p>
11. Price Schedule	<p>11.1 The Price Schedule shall be prepared using the Form provided in Section 6 of the ITB and taking into consideration the requirements in the ITB.</p> <p>11.2 Any requirement described in the Technical Bid but not priced in the Price Schedule, shall be assumed to be included in the prices of other activities or items, as well as in the final total price.</p>
12. Bid Security	<p>12.1 A Bid Security, if required by BDS, shall be provided in the amount and form indicated in the BDS. The Bid Security shall be valid for a minimum of thirty (30) days after the final date of validity of the Bid.</p> <p>12.2 The Bid Security shall be included along with the Bid. If Bid Security is required by the ITB but is not found in the Bid, the offer shall be rejected.</p> <p>12.3 If the Bid Security amount or its validity period is found to be less than what is required by UNDP, UNDP shall reject the Bid.</p> <p>12.4 In the event an electronic submission is allowed in the BDS, Bidders shall include a copy of the Bid Security in their bid and the original of the Bid Security must be sent via courier or hand delivery as per the instructions in BDS.</p> <p>12.5 The Bid Security may be forfeited by UNDP, and the Bid rejected, in the event of any, or combination, of the following conditions:</p> <ul style="list-style-type: none"> a) If the Bidder withdraws its offer during the period of the Bid Validity specified in the BDS, or; b) In the event the successful Bidder fails: <ul style="list-style-type: none"> i. to sign the Contract after UNDP has issued an award; or

	<ul style="list-style-type: none"> ii. to furnish the Performance Security, insurances, or other documents that UNDP may require as a condition precedent to the effectivity of the contract that may be awarded to the Bidder.
13. Currencies	<p>13.1 All prices shall be quoted in the currency or currencies indicated in the BDS. Where Bids are quoted in different currencies, for the purposes of comparison of all Bids:</p> <ul style="list-style-type: none"> a) UNDP will convert the currency quoted in the Bid into the UNDP preferred currency, in accordance with the prevailing UN operational rate of exchange on the last day of submission of Bids; and b) In the event that UNDP selects a Bid for award that is quoted in a currency different from the preferred currency in the BDS, UNDP shall reserve the right to award the contract in the currency of UNDP's preference, using the conversion method specified above.
14. Joint Venture, Consortium or Association	<p>14.1 If the Bidder is a group of legal entities that will form or have formed a Joint Venture (JV), Consortium or Association for the Bid, they shall confirm in their Bid that : (i) they have designated one party to act as a lead entity, duly vested with authority to legally bind the members of the JV, Consortium or Association jointly and severally, which shall be evidenced by a duly notarized Agreement among the legal entities, and submitted with the Bid; and (ii) if they are awarded the contract, the contract shall be entered into, by and between UNDP and the designated lead entity, who shall be acting for and on behalf of all the member entities comprising the joint venture.</p> <p>14.2 After the Deadline for Submission of Bid, the lead entity identified to represent the JV, Consortium or Association shall not be altered without the prior written consent of UNDP.</p> <p>14.3 The lead entity and the member entities of the JV, Consortium or Association shall abide by the provisions of Clause 9 herein in respect of submitting only one Bid.</p> <p>14.4 The description of the organization of the JV, Consortium or Association must clearly define the expected role of each of the entities in the joint venture in delivering the requirements of the ITB, both in the Bid and the JV, Consortium or Association Agreement. All entities that comprise the JV, Consortium or Association shall be subject to the eligibility and qualification assessment by UNDP.</p> <p>14.5 A JV, Consortium or Association in presenting its track record and experience should clearly differentiate between:</p> <ul style="list-style-type: none"> a) Those that were undertaken together by the JV, Consortium or Association; and b) Those that were undertaken by the individual entities of the JV, Consortium or Association. <p>14.6 Previous contracts completed by individual experts working privately but who are permanently or were temporarily associated with any of the member firms cannot be claimed as the experience of the JV, Consortium or Association or those of its members, but should only be claimed by the individual experts themselves in their presentation of their individual credentials</p> <p>14.7 JV, Consortium or Associations are encouraged for high value, multi-sectoral requirements when the spectrum of expertise and resources required may not be available within one firm.</p>
15. Only One Bid	<p>15.1 The Bidder (including the individual members of any Joint Venture) shall submit</p>

	<p>only one Bid, either in its own name or as part of a Joint Venture.</p> <p>15.2 Bids submitted by two (2) or more Bidders shall all be rejected if they are found to have any of the following:</p> <ul style="list-style-type: none"> a) they have at least one controlling partner, director or shareholder in common; or b) any one of them receive or have received any direct or indirect subsidy from the other/s; or c) they have the same legal representative for purposes of this ITB; or d) they have a relationship with each other, directly or through common third parties, that puts them in a position to have access to information about, or influence on the Bid of another Bidder regarding this ITB process; e) they are subcontractors to each other's Bid, or a subcontractor to one Bid also submits another Bid under its name as lead Bidder; or some key personnel proposed to be in the team of one Bidder participates in more than one Bid received for this ITB process. This condition relating to the personnel, does not apply to subcontractors being included in more than one Bid.
16. Bid Validity Period	<p>16.1 Bids shall remain valid for the period specified in the BDS, commencing on the Deadline for Submission of Bids. A Bid valid for a shorter period may be rejected by UNDP and rendered non-responsive.</p> <p>16.2 During the Bid validity period, the Bidder shall maintain its original Bid without any change, including the availability of the Key Personnel, the proposed rates and the total price.</p>
17. Extension of Bid Validity Period	<p>17.1 In exceptional circumstances, prior to the expiration of the Bid validity period, UNDP may request Bidders to extend the period of validity of their Bids. The request and the responses shall be made in writing and shall be considered integral to the Bid.</p> <p>17.2 If the Bidder agrees to extend the validity of its Bid, it shall be done without any change to the original Bid.</p> <p>17.3 The Bidder has the right to refuse to extend the validity of its Bid, in which case, the Bid shall not be further evaluated.</p>
18. Clarification of Bid (from the Bidders)	<p>18.1 Bidders may request clarifications on any of the ITB documents no later than the date indicated in the BDS. Any request for clarification must be sent in writing in the manner indicated in the BDS. If inquiries are sent other than specified channel, even if they are sent to a UNDP staff member, UNDP shall have no obligation to respond or confirm that the query was officially received.</p> <p>18.2 UNDP will provide the responses to clarifications through the method specified in the BDS.</p> <p>18.3 UNDP shall endeavour to provide responses to clarifications in an expeditious manner, but any delay in such response shall not cause an obligation on the part of UNDP to extend the submission date of the Bids, unless UNDP deems that such an extension is justified and necessary.</p>
19. Amendment of Bids	<p>19.1 At any time prior to the deadline of Bid submission, UNDP may for any reason, such as in response to a clarification requested by a Bidder, modify the ITB in the form of an amendment to the ITB. Amendments will be made available to all prospective bidders.</p> <p>19.2 If the amendment is substantial, UNDP may extend the Deadline for submission of Bid to give the Bidders reasonable time to incorporate the amendment into their Bids.</p>

20. Alternative Bids	<p>20.1 Unless otherwise specified in the BDS, alternative Bids shall not be considered. If submission of alternative Bid is allowed by BDS, a Bidder may submit an alternative Bid, but only if it also submits a Bid conforming to the ITB requirements. Where the conditions for its acceptance are met, or justifications are clearly established, UNDP reserves the right to award a contract based on an alternative Bid.</p> <p>20.2 If multiple/alternative bids are being submitted, they must be clearly marked as "Main Bid" and "Alternative Bid"</p>
21. Pre-Bid Conference	<p>21.1 When appropriate, a pre-bid conference will be conducted at the date, time and location specified in the BDS. All Bidders are encouraged to attend. Non-attendance, however, shall not result in disqualification of an interested Bidder. Minutes of the Bidder's conference will be disseminated on the procurement website and shared by email or on the e-Tendering platform as specified in the BDS. No verbal statement made during the conference shall modify the terms and conditions of the ITB, unless specifically incorporated in the Minutes of the Bidder's Conference or issued/posted as an amendment to ITB.</p>
C. SUBMISSION AND OPENING OF BIDS	
22. Submission	<p>22.1 The Bidder shall submit a duly signed and complete Bid comprising the documents and forms in accordance with requirements in the BDS. The Price Schedule shall be submitted together with the Technical Bid. Bid can be delivered either personally, by courier, or by electronic method of transmission as specified in the BDS.</p> <p>22.2 The Bid shall be signed by the Bidder or person(s) duly authorized to commit the Bidder. The authorization shall be communicated through a document evidencing such authorization issued by the legal representative of the bidding entity, or a Power of Attorney, accompanying the Bid.</p> <p>22.3 Bidders must be aware that the mere act of submission of a Bid, in and of itself, implies that the Bidder fully accepts the UNDP General Contract Terms and Conditions.</p>
Hard copy (manual) submission	<p>22.4 Hard copy (manual) submission by courier or hand delivery allowed or specified in the BDS shall be governed as follows:</p> <p>a) The signed Bid shall be marked "Original", and its copies marked "Copy" as appropriate. The number of copies is indicated in the BDS. All copies shall be made from the signed original only. If there are discrepancies between the original and the copies, the original shall prevail.</p> <p>(b) The Technical Bid and Price Schedule must be sealed and submitted together in an envelope, which shall:</p> <ol style="list-style-type: none"> Bear the name of the Bidder; Be addressed to UNDP as specified in the BDS; and Bear a warning not to open before the time and date for Bid opening as specified in the BDS. <p>If the envelope with the Bid is not sealed and marked as required, UNDP shall assume no responsibility for the misplacement, loss, or premature opening of the Bid.</p>
Email and eTendering submissions	<p>22.5 Electronic submission through email or eTendering, if allowed as specified in the BDS, shall be governed as follows:</p> <p>a) Electronic files that form part of the Bid must be in accordance with the format and requirements indicated in BDS;</p>

	<p>b) Documents which are required to be in original form (e.g. Bid Security, etc.) must be sent via courier or hand delivered as per the instructions in BDS.</p> <p>22.6 Detailed instructions on how to submit, modify or cancel a bid in the eTendering system are provided in the eTendering system Bidder User Guide and Instructional videos available on this link: http://www.undp.org/content/undp/en/home/operations/procurement/business/procurement-notice/resources/</p>
23. Deadline for Submission of Bids and Late Bids	<p>23.1 Complete Bids must be received by UNDP in the manner, and no later than the date and time, specified in the BDS. UNDP shall only recognise the actual date and time that the bid was received by UNDP</p> <p>23.2 UNDP shall not consider any Bid that is received after the deadline for the submission of Bids.</p>
24. Withdrawal, Substitution, and Modification of Bids	<p>24.1 A Bidder may withdraw, substitute or modify its Bid after it has been submitted at any time prior to the deadline for submission.</p> <p>24.2 Manual and Email submissions: A bidder may withdraw, substitute or modify its Bid by sending a written notice to UNDP, duly signed by an authorized representative, and shall include a copy of the authorization (or a Power of Attorney). The corresponding substitution or modification of the Bid, if any, must accompany the respective written notice. All notices must be submitted in the same manner as specified for submission of Bids, by clearly marking them as "WITHDRAWAL" "SUBSTITUTION," or "MODIFICATION"</p> <p>24.3 eTendering: A Bidder may withdraw, substitute or modify its Bid by Cancelling, Editing, and re-submitting the Bid directly in the system. It is the responsibility of the Bidder to properly follow the system instructions, duly edit and submit a substitution or modification of the Bid as needed. Detailed instructions on how to cancel or modify a Bid directly in the system are provided in the Bidder User Guide and Instructional videos.</p> <p>24.4 Bids requested to be withdrawn shall be returned unopened to the Bidders (only for manual submissions), except if the bid is withdrawn after the bid has been opened.</p>
25. Bid Opening	<p>25.1 UNDP will open the Bid in the presence of an ad-hoc committee formed by UNDP of at least two (2) members.</p> <p>25.2 The Bidders' names, modifications, withdrawals, the condition of the envelope labels/seals, the number of folders/files and all other such other details as UNDP may consider appropriate, will be announced at the opening. No Bid shall be rejected at the opening stage, except for late submissions, in which case, the Bid shall be returned unopened to the Bidders.</p> <p>25.3 In the case of e-Tendering submission, bidders will receive an automatic notification once the Bid is opened.</p>
D. EVALUATION OF BIDS	
26. Confidentiality	<p>26.1 Information relating to the examination, evaluation, and comparison of Bids, and the recommendation of contract award, shall not be disclosed to Bidders or any other persons not officially concerned with such process, even after publication of the contract award.</p> <p>26.2 Any effort by a Bidder or anyone on behalf of the Bidder to influence UNDP in the examination, evaluation and comparison of the Bids or contract award decisions may, at UNDP's decision, result in the rejection of its Bid and may subsequently be subject to the application of prevailing UNDP's vendor</p>

	sanctions procedures.
27. Evaluation of Bids	<p>27.1 UNDP will conduct the evaluation solely on the basis of the Bids received.</p> <p>27.2 Evaluation of Bids shall be undertaken in the following steps:</p> <ul style="list-style-type: none"> a) Preliminary Examination including Eligibility b) Arithmetical check and ranking of bidders who passed preliminary examination by price. c) Qualification assessment (if pre-qualification was not done) a) Evaluation of Technical Bids b) Evaluation of prices <p>Detailed evaluation will be focussed on the 3 - 5 lowest priced bids. Further higher priced bids shall be added for evaluation if necessary</p>
28. Preliminary Examination	<p>28.1 UNDP shall examine the Bids to determine whether they are complete with respect to minimum documentary requirements, whether the documents have been properly signed, and whether the Bids are generally in order, among other indicators that may be used at this stage. UNDP reserves the right to reject any Bid at this stage.</p>
29. Evaluation of Eligibility and Qualification	<p>29.1 Eligibility and Qualification of the Bidder will be evaluated against the Minimum Eligibility/Qualification requirements specified in the Section 4 (Evaluation Criteria).</p> <p>29.2 In general terms, vendors that meet the following criteria may be considered qualified:</p> <ul style="list-style-type: none"> a) They are not included in the UN Security Council 1267/1989 Committee's list of terrorists and terrorist financiers, and in UNDP's ineligible vendors' list; b) They have a good financial standing and have access to adequate financial resources to perform the contract and all existing commercial commitments, c) They have the necessary similar experience, technical expertise, production capacity, quality certifications, quality assurance procedures and other resources applicable to the supply of goods and/or services required; d) They are able to comply fully with the UNDP General Terms and Conditions of Contract; e) They do not have a consistent history of court/arbitral award decisions against the Bidder; and f) They have a record of timely and satisfactory performance with their clients.
30. Evaluation of Technical Bid and prices	<p>30.1 The evaluation team shall review and evaluate the Technical Bids on the basis of their responsiveness to the Schedule of Requirements and Technical Specifications and other documentation provided, applying the procedure indicated in the BDS and other ITB documents. When necessary, and if stated in the BDS, UNDP may invite technically responsive bidders for a presentation related to their technical Bids. The conditions for the presentation shall be provided in the bid document where required.</p>
31. Due diligence	<p>31.1 UNDP reserves the right to undertake a due diligence exercise, aimed at determining to its satisfaction, the validity of the information provided by the Bidder. Such exercise shall be fully documented and may include, but need not be limited to, all or any combination of the following:</p> <ul style="list-style-type: none"> a) Verification of accuracy, correctness and authenticity of information provided by the Bidder; b) Validation of extent of compliance to the ITB requirements and evaluation criteria based on what has so far been found by the evaluation team; c) Inquiry and reference checking with Government entities with jurisdiction on the Bidder, or with previous clients, or any other entity that may have

	<p>done business with the Bidder;</p> <p>d) Inquiry and reference checking with previous clients on the performance on on-going or completed contracts, including physical inspections of previous works, as deemed necessary;</p> <p>e) Physical inspection of the Bidder's offices, branches or other places where business transpires, with or without notice to the Bidder;</p> <p>f) Other means that UNDP may deem appropriate, at any stage within the selection process, prior to awarding the contract.</p>
32. Clarification of Bids	<p>32.1 To assist in the examination, evaluation and comparison of Bids, UNDP may, at its discretion, request any Bidder for a clarification of its Bid.</p> <p>32.2 UNDP's request for clarification and the response shall be in writing and no change in the prices or substance of the Bid shall be sought, offered, or permitted, except to provide clarification, and confirm the correction of any arithmetic errors discovered by UNDP in the evaluation of the Bids, in accordance with the ITB.</p> <p>32.3 Any unsolicited clarification submitted by a Bidder in respect to its Bid, which is not a response to a request by UNDP, shall not be considered during the review and evaluation of the Bids.</p>
33. Responsiveness of Bid	<p>33.1 UNDP's determination of a Bid's responsiveness will be based on the contents of the bid itself. A substantially responsive Bid is one that conforms to all the terms, conditions, specifications and other requirements of the ITB without material deviation, reservation, or omission.</p> <p>33.2 If a bid is not substantially responsive, it shall be rejected by UNDP and may not subsequently be made responsive by the Bidder by correction of the material deviation, reservation, or omission.</p>
34. Nonconformities, Reparable Errors and Omissions	<p>34.1 Provided that a Bid is substantially responsive, UNDP may waive any non-conformities or omissions in the Bid that, in the opinion of UNDP, do not constitute a material deviation.</p> <p>34.2 UNDP may request the Bidder to submit the necessary information or documentation, within a reasonable period, to rectify nonmaterial nonconformities or omissions in the Bid related to documentation requirements. Such omission shall not be related to any aspect of the price of the Bid. Failure of the Bidder to comply with the request may result in the rejection of its Bid.</p> <p>34.3 For the bids that have passed the preliminary examination, UNDP shall check and correct arithmetical errors as follows:</p> <p>a) if there is a discrepancy between the unit price and the line item total that is obtained by multiplying the unit price by the quantity, the unit price shall prevail and the line item total shall be corrected, unless in the opinion of UNDP there is an obvious misplacement of the decimal point in the unit price; in which case, the line item total as quoted shall govern and the unit price shall be corrected;</p> <p>b) if there is an error in a total corresponding to the addition or subtraction of subtotals, the subtotals shall prevail, and the total shall be corrected; and</p> <p>c) if there is a discrepancy between words and figures, the amount in words shall prevail, unless the amount expressed in words is related to an arithmetic error, in which case the amount in figures shall prevail.</p> <p>34.4 If the Bidder does not accept the correction of errors made by UNDP, its Bid shall be rejected.</p>

E. AWARD OF CONTRACT	
35. Right to Accept, Reject, Any or All Bids	35.1 UNDP reserves the right to accept or reject any bid, to render any or all of the bids as non-responsive, and to reject all Bids at any time prior to award of contract, without incurring any liability, or obligation to inform the affected Bidder(s) of the grounds for UNDP's action. UNDP shall not be obliged to award the contract to the lowest priced offer.
36. Award Criteria	36.1 Prior to expiration of the period of Bid validity, UNDP shall award the contract to the qualified and eligible Bidder that is found to be responsive to the requirements of the Schedule of Requirements and Technical Specification and has offered the lowest price.
37. Debriefing	37.1 In the event that a Bidder is unsuccessful, the Bidder may request for a debriefing from UNDP. The purpose of the debriefing is to discuss the strengths and weaknesses of the Bidder's submission, in order to assist the Bidder in improving its future Bids for UNDP procurement opportunities. The content of other Bids and how they compare to the Bidder's submission shall not be discussed.
38. Right to Vary Requirements at the Time of Award	38.1 At the time of award of Contract, UNDP reserves the right to vary the quantity of goods and/or services, by up to a maximum twenty-five per cent (25%) of the total offer, without any change in the unit price or other terms and conditions.
39. Contract Signature	39.1 Within fifteen (15) days from the date of receipt of the Contract, the successful Bidder shall sign and date the Contract and return it to UNDP. Failure to do so may constitute sufficient grounds for the annulment of the award, and forfeiture of the Bid Security, if any, and on which event, UNDP may award the Contract to the Second highest rated or call for new Bids.
40. Contract Type and General Terms and Conditions	40.1 The types of Contract to be signed and the applicable UNDP Contract General Terms and Conditions, as specified in BDS, can be accessed at http://www.undp.org/content/undp/en/home/procurement/business/how-we-buy.html
41. Performance Security	41.1 A performance security, if required in the BDS, shall be provided in the amount specified in BDS and form available at https://popp.undp.org/_layouts/15/WopiFrame.aspx?sourcedoc=/UNDP_POPP_DOCUMENT_LIBRARY/Public/PSU_Solicitation_Performance%20Guarantee%20Form.docx&action=default within a maximum of fifteen (15) days of the contract signature by both parties. Where a performance security is required, the receipt of the performance security by UNDP shall be a condition for rendering the contract effective.
42. Bank Guarantee for Advanced Payment	42.1 Except when the interests of UNDP so require, it is UNDP's standard practice to not make advance payment(s) (i.e., payments without having received any outputs). If an advance payment is allowed as per the BDS, and exceeds 20% of the total contract price, or USD 30,000, whichever is less, the Bidder shall submit a Bank Guarantee in the full amount of the advance payment in the form available at https://popp.undp.org/_layouts/15/WopiFrame.aspx?sourcedoc=/UNDP_POPP_DOCUMENT_LIBRARY/Public/PSU_Contract%20Management%20Payment%20and%20Taxes_Advanced%20Payment%20Guarantee%20Form.docx&action=default
43. Liquidated Damages	43.1 If specified in the BDS, UNDP shall apply Liquidated Damages for the damages and/or risks caused to UNDP resulting from the Contractor's delays or breach of

	its obligations as per Contract.
44. Payment Provisions	<p>44.1 Payment will be made only upon UNDP's acceptance of the goods and/or services performed. The terms of payment shall be within thirty (30) days, after receipt of invoice and certification of acceptance of goods and/or services issued by the proper authority in UNDP with direct supervision of the Contractor. Payment will be affected by bank transfer in the currency of the contract.</p>
45. Vendor Protest	<p>45.1 UNDP's vendor protest procedure provides an opportunity for appeal to those persons or firms not awarded a contract through a competitive procurement process. In the event that a Bidder believes that it was not treated fairly, the following link provides further details regarding UNDP vendor protest procedures: http://www.undp.org/content/undp/en/home/procurement/business/protest-and-sanctions.html</p>
46. Other Provisions	<p>46.1 In the event that the Bidder offers a lower price to the host Government (e.g. General Services Administration (GSA) of the federal government of the United States of America) for similar goods and/or services, UNDP shall be entitled to the same lower price. The UNDP General Terms and Conditions shall have precedence.</p> <p>46.2 UNDP is entitled to receive the same pricing offered by the same Contractor in contracts with the United Nations and/or its Agencies. The UNDP General Terms and Conditions shall have precedence.</p> <p>46.3 The United Nations has established restrictions on employment of (former) UN staff who have been involved in the procurement process as per bulletin ST/SGB/2006/15 http://www.un.org/en/ga/search/view_doc.asp?symbol=ST/SGB/2006/15&referer</p>

SECTION 3. BID DATA SHEET

The following data for the civil works to be procured shall complement, supplement, or amend the provisions in the Invitation to Bid. In the case of a conflict between the Instructions to Bidders, the Bid Data Sheet, and other annexes or references attached to the Bid Data Sheet, the provisions in the Bid Data Sheet shall prevail.

BDS No.	Ref. to Section.2	Data	Specific Instructions / Requirements
1	7	Language of the Bid	English
2		Submitting Bids for Parts or sub-parts of the Schedule of Requirements (partial bids)	Not Allowed
3	20	Alternative Bids	Shall not be considered
4	21	Pre-Bid conference	<p>Will be Conducted</p> <p>Time: 10:00 am (GMT +3, Local time-Turkey)</p> <p>Date: October 31, 2018</p> <p>Venue: Municipality of Hassa, Girne Mahallesi - 81. Sokak No:5 Hassa/Hatay, Turkey</p> <p>Following the pre-bid conference, a site visit will also be conducted with the participants of the pre-bid conference in order to examine the Site of Work and its surroundings. Bidders are strongly advised to participate the pre-bid conference and site visit to obtain information that may be necessary for preparing the bid. The costs of participation to pre-bid conference and site visit are at the bidder's own expense.</p> <p>The UNDP focal point for the arrangement is:</p> <p>Ersin Dağdur</p> <p>Telephone: +90 312 4541079</p> <p>E-mail: ersin.dagdur@undp.org</p>
5	16	Bid Validity Period	90 days
6	12	Bid Security	<p>Required in the amount of USD 100,000</p> <p>Acceptable Forms of Bid Security</p> <ul style="list-style-type: none"> Bank Guarantee (See Section 6; Form F for template) <p>Bid Securities will be returned to all bidders upon signature of contract with the successful Bidder.</p>
7	42	Advanced Payment upon signing of contract	<p>Allowed up to a maximum of 20 % of contract value</p> <p>Bidder shall submit a Bank Guarantee in the full amount of the</p>

			advance payment in the form available at: https://popp.undp.org/_layouts/15/WopiFrame.aspx?sourcedoc=/UNDP_POPP_DOCUMENT_LIBRARY/Public/PSU_Contract%20Management%20Payment%20and%20Taxes_Advanced%20Payment%20Guarantee%20Form.docx&action=default
8	43	Liquidated Damages	Will be imposed as follows: Percentage of contract price per week of delay: 1 % Max. number of weeks of delay is 10, after which UNDP may terminate the contract.
9	41	Performance Security	The successful bidder will be asked to provide a performance security of 10% of the amount of the contract at the signing of the contract. This security must be provided no later than 15 days after the bidder receives the award letter by the UNDP. If the selected bidder fails to provide such a security within this period, the contract will be void and a new contract may be drawn up and sent to the tenderer which has submitted the next cheapest compliant tender. The Performance Security must be issued by an accredited bank, in the format included in Appendix I to UNDP General Conditions of Contract for Civil Works and must be valid up to twenty-eight days after issuance of the Certificate of Final Completion. The Performance Security will only be released upon the issuance of Certificate of Final Completion in accordance with the Clause 10 of the UNDP General Conditions of Contract for Civil Works.
10	13	Currency of Bid	United States Dollar
11	18	Deadline for submitting requests for clarifications/ questions	5 days before the submission deadline
12	18	Contact Details for submitting clarifications/questions	Focal Person in UNDP: Ersin Dagdur Address: Yıldız Kule, Yukarı Dikmen Mah. Turan Güneş Blv. No:106 06550, Çankaya/Ankara Turkey E-mail address: tr.procurement@undp.org
13	18, 19 and 21	Manner of Disseminating Supplemental Information to the ITB and responses/clarifications to queries	Direct communication to prospective Proposers who have submitted their intention to submit a proposal, by email and Posting on the websites; www.tr.undp.org www.undp.org www.ungm.org www.devbusiness.com
14	23	Deadline for Physical Submission of Bids to UNDP Premises at Yıldız Kule	November 12, 2018; 2:00 pm (GMT +3, Local time-Turkey)

15	22	Allowable Manner of Submitting Bids	<p>Courier/Hand Delivery</p> <p>The bidders shall make all arrangements and controls to ensure that their bidders are physically delivered to UNDP, address of which is given in this ITB by the stated deadline. The bidders are free to make arrangements either for physical dispatch of their bids or through courier companies, at their own risk. UNDP shall not be responsible for any late physical delivery of the bids to UNDP due to potential delays in courier companies, working/non-working days, official holidays, strikes, etc. Physical dispatch of the bids to UNDP is possible as there is a security desk who will issue delivery receipts on a 24/7 basis.</p>
16	22	Number of copies of Bid	<p>Original: 1</p> <p>Copies: 2</p> <p>CD Copies 2 (copies of bid documents including Excel and word documents (Price Schedule, BoQs i.e.)</p>
17	22	Bid Submission Address	<p>United Nations Development Programme</p> <p>Turkey Resilience Project in Response to the Syria Crisis</p> <p>Yıldız Kule 16th Floor, Yukari Dikmen Mah. Turan Güneş Blv.</p> <p>No:106 06550, Çankaya/Ankara Turkey</p> <p>UNDP-TUR-ITB(MC2)-2018/06</p>
18	22	Electronic submission (email or eTendering) requirements	Not applicable
19	25	Date, time and venue for the opening of bid	<p>Date and Time: November 12th, 2018; 3:00 pm (GMT +3, Local time-Turkey)</p> <p>Venue: United Nations Development Programme</p> <p>Turkey Resilience Project in Response to the Syria Crisis</p> <p>Yıldız Kule, Yukarı Dikmen Mah. Turan Güneş Blv. No:106 06550, Çankaya/Ankara</p>
20	27, 36	Evaluation Method for the Award of Contract	Lowest priced technically responsive, eligible and qualified bid.
21		Expected date for commencement of Contract	<i>December 22, 2018</i>
22		Maximum expected duration of contract	<p>240 days, starting from the date on which the Contractor will be given Access to the Site and receive a notice from the UNDP Engineer to commence the Works and ending on the date of substantial completion of Works stated in the Certificate of Substantial Completion.</p> <p>As stated in the General Conditions of Contract for Civil Works, clause 47.1; "Defects Liability Period" is 12 months calculated from the date of completion of the Works stated in the Certificate of Substantial Completion issued by the UNDP Engineer.</p>
23	35	UNDP will award the contract to:	One Proposer Only

24	40	Type of Contract	Contract for Civil Works http://www.undp.org/content/undp/en/home/procurement/business/how-we-buy.html
25	40	UNDP Contract Terms and Conditions that will apply	UNDP General Terms and Conditions for Works http://www.undp.org/content/undp/en/home/procurement/business/how-we-buy.html
26	44	Payment Provisions	<p>Pricing Structure;</p> <p>The contract is based on unit price, and the final price of the Contract will be determined on the basis of actual quantities of work and materials utilized in the complete and satisfactory performance of the Works as certified by the Engineer and the unit prices contained in the Contractor's financial proposal. Such unit prices are fixed and are not subject to any variation whatsoever.</p> <p>Unless the technical specifications or the Bill of Quantities specifically and expressly state otherwise, only permanent works are to be measured and paid for by UNDP. Therefore, the Bidder shall consider inclusion of the costs which will be Borne by the Contractor during defect liability period in terms of operation and maintenance of plant and training of operational staff, while inserting the prices in the Bill of Quantities. The cost related to operation, maintenance and training are defined in detail at Article 7.8 of the Technical Specifications. No specific payment will be made against operation, maintenance and training.</p> <p>Payment Terms;</p> <p>The Contractor shall submit monthly invoices (reflecting the monthly work performed and materials utilized every month for the work performed and materials utilized every month as accepted by UNDP through the "Monthly Progress Reports") and a final invoice within 30 days from the issuance of the Certificate of Substantial Completion by the Engineer.</p> <p>UNDP shall affect payment of the invoices after receipt of the certificate of payment issued by the Engineer, approving the amount contained in the invoice. The Engineer may make corrections to that amount, in which case UNDP may affect payment for the amount so corrected. The Engineer may also withhold invoices if the work is not performed at any time in accordance with the terms of the Contract or if the necessary insurance policies or performance security are not valid and/or in order. The Engineer shall process the invoices submitted by the Contractor within 15 days of their receipt.</p> <p>Invoices will be paid within thirty (30) days of the date of their receipt and acceptance by UNDP.</p> <p>Currency of Payment;</p> <p>If the Contractor is registered and operating in Turkey, the payment shall be realized in Turkish Liras (TRY). Contract price will be converted from United States Dollar (USD) to Turkish Liras (TRY) by the UN operational rate of exchange¹ valid on the</p>

¹ Available at the website: <https://treasury.un.org/operationalrates/OperationalRates.php#E>

			<p>date of money transfer. Otherwise, the payments shall be affected in United States Dollar.</p> <p>Repayment of advance payment;</p> <p>The amounts of the monthly progress payments shall be subject to a deduction of 40 % over the amount accepted for payment until the cumulative amount of the deductions so effected shall equal the amount of the advance payment.</p> <p>The advance payment guarantee will be released when the cumulative amount of the deductions so effected will equal the amount of the advance payment.</p>
27	14	Eligibility of JV/Consortium/Association	JV/Consortium/Association are not eligible to submit a Bid in response to this ITB.
28		Taxation	<p>UN and its subsidiary organs are exempt from all taxes. Therefore, bidders shall prepare their Bids excluding Value Added Tax (VAT). It is the Bidder's responsibility to learn from relevant authorities (Ministry of Finance) and/or to review/confirm published procedures and to consult with a certified financial consultant as needed to confirm the scope and procedures of VAT exemption application as per VAT Law, Ministry of Finance's General Communiqués. The Contractor to be selected shall not be entitled to receive any amount over its Bid price in relation to VAT, Special Consumption Tax and any other applicable taxes.</p>

SECTION 4. EVALUATION CRITERIA

Preliminary Examination Criteria

Bids will be examined to determine whether they are complete and submitted in accordance with ITB requirements as per below criteria on a Yes/No basis:

- Appropriate signatures
- Power of Attorney
- Minimum Bid documents provided
- Bid Validity
- Bid Security submitted as per ITB requirements with compliant validity period

Minimum Eligibility and Qualification Criteria

Eligibility and Qualification will be evaluated on a Pass/Fail basis.

JV/Consortium/Association are not eligible to submit a Bid in response to this ITB.

Subject	Criteria	Document Submission requirement
ELIGIBILITY		
Legal Status	Vendor is a legally registered entity.	Form B: Bidder Information Form
Eligibility	Vendor is not suspended, nor debarred, nor otherwise identified as ineligible by any UN Organization or the World Bank Group or any other international Organization in accordance with ITB clause 3.	Form A: Bid Submission Form
Conflict of Interest	No conflicts of interest in accordance with ITB clause 4.	Form A: Bid Submission Form
Bankruptcy	Has not declared bankruptcy, is not involved in bankruptcy or receivership proceedings, and there is no judgment or pending legal action against the vendor that could impair its operations in the foreseeable future.	Form A: Bid Submission Form
Certificates and Licenses	<ul style="list-style-type: none"> ▪ Power of Attorney ▪ Official appointment as local representative, if Bidder is submitting a Bid on behalf of an entity located outside the country 	Form B: Bidder Information Form
QUALIFICATION		
History of Non-Performing Contracts²	Non-performance of a contract did not occur as a result of contractor default for the last 3 years. (reference period to be taken into account: from November 12, 2015 to November 12, 2018)	Form C: Qualification Form
Litigation History	No consistent history of court/arbitral award decisions against the Bidder for the last 3 years. (reference period to be taken into account: from November 12, 2015 to November 12, 2018)	Form C: Qualification Form

² Non-performance, as decided by UNDP, shall include all contracts where (a) non-performance was not challenged by the contractor, including through referral to the dispute resolution mechanism under the respective contract, and (b) contracts that were so challenged but fully settled against the contractor. Non-performance shall not include contracts where Employers decision was overruled by the dispute resolution mechanism. Non-performance must be based on all information on fully settled disputes or litigation, i.e. dispute or litigation that has been resolved in accordance with the dispute resolution mechanism under the respective contract and where all appeal instances available to the Bidder have been exhausted.

Previous Experience	Minimum five years of relevant experience.	Form C: Qualification Form
	The Bidder must have successfully completed, as the prime contractor , minimum one works contract with the scope of construction of municipal water and/or waste water treatment plant, and a minimum value of USD 3,500,000 over the last five years. (reference period to be taken into account: from November 12, 2013 to November 12, 2018)	Form C: Qualification Form
Financial Standing	Minimum average annual turnover of USD 8,000,000 for the last 3 years. (2015,2016,2017)	Form C: Qualification Form
	Bidder must demonstrate the current soundness of its financial standing and indicate its prospective long-term profitability.	Form C: Qualification Form
Technical Evaluation	The technical bids shall be evaluated on a pass/fail basis for compliance or non-compliance with the technical specifications identified in the bid document.	Form D: Technical Bid Form
Financial Evaluation	Detailed analysis of the price schedule based on requirements listed in Section 5 and quoted for by the bidders in Form E. Price comparison shall be based on the total estimated price for all the quantities set out in the Bill of Quantities.	Form E: Price Schedule Form

SECTION 5A: SCHEDULE OF REQUIREMENTS AND TECHNICAL SPECIFICATIONS/BILL OF QUANTITIES

Unless otherwise stipulated in the related sections of technical specifications, the following sections shall take precedence over one another in the following order in terms of technical specifications/requirements;

- 1) Section 5A.2 Specifications for Items/Pose Definitions
- 2) Section 5A.3 Design Drawings
- 3) Section 5A.1 Statement of Works/Technical Specifications

SECTION 5A.1 STATEMENT OF WORKS / TECHNICAL SPECIFICATIONS

1. GENERAL

1.1. INTRODUCTION AND BACKGROUND

UNDP Turkey has repositioned to contribute through four areas: 1) Inclusive and Democratic Governance (IDG); 2) Inclusive and Sustainable Growth (ISG); and 3) Climate Change and Environment (CCE); and 4) Syria Crisis and Resilience Response. In addition to these areas, UNDP Turkey is emphasizing the role of Strategic Partnerships that cut across the entire country programme regionally as well as globally.

As of November 2017, Turkey hosts over 3,2 million Syrian refugees. Syrian refugees are mainly located in the Southeast Anatolia region bordering Syria, but as the crisis continued, the population has expanded to other regions as well. Turkey hosts the largest refugee population in the world and has demonstrated strong national ownership of the response. The Government of Turkey provides a rights-based legal framework through the Temporary Protection regulation, which offers access to education, health care, employment and social security to Syrians. According to the Government of Turkey, it spent 30 billion USD over the last 5 years on the response to the Syria crisis.

Currently, out of the 3,2 million registered Syrian refugees, more than 2,6 million refugees live amongst Turkish host communities. 45% of the 3,2 million refugees are concentrated in 4 provinces in the South East. Within these provinces, there are four municipalities in Turkey that are particularly impacted, each hosting more than 100,000 Syrians. In these cities, the ratio of the Syrian population to that of host communities is higher than 15%, including Kilis, Hatay, Gaziantep and Şanlıurfa. Populations have either reached or exceeded 2023 population projections. Kilis, for instance, hosts almost as many Syrian refugees as its local population.

UNDP supports the Government of Turkey to respond to this large-scale displacement through its Syria Crisis Response and Resilience Programme in Turkey to strengthen the resilience of refugees, host community members, local municipalities and relevant national institutions to cope with and recover from the impact. UNDP's resilience response strategy is to invest in existing national and local systems to ensure they can adequately serve both host and refugee communities.

As part of this programme, UNDP will implement the EU-UNDP Turkey Resilience Project (2018-2019) (hereinafter referred to as 'the Project'), funded by the EU Regional Trust Fund in response to the Syrian crisis (EUTF Fund). The Project consists of three main components: Component 1 on Employment Creation, Component 2 on Municipal Service Delivery and Component 3 on Adult Language Training. The overall budget for the Project is 50 million euros to be implemented in 2018-2019.

UNDP uses a resilience-based development approach which focuses on investing in existing national and local systems to ensure they can adequately serve both host and Syrian communities. One of the aimed outcomes of the resilience response under Component 2 is to strengthen infrastructure capacities of the Municipalities by construction of waste water treatment plant. Within that scope, a waste water treatment plant will be constructed in Hassa District of Hatay, Turkey.

1.2. DEFINITION AND SCOPE OF THE CONTRACT

1.2.1. Definition

This contract comprises construction of the complete wastewater treatment plant to serve 40,000 p.e in Hassa District of Hatay, Turkey, including the supply and installation of electrical and mechanical equipment

and all auxiliary facilities for the operation of the plant. The wastewater treatment plant will be an activated sludge plant for nitrogen removal and shall produce stabilized sludge. Sludge stabilization shall be either accomplished within the activated sludge tanks as part of the extended aeration process.

1.2.2. Scope of Works

The works mainly consist of:

- Excavation and filling for all designed structures according to the site excavation plan,
- Engineering designs for wastewater treatment plant if required by this statement of works,
- Construction of the complete wastewater treatment plant including the supply and installation of electrical and mechanical equipment and all auxiliary facilities for the operation of the plant,
- Testing, start-up and trial operation and commissioning of the plant,
- Providing all "as-built drawings", operation manuals and all summary tables of laboratory results at the end of the Works, fully describing the finalized Permanent Works,
- Training of operational staff,
- Operation of the wastewater treatment plant for 12 months period,
- Execution of any outstanding work and all such works of repair, amendment, reconstruction, rectification, and making good defects, imperfections, shrinkages or other faults required by Engineer during the Defects Liability Period for 12 months period.

The works shall be executed under this contract, as mentioned in detail, in the Technical Specifications and on Drawings, together with all related civil works. In all construction and manufacturing, the provisions of the Technical Specifications and Drawings shall be obeyed.

Before erection/installation for all materials, the contractor shall request prior approval from the Engineer.

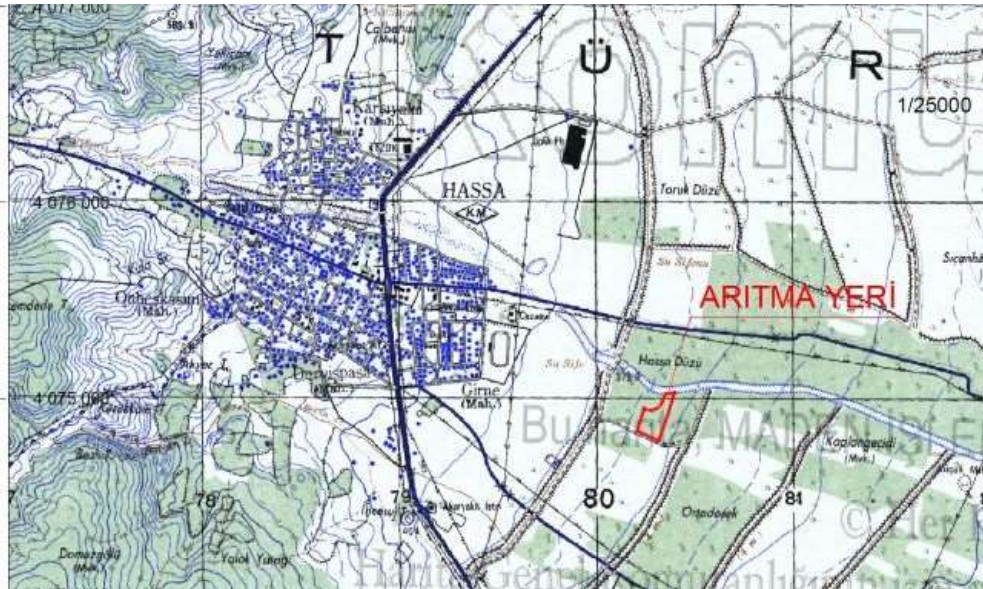
All measurements given on the drawings shall be checked on-site by the Contractor. The Contractor shall prepare the shop drawings accordingly and get the approval of the Engineer before starting the construction.

The Contractor shall be responsible for taking all the necessary health & safety measures according to the relevant legislations until the taking over of the works by the Employer.

The Contractor shall prepare shop drawings and as-built drawings for Engineer's approval, during the execution of the relevant stages of permanent works. The Employer and/or Engineer may request variations and/or additional works to be designed by the Contractor. The variations or new design works shall be carried out in accordance with the provisions of Technical Specifications and subject to Engineer's approval.

1.2.3. Construction Site

Construction site is 27,000 m² located within the borders of Hassa District of Hatay, Turkey.



1.3. SPECIFICATIONS AND STANDARDS

Equivalency of Standards and Codes

Wherever reference is made in the Contract to specific standards and codes to be met by the goods and materials to be furnished, and work performed or tested, the provisions of the latest current edition or revision of the relevant standards and codes in effect shall apply, unless otherwise expressly stated in the Contract. Where such standards and codes are national or related to a particular country or region, other authoritative EU standards that ensure substantially equal or higher quality than the specified standards and codes should be acceptable subject to the Engineer's prior review and written consent. Differences between the standards specified and the proposed alternative standards shall be fully described in writing by the Contractor and submitted to the Engineer at least 28 days prior to the date when the Contractor desires Engineer's consent. In the event the Engineer determines that such proposed deviations do not ensure substantially equal or higher quality, the Contractor shall comply with the standards specified in the documents.

During the implementation and management of all issues of the Works; the standards, specifications and principles listed in articles 2.1 and 2.2 below shall be adhered to in the management, design, construction, testing and acceptance and commissioning of all works.

1.3.1. Standards

The Contractor shall comply with the last updated editions of the following standards, in the order of precedence as listed, in the design, implementation, testing, acceptance and operation of all works within the scope of the tender. In circumstances for which there is no description in the following standards, it shall be permitted to use the last updated editions of other national and international standards on condition that the Engineer accepts.

- a. Turkish Standards (TS),
- b. European Norm (EN),
- c. International Standards Organization (ISO),
- d. Deutsches Institut für Normung (DIN),
- e. British Standards (BS)
- f. Union International des Chemins de Fer (UIC)

1.3.2. Legislation

The Contractor shall execute and complete the Works in strict accordance with applicable legislation of Turkey.

1.3.3. Specifications

The Contractor shall execute and complete the Works in strict accordance with the last updated editions of;

- Technical Specifications approved and published by İller Bankası A.Ş.
- Republic of Turkey Ministry of Environment and Urbanization "Construction Works, Civil, Mechanical Works and Electrical Works General Technical Specifications"
- Republic of Turkey General Directorate of Highways "Highways Technical Specifications"
- Union of Chambers of Turkish Engineers and Architects, Chamber of Landscape Architects Publication; Technical Specifications for Landscape Works

1.4. SITE

Refer to provisions stipulated in Clauses 11, 32, 33, 37, 39, 41 and Sub-Clauses 6.2, 34.2 of the General Conditions of Contract.

1.4.1. Arrangement of the Site

The ground levels of the Site shall not be changed without the permission of the Engineer and no infrastructure, structure or tree shall be removed or permanent structure shall be built without the Engineer's prior approval.

The Contractor shall construct temporary parking areas, loading and unloading areas, open storage areas, approach and internal roads, temporary facilities to facilitate its methodology and order of construction of the Works.

The Contractor shall immediately remove all of the temporary buildings after the completion of the work and deliver the areas clean, orderly and in a condition to be approved by the Engineer.

1.4.2. Site Requirements

Provision of all the necessary utility requirements on site, such as electricity, water, gas, etc. during the execution of the works shall be under the responsibility of the Contractor.

Application to the relevant authorities for subscription to provide utility connections shall also be under the responsibility of the Contractor. All costs of the consumptions on site shall be covered by the Contractor.

Any temporary fencing used by the contractor to protect the works shall be appropriate for the task to keep the public from danger and protect the workers.

The Contractor shall erect such fencing as soon as he is given possession of the relevant portion of the Site. The Contractor shall regularly inspect and maintain all such fencing, any defects being made good without delay.

Access shall be provided in temporary site fencing as necessary for the use of the occupiers of adjacent properties.

Temporary site fencing shall remain in position until the Works are sufficiently completed to enable that portion of the Site to be brought into use without danger to the public.

1.4.2.1. Site Temporary Buildings

The Contractor shall supply offices, dining halls and accommodation places for his own personnel, Subcontractors, the Employer and the Engineer and furnish and maintain these places.

The office of the Contractor shall be a building that he shall use as headquarters during the realization of the Works with necessary offices, service rooms and meeting halls. All notifications and other correspondence relating to the Contract by the Engineer to this office shall be deemed to have been made to the Contractor

For details, please refer to Section Article 1.9 below– Accommodation for the Engineer

1.4.2.2. Temporary Water Supply

The Contractor shall supply and distribute water both for the personnel and for the Works. All of the piping, storage and similar main and intermediate systems shall be established in accordance with drawings and specifications. In the event that the municipal water supply is not available in sufficient amounts or pressure, additional supplies shall be provided by the Contractor.

It is the responsibility of the Contractor to provide all necessary back-up, maintenance and repair works for the uninterrupted supply of water sufficient for construction of the Works.

1.4.2.3. Temporary Electricity and Gas Supply

Provision of all the necessary utility requirements on site, such as electricity and gas, etc. during the execution of the works shall be under the responsibility of the Contractor.

The Contractor shall be required to make all necessary arrangements with relevant local authorities and/or owners/occupiers of the properties in order to obtain the supply of necessary utilities and cover the expenses for supplying and consuming these services, where necessary.

The Contractor shall provide connection to the site from a suitable point.

The Contractor is obliged to take all precautions for the safety of employees and third parties both in the supply and distribution of the energy. It is the responsibility of the Contractor to provide all necessary back-up, maintenance and repair works for the uninterrupted performance of the temporary electrical supply.

The Contractor shall take necessary measures related to the unexpected cuts off of these services.

1.4.2.4. Temporary Communication System

The Contractor shall provide all necessary arrangements for bringing separate telephone lines to his offices in the site and to the offices of the Employer and the Engineer. The Contractor shall supply and install all

necessary equipment in this regard. The Contractor shall provide all the maintenance necessary for the uninterrupted performance of telecommunications.

1.4.2.5. Temporary Sanitary Installation, Cleaning

The Contractor shall clean the site when necessary and in such a way as to preserve it in a hygienic state and shall comply with the relevant laws and instructions of the Engineer.

The Contractor shall establish temporary sanitary facility in the site in order to meet the requirements for the working personnel. For this purpose, the Contractor shall supply flushed W.C., hot water and shower and toilets in suitable places on the site. Domestic water connections of facilities shall be protected against frost. Sewerage drains shall be connected to the sewerage network as much as possible. In the event that this is not possible, connection shall be made to cesspools built in accordance with national specifications. Cesspools shall be drained at suitable intervals.

1.4.2.6. Employer's Equipment and Free-issue material

There is no Employer's Equipment available for the use of the Contractor in the execution of the Works.

Free-issue materials are not available on behalf of the Employer.

1.4.2.7. Project Sign Board

The Contractor shall at his own cost supply, erect and maintain 1 signboard (size 2.5 m x 3 m) at locations to be determined by the Engineer on which the names and information asked by the Engineer. The design of the sign board requires the prior approval of the Engineer and the Employer.

1.4.2.8. Plant and Temporary Works

The property of all structures, materials, vehicles, tools and equipment supplied and established by the Contractor for the performance of the Work belongs to the Contractor.

Temporary facilities shall be removed within the time and method to be decided by the Engineer after Substantial Completion and their places shall be cleared. Fences, billboards, etc. that have been removed temporarily shall be placed again.

1.4.2.9. Protection of Existing Structures and Utilities

The Contractor shall assume full responsibility for the protection of all buildings, structures, and roads existing in the area of the construction site, public or private, whether or not they are shown on the drawings. Any damage resulting from the Contractor's operations shall be repaired at his expense.

The Contractor shall take all necessary precautions to avoid causing any unwarranted damage to roads, lands, properties, trees and other features and, during the Contract, shall deal promptly with any complaints by owners or occupiers.

Where any portion of the Works is close to, across, or under any existing apparatus of Statutory Undertakers, the Municipality or other parties, the Contractor shall temporarily support and work round, under or adjacent to all apparatus in a manner designed to avoid damage, leakage or danger, and to ensure uninterrupted operation.

Should any leakage's or damage be discovered, the Contractor shall at once notify the Employer and the Statutory Undertaker, Municipality or owner concerned, as appropriate and the Contractor shall afford every facility for the repair or replacement of the apparatus affected.

Building interiors shall be adequately protected during the course of the works to ensure that they remain water-tight.

The Contractor shall adequately safeguard the buildings affected by the works against damage and theft.

All electrical installations shall comply with the relevant national regulations and shall be safe for the Contractor and members of the public. All Works shall be illuminated when daylight deems to be insufficient.

Before commencement of works nearby the existing structures preconstruction photos shall be taken.

1.5. CONTRACTOR'S KEY PERSONNEL

The Contractor shall employ following key personnel with qualifications listed below on site in line with Programme of Work.

Project Manager/Construction Manager: English speaking, minimum 5 years' experience in construction of any kind of structure and degree in civil engineering or architecture.

Site Works Manager: English speaking, minimum 3 years' experience in construction of any kind of structure and degree in civil engineering or architecture.

Electrical Engineer: Minimum 3 years' experience in construction of any kind of structure, and degree in electrical engineering.

Mechanical Engineer: Minimum 3 years' experience in construction of any kind of structure and degree in mechanical engineering.

QA/QC Engineer: English speaking, minimum 3 years' experience in construction of any kind of building and relevant degree.

1.6. PLANT

The contractor shall ensure availability of the followings on site in line with Programme of Work.

Equipment	Specifications (minimum)	Minimum number of Quantity
Excavator	90 hp	1
Truck	15 tons	2
Compressor	180 hp	1
Power Supply Generator	250 kVA	1
Crane	40 tons	1
Roller Compactor	n/a	1
Loader	n/a	1
Grader	n/a	1
Concrete Vibrators	n/a	4
Scaffolding	n/a	3.000 m2
Water Tank	20 tons	1
Panels for Power & Lighting	n/a	4

1.7. MATERIALS

1.7.1. Conditions for Materials and Equipment

Materials and equipment within the scope of the Work shall comply with the conditions stated in the Technical Specifications. Materials and equipment proposed to be used by the Contractor and which have not been specified shall only be incorporated in the Works after their equivalence with the Technical Specifications has been verified and approved by the Engineer.

Any material or equipment proposed by the Contractor for substitution from that specified shall be subject to prior approval of the Engineer.

1.7.2. Storage Facilities

The Contractor shall establish open and closed storage places in suitable and sufficient extent at his own expense for the storage of materials and equipment in the site. The Contractor is obliged to take all necessary protective precautions against damage, contamination inclement weather and theft.

1.7.3. Terms of Transportation

All of the materials and equipment shall be packaged in such a way to facilitate transporting in and out of the storage and to the Work Place and to be protected against damage.

Materials and equipment shall be loaded on vehicles in conformity with international transportation rules. During transportation, all necessary additional precautions shall be taken, and adequate transportation insurance shall be provided at the sole responsibility and cost of the Contractor.

1.8. SETTING - OUT

All necessary application, measurement and instrumentation processes and equipment necessary for construction of the Works and for preservation of the environment in the vicinity of the Works are the responsibility of the Contractor at his own expense.

1.8.1. Application Works

The Contractor shall prepare application drawings showing the setting out of the structures on the site and based on the reference points and levels given in the Drawings and submit to the Engineer for approval. The accuracy of the setting out shall be the sole responsibility of the Contractor.

For application and measurement processes; the Contractor shall:

- Employ qualified and experienced land surveyors.
- Use modern type and high-quality topography devices suitable for the works.
- Inspect and have certified the necessary topographical devices at least once every six months.

1.8.2. Other Measurements for Site Inspection

The Contractor shall conduct any kind of measurement necessary for the determination of water, ground, seismic events and movements that might be caused by the aforementioned, which is related to the construction and the environment. These measurements shall be conducted in methods and at locations, which shall assist in execution of the project in line with Technical Specifications and in taking the corresponding precautions, which may damage the structures.

Within the frame of the aforementioned measurements, including but not limited to the following, fixed and moving measurement devices shall be supplied and installed by the Contractor in order to:

- Determine the ground movements that might occur due to various reasons and the movements that these shall cause in current structures and excavation supporting systems,
- Determine the vibrations and movements due to explosion, pole and sheet pile driving and earthquake and also determine the effects of these on the current structure and also structure and excavation supporting systems,
- Determine excessive rain condition and underground water movements.

Measurement devices, which are subject to the approval of the Engineer, supplied by the Contractor shall have the quality for correct reading.

The Contractor shall conduct correctly and fully:

- Placement and usage of devices,
- Recording and evaluating the measurements,
- Determination of device's lack of adjustment and ensuring their adjustment.

The Contractor's staff for measurements shall be subject to the approval of the Engineer as well.

The Contractor shall prepare and submit a Measurement Plan to the Engineer for approval in relation to the measurements including:

- Purposes of utilization of fixed and moving measurement devices, places of their settlement or points of measurement,
- Qualities and technical specifications of all measurement devices
- Reading, evaluation and reporting periods in ordinary situations,
- Any kind of determination before construction related to current structures.

In the event of detection of extraordinary events as a result of readings and evaluations, the decisions such as appropriate permanent and temporary precautions or ceasing the operations in the region shall be taken together with the Engineer and shall be implemented immediately. In the event that values are at levels affecting the calculation criteria, safety at work shall be taken into account and project shall be changed.

This measurement shall be done in case the Engineer needs them and the Engineer will give instruction to the Contractor and the Contractor shall apply them in his cost.

1.9. ACCOMODATION FOR THE ENGINEER

Before commencing the Contract, the Contractor shall supply and erect on the site an office of a minimum 10 m2 room for the exclusive use of the Engineer at a location to be agreed with the Engineer. This office shall be provided for the total construction period.

The washroom shall be provided with a washbasin, hot and cold-water supplies and a flush operated WC connected to the existing sewer. The Contractor shall be responsible for the security of the Engineer's office and all equipment therein until the office is finally closed.

The Contractor shall maintain, light, heat/cooling and clean the office for the duration of the contract. The Contractor shall be responsible for the insurance of the office for the duration of the contract. The Contractor shall insure the office and the contents provided by him, against fire, burglary and other risks ordinarily insured against during the period of the Contract.

Material	Quantity
Working Table	3
Director Chair	3
Guest Chairs	5
Design Review Table	1
Telephone Machine	3

The electricity, water supply, and maintenance costs of this office shall be met by the Contractor(s) until substantial completion of the Works.

All facilities shall be approved by the Engineer. The Contractor shall ensure that all equipment is kept in good condition and shall repair or replace, as directed by the Engineer, any equipment that becomes unserviceable.

1.10. COORDINATION

The Contractor is responsible for ensuring all coordination necessary for the execution of the work in accordance with the quality, cost and timing objectives foreseen by the Employer at the beginning of the work.

The Contractor shall prepare a Critical Path Method (CPM) work schedule, inspect the schedules according to the project timeframe, check the integrity of the schedules between infrastructure, superstructure constructions, electrical and mechanical works, combine the schedules and submit to the Engineer for approval.

The Contractor shall be responsible for ensuring administrative and technical coordination with the Employer, the Engineer and other parties who might directly affect the works along with the following parties who might have indirect effect:

- a. Relevant official institutions and organizations,
- b. Other authorized persons, institutions and organizations

1.11. CONTROL AND EXAMINATION OF MATERIALS AND EQUIPMENT

If the Engineer requests, s/he sends his own members to the project offices, factories of the Contractor and to factories of its subcontractors for the technical control and examination of the material and equipment, production in factories and for their participation in the project works. Any such visits, if required, are deemed to be additional to FAT (Factory Acceptance Test). The Contractor will inform the Engineer about the date when the material is ready for examination and request personnel. Examination personnel of the Engineer will be present in the construction, mounting of production parts, mounting of main groups and trial works, and will prepare the joint examination report as a result of the control.

FAT shall be organized by the Contractor. The Contractor will propose a program and a testing procedure to be approved by the Engineer. The Contractor and the Engineer shall attend the FAT in accompany with the End Recipient and at the end of the FATs, materials and equipment will be delivered on basis of the FAT Report signed by the Engineer. If the members of the Engineer are not present at the agreed date, Contractor

will consign the materials and equipment's based on the examination and reports of manufacturing factory 14 days after the technical control date specified.

The Engineer will inform arrival date of the personnel or whether or not joint acceptance of the material is necessary and its term within 10 days after the Contractor gives notice.

Control made in the factory is final in terms of the quality Material, of which its examination is realized by the personnel of the Employer or Implementing Partner in the factory or delivered together with the factory test reports, is controlled only for its quantity as soon as possible after its arrival to the port, where deemed necessary if imported from abroad, and the construction site. The Contractor may provide one personnel in the control made for the quantity.

As a result of the control and counting of the material, replacement of materials, which are not in compliance with the quality identified in the specifications, are malfunctioned, deficient or sent by mistake, will be realized and delivered to the buyer within 30 days (this term will be determined mutually, when special manufacturing is necessary) and all expenditures made. Otherwise, the Employer will procure these, and collect all expenditures from the receivables or performance security in the Employer.

1.12. OBTAINING OF RELEVANT APPROVALS AND CERTIFICATES

The Contractor shall obtain all relevant approvals and certificates from local Authorities regarding construction and operation of the Plants in the site.

Permits, license and approval costs which are required by the Turkish laws/regulations will be determined by the relevant local authorities.

1.13. AS-BUILT DRAWINGS AND OPERATION & MAINTENANCE MANUALS

This part of the Specifications covers the "As-built Drawings" to be prepared by the Contractor including Operation and Maintenance Manuals of the Plant incorporated in the Permanent Works. Three complete draft sets of prints of Drawings showing all Works exactly as made shall be submitted to the Engineer for approval within one month of the substantial completion of the Works on site.

The Contractor shall record all information necessary for preparing as-built drawings during the execution of the Works on the Sites. Neatly marked-up drawings and other documents covering the Permanent Works as completed shall be available to the Engineer at any time during construction.

Marked-up drawings shall be kept up to date and submitted monthly to the Engineer for approval, as the Works are completed. Submission shall be in hard copies.

The Contractor shall submit complete sets of instructions and manuals to Engineer for approval describing the installed Plant in order to facilitate operation and maintenance, together with the "As-built Drawings". The documents shall include but not be limited to:

- Layout drawings
- Schematic cabling diagrams
- Detailed descriptions
- Specific operation instructions
- Specific maintenance instructions
- Detailed record of all types of tests
- Component list specified for all installed Plant.
- Identifications of key design elements, systems and materials that are critical to long-term quality and performance of your project: e.g. exterior wall and roof materials, windows, exterior doors, landscaping, key mechanical equipment.
- Developing or collecting available operation and maintenance information/manuals on each of these components. (Much of this information will already exist and simply needs to be assembled.)
- Ensuring all materials, as-built drawings, final finish schedules and plans, and all warranties, guarantees and certifications – that are contractually owed to contractor are collected from contractor's design team before final payments are made.

All information in these manuals shall apply specifically to the Plant and equipment being supplied, and they shall be free from irrelevant matters such as might be contained in the manufacturer's general literature.

The as-built documentation shall include all architectural and engineering disciplines including architectural/ structural, electrical and mechanical drawings, and operation and maintenance manuals. Final version of as-built drawings in two hard copies and one electronic (in Auto CAD and Microsoft Word, Excel, etc) copy of each document shall be provided together with the notice for substantial completion incorporating Engineers' comments and all the modifications/revisions effected during construction. Operation and maintenance manuals shall be provided in Turkish.

All material except drawings shall be A4 size. Drawings shall be on international A size sheets, and drawings shall be marked as "AS-BUILT".

1.14. IMPLEMENTING PARTNER AND FINAL BENEFICIARY

The Contractor shall establish coordination with implementing partner of the project, namely **ILLER BANK** and final beneficiary, namely General Directorate of Hatay Water and Sewerage Administration, **HATSU**. If deemed necessary by Employer, the representatives of implementing partner and final beneficiary may participate meetings, tests on completion, acceptance and inspection of materials and equipment etc.

The representatives of the implementing partner and final beneficiary have right to access to site to monitor the progress of work, compliancy of the work to the requirements of the contract. The Contractor shall ensure their access to site at any time requested by them. However, they have no legal power in terms of contract terms and conditions.

2. PROJECT CONTROL DOCUMENTS

2.1. PROJECT MANAGEMENT

2.1.1. Project Management Obligation

The Contractor shall be responsible for effectively managing his efforts in carrying out the requirements of this Contract.

The Contractor shall be responsible for the management, performance, monitoring and coordination of the whole project in order to fulfil all requirements of the Contract and those given in Technical Specifications.

The Contractor's management obligations shall include the efficient planning of work to be performed in cooperation with the Engineer and Employer along with their appointed representatives to ensure project progress visibility.

2.1.2. General Requirements

The Contractor shall establish a project organization in accordance with requirements included herein, having the necessary resources, qualification and experience to fulfil all the Contractor's obligations.

The Contractor shall unambiguously define the tasks, responsibilities and authorities of each individual role within the organization, at least at the management and team leader level.

The project organization shall have clear and well-defined command lines and channels for reporting, within and outside the project organization.

The Contractor shall describe which parts of the Contractor's organization are used for staffing the project, and how the project organization aligns with the Contractor's main organization.

The Contractor shall describe the support functions, which are available for the project organization in the Contractor's main organization and how such resources are put to the disposal of the project.

The Contractor shall describe the organizational interfaces towards any sub-contractor and supplier that shall be in or outside the project organization. Such interfaces shall provide a clear reference between the project management level within the Contractor's and the sub-contractor's/Supplier's organizations.

The Contractor shall appoint key staff members, and these shall to the highest possible extent remain unchanged by the Contractor for the entire project.

Any later changes in such appointments shall be informed to and approved by the Engineer and shall be argued by the Contractor in order for the Engineer to assess the reasons and likely impact of such change.

The Contractor shall, unless this is not within the power of the Contractor, ensure that existing staff remains until suitable and acceptable replacements have been found.

2.1.3. Programme of Work

The programme of work shall comprise following as minimum:

- The proposed location of office on the site, stations (steel/concrete structures), warehouses, accommodation, etc. (sketches to be attached as required).
- A brief outline for completing the works in accordance with the required method of construction and stated time of completion
- A critical milestone bar chart (schedule of execution) representing the construction programme and detailing relevant activities, dates, allocation of labour and plant resources, etc.
- If the tenderer plans to subcontract part of the works, he must provide the following details:
 - Details of work to be subcontracted,
 - Name and details of subcontractors,
 - Value of subcontracting,
 - Experience of subcontractor in similar work.

2.1.4. Project Manager Responsibilities

The Contractor shall define a project management team and shall appoint a Project Manager in charge of the entire project.

The Contractor shall allocate the necessary competence and authority to the Project Manager, entitling the Project Manager to make decisions related to all aspects of the day-to-day management of the project.

Any restriction in the Project Manager's rights in this respect shall be clearly identified and described. Such restriction shall not impose management difficulties upon the project.

All official communication between the Engineer/ the Employer and the Contractor shall be passed through the Contractor's Project Manager.

The Contractor shall prepare and submit to the Engineer a list of the following Contractor's key personnel (names and CVs)

- Contractor Project Manager
- Contractor Chief Engineers Responsible for Civil Works
- Contractor Chief Engineers Responsible for Electrical Works
- Contractor Chief Engineers Responsible for Mechanical Works
- Quality Control and Quality Assurance Managers
- Contracts and Financial Manager

2.1.5. Engineer's Involvement

For the execution of this project, the Engineer reserves the right to be assisted by other agencies for technical, operational and contractual matters.

The Contractor shall establish a close coordination with the Engineer for the development of all planning activities related to the project, and shall forward relevant plans, procedures etc. for review and approval, prior to putting such plans or procedures into force.

Engineer's duties and responsibilities are defined within the UNDP General Conditions of Contract for Civil Works.

2.1.6. Project Plans

The Contractor shall prepare the following Project plans, which shall be reviewed and approved by the Engineer:

- a) Authority Liaison and Permitting Plan with Manual and Schedule
- b) Project Management Plan, including Work Breakdown Structure and Risk Management Plan
- c) Quality Control and Quality Assurance Plan
- d) Safety Management Plan
- f) Training Plan
- j) Documentation Plan
- k) Operation and Maintenance Manual
- l) Spare Parts Management Plan

The Contractor shall as far as possible align the planning of the Engineer involvement to the Engineer's possibilities in regard to:

- Staffing
- Resources available
- Co-ordination needs with other projects.

In co-ordination with the Engineer, the Contractor shall also unambiguously define which information is required from the Engineer and when during development and testing.

In addition, the Contractor shall prepare method statements for each activity. Any site activity (excavation, filling etc.) can be start after the approval of the method statements by the Engineer.

2.1.7. Project Management Plan

The Contractor shall establish a management system to plan, organize and control the administrative, technical and financial aspects of the project which will ensure the timely, efficient and cost-effective completion of this Contract's requirements and provide the Engineer and the Contractor with program progress visibility.

The Contractor's Management system shall establish:

- An agreed plan for orderly and effective project implementation;
- Rapid and accurate procedures to provide reports on progress and problems in all areas
- Effective decision-making processes with clear provision for the Engineer's participation as required; and
- Appropriate resource designation with necessary authority to control the achievement of the program.

As part of the contract, the Contractor shall deliver to the Engineer the license to use the management tools for the duration of the project.

The Engineer may wish to conduct an audit of the project management systems to be used during the project implementation. The Contractor is required to provide Engineer's authorized representatives with access to the information and supporting documentation necessary to demonstrate compliance with the project management and reporting requirements of the contract.

2.1.8. Reporting and Reports

The Contractor shall ensure that the Engineer and the Employer are kept informed about the status of all areas within the project, and as a whole ensure that the Engineer can maintain a complete and detailed knowledge of the project.

The Contractor shall provide progress reports to the Engineer describing, but not limited to, achievement, problems, risks and containing updated schedules, WBS, cost/schedule control reports, status of contract variation proposals, and other data which are required for the efficient management of the project.

The Contractor shall agree with the Employer dates for the submission of monthly Progress Reports. These reports shall normally be submitted no later than 7 working days after the completion of each month.

Such reports shall provide information on the status of the Contract, and/or on any matters that could interfere with the timely achievement of any aspect of the Contract and the steps proposed by the Contractor to remedy such matters. The progress report will have minimum the following contents:

- Project progress
- * Project management overview. Describes major results achieved, problems that have occurred, and corrective action that has been taken or is planned for solving the problems.
- * Technical status: Identifies detailed status, including requirements definition status, design and development progress, problems encountered, corrective actions taken, and a summary of outstanding and approved change items during the period.
- * Quality follow-up: Describes activities of the quality assurance program
- Project Schedules: Shows activities completed (e.g., milestones and deliveries), status of ongoing activities, schedule changes (if any). This section also identifies the outlook for the next three months with an assessment of the major activity completion dates.
- Action item status: Describes outstanding action items and action items that have been closed during the reporting period.
- Risk assessment: Presents the current critical paths, critical activities, and technical risk, including assessment, impact, and containment plans.

2.1.9. Action Items Management

The Contractor will generate action items throughout the Works life cycle, either at formal reviews and project progress meetings, or as issues arise during Works development.

The Contractor shall record and track all action items relating to schedule, technical issues, subcontractor problems, or the Engineer's concerns. The project managers will assign action items to the person responsible for resolving the issue.

Action items list and status shall be attached to the Progress report and shall be issued by the Contractor on request from the Engineer. The list shall at least include following information:

- Action item description

- Person in Charge
- Due Date
- Status

2.1.10. Meetings

2.1.10.1. Progress Meetings

Progress meetings will be held at the times indicated on the progress chart (at least every 1 months, unless agreed otherwise), and will take place at location, which shall be proposed by the Contractor and approved by the Engineer.

The following persons shall be present at progress meetings:

- The Contractor's representative (i.e. the project manager)
- The representatives of the Employer, the Engineer and the Implementing Partner.
- Any other persons whom the above representatives consider should be present in an assistant/consulting capacity.

The major items to be addressed in the progress meetings are those identified for the progress reports and any other items, which are deemed necessary by the Engineer, the Implementing Partner or the Contractor.

The Contractor shall prepare an agenda and forward it to the Engineer no later than 1 week prior to each meeting for review and approval.

Progress meetings will be chaired by the Engineer's Project Manager or his deputy and will be held at the Engineer's offices or as otherwise agreed.

The Contractor shall prepare and produce the minutes. Draft minutes will be ready at the end of meetings and reviews. Minutes signed by the Engineer and the Contractor shall be attached to the contract file and shall become binding for both parties. All of these proceedings pertaining to progress meetings shall be conducted by the Contractor under the orientation of the Engineer.

2.1.10.2. Weekly Site Meetings

Site Meetings (SMs) will be convened by the Contractor as mutually agreed between the Contractor and the Engineer, during the project to allow discussion on specific aspects of the execution, orientation, future arrangement and coordination of the works and also for briefing. SMs may be held to formalize important technical discussions, generally prior to the Progress Meetings and record information's and recommendations arising from these discussions. Decision shall be normally taken at the Progress Meeting.

SMs will be held at locations to be mutually agreed between the Contractor and the Engineer. The Contractor shall provide SMs with the papers documenting the technical items for discussion and recommendations.

The agenda of SMs shall be determined by the Engineer and the Contractor together. The agenda of SMs shall be notified to the participants at least 2 (two) days prior to SMs in writing and via e-mails. In addition to the Engineer, the Employer and the Contractor, SMs can be attended by supply companies, manufacturer companies, subcontractors and other institutions and organizations related to the works when necessary.

Meeting minutes shall be recorded by the Engineer, kept carefully and these shall be distributed as minutes of SMs to the Employer and the Engineer, participants and also other persons, institutions and organizations to be found necessary by the Engineer. Minutes signed by the Engineer and the Contractor shall be attached to the contract file and shall become binding for both parties. Minutes shall be forwarded by the Employer and the End Recipient for consideration at the next Progress Meeting. All of these proceedings pertaining to SMs shall be conducted by the Contractor under the orientation of the Engineer.

Electronic mail link will be established between the Project Offices to ease the communications between the Contractor and the Engineer.

The Contractor is also responsible for organizing additional meetings upon the instruction of the Employer or the Engineer.

2.1.11. Sub- Contractor Involvement

Generally spoken it is the responsibility of the Contractor that all sub-contractors perform their part of the work in accordance with the rules laid down in the contract between the Employer and the Contractor.

This implies that the sub-contractors are subject to the same Project Management procedures and must follow the same standards as applied by the Contractor. The Engineer has the same rights against any sub-contractor as against the Contractor, but this will not free the Contractor for his responsibility for the work performed by the sub-contractors.

To finish the approval procedure for Sub-Contractors involved by the Contractor within the Project, the Contractor shall provide to the Engineer specified documents for each Sub-Contractor (means Sub-Contractor and Sub-Designer) as stated below.

Registration for chamber of commerce

Trade registry gazette

Criminal records of the responsible people of the Sub-contractor

Delivery statement of previous project accomplished by the sub-contractor

Authorized signatures list

Relevant quality certificates like ISO 9001

No bankruptcy statement given by the commercial record authorities

A summary of the status of Sub-contractor with monthly progress payments needs for hand over to keep overview.

Be aware that this matter is pre-condition of payment for works done by Sub-contractors.

The Engineer shall have the right to disapprove a proposed sub-contractor in case of objective evidence that the sub-contractor cannot comply with requirements within this contract, that be related to the delivery or the Project Management and Quality Assurance.

The Contractor shall keep a list of all sub-contractors and suppliers, which are used or are planned to be used within the project and shall forward such list to the Engineer every time it is updated.

The list shall include a precise identification of which parts or components the sub-contractor or supplier in question shall deliver to the Contractor.

The Contractor shall be fully responsible for the work performed by any sub-contractor as for the work performed by the Contractor himself.

2.2. SPECIFIC ON-SITE ACTIVITIES

2.2.1. Management and Planning

The Contractor shall have the full responsibility for the construction, installation and setting up the Works.

The planning of the construction, installation and setting up of the Works shall be developed in close cooperation with the Engineer.

The Contractor shall be responsible for the maintenance and operation of the system during its installation and setting up.

2.2.2. Installation Plan

At each site where installation is going to take place, the Contractor shall prepare an installation plan comprising:

- The Engineer's activities
- Sub-contractor's involved
- Tasks to be performed and who is responsible for each task
- Timing of the tasks
- Documentation of installation (e.g. instructions, specifications and drawings)
- and other information important for the final installation.

The installation plan shall be approved by the Engineer in due time before the final installation

2.2.3. Installation

The Contractor shall, in due time before installation, submit instructions and specifications with detailed information concerning:

- interior

- installation
- cabling, routing, grounding, power, communication
- other topics important for the installation of the Works.

The installation shall take into consideration local legislation, rules and procedures to (i.e.) cabling, power connection and working conditions.

The Contractor shall produce, procure and supply all necessary equipment, tools, etc. consumable as well as non-consumable needed for the installation and setting-up.

2.2.4. Setting up

Setting up covers the activities after the physical installation to adjust and tailor system parameters, fine tuning, etc. to make the system 100% operational.

The Contractor shall specify which procedures will be used to set up the Works.

2.3. SAFETY

The Contractor is responsible for taking all necessary precautions in respect of Works, materials, machinery, equipment and current facilities, persons on site and neighbouring environment. All expenses including indemnities that might arise are the responsibility of the Contractor.

Before the commencement of the Works and site infrastructure survey, The Contractor shall prepare a detailed safety management plan along with safety manuals, in which precautions for the safe performance of Works and methods of actions against unexpected circumstances are specified and submit to the Engineer for approval. This approval does not free the Contractor from his responsibilities related to safety.

The Contractor shall also form experienced safety personnel that shall work 24 hours a day for the maintenance of safety and observation of precautions and for taking additional precautions if necessary. Detailed Safety Management Plan shall be prepared and approved by the Engineer after 28 days of site handover. The Contractor can only start the works on site after the approval of the Safety Management Plan by the Engineer.

2.3.1. Safety of the Construction Site and Periphery

2.3.1.1. Safety Fence

Contractor shall determine the extent of site boundary fencing necessary to protect the site, works, materials, equipment and facilities against unauthorized access and for safety of the public, to control entries-exits and prevent the entrance of unauthorized persons.

There shall be sufficient number of security officers provided by the Contractor at entrance-exit gates and locations where deemed necessary. There shall be adequate night lighting for ensuring supervision of security officers throughout the fence.

2.3.1.2. Fire Protection

The Contractor is responsible for taking necessary precautions for the protection of Works, Temporary Works and any kind of property and person during performance. All of the precautions, including raising the awareness of personnel, and the proceedings to be implemented in the event of a fire shall be determined working closely with the Fire Department.

During the Work, the special additional precautions that might be needed in the following cases shall be taken and implemented:

- Storage of materials that might easily inflame,
- Collection, storage and disposing of inflammable wastes,
- Operations performed with electric-arc welding and oxy-acetylene cutting machines,

In case a fire breaks out, the Contractor shall supply and get ready following equipment:

- Dry chemical powder type fire extinguishers that can be installed to walls, carried manually with nitrogen pressurized in certain places
- Special extinguishing systems in sections where Fire Department can't enter or access easily

2.3.1.3. Warning Marks, Lighting

All of the open excavations, material piles, structures, facilities and equipment that might create hazard shall be surrounded by barricades with appropriate marks with the aim of protecting the employees and other people.

In the same manner, the roads and passages blocked due to Works shall be protected by barricades.

This kind of areas shall be marked with warning plates placed in appropriate distances and attract the attention of people. All of the barricades, obstacles and marks shall be illuminated from dusk to sunrise.

2.3.2. Safety at Work

It is the responsibility of the Contractor to take necessary precautions to prevent accidents that might cause damage to persons, materials, equipment and facilities during the work.

The Contractor shall assign a Safety Team under the leadership of an experienced Safety Manager for any kind of work on safety at work. The primary duties of this team shall include but not limited to:

Training the employees in respect of actions and practices that shall cause accidents or damage, taking precautions in the site that shall at least meet the requirement of "TS 8983 General Safety Precautions that Should be Taken in Structures During Construction", Monitoring whether precautions and warning are obeyed or not,

Taking additional precautions, warning orally, and giving punishment in the event that faults are detected.

Stepping in and performing what should be done in the event of a harmful event.

The Contractor shall carry out the works in accordance with the Turkish Health and Safety regulations.

2.3.2.1. First Aid

Shall be arranged in accordance with the applicable Turkish Health and Safety Regulations.

2.3.2.2. Hazardous Substances

When the following are encountered, Works shall be ceased in the section where the event occurs:

- Buried known or unknown toxic substances,
- Unnaturally coloured ground water or soil,
- Asbestos,
- Volatile organic compounds measured with photo ionization detector,
- Chemical substances or oil products or other similar circumstances that are spilt and spread on the site.

Cleaning of the area in such a way not to damage employees and removal of the hazardous substance shall be performed by an expert team trained and equipped for this kind of works.

2.4. QUALITY CONTROL AND QUALITY ASSURANCE

The Quality Control and Quality Assurance Manager shall be employed after the approval of the Engineer.

2.4.1. Quality Responsibility

All of the Works shall be performed according to the most appropriate engineering practices and standards in respect of construction, material, equipment and workmanship.

It is the responsibility of the Contractor to control the quality of the work and to take samples and carry out necessary tests in respect of achieving conformity with specifications and approved materials at his own expense. A Quality Control and Quality Assurance Manager to be assigned by the Contractor shall be responsible for all phases of quality control and sustain an efficient communication with the Engineer.

2.4.2. Material Quality and Equivalent Materials

All of the materials and equipment supplied to be used permanently within the scope of the works shall comply with current standards and specifications. The products of other Manufacturers instead of determined materials and equipment shall be accepted on condition that their equivalency is approved by the Engineer. In such events, the Contractor shall submit to the Engineer all of the evidences of the equivalency of the new product.

2.4.3. Quality Control and Quality Assurance Plan

After signature of the Contract, the Contractor shall submit to the Engineer a detailed Quality Control and Quality Assurance Plan within 28 (twenty-eight) days for approval. The plan shall cover quality control and assurance of all phases of works on the site.

The plan shall include at least the following items and shall be supported by additional information that might be needed by the Engineer.

The Plan shall cover the quality assurance of all aspects of the Works, and contain, as a minimum, the following items:

- Organization chart for quality control and quality assurance
- List of Contractor's staff to be engaged in quality control and materials testing together with details of their relevant experience
- List of facilities which will be inspected and tested by the Contractor at stages during implementation of the Works as part of his quality control, together with inspection procedures and test types
- Certificates of materials
- Specifications of equipment and work
- Tests
- Relevant certificates on supplied materials
- Detailed checklist for all installations. The checklist shall be for the Contractor's own use, documenting the Contractor's own quality control of the installation.

The Plan may be supplemented with additional items from time to time as requested by the Engineer.

The approved Quality Plan shall be followed throughout the performance of the Contract, unless the Engineer to the contrary issues specific approvals or instructions. Any approval of the Engineer shall not relieve the Contractor of his obligation to ensure that the Works comply with the requirements of the Contract.

Quality assurance records, test certificates, reports and daily records of on-site testing and inspection shall be kept on site during the works, and the results shall be certified by the responsible member of the Contractor's staff.

Quality Control and Assurance Plan shall enter into force after the approval of the Engineer.

2.4.4. Tests Samples, Materials and Equipment

The Contractor shall supply all of the samples including storage, packaging and transportation related to quality control and tests. The materials represented by these samples shall not be manufactured without the approval of the Engineer, brought to work place or used in any work.

Approved material and equipment samples to be used on the site shall be kept carefully under they are permitted to be disposed by the Engineer.

2.4.5. Test Laboratory Services

Quality Control tests shall be done in the laboratory to be established by the Contractor. For the tests that cannot be done in this laboratory, an independent laboratory that is approved by the Engineer shall be used at the expense of the Contractor.

The Contractor shall ensure that both his own laboratory and the independent test laboratory perform the desired material inspection, sample receiving and test processes as fast as possible and conclude them.

Test results shall be immediately submitted to Engineer. In the event of detection of disorders or deficiencies that might affect the Work, the Contractor shall take any kind of corrective precaution immediately.

The laboratory is not authorized to change, expand or invalidate the terms of the Contract.

2.4.6. Examinations and Manufacturer's Tests

The Contractor is responsible for ensuring that quality control and all relevant examinations and tests are carried out duly without taking into account whether they are on Site or in any other place and also for taking corrective precautions when necessary.

The Engineer can audit the work carried out in the Manufacturer Company's facilities and also the tests related to these works. The Contractor shall inform the Engineer and the End Recipient on time so that this can be done as desired.

The manufactured items and materials that are delivered to the Site shall be examined by the Contractor on their arrival and any kind of fault shall be informed to the Engineer. The products with important faults shall be returned to the Manufacturer Company to be amended or replaced.

Examinations and tests carried out by the Engineer or on his behalf do not release the Contractor of his obligations related to quality control.

2.4.7. Construction Site Records and Tests Certificates

Quality Control records, test certificates, reports, daily construction site tests and examination records shall be kept on forms approved by the Engineer.

All of the test certificates and examination records shall be divided into their relevant departments and kept including those in the Manufacturer Company and other test institutions. The processes shall be under the responsibility of qualified personnel of the Contractor and moreover the Contractor shall establish a comprehensive archive and library related to quality control.

The Contractor shall prepare details lists including tests, approvals, orders and delivery information related to quality control and other materials and products depending on approval. These lists shall be submitted to Engineer as they are updated, however once in a month under any circumstance.

Test results shall be delivered to Engineer at the end of the test in respect of determining the necessary precautions, if any. Test certificates, on the other hand, shall be submitted to the Engineer

- When the tests of the Production Plant and Manufacturer Company are completed or not later than 7 days before the date on which products should be used in the Work under any circumstance,
- Within 7 days following the completion of the test for those conducted during or upon completion of the continuous work.

3. ENVIRONMENTAL MANAGEMENT PLAN – (EMP)

3.1. GENERAL

The Contractor shall comply with the provisions of the applicable Turkish legislation on environment protection that may affect the Project (the "Environmental Requirements"). In particular this shall include compliance with the following regulations (latest version of the below mentioned laws will be in placed):

Environment Law (no. 2872, date: 09.08.1983, published in the 11.08.1983 dated and 18132 y numbered Official Gazette, amended on 26.04.2006 no 5491),

Worker Health and Work Safety Act (published in the 11.01.1974 dated and 14765 numbered Official Gazette),

The Regulation for the Assessment and Control Air Pollution 2009

The regulation for the assessment and management of environmental noise (2008),

Water Pollution Control Regulation 2004

Solid Waste Control Regulation (published in the 14.03.1991 dated and 20814 numbered Official Gazette),

Hazardous Waste Control Regulation 2005

Cultural and Natural Assets Protection Law and relevant regulations

Waste Oil Control Regulation (21.01.2004 dated and 25353 numbered Official Gazette.)

Excavation Soil, Construction and Debris Waste Control Regulation (18.03.2004 dated and 25406 numbered Official Gazette)

Soil Pollution Control Regulation (31.05.2005 dated and 28831 numbered Official Gazette.)

The Contractor shall take all measures and precautions to avoid any nuisance or disturbance arising from the execution of Project Activities. This shall, wherever possible, be achieved by suppression of the nuisance at source rather than abatement of the nuisance once generated. The Contractor will also be required to compensate for any damage, loss, spoilage, or disturbance of the properties and health of the project affected people during construction. In conformance with the Contract Specifications of which these Environmental Provisions are a part, the Employer reserves the right to withhold payments and/or stop construction in the event of serious or repeated violations of the conditions stipulated herein.

The Contractor shall, at his own expense, obtain, retain in force and renew as necessary all Consents provided for by the Environmental Requirements of the Government of Turkey that are required to enable it to meet its obligations in designing and constructing the Project.

3.2. REQUIREMENTS for ENVIRONMENTAL MANAGEMENT PLAN

The Contractor shall establish, implement and maintain an Environmental Management Plan (EMP) and shall document all environmental Operations carried out on the Project during the Contract Period. The Environmental Management Plan shall be prepared to by the Contractor ensure that the application and execution of the mitigation and compensation measures are in compliance with the Environmental Requirements of the Project EIA. The final EMP shall be submitted for approval of the Engineer within 28 days after signature of the contract.

EMP shall be organized in five sections as follows:

- Management Acknowledgements.
- Organization & Staffing.
- Reporting Procedures.
- Environmental Management Provisions. The environmental mitigation and monitoring obligations required for inclusion within the EMP.

Review of the EMP will be provided by the Engineer and/or Employer following the receipt of all necessary information and documentation. The EMP shall be subject to the approval of the Engineer. Approval may be conditional as specified by the Engineer/Employer. The Engineer may also require periodic reviews, updating and supplements to the EMP in the course of the work. The Contractor shall particularly note that aspects of the EMP will affect the ability to commence work, including the following:

- Initial Safety Induction Courses are required for Contractor`s staff within their first week on the Site.

4. TECHNICAL SPECIFICATIONS FOR CIVIL / STRUCTURAL WORKS

4.1. EXCAVATION AND FILL WORKS

4.1.1. General

General excavation required for structures including pipes and subsoil-structures, roads or other mass excavation includes:

- excavation of any type of ground, whether this excavation has to be made by hand or by machine;
- any additional excavation to accommodate temporary supports and all working space to carry out the work;
- scarifying of the exposed surface, compaction to maximum density and protecting of formation levels;
- supporting excavations and temporary support of the sides of excavations;
- keeping free the excavation from surface and ground water;
- location, maintaining and, where required, reinstatement of other services;
- disposal of excavated material whether it shall be reused for backfilling or removed as surplus material off site including formation of all temporary spoil heaps and all double handling necessary;
- protection of the Works and all additional measures necessary to ensure that the dug is maintained in a safe and workmanlike manner.

The Contractor shall prepare a method statement of his proposal for earthworks operation for each particular part of the Works to be constructed at any one time, detailing the location, programme of excavation, temporary supports and the placing and handling of the spoil.

The Contractor shall submit for the Engineer's approval his proposed method statement at least 14 days before his intended date to commence earthworks on each particular part of the Works.

The Contractor shall give to the Engineer at least seven days written notice of his intention to commence earthworks on any part of site and shall furnish the Engineer with all ground levels site photographs showing the existing conditions and levels and other particulars he may require for the purpose of carrying out measurements.

Earthworks shall not be commenced until written approval has been received by the Contractor from the Engineer.

4.1.2. Traffic requirements

The Contractor shall comply with National laws and codes of practice in respect of this clause.

Before any work in or affecting the use of any highway is commenced, the Contractor's proposed method of working shall be agreed with and confirmed in writing to the Engineer and the Highway and Police Authorities.

Throughout the Contract, the Contractor shall co-operate with the Highway and Police Authorities concerning works in, or access to, any highway. The Contractor shall inform the Engineer of any requirements of, or arrangements made with, the Highway and Police Authorities.

Where the diversion of any existing carriageway, footway or public right of way is temporarily made necessary by the Works, the Contractor shall provide and maintain an alternative, acceptable to the Engineer, which shall be operational before any interference with the existing way takes place.

Where ramps are required, they shall be provided and maintained to a standard suitable in all respects for the class or classes of traffic or pedestrians requiring to use them.

The Contractor shall maintain emergency vehicle access to all properties at all times.

Where single line traffic operation is unavoidable, the Contractor shall provide a proper system of traffic control as agreed by the Engineer.

4.1.3. Extent of excavations

The construction of open trenches shall, at any time, be limited to lengths previously approved by the Engineer, in writing. Unless otherwise approved by the Engineer in writing work on each approved length shall be completed to the satisfaction of the Engineer before work on any new length is commenced.

4.1.4. Relocation of possible utilities and trial holes

The Contractor shall take all steps necessary to find, protect and safeguard any drains, pipes, cables and similar services encountered, already installed or to be installed, for the duration of the contract in order to keep them in good working condition. Should the services become damaged during the course of the works, then the Contractor shall be responsible for liaising with the responsible utility companies or organizations and arranging for the repair of that service and bear all costs associated with the repair of the service.

Information as may be given in the contract in relation to the present condition and character of the existing structures, roadways, embankments and the like and in relation to the dimensions of various parts of the existing structures, the position, extent and particulars of drains, pipes, cables and the like, is given without guarantee of accuracy and neither the Employer nor the Engineer will be liable for any discrepancy therein.

The absence of such information shall not relieve the Contractor of this liability for the cost of any repair work necessitated by damage caused by him to such mains and services in the course of his work and for the cost of all losses arising from their disruption.

The Contractor shall obtain all available information, assistance, full permission and approval of all relevant utility companies or organizations regarding the positions and/or relocation of mains and services, serving notices of intent to start work as may be necessary in accordance with all the local laws and regulations. He shall make this information available to the Engineer as soon as he obtains it. He shall agree with the Engineer any trial excavations, which may be necessary to confirm or establish these locations. All relocating works shall be carried out two weeks in advance of execution of the relevant work.

Any temporary or permanent diversion and/or relocation of mains and services shall only be permitted after agreement with the appropriate utility companies or organizations and the approval of the Engineer.

Where a service, or obstruction is encountered along the route of a pipeline or in other excavation works which prevents the Contractor from carrying out his work, the Contractor is to inform the Engineer immediately of its presence and shall submit details, including the type of service, or obstruction, its

dimensions, depth below ground level and his proposed method of overcoming the obstruction or service. Unless already detailed in the contract documents, the Engineer shall then advise on the action to be taken. The Contractor shall arrange for the refilling and reinstatement of trial holes to be carried out immediately the required information is obtained. The reinstatement of the surfaces of trial holes shall be carried out to the approval of the Engineer.

4.1.5. Intersections with roads, highways and railroads

The Contractor shall get the necessary permissions for crossing existing infrastructure from related Authorities and provide necessary data requested by these Authorities.

The Contractor shall take all necessary safety precautions before starting the Works. All intersections and parallel constructions shall be subject to the approval of the Engineer.

After crossing the paved roads, drainage systems sidewalks and pavements shall be restored to their original positions by the Contractor. The pavement repair width shall be proportional with the road width.

At locations where, new pipelines or culverts cross the roads, the soil cover above the pipe crest or top of the box culvert shall be at least 1.50 m.

At locations where new pipelines and culverts cross railroads or major highways, the crossing shall be made by pipe jacking or similar method without disturbing traffic.

Contractor shall design and build related structures to cross the highways by horizontal drilling or pipe jacking. Before construction, Contractor shall present the method statement describing the proposed method for construction to the approval of Engineer.

4.1.6. Drainage and dewatering

The Contractor shall keep all excavations for structures and pipelines clear of water from whatever source, so the works are constructed under dry conditions.

The method of keeping the excavations clear of water, dewatering and the disposal of water, shall be subject to the approval of the Engineer. The Contractor shall provide all the equipment for pumping and shall ensure that sufficient stand-by plant is on site at all times to avoid any interruption in continuity of dewatering.

For dewatering of the excavation one of the following techniques can as examples be used:

- Dewatering with pumping from wells;
- Pumping directly from the excavation;
- Pumping from drilled and filtered wells; and
- Pumping from acicular filter systems.

The usage of the above methods will depend on the soil characteristics as described in the geotechnical investigations.

4.1.7. Safety of excavation and adjacent structures

The Contractor shall provide support necessary to ensure the stability of the excavation and adjacent roads and structures. The support may be made with sheet-pile walls, holding walls, open caissons or pneumatic caissons etc. Any such support shall be deemed to be included in the relevant prices for excavations for structures, installation of pipes and cables, etc.

4.1.8. Sheet piling and Bracing

The Contractor shall be responsible for the design, installation, and maintenance during construction, and where appropriate, removal of all support works needed for trenches and other excavations. The Contractor shall submit to the Engineer for approval, details of his proposal for excavation support which details shall include such Drawings, calculations or other explanatory matter as the Engineer may require, but such approval shall not relieve the Contractor of his responsibilities under the Contract. No excavation work may proceed until the Engineer's approval has been given to the Contractor's proposals.

The Contractor shall not remove temporary works supporting the excavations until in the opinion of the Engineer the Permanent Work is sufficiently advanced to permit such removal which shall be executed under the personal supervision of a competent foreman. Where the removal of excavation support works is

considered by the Engineer to endanger existing structures thus making them liable to subsidence damage, the Contractor shall leave such support works in place, removing only the minimum necessary to allow the reinstatement of the surfaces.

Works for pit sheeting and bracing close to private or public properties, structures and utilities shall be carried out with low vibration and low concussion.

4.1.9. Slips, falls and excess excavations

The Contractor shall prevent slips and falls of materials from the sides of the excavations and embankments.

In the event of slips or falls occurring in the excavations, and where excavations are made in excess of the specified dimensions, then any unsuitable material that has entered into the excavation is to be removed from the excavation, and the additional backfilling that may be required is to be carried out with selected excavated or imported material and compacted to the approval of the Engineer.

If any unsound material occurs in the bottom of any excavation, the Contractor shall remove it and dispose it all to the satisfaction of the Engineer. Unless otherwise specified or ordered by the Engineer, the Contractor shall fill the voids so formed with concrete grade C8/10 or with suitable granular material to the approval of the Engineer.

Unsound material shall include:

- Peat, timber and perishable material;
- Clay with a liquid limit exceeding 80 and having a plasticity index exceeding 55; and
- Materials having moisture content greater than the maximum permitted for such materials.

4.1.10. Stripping of topsoil

Topsoil is by definition the top layer of soil that can support vegetation, which shall be retained for later re-use.

Stripping of all topsoil shall be carried out in the immediate areas to be occupied by the works, including areas of excavation where material from excavation may be used in fill, areas to be occupied by temporary works, or any other areas as directed by the Engineer. Stripped topsoil shall be stored in a location agreed with the Engineer and shall not exceed 2 m in height. Stored topsoil shall be kept free of weeds and grasses.

4.1.11. Backfilling and filling

Fill materials in general

Fill material shall not contain roots, frozen material, organic or otherwise unsuitable materials.

No fill material shall be placed in any of the permanent works until its foundation has been prepared as specified.

Fill materials shall be handled, placed, spread and compacted in such a manner as to avoid segregation of the fill and to obtain a stable, homogeneous compacted structure.

When organizing his work, the Contractor shall take due account of the climatic conditions, which may be expected in the area. Should place material by any cause become unacceptable, the Contractor shall remove such material or shall process it until all specifications are met. Such work shall be performed at no additional cost to the Employer.

Unless otherwise specified or approved, the material used for backfilling and fill shall be excavated material of particle size not exceeding 75 mm.

Backfill against the permanent works shall be selected, and free from boulders, cobbles, rock fragments and the like greater than 50 mm nominal size.

Imported fill materials shall comprise the following materials all in accordance with the relevant norms:

- Sand in fraction 0.1-2 mm;
- Gravel in fraction 2-75 mm; and
- Boulders in fraction 75-100 mm.

Where fill will be used below structures and building floors, the material shall consist of durable gravel, broken stone, crushed concrete or sand with a particle size not exceeding 10 mm. The grading of the material shall be such that there is no migration of fines into the fill.

Placing and compaction of fill and backfill

The natural ground over which filling is to be placed shall be cleared of all loose boulders, grass, productive soil, mud, bushes, trees, roots, other vegetation and other unsuitable material.

Unless otherwise specified, fill shall be spread by machine or manually in successive horizontal layers of not more than 200 mm loose depth and compacted to 95% Standard Proctor.

Operations on earthwork shall be suspended at any time when satisfactory results cannot be obtained because of rain, or other unsatisfactory field conditions. The Contractor shall drag, blade, or slope the embankment to provide proper surface drainage.

The material in the layers shall be of the proper moisture content before compaction. Wetting or drying of the material and manipulation when necessary to secure uniform moisture content throughout the layer may be required.

The Contractor shall take all necessary precautions to protect exposed faces against deterioration.

The Contractor shall compact the fill using approved compacting methods and equipment. Backfilling shall not impose uneven or excessive load on a structure.

All material used for filling shall be deposited and compacted as soon as practicable after excavation in layers of thickness appropriate to the compaction plant used. Filling of areas and embankments shall be built up evenly over the full width and shall be maintained at all times with a sufficient camber and a surface sufficiently even to enable surface water to drain readily from them.

Trial area of filling

Where required by the Engineer and before commencing filling, the Contractor shall at his own expense compact a trial area of filling of the type proposed using the equipment proposed for the works in accordance with specified standards of compaction. The area shall be of a size and depth to the approval of the Engineer sufficient for the trial to adequately represent the work involved in the general filling operations.

Variations of method or equipment shall only be permitted when the Contractor demonstrates by field trials that the compaction obtained by the alternative method achieves compaction equivalent to that obtained by the approved method.

During the progress of the works the Contractor shall inform the Engineer of any factors outside his control which may adversely affect the compaction achieve so that the Engineer can give consideration to a variation of the equipment or method.

Filling adjacent to structures

Filling against the perimeter of structures shall not be carried out until the Engineer agrees that the construction is sufficiently advanced implying no risk of interferences or damage from either the compaction equipment or the backfilling material.

Filling material for excavations and for making up levels within the perimeter of structures shall be suitable material and shall contain no particular size in excess of 50 mm. The compaction of fill material within the perimeter of structures shall be carried out with equipment suited to the area being compacted.

Tolerances for filling

The fill shall be placed and compacted to a tolerance of $-10 \text{ mm}/+ 15 \text{ mm}$ for a final surface. Where further works will be carried out above the fill the tolerance shall be $-25 \text{ mm}/+0 \text{ mm}$.

Within the above tolerances the surface shall have a smooth regular face all to the approval of the Engineer.

Control and testing of the fill

Control testing shall be carried out by members of the Contractor's staff competent to perform the required tests. Additional testing may be carried out at the discretion of the Engineer.

Soil compaction tests shall be carried out according to the relevant standards.

Allowance for settlement

The Contractor shall make due allowance for consolidation and settlement of fill and compacted fill such that the levels and dimensions of the finished surfaces at the end of the contract (defects notification period) are within the tolerances specified.

4.1.12. Disposal of surplus material

Deposits of surplus suitable material and unsuitable materials are in the following referred to as "soil dumps". Generally, the Contractor shall transport and dispose of all excavated material not required for the works. The locations proposed by the Contractor for disposing of excavated material, whether temporarily or permanently, shall be subject to the approval of the Engineer.

The Contractor shall be responsible for negotiating and securing suitable areas for disposal of surplus excavated materials and shall pay any fees or surplus excavated materials and shall pay any fees or other payments associated with such disposal.

In connection with the disposal of excess spoils, the Contractor shall be responsible for the following during the Contract period:

- Upgrading the strength and the quality of the existing access road(s) and maintaining the same in good order and final reinstatement.
- Dewatering of the tipping area(s) by means of porous concrete pipes laid at the bottom of the valleys or as agreed with the Engineer.
- Unloading, spreading, levelling, placing the soil into embankments etc as necessary, in order to keep the top(s) in good, safe and manageable order.
- Keeping third parties from using the tipping area(s). No claims shall be accepted by the Engineer for any extra work associated with soil disposed of by others or requests for additional tipping area should the existing one become saturated due to use by others.
- Keeping vehicles clean when leaving the tipping area(s) and to ensure they do not contaminate public roads.

4.1.13. Disposal of existing asbestos cement pipes

Existing asbestos cement pipes are not considered as hazardous, as long as these pipes are not broken and remain underground. Even if these pipes are broken, only a small quantity of asbestos fibres is exposed, and the pipes do not crumble easily. Therefore, existing asbestos cement pipes can be left underground in general unless any special engineering measures are needed for removing these.

Asbestos cement pipes shall be handled as follows:

- If the asbestos cement pipes need to be rehabilitated, old pipes shall be left underground.
- If the asbestos cement pipes shall be taken out for any reason, pipes shall be handled according to Turkish Health Regulations and related European Union directives.

Asbestos cement pipes are considered as hazardous waste when taken out of ground. Asbestos cement pipes are considered as products that do not produce dust during service. However, they shall be handled with care.

After being taken out of ground, asbestos cement pipes shall be transported to a suitable landfill and collected according to Turkish Regulations.

4.2. PIPE WORKS

4.2.1. General

The requirements covered by the present section are applicable for external, buried pipes between treatment units, to/from pumping stations to/from buildings, wastewater collectors/networks, storm water collectors/networks and pressured storm water/wastewater pipelines and applies to pipe systems for:

- Wastewater;
- Return, excess and floating sludge;
- Potable water;
- Technical water;
- Treated wastewater for re-use;
- Storm water drainage;

- Groundwater drainage (if required);
- Aeration; and
- Gas.

4.2.2. Standards and rules

The following standards shall apply for the pipes:

- TS 821 EN 1916: Concrete pipes and fittings, unreinforced, steel fibre and reinforced
- TS EN 969: Ductile iron pipes, fitting, accessories and their joints for gas pipelines-Requirements and test methods
- TS EN 545: Ductile iron pipes, fittings, accessories and their joints for water pipelines - Requirements and test methods
- TS EN 598: Ductile iron pipes, fittings, accessories and their joints for sewerage application-Requirements and test methods
- TS EN 10216: Seamless steel tubes for pressure purposes-Technical delivery conditions
- TS EN 10217: Welded steel tubes for pressure purposes-Technical delivery conditions
- TS EN 10246: Non-destructive testing of steel tubes
- TS 9937: Polypropylene pipes general purpose
- ISO 2531: Ductile iron pipes, fittings, accessories and their joints for water applications.

If deemed necessary by the Engineer, the contractor shall ensure that all tests and analysis performed by the independent bodies prior to delivery of the pipes to the site.

4.2.3. Pipe markers

Water, wastewater and surface water pipes, manhole elements and fittings shall be marked either by carving and painting text or by thermally transferred water resistant paint.

Pipe marks shall have the following information:

- The name of the Municipality
- The name of the water and sewerage administration
- The name of the pipe factory
- The pipe class, diameter and production date.

4.2.4. Pipe materials

Generally, all pipes, valves and pipe fittings installed shall conform to the relevant international norms and standards. The Contractor shall, if required, forward to the Engineer certificates showing that the materials have been tested and comply with the requirements of this specification and the relevant standard.

Pipes shall be ordered in the maximum lengths available to minimize the number of joints. The Contractor shall be responsible for the supply of all materials in sufficient quantities and shall immediately prior to placing any order, especially for imported goods, ascertain the required quantities.

4.2.5. Concrete pipes

General

Unreinforced and reinforced concrete pipes and fittings with flexible joints shall comply with TS 821 EN 1916. The pipes shall be reinforced to stand the load during installation as well as in the permanent installation. Concrete pipes shall be sealed with standard rubber ring gaskets. Prior to use the jointing rings shall be stored in a cool place, protected from direct sunlight and frost.

Pipes used for wastewater or combined stormwater and wastewater pipelines shall be steam cured pipes with integrated gasket type.

Pipes used for stormwater pipelines shall be steam cured with separate gasket type.

Pipes shall be subject to rejection on account of failure to meet any of the testing requirements. Pipe sections also may be rejected if found to contain cracks, damaged ends and other defects due to faulty manufacture, handling, transporting or placing.

For pipe diameters of 200 mm to 400 mm, connections to the wastewater pipe can only be performed with single branch fittings produced in a factory. For pipe diameters of 500 mm and greater, saddles may be used but only saddles using direct drilling in the concrete pipe.

Pipe diameter, mm (Pipe with bell and integrated gasket)	Minimum compressive strength, kN/m (Force applied on crest)
200 mm concrete	35
300 mm. concrete	40
400 mm. concrete	60
500 mm. concrete	75
600 mm. concrete/reinforced concrete	90
800 mm. reinforced concrete	120
1000 mm. reinforced concrete	150
1200-3500 mm. reinforced concrete	According to TS-821 EN 1916

Pipe Length, joints and reinforcement

Standard pipe lengths shall not be shorter than the values specified below (excluding special and short pieces).

Diameter, mm	Minimum pipe length, m
600 and smaller	1.25
700 - 1000 and larger	2.00

Every concrete and reinforced concrete pipe joint shall be designed to withstand a load applied on joint, load being equal to the gasket pressure plus 60,000N per every 1 m of internal diameter of the pipe.

Spiral reinforcement shall be of totally circular type. Ellipsoid or partial circular reinforcement shall not be accepted. Longitudinal reinforcement shall not be less than 0.2% of the pipe cross sectional area. Longitudinal reinforcement shall be placed around the pipe in a uniform spacing.

Land parcel and street connections of wastewater and stormwater networks

Wastewater parcel connections shall start either from the manhole or from the Y(C) fitting on the street wastewater branch integrated pipe. Parcel connections shall end at existing or newly constructed parcel manholes located in the property borders, or on the sidewalk outside property borders.

Stormwater parcel connections shall start either from the manhole or from the Y(C) fitting on the street storm water branch integrated pipe. Parcel connections shall end at newly constructed catch basins or gratings located on the streets.

Pipe material used for parcel connections of the sewerage networks shall be of the same material used at sewerage networks, with minimum 150 mm nominal diameter.

Pipe material used for connections of inlets of the storm water networks shall be of the same material used at storm water networks, with minimum 300 mm nominal diameter.

Causes for rejection of pipes

Inspection of the pipes as may be deemed necessary by the Engineer will be made at the place of manufacture. Unless a damaged pipe can be repaired as specified below and approved by the Engineer the pipe may be rejected.

Pipes will be rejected as unsuitable for the Works for any of the following reasons:

Defects in unreinforced and reinforced concrete pipes

Pipes, which exhibit any of the following defects, shall be subject to rejection:

- A piece of any size broken out of the pipe.
- Defects that indicate imperfect mixing or moulding of the concrete.
- Any crack extending through the wall of the pipe and having a longitudinal or transverse length greater than the wall thickness of the pipe.
- Any shattering or flaking of concrete at a crack.
- A deficiency greater than 6.5 mm from the specified wall thickness of pipes 750 mm or smaller in diameter, or a deficiency greater than 6 percent from the specified wall thickness of pipes larger than 750 mm in internal diameter, except that the deficiency may be 8 percent adjacent to the longitudinal form joint, provided that the additional deficiency does not lie closer than 20 percent of the internal diameter to the vertical axis of the pipe and does not extend along the circumference for a distance greater than 20 percent of the internal diameter of the pipe.
- The deficiencies in wall thickness permitted herein do not apply to gasket contact surfaces in gasketed joint pipe. Dimensions and tolerances of such contact surfaces shall be submitted for approval.
- A variation from a true circle of the specified diameter by more than 1 percent.
- Rock pocked and water pockets in any pipe.
- Exposure of any reinforcement or insufficient cover to reinforcement.
- Surface defects indicating honeycomb or open texture.
- Separation or "blisters".
- Any continuous crack having surface width of 0.25 mm or more and extending for a length of 300 mm or more, regardless of depth or position in the wall of the pipe.
- The pipe fails the strength test.

Repair of imperfections (Bonding mortar repairs with epoxy resin adhesive)

Unsound or imperfect concrete shall be removed by chipping with a sharp tool. If hand placed mortar is to be used, the edges shall be left sharp and square with the surface. The area to be repaired shall be kept dry. Loose material and concrete dust remaining after the chipping operation shall be removed by means of an air jet.

Epoxy resins previously approved for such use by the Engineer shall be used as a bonding agent in the manner prescribed by the Engineer. The prepared area shall be primed with the epoxy resin compound, care being taken to insure intimate contact with the base material. Mortar shall be applied before the epoxy resin compound sets.

The mortar used for repair shall contain the same of cement and sand as the mix from which the pipe was made and shall also incorporate an expanding additive.

This mortar shall be pre-shrunk by mixing it to a plastic consistency as far in advance of its use as possible. Trial mixes shall be made and aged to determine the longest period the mortar's use can be delayed while retaining sufficient plasticity to permit good workmanship.

Immediately prior to the application of the mortar, the damp surface of the area to be repaired shall be scrubbed thoroughly with a small quantity of neat cement ground, using a wire brush. Remaining loose sand particles shall be swept away immediately before application of the mortar.

In applying the mortar, it shall be compacted into the space to be filled, care being taken to eliminate air pockets and to secure bond at the edges. The surfaces shall be shaped and finished to correspond with adjacent surfaces of the pipe.

Any holes and small areas of defects on the surface shall be repaired by using dry-pack mortar as specified in the Employer's Requirements, Section 6: Concrete and Steel Works.

The newly repaired surfaces shall be kept damp for 24 hours after the repair is completed. A membrane coating of an approved white-pigmented sealing compound shall then be applied.

4.2.6. Ductile iron pipes

Pipes and fittings in ductile cast iron shall be in conformity with TS EN 545, DIN EN 598 and TS EN 969, ISO 2531 and shall withstand successfully any test described therein.

Pipe connections of ductile Iron Pipes shall be tension proved sockets according to DIN 28603. All bending points shall be provided with concrete abutments or anchorage in sub grade.

All pipes, and fittings and accessories shall be made from ductile cast iron, also called nodular or spheroid graphite cast iron, characterized by the presence of graphite in the spheroid state in sufficient quantities to impart the mechanical characteristics defined in the standard TS EN 969 or ISO 2531 to the material.

Pipes for water supply

Pipes for water supply shall be subjected to a maximum static head of 85 m of water column. Allowing for friction losses and water hammer conditions, the maximum working pressure shall be 16 bar.

Pipes for pumped wastewater

Pipes for pumped wastewater shall be subjected to a maximum static head of 35 m of water column. Allowing for friction losses and water hammer conditions, the maximum working pressure shall be 16 bar.

Ductile iron pipes for pumped wastewater shall be lined with an inner sulphate resistant cement lining according to DIN 28610 and TS EN 545. The outer corrosion protection shall be in accordance to DIN 30674 and TS EN 598.

All pipes of ND 250 or smaller shall have an external electrolytic zinc protection. In addition, all pipes shall have an external coat of black varnish applied at the factory. A special external bitumen, having a minimum thickness of 0.3 mm, shall be sprayed onto the pipes before laying to provide protection against corrosion.

Coating of water supply pipes

Pipes for water supply shall be lined internally with spun cement mortar. The mortar shall contain no toxic element or elements soluble in water, or any elements susceptible to impart any smell or odour to the water. The characteristics of the mortar, its placing and control shall be in compliance with ISO 4179.

All pipes of ND 250 or smaller shall have an external electrolytic zinc protection. In addition, all pipes shall have an external coat of black varnish applied at the factory.

A special external bitumen-based hot applied coating, having a minimum thickness of 0.3 mm, shall be sprayed onto the pipes before laying to provide protection against corrosion.

Bends and tees

Bends and tees shall be lined inside with epoxy as specified for accessories and coated outside as specified above for pipes.

4.2.7. Polypropylene (PPRC) pipes

This kind of pipe shall be used for drinking water systems in the buildings. The installation, material and fittings shall be compatible with TS 9937 and international requirements. The Contractor shall provide the material catalogues with related standards to the Engineer's approval.

4.2.8. PVC and PP pipes

All PVC and PP pipes shall be manufactured by a quality assured manufacture in accordance with the ISO 9000 system. Un-plasticized PVC pipes and fittings for gravity drainage and sewerage shall comply with the relevant provisions of EN 1401, PP pipes shall comply with EN 1852. Un-plasticized PVC pipes and fittings for pressure pipes shall comply with the relevant provisions of EN 1452.

All connections to PVC and PP pipes must be performed by using single 45 branch; no saddle must be used. Only pipes with a ring stiffness greater than 8 kN/m² may be used. Reference is made to ISO 9969.

4.2.9. High density polyethylene (HDPE) pipes

All HDPE pipes and fittings shall be manufactured by a quality assured manufacturer in accordance with the ISO 9000 system. HDPE pipes shall be manufactured from PE 100 material, as classified by the European Technical Committee Report CEN/TC 155. In accordance with TS EN ISO 12162, the PE 100 material shall have a minimum required strength (MRS) value of 10 MPa. The pipes and fittings shall be coloured blue (potable water), yellow (gas) or black (wastewater) and be suitable for below-ground use.

Gravity pipes shall be engineered light weight pipes with (structured wall pipe type) with ring stiffness larger than SN 8 kN/m². The pipes shall be manufactured so that the cavity between the inner and outer pipe can be water filled.

Pressure pipes shall be in pressure class PN6 minimum.

PE pipes and fittings shall comply with the relevant provisions of EN 12201 (water and wastewater) and TS EN 1555 (gas).

Generally, all buried pipes shall be jointed using either butt or electro fusion welding techniques. Small diameter pipes (diameter < 63 mm), pipes within structures and pipes connecting to metal fittings shall be jointed using mechanical jointing techniques, such as compression, flanged joints or push-fit joints.

Jointing of large pipes of the light weight type shall be made by extruder welding.

All welding shall be performed by certified welders holding licences not older than 12 months and issued by a recognised institution approved by the manufacturer and the Engineer.

4.2.10. Welded Joints in Polyethylene Pipes

In addition to the manufacturer's recommendations, the welding sub-contractor shall adhere to the following requirements with regard to electro-fusion fittings or butt fusion welding, unless otherwise approved by the Engineer.

Pipes with different classes of resin (i.e. PE 80 and PE 100) must be jointed with electro-fusion couplers. Butt-fusion welding is not allowed.

Pipes with different wall thickness, but the same outside diameter shall be jointed with electro-fusion couplers. Butt fusion welding is not allowed.

The welding sub-contractor shall use automatic welding equipment which provides complete data storage and data retrieval to record all conditions used for each weld.

The welding sub-contractor shall exercise extreme care and control over the welding equipment, the cycle itself and the environment in which the welding is carried out.

The welders shall be subject to annual welder qualification tests.

The welding sub-contractor shall use automatic fusion welding equipment which ensures that:

- a. The cycle is automatically controlled.
- b. Pipe cannot be released from the machine or clamps until the specified cooling time has elapsed.
- c. All critical parameters in the process are recorded. For butt welding, all equipment shall be regularly maintained and in particular:
 - i. The clamps shall be effective in holding the pipe square.
 - ii. The trimmer shall be square and have power in reverse to ensure a clean cut.
 - iii. The heater plate shall have a control system capable of maintaining a uniform temperature over the area in contact with the pipe.
- d. The hydraulic system shall be effective, and a gauge must be attached which can accurately display pressures to be used.
- e. The pipe shall be supported on well-maintained rollers. This should ensure that the 'drag' pressure needed to overcome friction is minimized. The drag pressure shall always be less than the fusion pressure. (Where circumstances dictate that the drag is unavoidably high, great care shall be taken with pressure control especially when using dual pressure conditions.)

All newly introduced welding equipment and/or welding crews shall be subject to qualification testing on dummy welds as selected and directed by the Engineer.

To control dust contamination, it is essential to ensure that all fusion welding is carried out in a completely enclosed protective shelter. The floor shall be covered by plywood or tarpaulin.

All equipment and pipe shall be suitably cleaned to ensure oil, grease and dust do not contact the weld surfaces.

Dummy welds shall be made in the following manner, unless otherwise approved by the Engineer:

- a. To ensure that contamination does not affect butt welds in installed pipes, it is necessary to make a dummy weld at the start of any welding session after the plate has been allowed to cool.
- b. It is only necessary to follow the welding cycle to the point where the pipe is snapped from the plate.
- c. Following cooling, the surfaces may be re-trimmed to allow production welding to begin. Alternatively, a scrap piece of pipe may be used and then discarded.
- d. For thick walled pipes (wall thickness > 20 mm), it has been found that it is necessary to make two dummy welds, because the surfaces of the heater plate may not be cleaned sufficiently by the first weld.

The weld shall remain clamped until all re-solidification has taken place. The cooling time shall be such that no significant axial stress is placed on the weld until it has reached 800°C. Guidance on cooling time shall be taken from the pipe manufacturer.

To ensure that high quality welds are produced, the Contractor shall adhere to the following:

- a. The welds shall be numbered to ensure traceability, in case problems occur.
- b. Only certified welders shall be permitted to perform polyethylene fusion welding and the Contractor shall provide a copy of original certificates from the issuing body, for inspection by the Engineer.
- c. The welder shall mark the pipe alongside each joint with a personal code number.
- d. All relevant data as directed by the Engineer shall be recorded and provided to the Engineer.

4.2.11. Corrugated HDPE pipes

HDPE pipes shall comply with TS EN ISO 9969, TS EN 13476-1, and TS EN 13476-2, TS EN 13476-3 or equivalent EN standards. The pipes shall be designed for a nominal working pressure Class PN 8, have a hydrostatic design stress of 50 kg/cm² at 20 °C and be jointed with push fit couplings.

The length of coiled pipes shall be in general 100 m. The minimum diameter of the rollers for coiled pipe should be such that kinking of the pipe is prevented. The minimum internal diameter of the rollers shall not be less than 24 times the nominal outside diameter of the pipe. The ends of the pipe shall be plugged or covered.

The pipes shall be manufactured from high-density polyethylene containing only those antioxidants, UV stabilisers and pigments necessary for the manufacture of potable water black pipes. The Contractor shall provide an approved third party certificate to verify the above.

Mechanical couplings and fittings shall be used. The mechanical joints shall be push-on types. They shall be produced in acetal-homo-polymer or be combined with gunmetal adaptors. The joints shall provide the system with strength in tension and water tightness. Push fit jointing type shall consist of a PVC grip ring and nitrile elastomer or equivalent O ring.

The couplings and fittings shall be designed for a nominal working pressure of 16 bars and a temperature of 40°C.

4.2.12. Steel pipes

The specification for steel pipes is given below in the Section 5.

4.3. CONCRETE WORKS

4.3.1. Standards and rules

The Contractor shall carry out the works described in accordance with the appropriate Turkish Standards and EN standards. The main standards that shall be used are the following, but not limited to:

TS 498	Design loads for buildings
TS 500	Requirements for design and construction of reinforced concrete structures
TS 708	Steel for the reinforcement of concrete - Reinforcing steel
TS 1247	Mixing, placing and curing of concrete (Normal weather conditions)
TS 1248	Mixing, placing and curing of concrete (Abnormal weather conditions)
TS 2810	Jointing materials for construction and expansion joints in concrete work - Rubber

	waterstops
TS 3078	Building construction - Jointing products and sealants - PVC plastic waterstops
TS 3440	Rules for making concrete exposed to aggressive effects of liquids, soils and gases
TS 3721	Steel wires for prestressed concrete
TS 3821	Aggregates for concrete-Acceptability testing
TS EN 196	Methods of testing cement
TS EN 206	Concrete
TS EN 1008	Mixing water for concrete - Specifications for sampling, testing and assessing the suitability of water, including water recovered from processes in the concrete industry, as mixing water for concrete

Code for buildings to be built in disaster areas, 2007, Ministry of Public Works and Settlement

Code for infrastructure to be built in disaster areas, 2007, Ministry of Public Works and Settlement.

The Contractor shall provide printed or digital copies of these standards at the site office, for the use of the Engineer's and Contractor's personnel.

4.3.2. Record of concreting

The Contractor shall keep accurate and up to date records of concreting, showing for each day when sections of the works were concreted. These records shall include:

- Date, time, weather conditions and temperature
- Results of all concrete tests, including identification of which part of works the sampled material is representative
- Number of batches produced, weight and kind of cement used, volume of concrete placed, number of batches wasted or rejected
- Class of concrete, volume of concrete placed, and number of batches used for each location.

The laboratory where the concrete tests have to be carried out shall be approved by the Engineer and the Employer and be accessible for the said parties at any time. The laboratory should preferably be placed at the site.

4.3.3. Classes of concrete

The grades of concrete to be used in the works are shown in the following table:

Concrete class	Minimum cement content	Characteristic cylinder strength at 28 days	Characteristic cube strength at 28 days	Works to be used
C30/37	300 kg/m ³	30 N/mm ²	37 N/mm ²	<ul style="list-style-type: none"> - Water retaining structures - Water channels - Manholes for water - Silos - Precast concrete elements
C20/25	250 kg/m ³	20 N/mm ²	25 N/mm ²	<ul style="list-style-type: none"> - Buildings - Roads & kerbs - Surface drainage units

C16/20	200 kg/m ³	16 N/mm ²	20 N/mm ²	<ul style="list-style-type: none"> - Fill concrete and mass concrete inside/under water retaining structures - Thrust blocks - Pipe casings - Cable channels and cable manholes (if cast in situ)
C 8/10	150 kg/m ³	8 N/mm ²	10 N/mm ²	<ul style="list-style-type: none"> - Blinding layer below structures - Fill in trenches

The maximum cement content shall not exceed 400 kg/m³. Grades of concrete shall be in accordance with TS EN 206-1. The maximum nominal aggregate size shall be 32 mm.

The concrete shall be capable of being transported and readily compacted by internal vibrators into a dense impermeable mass without segregation, bleeding or plastic cracking. Subsequently, the concrete shall be durable and free from crazing, thermal cracks and drying shrinkage cracks.

The slump shall be kept to the minimum compatible with approved placing and compacting requirements, but in no case shall the concrete be placed at a slump of more than 160 mm or less than 40 mm, determined in accordance with TS EN 12350, without the prior approval in writing of the Engineer.

Concrete mixes shall have the cement content necessary to meet the specified water-cement ratio, the workability and the compressive strength requirements.

Concrete mixes shall have the lowest possible sand content to meet the workability and water tightness requirements.

4.3.4. Organisation of concrete production at the site

At the commencement of the Contract, the Contractor shall submit, for the approval of the Engineer, a Method Statement detailing his proposals for the organisation of concreting activities at the site. The concrete production plant shall preferably be placed at the site.

The Method Statement shall include the following items:

- Plant proposed and layout of concrete production facility
- Proposed method of organisation of the concrete production facility
- Quality control procedures for concrete and concrete materials
- Transport and placing of concrete
- Details of formwork including striking times and procedure for temporary support of beams and slabs
- Protection and curing.

4.3.5. Ready-mixed concrete

Concrete obtained from a single supplier of ready-mixed concrete may be used in the Works, subject to the written approval of the Engineer. Such approval will not be given until the Engineer is satisfied that the organisation and control of the manufacture and delivery of all ready-mixed concrete is in accordance with the Technical Specifications.

4.3.6. Materials and testing

Type of Cement

The type of cement used in the Works shall be Portland cement from a single approved source conforming to the requirements of Portland cement in accordance to TS EN 196.

Tests of Cement

The Contractor shall submit to the Engineer, free of charge, test certificates relating to each consignment of cement. Each certificate shall show that a sample of the consignment has been tested by the manufacturer or by an approved laboratory and that it complies in all respects with the Technical Specifications.

When required by the Engineer, the Contractor shall supply samples of cement taken on delivery to site, or during storage on the site, for testing at a nominated laboratory free of charge.

No cement from any consignment shall be used without the approval of the Engineer and the Contractor shall maintain a record of the locations of the concrete made from each consignment which record shall be available for inspection by the Engineer.

If, for any reason, the Contractor shall decide to vary the source of supply, country or manufacture in respect of any type of cement already approved by the Engineer at any time during the Contract, then the Contractor shall give adequate notice of every such variation to the Engineer. The Contractor shall carry out all the tests called for by the Engineer's written approval of such variation before ordering any material from the new source or supplier.

If cement has been stored on the site for more than 40 days or in the opinion of the Engineer is of doubtful quality, new tests may be required, at the Contractor's expense, to check whether or not the cement still conforms to the requirements.

Delivery and Storage of Cement

All cement shall be delivered to the site in properly and permanently marked, sound and sealed bags or other approved containers, unless written approval from the Engineer is obtained for the delivery and storage of cement in bulk.

Rejection of Cement

Notwithstanding the receipt of the test certificate and the approval of the Engineer, the Engineer may reject any cement as a result of further tests. The Engineer may also reject cement which has deteriorated as a result of inadequate protection or other causes or in any other case where the cement is not to his satisfaction. The Contractor shall remove all rejected cement from the site without delay at his own expense.

Quality of Water

Water for use in concrete, mortar mixing and curing shall be obtained from an approved source and shall be of a quality that will not affect the setting time, strength, durability of the concrete or mortar, or the appearance of hardened concrete or mortar by discolouration or efflorescence, or the reinforcement at any age of the concrete or mortar.

Water shall be clean, potable, blended or unblended, with a pH between 5.0 and 9.0 and shall be tested in accordance with TS EN 1008. The following limits shall not be exceeded:

- Total dissolved solids (TDS) not greater than 2000 mg/l
- Suspended solids not greater than 2000 mg/l
- Chlorides (Cl) not greater than 500 mg/l
- Sulphates (SO₄) not greater than 1000 mg/l
- Alkali (HCO₃/CO₃) not greater than 1000 mg/l.

Water shall be stored in approved, clean containers which are protected from sun, wind, dust, organic contamination or from contamination by any other source.

Fine and Coarse Aggregates

Fine and coarse aggregates for concrete shall be obtained from sources approved by the Engineer. Fine aggregates shall consist of natural sand unless otherwise approved.

Aggregates for all types of concrete shall be from natural sources. They shall be hard, strong and durable and shall not contain harmful material of sufficient quantity to affect adversely the strength or durability of the concrete or, in the case of reinforced concrete, to attack the reinforcement. The aggregates shall be obtained from an approved source and shall conform to the requirements of TS 3821.

Fine and coarse aggregates shall comply with the following chemical requirements:

- Fine and coarse aggregates shall not contain more than 0.10% and 0.05% by weight of chlorides (as NaCl)
- Fine and coarse aggregates shall not contain more than 0.40% by weight of acid soluble sulphates (as SO₃)
- Coarse aggregates shall be a minimum of 85% by weight calcium carbonate
- Fine and coarse aggregates shall not be potentially reactive with alkalis
- Fine and coarse aggregates in concrete elements exposed to wastewater shall be equivalent to the high sulphate resistance of the cement. Appropriate aggregates are siliceous sand and gravel.

If this requirement cannot be met the Contractor shall adopt constituents for his concrete such that either:

- the cement material shall have a reactive alkali content not exceeding a maximum value of 0.6% by mass when defined and tested in accordance with the method prescribed, or
- the total mass of reactive alkali in the concrete mix shall not exceed 3 kg per m³ of concrete when defined, tested and calculated in accordance with the method prescribed.

The Contractor shall notify the Engineer of his proposals for complying with this requirement at the time of commencement of the Works.

If, in the opinion of the Engineer, the aggregates fail to comply with, or if there are doubts as to the uniformity of their compliance with the specified purity requirements, he will order all aggregates to be washed before use in the Works. When washing is ordered, it shall be done by using water of the quality specified herein and using methods and plant approved in advance by the Engineer and all costs arising there from shall be borne by the Contractor.

Each size of fine and coarse aggregate shall be stored in separate bins or on areas covered with steel plate, concrete or other hard and clean surface, which shall be self-draining and protected from contamination by earth or other deleterious matter.

Fine and coarse aggregates shall be stored in such a way so as to avoid the two materials from becoming intermixed.

Tests on Aggregates

The Contractor shall submit to the Engineer samples of the fine and coarse aggregates proposed for use in the Works. Samples shall be of a size sufficient to carry out all preliminary tests specified which the Engineer may order in addition to the concrete tests. The Contractor shall provide 50 kg samples for comparison purposes as described below. The samples shall then be tested in the presence of the Engineer by the Contractor in accordance with the Employer's Requirements or as the Engineer may direct.

If the source of aggregates is changed at the Contractor's request and with the approval of the Engineer at any time during the course of the Works, all sampling and testing described in the relevant sections shall be repeated at the Contractor's expense.

After approval has been given for any particular aggregate, a sample weighing at least 50 kg of the approved aggregate shall be retained by the Engineer as a standard against which all future samples shall be compared.

During the course of the Contract, fine and coarse aggregates shall be tested at site as often as required by the Engineer and at the Contractors expense.

Delivery of Samples

Samples of cement, water and fine and coarse aggregates called for in the foregoing sections shall be delivered to the Engineer for testing by the Contractor before concreting. Cube tests shall be completed before work is due to start.

4.3.7. Mixing and testing

All common site tests, especially slump tests, shall be carried out on samples taken from every transmixer.

If the cubes fail to attain the required compressive strength as specified, the concrete which they represent shall be cut out, removed and replaced with concrete complying with the Technical Specifications to the satisfaction of the Engineer.

All cubes shall be marked at the time of casting, with the date, class of concrete and other necessary markings to identify the part of the Works from which they are taken.

4.3.8. Formwork

Formwork for concrete shall be rigidly constructed of approved materials and shall be true to the shape and dimensions. Formwork shall be constructed of material or lined with materials as may be necessary to achieve the finishes specified in this section. The formwork design shall be submitted to the Engineer for approval before construction commences.

All material brought onto the site as forms, struts or braces shall be new materials.

Faces in contact with concrete shall be free from adhering grout, projecting nails, splits or other defects. Joints shall be sufficiently tight to prevent the leakage of cement grout and to avoid the formation of fins or other blemishes. Faulty joints shall be caulked. 20 mm by 20 mm chamfers shall be formed on the external corners of concrete members, unless otherwise specified. Internal corners shall similarly be provided with 20 mm fillets.

Formworks for exposed surfaces shall be laid out in a regular and uniform pattern with the long dimension of panels vertical and all joints aligned.

If openings of the formwork for the escape of water used for washing out are made, they shall be formed so that they can be conveniently closed before placing the concrete.

Connections shall be constructed to permit easy removal of the formwork and shall be strong enough to retain the correct shape during consolidation of the concrete.

Metal ties or anchors within the form shall be so constructed as to permit their removal to a depth of at least 50 mm from the face without injury to the concrete. All fittings for metal ties shall be of such design that, upon their removal, the cavities which are left shall be of the smallest possible size. Spreader cones or ties shall not exceed 25 mm diameter. The cavities shall be filled with cement mortar and the surface left sound, smooth, even and uniform in colour.

Formwork shall be true to line and braced and strutted to prevent deformation under the weight and pressure of the unset concrete, constructional loads, wind, and other forces. Beams spanning more than 3 m shall have an upward camber of 1.5 mm per m of span.

Concrete shall normally not be placed in lifts deeper than 3 m. For lifts higher than 3 m, openings for placing the concrete shall be provided in order to avoid segregation of the concrete.

The approved mould oil or other material shall be applied to faces of formwork to prevent adherence of the concrete. Such coatings shall be insoluble in water, non-staining and non-injurious to the concrete. Liquids that retard the setting of concrete shall be used only when approved. Mould oil, retarding liquid and similar coatings shall be kept from contact with the reinforcement or previously cast concrete.

Before any concrete is placed, forms shall be properly cleaned by washing out with water and/or air under pressure to remove sawdust, shavings, metal and other foreign matter. All water shall then be drained and mopped out from the formwork. In no case shall concrete be placed in the forms until such forms have been approved by the Engineer. Such approval shall not relieve the Contractor of his responsibility for the formwork.

Details of any fixtures to be cast into the concrete shall be to the approval of the Engineer. No fixtures shall be attached to the concrete by shot-firing without prior permission of the Engineer. Notwithstanding any such authorization, the Contractor shall take full responsibility for any damage caused to the structure and make good to the satisfaction of the Engineer.

4.3.9. Placing and compaction of concrete

Mixing, placing and curing of concrete shall be made in accordance with TS 1247 and TS 1248.

Preparatory Work

The Engineer's approval in writing shall always be obtained before any concrete is placed in the Works. All constructional plant and materials required, or which may be required during the concreting work and for curing shall be on site and the Contractor shall be fully prepared for the work. The Engineer's approval to place concrete shall only be given after such preparations and other relevant requirements of the Employer's Requirements have been carried out and complied with.

If necessary and/or directed by the Engineer, the Contractor shall cool any shuttering that has become overheated or exceptionally dry through prolonged exposure to the sun. The Contractor shall ensure that all shuttering retains a sufficient amount of humidity and has not become shrunk or warped. All soaking or spraying of shuttering shall be done with potable water.

The Engineer may completely forbid the placing of concrete in any shuttering which he believes has become too hot and/or dry and the condition of which could harm the quality and strength of the concrete. No extra payment for cooling or soaking of shuttering shall be made.

All shuttering, area of deposition, reinforcement and exposed surfaces of adjoining concrete surface shall be thoroughly cleaned and free from dust, debris, oil any other substance that may be harmful to fresh concrete.

Depositing in Work

The methods of conveying and depositing concrete shall be such as to prevent segregation of the materials and shall be approved by the Engineer before concreting begins. The placing and compaction of concrete shall be carried out under the direct supervision of a competent member of the Contractor's staff.

Concrete shall be placed directly in the Works as soon as possible without the need for re-handling and not more than 45 minutes after mixing and, in any case, before the initial setting has taken place. If any delay has occurred after mixing and the concrete has begun to set, it shall not be used in the Works and shall be removed from the site. Unless otherwise agreed by the Engineer on the basis of satisfactory site trials, concrete shall not be dropped into place from a height exceeding 2 m.

Concreting of any section or unit shall be carried out in one continuous operation up to the construction joints. No interruption of the concreting will be allowed without the approval of the Engineer. Where deposition of concrete has to be interrupted, precautions shall be taken to ensure satisfactory adhesion of later batches of concrete to that previously placed.

Where a delay of more than one hour has occurred between concreting operations in one section or unit of work, concreting shall only be resumed when, in the opinion of the Engineer, the previously placed concrete has had ample time to harden and the resulting joint shall be treated as a construction joint. At all times when concrete is being placed, a competent steel fixer shall be in continuous attendance to adjust and correct the position of any reinforcement which may become displaced.

Transportation of concrete directly over fixed reinforcement steel during concreting shall not be allowed unless proper provisions are made to avoid displacing or damage to the reinforcement.

Depositing in Layers

Concrete shall be deposited in approved quantities and horizontal layers of such depth as to permit thorough incorporation with the layers below by vibration, spading, ramming and working. If, for unforeseen reasons, it is necessary to stop concreting before completion of a section, then construction joints as specified shall be formed and further concreting shall be suspended for at least 24 hours.

Concrete Placed in Water

Concrete shall not be placed under water without the written approval of the Engineer. The Contractor shall submit his detailed proposals of the plant and method for underwater concreting.

The method of placing concrete under water shall be such as to keep as much as possible of the concrete being placed out of direct contact with the water so as to avoid any rapid movement or agitation of exposed surfaces. The work shall, where possible, be carried out in one operation. Where this is impracticable, laitance, washed out aggregate or foreign matter which may have accumulated on the previously placed concrete shall be completely removed prior to additional concrete being placed. This concrete shall then be placed directly on the cleaned surface. Tremie pipes shall be smooth bored, watertight and fitted with quick

release joints and have an adequate cross-section for the size of aggregate to be used. Bottom opening skips shall be straight sided, perfectly smooth and fitted with externally operated bottom opening double doors and overlapping canvas flaps. Toggle bags shall be used only for small pours and for depositing small discrete quantities of concrete. Bagged concrete shall not be used for permanent work.

During and after concreting underwater, pumping or dewatering operations in the immediate vicinity shall be suspended until the Engineer permits them to be continued.

Concreting in Hot Weather

The Contractor shall take great care during hot weather to prevent the cracking or crazing of concrete. The Contractor shall arrange for concrete to be placed in the early morning or late evening as directed by the Engineer.

The Contractor shall pay particular attention to the requirements specified herein for curing.

Formwork shall be shaded from direct exposure to the sun both prior to placing of the concrete and during its setting. The Contractor shall take appropriate measures to ensure that reinforcement in the section to be concreted is maintained at the lowest temperature practicable.

Concrete at placing shall have a temperature of not more than 32°C. If necessary, the Contractor shall cool the aggregates and mixing water by methods approved by the Engineer.

Where necessary, the Contractor shall design, install and operate a cooling system by which cooling water is pumped through a piping system in order to decrease the heat of hydration during concreting. The proposal for such a cooling system shall be submitted to the Engineer for his approval well in advance of the concreting operations.

The temperatures of ambient air, concrete at various levels and intervals not exceeding 5 m and cooling water where applicable shall be measured by means of thermocouples and recorded

Concreting in Cold Weather

Cold weather is defined as the situation existing at the Works, where either or both of the following conditions existing:

- The air temperature at the time considered is below 2°C
- The mean daily air temperature over three or more successive days has dropped below 5°C.

Under no circumstances may concrete be placed in contact with frozen ground or formwork, or in contact with ice, snow or frost on the ground or on formwork or reinforcement. Concrete shall not be made with frozen materials.

Concreting may proceed in cold weather provided that special precautions are taken to ensure that the surface temperature of the concrete at the time of placing is not less than 5°C for a succeeding period of at least:

- 4 days when the cement used in the concrete is ordinary Portland cement
- 2 days when the cement used in the concrete is rapid hardening Portland cement.

Such precautions may include the following:

- Warming the aggregates and heating the water, provided that the temperature of either does not exceed 60°C. Water and aggregates shall be mixed for a period sufficiently long for them to acquire a uniform temperature before cement is added.
- Completely surrounding the freshly placed concrete with a cover and heating the enclosed air, which shall be kept moist. Draughts of hot or dry air shall not be directed at surfaces.
- Insulating the formwork and finished concrete surfaces.
- Providing screens to protect the concrete from air currents.

The Contractor shall provide the Engineer with details of the precautions he proposes to take to protect the concrete from the effects of low temperatures and with details of the methods he proposes to use assess

the correct timing at which such protection may be removed. No concreting shall be done in cold weather prior to the approval the Engineer for the proposed measures.

Concreting in Unfavourable Weather

Concreting shall not be permitted during heavy rain or snowfall, or when the air temperature falls below 2°C, or when the concrete temperature rises above 32°C. When the air temperature exceeds 25°C, concreting shall only be permitted after special precautions, approved by the Engineer, have been taken to prevent early setting of the concrete, such as lowering the temperature of the water to be used in the mix or by means of a cooling-system, keeping the aggregates and shutters continuously sprayed with water and erection of temporary sun shades over the working area. During concreting operations, the temperature of the placed concrete shall be recorded.

Compaction of Concrete

The Contractor shall regard the compacting of the concrete to be of fundamental importance. A watertight concrete of maximum density and strength shall be obtained.

Concrete shall be thoroughly compacted during the operation of placing and shall be thoroughly worked around the reinforcement and embedded fixtures and into corners of the formwork and moulds.

Mechanical vibrators shall be of the immersion type with a frequency of not less than 6000 vibrations per minute and as approved by the Engineer. A sufficient number of vibrators shall be used to handle the maximum rate of concrete production with a 50% allowance for standby units during any period of concreting. All operators handling vibrators shall be trained in their operation.

Vibrators shall be inserted into the uncompacted concrete vertically and at regular intervals. Where the uncompacted concrete is in a layer above freshly compacted concrete, the vibrator shall be allowed to penetrate vertically for about 100 mm into the previous layer. Vibrators shall be withdrawn slowly from the mass of concrete so as to leave no voids. Internal type vibrators shall not be placed in the concrete in a random or haphazard manner nor shall concrete be moved from one part of the work to another by means of the vibrators.

Vibration shall not be applied directly or through the reinforcement to sections or layers of concrete which have hardened to the degree that the concrete flows in the formwork over distances so great as to cause segregation.

Every care shall be taken to see that reinforcement and fittings attached to the shuttering are not disturbed and that no damage is caused to concrete that has already set or to the internal face of the shuttering by using immersion type vibrators. In areas of congested reinforcement, it may be necessary to use small diameter pokers and the Contractor shall supply suitable sizes of pokers for each part of the work. Vibration of concrete by hammering the shuttering with hand tools shall not be permitted.

When placing concrete against horizontal or inclined elements of waterstops, they shall be lifted, and the concrete placed and compacted to a level slightly higher than the underside of the waterstop before releasing the waterstop to ensure complete compaction of the concrete around the waterstop.

The duration of vibration shall be limited to that required to produce satisfactory compaction without causing segregation. Vibration shall not be continued after water or excess grout has appeared on the surface.

Concrete shall not be disturbed after compaction and placing in its final position. Concrete that has partially set before final placing shall not be used and shall be removed from the site.

Placing Concrete on Previously Executed Work

Where concrete is to be placed against or on top of previously executed work, the surface of the old concrete shall be thoroughly wire brushed, hacked and cleaned with water and air under pressure to expose the surface of the aggregate and to remove all laitance.

Special care shall be taken to ensure that the new concrete is thoroughly compacted and rammed against the old.

Protection and Curing of Concrete

Concrete shall be protected from damage by climatic conditions (direct sunlight, rain, snow or frost), running water or mechanical damage during curing. All methods to be used for curing and protection of freshly placed concrete shall be subject to the prior approval of the Engineer.

The maximum and minimum ambient temperatures and humidity shall be measured and recorded each day by the Contractor. The records shall be made available for the Engineer's inspection.

As finishing proceeds, all exposed surfaces shall be covered with a wet hessian sheet followed by a reflective polythene sheet. These shall be securely fastened around the edges and supported in order not to damage the finished concrete surface. As soon as practicable, the hessian and polythene shall be lowered into close contact with the concrete and securely weighted or fastened down to prevent wind blowing underneath. The hessian sheet shall be maintained in a moist condition at all times and shall be inspected at intervals not exceeding 6 hours. Concrete shall be kept moist on exposed surfaces for a period of not less than 10 days or as approved by the Engineer.

Alternative methods of protecting and curing concrete may be approved by the Engineer. In any case, liquid curing membranes shall not be used on exposed surfaces or where laitance is to be removed and aggregate exposed to provide satisfactory bond for placing further concrete or mortar screeds. Liquid curing membranes shall not be used where mortar, resin mortar or joint sealant is to be applied.

Sufficient methods to afford full protection to a concrete pour shall be available at the place of work prior to the commencement of concreting.

During very hot weather conditions, the Contractor may be required to cool formwork containing concrete by spraying with water. This shall be carried out where directed notwithstanding and whatever other measures the Contractor may have employed for the curing of the concrete. All materials, spray equipment and an ample supply of water for curing shall be ready on site before any concreting starts.

4.3.10. Joints

In order to incorporate the effects from thermal action, shrinkage and creep, the Contractor shall make construction joints or contraction joints in accordance with this Specification. The Contractor shall make his design calculations in accordance with the intended location of joints.

Construction Joints

In construction joints, the reinforcement passes through the joint. The purpose of this type of joint is to separate the structure into sections equal to a size which easily can be cast. In critical sections with a high stress, the joints shall be made with an approved water stop.

The surface of the concrete shall be thoroughly cleaned. The surface layer shall be completely removed with a steel brush to expose the aggregates.

The hardened concrete shall be watered continuously for 1 hour prior to casting the adjacent concrete. When casting, the hardened concrete surface shall be saturated but free from water on the surface.

Cement grout and adhesives shall not be used at joints.

Contraction Joints

Complete contraction joints have no restraint to movement but are intended to accommodate only contraction of the concrete. Partial contraction joints provide some restraint but are intended to accommodate some contraction of the concrete. Both types of contraction joints are allowed in the works.

Expansion Joints

Expansion joints have no restraint to movement and are intended to accommodate either expansion or contraction of the concrete. Expansion joints are allowed in the works.

The following general requirements shall apply to both expansion and contraction joints:

(a) Filler Boards

Filler boards in expansion joints shall be of approved material securely fixed at right angles to the surface of the concrete within a tolerance of 1°. The boards shall extend without any gaps from the underside of the sealing groove to the base and between side forms or existing slabs. Dowel bars where specified shall be a close fit where they pass through boards. Joints in boards shall be taped to prevent discontinuities.

(b) Dowel Bars

Dowel bars shall be round mild steel complying with TS 708 and shall be sawn or flame cut to length. Flame cut bars shall be dressed by grinding to remove any snags or lips. Dowel bars shall be straight without any irregularities likely to interfere with longitudinal movement in the concrete.

Dowel bars in expansion joints shall be fitted at one end with sleeves which are a sliding fit on the bar and which contain compressible filling in the end remote from the bar, all to the dimensions and details shown in the Drawings.

(c) Sealing Grooves and Sealant

Caulking grooves shall be provided where necessary and as specified. At all joints where a caulking groove is formed, the groove shall be wire brushed and loose material removed and blown out by compressed air immediately prior to caulking. After the groove has dried, it shall be primed and caulked with approved jointing compound applied in accordance with the manufacturer's instructions. At all caulked joints, the face of the caulking strip and a 50 mm width of concrete on either side shall be painted with two coats of primer having the same base as the caulking compound.

Joints in the concrete shall be sealed with an approved sealant from an approved manufacturer, which is suitable for the particular location and environment. Joints shall be sealed immediately after the expiry of the concrete curing period or as soon thereafter as weather conditions permit.

Before sealing is carried out, the sealing grooves shall comply with the following requirements:

Grooves shall extend across the bays from edge to edge in the case of transverse joints and shall be continuous in the case of longitudinal joints.

In expansion joints, the filler material shall be exposed for the full length of the joint.

All grooves shall be dry and free of loose aggregate, paint, corrosion, oil, bitumen spillage, waterproofing agents, concrete curing agents, or release agents.

Bond breaking tape or other suitable material acceptable to the Engineer shall be placed in the bottom of the groove to leave the specified depth for the seal.

Primer shall be applied evenly to the sides of the grooves ensuring complete coverage. The interval between priming and sealing shall be within the limits specified by the sealant manufacturer. In dusty conditions, the primed joints shall be protected from contamination.

The sealant shall be prepared and applied in accordance with the manufacturer's instructions. Care shall be taken to avoid trapping air or forming bubbles and the finished surface of the sealant shall be smooth and free from blemishes to the specified level.

Expansion and contraction joints shall be placed in the positions and in accordance with the details shown on the Drawings.

4.3.11. Waterstops

Waterstops shall comply with TS 2810 and TS 3078.

When waterstops are placed for water tightness, the waterstops shall be made by an appropriate material resistant to chlorides, sulphates, chemicals and the like which is approved by the Engineer.

The width of the waterstops shall be according to the manufacturer's specifications.

All waterstops shall be made continuous and shall be welded at all connections. Overlapping shall not be allowed. All joints in waterstops shall be made by the manufacturer of the waterstop.

If a joint end at another part of the structure, such as the connection between a wall and a bottom slab, the waterstop shall also be placed at least 300 mm inside the adjacent part of the structure.

Waterstops shall be placed in accordance with the manufacturer's specifications. Waterstops shall be carefully placed and maintained in position during concreting and compaction operations. Concrete shall be carefully compacted around the waterstops so as to leave no cavities.

Waterstops shall fulfil the following requirements:

Property at 25°C	Rubber	PVC
Minimum tensile strength (N/mm ²)	20	15
Minimum elongation at break (%)	450	285
Hardness (IRHD/ Shore A)	60 - 75	70 - 75
Softness (BS 2571)	42°C - 52°C	
Specific gravity	1.1 (+5%)	1.3 +(5%)

The Contractor shall submit details of the waterstops, including a description of the installation of the waterstops, to the Engineer for his approval at least one month before commencement of the formwork at site.

4.3.12. Testing of tanks

All tanks shall be tested for water tightness in accordance with EN 1992-3. The testing procedure shall be according to the following procedure.

Excavation for tanks shall not be filled and tank wall faces shall not be coated or plastered outside and inside before the water tightness tests have been passed successfully.

Filling of tanks with water shall take place with a constant flow rate. The chosen flow rate shall raise the level in the tank not more than 2 m height in 24 hours.

A period of 1 week shall be allowed for saturation and stabilisation (admission of water into the concrete).

Water levels shall be measured by approved means at 24 hours intervals for a test period of 5 days.

During the test period the total permissible water level drop, after allowing for evaporation and rainfall, shall not exceed 1/500 of the average water depth of the full tank or 10 mm, whichever is greater.

The testing procedure shall be used also for small chambers (flow confluence or distribution chambers) and for manholes of gravity pipelines.

Notwithstanding the satisfactory completion of the above test, any leakage or soaking visible on the outside face of the tank walls shall be stopped, after allowing for self-sealing. Any sealing or making good of cracks in the concerned wall section shall, where practicable, be carried out from the inside face. Adjacent internal chambers within a structure shall be tested sequentially in case the treatment process allows for emptying of the respective chamber independently of the whole structure. In this case, the chambers adjacent to the chamber under test shall be empty during the test period.

4.3.13. Tolerances of dimension and surfaces of in-situ concrete

Workmanship in formwork and concreting shall be such that the concrete shall normally require no making good with the surfaces being perfectly compacted, smooth and with no irregularities. Concrete surfaces for the various finishes shall not exceed the maximum permitted tolerances stated in the table below.

The tolerances within which concrete work shall be constructed are as summarized below:

Item of construction	Permissible deviation
Position in plan	± 20 mm
Wall and slab thickness	± 6 mm
Columns and beams	± 6 mm.
Dimensions of foundations	+ 50 mm / - 0 mm.
Variation from plumb:	(vertically - up to 5 m) ± 12 mm.
Levels to slabs and beams:	± 10 mm.
Holes Placement:	± 10 mm
Hole Size	± 3 mm.

Item of construction	Permissible deviation
Cast-in items (reinforcement bars or wire strands) Placement:	± 10 mm
Distance between interconnected items:	± 2 mm.

The Contractor shall be responsible for keeping the deviations of the finished concrete structures within the limits given, and any rectification of work not constructed within the tolerances set out shall be entirely at the expense of the Contractor.

4.3.14. Remedial treatment of concrete surfaces

Any remedial treatment to concrete surfaces shall be agreed with the Engineer following inspection immediately after the stripping of formwork and shall be carried out without delay.

Any concrete surface which is found to have been treated before inspection by the Engineer shall be rejected.

Any minor surface blemishes shall be repaired to the satisfaction of the Engineer immediately after completion of curing. Remedial measures may include, but shall not be limited to, the following:

- a) Holes left for formwork supports shall be thoroughly cleaned out to remove all loose material and the sides shall be roughened, if necessary, to ensure a satisfactory bond. They shall then be filled with dry-pack mortar.
- b) Fins, pinhole bubbles, surface discoloration and minor defects may be rubbed down with sacking and cement immediately the formwork is removed.
- c) Abrupt and gradual irregularities may be rubbed down with carborundum and water after the concrete has been fully cured.
- d) Small defects and minor honeycombing shall be chipped out perpendicular to the face of the concrete to a depth of at least 25 mm and filled with dry-pack mortar.
- e) Fissures shall be repaired by using epoxy-based materials or by using materials approved by the Engineer.

All other defects will be regarded as too extensive to permit satisfactory repair and the concrete containing the defect shall be broken out and replaced.

4.3.15. Dry-pack mortar

Dry-pack mortar for filling holes and repairing surface blemishes shall be from one part by weight of cement and three parts fine aggregate passing a 1 mm sieve and epoxy-based materials. Additives to improve workability may be added to the approval of the Engineer. The colour of the mortar shall match that of the surrounding concrete. The mortar shall be mixed with only sufficient water to make the materials stick together when being moulded in the hands.

The dry-pack material shall be placed and packed in layers having a thickness not greater than 15 mm. The compaction shall be carried out by use of hardwood stick and hammer and shall extend over the full area of the layer, particular care being taken to compact the dry-pack against the sides of the hole. After compaction the surface of each layer shall be scratched before further loose material is added. Holes shall not be over filled, and the surface shall be finished by laying a hardwood block against the dry-pack fill and striking the block several times. Steel finishing tools shall not be used, and water shall not be added to facilitate finishing.

In the case of using epoxy-based materials, the Contractor shall provide material catalogues and method of application to the Engineer for his approval. No additional payments shall be done for these requirements and any necessary tests shall be carried out after repair.

4.4. STEEL REINFORCEMENT

4.4.1. Types, quality and storage

Reinforcement shall comply with, TS 708 and TS 4559.

Prestressing steel wire or bars shall be of low relaxation strand type in accordance to TS 3721 or DIN 4227.

Reinforcement bars shall have strength equal to high yield steel bars and shall be ribbed bars.

The characteristic yield stress of reinforcement steel shall be at least 420 N/mm² (BÇ III Class).

The Contractor shall furnish the Engineer with copies of the manufacturer's certificates of tests for the steel reinforcement to be supplied.

The Contractor shall prepare test specimens of steel reinforcement to be used in the Works. Test specimens shall be taken in the presence of the Engineer and shall be of a size sufficient to carry out the tests as described below. They shall be tested in an approved laboratory and the certified copies of the results of the tests shall be submitted to the Engineer. The specimens shall be tested for bending and tensile properties and the wire fabric also for weld shear strength. No steel reinforcement shall be used in the Works until the testing results have been approved by the Engineer. If ordered by the Engineer, test procedures shall be repeated at the Contractor's expense for any new supply of reinforcement during the course of the Works.

All reinforcement shall be clean and free from pit corrosion, loose rust, mill scale, paint, oil, grease, adhering earth, or any other material that may impair the bond between the concrete and the reinforcement or that which may cause corrosion of the reinforcement or may be detrimental to the quality of the concrete.

Storage of reinforcement shall be on racks or supports clear of the ground. Different types and sizes of reinforcement shall be kept separate.

4.4.2. Bending and cutting schedules

The Contractor shall prepare for his own use bar bending schedules and bar lists, cutting schedules and sheet lists for wire mesh for each individual structure from the information given in the approved working Drawings and in the Employer's Requirements, and shall be responsible for ensuring that correct information is given when ordering reinforcement. Copies of these schedules lists and orders shall be submitted to the Engineer for his approval. Steel bar supports shall be included in the bending schedules.

The approval of the bar bending and cutting schedules, lists and orders shall not relieve the Contractor of his responsibility to execute the reinforcement fixing in accordance with the Drawings and/or according to the requirements specified in TS 500 and the code for buildings to be built in disaster areas 2007.

4.4.3. Protection and cleaning

Reinforcement shall be protected at all times from damage, and when placed in the structure shall be free from dirt, loose mill scale, rust scale, paint, oil or other foreign substance. All reinforcing steel shall be carefully cleaned of all set or partially set concrete, shutter oil or paint which may have been deposited during the construction of adjacent works.

4.4.4. Bending of bars

Steel reinforcement shall be cut from straight bars free from kinks and bends or other damage and shall be bent cold by experienced competent workmen. Bars of diameter greater than 12 mm shall be bent in a bending machine designed for the purpose and approved by the Engineer. Any reinforcing bar that has already been bent shall not be re-bent at the place of the previous bend.

4.4.5. Cutting of wire mesh

Wire fabric reinforcement shall be cut straight from the sheets. The use of off-cuts in the Works will not be permitted.

4.4.6. Lapping of bars and wire mesh

Lapping bars and wire mesh shall be permitted when necessary and approved by the Engineer. No welding of reinforcement shall be carried out.

Unless otherwise specified, lap length of bars shall be at least fifty (50) times the diameter of the larger bar, and laps shall be positioned in a staggered pattern.

Laps on adjacent section of wire mesh shall generally be carried out as follows:

End to end by lapping the two pieces one full mesh (measured from the ends of the longitudinal wires in the other piece) and securing the two pieces together with wire ties placed at intervals of about 450 mm.

Side by side by placing the two selvage wires (the longitudinal wires at the edges of the fabric) one alongside and lapping the other, and by securing the two pieces together with wire ties placed at intervals of about 900 mm.

4.4.7. Fixing of reinforcement

All reinforcement steel shall be accurately placed and fixed in position and retained in that position during the placing of the concrete.

Spacer blocks for holding the reinforcement from contact with the forms, or adjacent reinforcement, shall be of dense precast concrete blocks of approved shapes and dimensions. The blocks shall be fitted with a semi-circular hollowing and double bent poured-in binding wires. The water tightness of these blocks must be at least similar to the concrete into which they are concreted. The use of pebbles, pieces of broken stone or brick or other materials shall not be permitted. Steel shall be bound and tied in its correct position using steel wire. Apart from any other requirement, the reinforcing steel shall be fixed in such a manner that it shall support its own weight and any loads which may be imposed upon it during construction without displacement, deflection or movement of any kind.

In slabs provided with two or more layers of reinforcement, the parallel layers of steel bars shall be supported in position by the use of steel chairs. Spacer blocks shall be placed at each chair to support the layers of reinforcement from the blinding concrete or shuttering.

The concrete cover to the nearest reinforcement exclusive of plaster or other decorative finish and concrete blinding shall be accordance with TS 500 unless otherwise stated in the Employer's Requirements for the relevant structure.

The distance between any two parallel bars except at laps shall not be less than 5 mm greater than the nominal aggregate size.

All reinforcement exposed to the weather for long periods before concreting is commenced shall be covered with polythene binding tape, cement grout or other materials to the surrounding concrete. Should rust staining occur on any permanently visible surfaces, it shall be removed at once to the satisfaction of the Engineer.

4.4.8. Thickness of cover

The thickness of cover for the reinforced concrete shall be as described below:

- For manhole elements (walls, covers, bottom slabs):
50 mm
- For external works, water retaining structures and casting of concrete in/under water: 50 mm.

Structures other than water retaining structures:

- For beams and columns: 30 mm
- For slab reinforcement: 20 mm or the same as the diameter of the largest steel bar, if the diameter is greater.

4.4.9. Tolerances

Tolerances in placing reinforcement shall be:

- For members 60 cm or less in depth: +/- 0.5 cm
- For members more than 60 cm in depth: +/- 1.5 cm

4.4.10. Approval before concreting

All reinforcement, after having been fixed in position, shall be inspected and approved by the Engineer before any concrete is placed. Any concrete placed contrary to this requirement shall, if ordered by the Engineer, be removed together with the reinforcement and replaced by the Contractor at his own expense.

4.5. PRECAST CONCRETE UNITS

4.5.1. General

Buildings, pipeline manholes and cable manholes may be designed as precast concrete structures. Precast concrete units shall not be used for building water retaining structures.

Precast concrete units, both reinforced and unreinforced, shall comply with the Employer's Requirements. The Contractor shall submit drawings to the Engineer in accordance with Technical Specifications. If ordered by the Engineer, the Contractor shall also submit detailed calculations for precast concrete units.

Precast concrete units shall be manufactured either on the site or in a concrete factory approved by the Engineer.

All precast concrete units shall have the date of casting and identification number engraved on them before the concrete is fully hardened. Any undated units shall be liable to be rejected by the Engineer. The Contractor shall take all measures concerning the curing and protection of the units after fabrication.

Transportation of the units to the site shall be permitted only under the following conditions:

- 28 days after fabrication, or
- after the required compressive strength has been reached.

Where the installation of precast concrete units in any particular structure is such that the faces of the units are to be left exposed either internally or externally, the exposed surfaces of the units as finished shall be uniform in colour and in texture. All cement, aggregates and other materials used in the manufacture of the units shall be obtained from the same approved sources throughout the period of manufacture.

Concrete for precast units shall be placed and compacted by methods approved by the Engineer.

4.5.2. Concrete quality and tests on concrete

The concrete used in the manufacture of precast concrete units shall comply in every respect with these Specifications and the class of concrete required shall be in accordance with the requirements of TS 500.

The design, mixing, testing, curing and quality control of the concrete used in precast units shall be in accordance with these Specifications.

4.5.3. Cast-in parts

Cast-in parts, such as lifting lugs, fasteners, jointing materials supporting structures, etc shall be fixed in the positions as shown on the drawings. Cast-in parts shall be free from rust, dirt or grease and shall be properly stored before using.

4.5.4. Transport, storage and erection

At all stages and until completion of the Works, precast units shall be adequately protected to preserve all permanently exposed surfaces and arises. The protection shall not mark or otherwise disfigure the concrete.

Transportation, storage and erection of the precast concrete units shall be done carefully and, in such way, as to avoid any damage and to keep the surfaces of the units free from dirt or other unwanted marks. Loading and unloading, storage and erection of the precast concrete units at the site shall be carried out by skilled labour and under supervision of a competent supervisor.

Any precast concrete unit which is found cracked, damaged or otherwise inferior in quality either before or after erection shall be rejected and shall be replaced by the Contractor.

4.5.5. Installation of precast concrete

All precast concrete units shall be laid, bedded, jointed and fixed in accordance with the lines, levels and other details shown on the approved drawings provided by the Contractor.

Dry-pack mortar, where necessary, shall be used for jointing or packing in accordance with these Specifications. The mortar shall be placed and packed in stages where possible from both sides of the space being filled using a hardwood stick hammered until the mortar is thoroughly compacted.

4.5.6. Manufacturing in a factory

Precast concrete units may be manufactured in a factory approved by the Engineer. The Contractor shall give the Engineer full information, in advance, concerning the name and address of the factory and details of the probable date of commencement of manufacture. The Contractor shall make the necessary arrangements for the Engineer to inspect the factory during working hours. The conditions stipulated in Section 6.1 of these Specifications shall also be valid for precast concrete.

4.5.7. Work programme and method statement

The Contractor shall submit to the Engineer, for his approval, the work programme and method statement giving full details of his proposed method of carrying out all operations connected with the manufacture and erection of precast concrete units, which shall include the following:

- period required to produce the drawings and detailed calculations
- dates of commencement of manufacturing of the concrete units
- dates of delivery to site
- sequence of erection and the period required for site erection works
- a description of the types of casting bed, mould and shuttering for the various types of members
- the procedure for reinforcing, concrete casting and method of curing the concrete
- the procedure for transporting, handling, hoisting and placing of each type of precast concrete unit
- the necessary strength of in situ cast concrete before starting site erection works
- the design, manufacturing and mounting details to adapt the in-situ cast concrete to the assembly
- particulars of temporary supports as deemed necessary to ensure adequate stability during erection and to sustain the effects of construction loads, wind loads or other transient loads.

No works shall be started until the programme and the method statement have been approved by the Engineer.

4.6. STEELWORKS

4.6.1. General

The Contractor shall fabricate, supply, deliver and erect all steelworks, fixing materials and associated parts according to the Employer's Requirements and drawings and shall comply with the requirements of the relevant standards, unless otherwise specified or instructed by the Engineer.

The steelworks shall comprise of the following main items:

- open mesh flooring and gratings, including framework and supports
- manhole covers
- bar screens and accessories in overflow chambers and outfalls
- flanges and bolted connections
- anchoring
- step irons, ladders and pipes where shown on the approved drawings or instructed by the Engineer
- Staircases, landings and platforms in buildings.

For all fabricated steel works, the Contractor shall submit fabrication details and drawings and calculations for the approval of the Engineer prior to the manufacture of any of the items.

The structural steelworks comprise mainly the fabrication and erection of the following constructions:

- columns and beams
- gratings, including frameworks
- hatches, including frameworks
- angles for protection of edges in several lengths, including anchors
- ladders and step irons
- staircases, landings and platforms
- other structural steelwork associated with the specified mechanical and electrical plant.

Prior to any steel fabrication work, the supplier shall submit full details of his proposed procedure, qualification and methods of fabrication to the Engineer for approval.

This information shall include (but not be limited to) the following details where they are relevant:

- The method of plate forming
- Joint design

- Proposed welding procedure and proof of competence of welders
- Method of straightening, sizing and hydrostatic testing
- Quality control and inspection procedures.

4.6.2. Standards and rules

The Contractor shall carry out the works described in accordance with the appropriate Turkish Standards (TS) and European (EN) standards. The main standards are, but shall not be limited to, the following:

TS 498	Design loads for buildings
TS 648	Building code for steel structures
TS 11590	Paints - Epoxy resin based - Used for steel structures
TS EN 10025	Hot rolled products of structural steels
TS EN 10029	Hot rolled steel plates 3 mm thick or above; tolerances on dimensions and shape
TS EN 10034	Structural steel I and H sections; tolerances on shape and dimensions
TS EN 10067	Hot rolled bulb flats - Dimensions and tolerances on shape, dimensions and mass
TS EN 444	Non-destructive testing - General principles for radiographic examination of metallic materials by X and gamma-rays
TS EN 583	Non-destructive testing - Ultrasonic examination
TS EN ISO 23277	Non-destructive examination of welds - Penetrant testing of welds - Acceptance levels
TS EN ISO 11666	Non-destructive examination of welds - Ultrasonic examination of welded joints - Acceptance levels
TS EN 1011	Recommendations for welding of metallic materials
TS 6062 EN 25184	Straight resistance spot welding electrodes
TS 1478 EN 124	Gully tops and manhole tops for vehicular and pedestrian traffic - Design requirements, type testing, marking, quality control.

Contractor shall provide printed or digital copies of these standards at the site office, for the use of the Engineer's and Contractor's personnel.

4.6.3. Quality and testing of materials

Should the Contractor propose to use materials complying with standards other than those specified above, he shall have submitted details of such standards. At least two weeks before ordering materials, the Contractor shall send a written notice to the Engineer giving the following details:

- type, quality and quantities to be ordered from a steel mill
- type, quality and quantities to be ordered from available (local or non-local) stocks.

Test certificates from the steel manufacturers shall be required to be submitted to the Engineer for the materials ordered. Material obtained from stocks shall be checked by the Engineer for the exterior defects either in the workshop or at the site.

4.6.4. Manhole and access covers and frames

Manhole covers, and frame material shall be spheroid graphite cast iron in accordance with TS 526 EN 1563. Employer's name, logo and the collector type (rainwater or wastewater) shall be designated on the manhole covers.

A heavy grease seal is to be formed between the cover and frame to prevent the ingress of sand.

Keyways in manhole covers shall be closed.

4.6.5. Surface boxes

Cast iron surface boxes shall comply with the relevant requirements of TS 1478 EN 124. The lid shall be chained to the frame.

4.6.6. Ladders and step irons

With the exception of internal access ladders to water tanks, reservoirs and wet sumps, ladders shall be in steel (fully hot-dip galvanised). Ladders for internal access shall be in stainless steel.

The stringers shall be sized to suit the height of the ladder and the interval of the stringer supports. Stringers shall be radiused over the top and drilled to receive the rungs, which shall be welded to the stringers on each side of each stringer. The bottom ends of the stringers shall not be designed for floor fixing but shall terminate at wall fixing supports at least 150 mm above the floor. All edges of stringers shall be ground smooth to remove burrs and sharp edges.

Where the installation of hoops is not possible or appropriate, as agreed with the Engineer, anchorage points shall be provided for attaching safety harnesses.

4.6.7. Steel stairways in buildings

Stairways shall be designed for a loading of 5.0 kN/m² of plan area of the stairway. Steel stairways shall be provided with tubular handrailing, stringers of cross section suitable for the span and loading and treads of open mesh flooring or chequer plating. Except where specified otherwise, the rise between treads shall be uniform and between 150 mm and 175 mm. Stairways in the same area of the works and in similar locations shall have the same angle and height of rise between treads.

The width of the treads shall be between 250 mm and 300 mm. The width of the stairways shall not be less than 750 mm.

The stringer shall be mounted by means of angle brackets with slotted holes for adjustment of line and level.

4.6.8. Handrails in buildings

Handrails shall consist of galvanized steel and be designed to withstand a horizontal force at handrail level of 350 N/m. The deflection of rails shall not exceed 0.8% of their span between standards and the deflection of standards shall not exceed 0.8% of their height.

Standards and handrails shall be not less than 30mm in diameter.

Horizontal handrails shall be 1100 mm high with an intermediate rail 550 mm high. The handrail height shall be measured vertically from finished floor level to the handrail centreline.

Sloping handrails shall be as specified for horizontal handrails but with the top rail 900 mm vertically above the line of pitch. Stanchions shall be vertical and spaced at not more than 1.5 m measured parallel to the line of pitch.

Horizontal mounting flanges shall be drilled for not less than three bolts with two bolts on a line parallel to and on the walkway side of the line of the handrail. Vertical mounting flanges shall be drilled for not less than two bolts with the line through the bolts being vertical. Fittings shall be screwed or secured with grub screws. The standards shall be set at not more than 1.5 m centres. When provided in sections, handrails shall be joined together with purpose-made fittings secured by screws or grub screws.

Ladder and other openings shall be closed with two galvanized mild steel hanging chains which shall be secured at one end and detachable at the other.

Bolts, nuts and washers shall be hot-dip galvanized.

Handrails, balustrades, bolts and nuts in the Administration Building shall be made of stainless steel.

The Contractor shall ensure that, unless specified to the contrary, all handrails shall be of uniform appearance and manufacture.

4.6.9. Structural steelwork

The permissible design stresses for materials, bolts, rivets, etc are given in TS 648.

Rolled structural steel sections shall be mild steel complying with the requirements of TS EN 10025 and TS EN 10029. The dimensions, tolerances and properties of the structural sections shall conform to TS EN 10034 or TS EN 10067

Structures and components, such as required for ladders, hoppers etc shall be shop fabricated so as to form sub-assemblies of the largest practical size suitable for transportation, handling and erection.

The coating systems shall be as given in Section 5.

4.6.10. Bolts and nuts

Steel bolts and nuts for structural steelwork shall be high strength friction grip galvanized bolts conforming to ISO 887 or black bolts conforming to DIN 7990. Nuts shall conform to TS 1026-8 EN ISO 4032 and TS 1026-31 EN ISO 8673. Washers shall conform to DIN 7989.

High strength friction grip bolts shall be used in conjunction with approved proprietary load indicating washers.

4.6.11. Welding

All welding carried out during fabrication or erection shall be in accordance with the requirements of TS EN 1011 and as shown on the approved detail drawings. Details of the proposed weld procedures shall be submitted to the Engineer for approval at the same time as the detail drawings. All connections shall be welded in such a manner as to make the finished connections neat and smooth in appearance and suitable for painting. All slag shall be removed, and all sharp projections shall be round smooth.

Before welding is commenced either in the fabrication shop or on Site, weld procedure tests shall be carried out in accordance with TS EN ISO 15614 where directed by the Engineer.

All welders employed either in the fabrication shop or on Site shall pass qualification tests relevant to the weld procedures in use in accordance with TS EN 287. Welders shall have satisfactory evidence of having been engaged in welding for at least 9 months in the preceding 12-month period. If the work of any welders employed on the Contract is unsatisfactory, the Contractor shall carry out such further welder qualification tests as are necessary to demonstrate that the welders are proficient.

Welds shall be subjected to non-destructive testing by processes which may include but shall not necessarily be limited to radiographic, ultrasonic, magnetic particle or dye penetrant methods, depending on the type of weld and its position in the structure. The standards of acceptance shall be as defined in TS EN 444, TS EN 583, TS EN 23277 and TS EN ISO 11666, unless otherwise agreed with the Engineer. If any work shows defects or fails to comply with the requirements of the detailed drawings or Specification for any reason it shall be repaired or rejected, even though it may have been carried out by qualified welders using approved procedures.

All welding consumables (electrodes, wire, filler rods, flux, shielding gas and the like) shall comply with the requirements of TS EN 1011.

Weld electrodes for metal arc welding shall conform to TS 6062 EN 25184 and with the requirements of the appropriate weld procedure.

4.6.12. Fabrication tolerances

The general tolerance on all dimensions shall be ± 2 mm. Holes shall be aligned such that fasteners can be freely inserted through the members at right angles to the contact face. Where holes in members cannot be aligned without damaging or distorting the structure, the member or members shall be rejected unless the Engineer shall permit reaming the holes.

A structural member shall not deviate from straightness (or from the specified shape) by more than:

- 1/1000 of the lengths between lateral restraints in the case of compression members and beams, or
- 1/500 of the overall lengths (maximum 25 m) in the case of other members.

A structural member shall not deviate from its intended length by more than:

- 1 mm in the case of compression members faced at both ends for bearing, or
- + 0 to - 4 mm in the case of other members.

Lengths of components shall be such that cumulative variations do not prejudice the accurate alignment of the completed structure.

Where two steel surfaces are required to be in contact to affect a bearing or frictional contact, the surfaces shall be prepared so that at least 90% of the area is touching before any clamping force is applied.

4.6.13. Dissimilar metals

Where dissimilar metals are used in close proximity to structural steel members or their connections, contact between such metals and the steel shall be avoided unless the Contractor can demonstrate to the satisfaction of the Engineer that contact between the dissimilar metals will not lead to galvanic corrosion.

Contact between aluminium or aluminium alloy and galvanized mild steel shall be permitted. For fixing aluminium to steel structures, bolts, nuts, washers and screws shall be galvanized.

Where galvanized parts may become sacrificial anodes to the main structure or where the electrolytic potential difference exceeds 250 mV, the parts shall be separated by an insulating medium of adequate strength.

4.6.14. Stainless steel

The requirements for stainless steel are given below in Section 5.

5. TECHNICAL SPECIFICATIONS FOR MECHANICAL WORKS

5.1. GENERAL

It shall be the responsibility of the Contractor to ensure full coherence of all the equipment installed and to comply with the present minimum quality requirements.

5.1.1. General Requirements

All materials that are the subject of the tender shall be new, and they shall not have any material and manufacturing defect. The name of the manufacturer, year of manufacturing and serial number shall be written on each material.

The contractor shall deliver the catalogues, brochures and data sheets of at least 3 (three) different manufacturers or sellers to the Engineer during performance of the work, before supply of all pump, equipment and MCC Panels (together with the single line diagrams to be prepared taking into account the motor power consumptions of motors from network) in accordance with the relevant technical specification and the item(pose) description. The materials shall be ordered as a result of the agreement to be made at the end of the evaluation by Engineer with consent of Employer to be performed.

The Contractor is obliged to take all measures necessary for safe operation of the system and to install the required equipment in the plant.

Each machinery and equipment shall have minimum 2 (two) years commercial(manufacturer) warranty beginning from the substantial completion of the plant in line with regulations of Turkey. The contractor is obliged to issue the warranty certificates on behalf of the Municipality and submit the original copies to the Municipality. In case of the failures of the materials that may occur during the Defect Liability Period, the Contractor shall intervene within maximum 10 days following the written notification of the subject by the Employer or Municipality taking into account the urgency of the work. If the contractor fails to fulfil its obligation for maintenance and repair on time or fulfils it with delay, although it is specified in the contract, the contractor shall be responsible for remedying the losses and damages of the materials.

The Contractor shall ensure;

- Safety of operation and easy maintenance
- Well-proven and reliable components
- Ability to withstand the service conditions
- Inaccessibility for vermin, dust and humidity
- Precautions to minimize corrosion
- Spare parts available in Turkey
- Service available in Turkey
- Minimization of noise

'The Contractor is full responsible for choice of material and equipment, delivery to the site and installation of all. Alterations of design and make of the offered equipment after the contract has been signed can only take place with the consent of the Engineer.

5.1.2. Environment

All equipment shall be rated for the ambient temperatures relative humidity and altitude at the Site.

The Contractor shall in selection of equipment take into consideration under which conditions each item shall be in operation. Equipment placed in the open shall be designed for solar radiation induced temperatures.

Equipment placed in or near wastewater shall be efficiently protected against the intrusion of humidity and water.

Equipment placed where the risk of condensation prevails shall be provided with drainage holes placed in the lower part of the equipment.

Equipment shall moreover be designed for preventing intrusion of insects and smaller reptiles.

5.1.3. Programme of works for machinery

The programme of works for machinery to be supplied and installed shall be divided into the following parts:

Part I Manufacturing period:

Design and manufacture of all equipment to be supplied under the contract including inspection and works testing.

Part II Shipping period:

Delivery of all equipment from factory to the Contractor's on-site storage including all freight loading, offloading, customs duties and clearance.

Part III Erection period:

Removal of the materials and equipment from off or on-site storage, delivery to erection site and installation.

Part IV Site testing:

All mechanical equipment and machinery shall be tested in the presence of the Engineer before being put into operation.

Part V Running-in and Tests on Completion:

All installed mechanical equipment and machinery shall be adjusted so as to comply with the operation requirements and actual conditions. Manuals and other documentation shall be provided by the Contractor.

Tests on Completion shall not take place before the Contractor has finalized all the works including testing and running in, despite the fact that some machinery will, at the time for Tests on Completion, have been in operation for some time.,

5.1.4. Coordination

It is the responsibility of the Contractor to ensure full coherence between the equipment delivered according to the present mechanical specifications and the specifications for electrical and civil works.

The Contractor shall also be responsible for all sub-contractors and suppliers of equipment and materials. No direct formal communication between the Employer and the sub-contractors will be permitted.

It is the responsibility of the Contractor to secure that sub-contractor and suppliers get all the relevant information of the present specifications.

The Contractor shall appoint and provide an experienced mechanical and electrical engineer to monitor and co-ordinate all aspects of the mechanical and electrical work.

5.1.5. On-site manufacturing

It is the obligation of the Contractor to provide all installations within the working area as he considers necessary for on-site manufacturing and shaping of materials and equipment. The working site may be used as intermediate storage for equipment at the Contractor's own risk and at his own cost.

It shall be noted, that the Contractor's obligations on taking the necessary safety precautions shall apply for the working camp area as well.

5.1.6. On-site storage and safekeeping

The Engineer shall be informed by the Contractor about machinery delivery dates well in advance of the anticipated time of arrival of the items.

In general, all equipment shall be stored according to the manufacturer's requirements. If equipment and/or machinery is to be stored on site, the Contractor shall either:

Adequately package all items to enable the equipment and materials to be stored in the open without any deterioration whatsoever, or

Provide an approved store, complying with the following minimum requirements:

- Rotating mechanical equipment: Covered, ventilated, dust and vermin proof area.
- Pipes, valves, steelwork etc.: Sheeted on open hard standing area.

The Contractor shall be responsible for the operation, safe keeping and maintenance of all equipment on site during storage and after erection up to the issue of the taking-over certificate.

Operation and maintenance of the equipment after the taking-over period and during the Contractor's operation and maintenance period shall be the responsibility of the Contractor.

5.1.7. Erection

The Contractor shall make his own arrangements for unloading of equipment and materials supplied and shall be responsible for any damage occurred. The Contractor shall at his own expense provide all tools, meters, gauges, temporary provisions as well as skilled and unskilled labour for the erection of the mechanical installations so that it can be installed complete and in good working order.

If required by the Engineer, for the proper installation of all mechanical equipment under this Contract an authorised representative of the manufacturer and its service organisation shall approve the installation and sign together with the contractor a statement with such approval. A form of such statement will be provided by the Engineer.

5.1.8. Standards

The applicable standards for machinery are as follows (but not limited to):

EN ISO 14121: Safety of machinery - Risk assessment

TS EN ISO 12100: Safety of machinery - General principles for design - Risk assessment and risk reduction

TS EN ISO 13850: Safety of machinery - Emergency stop equipment - Functional aspects and principles for design

TS EN 60204: Safety of machinery - Electrical equipment of machines

TS EN ISO 14122: Safety of machinery - Permanent means of access to machinery

TS EN 61000: Electromagnetic compatibility

EN 12255: Wastewater treatment plants

TS 2575 EN 60073: Basic and safety principles for man-machine interface, marking and identification - Coding principles for indication devices and actuators

TS EN 60439: Low-voltage switchgear and control gear assemblies

TS EN 60947: Low-voltage switchgear and control gear

TS IEC 60255: Electrical relays

TS EN 61131: Programmable controllers

TS EN 61082: Preparation of documents used in electrotechnology

TS IEC 60617: Graphical symbols for diagrams

IEC 60076: Power transformers

TS HD 60364: Low-voltage electrical installations

IEC 61024: Protection of structures against lightning

If there is a standard for the equipment required to be manufactured specially, quality certificates of the related equipment shall be submitted during delivery.

The materials to be supplied from abroad shall have ISO certificate and shall comply with the international norms.

If more than one standard is specified for any equipment and material, any material that is appropriate for the request of the contractor or the approval of the Administration can be supplied.

For the issues that are not included in the national specifications and standards, compliance with the recognized international standards shall be requested. Manufacturing with more than one standard shall be preferred.

5.1.9. Equipment and manufacture

The Contractor shall guarantee all mechanical equipment against faulty or inadequate design, improper assembly or erection, defective materials or workmanship, as well as leakage, breakage or other failure. Materials used shall be suitable for operation conditions.

All equipment shall be designed, manufactured and assembled in accordance with recognized and acceptable engineering and shop practice and selected for long life and minimum maintenance. Individual

parts shall be manufactured to standard sizes to the extent possible, so that repair parts furnished at any time can be installed on site.

Mechanical equipment shall be new and shall not have been in operation at any time prior to delivery, except as required by tests.

Mechanical equipment manufacturers, will be proposed as vendors, shall have ISO 9000:2000 quality system certificate.

It is the Contractor's responsibility to ensure that the components of the systems are compatible as to dimensions, ratings and operational characteristics and integrated to form a fully efficient system complying with the specifications.

All equipment and materials, which shall be provided to be used in pertinent works, shall be submitted to the Engineer's approval together with operating capacity, certified test reports and other necessary information. Engineer may not accept any equipment or material which is not as per specification.

5.1.10. Machinery guards and labelling

Machinery shall be guarded to prevent injury to persons and meet international and local safety regulations.

Adequate guards shall be supplied and installed throughout the installation to cover all drive mechanisms. All rotating and reciprocating parts, drive belts etc. shall be securely covered to the satisfaction of the Engineer to ensure the complete safety for both maintenance and operating personnel. However, whilst all such guards shall be of adequate and substantial construction, they shall also be readily removable for gaining access to the equipment.

The Contractor shall arrange for the supply and fitting of warning labels for all machinery operated under automatic control.

All identification information and warning labels shall be in Turkish language.

Guards for machinery shall be constructed of stainless steel mesh or other corrosion resistant material. Means of set bolts or studs in tapped holes shall attach guards for parts that need to be examined. Self-tapping screws shall not be used.

5.1.11. Lubrication

Equipment shall be adequately lubricated by systems, which require attention not more frequently than weekly during continuous operation. Lubrication systems shall not require attention during start-up or shutdown and shall not waste lubricants.

Lubrication facilities shall be convenient and accessible. Oil drains and fill openings shall be easily accessible from the normal operating area or platform. Drains shall be located so as to allow for collection of waste oil into containers without removing the equipment from its normal position.

Lubricants of the type recommended by the equipment manufacturer shall be provided in sufficient quantities to fill all lubricant reservoirs and to replace all consumption during testing, start-up and operation prior to acceptance of the equipment by the Engineer.

Furthermore, a list of recommended lubricants and their equivalents shall be included in the operation and maintenance instructions. The lubricants recommended shall be available in Turkey. Sufficient lubricants shall be supplied for operation of the plant during the entire defects liability period. The quantities shall be based on operating hours of 24 hours per day.

A list of recommended lubricants and their equivalents shall be included in the operation and maintenance instructions.

5.2. CORROSION PROTECTION

5.2.1. General

Mechanical equipment shall be protected against corrosion by painting or other convenient treatment to a degree sufficient for the intended function and placement of the actual works.

All bright metal parts shall furthermore be covered before shipment with an approved protective compound and adequately protected during shipment to site. After erection these parts are to be cleaned.

Where the Contractor has a possibility to select different coatings that comply with technical requirements then the coating that has the smallest possible impact on workers' health and safety shall be used. Documentation of the choice should be made available to the Engineer.

Dry surfaces, e.g. outer sides of valves, shall be categorised to C3 in TS EN ISO 12944 and shall be protected against corrosion accordingly. Wetted or submerged surfaces, e.g. inner sides of valves, shall be categorised to IM2 in ISO 12944 and shall be protected against corrosion accordingly.

5.2.2. Galvanizing

Where steel or wrought iron is to be hot-dip galvanized, it shall be carried out by the hot-dip process and shall conform in all respects with TS EN ISO 1461.

Attention shall be paid to the detail of members in accordance with TS EN ISO 14713. Adequate provisions for filling, venting and drainage shall be made for assemblies manufactured from hollow sections. Vent holes shall be suitably plugged after galvanizing.

All surface defects in the steel including cracks, surface laminations, laps and folds shall be removed in accordance with TS EN 10025. All drilling, cutting, welding, forming, unit members and assemblies shall be completed before the items are galvanized. The surface of the steel to be galvanized shall be free from welding slag, paint, oil, grease and similar contaminants.

The additional weight of the items after being galvanized shall be not less than 610 grams (80 micron) per square metre of galvanized surface.

During off-loading and erection utmost care must be taken in order to avoid any damages to the galvanized surfaces. Galvanized items in stock shall be stacked so as to provide adequate ventilation to avoid wet storage staining.

Small areas of damaged galvanized coating may according to agreement with the Engineer in every case, be restored by:

Cleaning of the area of any weld slag and thoroughly brushing to provide a clean surface

Application of two coats of zinc-rich paint or application of a low melting point zinc alloy repair rod or powder to the damaged area, which is heated at 300°C.

Where galvanized steel will be in contact with aggressive solutions and/or atmospheres, the galvanized surfaces shall receive further protection by painting in accordance with the paint specifications given below.

The geometry of galvanized steel parts shall be thoroughly checked after galvanising. Any deformations shall be corrected without damaging the zinc layer.

Inspection and Documentation of Hot Dip Galvanising

The inspection and quality assurance of the hot dip galvanising carried out by the Contractor shall be in conformity with TS EN ISO 1461. Documentation for this inspection and quality assurance shall be issued and become part of the Quality Assurance documentation. After components have become hot dip galvanised, machining is not allowed.

5.2.3. Painting in particular locations

The painting specifications are applicable to metal surfaces in the below mentioned locations:

A. Indoor location

The surfaces are not liable to liquid splashing or aggressive atmospheres.

B. Outdoor location

The surfaces are liable to rain and/or splashing from non-aggressive liquids. The surfaces are not liable to aggressive atmospheres.

C. Immersed location

The surfaces are below liquid level in aggressive or non-aggressive solutions, or the surfaces are liable to aggressive atmospheres.

The colour schemes for the applied final paints shall be presented for and approved by the Engineer.

All preparation and painting at works shall be carried out under cover at ambient temperatures controlled between 16 and 21°C and as agreed with the Engineer. Painting shall not be carried out on surfaces which are not absolutely dry.

5.2.4. Preparation and painting of steel work

Preparation and Initial Protection of Steelwork in Locations A and B

Works preparation shall be carried out when all machining has been completed and all traces of grease removed. In the case of welded steel works all slag and splatter shall be removed from the area of welds by chipping prior to sandblasting and priming.

All steel other than stainless steel shall be sandblast to grade SA 2½ and given a priming coat of an approved polyamide cured Zinc Phosphate Epoxy - double layer to provide a dry film thickness of at least 50 microns above peaks. The prime coating shall be applied with an airless spray process within 4 hours after sandblasting.

NB! Galvanized steel shall remain unpainted in these locations.

Preparation and Initial Protection of Steelwork in Location C

Works preparation shall be carried out when all machining has been completed and all traces of grease and welding slag and splatter removed.

All steel other than stainless steel shall be prepared and hot-dip galvanized to TS EN ISO 1461.

Initial protection of hot dip galvanized surfaces shall comprise:

Thoroughly cleaning and de-greasing of all surfaces followed by etching with T-wash according to TS EN ISO 12944.

Washing with clean water, completely dried and given a priming coat of an approved Polyamide Cured Zinc Phosphate Epoxy - double layer to a dry film thickness of not less than 40 microns.

First Finishing Paint in Locations A, B and C

To surfaces in location A one coat of an approved Polyamide Cured Epoxy Micaceous Iron Oxide double layer shall be applied by brush or airless spray to give a dry film thickness not less than 125 microns. First finishing paint shall be given within 48 hours after application of priming coat.

To surfaces in location B and galvanized surfaces in location C one coat of an approved Polyamide Cured Epoxy Coal Tar double layer shall be applied by brush to give a dry film thickness not less than 125 microns. First finishing paint shall be given within 48 hours of priming coat.

Final Finishing Paint in Locations A, B and C

Surfaces in location A shall be given sufficient coats of approved Silicone Alkyd Enamel to give a dry film thickness of not less than 50 microns.

Surfaces in location B and C shall be given one coat of an approved Polyamide Cured Epoxy Coal Tar to give a dry film thickness of not less than 125 microns.

The total paint thickness on final inspection of the works shall not be less than:

Surfaces in location A - 200 microns

Surfaces in location B and C - 300 microns.

The colour of the final coating shall be approved by the Engineer.

Cast Iron

Cast Iron and Ductile Iron shall be protected with first and final finishing paint as described above according to the actual location. The total paint thickness shall conform to the requirements stated.

Electric Motors and Enclosures

The surfaces of motors, gear enclosures shall be to the manufacturer's recommended finish according to location and shall be given sufficient coats at site of approved Silicone Alkyd Enamel to give a dry film thickness of not less than 50 microns.

Inspection of Corrosion Protection

Prior to the termination of the defect liability period a visual examination of the surface treated constructions and components shall be carried out. If rust or blisters is visible and these failures cannot be assigned to normal wear nor impact damages, the Contractor shall without any expense to the Employer mend the damages in conformity with a repair procedure approved by the Engineer.

5.3. STEEL CONSTRUCTION

Steel constructions shall be designed as to resist the static and dynamic forces they are exposed to. The Contractor must specify in his offer the most important materials used.

Where risk of galvanic corrosion persists, galvanic separation is required.

5.3.1. Structural Steel

Structural steel shall be selected from TS EN 10025 of an appropriate grade and be accompanied by a materials certificate in accordance with EN 10204.

Where risk of galvanic corrosion persists, galvanic separation is required.

5.3.2. Wrought steel

Where not otherwise specified, wrought steel parts shall be selected from appropriate grade of TS EN 10083 and be free from blemishes, shot or hammer marks.

The steel must be suitable for hot dip galvanizing. Serious rust must not be found.

The Contractor shall submit for the approval of the Engineer, the grade number selected for the various components.

5.3.3. Cast iron

All grey iron castings supplied shall be to the appropriate grade in TS 522 EN 1561. All castings are to be free from blowholes, flaws and cracks.

No plugging, filling, welding or "burning-on" will be accepted.

5.3.4. Stainless steel

Stainless steel used throughout the wastewater treatment plant shall be provided in accordance with TS EN 10088-1 grade EN 1.4404 or be of better quality, if not specified otherwise. However, the Contractor shall determine if the stated minimum requirements are sufficient for the particular application and if necessary select a higher grade.

Material thickness in constructions of stainless steel shall be at least 3 mm when not otherwise stated. Welded tubes shall have a wall thickness of at least 2 mm.

Material certificates are required for all stainless steel to be incorporated in the works. Certificates shall comply with EN 10204. Certificates shall be part of the QA-documentation

All stainless-steel material, pipes, flanges etc., shall be stamped according to their type, grade and pressure class. In addition, all stainless steel shall be accompanied by an authentic manufacturer's certificate to enable verification of origin and date of manufacture.

5.3.5. Aluminium and aluminium alloys

Due to the corrosive atmosphere, the use of aluminium or aluminium alloy requires the approval of the Engineer in all cases.

Immersed installations or installations which are periodically immersed must not be constructed from aluminium or aluminium alloys.

If used alloys shall be of a type used for marine applications with magnesium as the main additive.

5.4. WELDING

5.4.1. Welding in general

All welders shall be qualified and have a valid certificate according to TS EN 287 from a recognised testing institute. The certificate shall prove that the welder has passed the tests satisfactorily.

All welds in pipe joints shall be carried out in accordance with Welding Procedure Specifications (WPS) issued for each particular type of weld and material according to EN 288. The Welding Procedure

Specifications shall be filled in or approved by an independent body, approved by the Engineer, before welding.

All welding works shall be performed under the most convenient working conditions; hence all welding work shall be carried out at the manufacturer's workshop. Field welding will be allowed only after prior approval by the Engineer. Modern, effective equipment and techniques and latest welding technologies are to be utilised. All welding shall be performed by welders qualified and experienced in the particular type of welding required. It shall be the responsibility of the Contractor to ensure that all welding operators are properly qualified and competent to carry out all required field welding.

Records of welding procedures and welder performance qualification tests for work done shall be maintained by the Contractor for review by the Engineer.

The method and procedure adopted for welding in workshops and at site shall be approved by the Engineer before production starts.

Welding Procedure Qualification

The Contractor shall submit detailed welding procedure specifications complying with TS EN 287. All dimensions, all combinations of materials to be joined and all repair welding shall be covered by the procedure specifications. The procedure specifications are subject to the approval by the Engineer.

The Engineer may at sole discretion approve the use of already established, sufficiently tested and documented procedures not more than two years old. Transfer of welding procedure qualification records from one contractor to another is not permitted.

For each procedure specification and prior to start of production welding the Contractor shall carry out welding of test joints under site conditions following all of the details of the approved procedure specifications.

The qualification test shall be carried out on steel with the highest specified minimum yield strength/maximum carbon equivalent which is expected to be covered by the Welding Procedure Specification. All the results from the procedure qualification records shall be submitted to the Engineer for approval of welding procedures.

Qualification of Welders and Welding Operations

Only skilled welders and welding operators who can document qualifications relevant for pipeline welding will be accepted by the Engineer. Prior to the performance of any production welding operators shall qualify for the relevant welding procedures according to TS EN 287.

The qualification tests are acceptable if they meet the requirements for visual examination, destructive testing and for radiographic examination as specified in TS EN 287. The testing shall be carried out by an approved laboratory at the Contractor's expense. Welder and welding operator performance test certificates shall be issued and kept on site during the whole working period.

Welder and welding operator qualification tests may be performed together with welding procedure qualification tests. These certificates are only valid for six months after the last welding.

Welding of Pipelines

The Contractor shall supervise the site, the welders and their work during the entire working period. For this purpose, the Contractor shall use a qualified welding engineer or alternatively, if accepted by the Engineer, an engineer with documented thorough theoretical knowledge and practical experience in the performance and evaluation of the welding work.

The welding shall be inspected by an independent inspection company engaged by the Contractor. It is the sole responsibility of the Contractor to document that welding, and welding inspection fulfils all specified requirements.

Welding Preparation

Each pipe or component shall be visually inspected to ensure that it has not sustained any visually determinable damage. Disposition of damaged items shall be resolved in consultation with the Engineer.

All requirements for welding preparation contained in the qualified welding procedure specification shall be strictly adhered to.

Welding

All welding shall be performed by qualified welders and strictly in accordance with qualified welding procedures.

Welding shall be suspended by the Contractor when prevailing weather conditions will impair the quality of the work, e.g. airborne moisture, blowing sand, high winds or thunderstorms.

Stray arching outside the weld groove is not permitted. Should stray arching outside this area occur, this shall be brought to the attention of the Engineer who may require any such damaged section to be repaired or cut out at the Contractor's expense.

Each pass shall be completed around the whole circumference before the next pass is started.

The position of start/stop on subsequent passes shall not be identical.

No welded joints shall have less strength than the joined parts.

Upon completion of the weld and the pipe surface shall be cleaned of weld spatter and other deposits and shall then be wrapped with a dry waterproof insulating mat to ensure a slow cooling of the weld zone and to give protection against rain.

Materials

The weld filler metal selected shall give a weld metal matching the base metal properties as closely as possible. The yield strength of consumables shall neither overmatch the base material yield strength by more than one level in TS EN ISO 2560, nor shall under matching be allowed.

Cleaning of Carbon Steel Items after Welding

The surface shall be dry and free of oil, grease, soil and concrete residues. All loose rust and mill scale shall be removed by wire brushing immediately before welding inspection. On straight pipes brushing shall be done mechanically using sharp brushes to avoid polishing of the steel surface. Therefore, a stock of readily accessible new brushes is required.

Welds fabricated with basic filler metals shall be washed with fresh water.

Cleaning by sandblasting to grade Sa2 is allowed as an alternative.

Identification of Weld Seams

Every girth weld shall be numbered by the Contractor in accordance with a system to be specified by the Engineer. This number shall be painted on the pipe coating on one side of the joint between 0.5 m and 1.0 m from the seam together with the pipe number and pipe length to facilitate completion of the pipe book.

For each pipeline and each pressure test section, the Contractor shall fill in pre-printed forms and enter these in a pipe log. As the work progresses, the Contractor shall present the pipe log forms to the Engineer. Before the start of a pressure test, the completed pipe log for the section in question shall be handed over to the Engineer.

General Requirements, Welding Inspection

Examination shall be performed according to this specification and the following codes and standards:

- Radiographic examination according to ISO 1106, Part 3.
- Ultrasonic examination according to ASME Boiler and Pressure Vessel Code, Section V, Non-destructive Examination, Article 5, Ultrasonic Examination Methods for Materials and Fabrication.
- Magnetic particle examination according to ASME Boiler and Pressure Vessel Code, Section V, Non-destructive Examination, Article 7, Magnetic Particle Examination.
- Liquid penetrate examination according to TS EN ISO 3452.
- Visual examination according to ASME Boiler and Pressure Vessel Code, Section V, Non-destructive Examination, Article 9, Visual Examination.
- Hardness measurement according to ASTM E110, Standard Test Method for Indentation Hardness of Metallic Materials by Portable Hardness Testers.

The Contractor shall engage a qualified independent inspection company which shall perform, evaluate and document all welding inspection. The inspection company shall be approved by the Engineer.

All non-destructive examination shall be performed according to a written procedure. The procedure shall conform to the requirement of the adequate method standard and this specification. Procedures shall be submitted to the Engineer for approval and shall be qualified to the satisfaction of the Engineer.

Extent of Examination, Welding Inspection

All welds shall be 100% visually examined.

Thirty percent of the welds shall be tested. The following methods may be applied as approved by the Engineer:

- Radiographic
- Ultrasonic
- Penetration.

The radiographic method shall be used. However, if this method cannot be applied one of the other methods may be used, as approved by the Engineer.

Ultrasonic examination may substitute radiography where radiographic examination is impractical and may be used as general back-up for radiography in case of interpretation/verification problems.

Guarantee welds (welds which will not be pressure tested) and tie-in welds shall be 100% examined by radiography as well as by ultra-sound.

Welds to be tested shall mainly be selected from those of which the backside of the weld cannot be visually inspected. Such welds shall be tested by the radiographic or the ultrasonic method. Selection of welds shall be carried out by an accredited independent agency, approved by the Engineer.

All welds which have been repaired or replaced shall be 100% re-examined by the same methods and with the same acceptance criteria as required for the original work.

Socket welds and branch connection welds which are not radio graphed shall be examined by magnetic particle or penetrate methods to the extent stated for butt welds.

Where spot examination is required in subsequent sections, the welds shall be selected to ensure that the work of each welder and each welding procedure is included.

When required spot examination reveals defects, two additional welds, the preceding and the subsequent welds made by the same welder, shall be examined.

If one of these welds shows defects, three preceding and three subsequent welds shall be examined at the Contractor's expense.

If five or more subsequent welds of one welder show defects, all welds of this particular welder shall be additionally examined at the Contractor's expense.

10% of all butt welds shall be examined by radiography along their entire circumference as described above. The Engineer may specify greater extent of examination.

Acceptance Criteria

The accept criterion shall be class C in accordance with ISO 5817. The test shall be carried out by an accredited independent agency, approved by the Engineer. A report on the tests shall be provided.

Production Testing

The Engineer shall be entitled to select a number of seams for destructive testing.

The Contractor shall be responsible for cutting out the seams, bevelling the pipe ends and re-welding the joint. The destructive tests shall, unless otherwise agreed, be made in accordance with the requirements in the respective general welding specification covering qualification tests for welding procedures.

The Employer will bear the cost of these tests, if the welds are proved to be acceptable. However, if it turns out that the seam does not comply with all the requirements, the Contractor himself shall bear the costs. In this case, the Engineer may insist on an additional seam being tested, and the costs of the testing and renewal of this seam shall be paid by the Contractor, irrespective of the results. If this seam does not comply with the requirements, the control may be further extended at the Contractor's expense.

The extent of any such supplementary inspection work shall be decided by the Engineer with the aim of establishing in a satisfactory manner whether the welding work complies with the requirements or not.

If any change of personnel takes place during the course of the welding work, this could influence the quality of weld seams and the Engineer may require a new seam to be destructively tested at the Contractor's expense.

Document Requirements

The following documents are required before examination:

- Certificates for NDE personnel
- NDE procedures
- Report forms
- Request for deviations, if any, from specified requirements

During examination:

- Field reports

After examination:

- Authorised examination reports with enclosed field reports and films.

Coating of Weld Seams

Upon successful completion of all inspection procedures, the weld seams on carbon steel items and their surroundings shall be carefully cleaned and protected with an internal and external coating as specified in Section 5.2.

5.4.2. Welding of carbon steel

Acceptable welding processes are:

- Shielded Metal Arc Welding (Stick) SMAW
- Gas Tungsten Arc Welding (TIG) GTAW
- Gas Metal Arc Welding (MIG/MAG) GMAW
- Flux Cored Arc Welding FCAW.

The use of welding processes other than those listed above is permitted only with the prior approval of the Engineer. Processes may be used in combination if the same combination and sequence of processes have been qualified by the welding procedure qualification test.

Prefabrication in workshops shall be used to the maximum extent possible.

For the welding of carbon steel pipes, the AISI code B 31.1 and API Std. 5L recommended practices shall apply. Welded structures shall comply with TS EN 729.

5.4.3. Welding of stainless steel

For welding of stainless steel pipe, the AWS D10.4-79 shall apply.

The welding method shall be the tungsten inert gas method (TIG) or the metal inert gas method (MIG) for workshop as well as on-site welding. Irrespective of the method chosen the inner surface of the weld shall be protected by clean inert gas. When welding the oxygen content of the mixture oxygen/inert gas must not exceed 20 ppm.

In order to guarantee high quality welded joints, piping and other quality stainless steel components shall as far as possible be prefabricated in workshop.

For stainless steel welding the following shall be observed:

- Only butt weld jointing of pipes is allowed during erection work,
- Where butt welds are used, the penetration shall be completed, if necessary with root run,
- Backing rings shall not be used,
- No surface defects reducing the corrosion resistance or discoloration of the surface will be accepted,
- After welding the weld shall be carefully pickled and passivated, and
- The welds shall be thoroughly washed in clean water after pickling and passivation.

5.5. BOLTS

Steel-bolts shall be provided according to ISO 8.8 according to TS 3576 EN 20898. Stainless steel bolts shall be provided according to TS EN ISO 3506 and 3506-2 in grade A4, Class 70 or 80.

Bolts shall have an over-length of minimum 3 mm and maximum 12 mm for bored in or embedded bolts as well as flanged joints.

All necessary bolts, nuts, washers and anchor plates shall be supplied together with the joints. The bolts and nuts shall be high tensile steel with metric treads, and with hexagon heads.

All bolts, screws, nuts and mounts shall correspond to the material secured by bolts. This also applies to chemical anchors.

Bolts, washers and nuts for galvanized steel items and for coated steel items shall be hot dip galvanized. Washers shall always be used for bolts fastening coated steel in order to prevent destroying the coating.

Bolts, washers and nuts for stainless steel items like flanges shall be of stainless steel of similar grade or higher.

To prevent galling, strain hardening, crack and contact corrosion, it is necessary to apply molybdenum-sulphide or similar to thread and washers.

5.5.1. Chemical anchors and anchor bolts

Holding down bolts of sufficient length shall be provided and fixed for securing the whole of the machinery to the foundation.

Chemical anchors shall be supplied in quality suitable for conditions under which they are permanently exposed to the action of water.

Alternatively, an injection technique can be applied.

Fixation of mechanical equipment to concrete structures can be done by anchor bolts, which can be placed during casting, or by drilling. No anchor bolts may get in contact with reinforcement bars in the concrete structure. Anchor bolts used for installation of stainless steel equipment shall be made of stainless steel of equivalent quality.

For all other purposes hot dip galvanised anchors shall be applied.

5.6. STEEL PIPEWORK

All pipes and assembling parts under this Contract shall be of first quality, truly circular, and uniform thickness, free from scale, lamination and other defects, and shall be designed and suitable for the operational pressures and temperatures.

Pipework shall be arranged, as to ease the dismantling and removal of pumps or major items of equipment i.e. by the installation of dismantling joints where appropriate.

Expansion and dismantling joints shall be double flanged. Dismantling joints shall be able to withstand the total tension loads from the maximum pressure occurring in the pipes.

A dismantling joint shall be included in the suction and delivery pipework of all pumps for easy dismantling.

All pipework shall be fixed adequately with supports. When passing through walls, pipework shall include puddle flange.

In addition, all stainless steel shall be accompanied by an authentic manufacturer's certificate to enable verification of grade, origin and date of manufacture. All pipes shall comply with TS EN 10217-7 accompanied with a test certificate according to TS EN 10204. The certificates shall be part of the QA documentation.

All piping inside buildings up to 1m outside the buildings shall be made of stainless steel, see Section 5.3.4. Other materials can only be accepted after prior acceptance from the Engineer.

All piping inside shall have permanent marking, stating standards and material identification numbers.

Pipe ends shall be sealed with PVC caps during transportation.

The minimum wall thicknesses of welded stainless-steel pipes are given in the table below.

Internal diameter (mm)	Wall thickness (mm)
200 or less	2.0
250	2.5
300	3.0
400	3.0
500	4.0
600	4.0

The wall thicknesses of pump discharge pipes, collector pipes and the SS304 stainless steel pipes to be used in maneuver rooms are indicated below.

15-40 mm diameter (Including 40 mm)	2mm
40-80 mm diameter (Including 80 mm)	3mm
80-200 mm diameter (Including 200 mm)	4mm
200-450 mm diameter (Including 450 mm)	5mm
450-600 mm diameter (Including 600 mm)	6mm
600-900 mm diameter (Including 900 mm)	9mm
larger than 900 mm diameter, unless otherwise stated	12 mm

5.6.1. Pipes from stainless steel

Pipe work for aquatic, biogas and air media shall be stainless steel (EN 1.4404) pipes if not otherwise stated. Pipes shall be according to TS EN 10217-7. Pumping mains and pressure pipes shall be rated for a minimum of PN 10.

5.6.2. Pressure test of pipes

The Contractor shall perform pressure tests according to the following instructions for all pressure piping. The Contractor shall advise the Engineer in due and shall provide and mount all for the pressure tests necessary equipment.

If pressure tests are made against closed valves the guidelines from the manufacturer of the valves regarding the highest single side pressure against closed valve shall be complied with.

Hydraulic pressure tests shall be carried out by the use of potable water.

During pressure tests a minimum of 1.5 times maximum allowed operating pressure shall be maintained. Water shall be forced into the pipes by means of a force pump fitted with a pressure gauge to indicate the pressure at the lowest point in the section under test. Pipelines will not be accepted until they have withstood the required pressure for 30 minutes without leaking and without the pressure dropping.

Pressure tests shall be according to API 5L and TS EN 10217.

The Contractor shall prior to pressure testing verify on the spot that the piping is fully evacuated from air. After successful and approved pressure test the piping shall be emptied and the pressure test fluid shall be disposed of.

If it is not possible to perform visual inspection of leaks of all welded joints, the piping shall be tested according to the following guidelines:

- Piping is tested with a test pressure of minimum 1.5 times maximum allowed operating pressure. The pressure shall be held for at least four hours.
- During the pressure hold period no water shall be allowed to be added, and
- All visible welding joints, flange joints and glands on valves and pumps shall be inspected.

The acceptance criterion demands no detected leaks.

After the pressure tests have been finalised the Contractor shall elaborate a report, a copy of which shall be submitted to the Engineer. The report shall as a minimum include:

- Pressure Test Procedure,
- Unambiguous references to piping or part of piping and shut-off,
- Specification of test pressure,

- The period of the pressure tests,
- Results and signature of acceptance, and
- A description of atypical testing results, their causes and corrective action.

5.6.3. Flanges

Flanges for stainless steel pipes shall be executed as welding neck rings and loose flanges of similar quality as the piping.

All flanges must be rated for PN 10 and drilled according to EN 1092.

5.6.4. Pipe bends

Bends shall have minimum the same wall thickness and be of same material grade as the joining pipes. Execution shall be according to DIN 2605. The radius of pipe bends shall be 1.5 x the pipe diameter.

5.6.5. Tapers

The tapers shall be made of stainless steel. In general, all tapers shall be of the concentric type, similar to DIN 2616.

Suction intake taper for pumps, however, shall be of the eccentric type. The installation of the taper for dry installed pumps shall be with the straight side at the top. The length of the taper shall not be less than $0.5 \cdot (D+d)$.

5.6.6. Flush appliances

The flush appliances shall be made out of stainless.

Each section, which can be separated from the overall piping system, by valves, must have a sufficient number of connections for drainage and cleaning. The exact number and location of connections shall be decided jointly with the Engineer.

A flush connection comprises:

- pipe socket DN 50 with outer thread 2", approx. 100 mm long
- socket globe valve DN 50
- C-coupling with outer thread 2" according to DIN 14 307, material: brass
- C-blind coupling according to DIN 14 311 complete with chain, material: brass.

5.6.7. Branch pipes

Wherever possible, sockets according to DIN 2618 shall be used. Tees DN 65 and smaller shall be according to EN 2615

5.6.8. Measuring instruments

Wherever from a process engineering or operational point of view the necessity to install measuring instruments arises, the required socket or flange connections shall be provided on the pipelines.

5.6.9. Vent pipes

The vent pipes shall be made of PVC. Depending on the pipe arrangements, vent pipes including valves may become necessary. Generally, vent pipes shall terminate in safe areas, such as above roofs. The arrangement of the pipes shall guarantee unobstructed ventilation.

5.6.10. Pipe brackets

All pipe brackets shall be of stainless steel in accordance with Section 7.3.4. Pipe bracket arrangements shall consist of sliding and fixed brackets. Design and installation of sliding brackets shall guarantee proper alignment of the pipe, even when the pipe is moving longitudinally. No stress shall be transmitted to the supports, except for the weight resulting from pipe and medium. The design of the fixed brackets shall be such that all forces and moments resulting from operating conditions are safely transmitted onto the building structure. Required pipe supports, gussets, etc. shall be connected to the pipes by reinforced welds. The design of the brackets with respect to axial movement, static and dynamic forces such as from water hammer etc shall be based on the prevailing operating and ambient temperatures of the pipe system in question.

All brackets and pipe components being inaccessible after installation shall be sufficiently protected against corrosion prior to assembly.

5.6.11. Installation of piping

Pipelines shall be level, plumb and properly aligned, respectively installed to the required slope. Utmost attention shall be given to all pipes connected to machinery and appliances for not transmitting forces and moments to the equipment. Forces and moments due to misalignment of pipe work shall under no circumstances be transmitted to duct walls.

5.7. STAIRS, WALKWAYS, PLATFORMS AND HANDRAILS

All stairs, walkways, platforms and handrails shall be made compliant to the current local requirements.

All open sides of stairs, landings, walkways and platforms shall be guarded with handrails. Handrails shall include top handrail, intermediate rail, handrail, balusters and toe kick plates. Two hanging chains shall guard access openings to stairs and ladders, which shall be secured at one end and detachable at the other.

Unless otherwise stated, the height of the handrails shall be 1,100 mm with an intermediate rail at a height of 550 mm. Handrail height shall be measured vertically from finish floor level to the handrail centreline. The height of toe plates shall be 150 mm. Toe plates shall be fixed securely to the stanchions.

Unless otherwise stated, sloping handrails shall be as specified for horizontal handrails, but with top rail 900 mm vertically above the line of pitch and stanchions vertical and spaced at not more than 1,500 mm measured parallel to the line of pitch.

All mounting flanges shall be of substantial construction, with horizontal flanges drilled for not less than three bolts with two bolts on a line parallel to and on the walkway side of the line of handrails. Vertical flanges shall be drilled for not less than two bolts, the lines through the bolts being vertical. Fittings shall be screwed or secured by means of grub screws.

Unless otherwise stated, handrails shall be able to withstand a vertical force of minimum 0.8 kN/m on the top rail. The deflection of the rails shall not exceed 0.8% of the span between stanchions, and the deflection of stanchions shall not exceed 0.8% of their height.

Handrail and balusters shall be manufactured from either aluminium, hot dip galvanised steel or stainless-steel tube with bore not less than 32 mm. Toe plates shall be of 5 mm thick aluminium, hot dip galvanised steel or stainless-steel plate. Distance between balusters shall not exceed 1,500 mm.

Handrails, balusters and toe plates shall include all necessary joints to facilitate easy installation and to provide a smooth and neat appearance. The Contractor shall ensure that unless specified to the contrary all handrails shall be prefabricated and of uniform appearance and manufacture.

The Contractor shall submit working drawings of the handrails to the Engineer for approval.

5.7.1. Staircases and galleries

Unless otherwise stated;

Stairs shall have handrail on both sides. The height of the handrail on stairs shall not be less than 900 mm. If handrail is attached to a wall, it shall have at least 75 mm clearance from the wall.

Staircases shall preferable be within 38-45° with riser/go dimensions in accordance with the formula: Twice the riser plus the go should not be less than 572 mm nor more than 635 mm. Overlap shall be minimum 16 mm.

Staircases shall be designed to carry a uniform load of 3.5 kN/m² in addition to dead weight and loads during operation calculated on the plan area of the stair. The Contractor shall design the staircases for the actual point-load adequate for the equipment to be unloaded, however, no less than 3.0 kN in the middle.

Treads shall be with non-slip pattern surface.

Staircases and galleries shall be made with hot dip galvanised steel.

5.7.2. Access ladders

Unless otherwise stated;

Ladders shall be fabricated of mild steel and hot dip galvanised after fabrication. The stringers shall be flat section not less than 65 mm x 13 mm spaced 380 mm apart and shall be flanged and drilled for wall fixing at both ends. The distance between stringers shall be widened over the top where they shall be not less

than 600 mm apart. Ladders over 3,000 mm long shall have additional intermediate stays at not more than 2,500 mm centres.

Rungs shall be 25 mm diameter solids at 300 mm centres riveted or welded to the stringers. Rungs shall be not less than 225 mm from the wall.

All ladders shall have safety cages, which shall be constructed of three flat vertical strips supported by flat hoops, with a diameter of 750 mm. The hoops shall be approximately 700 mm centres and the first hoop shall be 2,400 mm above ground or platform level.

Where the rise exceeds 6,000 mm, an intermediate landing shall be provided.

5.7.3. Open mesh and chequer plate flooring

Open mesh flooring and gratings shall generally comply with TS EN ISO 14122 except where otherwise specified hereinafter. Such flooring and gratings shall be of rectangular mesh and non-slip and shall be mild steel and hot dip galvanised after manufacture. Alternatively, open mesh and chequer plate flooring may be of stainless steel (EN 1.4404) or glass fibre reinforced polyester.

Flooring shall be adequately supported by means of substantial members.

Flooring shall be designed to carry a uniform load of 3.5 kN/m² in addition to dead weight and operational loads. The Contractor shall design the flooring for the actual point-load adequate for the equipment to be unloaded, however, no less than 3.0 kN in the middle.

The deflection shall not exceed 0.2 percent of the span. Flooring shall be provided with curbing at the edge of walkway. Each floor panel shall be separately secured to the supporting members by means of fixing brackets. However, each floor panel shall be secured in a way that when not fixed by brackets it shall be fixed in all horizontal directions.

Both the load bearing and transverse bars in rectangular open mesh flooring panels shall be positioned symmetrically around the centre lines of the panels in both directions so that when the panels are fixed in extensive areas or in long runs, the bars of all panels are in line.

Chequer plate flooring shall be of the non-slip type, not less than 6 mm thick measured excluding the raised pattern. The flooring shall be secured to its frame by stainless steel countersunk screws.

All flooring shall be removable and set flush in frames of similar material. Where frames are to be fixed over openings the frames shall be provided with lugs for building in.

Flooring shall be provided in sizes suitable for lifting and removal by one man and with the appropriate cut-outs to permit its removal without disturbing or dismantling spindles, supporting brackets, cables or pipe-work.

5.7.4. Hatches

Hatches shall consist of a frame with a hinged cover. The frame shall be designed for mounting in recesses in the concrete slab. Hatches on dry wells shall be watertight. Detailed design for sealing shall be subject to the approval of Engineer.

A handle for opening of the hinged cover shall be integrated in the cover. The cover shall be provided with a safety mechanism, which locks the cover in open position whenever opened. The mechanism shall be manually released before the hatch can be closed again.

The hatches shall be designed to withstand a load of minimum 15 kN depending on the location.

Hatches shall be prefabricated and shall be from a recognised manufacturer specialised in the manufacturing of hatches for similar purposes.

Heavy hatches shall be provided with spring-loaded mechanisms or similar facilities which reduce the force required for safe opening and closing of the hatch.

The hatches shall be made of hot dip galvanised steel. Alternatively, hatches may be made of stainless steel.

5.8. GENERAL MECHANICAL EQUIPMENT

5.8.1. Lifting equipment - cranes

The traveling bridge and the monorail cranes (complete with steel rope, hook block, roller set, drum, drum bearing, limit switch, reducer, brake and motor) to be used in the places specified in the project shall be

manufactured according to TSE and DIN norms. Cross laid steel wire ropes which have high tensile strength and are resistant against abrasion resistance and bent in every direction shall be used.

The cranes or hoist shall enable to bring the equipment to a point where further transport is possible such as by a fork lift.

Hoists shall be of the hand operated or electrical operated type with lifting chain and designed to run on the lower flange of the lifting beam.

The hoist shall be rated for the heaviest single lift under erection or maintenance operations.

Chains shall be hot dip galvanised and be able to reach the floor/ground.

Unless otherwise stated; Hoist shall be electrical operated for service lifting equipment with a mass exceeding 150 kg.

The maximum load shall be clearly marked with large easy reading figures/letters on the crane.

Construction and assembling shall be according to local laws and regulations or if not available according to the respective EN or ISO standards.

Crane runway consisting of one or two beams (due to static requirement), incl. all rails, mounting plates and fixing material, attachments for cabling etc. and stop blocks for limitation of movement.

Crane bridge shall be distortion free and wheels of crane travel have to operate synchronously to avoid twisting.

Crane bridges constructed as maintenance free box beam.

Gearboxes, wheels and motors to be maintenance free.

Painting shall be in accordance with Section 5.2.

Cranes and lifting equipment with electric actuator:

Electric cranes shall be equipped with precision hoisting gear to allow accurate and sensitive lifting and lowering. Brakes to secure the load in case of power failure shall be provided.

All connections shall be equipped with vibration proof terminals.

All motors shall be protected by means of thermistor protection.

Limit switches shall be fitted for all final positions.

Local switch cabinet for each crane equipped with pilot lamp, switches and an emergency cut-out for all actuators shall be provided.

Power supply for movable bridges and lifting devices via trailing cable or trolley wire shall be provided.

Travelling cranes

Travelling cranes shall be longitudinally and transversally moveable, with one or two beams due to static requirements, and shall include electric cable hoisting gear.

Rails shall be manufactured as I-profile, and corrosion protected. Two speed drive for crane and trolley shall be provided.

Lifting with brake device with precision hoisting shall be provided. Electrical equipment shall be integrated in the trolley.

Control: If not mentioned otherwise by movable suspension switch.

5.8.2. Person and Goods Lift System

The lift installation shall be designed as cable-operated lift with traction machine. The car shall be provided with automatic telescope sliding doors.

Lift shall be additionally provided with one hand-lamp each, with approx. 6 m connection cable with plug on the top of the car and in the machinery room and the necessary equipment for inspection and moving of the lift.

The lifts shall be designed, manufactured, erected and tested according to TRA, DIN standards. If the specification contains requirements beyond the requirements of the above-mentioned standard, the requirements of the specification shall have priority.

The cars shall be made of stainless steel, 1.4401 as a minimum. An anti-drumming substance is to be applied on the outer surface. On the inside, the cars shall be provided with skirting strips, a handrail made of anodized aluminium and two protecting strips made of hardwood.

The floors shall be made of sheet steel and are to be provided with plastic floor covering (PC or equivalent).

A fan and illumination are to be fitted in the car ceiling.

During the construction period, the sides of the cars (without doors) and the floor of the cars shall be provided with protective coverings (hardboard panels or similar). The protective coverings shall be removed by the Contractor after the construction period.

Photo-electric light barriers are to be fitted at the car entrances.

A floor indicator with floor symbols and 'up' and 'down' arrows is to be provided in the cars.

The car roofs are to be fitted with three-sided, twist-resisting railing. A mounting plate fixed to the railing must be fitted with all equipment and power sockets required for inspection rides, repair work, etc.

The lift shall be equipped with an adjustable overload protection device with a visual and audible signal in the car.

All floor selector buttons – including the lift call buttons on the outside panels – shall be designed in the form of pushbuttons with call acknowledgement.

At every landing call acknowledgement button and an "out-of-order" sign have to be provided.

The shaft doors must, like the cabin doors, be of the telescope type and must be fire-resistant and made of stainless steel.

Lift shaft illumination shall be provided at each landing and at intervals of not more than 3 m. In the pit of the lift shaft illumination must also be provided as well as a power socket. One switch each is to be provided in the machinery room and in the pit of the lift shaft.

The safety gears shall be of the progressive type.

In the event of failure of the mains voltage for car illumination, alarm equipment and ventilation, the emergency power supply must be able to keep the alarm equipment and ventilation operational for at least four hours.

During that period emergency illumination must be effective in the car, too.

For the telephone, cabling, screened telephone cable is to be used.

Telephones shall be of a wall-mounting design. In the cars, telephones are to be placed in recesses next to the car panel.

All motors, switching installations and switchgear must be designed for an ambient temperature of at least 50°C and must be fully operational at this temperature.

In the machinery rooms forced ventilation shall be provided in order to keep the temperature in the rooms to a maximum of 50°C. A dust filter must be fitted at the forced ventilation air intake.

The lift machinery shall be equipped with special drive motors, clutches, brakes, brake discs and gears with drive pulleys.

The drives are to be equipped with electronic control ensuring absolutely continuous and load-independent control of acceleration and deceleration. During the latter, the mechanical brake must not operate before complete standstill has occurred.

Controls are to be designed as direction-sensitive two-button collective controls.

The controls for the lifts shall be supplemented by a priority control in the car and an external priority control on the main service platform. Operation of the priority controls shall be achieved by means of key switches.

The lifts stop at this main service platform. Controls must be set so that the lifts always return there automatically.

The motors and switchgear must be designed for at least 180 starts/stops per hour. The type of enclosure

of motors and the type of enclosure of switchgear cabinets shall be in accordance with the ATEX Directive.

5.8.3. Ventilation

In order to avoid odour emissions to the surroundings, the inlet structures shall be covered and mechanically ventilated. The exhausted air from these structures as well as from the sludge dewatering facilities shall be exhausted in free air or treated in a bio filter if stated so in order to remove any odorous compounds which could cause nuisance complaints.

All intakes and exhausts shall be covered for all weathers.

5.8.4. Drive units

Drive units for the equipment shall be designed for 24 hours continuous operation. The nominal rating of the gear shall be at least equal to the nominal kilowatt output of the attached motor. Each gear shall be a totally enclosed unit with oil or grease lubricated antifriction rolling bearings throughout.

All drives, couplings and other moving parts shall be efficiently covered on all sides with safety guards.

Long-life seals on the input and output shafts shall be fitted up to prevent the escape of lubricant and the ingress of dust, sand and moisture.

Lubrication of bearings etc shall be by either splash or forced feed system.

The Contractor shall ensure that the lubricants used for initial filling and specified in the maintenance manual is adequate for prolonged operation in ambient temperatures of up to 55°C. without overheating.

The gearboxes shall be marked with manufacturer's identification together with the rated shaft speeds, output power and maximum ambient temperature.

5.8.5. Bearings

All bearings shall be generously rated and sized to secure satisfactory and stable running without vibration under all conditions of operation for a minimum life of 50,000 hours running, which shall be certified or otherwise documented.

All bearing shall be to ISO standard and SI metric unit dimensions where practicable.

The intervals between lubrication shall be maximized (not less than 2 weeks) and shall be defined for each individual item and included in the operation and maintenance manual.

5.8.6. Motors

General

Motors shall comply with the following general standards and norms:

- IEC 60034 and other relevant EN standards.
- Motors shall be designed for the temperatures and humidity occurring on Site and the installation in which they operate.
- The motors shall be designed and marked for operating conditions according to IEC 60034.
- Unless otherwise specified, Motors shall be delivered for soft starter or frequency converter.
- Motors for pumps shall be squirrel-cage asynchronous motors unless otherwise stated.

Mechanical Requirements

The degree of protection provided by enclosure for motors shall be minimum IP 55 to IEC 60034-5.

Protection grade for outdoor motors shall be minimum IP 55 and equipped with a drainage hole in the lowest point.

The degree of protection for submerged motors shall be minimum IP 68.

The motors shall be cooled in order that the permissible operation temperature is not exceeded.

Motors shall be balanced according to TS EN 60034-14 vibration class N.

Noise level shall minimum fulfil TS EN 60034-9.

All motor covers shall be delivered efficiently protected against corrosion according to Section 5.2.

Motors shall be insulated to class F in accordance with the TS EN 60085. The limit of temperature rise during operation shall not exceed that for class B insulation.

Electrical Specifications

Motor performance and data shall be in accordance with TS EN 60034-1/ Motors shall have a data plate legibly marked with:

- manufacturer,
- serial number,
- rated power,
- full load current,
- voltage,
- $\cos \varphi$
- frequency,
- number of phases,
- start current,
- rpm.

Each motor shall be provided with thermo protection.

Motors larger than 5.5 kW shall have star-delta windings.

Motors larger than 10 kW shall be provided with thermistors in the windings for each phase.

Smaller motors shall be provided with bi-metal thermo switches (Klixon) if thermistors cannot be provided.

Submerged gearboxes shall be provided with moisture sensors.

The motors shall be designed for the following parameters:

- Voltage fluctuations +/- 10%. The voltage variations must not result in a temperature increase in excess of what is stated in TS EN 60034-1,
- Frequency: 50 Hz. Frequency variations +/- 2.5 Hz.

Motors shall be equipped with connection boxes with separate terminals for each winding end, and connection for protective conductor. The terminals shall be designed for twice the nominal current; however, they shall be a minimum of 2.5 mm².

Thermo switches shall be connected to separate terminals inside the connection box.

Marking of connections and rotation direction shall be in accordance with EN 60034-8.

All motors shall be equipped with suitable number and dimension of cable glands.

All submerged pumps (and other motors) that can be taken out of operation and lifted to ground level by a hoist (or in an equal way) shall have power supply and signal cables connected by CEE sockets enabling electrical disconnecting without use of tools. The sockets (the male as well as the female part) shall be mounted in a location where flooding is impossible. The sockets shall be protected against rain and other weather conditions as described for outdoor instruments in general. If these demands cannot be met the degree of protection shall be IP 68 to TS 3033 EN 60529.

5.8.7. Balancing

Revolving parts shall be balanced both statically and dynamically, so that for any combination of speed and load up to the maximum, there shall be no vibration caused by out-of-balance forces.

5.8.8. Suppression of noise

All plant offered should be quiet in operation. The noise level within the buildings shall not be more than 80 dB(A) if not otherwise stated. The Contractor shall ensure that all sections of equipment are designed such that when installed the noise emitted is no more than stated in the specific requirements and as stated above.

5.8.9. Penstocks

Penstocks shall be of the following types:

- Stainless steel in accordance with TS EN 10088-1 grade 1.4404, with EPDM sealing faces.

Each manually operated penstock shall be provided with a suitable handle of adequate size for the duty required and the gearing shall be supplied where necessary to ensure that the required operating force

applied by hand to the handle shall not exceed 250 N. The height of the operating handle shall be approximately 1 meter above operating level unless otherwise stated.

The handles shall have cast on them the direction of closing, which shall preferably be clockwise.

Electrically operated penstocks shall be provided with an adequately rated electrical drive.

Unless otherwise specified, penstocks that are larger than 1 m² shall be motor controlled.

Spindles shall have machine cut robust trapezoidal or square form threads. They shall be of stainless steel, manganese steel or manganese bronze.

All penstocks shall be of the non-rising spindle type.

All penstocks shall be provided with one or more separate stainless-steel emergency lifting wires for use in case of spindle brakeage. The wires shall be properly attached to the penstock door and led to operating level where the end of the wire(s) shall be provided with lifting eye(s) which shall be attached to a bracket.

Penstocks shall be watertight under the conditions of head and flow direction they are designed for and exposed to.

Non-ferrous metal sealing faces shall be formed from accurately machined gunmetal or bronze strips, bedded and fixed to machine recesses by corrosion resistant countersunk screws. The faces of the strips shall be brought together in the operating position and hand scraped to a watertight finish.

The penstocks shall be designed so as to secure tight closure while maintaining freedom of plate movement during operation and minimizing sliding wear of the sealing.

Rubber sealing faces shall be formed from high quality synthetic rubber suitably shaped to interlock into grooves in the frame or plate and shall be securely bonded thereto.

Channel mounted penstocks shall be installed in recesses in the channel sides and grouted.

In the case where the penstock width is greater than 2 m, penstocks shall be of double spindle type.

- Cast Iron EN 1561 Grade 180
- Gunmetal EN 1982 Grade LG2
- Stainless Steel TS EN 10088, pt 4 Grade 316 S31
- Manganese Steel TS EN 10083, pt 4 Grade 150 M19
- Phosphor Bronze TS EN 12167 Grade PB 102.

5.8.10. Valves

5.8.10.1. General Requirements

Each valve shall be in conformity with the relevant TSE standards and DIN norm and should be produced by the companies having ISO quality certificate.

Unless otherwise stated in the list of characteristic values the valves with a diameter of 100mm and larger shall be butterfly valve. The valves and check valves with a diameter of 100 mm and larger shall be used with dismantling joints.

The name of the manufacturer, nominal pressure and flow direction shall be indicated as embossed during casting on each type of valve, check valve and dismantling joint.

Each type of valve, check valve and dismantling joint shall have double-sided flange.

Valves and dismantling joints shall be subjected to leakage test against a pressure of 1.5 times the operating pressure, their casings at a pressure of 1.1 times the operating pressure for the durations specified in the relevant standards according to the diameters and pressures.

Unless otherwise specified, the valves shall be offered as manually operated valves and they should be opened and closed by one person easily during operation. The torque ratio, motor revolution number and opening and closing times in the motorized valves should be compatible.

In order to provide easy handling for the valve, check valve and dismantling joints with a diameter of 500mm and larger, there shall be lugs with suitable dimensions on casing.

5.8.10.2. Gate valves

The design, valve dimension, flanges, manufacturing and tests of the gate valves shall be in accordance with the EN 1171, EN 558-1 series 14 (DIN3202-F4) EN558-1 series 14 (DIN3202-F5) EN1092-2, ISO7005, BS4504, ANSI, EN 12266, EN 1074 EN558-1 Series 3 (BS5163) and related norms.

Gate valves shall be of the double-flanged cast iron resilient seated full-bore type with vulcanised EPDM rubber on ductile iron wedge.

Gate valves from DN 50 mm to DN 600 mm shall be in accordance with EN 1171. The face to face dimension shall be to TS EN 558.

Unless otherwise specified, each valve shall be provided with a suitable hand wheel of adequate diameter for the duty required. Gearing shall be supplied where necessary, to ensure that the required operating force applied by hand to the rim of the wheel does not exceed 250 N.

Gate valves of DN 500 diameter and bigger shall be motor driven.

Hand wheels shall have smooth rims and the direction of closing, which shall be clockwise, cast on them.

Valve stems shall be of stainless steel, machined all over with a machine cut robust trapezoidal or square form thread, operating in gunmetal nut.

Stem seals shall be the O-ring type with two such seals arranged for easy replacement of O-rings and shall be accessible for maintenance with the valve under pressure without removing the valve from service.

Fastening bolts shall be of stainless steel, countersunk and corrosion sealed.

Extended spindles for all motorized or actuator operated valves shall be provided with thrust tubes between valve and headstock in order to absorb the thrust in both directions of operation.

Valves shall carry identification plates or marks in accordance with appropriate standard.

All valves shall be painted in accordance with the specifications in Section 7.2 according to actual location.

All materials used in manufacture of the valves shall conform to the following minimum standards:

Ductile Iron	TS 526 EN1563 GGG-50
Dezincification Resistant Brass	TS EN 12167
Stainless Steel	DIN X 20 Cr 13
O-rings	NBR Rubber.

Material properties

Casing: shall be GGG40/GGG50 nodular cast iron

Disc: Shall be CZ132-brass (not releasing zinc) bronze in accordance with BS 2872/2824 standards

Shaft: shall be X20Cr13 or equivalent stainless steel

Shaft bearing and bushings: shall be bronze, delrin, EPDM O-ring + polyamide

Gasket: Shall be natural rubber or EPDM

Connecting bolts and nuts: shall be SS304 stainless steel for above 8.8 quality

Valve handwheel: shall be DIN 1691 GG 25 cast iron

5.8.10.3. Knife gate valves

Knife gate valves shall have face to face dimensions to TS EN 558 and can be used on sludge and slurry only

The body shall be made of cast iron. The gate and stem as well as connecting parts shall be made of stainless steel. Stem nut shall be of dezincification resistant brass.

Knife gate valves shall be painted in accordance with the requirements in Section 7.2 according to actual location.

Materials for seals shall be suitable for use with wastewater.

Unless otherwise specified, each valve shall be provided with a suitable hand wheel of adequate diameter for the duty required. Gearing shall be supplied where necessary, to ensure that the required operating force applied by hand to the rim of the wheel does not exceed 250 N.

Knife gate valves of DN 500 diameter and bigger shall be motor driven.

Hand wheels shall have smooth rims and the direction of closing, which shall be clockwise, cast on them.

5.8.10.4. Check valves

Design, valve dimension, flanges, manufacturing and tests of check valve shall be in accordance with the EN 12334, EN 558-1series 14 (DIN3202-F4) EN558-1series 14 (DIN3202-F5) EN1092-2, ISO7005, BS4504, ANSI, EN 12266, EN 1074 EN558-1 Series 3 (BS5163) and the related norms.

Check valves shall be double flap or tilting type. Closing of the valve shall be ensured hydraulic brake, pneumatic cylinder, spring, counterweight and similar mechanism.

Material characteristics:

Casing: shall be GGG40-50 nodular cast iron resistant to PN6-16 atu operation pressure

Casing bushing: shall be bronze

Shaft and pin: shall be X20Cr13 or SS304 stainless steel as solid

Valve rubber: shall Buna-N material

Check valves shall be normally closed, suitable for wastewater/sludge and shall open under minimum flow conditions. The non-return valves shall be of the swing type with lever and counterweight and position indicator.

The non-return valves shall be manufactured from cast iron with top hinged door.

The tightness of the non-return valves shall be secured with renewable accurately machined non-ferrous facing strips or with rubber sealing, which shall be easily renewable as well.

Valves shall be painted in accordance with the requirements in Section 5.2 according to actual location.

5.8.10.5. Butterfly valves

Butterfly valves shall comply with TS EN 593 and be of the double flanged type with metal or resilient seating and grey or ductile cast iron body.

Valves shall be drop tight at closure and the diameter not less than that of the nominal pipe bore.

The disc shall be in grey or ductile cast iron with a resilient seating ring in moulded rubber, or other material to the approval of the Engineer, located in a landing on the disc and secured by a gunmetal retaining ring fixed with screws made from homogenous corrosion resistant material.

The shaft shall be in one piece and attached to the disc by using fixings in a corrosion resisting material of a pattern which precludes the assembly becoming loose during service. Grub screws, pins or clamps will not be accepted.

The shaft shall rotate in bearing bushes fitted with grease lubrication facilities.

Glands shall be of the O-ring type fitted on the operational shaft extension to the pressure side of the valve. The design shall be such as to facilitate O-ring replacement without removing the valve from service.

Unless otherwise specified, each valve shall be provided with a gearbox with hand wheel proportioned so that the required force applied by hand to the rim of the wheel does not exceed 250 N.

Butterfly valves of DN 500 diameter and larger shall be motor driven.

The closing direction shall be clockwise and cast on the wheel.

Suitable stops shall be incorporated to prevent disc movements beyond the fully open and fully closed positions.

A valve position indicator to show the position of the disc shall be provided on the valve.

Valves shall carry identification marks or plate in accordance with EN standards.

All butterfly valves and operation devices shall be painted in accordance with the requirements in Section 7.2.

It shall be possible to control the motor driven valves separately by motor and manually by means of a separating control handle. Limit and torque switches shall be adjustable and in the drive box.

Motor operated valves shall be opened and closed with 4~20 mA signal. Protection class of the actuator of the butterfly valve required to be actuator-controlled valve shall be IP67, and it shall also be possible to operate it manually, when necessary.

There shall be 2 limit switches in the motor and actuator operation system to stop the motor at the full open and full closed positions of the valve.

There shall be torque switch in the motor and actuator operation system to prevent mechanical system failure of the motor or overloading of motor for any reason and additional mechanical measures shall also be taken.

In the operation with Actuator-PLC system, the valve will stop immediately in the case of excessive torque increases which occur suddenly during opening and closing of the valve and it will be reactivated after it moved a little in the reverse direction. If the torque increase continues in the second time, it will give alarm signal and warn the operator to operate it manually.

The design, valve dimension, flanges and tests of the butterfly valves shall be in accordance with the EN 593, EN 558-1 series14 (DIN3202-F4) EN558-1series14 (DIN3202-F5) EN1092-2, ISO7005, BS4504, ANSI, EN 12266, EN 1074 EN558-1Series3 (BS5163) and related norms and they shall be manufactured as double eccentric butterfly valves. Unless otherwise stated, butterfly valves shall be manually operated.

Material properties

Casting and disc: shall be GGG40-50 nodular cast iron resistant to PN6-16 atu operation pressure

Shaft: shall be X20Cr13 or equivalent stainless-steel shaft bearing delrin, bronze or Teflon,

Thrust ring tie bolt: A2 stainless steel

Silt surface: shall be SS304 stainless steel and welded to casting with stainless steel electrodes and machined precisely.

Connecting bolts and nuts: shall be SS304 stainless steel for above 8.8 quality

Drive box: shall be GG25 cast iron

Worm screw: shall be SS304 stainless steel

Worm gear: shall be GGG40-50 nodular cast iron.

5.8.10.6. Dismantling joints

Dismantling joints shall be incorporated in each pipeline which is \geq DN 250 in accordance with design. The dismantling joints shall be made of GGG sphere cast iron and shall have an axial adjustment capability of at least ± 25 mm to facilitate easy dismantling and installation of pumps, valves, non-return valves, measuring devices, etc. Threaded rods and nuts through two opposite flanges shall secure the dismantling joint in the position determined during installation, so that the system represents a rigid connection of two adjoining pipes.

Dismantling Joint shall be manufactured in accordance with the EN1092-2, ISO 7005-2 BS4504, ANSI, EN 12266 and related standards and norms.

Material characteristics

Casing: shall be GGG40/GGG50 nodular cast iron

Gasket: It shall be made of NBR or EPDM rubber to resist surface friction and hydraulic forces.

Connecting bolts and nuts: shall be SS304 stainless steel for 8.8 quality

Bolts and nuts providing its movement: shall be SS304 stainless steel and their studs shall be full length stud.

5.8.10.7. Ball valves

The ball valves shall be of the two-way type and be provided with a handle for easy opening.

All flanges must be rated and drilled for PN 10 according to EN 1092.

Ball valves shall be manufactured in accordance with TS EN 1983 and related standards and norms.

Material characteristics

Casing: shall be GGG40/GGG50 nodular cast iron

Disc: shall be X20Cr13 or equivalent stainless steel

Shaft: shall be X20Cr13 or equivalent stainless steel

Shaft bearing and bushings: shall be bronze, delrin, EPDM O-ring + polyamide

Gasket: shall be EPDM

Connecting bolts and nuts: shall be SS304 stainless steel for 8.8 quality

Valve handle: shall be St37 stainless steel.

5.8.10.8. Surge anticipating control valves, air relief and vacuum protection valves

Surge anticipating control valve, air relief and vacuum protection valve shall be new, have no material defect and, nominal diameter, nominal pressure and manufacturer's name shall be inscribed on.

Surge Anticipating Control Valve:

Surge anticipating control valve shall automatically protect the system against water hammers arising from power cut, power fluctuation and pump start-stops.

Surge anticipating control valve shall be installed in pump pressure side header and open to atmosphere. The bodies shall have Y-form so that pressure loss would be small.

Pilot-actuator pressure signal for surge anticipating control valves to be used in waste water treatment plant and pump stations shall be provided from clean water resource equivalent to minimum operating pressure. A tank and a package pump unit shall be provided to enable surge anticipating control valve to operate properly.

Valve actuator part shall be double-chambered type.

Technical Features:

• Body type:	Y-form
• Actuator type:	Double-chambered diaphragm actuator
• Control pilot:	Pressure-reducing pilot, pressure-fixing pilot
• Connection type:	Flange connection
• Maximum operation pressure:	16 bars
• Casing:	GGG40-50 graphite nodular cast iron resistant to PN6-16 atu operation pressure
• Casing bushing	Bronze
• Valve rubber	Buna-N
• Spring material:	AISI 316 stainless steel
• Diaphragm material:	Nylon reinforced Neoprene
• Sealing bushing:	replaceable type SS304 stainless steel
• Sealing disk	SS304 stainless steel
• Flap disk ring:	EN 1.4301 stainless steel
• Seat:	Replaceable Buna-N material
• Valve stem material:	SS304 stainless steel
• Valve signal circuit:	SS304 stainless steel

Air Relief and Vacuum Prevention Valve (Ventouse):

Waste Water Air Relief and Vacuum Prevention Valves (Waste Water Ventouse) with appropriate capacity shall be installed in discharge manifold and to the discharge line together with the Pulse Prevention Valve. These valves should be capable of eliminating the air and vacuum problems occur during filling and discharging of the pipeline. They shall prevent narrowing in the pipeline and reduction in the flow rate by preventing air pocket formation in the pipeline. Waste Water Ventouse the shall have large orifice should be capable of providing necessary air during discharge of the line (vacuum principle) and in addition it should include a mechanism that prevents the contact of waste water with the sealing element in the valve. The ventouse shall be resistant against high air speeds and it should be capable of discharging compressed air and gases (Air Relief Principle) while the pipeline is under pressure.

Material characteristics:

Casing-Cover: shall be GGG40-50 nodular cast iron resistant to PN6-16 atu operation pressure

Float-ball: SS431

Shaft: X20Cr13

O-rings: NBR, Gasket: shall be EPDM

Connecting bolts and nuts: shall be SS304 stainless steel for 8.8 quality

Ball valve: shall be brass

Blind flange: shall be brass

Fasteners: shall be galvanized steel

Big Orifice Ball: shall be PVC

5.8.10.9. Telescopic valves

Open stem and yoke valve may be used to draw sludge from clarifiers, depends on the Contractor's design. Its pipes and parts shall be made up of 1.4404 stainless steel. It shall telescope up and down (two pipes, one inside other), having a proper diameter, depending on the flow rate of sludge taken. Sealing shall be provided between two pipes.

Telescopic valves may be controlled by motor or manually. For manual control, wheel shall be installed in a suitable size, the turning force of which does not exceed 250 N. Wheel is approximately 1 meter above the platform. Closing direction shall be inscribed on wheels, preferably clockwise.

Motor driven valves shall have actuators which have 4-20 mA control signal.

5.8.11. Electric actuators

Where required, penstocks and valves shall be operated by means of electrically driven actuators with integral reversing starters in accordance with EN ISO 5210. Each actuator shall be fully weatherproof to minimum IP55, and fitted with anti-condensation heater, upper and lower limit switches and torque switches, for operation through 4-20 mA signals.

Each actuator shall be adequately sized to suit the application. The operating gear of all penstocks shall be capable of opening or closing the gate against an unbalanced head equal to the maximum working pressure.

The gearbox shall be oil or grease filled, and capable of installation in any position.

Alternative hand operation shall be possible, and the hand wheel together with a suitable reduction gearbox if necessary, shall be of adequate dimensions for easy operation by one man. The motor drive shall be automatically disengaged when under manual operation. Hand wheels shall be rotated clockwise to close the valves or penstocks and shall be clearly marked with the words "OPEN" and "CLOSE" and arrows in the appropriate directions. The rims of hand wheels shall have a smooth finish.

Control drives shall have a stall torque rating of at least 150 percent of the maximum required torque for the driven element and shall be capable of operating at 65°C continuously. The stroking time shall be suitable for the application.

All drives shall have minimum repeatability of ± 0.5 percent of full-scale travel.

All drives shall have slide wires or differential transformers and end limit switches for position and/or feedback control.

Electric drives shall have proportioning control.

All control drives shall include mounting stands, drive arms, clevises, connecting linkage and suitable enclosure.

5.8.12. Pumps

5.8.12.1. General Requirements

Where applicable before delivery to site all pumps shall be works tested according to EN ISO 9906 witnessed by the Engineer.

The pumps shall be centrifuge type and in accordance with the current TSE standards. Monoblock submersible pumps with vertical shaft or capable of running dry (with cooling jacket) shall be used. Submersible pumps shall be used in wet type pumping stations.

Necessary lubrication shall be carried out for all bearings of the pump unit.

Inner and outer surfaces of the pumps shall be cleaned and then coated with primer and epoxy paint resistant to corrosion and waste water.

There shall be replaceable wear ring between the pump casing and the fan. The pump manufacturing companies that do not have replaceable wear ring in their designs are obliged to indicate the system that can be replaced by it in their proposals.

The pumps shall have a metal label indicating the technical characteristics on them.

The rotation direction of the pump shall be shown as embossed during casting or by mounting a metal plate on the pump.

The type, flow rate and manometric head (at operation point) shall be in the technical characteristic form of the pump.

Manometric head has been calculated on the basis of parallel operation of the pumps except spare pump.

A pressure gauge with a capacity of twice (two times) of the operation pressure shall be connected to the pump discharge line.

The companies shall give the pump discharge line system curve, and flow rate, head, power, efficiency, net positive suction heads (NPSH) according to the operation with one, two, three pumps, etc. respectively in their bids.

Operation and maintenance repair manuals and spare parts list shall be given in Turkish together with the pumps.

The pumps shall be made from quality, durable material, their maintenance and repair shall be easy, and they shall provide continuous and safe operation.

Material properties

Casing: Cast iron GG25,

Fan: SS304 Stainless steel or cast iron GG25,

Shaft: X20Cr13 or equivalent stainless steel

Wear rings: Shall be SS304 Stainless steel or cast iron,

Bolts and nuts: Shall be SS304 Stainless steel.

In each pumping installation all pumps shall be equal with respect to manufacturer and type.

On the suction pipe before the pump an isolating valve shall be incorporated (only dry mounted pumps) and on the pressure pipe an isolating valve, dismantling piece and a check valve shall be incorporated (both dry and wet mounted).

All delivery pressure pipes from pumps shall be provided with connecting branch with ball valve and manometer.

For dry mounted pumps the connection on both suction side and pressure side of the pump shall be via flexible connections.

Single stage pumps with low speed motors with speed below 1,500 rpm unless otherwise specified. For pumping of sludge, the speed shall not exceed this speed, whereas high speed pumps may be accepted by the Engineer under certain operational conditions for wastewater.

Multi-stage high-speed pumps will not be allowed.

Pumps shall be arranged for priming by means of an adequate positive suction head in all possible operating conditions.

The operation cycle of the pumps shall include alternating also of the stand by pump. The pumps shall be dimensioned for minimum 10 starts per hour.

Discernible noise caused by hydraulic turbulence and cavitation will not be accepted.

Water hammer in the piping system shall be eliminated by installing surge vessels, special valves or similar.

The pump impeller shall be selected for maximum efficiency. Pumps shall operate right to BEP (Best Efficiency Point) at start conditions and so to the left of BEP at stop conditions.

The pump type shall be determined by the Contractor for the time between failures (clogging etc.) which shall be a minimum of 60 operation days.

Impellers of minimum or maximum diameters in relation to size of pump house shall not be used.

Pump housing shall be fabricated from cast iron with special epoxy coating and hardness state shall be minimum 60 HRC.

When using frequency converters for speed control the pumps shall be equipped with external ventilation if speed control is possible below 35 Hz.

All pumps shall be equipped with thermal switches for thermal protection.

Pumps shall be easily accessible for service and provided slewing davits or cranes.

5.8.12.2. Slewing davits for submersible pumps

The slewing davit shall be capable of lifting and lowering the submersible pump and shall have the following features:

- it shall be mobile and easily removable by one man
- the davit shall be based on DIN 15018 H1 B2
- the hoist shall be in compliance with DIN 15020
- the davit shall have a manually operated wire hoist
- the davit shall be complete with all necessary fastening materials
- the slewing radius of the davit shall be such as to permit unloading of the raised pump at a place accessible by forklift
- the lifting height shall be sufficient to allow slewing of the davit with the pump to pass the obstacle height, such as the handrail
- the davit including all accessories shall be in accordance with current national safety regulations.

Materials

- the davit: shall be made with hot dip galvanized steel, stainless steel structure or aluminium
- the manual wire hoist: shall be seawater resistant aluminium, or stainless steel, with safety ratchet block
- the lifting wire, thimble and shackle shall be stainless steel
- the pulley shall be polyamide.

5.8.12.3. Monoblock Dry Type Pumps with Vertical Shaft

The pumps shall be designed to pump waste water that is passed through coarse grid.

Pump and motor shall be connected to each other with an elastic coupling or shall be directly coupled.

Elastic couplings shall be capable of compensating the axial and radial loads. There shall be a protective cover on the elastic coupling.

Unless stated otherwise, mechanical seals shall be used in the pumps. Seal system shall be double-sided mechanical seal (with tungsten carbide or silicon carbide) and both shall have oil-washing and cooling (in oil chamber as in the submersible pumps).

There shall be easily removable cleaning hole on pump casings or suction elbow.

5.8.12.4. Submersible Pumps

The pumps shall be designed to pump waste water that is passed through coarse grid. The pump should have a slide system that can be easily removed for maintenance and repair and equipment that will ensure connection of the pump automatically to the discharge line. Slide and coupling system shall be given with the pump. Slide pipe shall be made from SS304 stainless steel and the chain shall be galvanized.

Slide set shall not be provided for the submersible pumps running dry.

Submersible pump and its cable shall be capable of running 15 m under water continuously without losing water tightness characteristic.

In case of a request by the Employer, there shall be a washing valve mounted on spiral casing or discharge line of wet type submersible waste water pumps. The mentioned washing valve shall discharge water to the floor of the pumping station for a period of 20-40 seconds after each operation of the valve and thus ensure suspension of the solid matters precipitated on the floor of the pumping station. This function shall also be performed by a submersible mixer with appropriate strength. The companies shall give the technical brochures of the washing valve together with their bids.

In case of using the pump dry, there shall be an easily removable cleaning hole on the suction elbow.
Sealing between pump and motor shall be ensured with double mechanical seal working in an oil chamber.
The level of the oil chamber in the motor shall be easily controlled from outside.

Motor should be protected with thermistors against overheating and with sensors against liquid leakage.
This protection equipment shall be explained in detail in the bid.

< 7.5 kW motor of the submersible pumps should be designed to provide adequate cooling with waste water without having a cooling jacket.

In the ≤ 7.5 kW pumps,

- It can be closed circuit type with cooling jacket. Waste water discharged by the pump shall not be used as coolant. Glycol-water mixture or oil should be circulated within the closed circuit as coolant. The first filling of the coolant should be carried out and tested in the factory.
- In case of using waste water as coolant, water jacket shall cover around the stator housing and shall dissipate the heat without depending on the mounting type. Circulation of the coolant waste water within water jacket shall be provided with the special design of the pump impeller. The channels intended for cooling should be capable of preventing clogging.

The Contractor shall give the technical brochures showing the cooling jackets and cooling types (closed circuit or with water jacket) together with their bids.

The **submersible pumps suitable for dry installation** shall have the following features:

- The design shall be according to DIN 19569, where applicable
- The casing shall have a large-flow cross-section and replaceable wear ring where applicable
- The impeller shall have large, unobstructed flow ways to ensure non-clogging and non-stringing operation
- The impeller shall have means to reduce end thrust
- The common motor/pump shaft shall be supported in anti-friction bearings with grease and/or oil lubrication
- The shaft shall not be in contact with the pumped medium
- The intake and discharge sides of the pump shall have flanged connections
- Due to the dry installation of the pump, the motor cooling system shall be highly efficient with cooling shall be based on indirect cooling.
- Seal leak detection and prevention shall be included

Materials

The materials given below are the minimum requirements.

- volute casing: GG-25 cast iron with special epoxy coated against corrosion
- impeller: Hardened steel (Min. 60 HRC)
- pump shaft: C45 carbon steel or stainless steel (EN 1.4301 or higher)
- type of seal: mechanical seal suitable for liquids with a high concentration of abrasive solids
- Fastening components: material stainless steel according to Section 7.3.4

All electrical components as detailed under section "Electrical Power and Control Equipment".

Drive

The motor shall have the following features:

- dry-running three-phase asynchronous motor in watertight casing according to IEC standard
- protection type IP 68
- insulation class H
- operating mode S3 or S8 (Frequency converter)
- internal indirect cooling
- moisture/water sensor device to prevent damage to motor windings and bearings
- tandem mechanical shaft seal
- thermo element in coil for motor protection

- pump completely cabled.

The **submersible pump for wet installation** shall have the following features:

- The design shall be according to DIN 19569, where applicable
- The casing shall have a large-flow cross-section and replaceable wear rings where applicable
- The impeller shall have large, unobstructed flow ways to ensure non-clogging and non-stringing operation considering the media to be pumped
- The impeller shall have means to reduce end thrust
- The common motor/pump shaft shall be supported in anti-friction bearings with grease and/or oil lubrication
- The shaft shall not to be in contact with the pumped medium
- The intake and discharge sides of the pump shall have flanged connections
- The motor cooling system shall be highly efficient with cooling shall be based on indirect cooling
- Duck foot bends shall be provided for automatic coupling of the pump to the discharge pipe
- A guide bar system shall be provided for lowering and lifting the pump
- The pumps shall be suitable for reversing by backflow in the pipe after pump stop
- Cable shrouds shall be of steel wire mesh instead of synthetic material.

Materials

The materials given below are the minimum requirements.

- volute casing: GG-25 with special epoxy coated against corrosion
- impeller: Hardened steel (Min. 60 HRC)
- pump shaft: C45 carbon steel or stainless steel (EN 1.4301 or higher)
- type of seal: mechanical seal suitable for liquids with a high concentration of abrasive solids
- fastening components, material stainless steel.

Drive

The motor shall have the following features:

- dry-running three-phase asynchronous motor in watertight casing according to IEC standard
- protection type IP 68
- insulation class H
- operating mode S3 or S8 (frequency converter)
- internal cooling
- moisture/water sensor device to prevent damage to motor windings and bearings
- tandem mechanical shaft seal
- thermo element in coil for motor protection
- sensor for bearing temperature
- pump completely cabled

5.8.12.5. Centrifugal pumps for wet installation

The centrifugal pump shall be suitable for wet installation and handling of liquids with long stringy solids as well as liquids of high solid concentration. The pump shall have the following features:

- design according to DIN 19569, where applicable
- impeller with large, unobstructed flow ways to ensure non-clogging and non-stringing operation
 - considering the media to be pumped.
- capable of pumping activated sludge and oil water mixtures
- steep performance curve
- high efficiency
- casing with replaceable wear liner
- common motor/pump shaft supported in anti-friction bearings with grease lubrication. Shaft not to be in contact with pumped medium
- duck foot bend for automatic coupling of pump to discharge pipe
- guide bar system for lowering/lifting of pump
- fixing components.

Materials

The materials given below are the minimum requirements.

volute casing:	GG-25 with special epoxy coated against corrosion
impeller:	Hardened steel (Min. 60 HRC)
pump shaft:	C45 carbon steel or stainless steel (EN 1.4301 or higher)
type of seal:	mechanical seal
motor side seal:	same type and material
pump side seal:	different type and material.

The pumps shall be suitable for liquids with a high concentration of abrasive solids. The guide bar system for lowering and lifting the pump shall be stainless steel. The fastening components shall be stainless steel

Drive

The drive unit shall have to the following features:

- protection type IP 55
- insulation class F
- thermo element in coil for motor protection.

5.8.12.6. Centrifugal pumps for dry installation

The centrifugal pump shall be suitable for dry installation and handling of liquids with long stringy solids as well as liquids of high solid concentration. The pump shall have the following features:

- design according to DIN 19569, where applicable.
- impeller with large, unobstructed flow ways to ensure non-clogging and non-stringing operation
- considering the media to be pumped.
- capable of pumping activated sludge and oil water mixtures.
- steep performance curve.
- high efficiency.

- casing with replaceable wear liner.
- pump and motor on common base frame.
- pump shaft supported in anti-friction bearings with grease lubrication.
- pump with stuffing box packing.
- Leak detection and prevention shall be included

Materials

The materials given below are the minimum requirements.

- volute casing: GG-25 with special epoxy coated against corrosion
- impeller: Hardened steel (Min. 60 HRC)
- pump shaft: C45 carbon steel or stainless steel (EN 1.4301 or higher)

Drive

The drive unit shall have to the following features:

- dry-running three-phase asynchronous motor according to IEC-standard
- protection type IP 55
- insulation class F
- thermo element in coil for motor protection.

5.8.12.7. Mono Pumps (Helical Type Sludge Pumps):

The pumps shall be volumetric, eccentric screw type with positive displacement, shall have a circular cross-section with single-spiral metallic rotor and shall rotate in a pair of internal helical elastomeric stator with twice the step length of the rotor. It shall be self-priming pump. If necessary, it shall be capable of turning forward and backward.

It shall be designed specifically for pumping of the waste water treatment sludge containing organic solid matters and small inorganic particles.

The pump shall be suitable for closed connection to the motor-gear box.

The eccentric-screw pump for conveyance of sludge shall have the following features:

- design according to DIN 19569, where applicable
- self-priming, rotary, valve less screw pump
- direction of rotation reversible
- suction chamber with venting and flushing attachment
- anti-friction bearings with grease and/or oil lubrication
- type of seal: mechanical seal
- shaft at mechanical seal position to have wear resistant coating or wear sleeve
- sensor on suction side to prevent dry running
- pressure switch on discharge side
- pump and motor assembled on common base frame complete with coupling
- all fastening material to be included
- pin-type/ball joints connecting drive and rotor to be greased for service life; gastight and watertight sealing.

Materials

The materials given below are the minimum requirements.

- casing: GG 25
- stator: Elastomer
- rotor: chrome-nickel-molybdenum steel.

Drive

The drive unit shall have the following features:

- three-phase asynchronous motor according to IEC-standard
- protection type IP 55
- insulation class F.
- thermo element in coil for motor protection.
- the speed of pump shaft must not exceed 150 rpm.

5.8.12.8. Submersible Type Recirculation Pump

It should transfer waste water with propeller blades designed with low speed in the axle direction from the suction side to discharge side.

Axial fan shall be completely made of corrosion resistant stainless-steel casting. Side fan guards and placement apparatus shall be made of SS304 stainless steel.

There should be a 30 to 50Hz frequency converter in order to be able to provide variability of fan speed.

Motor shall have a sensor showing humidity and water in oil. The insulation class of the motor windings shall be F and motor protection shall be IP68. A gear box with appropriate gear ratio should be used to obtain the desired speeds.

5.8.12.9. Rotary lobe pumps

The pump and its components should be suitable for 24 hours continuous operation, its casing and all components should meet the specified flow rate and pressure values and there should be no overheating, vibration, wearing and strain. It should also be resistant to dry running for at least 30 minutes.

Pump casing and front cover shall be made of cast iron or stainless-steel material depending on the properties of the fluid.

The pump, reducer and motor group should be installed completely on a steel frame together with all necessary coupling, protection and fittings.

The lobes in the pump should have at least 4 blades. Hub of the lobes shall be made of cast iron and coated with NBR, EPMD, FPM or WEROBUST material depending on the property of the fluid.

Pump shafts shall be made of ASTM A293 carbon steel. Diameter of the pump shaft shall be minimum 60 mm for the pumps with flow rate of higher than 25 m³/h and minimum 85 mm for the pumps with a flow rate of higher than 100 m³/h.

Seal group of the pump shall be pre-assembled block type cartridge mechanical seal to facilitate maintenance and replacement. One side of each cartridge mechanical seal should consist of mechanical seal and the other side should consist of soft seal.

The upper and lower casing parts of the pump should be adjustable/replaceable against the possible wear.

The speed of the lobes during operation of the pump should not exceed 4.5 m/s.

Motor power of the pumps should reserve at least 20% of its existing power to be able to meet the additional power requirement that will compensate the changes that may occur in the performance curves depending on the use over time.

The rotary lobe pump for conveyance of sludge shall have the following features:

- Pump and gear motor group should be assembled on hot dip galvanised steel base plate with coupling, protecting
- diameter of solid particle: minimum 40 mm
- Considering leaks may occur during time through seals, the seals should be maintained in a chamber sealed from exterior.
- Maintenance and replacement of lobes and block seal should be made through the front cover without requiring removal of pump suction and discharge line connections and/or coupling between motor and pump.
- The bottom and top body parts of the pump should be made in such way adjustable (movable) /replaceable against wears.

Materials

The materials given below are the minimum requirements.

- body/front cover :GG 25 Cast iron
- shaft :C45 carbon steel stainless steel (EN 1.4301 or higher)
- lobe : helical shape, cast iron covered with NBR (minimum 3 wings).
- pump sealing : mechanical seal
- wear plates : hardox
- Suction and discharge connections: gooseneck shape with DIN 2633 as hot dip galvanized.

Drive

The drive unit shall have the following features:

- three-phase asynchronous motor according to IEC-standard
- protection type IP 55
- insulation class F.
- thermo element in coil for motor protection.
- the motor power should reserve at least 20% of its nominal power.
- the speed of pump shaft must not exceed 500 rpm at 50Hz.
- The motors will drive with frequency converters.

5.8.12.10. Grit and grease pumps

Type: Vortex

Installation: Submersible

Each pump shall be suitable for operation in a wet well installation and shall be provided complete with duck food with automatic coupling, guide rails and lifting chain. For each grit pump shall be capable of handling wastewater containing grit settled on the bottom of grit chambers.

Each pump shall be provided with a flexible hose connected to the suction flange. The flexible hose shall be reinforced to resist vacuum conditions during operation. Pumps shall have agitators. An agitator connected to pump shaft shall be provided after pump volutes. This agitator shall be durable against abrasive effect of the sand, coated with special wear resistant material that provides an especially high level of wear resistance against sewage with high concentration of abrasive particles.

Guide rails and lifting chain shall be made of stainless steel or hot dip galvanized steel.

Each pump shall be provided with a control panel. The panel shall include an adjustable timer for setting

the operation/pause times for the pump.

5.8.12.11. Dosing pumps

Chemical dosing pumps shall be of the plunger or diaphragm type driven by electric motors. Hydraulically actuated diaphragm pumps will not be acceptable. Pump, motor and driving arrangement shall be mounted on a robust combined base plate incorporating a drain connection.

The operating rate of dosing pumps shall not be less than 6:1 for diaphragm pumps and 10:1 for plunger pumps, with overall accuracy within the following percentages:

	Diaphragm pumps	Plunger pumps
Accuracy of setting	3	1
Repeatability	1.5	0.5
Linearity	3	1

Plunger pumps shall have alum-type-ceramic or stainless-steel plungers. Diaphragm pumps shall have thermoplastic diaphragms faced with polypropylene, butyl or polytetrafluoroethylene (PTFE). Pump heads shall be either stainless steel or polypropylene. Mechanical glands shall not be used.

The output of the pump shall be adjustable by varying the effective length of the stroke settings.

Pump motors shall incorporate an integral reduction gearbox drive, which shall be totally enclosed in a lubricated oil bath. The gearbox shall incorporate the cams for the plunger or diaphragm drive and shall be provided with oil filling and drain connections and visible oil level indication.

The design and location of metering pump heads shall facilitate easy dismantling for removal of any foreign matter.

Dosing pumps shall be provided with means for calibration by direct measurement upstream of the dosing pump. Manually isolated tapping shall be provided on the pump suction for connecting the calibration unit. The Contractor shall provide all necessary equipment and fittings in duplicate for the calibration of the dosing pump.

Particular attention shall be paid to the layout of the dosing pumps and pipework. All connecting manifold systems shall be permanent and complete with drain connections. When handling chemicals with low vapour pressure, piping shall be designed to eliminate vapour pockets. Dosing pumps shall be provided together with all accessories like back pressure valves as a complete set.

5.8.12.12. Electric Motors

Electric motors used to drive the pumps and other mechanical equipment shall be manufactured as Asynchronous motor with a Short Circuit Squirrel Cage, unless otherwise specified.

Electric motors shall operate at an ambient temperature between -30°C and +50°C and in humid environment.

Dry type mono-block pump motors shall have a protection type of at least IP 55, insulation class of F, and protection type of the motor terminals shall be IP 55.

Electric motor of the submersible pumps (including submersible pump running dry) shall be manufactured with IP68 protection and insulation class H. Motor manufacturer has to certify that the motor has been manufactured in class H and the contractor shall submit this certificate upon delivery of the pumps. Motors shall have thermistor for winding temperature control and water leak sensor to control water leakages. Insulation class can be F for the electric motors if the power of the motor is less than 4 kW.

Motors shall meet the nominal operation powers if the nominal operation frequency changes $\pm 5\%$ and operation voltage changes $\pm 10\%$.

Construction type of motors shall be VI, unless otherwise stated.

Start-up moment of the pump motors shall be a value that is adequate to start up the pumps while the valve is open, and the discharge pipe is full. The motors used to drive the mechanical equipment other than the pump should provide the power and moment that will ensure functioning of the equipment without any failure.

The motors shall be heavy duty type and suitable for use in outdoor conditions and shall be compatible with operation with the frequency converter in a way to meet the possible variable revolution requirements in the future.

The motors shall have labels indicating their technical characteristics on them. In addition, information requirements specified in the sub-paragraphs with no. (3), (4), (5), (6) and (12) of Article 2 of the "Communiqué on environmentally sensitive design requirements for electric motors" published by the Ministry of Science, Industry and Technology in the official gazette dated 02.07.2012 shall apply.

Motor shall be fed with 380 V, and if it is specified in the technical specifications and their annexes, the motors that are fed with different voltages shall be used.

Electric motor power and number of revolutions of motor that are lower than the electric motor power and number of revolutions of motor specified in the specification or its annexes can be offered, provided that the characteristic values requested in the specification shall be provided and safety limits shall be obeyed.

5.8.12.13. Pump Inspection and Acceptance Procedures

Tests and inspections of the submersible pumps shall be performed under operation conditions (in water). The documents including the test information related to the tests and inspections of the imported pumps performed at the factory and the catalogue information of the pumps in the standard production shall be submitted to the Employer together with the pumps. The test costs of the pump acceptance procedures shall be borne by the contractor.

Test Stand: The factory test stand shall be in accordance with TSE. The measuring instruments used in the tests shall be calibrated once a year by the authorized institutions and their documents shall be submitted, if requested. If the factory test stand is deemed inadequate by the Engineer, the factory acceptance tests shall be carried out at another stand that shall be deemed appropriate by the Engineer. Tests and inspections of the imported pumps may be performed at the factory test stand of the manufacturer and they may also be performed at the test stand of the contractor abroad or at the test stand of another institution.

Physical inspection and material test: Physical inspection of all materials is performed visually. The Engineer, if it deems necessary, may request performance of the chemical analysis of the material at an institution that shall be deemed appropriate by the Engineer. In this case, the laboratory costs shall be borne by the contractor.

Hydrostatic pressure test: There should be no leakage when a pressure that is 1.3 times the operating pressure is applied to the pump in the periods specified in the standards.

Efficiency test: The pumps are operated at minimum four points, including the operating point, 10% below and above the operating point head and the closed valve position and the (Q-H_m), (Q-N) and (Q- \cdot p) curves are drawn. It is determined whether the obtained values meet the technical specifications. In the closed valve position, the pressure occurred at the pump should not be less than 1.1 times the manometric head at the operating point. The flow rate, efficiency and total pump load to be obtained in the tests shall be in accordance with TS EN ISO 9906 standards. Tolerance factors of the pumps shall remain within the tolerance limits of ± 8 % for flow rate, -5 % for efficiency and ± 5 % for total pump load. Catalogue performance curves shall be taken into account for the serially produced pumps with power less than 4 kW (waste water pumps, sand pumps, mobile and drainage pumps, etc.).

Temperature test: The pump shall be operated in the operation range for a period of 1 (one) hour. The temperature that will occur in bearings at the end of this period should not exceed the values required in the standards.

Vibration and cavitation test: The pumps should operate at the value of $\pm 10\%$ of the operating point without vibration and cavitation.

5.8.13. Coarse screens

- | | |
|------------------|------------------|
| • Screen type: | Automatic screen |
| • Bar aperture: | 20 mm |
| • Bar thickness: | minimum 10 mm. |

Material (parts in contact with media): Stainless steel 1.4404

Coarse screens where solids harmful to the inlet pumps will be retained are to be installed.

The automatic coarse screens and all equipment related to the screen facilities shall be kept in operating working conditions during frost.

If required head is available, an overflow bypass to the receiving water shall be established upstream of the coarse screen.

The individual coarse screens shall be able to isolate by means of penstocks or similar to allow service of each of the individual screens.

The screen operation shall be controlled by means of a level transmitter installed upstream and downstream the screens. The automatic screens shall be provided with an automatic release system in case of stuck moving parts.

The screens shall be secured against overload.

The screens shall be manufactured completely of stainless steel 1.4404

No chain, bearings or any devices for transmission are allowed to be submerged.

The automatic screens shall be able to be maintained and inspected when installed.

Human contact with screenings shall be minimized, i.e. screenings shall be conveyed automatically to the reception container located at ground level.

If the screenings conveyor is out of order the screens shall be able to operate without. The discharge height of the screens shall be sufficient to allow screenings to be dropped directly into a reception container.

If screens and screen containers are located in a building the screen and building shall be ventilated and led to a biofilter.

Easy access to all mechanical equipment shall be provided.

5.8.14. Fine screens

Screen type: perforated plate type step screen, continuous belt or drum screen

Perforation spacing: maximum 6 mm.

Material (parts in contact with media): Stainless steel 1.4404

Screen elements : Stainless steel 1.4404 or polyamide

The screen operation shall be controlled by means of a level transmitter installed upstream and downstream the screens.

The automatic screens and all equipment related to the screen facilities shall be located in a building.

Combined press and washing unit may be provided together with the fine screen.

The automatic screens shall be provided with an automatic release system in case of stuck moving parts.

The screens shall be secured against overload.

The screens shall be manufactured completely of stainless steel (1.4404).

No chain, bearings or any devices for transmission are allowed to be submerged.

If screens and screen containers are located in a building the screen and building shall be ventilated.

The automatic screens shall be able to be lifted up of the inlet channel for repair and inspection by means of build-in hinges. Furthermore, stop logs or penstocks shall be provided to enable isolation of the automatic screens for maintenance.

The screenings from the fine screens (if not combined) shall be transferred to screen press through screw type conveyor. Screen press shall be spiral conveyor type with washing compacting facility.

5.8.15. Conveyor systems

For transportation of screening, sand, sludge etc.

Spiral conveyor

The conveyor shall be a shaftless spiral conveyor.

The screw conveyor with washing and compacting facility shall be capable of transport, wash and compact the screenings discharged from the screens. Wash water shall be treated wastewater, see Section 7.8.52. Reject water from the compacting/washing facilities shall be led into the screen channel.

The design shall include anti vibration supports, trough with connection flange, feeding and discharge chute.

The materials of the conveyor shall be suitable for the material to be transported, but shall comply with the following specifications: supports, suspension and trough stainless steel (EN 1.4404 or higher), trough lined with PE, spiral made from special steel painted or stainless steel (EN 1.4404 or higher).

The shaftless spiral conveyor shall be manufactured in its full length. Site welding of the conveyor shall not be acceptable.

Motor:

Protection class IP 55 with thermo protection.

Insulation class: F

Belt conveyors

Mainly consisting of support and frame with sound absorbing, oil- and sewage resistant bearings, an oil- and sewage resistant belt with plies of fabric; incl. motor.

The belt conveyors shall be completely encased to avoid odour nuisance.

Velocity: approx. 0.8 m/s

Due to impact effect at the feeding zone of the belt conveyors, the distances between the rollers should be reduced at the feeding zone.

Side plates to be equipped with rubber or plastic aprons at contact area to belts.

The specified width of the conveyor is the required effective width of the conveyor belt. The inclined sides of the belt and the conveyor frame shall be in addition to the specified width of the conveyor.

Bearings shall be sufficiently rated for both vertical and horizontal loads.

Material: Frame, supports, enclosure, baffles and chutes: stainless steel

All other parts: cast iron, hot dip galvanised steel or steel with corrosion protection according to general specifications.

Motor:

Protection class IP 55 with thermo protection.

Insulation class: F

5.8.16. Screenings press

The screen press trough and cover shall be made of stainless steel (1.4404) plate. The trough shall be provided with an anti-friction lining of PEHD, not less than 8 mm thick. The screw shall be of the shaft-less type and made of special steel. Operating range of screen press, fine screen and conveyor bands shall be adjustable via PLC system. Spiral edges of screen press shall be furnished with brush against sticky dirt.

If the washing and compacting unit is out of order the screen shall be able to operate without these auxiliary units. The discharge height of the screen shall be sufficient to allow screenings to be dropped directly into a reception container.

An emergency bypass, for bypassing the automatic screen, shall be installed.

The washing and compacting section and all bolts, screws, pipes for compressed screenings, supports and brackets shall be of stainless steel 1.4404 in accordance with the specifications for stainless steel.

Easy access to all mechanical equipment such as screens, gates and washing and compacting unit shall be provided.

Drain-off facilities shall be provided where necessary. Pipes for compressed screenings shall be removable for easy cleaning.

Operation of screens, washing and compacting unit to be controlled by the difference in water level up- and downstream the screen superseded by timer control.

5.8.17. Grit and grease removal equipment

The aeration equipment shall provide coarse bubble, clogging free aeration. The diffusers shall be easy dismountable section-wise without emptying the tank.

The scrapers for grease removal shall operate timer controlled. The grit chamber aeration shall be continuous. Each drop air pipe shall be provided with a shut off valve.

Easy access shall be provided to all equipment that needs regular service and maintenance.

All submerged steel shall be stainless steel 1.4404 or SS304.

The inflow shall be distributed equal to all lines.

The grit- and grease installation shall include service penstocks for closing each line. A penstock shall be installed before and after each line for isolation of the line.

A separating wall shall be constructed between sand channel and grease channel using grease lamellas made up of wooden and polyethylene material. Those lamellas shall be of 2.5-3.0 cm thickness and 10 cm width.

Travelling Bridges for Grit and Grease Chambers

Travelling bridges for grit and grease chambers shall be complete units consisting of a bridge with surface scraper for the collection and removal of grease from the surface of the grease chamber.

The bridge shall be a lattice construction made of steel with walkway of grated floor panels and hot dip galvanized after fabrication.

The surface scraper shall collect and convey the grease to the weir at the outlet end of the Grit and Grease Chamber. The scraper shall be mechanically lifted out of the water and locked in its top position when the bridge approaches the weir. The scraper shall remain in its top position while the bridge returns to the inlet end where the scraper shall be released automatically.

The travelling bridge shall be controlled from a local panel installed on the bridge. The bridge and the grit pump shall operate automatically; however, it shall be possible to operate the bridge and the grit pumps manually from the panel.

Surface scraper, sand and grease pump installation materials, and slipway pipes shall be of EN 1.4404 or SS304 type stainless steel.

The power supply to the bridge shall be provided through a flat cable running in a guide rail along one side of the grit and grease chamber wall.

The bridge shall be provided with bogies and two wheels at each end running directly on the rails installed on the concrete walls. The material of rail shall be GG 60 cast iron and the material of wheels shall be St-37 carbon steel.

One wheel at each end shall be connected to a drive unit via traversing drive shafts. Furthermore, the bridge shall be provided with four fixed guide wheels running on the inside of the walls. The guide wheels shall ensure that the bridge runs evenly.

The scraper shall be provided with the necessary gear box, drivers, motors and supporting bridge structures.

The bridge shall be walkable and covered with galvanized open mesh flooring and provided with railing. The bridges shall be stiffened by cross and diagonal steel members be provided with sub-frames to carry the electric drive and cable drum and be designed for a load of 1.5 kN/m² and the deflection shall not exceed 1/360.

Specific requirements for Sand Trap Unit

The bridge shall automatically make two movements in rectangular structures (channel, tank) as going and return. The scraper blades shall rise automatically during going while scrapping foam on the surface and providing transfer of foam to the foam discharging channel, and the sand scraper blades shall be activated automatically to scrape the settled sands and transport them to the sand collecting chamber.

There shall be articulated scraper blades that can move up and down automatically, foam scrapers, railing and stairs on the bridge.

The bridge platform shall be manufactured from hot-dip galvanized coated perforated sheet.

Bridge scraper arms and blades shall be made of SS 304 stainless steel material.

If sand collecting is performed by pump; the bridge to be used on the sand retainer unit shall be manufactured in accordance with the assembly and disassembly of the sand pump.

Sand pump and bridge shall operate simultaneously. It can be stopped by means of the torque switches in case of any jamming.

Movement of the power cables that feed the sand trap bridge and the sand pumps on the bridge on a suspended rail extending along the sand trap shall be provided by sliding rollers.

The pump shall be cast iron and have vortex fan. Manually operated lifting apparatus made of galvanized box profile shall be mounted on the bridge in order to be used in the assembly and disassembly of the pumps.

Insulation class of the electric motors up to 4 kW belonging to the sand pumps and drainage pumps shall be F.

Specific Requirements for Rotating Bridge, Sludge Scraper and Weir Structure

The sludge that accumulates in the pre-settling and final settling basins and the bottom of the sludge thickener tank shall be transferred to the sludge chamber in the middle of the tank by the scraper blades supported on a rotating bridge. The replaceable scraper blades shall be hinged type so that they can rise when they come across rigid bodies.

The bearer central bearing, scraper arms, replaceable scraper pallets, oil and foam scrapers, all bolts, nuts etc. used with deflector and stalks shall be made of SS304 stainless steel material in accordance with the project, the scraper blades shall be manufactured from abrasion resistant material. Walking way grate shall be manufactured from perforated sheet and coated by hot dip galvanizing.

The foam accumulated on the surface shall be scraped towards a foam collector on the perimeter of the tank. Foam scrapers shall be supported on the bridge.

There shall be a notched, circular overfall structure made of minimum 3 mm thick SS304 stainless steel sheet in the form of "U" or "V" around the sedimentation basins and the sludge thickener tank. The weir height should be adjustable.

5.8.18. Diffusers in grit chambers

The plate, tube or disk diffusers to be used for oxygen supply in wastewater treatment plants shall be a membrane producing tiny bubbles in an average diameter of 2 mm and operating continuously (continuous purge system) and having ceramic or plastic body and they shall be resistant to clogging and waste water so as to be able to operate safely in the calculated pressure and air flow ranges.

Air distribution pipes and all fasteners (bolts, nuts, washers, etc.) shall be made of SS304 stainless steel material. Easy to repair clamps shall be used to repair the damages occurred on the pipes in emergencies. EPDM or NBR rubber gasket shall be used for sealing.

Diffusers shall be mounted with stainless steel support legs so as to tolerate the difference of the height to the base of the basin.

The air distribution pipes shall be connected to each other and to the diffusers with abrasion and corrosion resistant inserts with special threaded joint.

The diffuser shall be equipped with an integrated control system (when air supply is stopped, the centre of the membrane will cover the top of the air outlet hole on the membrane support plate to prevent water or activated sludge from entering the line). When the air pressure dropped, the diffuser holes shall also close and function in the same way.

The oxygen concentration in waste water in the diffuser type aerators shall be 1-3 mg/l.

Air filters shall be placed to the blowers' suction ports, and there shall be a pressure gauge on the outlet pipe.

5.8.19. Grit classifier (Sand Separator/Sand Classifier)

For sedimentation of easy settle-able substances of the sand water mixture withdrawn from the grit chamber. The grit classifier shall be with funnel shaped inlet for sedimentation with sand discharge by screw.

Required grade of separation: > 90% for particles ≥ 0.2 mm;

Design to guarantee that separated matters will not harm or damage the separator (over load safety device).

The classifier shall be made from stainless steel 1.4404 or SS304, conveyer coated with polyethylene against abrasion, screws made from special steel or stainless steel. Spiral shall be made without stem

The feeding rate shall be designed to match to sand pump capacity.

The unit shall be suitable for automatic operation outdoor for a period of 24 hours, it shall be completely closed, and shall not give off smell around. If requested, sand washer clean water spraying equipment shall be included in the system

To avoid odour nuisance the complete plant shall be housed and if necessary ventilated.

The grit classifier and container shall be located inside a building in frost free conditions.

5.8.20. Containers for screenings and grit

The containers for screenings and grit classifier shall be provided. The containers shall be equipped with a hinged lid. The containers shall be made of hot dip galvanized steel.

Containers shall be fitted with wheels for easy manually handling. It shall be compatible with the End Recipient's existing containers and trucks.

5.8.21. Submersible mixers

Generally, the mixers shall be of the submerged rotating propeller type. The mixers shall be mounted on guide bars, which allow them to be lifted from the tank for inspection and maintenance. A removable crane with steel wire winch shall be provided for the hoisting of the mixers.

Mixers shall be provided with bimetal (klixon) switches or PT100 sensors in the windings for thermal protection. Furthermore, mixers shall be provided with leak detectors.

Mixers shall be corrosion protected according to Section 3 of Volume 3b...

The mixer system shall be complete with a local switch panel with emergency stop push button, On/Off-key-switch, Manual/O/Automatic-switch, manual operated lifting and lowering device, guide rails, lifting cable / chain. Guide system incl. brackets and fixing parts shall be made of stainless steel 1.4404. Hand operated cranes shall be delivered in hot dip galvanized steel. Winch and wire however, shall be made of stainless steel 1.4404.

Special attention shall be paid to the design and construction of the panels taken into consideration the particular climate conditions with high temperatures and up to 100% humidity.

The mixers shall be equipped with stainless steel or polyurethane blades with self-cleaning hydraulics. Mixer and drive motor shall be submerged in the media and of protection class IP68 with insulation class F, minimum 80% efficiency, leakage control and mechanical seals. The mixers shall ensure that the content of sludge in the water is kept in constant suspension. Maximum allowed deviation of sludge concentration measured at different levels and spots in the process tank is 5%.

For mixers in raceway shaped tanks the minimum average velocity in the process tank shall be 0.30 m/s and a minimum velocity of 0.25 m/s measured in the direction of the current all over in the tank in a distance of minimum 0.3 m from bottom and walls.

The mixers for raceway tanks shall be of the slow rotating type with a maximum permitted peripheral velocity of 7 m/s and propeller speed at maximum 50 rpm.

Mixers for different shapes of tanks where no velocity as such but only turbulence can be obtained the mixer may be of the medium speed rotating types up to 150 rpm.

Stainless steel shall be in quality according to specifications for stainless steel.

Material:

Casing motor-gear: GGG 40

Propeller: Stainless Steel 1.4404 or SS304 / Polyurethane

Propeller shaft: Stainless steel (1.4021) or SS304

Bolts and nuts: A4

These material examples shall describe the minimum required qualities. The contractor is free to offer other materials with the same or better quality, which acceptance is subject to the Engineer. The bearings are to be sized to guarantee a service life of 50,000 hours.

For easy service moveable cranes fitted with winch shall allow easy lifting and lowering of each mixer. One crane for each type of mixer shall be provided. Cranes shall be manufactured of either aluminium or stainless steel. The wire shall be of stainless steel.

5.8.22. Blowers

The blowers that shall supply necessary air to the sand trap unit and the diffusers in the aeration basins shall be provided with, in a way to be started with frequency converter, safety valves, suction filters, silencers, check valves, outlet air cooler, outlet temperature indicator, manometer, thermometer, safety valves with 3- or multi-way pipe connections, vibration damping pads, electric motor and housing, pressure gauge and filter clogging indicator, a sound enclosure equipped with an internal ventilation fan that automatically operates for a certain period of time, belt and pulley, elastic hose and clamps. There shall be insulation material in the sound enclosure and top of this insulation material shall be completely covered with a perforated sheet plate.

The blowers for grit chambers, and aeration tanks shall be separate groups and each one shall have its own individual air piping.

Positive Displacement Blowers

Blowers shall be of the positive displacement lobe type (roots type) and controlled via frequency converter.

The blowers may supply both grit chamber as well as other facilities such as air lift pumps. Capacity of the blowers shall be determined by the Contractor.

The blowers shall be operated alternating.

The motors shall be provided with bimetal "klixon" switches or PT100 sensors for thermal protection.

The blowers shall be provided with silencer at inlet and outlet and noise reducing covers. Noise level may not exceed 85dBA 1 m away from the blower inside the station. Noise reduction covers shall permit easy dismantling and mounting for maintenance and repair and if necessary facilitated with internal ventilation.

The speed of blower must not exceed 3000 rpm.

When selection of blower types it should be considered that some types of blowers emit pulsations at the discharge that might be transferred to the air distribution pipes with noise problems as consequence.

Noise should be limited to a minimum and not exceed the requirements at the field boundary according to requirements stated in Section 2 of Volume 3a Employer's Requirements.

Pipes inside the blower station shall be of stainless steel 1.4404. Each blower shall be provided with all necessary instrumentation and valves such as: check-valves, blow-off valves, pressure gauges on suction- and discharge side, shut-off valves as well as a flexible connection to the pressure manifold.

Lead-in pipes shall be designed to prevent possible damages to the pipes or concrete caused by vibrations and thermal expansions.

Distribution pipes outside the blower shall be made of stainless steel 1.4404 quality according to the requirements stated for stainless steel.

The requirements for air velocity are stipulated in the Employer's Requirements, Section 3: Plant Description.

Air intake to the blower station shall be provided with a filter, which in degree of purification corresponds to the requirements of the diffusers.

The blowers shall be of the rotary piston type, based on the roots-compressor-principle and shall be manufactured in accordance with DIN 1945 with an admissible tolerance of +/-5%, referred to the power consumption and the intake volume.

Two rotors shall be located inside the housing. The housing shall be provided in cast iron, material GG20, with cast-in pre-inlet channels in the discharge side cylinders part to minimize the sound by pulsation reduction.

The rotors shall be dynamically balanced (with test certificate) and manufactured in carbon steel, C45N, drop-forged in one piece.

The helical timing gears, material 16 Mn Cr5E, shall be teeth hardened and ground, and machined to the highest precision.

The sealing at the conveying chamber shall be by three piston ring labyrinth seals and oil slingers. The sealing at the driving shaft shall be by radial sealing.

Each retain piston blower shall be covered by an acoustic hood of galvanized steel plate in segmental design with hardly inflammable internal lining.

Each blower shall be provided with the following components:

- a. base frame with integrated absorption - silences, including console and tension device for motor.
- b. 1 set of anti-vibration mountings including holding down bolts.
- c. 1 intake filter silence and 1 discharge filter silencer.
- d. V-belt drive with guard.
- e. 1 pressure relief valve.
- f. 1 connection housing with fitted non-return valve and connecting flange for pressure relief valve.
- g. Flexible connection with hose clamps.
- h. 1 pressure gauge with connection places.
- i. 1 vacuum indicator for filter control.
- j. 1 pneumatic start-up unloading device.
- k. 1 driving motor, 1EC standard, design B, 3 phases, protection IP 54, size 132S, insulation classification

Centrifugal/Turbo Blowers

Blowers shall be identical and of the centrifugal type with servo operated variable diffuser and servo-operated variable pre-rotation system for maximum efficiency.

The blower station shall be able to provide air linear in the minimum range of 20% to 120% of required maximum design capacity in terms of flow to the biologic reactors at the actual conditions. Each blower shall operate linear in a range of 45% - 100% of its maximum capacity. Actual conditions are in terms of discharge pressure, ambient temperature range and ambient humidity and altitude at the Site.

The efficiency of the blowers shall be no less than 80% through the entire duty range. The maximum efficiency in the duty range shall be no less than 85%.

Capacity of the blowers shall be determined by the Contractor.

The blowers shall operate fully automatic based on a pre-set oxygen value, monitored in the biologic reactors.

Blowers shall operate alternating.

The motors shall be provided with bimetal "klixon" switches or PT100 sensors for thermal protection.

The blowers shall be provided with silencer at inlet and outlet and noise reducing covers. Noise level may not exceed 85dBA 1 m away from the blower inside the station. Noise reduction covers shall permit easy dismantling and mounting for maintenance and repair and if necessary facilitated with internal ventilation.

Pipes inside the blower station shall be of stainless steel. Each blower shall be provided with all necessary instrumentation and valves such as: suction filter, pressure relief-valve check-valves, blow-off valves, pressure gauges on suction- and discharge side, inlet filter clog indicator, shut-off valves as well as a flexible connection to the pressure manifold. Lead-in pipes shall be designed to prevent possible damages to the pipes or concrete caused by vibrations and thermal expansions.

Distribution pipes outside the blower building shall be buried and buried pipes shall be made of stainless steel quality according to the minimum requirements stated for stainless steel.

The requirements for air velocity are stipulated in the Employer's Requirements, Section 3: Plant Description.

Air intake to the blower station shall be provided via a filter, which in degree of purification corresponds to the requirements of the blower and aeration diffusers.

The building housing the blowers shall be adequately ventilated to prevent overheating. If air intake is from inside the room, adequate unlock able ventilation ducts e.g. louver openings, shall prevent vacuum creation.

Factory Acceptance Test of Centrifugal/Turbo Blower

Prior to dispatch from the works, the turbo blowers are subjected to factory acceptance test (FAT) under load and the operational, output and consumption data described in the following documented in a test protocol. Such protocols serve as proof of specified technical performance. If so desired, the test run of the blowers shall be carried out in the presence of the Engineer.

The following values are to be recorded in a test protocol during the test run of each blower (measurements at load points 100%, 75%, 45% according to ISO 5389 and VDI 2045):

Air intake

(273 K, 1.013 bar abs.)	:	m ³ /h
Air outlet temperature	:	K
Air flow control range	:	%
Differential air pressure	:	bar
Power requirement	:	kW
Efficiency	:	%

The following points shall be documented in the acceptance protocol:

- Determination of the completeness of the delivery
- Determination of the provision of inventory documents, operating instructions and maintenance schedules
- Verification of the efficiency and capacity of the blowers

5.8.23. Aeration diffusers for the activated sludge tanks

Aeration in process tanks shall be based on floor mounted diffusers with fine bubble diffusers.

The aeration diffusers shall transfer the oxygen content in the compressed air to the sludge/water-mixture in the bioreactors as efficient as possible. Minimum oxygen transfer coefficient (SSOTE) is 16 g O₂/Nm³ at standard conditions according to DIN EN 12255-15 in clean water at 20°C, or the oxygenation efficiency of the brush type surface aerators with vertical shaft, horizontal shaft shall be at least 1.2 kg O₂/Kwh.

The oxygenation capacity and efficiency tests of the selected aerator type should be performed under standard conditions and the relevant information sheets should be submitted to the administration. The oxygenation tests of superficial type aerators that do not have test reports or are to be manufactured for the first time shall be performed by the manufacturer at a suitable test stand or at the workplace where the aerator will operate.

On demand by the Engineer the efficiency shall be verified in a test with pure water for the selected aeration system in accordance with an expert to be chosen by the Engineer. Test shall be carried out on site in one basin (to be chosen by Engineer).

The design capacity per diffuser in Nm³/h must be equal or lower than 75% of the tolerable maximum capacity in permanent operation. In order to minimize the power consumption maximum pressure, drop over the diffusers at maximum design air flow one year after commissioning shall not exceed 0.5 mWC.

The drop legs shall be made of stainless steel 1.4404 or SS304 according to specifications for stainless steel. The immersed distribution pipes can be made of HDPE or PVC. If PVC pipe is used minimum tensile strength of 7000 PSI shall be required. SDR sewer pipe is not acceptable for any in-tank piping. Factory solvent-weld all PVC joints. Field solvent welding is not permitted. Manifold pipes and header pipes shall be made of either stainless steel 1.4404, Sch40 wall thickness PVC or HDPE. The support system of the distribution pipes shall be made of stainless steel 1.4404.

The submersion depths of the aerators shall be adjustable, and their shafts shall be balanced against the dynamic loads. Brush, shaft, bolts, nuts, washers, etc. shall be made of SS304 stainless steel.

The aerator blades shall be resistant to corrosion and external effects and shall provide complete mixing by keeping the suspended matters in the basin in suspension.

Motor and reducer with protection and insulation classes that are suitable for continuous and vibration free operation in waste water shall be used in the drive system.

Necessary valves on the pipes for air distribution to shut-off and adjust the airflow of each section shall be included. Arrangements for collection and drain-off of condensed water from all possible spots condensed water is expected to accumulate shall be built in as part of the aeration diffusers.

The airflow to each tank shall be regulated relative to the oxygen content in the water. The airflow shall be automatic regulated by means of motor operated butterfly valves installed at the air supply pipe from the corresponding blowers.

Diffusers shall be either tube- or disc type. The diffuser material shall be resistant to the environment they are exposed to in the present bioreactor. If bioreactors are run in alternating operation diffusers shall be rated for this without clogging.

5.8.24. Rotating scraper bridges for the clarifiers

The scraper bridges inclusive of bottom scraper and surface scraper shall span the full diameter of the tanks. Scraper bridges for circular tanks shall be designed as self-supporting lattice structures fabricated of steel sections and provided with walkway of open mesh flooring. The bridge shall be provided with main bearing in the centre of the tank, mounted on a cross member of steel, which rests on four concrete columns. A geared motor provided with a driving wheel shall drive the bridge. The bridge shall be fitted with a boogie with wheels that runs on the top of the outer wall of the tank. The bridge shall be easy and safe to push to the position wanted, and uninterrupted could rotate all 360°. An efficient brake system shall be provided to ensure no unintended travelling of the bridge is possible. At the periphery of the tank, the bridge shall run on two wheels with rubber tyre. A gear motor shall drive one of the wheels. The bridge shall have a drive unit at both ends. The peripheral speed of the scraper shall for secondary clarifiers be 1.8 - 2 m/minute and for primary clarifiers 2.2 - 2.5 m/minute.

The drive motors shall be provided with power from a control panel mounted on the bridge. The panel shall be powered from the centre structure of the tank via a collector ring mounted on the bridge.

The bridge shall be provided with bottom scraper for collection and transport of sludge to the sludge pit in the centre of the tank. Furthermore, the bridge for secondary clarifier shall be provided with a surface scraper for collection and transport of floating sludge to a floating sludge funnel at the tank periphery. The bottom scraper arms shall be arranged for inspection and replacement of blades and blade tips. For the cleaning of the effluent trough and scum board the bridge shall be furnished with a rotary brush. The Bridge and all subsidiary elements such as open mesh floor, handrails, steel cross members etc. shall be hot deep galvanized steel in accordance with specifications in Volume 3A section 7.2.2. - Galvanizing.

Bottom scraper, surface scraper, floating sludge arrangement and all suspensions and brackets shall be fabricated of stainless steel 1.4404. Stainless steel shall be in quality according to specifications for stainless steel.

Geared motors and other parts of rotating scraper bridge to which hot dip galvanized protection not applied and not in contact with water (not immersed), shall be corrosion protected according to Volume 3A Section 7.2 - Corrosion Protection.

The bridge shall be designed to carry a uniform load of 1.5 kN/m² in addition to dead weight and operational loads. The Contractor shall design the bridge for the actual point-load adequate for the equipment to be unloaded, however, no less than 3.0 kN in the middle of the span.

The maximum allowable deflection at the above design loads is 1/700 of the span. Limitations of the load bearing capacity of bridge shall be indicated on a distinct sign mounted at the entrance to the bridge.

The width of the bridge shall not be less than 800 mm. The height of the handrails shall be minimum 1000 mm. All open mesh floor sections forming the walkway of the bridge shall be properly secured against skidding by means of special brackets. The bridge shall be furnished with toe plates.

The centre bearing shall be adequately rated for continuously operation under the maximum design load. Lubrication points for the centre bearing shall be easily accessible without the necessity of dismantling any floor sections.

The centre bearing shall be fitted with an arrangement of slip rings with adequate amount of slip contacts rated for 16 Amperes to provide all motors etc. with power plus one contact for earthing. A set of surplus 3 (three) slip contacts for spare purpose shall be included. The arrangement shall be safely internal fitted in a protective capsulation. The arrangement shall be well constructed by design and chose of materials to prevent corrosion, condense and development of ice that can disturb the operation.

The bottom scraper shall span over the entire tank radius and be designed for effectively collection and transport of settled sludge to the sludge pit in the centre of the tank. The bottom scraper shall be provided with a sufficient number of wheels and fit perfectly to the bottom of the tank.

The surface scraper shall ensure collection and transport of floating sludge to the scum box. The surface scraper shall span over the entire tank radius and be designed to convey the floating sludge towards the periphery of the tank.

The scum box shall be designed as a valve-controlled scum outlet shaped as a funnel. Activation of the valve shall take place by means of a proximity switch which shall be activated by the bridge. The operation time shall be timer controlled.

A geared motor of recognized make shall drive the rotary brush. The brush shall be adjustable and lockable in desired positions during operation. The mechanism shall be made of stainless steel 1.4404. Springs and pulleys shall be made of stainless steel 1.4404.

5.8.25. Suction type bridges for the clarifiers

Suction type bridge complete with walkway, inlet and outlet facility, sludge suction pipes with V shaped scrapers, siphon arrangements and drive unit shall be provided. The bridge shall span the full diameter of the tank. The scraper suction system shall consist of single suction units arranged to reach the complete diameter of the tank. Each suction unit shall be attached to a depending arm with piping to the rotating bridge and the collecting pipe. The suction units shall ride along the contours of the tank floor and have to be adjustable to any slight undulation. The Contractor shall ensure that the suction units scrape at right angles to the floor and prevent any undue sideways movement of the suction units, so that any build-up of deposit is avoided. The collecting pipes have to be adequate dimensioned to the sludge flow and have to be equipped with vent facilities. All submerged material shall be made of stainless steel 1.4404. The bridge and other accessories above the water level shall be hot dip galvanized steel.

5.8.26. Effluent troughs, baffles, stengel and scum boards for clarifiers

Steel inboard weir troughs shall be designed with adjustable effluent weirs. Heavy fabricated knee braces anchored to the concrete wall shall individually support all segments.

Weir plates shall be furnished for mounting on the effluent troughs. Slotted holes for mounting shall be provided in the weir plate to provide vertical adjustment. The weir plates shall have 90° V-notches. The number of V notches shall be determined by the Contractor.

Effluent weirs, baffle segmental troughs, stengels and circular scum baffles for clarifier tanks with supports and anchorage shall be fabricated of stainless steel 1.4404. The minimum plate thickness allowed is 3 mm.

Stainless steel shall be in quality according to specifications for stainless steel.

5.8.27. Service bridges for circular tanks

Service-bridges for circular tanks shall be designed as self-supporting lattice bridge fabricated of steel sections and provided with walkway of open mesh floor. The bridge shall be provided with a main bearing in the centre of the tank, assembled on a centre-suspension resting on 4 columns of concrete. The bridge shall be fitted with a boogie with wheels that runs on the top of the outer wall of the tank. The bridge shall be easy and safe to push to the position wanted, and uninterrupted could rotate all 360°. An efficient brake system shall be provided to ensure no unintended travelling of the bridge is possible.

The bridge supporting members and open mesh floor sections shall be hot dip galvanised in accordance with specifications stated in Corrosion Protection, Clause 3.2.

The bridge shall be designed to carry a uniform load of 1.5 kN/m² in addition to dead weight and loads during. The Contractor shall design the bridge for the actual point-load adequate for the equipment to be unloaded, however, no less than 3.0 kN in the middle of the span.

Maximum allowed deflection by rated load is 1/700 of the span.

The width of the bridge shall be as minimum 800 mm.

Bridges shall be provided with necessary hoisting equipment for e.g. haul up and reinstall diffusers and mixers etc. Bridges and equipment shall be rated and designed to allow all haul ups and reinstallation of equipment as well as its inspection and maintenance can be carried out safe and unburdened, and without requirements for heavy lifts.

The centre bearing shall be selected for at the rated load including the operational load.

5.8.28. Service bridges for process tanks

Service-bridges in steel for process tanks shall be designed as self-supporting bridge fabricated of steel sections and provided with walkway of open mesh floor.

The bridge supporting members and open mesh floor sections shall be hot dip galvanised in accordance with specifications stated in Corrosion Protection, Clause 3.2

The bridge shall be designed to carry a uniform load of 1.5 kN/m² in addition to dead weight and operational loads. The Contractor shall design the bridge for the actual point-load adequate for the equipment to be unloaded, however, no less than 3.0 kN in the middle of the span.

Maximum allowed deflection by rated load is 1/700 of the span.

The width of the bridge shall be as minimum 1000 mm, adequate for transporting equipment from tanks to the ground.

Bridges shall be provided with necessary hoisting equipment for e.g. haul up and reinstall diffusers and mixers etc. Bridges and equipment shall be rated and designed to allow all haul ups and reinstallation of equipment as well as its inspection and maintenance can be carried out safe and unburdened, and without requirements for heavy lifts.

5.8.29. Centre driven scraper for gravity thickeners

The centre driven scraper for gravity thickener with bridge supported picket fence stirrer shall be: Either a fixed beam lattice type support bridge that spans the tank and suspend the thickener mechanism made of hot-dip galvanised steel members and be provided with access-way made of hot-dip galvanised open mesh floor, or alternatively the bridges can be made of concrete provided with access-way.

Hot dip galvanising shall be carried out according to specification stated in Corrosion Protection, Clause 3.2.

The centre drive assembly suspended from the access and support bridge shall consist of a heavy fabricated steel housing with a forged steel combination spur gear and bearing assembly designed such that the gear bearing balls and raceways are a complete unit. The gear-bearing races shall have tight internal clearances with vertical ball contact to resist large overturning moments.

The centre torque tube shall be of heavy-duty construction.

All submerged steel parts of the gravity thickener shall be fabricated of stainless steel 1.4404 according to specification for stainless steel.

Maximum periphery velocity of the stirrer is 2.0 m/minute.

Design loading for the structural analysis of the torque tube, flight arms and support bridge shall be taken as all dead loading resulting from the weight of all rotating equipment, plus a live load equal to 2.25 times the continuous output torque rating of the spur gear drive.

The bridge shall be designed to carry a uniform load of 1.5 kN/m² in addition to dead weight and operational loads. The Contractor shall design the bridge for the actual point-load adequate for the equipment to be unloaded, however, no less than 3.0 kN in the middle of the span.

Maximum allowed deflection by rated load is 1/700 of the span.

The width of the bridge shall be minimum 800 mm. For handrails, refer to sub-clause "handrails".

The main gear shall be rated according to above criteria's. The gear housing shall be fitted with oil fill port, a breather cap, and an oil level sight glass. One drain with a valve shall be provided to assure the complete removal of spent oil and condensate from the housing. Access for oil filling/emptying shall be allowed without removing floor sections.

The centre torque tube shall be bolted to the main drive gear and shall be of a heavy-duty construction. The lower torque tube shall have welded attachments for rigid attachment of the flight arms and hopper agitator. The torque tube shall be fabricated from stainless steel.

The thickener mechanism shall have two rotating collector arms with angled flights arranged to sweep settled sludge to the centre hopper. The flight arms shall be fitted with vertical pickets to agitate the sludge blanket. The flight arms shall be fabricated from stainless steel 1.4404.

The pickets shall be supported by bolting to both the top and bottom of the flight arm. Individual pickets shall extend to a point equal to one-half of the side water depth as measured at the perimeter of the tank.

Flights shall be provided with scraper blades and cover the whole bottom of the tank after every 180° turn of the scraper. Scraper blades shall be adjustable to insure a small clearance to all areas in the bottom of the tank.

A central steel agitator shall be provided at the base of the torque tube and shall be detailed to fit within the concrete sludge hopper with a maximum of 50 mm of clearance.

A fixed influent well shall be provided. The influent well shall have a flanged nozzle for attaching the influent feed pipe. The influent well shall be fitted with at least two scum relief ports having adjustable weirs.

The effluent trough shall be provided with weir and scum baffles. Weirs shall be adjustable for levelling.

5.8.30. Pre-dewatering equipment - mechanical thickeners

Sludge taken from the sedimentation basins and containing 0.8-1% solid matter shall be converted to a sludge cake containing approximately 2-4% solid matter by gravity type, drum type, disc type or screw type mechanical sludge thickeners.

All driving drums of the gravity type mechanical thickeners shall be lined with industrial rubber. Belt tensioning shall be provided by the pneumatic cylinders, belt protection and adjustment and prevention of lateral movement shall be provided completely automatically by the proximity limit sensors. Belt speed shall be between 3-10 m/min, and sludge scraping shall be performed mechanically. There shall be cleaning brushes and removable spray nozzles for continuous belt washing. It should be possible to clean the nozzles with rotating brush. Belt motor shall be frequency controlled.

The mechanical, disc type and screw type mechanical thickeners shall be completely made of stainless steel material (SS304). The cover of the thickener may also be made of fiberglass material.

The Contractor shall provide detail explanations about the polymer type, polymer dosage, speed of the flocculation reactor mixer, speed of the thickener, washing period and so on in order to bring the performance of the mechanical thickeners to the optimum point.

Belt Thickeners (Belt Filter Press)

Required DS in sludge out: minimum 4%

The whole plant shall be operated automatically without plant operators permanently present.

The belt thickeners shall be designed as a closed unit. A flushing system shall be applied for continuously flushing and during final cleaning. The flushing system shall be easily removable and furnished with a system of nozzles.

The thickener shall have inspection doors.

The pre-dewatering unit shall be totally enclosed for connection to the odour control unit.

The inlet of each thickener unit shall be furnished with taps for sludge sampling. If standalone unit taps should also appear on the discharge.

All steel constructions, rollers, outlet/reject tray sludge trough, pipes, etc. in contact with the sludge and water shall be made of stainless steel 1.4404 or SS304.

Each of the belt thickeners with auxiliary internal and external equipment shall be controlled as autonomous units however, e.g. controlled by a common control panel for both final dewater unit and pre-dewater unit. The control unit shall include e.g. logic module, variable frequency drive, contactors, protective motor switches etc. The control unit shall include control for internal functions such as working time, cleaning time, alarms etc. Moreover, signals for controlling external equipment such as sludge pump, polymer unit etc.

In order to ensure spreading of the sludge on the belt easily, there shall be a distribution structure and the surfaces of this structure contacting with the belt shall be made of soft PVC and other parts shall be made of SS304 stainless steel. In addition, dynamic mixer shall be placed to ensure better conditioning of the sludge mixed with polyelectrolyte. Compression cylinders shall be electrostatically coated with Rylsan material and other drive drums shall be lined with industrial rubber.

Belt tensioning shall be provided by the pneumatic cylinders, belt protection and adjustment and prevention of lateral movement shall be provided completely automatically by the proximity limit sensors. Belt speed shall be between 0.8-4 m/min and equipped with cleaning brushes, which are capable of uninterrupted washing, and removable spraying nozzles. Nozzles are able to be cleaned by rotating brush. Belt motor shall be controlled by frequency convertor.

Drum Thickeners

Required DS in sludge out: minimum 4%

The drum thickener shall work on the principle of conveying polyelectrolyte treated (flocculated) sludge through a slowly rotating drum filter. The sludge shall remain in the drum, while the water phase passes through the filter cloth.

The rotating filter cloth shall be made of flexible polyester.

The drum thickener shall be equipped with a drum cleaning system consisting of a spray bar for water. Water consumption shall be minimised by intermittent cleaning of the drum using potable water.

The configuration of the filter cloth shall be in such a way that a filter cloth element with smaller mesh size (0,6 mm) shall be mounted on the first (inlet) section of the drum and a filter cloth element with larger mesh (1 mm) size shall be mounted on the following (outlet) section of the drum with large openings.

The drum thickener shall be totally enclosed for connection to the odour control unit.

Sludge concentration should be optimised by varying the feed rate, the polymer type and dosage, flocculation mixer speed, drum speed, angle of the drum and the spraying interval.

The bearings shall have an anticipated life of over 10,000 hours.

Materials:

Cover: Fiberglas or stainless steel

Housing: 1.4404 or higher

Drum: 1.4404 or higher

Base Frame: 1.4311 or higher

Cloth: Polyester

Flocculation Reactor: 1.4404 or higher

Agitator: 1.4404 or higher

An unpressured, gently agitated flocculation reaction vessel shall be supplied with level switches.

Both drum and agitator motors shall be driven with frequency inverters in order to run the equipment with variable speed.

Flocculation reactor shall be equipped with a specially designed wing type agitator driven by an AC motor.

Belt Conveyor

Belt conveyor consists of drive drum (connected to drive unit), return drum (connected to the tensioning system), upper and lower pulleys, guide roll, tensioning system, motor and steel construction. Electric motor and reducer shall be protected against all kinds of weather conditions. The rubber coated belt shall have a thickness of 5mm and a width of 500 mm. The carrying rollers shall be installed to the belt on the groove

shape frame in the upper part. Conveyor chassis shall be hot dip galvanized and the fasteners shall be stainless.

5.8.31. Final dewatering equipment

Type: Decanter Centrifuge

Required DS in sludge out: minimum 25%

Decanter centrifuges supplied as self-contained unit with all accessories and auxiliary equipment shall be offered.

Polymer preparation system includes polymer storage tank, polymer transfer and dosing pumps, and polymer dilution unit.

Electrical control panel for the centrifuges and all peripheral equipment, instrumentation and control.

Decanter Centrifuges

The centrifuges shall be the type of bowl and work horizontally. The sludge cake shall be transported with a conveyor system in a rate depending upon the velocity of centrifuge. Scroll / bowl velocity difference should be illimitable changeable and should be controlled with PLC. The centrifuges shall be driven by means of an electrical motor and V belt and constructed as a packaged set, consisting bowl and screw electrical motors. The connection between centrifuges and motors shall be created with frequency converters. Panels, wires and mounting belong to centrifuges.

The Decanter-Centrifuge shall be constructed as a packaged unit, consisting of but not limited to the following components:

- a rotating bowl and scroll assembly
- a drive system
- a foundation
- rotor and motor covers

The bowl shall be imbedded in heavy-duty bearings which are mounted in the foundation. The bowl bearings shall be grease lubricated.

The bowl shall consist of a conical section and a cylindrical section and shall be manufactured with centrifugal cast technology. The bowl consists of maximum two pieces. The cylindrical part provides the liquid pool and the conical part the so-called beach section. The conical section shall terminate with the solids discharge ports, lined with replaceable bushings to compensate for wear.

The wide end of the bowl (liquid discharge) shall be closed by an end piece with exchangeable liquid overflow weirs which determine the liquid level (pool depth).

The conveyor shall be coaxial journalised in grease lubricated bearings inside the bowl assembly. The leading faces and tips of the scroll conveyor flights shall be wear-protected by wear resistant alloy, designed for 15,000 hours operation in normal service. The condition of the wear protection shall be monitored through drilled holes in the bowl. The feed ports in the scroll shall be protected by exchangeable, hard surfaced bushings.

Bearings shall be designed for 100,000 hours operation. Seals shall be Nitrile rubber.

Electrical Motors shall have at least IP 55 protection class

The foundation shall be a sturdy construction to provide stability and shall house the centrifuge bearings attached with bolts in the foundation, functioning as motor bracket. The foundation shall be equipped with vibration absorbers. Inlet connector for sludge, water and polymer with a flexible hose to connect to the sludge pipeline, rejects outlet hose and sludge cake outlet box.

Materials of Construction shall be as per the following:

- Foundation: DIN 17100 steel 37.2 and 44.5
- Bowl: Duplex (SAF 2205) stainless steel
- Scroll body: 1.4404 stainless steel
- Scroll flights: 1.4404 stainless steel

- Cover, sludge outlet: 1.4404 stainless steel
- Cover, reject outlet: 1.4404 stainless steel
- Motor and bowl cover: Polished 1.4311

Wear protection:

- Scroll flights Binder : Eutalloy type 10 1 85
- Comer surface : Eutalloy type 1 00 1 1
- Wear surface : Eutalloy type 10819
- Sludge outlet ports : Exchangeable Stellite bushings
- Sludge inlet : Exchangeable Stellite bushings
- Feed chamber : Exchangeable Addiprene cartridge

Alternative materials of construction and wear protection, if proposed, shall be of equal or higher quality than the above specification and shall be subject to approval by the Engineer.

There should be drum protection cover sensor in the decanter and the decanter should not be allowed to operate when the drum cover is open. Other systems, if any, shall be indicated.

Vibration: Maximum allowable vibration, at factory test, shall be 7 mm/s at nominal speed.

Noise level: of the decanter-centrifuge shall not exceed 80 dB(A).

An electromagnetic flow meter shall be installed at the inlet of the decanter.

Provisions shall be taken for the separation of rewash water and the circulation of dewatered sludge into discharge system, in the case that the system is out of circuit. The velocity of centrifuge drive motors shall be convenient to run time of centrifuges.

5.8.32. Polyelectrolyte preparation and dosing system

It shall be complete with polyelectrolyte feed box equipped with one vibrator to facilitate the flow of the powdered chemical, mixer with stirrer, screw feeder wrapped with heating coil to prevent moistening of the powder chemical, mixer with removable shaft and propeller made of corrosion resistant stainless steel, SS304 stainless steel tank consisting of two or three with two parts in three compartments depending on the system capacity, 2 pieces of (one spare) frequency controlled dosing pump with a capacity of $Q = 0-1000$ l/h, 1 compressor, flow meter, one conductive type level gauge to measure the liquid level in the tank and to control the operation of polyelectrolyte dosing pumps, control panel, pressure gauge for feed water, and adjustable valves and piping

Powder hoppers shall be filled by means of vacuum conveyors to ensure dust free handling.

Polymer dosing pumps shall be provided with variable capacity and as well as in-line dosing/mixing systems for mixing the influent sludge and polymer shall be included. The dosing pumps shall be of the progressive cavity pump type with maximum rotation speed of 200 rpm. Each pump shall be protected against overload by means of pressure switch on the pressure side of the pump and the pumps shall be furnished with an automatic dry running protection.

Necessary tanks shall be included. The tanks shall be fitted with a low-level switch, a dry running switch for the dosing pump, a pump connection valve and a bottom drain valve.

A valve system shall allow flexibility in the polymer dosing. Hence switching from one polymer dosing unit to the other can be done by means of valves and each polymer dosing pump shall by change in the valve position supply either of the dewatering lines.

All steel constructions, pipes, etc. in contact with the sludge and reject water shall be made of stainless steel 1.4404. Polymer pipes are accepted as PE pipe.

The polymer unit shall be located and arranged in a way that gives no obstructions for filling with polymer, service and maintenance.

5.8.33. Sludge Digesters

Anaerobic Sludge Digester

Anaerobic sludge digesters shall be two-stage and have high speed. Heating and mixing shall be performed in the first stage and there shall be no heating and mixing in the second stage. The sludge from the thickener shall enter the first tank from the top and shall be taken from the bottom. The sludge taken from the bottom shall be given to the second tank from the top to mix the part corresponding to 1/2 or 2/3 of the volume. The sludge settled in the second tank shall be taken from the bottom and transferred to the sludge drying beds and a part of the sludge shall be sent back to the inlet of the first tank. The liquid accumulated on the second tank shall be taken by the outlets placed at certain intervals and sent to the inlet of the treatment plant. The digester tanks shall be cylindrical or egg-shaped, shall be constructed as reinforced concrete and the measures shall be taken to prevent heat loss.

Aerobic Sludge Digester

It shall be possible to use vertical shaft, horizontal shaft, brush type surface aerators in the aerobic sludge digesters.

The power required for surface aerators shall be;

- 20 kW/1000 m³ digester volume, if the suspended solid concentration is 8000-12000 mg/l, and
- 50 kW/1000 m³ digester volume, if the suspended solid concentration is 20000 mg/l.

In the aeration systems operating with compressed air, the amount of for a digester volume of 1000 m³ shall be selected to be between 20-30 m³/min.

Equipment Used in Sludge Digesters

Digester Covers; In two-stage sludge digesters, preferentially fixed covers shall be used in the first stage and floating covers shall be used in the second stage. Fixed covers shall be manufactured from reinforced concrete or steel as flat, conical or domed. Floating covers shall be manufactured completely from steel with a moving distance of 0.6 - 1.8m in the vertical direction. All covers shall have pressure-vacuum safety valves and flame arrestors, and there shall be at least two manholes with a diameter of 0.6-0.7 meters on the covers used for maintenance, repair and foam removal. Special measures shall be taken against fire and explosion when the manhole covers will be opened.

Heating of Digesters; The tank shall be maintained at 35 ± 0.5 °C in the heated sludge digesters. The sludge taken from the tank and the sludge from the thickener to provide heating shall be heated by passing through an external heat exchanger and sent back to the tank from the top. The heat loss on the walls of the digestion tank and the temperature of raw sludge shall be taken into consideration during the design of the heating installation. The biogas produced in the tanks shall be used as the main heat source in the heating system. It should be possible to provide heating also with solid or liquid fuels to be used for initial heating and emergencies. All digester tanks shall be insulated to prevent heat loss.

Mixing System; Complete mixing shall be provided in the first digester to ensure homogeneous heat distribution in the tank. For mixing the engine will be applied Motor driven mechanical mixers, recirculation pump or the process of feeding of the produced methane gas back to the tank with compressor-diffuser system shall be used for mixing. Mixing mechanism shall be activated 3-6 times a day for a period of 1-3 hours in order to ensure complete mixing in the tank. This procedure shall be manually controlled.

Pipe System

- The diameter of the main gas outlet pipeline of the tank shall be maximum 70 mm in diameter and the pipes of the sludge outlet line shall be maximum 20 cm in diameter when it is taken by pump.
- There shall be a distance of at least 1.2 m between the gas outlet pipe and the liquid level in the tank.
- The speed in the gas pipe shall be maximum 3.5 m/s.
- All gas transmission lines shall have a slope of at least 1/100.
- Manually cleaned holders shall be placed in specified places for taking sediment, condensate (vapor condensed due to heat losses) and other foreign substances accumulated in the pipes.
- Gas pressure in the pipes shall be controlled with the relief valves.
- Gas pipes shall be bedded against external factors in the best way.
- The gas pipes under the ground shall be wrapped with bituminous canvas.
- The gas pipes and the sludge pipes inside and outside the tank shall be made of stainless steel.

- Conical valve shall be used in sludge pipes.
- There shall be a discharge valve for discharging the tanks, when necessary.

5.8.34. Other Equipment

Garbage Collection Container

It shall be made of 2mm DKP sheet coated by hot dip galvanizing against corrosion.

Trickling Filter

Waste water shall be sprayed to the trickling filters by the rotary distributors with minimum two, and maximum six distributor arms installed on a central column. Sealing between the moving and the stationary parts shall be provided by pressurized oil or neoprene gasket or by circular diaphragm made of high-quality steel resistant to waste water corrosion and rubber gasket.

The moving part shall be seated on the stationary part with ball bearings and functioning of the ball bearings in grease shall be provided. The diameter of the distributor arms shall be selected in such a way that the speed shall not exceed 1.2 m/s at maximum flow rate and flange covers shall be mounted to the end of the distribution arms. The distribution arms shall be connected to the central column with steel wires at minimum three points and the lengths of the steel wires shall be adjustable to hold the arms in horizontal position.

In the distributors rotating with reaction, orifices shall be opened on one side of the distributor arms, the minimum orifice diameter shall be 2 cm and the load loss of the rotary distributor shall be given by the manufacturer.

In the motor driven rotary distributors, the rotation speed shall be adjustable, and the electric and gear system shall be placed in enclosure.

It shall be possible to discharge water in the distributor with a valve to be placed on the central column.

The distributor arms shall be coated by hot dip galvanizing

Gas Tanks

Gas tank shall be insulated against extreme temperatures (hot and cold), internally protected against effect of the carbonic acid in the gas composition and shall be made of 6 mm steel sheet resistant to corrosion. Tank volume shall have a capacity sufficient to store 25-50% of the gas produced daily and the gas pressure shall be 1.5-3 atm. Gas came from the digesters, if necessary, shall be passed through a chemical mechanism to remove the H₂S gas in its composition before entering the tank and transferred to the gas tank by compressors. When the tank capacity is exceeded, the residual gas shall be burned automatically and released to atmosphere in an area at a distance of at least 50 m from the tank

5.8.35. Potable water supply system

Potable water is based on tap water. The one-way flow shall be secured on e.g. a booster pump system including pressure holding tank, pump and check valve.

Potable water applies to all installations that require clean water and were treated wastewater for reuse is inapplicable.

5.8.36. Preliminary Acceptance of The Mechanical Equipment

The Contractor shall notify the Engineer in writing that all materials offered by the Contractor are ready for the factory inspection and acceptance.

Engineer and Employer shall perform visual physical inspection of all mechanical and electrical equipment included in the contract in accordance with the specifications and standards and control whether they meet the technical requirements. The Engineer and/or Employer, if it deems necessary, may request performance of the chemical analysis of the material at an institution that shall be deemed appropriate by the Engineer/Employer. In this case, the laboratory costs shall be borne by the contractor.

The Engineer and/or Employer may inspect and control the equipment during manufacturing in accordance with the relevant articles of the technical specification, when necessary.

The contractor shall be able to transport the inspected materials to the plant after the approval of the report including the statement "There is no objection to transportation of the inspected and accepted materials".

5.8.37. Packaging, Marking, Transportation

Mechanical and electrical equipment manufactured and approved by the Engineer and/or Employer shall be packaged in such a way that they shall resist land and marine transport and accidents during transportation and the packages shall be resistant to adverse weather conditions, outdoor storage and the conditions to be exposed due to possible delays in the docks.

The packages containing hazardous materials or fragile goods shall be packaged and marked in accordance with the rules and instructions to be applied domestically and abroad and at sea.

The contractor is responsible for safe transportation of the equipment to the work place, including insurance costs. In case of damaging of the equipment during transport, the contractor should notify the Engineer immediately and should request preparation of a report indicating whether the equipment shall be used

5.8.38. Installation

The contractor shall be responsible to keep the installation equipment in adequate amount and capacity in the plant in order to ensure installation of the plant completely in accordance with the project and the contract and to be able to intervene in emergencies. All parts shall comply with the relevant TSE norms.

The contractor is obliged to take all kinds of measures for the work and worker safety during installation.

The cost for the tools and materials to be used during the installation shall be provided by the contractor and cost of the energy to be used shall be borne by the contractor.

The Contractor shall notify the Administration in writing that the installed plant is ready for inspection and acceptance.

The Engineer shall perform visual physical inspection of the installed equipment included in the contract in accordance with the specifications and standards and control whether they meet the bid values.

The system settings of the equipment installed in the units shall be performed by the contractor and calibrated in a manner that shall be deemed appropriate by the Engineer/Employer.

The contractor cannot perform commissioning of the plant and cannot stock any spare parts to be used in the relevant plant on behalf of the Municipality without having the approval of the Engineer/Employer on commissioning of the plant.

6. TECHNICAL SPECIFICATIONS FOR ELECTRICAL WORKS

6.1. GENERAL

6.1.1. System of Units

The SI system of units shall be used throughout the Contract.

6.1.2. Degree of Protection

All terminal boxes, cabinets, lighting fixtures, etc. shall have degrees of protection by enclosure, as follows:

Panels: IP54

Other material: IP55.

Other requirements are as specified in the relevant sections.

6.1.3. Marking

Each item of equipment shall be provided with a rating plate giving the type and serial number together with its ratings and service conditions. Labels and nameplates shall be provided as necessary to clearly identify the function and circuit designation of equipment. The supply voltage shall also be written on the rating plate. All panels, switches, boxes, cables, motors etc. shall be labelled.

All rating plates, nameplates, labels and wiring plates shall be of non-corrodible material. Inscriptions shall be clearly legible from the operating distance and shall be in Turkish throughout. Notices indicating danger to personnel shall be in Turkish. Details and locations of all such plates, labels, etc. shall be subject to the Engineer's approval.

6.2. SCOPE OF WORKS

The scope of electrical works to be covered in this contract includes, but is not limited to, the following main items:

- High voltage switchgear, step-down transformers, metering system, power supply cables for both high and low voltage.
- Supply and implementation of 34.5 kV (or level provided by local power authority) supply between the plant and the local electricity grid run by local electricity company. It will be necessary to corporate with local electricity company for this purpose. Outside the wastewater treatment plant perimeter, the new power supply installations comprise electrical underground cables from an existing over head line.
- A complete electrical installation including transformers, UPS's, distribution panels, MCC's, control panels, cable trays and building installations.
- A complete indoor and outdoor lighting system and outdoor socket outlets stations, data and communication system.
- A complete computer-based control and monitoring system together with necessary software.
- Automatic power compensation system.
- Lightning protection systems and installation inclusive protective earthing and equipotential bonding.
- A complete instrumentation system.
- A complete uninterruptible power supply system (UPS) for the control and monitoring system and the instrumentation.
- An emergency lighting system in specific rooms.
- Diesel generator set.
- Supply of special tools.
- All approvals (design, connections, earthing etc.) and negotiations with local authorities (electricity supply company).

6.3. STANDARDS

The Contract shall be executed in compliance with the directives, norms and standards listed below and elsewhere in the Technical Specifications.

Standard No	Subject
EN 60076-1	Power transformers - Part 1: General
EN 60076-2	Power transformers - Part 2: Temperature rise for liquid-immersed transformers
EN 60076-3	Power transformers-Part 3: - Insulation levels, dielectric tests and external clearances in air
TS 3989 EN 60156	Insulating liquids- Determination of the breakdown voltage at power frequency - Test method
TS 623 EN 60296	Fluids for electromechanical applications - Unused mineral insulating oils for transformers and switchgear
EN 60076-11	Power transformers - Part 11: Dry type transformers
EN 60076-12	Loading guide for dry type power transformers
EN 62271	High-voltage switchgear and control gear
EN 60076-10	Determination of sound levels
IEC 60050-321	International electrotechnical vocabulary - Chapter 321: Instrument transformers
TS 620 EN 60044-1	Instrument transformers - Part 1: Current transformers
TS 718 EN 60044-2	Instrument transformers - Part 2: Inductive voltage transformers
TS EN 12843	Precast concrete products - Masts and posts
TS 9632 EN 50183	Conductors for overhead lines - Aluminium-magnesium-silicon alloy wires
TS EN 50182	Conductors for overhead lines - Round wire concentric lay stranded conductors
HD 21.1	Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V - Part 1: General requirements
TS EN 60034	Rotating electrical machines
EN 60051	Direct acting indicating analogue electrical measuring instruments and their accessories
TS 461 EN 60521	Class 0.5, 1 and 2 alternating current watt-hour meters
TS EN 60898	Circuit-breakers for overcurrent protection for household and similar installations
TS EN 60439	Low-voltage switchgear and control gear assemblies
EN 61058	Switches for appliances
TS EN 60947	Low-voltage switchgear and control gear
EN 60669	Switches for household and similar fixed electrical installations
EN 60947	Low voltage switchgear and control gear
EN 60598	Luminaires
EN 60598	Luminaires
EN ISO 1461	Hot dip galvanized coatings on fabricated iron and steel articles - Specification and test methods
EN 62271	High-voltage switchgear and control gear
EN 60383	Insulators for overhead lines with a nominal voltage above 1000V

Standard No	Subject
EN 60099	Surge arrestors
EN 60931	Shunt power capacitors of the non-healing type for a.c. systems having a rated voltage up to and including 1kV

Regulations

Regulation on Designing of Electrical energy installations

Regulation on electrical high current installations

Regulation on internal electrical installations

Regulation on electrical earthing installations

Technical Specifications of TEDAS

TEDAS-MYD-96-017 Technical specifications for medium voltage breakers

TEDAS-MYD-96-019 Technical specifications for medium voltage metal oxide surge arresters

TEDAS-MYD-96-014 Technical specifications for knitted aluminium and steel-based aluminium knitted conductors.

TEDAS-MYD-96-018.A Technical specification for Insulated Energy cables made from crosswire polyethylene (XLPE)

TEDAS-MYD-99-033.A Technical specification for medium voltage cable head

TEDAS-MYD-95-007.C Technical specifications for air insulated, medium voltage, metal enclosed modular cells

TEDAS-MYD-95-012.B Technical specifications for distribution power transformers

TEDAS-MYD-2003-006 Technical specifications for metal enclosed low voltage distribution panels

TEDAS-MYD-96-015 Technical specifications for 0.6/1 kV thermoplastic or thermosetting insulated energy cables.

EUB.02 External type fused earthing breaker

EUB.03 Surge Arresters.

EUB.04 Steel aluminium swallow conductor

EUB.05 Medium voltage cables

EUB.06 Medium voltage cable header

EUB.08 Metal enclosed medium voltage modular cells

EUB.09 Power distribution transformer

EUB.10 Transformer low voltage panel

EUB.11 Compensation panel

EUB.12 MCC panels

EUB.14 0.6/1 kV YVV (NYY) power, control and signal cables

6.4. SPECIFIC REQUIREMENTS FOR ELECTRICAL WORKS

Following requirements shall prevail in case of inconsistency with any other requirements stipulated by contract and its annexes.

- The contractor shall deliver the catalogues, brochures and data sheets of at least 3 (three) different manufacturers to the Engineer/Employer during performance of the work, before supply of all electrical material and equipment according to the relevant specification and the item descriptions. The materials shall be supplied as a result of the agreement to be made at the end of the evaluation to be performed.
- All materials included within the scope of the electrical works shall not be brought to the plant without the approval of the Engineer. In addition; Transformer, Diesel Generator, LV Panels (TR-LV Measuring Panel, MCC Panels, Compensation Panel), Automation Panels, Metal Enclosed Modular

- Cells, Monoblock Concrete Kiosk materials shall be brought to the plant after performance of their tests and acceptances in the manufacturing place with participation of the material manufacturer, the contractor and the Engineer/Employer.
- Since the opinion that has been issued by the relevant Electricity Distribution Company for the Waste Water Treatment Plant is valid for limited periods (180 days), the energy permit shall be updated by the contractor after starting construction of the plant. In case of a change in the route of the power transmission line or the power (supply) connection points, Power Supply modification project of the Waste Water Treatment Plant shall be prepared free of charge by the Contractor according to the new energy permit documents and construction of the plants shall be started after approval of the project by the Engineer.
 - The documents required for the electricity subscription procedures of the pumping stations shall be supplied by the contractor. The electrical installation number shall be supplied by the contractor.
 - Following completion of the deficiencies of the Power Transmission Line (PTL), the documents required for temporary acceptance of the PTL shall be prepared by the contractor and these documents shall be submitted to the company to complete the acceptance procedures. Any additional fee shall not be paid to contractor for this work.
 - PTL underground cables shall be laid at a depth of 150 cm. Road crossings of the cables shall be with protection pipe and concrete protection.
 - Engine and alternator groups of the diesel generator should have been manufactured for five years and both groups should have CE certificate.
 - Cable installation detail has not been given for the concrete cable channels left under the floor of B104 Transformer-Generator Building and B102 Blower Building. Galvanized cable trays with sizes to be approved by the Engineer shall be installed within these channels.
 - In the places with high cabling density, galvanized cable trays shall be used to an extent to be deemed appropriate by the Engineer instead of cable protection pipe. Galvanized cable trays shown in the power control plans are short in some places and they shall be extended as necessary during installation phase.
 - Installation of the cable trays in basins shall be attached to railings in accordance with the standards (in order not to constrict the walkway).
 - Supply and signal cables of all mechanical equipment and instruments on site and inside the buildings shall be carried by using cable trays and cable protection pipes. Separate cable trays and cable protection pipes shall be used for power and signal cables. Tray separators shall not be used.
 - Instead of the galvanized cable trays shown as 160 mm in its project, 200 mm trays with the same characteristics shall be used. Any additional fee shall not be paid to contractor for this work.
 - Operation, protection, surge arrestor and pole grounding shall be carried out in accordance with the TEDAŞ specifications and grounding regulation. If the transition resistance of grounding remains below the required value, grounding electrodes shall be added until the required value is obtained. Any additional fee shall not be paid to contractor for this work.
 - Two types of grounding electrodes shall be used. The electrodes to be connected to the foundation grounding (galvanized strips) shown in the foundation grounding and network plans shall be galvanized steel electrodes in a length of 2 m and sizes of 65X65X7 mm, connections shall be made by using steel electric terminals and bolts and concrete manhole shall not be used. Operation grounding of the transformer and the generator shall be carried out by using electrolytic copper rod electrode in a length of 1.75 m and a diameter of 20 mm, its connection with the copper conductor shall be made by thermal welding and the seams shall be coated with bituminous cover.
 - 1x50 mm² NYY and 1x50 mm² NYA network (ring) grounding conductors are shown in cable trays and in sand in the panel layout plan. These conductors shall be passed through the cable protection pipes. In case of having inadequate protection pipes, pipes shall be added. Any additional fee shall not be paid to contractor for this work.
 - 16 mm² NYY cable shall be used instead of 35 mm² copper grounding conductor shown in the site lighting plan. This grounding cable shall be passed through the cable protection pipe together with the supply cable. Protective concrete shall be poured over the protection pipes in order to increase the strength at road crossings. Electrolytic copper rod electrode in a length of 1.75 m and a diameter

- of 20 mm shall be used as grounding electrode, its connection with the copper conductor shall be made by thermal welding and the seams shall be coated with bituminous cover.
- Down conductors of the lightning arrester installation shall be attached to the lightning arrester mast with down conductor crochets at 0.5 m intervals. Electrolytic copper rod electrode in a length of 1.75 m and a diameter of 20 mm shall be used as grounding electrode, its connection with the copper conductor shall be made by thermal welding and the seams shall be coated with bituminous cover. There should be test terminal on down conductors at a height of 2 to 2.5 m above the ground. Conductors should be passed through galvanized protection pipe to the ground. Top of the conductors and electrodes shall be buried to a depth of at least 50 cm in to the ground and the distance between the grounding electrodes shall be at least 3.5 meters.
 - Power supply cables for oxygen meters and ultrasonic level meters are not shown in the PLC projects. Supply cables shall be laid through the UPSs on the PLC panels for such instruments. Any additional fee shall not be paid to contractor for this work.
 - Concrete cable channel shall be manufactured with reinforcement and the manholes shall be ready-made type.
 - Labelling of all cables at the inlets and exits of the panel shall be carried out in accordance with the standards.
 - There shall be space and spare left in a ratio specified in the specification for switching material that can be added later in the MCC panels and for the signals that may be added later in input and output cards of PLC panels.
 - Surge arrester, over voltage and under voltage protection relay and phase sequence protection relay shall be placed at inlets of all MCC panels. An extra payment shall not be made to the contractor for this work.
 - Ventilation fans in a number to be determined according to the calculation of heating in panel shall be placed upper compartments of the LV, MCC and PLC panels and there shall be grilles with dust filter at the lower parts of the front doors of the panels. Ventilation fans should be placed in the compartments where there are frequency converters and compensation units. All compartments other than grilles and fans shall be manufactures as closed and dust proof.
 - Emergency stop buttons shall be placed on all field control panels and the field panel sizes shall be determined accordingly. An extra payment shall not be made to the contractor for this work.
 - PLC and MCC Panels shall be manufactured as separated from each other and they shall never be combined.

6.5. HAZARDOUS AREA CLASSIFICATION AND EX-PROOF EQUIPMENT (WHERE APPLICABLE)

All explosion and fire hazards shall be identified, and hazardous areas shall be defined in accordance with international standards by process and electrical engineers of the Contractor in coordination. The plant and equipment specified for such areas shall be limited as to type and construction by the area classification. Test certificates shall be furnished for all plant and equipment that constitutes a hazard. Such certificates shall be in accordance with the relevant standards stated at the end of this item of the Specification.

Whenever on the site an explosion and fire hazard exist, adequate instructions should be given to all personnel working in the area and notices shall be displayed to warn all third parties of the danger. Such notices should also advise on precautions to be taken. The process engineer is responsible to issue for each unit a list, showing the data and characteristics of the flammable substances (if any) handled in that unit.

Proper electrical equipment and instruments shall be used for the hazardous (Classified) areas (Exd, Exi and intrinsically safe panel barriers, etc.)

Electrical and control system equipment and materials for installation in hazardous areas shall be labelled according to IEC markings, listed, certified, accepted or otherwise determined to be safe by nationally or internationally recognized testing authorities.

Ex (Explosion)-proof and/or intrinsically safe equipment shall be used at flammable gas and/or flammable gas leakage hazard areas according to the related standards (CH4 or any others.).

The Contractor shall follow the regulations and/or rules about the Hazardous Area Classification according to the following standards/directives and shall design/provide Hazardous Area Classification Lists and Drawings, where hazardous risks may arise for flammable gas/vapours, atmospheres:

- EN 60079: Electrical apparatus for explosive gas atmospheres.
- Guide CEI 31-35: Guide for the application of EN 60079-10
- Guide 31-35A: Electrical apparatus for explosive atmospheres - Guide for the application of the Norm EN 60079-10 - Classification of hazardous zones
- ATEX 137 workplace directive 99/92/EC, Minimum requirements for improving the safety and health protection of workers potentially at risk from explosive atmospheres

6.6. HIGH VOLTAGE SWITCHGEAR AND TRANSFORMER STATIONS

6.6.1. General

The equipment is located at the treatment plant and pumping station sites and is supplied under this Contract and is owned by the Employer. Nevertheless, it shall be possible for skilled representatives from the power supply company to get unlimited access to the transformer installations.

The components of the stations shall be a standard construction provided with standard equipment and delivered ready for easy connection and reliable and safe operation.

The stations shall consist of:

- High voltage section with power circuit breakers, earthing connectors, over voltage protection equipment, volt and ampere measuring transformers
- Transformer section with power transformer(s)
- Low voltage section
- Earthing system.

Power transformers shall be constructed for installation on a concrete foundation. The latter shall be constructed with an internal collecting pit for insulating fluid (oil) from the transformer. The pit shall be filled with stones of suitable size. The pit shall have sufficient capacity to contain all the insulating fluid of the transformer.

The layout of the station shall allow for easy access to equipment inside the station. Further, easy replacement shall be allowed, in particular replacement of the transformers.

Protection equipment, control switches and indicating instruments for the high voltage switchgear and transformer station shall be installed in a dedicated control panel. Connectors at all panels shall be numbered.

The high voltage equipment shall be rated for continuous operation with maximum load of the distribution transformers and the present fault level as calculated by the Contractor.

All materials shall be "ready-made" and prepared for easy site installation with a minimum of work required onsite.

All components shall be manufactured from a modified, cross-linked, polyolefin-based, heat shrinkable product manufactured from a semi-rigid compound. The dimensions of the product shall reduce a predetermined size upon application of heat in excess of 125°C.

Where applicable, the materials shall have the following properties:

- A tensile strength of 170 kg/cm², the ultimate elongation shall not be less than 350 percent and the high temperature ultimate elongation shall not be less than 400 percent. After subjection to thermal ageing at 150+2°C for 168 hours, the tensile strength shall not be less than 140 kg/cm² and the ultimate elongation shall not be less than 300 percent. The tests shall be in accordance with TS EN 12167.
- The electric strength of the material shall not be less than 120 kV/cm.
- The material shall have a continuous operating temperature of 120°C.
- The material shall have water absorption of less than 0.1 percent in accordance with the test requirements of TS EN 12167.

- All parts which are required to be resistant to ingress of moisture shall be coated with an adhesive which will operate satisfactorily under the conditions of direct sunlight, temperature and humidity and in particular, shall exhibit the following properties.
- The adhesive shall have a viscosity of 250 ± 40 poise at 160°C when tested in accordance with ASTM D1084 Method B, Shear 5, OR.P.
- The adhesive shall have a softening point of $120 \pm 10^{\circ}\text{C}$ when tested in accordance with ASTM E 28.
- The adhesive shall have peel strength to PVC of 13 kg/25 mm width when tested on a rotating mandrel.
- The adhesive shall have shear strength of not less than 35 kg/cm at $23 \pm 2^{\circ}\text{C}$ on aluminium/aluminium after heating at 150°C for 20 minutes.

6.6.2. Power circuit breakers and disconnectors

Power circuit breakers and disconnectors shall be three-pole types, and fully enclosed metal-clad draw out vacuum circuit breaker system with 2 feeder inlets, sectioning, transformer outlets and measuring systems. Load disconnectors shall have characteristics commensurate with the circuit they supply and a load break capacity in excess of the total load of the circuit they supply.

Power circuit breakers rated switching capacity shall be at least equal to the total load of the circuit they supply. Power circuit breakers shall be provided with adjustable instantaneous short circuit and overload trips relays to allow for changes in the site load, and to allow for plant expansion. The prospective fault level must not be higher than the breaker capacity, and the time/current tripping characteristics shall be chosen and set with due regard to the equipment performance and circuit data, and to assure discrimination between series connected power circuit breakers. The power circuit breaker closest to a fault shall clear the fault. If it fails, the upstream power circuit breaker shall clear the fault.

Power circuit breakers shall be fitted with a protection system to comprise the following facilities:

- Single phase failure trip
- Earth fault trip
- Thermal overload trip
- Short circuit trip

The power circuit breakers shall comply with TS EN 60265 and 60420.

Construction in accordance with:	TS EN 60265 and 60420
Fuses: Transformer stations	HRC fuses to TS EN 60282-1
On and off switching:	Independent of operation speed, snap action.
Manual Opening:	Manual by means of an operating handle.
Automatic opening:	Energy storing trip mechanism for automatic opening after HRC fuses have operated.

All power circuit breakers shall be automatically controlled from the protection equipment (gas alarm, high temperature alarm, overcurrent, short circuit and I^2t thermo).

All power circuit breakers shall be remote controlled from the control panel. All power circuit breakers shall be fitted with an operator handle enabling manual switching.

All cables shall be connected through terminals. Terminals shall be suitable for the dimension of the cables and conductor material used.

All available signals shall be provided for telemetry and wired to the PLC for remote control and monitoring.

6.6.3. Transformers

All material used for manufacturing transformers, will be chosen as appropriate for its use and purpose in structure, first class quality, robust, and will have excellent physical and electrical features.

Design and manufacturing of transformers will be accomplished by the latest technical applications and

with the best workmanship and safety factors will be taken into consideration thoroughly for the whole job. The power transformers shall be three-phase transformers with voltage level 34.5/0,4 kV (value shall be approved by electricity supply authorities) suitable rated for continuous load of the treatment plant under worst climatic site conditions. The capacity is divided into two transformers. The Contractor shall specify the capacity based on the detailed design.

The design and specifications shall be approved by local electricity authorities. Transformer losses (no-load and load losses) shall be designed to a minimum. The transformer rating under standard conditions shall be in accordance with IEC-60076.

The three phase transformer windings shall be connected in a delta-star formation with group 4 phase displacement, high voltage to low voltage vector group reference Dyn 11. The star point of the low voltage winding shall be brought out through the tank and suitably terminated for solid earthing.

Winding insulation shall be to Class 'A'. The temperature rise shall be limited to the maximum operating temperature for Class 'A' materials as defined in IEC 60076 de-rated for the climatic conditions.

The high voltage windings shall be provided with tapping from +5% to -5% in 2½% stages with constant flux voltage variation as defined in IEC 60076.

Tap selection shall be by means of a five position externally operated manual control off-circuit tapping switch. A mechanical tap position indicator shall be provided, and the switch shall be pad lockable in any position. A suitable padlock shall be fitted to each tap changer and be supplied complete with two keys.

A label warning that power must be switched off before the tap changer is operated shall be fitted.

The winding design and construction shall provide adequately designed and located coolant flow ducts so that possible hot spots are eliminated. Windings shall be braced to withstand dynamic stresses due to short circuit conditions. Full details shall be provided of the arrangements for taking up or eliminating coil shrinkage during service. The core and winding shall be designed so that the loss is minimum but the ratio of copper loss to iron loss shall be in accordance with an economic design and the manufacturer shall state the ratio used.

The complete transformer arranged for service shall be capable of withstanding an impulse voltage on the primary windings in accordance with EN 60076-3.

Oil-immersed type transformers:

Transformers shall be constructed in accordance with EN 60076 and be of the naturally air-cooled (ONAN) oil filled type and meet or exceed the requirements of EN 60076. They shall be suitable for outdoor installation and provided with a first filling of mineral oil to comply with BS 148 Grade B30 or similar (DIN EN 60156 VDE 0370, ANSI C59-2 and TS-623 EN 60296). The transformer shall be mounted over an oil pit. The pit shall have capacity to consume the entire amount of oil in the transformer. The pit shall be filled with stones that in shape and size are suitable for the purpose of preventing fire in the spilled oil.

All terminals shall be brought out through oil tight insulating bushings to facilitate cable testing without the necessity to disconnect the cables. Bushings shall be made of porcelain.

All windings, winding terminals and connections shall be fully immersed in oil under all operating conditions. All materials shall be suitable for this duty and not subject to deterioration.

All joints shall be arranged so that they may be tightened externally.

All transformer tanks, tubes and all steelwork shall be shot blasted internally and externally before painting and a rust inhibiting paint shall be applied to both external and internal surfaces before applying a final finish. The exterior shall be given an additional coat on site of a durable oil and weather resisting paint to the shade to be specified by the Engineer.

Each transformer shall be provided with the following facilities:

- Thermometer for oil temperature with alarm and trip function,
- Buchholz relay with trip function,
- Oil level gauge, clearly visible from ground level,
- Large identity labels shall be affixed to each transformer identifying their high voltage circuit feeder switchgear,

- High voltage and low voltage power circuit cable termination to suit the specified power circuit cables,
- Drain valve.

Dry type transformers:

- Three-phase, two coils
- Dry type that has epoxy resin covered coils
- Indoor
- Protection level IP31
- Natural air cooling (AN)
- Voltage adjusted at idle

It will be 34.5 kV/0.4 kV voltage level in accordance with the facility energy input.

Unless it is stated otherwise in this specification and appendices, transformers will be manufactured and tested according to EN 60076.

Testing and commissioning

Power transformers shall be routine tested at the manufacturer's works in accordance with EN 60076. The Engineer will require witnessing the following tests:

- Measurement of winding resistance.
- Ratio, polarity and phase relationship.
- Impedance voltage.
- Load losses.
- No-load losses and no-load current.
- Insulation resistance.
- Induced over-voltage withstand.
- Separate source voltage withstands.

Further witness tests shall also be carried out in accordance with the following:

- Impulse voltage withstands. If the manufacturer can provide evidence covering impulse voltage withstand tests for transformers of similar type and design, type test certificates will be acceptable.
- Temperature rise. Where transformers of identical design and rating are being supplied, only one unit needs to be subjected to the full Temperature rise test and Type Test certificates supplied for the duplicate units.
- Prior to dispatch to site the Contractor shall pass to the Engineer or its representative, in triplicate, copies of the all test certificates for approval.

6.6.4. Instruments

The measuring transformers shall at least include load for the following instruments, all within Class 1:

- Three voltmeters (one for each phase).
- Three ammeters with overload scale to 150% of I_N
- kWh meters.
- kVAh meters.

Three ampere transmitters providing 4-20 mA signals for remote monitoring of the current in each high voltage feeder shall be fitted. Three ampere transmitters providing 4-20 mA signals for remote monitoring of the voltage at each busbar section shall be fitted.

Instrument current transformers for protection equipment shall be installed.

Current transformers shall be of the wound primary or bar primary type according to the ratio required. Current transformers shall be suitably rated and designed to carry out appropriate metering and protection functions as indicated.

The rated load of current transformers shall not be less than the sum of loads of all relays, instruments and related loads. The current transformers shall have a continuous thermal current capacity in accordance with the current capacity of the relevant switchgear, and a short circuit capacity of the plant.

All available signals shall be provided for telemetry and wired to the PLC for remote control and monitoring.

6.6.5. Earthing system

The transformer station shall be provided with an earthing system less than 1 ohm.

Before proceeding with the design of each earthing system, the Contractor shall measure soil resistivity for particular locations of the transformer station.

The earthing system shall be constructed of earth rods driven into the ground beneath, or as close as practicable to the foundation of the transformers. An additional earthing connection between the earthing rods may be installed in as a ring electrode if needed. When strips are used, they may be buried beneath the foundation or laid in trenches at least 1.5 m depth.

The rod electrodes shall be depth electrodes of copper with low carbon steel core not less than 3 m length and 32 mm in diameter.

The strip electrodes shall be of bare copper with conductor size not less than 20 x 4 mm.

The earthing system for each transformer station shall be interconnected with the common equipotential bonding bar (CEBB) for the Site. This interconnection shall be made of a copper strip or wire with cross section not less than 50 mm².

The earthing system shall be provided with testing joints mounted in a separate earthing cubicle. Testing joints shall be provided for each earth rod and for the connection point to the earth for the plant.

All joints and connections in the earthing system shall be carefully designed to ensure that they produce a non-relaxing joint. Welded, bolted or clamped connections are permitted.

All earth conductors shall be marked green-yellow.

6.7. DIESEL GENERATING SET

6.7.1. General

The diesel generating set shall provide power in case of a grid failure; i.e. its power output shall be designed as a stand by set. As grid failures may occur frequently for the long duration, the set shall be capable of supplying its rated power continuously.

Generator set shall be able to be operated automatically and manually.

The power rating for the generating set shall be selected to ensure that the generating set is not more than 90% loaded when all specified equipment (refer below) are operating at the same time at maximum capacity at the given power factor and at site conditions.

Rating and performance shall be in accordance with the ISO, at site conditions.

- Rating: Continuous running at variable load for duration of an emergency situation
- Voltage regulation: +/- 5%
- Governing: Electronic type/Class A 1
- Load Acc.: 100 % in one single step and sufficient to run as specified in this section.

The prime mover and the alternator shall be factory mounted on a common steel chassis frame with built-in antivibration system.

A flexible coupling shall be provided between the alternator and the engine. All piping and electrical connections shall be flexible to prevent damage by movement of the gen. set.

A local authorised representation in Turkey shall be able to provide service and maintenance. Name, address and a list of service and references shall be provided for the local representation.

6.7.2. Prime mover

The prime mover shall be a 4-stroke multi-cylinder (preferably a 6-cylinder engine), direct injection industrial standard diesel type according to ISO 8528.

The engine shall be suited for the purpose and shall have a proven record of long life operation with a minimum of maintenance.

The following details shall be incorporated:

Fuel System

The fuel system shall at least include the following:

- Fuel storage tank with a capacity for 24 hours continuous operation.
- Reservoir for the fuel storage tank to prevent oil spillage to the surroundings in case of leakage
- Pipe near the road for filling the tank (provided with a pad lockable lid and ideal access)
- Level indication on fuel storage tank (accuracy +/-50 litres)
- Local fuel tank incorporated in the frame, with a capacity for 8 hours continuous operation
- Drip tray under the sump to collect oil spillage
- Fuel oil booster pump (electrical or forced driven)
- Fuel oil filters for the duplex type. Filter elements of paper and of the disposal type
- Injection pumps
- Injection valves
- Fuel water separator
- Piping, valves and fittings
- Dual flexible fuel lines.

Fuel Specification

The diesel engine shall operate on high speed (HSD) diesel fuel.

Combustion Air

The combustion air system shall include but not be limited to the following:

- Dry element air filters
- Service indicator (restriction indicator)
- All necessary air ducting between filter and engine.

Lubrication System

The lubrication system shall at least include the following:

- Lubrication oil pump (forced driven)
- Hand operated pump for emptying engine oil
- Lubrication oil tank (only if a dry sump is used)
- Lubrication oil filter of the duplex type with replaceable filter elements and by pass function
- Facility for pressure gauge and low voltage switch
- Piping, valves and fittings.

The filters shall be mounted in accessible locations enabling easy changing of filter elements without the necessity of disconnecting piping or another engine equipment.

Exhaust System

The exhaust system shall include but not be limited to the following:

- Silencer provided with adequate drainage facilities. The silencer shall reduce the noise with a minimum of 25 dB(A)
- Expansion joints
- All necessary exhaust system piping inclusive hangers
- Exhaust pipe.

Exhaust silencer shall be of welded construction designed for outside mounting. Pressure drop through the silencer shall not exceed the engine manufacturer's recommendations. The exterior of the silencer shall be treated to resist rust.

The exhaust pipes shall be properly insulated in accordance with the recommendations of the engine manufacturer.

On leaving the engine room, the exhaust pipe shall pass through a weather proof flange. The piping shall have as few bends as possible.

The exhaust system shall be designed to reduce the heat transmission inside the room as much as possible.

Starting System

Batteries (maintenance free, lead type) for starting shall be included. The battery shall have a capacity sufficient for at least 10 abortive start attempts, each of 10 seconds duration, without recharging.

The engine shall be equipped with an alternator and voltage regulator for re-charging batteries when running as well as a static charger with manual boost charging function. The static battery charger shall be built-in in the DGP.

It shall be possible to start the engine from any crank position.

Cooling System

The cooling system shall include but not be limited to:

- Radiator cooler
- Cooling water pump for circulation of water through diesel engine and radiator cooler, engine driven
- Cooling thermostatic valve, designed to fail open to radiator circuit
- Expansion tank
- Facility for temperature gauge and high temperature switch
- All necessary piping, valves, vents, drains, etc.

Speed Control

An adjustable droop governor shall be provided complete for the diesel engine and shall be of the electronic/hydraulic type. The governor shall be capable of maintaining the frequency within the limits set in ISO 8528 for standard types.

6.7.3. Alternator

The alternator shall be of the flange mounted, brushless, self-exciting, self-regulating standard type.

Alternator enclosure shall as a minimum be IP22.

Both ends of the generator main leads shall be brought to a terminal box and star connected.

The alternator shall be able to sustain unbalanced loads up to 20% without affecting the voltage regulation.

The insulation of alternator and exciter windings shall be class H, and the manufacturer shall guarantee that the insulation is suited for use in tropical climate. Alternatively, a special varnish shall be applied to achieve the required guarantee.

The alternator shall be capable of producing short circuit currents of 3-5 times I_N , enabling the protection devices in the panels to function.

Automatic Voltage Regulator

An automatic voltage regulator of the static type capable of maintaining the voltage within the limits set in ISO for best grade of voltage regulation shall be incorporated.

The system shall incorporate a low speed protection, that decreases the excitation current in case of the alternator being operated at a speed lower than nominal. The system shall provide full security for the excitation system against overload.

Arrangement of the Diesel Generator Set

The diesel generator set shall be installed in the generator room on a solid concrete block. The concrete block shall be isolated from other building works by provision of flexible expansion joints, in order to isolate seismic motor vibrations from spreading to building structures producing cracks.

Noise reduction measures shall be included in order to reach not more than 85 dB (A) at 1 metre from the generator room. The measures shall include air intakes provided with noise reducing baffles and heavy-duty isolation of the entrance door to the generator room.

The Contractor shall include installations (if necessary), such as forced ventilation of the generator room, in order to reduce the indoor temperature rise to an acceptable degree recommended by the equipment supplier, when the diesel generator set is in operation. Heat reduction measures must not reduce noise reduction precautions.

All equipment located outside shall be provided with sun cover in order to be protected against direct sun radiation.

6.8. ASSEMBLIES (PANELS)

In the following low-voltage switchgear and control gear assemblies, panels, switchgears, switchboards, cubicles, control gears etc. are referred to as assemblies.

6.8.1. General requirements

Assemblies shall comply with:

- TS EN 60439: Low-voltage switchgear and control gear assemblies.
- TS EN 60204: Safety of machinery - Electrical equipment of machines.

Assemblies shall provide minimum of 20% spare space for future use after installation is completed and when handing over. The spare space shall be provided as coherent space in whole and empty sub-sections. Building installation such as illumination, socket outlets, electrical heaters etc. shall be energised from assemblies intended solely for building services.

6.8.2. Construction

Assembly enclosures are to be fabricated from best quality of electro-galvanised mild sheet steel and cold rolled sections bolted together. All steel parts shall be treated effectively against corrosion after manufacturing. The treatment shall include sand blasting, anti-grease, primer and coating. Paint must be sprayed and kiln-dried.

Assemblies shall be constructed so that normal maintenance may be carried out from the front. All cubicles shall be fitted with doors at the front to access to control wiring and equipment. Front doors and covers shall be hinged and lockable with a common key for each section. Assembly enclosures shall provide a minimum protection of IP54, dust and vermin-proof. The construction shall comply with form 3b as detailed in TS EN 60439-1. They will be so constructed as to withstand all forces likely to be produced upon them during transportation, erection, operation, and short-circuit conditions. Each compartment shall be isolated from the nearby compartment by metallic barriers.

Assembly design is to be of a modular type allowing the assembly to be broken down into sections for ease of transportation and installation. The preferred module size adopted is 600 x 600 mm. Height of assemblies must not exceed 2100 mm measured from finished floor level to the highest point of the assembly. Isolator handles, control switches, push buttons, indicator lamps and instrumentation shall not be less than 700 mm and not more than 1,750 mm above finished floor level.

Solid barriers shall be provided to segregate each load compartment from other compartments and the busbar chamber, to prevent objects falling into lower live compartments, and to restrict fault travel to other compartments.

The finish colour for assemblies shall be the manufacturers standard unless specified in the particular specification.

Assemblies shall be regular shaped and rectangular, and where possible designed and constructed for floor mounting over cable trenches.

Minor assemblies may be designed and constructed for wall installation. All cables must enter or exit assemblies through a glanding plate provided with the appropriate sizes and types of cable glands (bushings) from the bottom side of the assembly.

Reference is to be made to service conditions above for the rating of components and equipment to be installed in assemblies. Further equipment ratings shown on components and equipment must show the values applicable for the ambient conditions.

6.8.3. General electrical requirements

Assemblies shall be rated for operation on a 400 V, 3 phase, 5-wire (TN-S), 50 Hz supply. Control voltages shall be 230 V and 24 V. The size of the 24 V supply unit is to be based upon actual consumers connected plus future expansions of the plant.

All components shall function properly within a supply tolerance of -10 % to +10 % on the 400/230 V and +/- 2.5 Hz on the 50 Hz frequency.

Signals to and from instrumentation shall be for analogue 4-20 mA, and for digital 24 V DC.

All component installed in assemblies shall be CE-labelled and must be capable of withstanding the dynamic and thermal stresses, without detriment, resulting from the prospective fault current.

Voltmeters and ammeters shall be door mounted square type 96x96 mm pointer instruments with black scale on white background and 1 accuracy class. Indicating instruments shall have a scale which provides 25% spare capacity of normal working indication. Moreover, ammeters shall not be damaged by the passage of fault currents within the rating and prospective fault duration time of the associated switchgear through the primaries of their corresponding instrument transformers. Motor ammeters shall in addition to the basic scale have an upper compressed scale intended for the inrush starting current only, which is approximately six-fold full load operating current. On scales, normal indicating range should be between 50-75 % of the full deflection to allow for accurate readings and other parts of the scales should be contracted.

The system of tripping devices for the circuit breakers shall be designed and set to ensure full selectivity, for example, a short-circuit in any circuit shall be cut off by the breaker that is closest to the short.

The branch circuits shall be protected by means of circuit breakers. Fuses may not be used.

Relays shall have indication of status (on/off) by signal lights (LED) or by a mechanical arrangement. Relays shall have a test button. The relays shall be connected via a standard 11-pole circular socket mounted on DIN-rails.

Pilot and indication lamps shall be of the LED type and provided with a common lamp test facility.

6.8.4. Access

All apparatus, equipment and components within assemblies must be so arranged that they can easily be identified and worked on, and, as necessary, removed for repair and maintenance. Sensitive equipment must not be installed on covers, doors or hinged assemblies. It is a requirement of this specification that any piece of equipment shall be removable without disturbance to any other piece of equipment.

6.8.5. Internal wiring

All wiring within assemblies must be supported in trunkings appropriate during construction. Component terminals must never take the weight of wires. All supports for wiring must be either screwed or stud welded. Adhesive type supports are expressly forbidden.

All wires shall have stranded copper conductors. The minimum conductor size shall be 1,5 mm². The maximum size for door mounted equipment shall be 2.5 mm².

Wiring at different voltages and AC and DC must be segregated in accordance with TS HD 60364.

Wiring shall not be less than 300/500-volt grade with an insulation temperature withstand of not less than 70° C. Wiring is to be sized according to the prospective fault current level and duration in reference to current rating. Joints between components in wiring will not be permitted.

6.8.6. Terminations

All terminals and terminal blocks must have each termination numbered. Connectors at all panels shall be numbered. Power supply terminals are to be identified with colours and/or numbers corresponding to phase designations. Depending on the type of terminal, cable lugs shall be attached to wires or cores; however, the use of "C" or "Jaw" type lugs is expressly forbidden.

6.8.7. Earthing

All normal non-current carrying metal work of an assembly must be bonded to the earth connection point within the enclosure. All doors, covers or assemblies must be permanently connected. All earth conductors must be single core multiple stranded and PVC insulated for mechanical protection, coloured green/yellow spiral striped.

6.8.8. Transient and surge protection equipment

Transient and surge protection equipment shall be connected to the incoming power supply cables and medium voltage power consumers like motors and transformers, if any. The equipment shall be placed in its own section of the assembly and located as near as possible to the consumer. Each phase and the neutral shall be provided with overvoltage/transient protection devices. Status (available/defect) of the transient protection equipment is to be signalled to the PLC.

6.8.9. Busbars

Assemblies shall be equipped with separate earthing and neutral busbar.

Busbars shall be of hard drawn electrolytic copper.

Ends and joints must be protected against corrosion. The buses shall be painted and supported on flame-retardant, track-resistant and non-hygroscopic insulators strong enough to withstand the stresses caused by magnetic forces when faults occur.

Busbars must be sized for the prospective fault current level and duration. Due regard shall be given to the method of supporting, regarding current withstand and thermal/mechanical stresses. The busbars shall have a continuous current rating in accordance with IEC 298 standard of temperature rise.

The dimensions of the busbar copper work shall be of one size throughout the complete assembly and the busbars shall be the same rating as the incoming supply switch.

Busbars shall be enclosed in a separate chamber and shall be continuous over each shipping section.

Riser bars shall be of the same construction and be fault rated to the same level as the main busbars.

Easy access shall be available to the busbars for future connections.

Circuit connections to the ground bus shall be made so that it is not necessary to open circuit the ground bus to remove any connection made to the ground bus.

6.8.10. Assembly ventilation

All sections that contain equipment susceptible to heat that may be generated in normal operation shall be fitted with forced air-cooling.

Filters shall be provided to maintain the integrity of the dust and moisture protection rating of the assembly. Fans shall be thermostatically controlled and automatically switched on, on rising temperature level in the section.

Indication of fan failure or section over temperature shall be included on the section door and signalled to the PLC.

6.8.11. Circuit breakers (CBs)

Circuit breakers (CBs) for supply of final sub-circuits to equipment shall be in accordance with TS EN 60947, type 2, and have a rated switching capacity at least equal to the total load of the circuit they supply. CBs greater than 630 A shall be draw-out type and CBs greater than 100 A shall be air circuit breaker.

Miniature circuit breakers (MCB) shall be provided with fixed instantaneous short circuit and overload trips, and be of the single, double or triple pole type as required. The prospective fault level must not be higher than the breaker capacity, and the time/current tripping characteristics shall be chosen with due regard to the equipment performance and circuit data, and to assure discrimination between the miniature circuit breaker and the moulded case circuit breaker. The choice of miniature circuit breaker shall ensure basic protection against indirect contact when used on a circuit with earthed equipotential bonding.

Where miniature circuit breakers are grouped together in the form of a distribution assembly a load breaking isolating switch shall protect the whole group.

6.8.12. Earth leakage circuit breakers

Earth leakage circuit breakers (ELCB) for supply of final sub-circuits shall generally comply with the clause above. Tripping level must not be above 30 mA.

Earth leakage protection shall be adopted in every branch circuit with socket outlets.

6.8.13. Isolating switches

Isolating switches shall be adopted as bus-coupling switches and as incoming breakers downstream assemblies if they are protected by a source circuit breaker.

Isolation switches must be four pole and have characteristics commensurate with the assembly duty, and as a minimum be rated at a voltage of 500 V and of a load break capacity in excess of the total load of the assembly.

The switch is to generally comply with TS EN 60947 and be provided with an operating handle, interlocked with the compartment door, lockable in the on and off positions.

6.8.14. Motor controllers

Each electric motor must have its associated control and protection equipment located within compartments of the assembly complying to form 3b. All motor control gear must be in accordance with TS EN 60947.

Motor controllers are to be designed in accordance with the manufacturers' recommendations for the motor type, characteristics, size and duty. Facilities for padlocking in on/off positions are to be provided as well as extended operating handle for front of assembly operation.

Contactors and relays shall be chosen to ensure that under normal operation the contact's life will exceed 5 years, and that, irrespective of actual usage, all motors starters are to have a category of frequent duty.

Thermal relays for motor protection shall be adjustable and comply with TS IEC 60255, and must be rated for the ambient conditions, and must not deviate in accuracy due to temperature or ageing and must be chosen so that the full-load current corresponds to approximately the middle range of operation of the relay. A tripped relay shall be reset by hand via a push button. Two auxiliary contacts shall be provided for signalling. Single phase failure shall be incorporated on all phases with a sensitivity not exceeding the values stated in TS EN 60947.

Contactors for motor starters are to comply with TS EN 60947 and be arranged as necessary for direct-on-line, with the choice of contactor ensuring that the full-load current is not at the contactors capacity (25% spare capacity is to be assured). Contactors shall be of the no volt release type. Two auxiliary contacts are to be provided for signalling.

Motor starters shall include the following:

- Motor circuit breaker, suitably rated moulded case circuit breaker, with short circuit protection.
- Suitably rated miniature circuit breaker for the control circuit.
- Contactor suitably rated for direct on-line start.
- Adjustable thermal overload protection
- Complete control circuit.
- Set of main and auxiliary terminals and a 15% spare capacity.
- Door mounted:
 - Indicating lamps for:
 - thermal trip
 - running
 - emergency stop activated (if applicable)
 - Selector switch for hand-off-automatic (HOA) control In position:
 - Hand: The operator controls operation of the motor by means of start/stop push buttons. The automatic control system is bypassed.
 - Off: The motor is switched off and inoperative. The automatic control system is bypassed.
 - Automatic (Auto): The motor is controlled by the automatic control system, i.e. the PLC. The start/stop push buttons are inoperative.
 - Push buttons for:
 - start/stop
 - overload reset
 - reset after emergency stop
- Auxiliary contacts for remote monitoring.

All available signals shall be provided for telemetry and wired to the PLC for remote control and monitoring.

Important: For selected motors according to the SCADA description there shall also be a position on the HOA switch called S for semi-automatic. In this position the motor shall be governed by the necessary time relays and other controllers.

Circuits for manual operation shall be hardwired to ensure operation of the plant if the automatic control system fails.

The running indication lamp shall be driven solely by means of a dedicated current actuated relay. When current flows to the motor the relay picks up starting the hours run meter and energizing the lamp. Auxiliary contacts on the contactor may not be used.

Every safety and protection device for the motor e.g., thermistor switch imbedded in motor windings etc., shall be hardwired into the motor control circuit to ensure immediately disconnection of the motor in the event of a failure. **Important:** The control circuit shall be designed such that a tripped motor cannot re-start automatically, but only after the fault has been cleared and after reset by hand via a door mounted push button.

All available signals shall be provided for telemetry and wired to the PLC for remote control and monitoring.

6.8.15. Soft starters

In general, soft starter means shall be applied for motors equal to or above 15 kW. Only electronic soft starter drives will be accepted.

Motors powered by frequency converters will be soft started by means of the latter.

On the front of the unit the following indicating lamps shall be found:

- Alarm
- Normal operation

The alarm signal shall be provided and wired to the PLC.

By-pass contactors shall be installed for soft starters for motors running more than one hour per day.

Requirements as mentioned for frequency converters.

6.8.16. Frequency converter motor controllers

In addition to the required standard motor starter fitting-out mentioned above, frequency converter motor starters shall be performed according to the following.

Earth leakage protection shall be incorporated either using electronic relays or by adding residual current protection to the motor circuit breaker. The earth leakage protection shall in either cases trip the motor circuit breaker instantaneously in the event of an insulation fault in the motor circuitry, ensuring that the system-to-frame voltage will not exceed 50 V AC and will be cleared within 5 sec, as required pursuant to TS 60364. Attention is drawn to the fact that the earth leakage protection must be of a type, which is capable of functioning with frequency converters.

If the frequency converters employed are incorporated with overload protection the latter may be utilised for motor overload protection in lieu of thermistor protection relays.

Each frequency converter shall be clearly labelled with the number of the motor/pump, which it is serving. The frequency converter shall be placed so its internal control panel is placed approximately 1600 mm above finished floor level. If installed inside an assembly provision shall be made for adequate ventilation.

When the panel hand-off-automatic (HOA) selector switch is in position (signal also to PLC):

- Hand: The operator controls operation of the motor from the front of the frequency converter. The automatic control system is bypassed.
- Off: The motor is switched off and inoperative. The automatic control system is bypassed.
- Automatic (Auto): The motor is controlled by the automatic control system.

The start/stop push buttons, the required specification for a standard motor controller shall not to be employed. Manual control shall be performed from the front of each frequency converter where the operator shall be capable of starting/stopping and turning up and down the pump revolutions.

Each frequency converter shall be configured to display the following current values on request:

- Ampere [A]
- Power factor (0-1)
- True power [kW]
- Apparent power [kVA]
- Revolutions per minute [RPM]

Frequency converters shall comply with:

- TS EN 60439, Low-voltage switchgear and control gear assemblies.
- TS IEC 60664, Insulation co-ordination for equipment within low-voltage systems.
- EN 50082, Electromagnetic compatibility - Generic immunity standard.

Frequency converters shall be 3 phase - 400 V grade, equipped with EMC-filter, fully enclosed to a degree of IP44, fitted with self-cooling fans venting through filters, capable of 100 % continuous RMS load up to 50 °C, at least 110 % overload for 60 seconds and capable of providing constant torque when high start torque required. All electronic parts shall be varnished against adverse effects of wastewater environment or equally protected.

Frequency converters shall be microprocessor based, fully configurable and fitted with an internal multilingual alphanumeric control panel with keypad-display for user interface for monitoring, adjusting parameters, manual control and configuration of the converter. Frequency converters shall come with an extensive library of pre-programmed application macros to allow rapid configuration of its in and outputs.

Frequency converters shall have the following configurable in and outputs:

- Two analogue (4-20 mA) inputs.
- Two analogue (4-20 mA) outputs.
- Six digital inputs.
- At least two digital outputs.

All available signals shall be provided for telemetry and wired to the PLC for remote control and monitoring.

6.8.17. Motor valve controllers

Motor starter for motor valves shall include the following:

- Motor circuit breaker, suitably rated miniature circuit breaker with overcurrent protection.
- Suitably rated miniature circuit breaker for the control circuit.
- Complete control circuit.
- Door mounted:
 - Indicating lamps for fully opened, fully closed, malfunction. The following colours are to be applied:
 - Valve fully opened "Green"
 - Valve fully closed "Yellow"
 - Valve malfunction "Red"
 - Selector switch for hand-off-automatic (HOA) control. In position:
 - Hand: The operator controls operation of the motor by means of open/close switch buttons. The automatic control system is bypassed.
 - Off: The motor is switched off and inoperative. The automatic control system is bypassed.
 - Automatic (Auto): The motor is controlled by the automatic control system. The open/close switch is inoperative.
 - Open/close switch.

Important: If applicable there shall also be a position for semi-automatic as described for motor starters

All available signals shall be provided for telemetry and wired to the PLC for remote control and monitoring.

6.8.18. Control panels for local functions

Local functions can be designed as stand-alone units with possibility of local manual operation.

Outdoor installed panels shall be made of reinforced fibre-glass. They shall be installed inside a galvanised steel cabinet and have IP65 protection degree.

The panel shall automatically control the operation of the installations. "Auto-O-Manual" selectors shall be available locally.

Indication of pump running, and fault shall be included.

Lamp test and emergency stop shall be included.

Monitoring of the motors running, and faults shall be included in the control and monitoring system.

Local Pad-lockable Stop Switch:

A local stop switch shall be installed adjacent to each machine (motor). The stop position shall be pad-lockable, and it shall be impossible to start the machine when locked. The switch shall be capable of disconnecting the full load current. For motors with a nominal current above 250 A, the safety switch facility shall be provided by means of the motor circuit breaker.

The switch shall include the following positions/functions:

O: Stop, pad-lockable, power supply is cut-off

I: Automatic, control from panel.

The switch shall be installed in the power circuit for the motor and all phases shall be disconnected in the OFF position.

Emergency Stops:

In general emergency stop for emergency shutdown is mandatory for any machinery, which can expose personnel to risk of injury during normal operation.

Emergency stop push buttons are required adjacent to every pump (except drain/sump pumps), motor valves and valve actuators and at aerated tanks for stop of the blowers.

Emergency stop shall be housed in tough high visibility yellow enclosures with red mushroom button which stand out well amongst other equipment and must be clearly labelled: "EMERGENCY STOP" (note the text shall be in Turkish and English. The button shall stay in off position when activated and can only be brought back to normal position, when reset.

Every emergency stop circuit shall be hardwired into the motor control circuit to ensure immediately disconnection of the motor in every mode of control. **Important:** The motor control circuit shall be designed such that a tripped motor will not restart automatically when the emergency stop is reset. A stopped motor can only re-enter service when the emergency button has been reset and after reset by hand via a door mounted push button in the motor panel.

Status of each emergency push button shall be signalled to the PLC and to an indicating lamp on front of the motor panel.

6.8.19. Labelling and marking

Text on labels shall be in the Turkish and English languages. Other languages will not be accepted.

All marking shall comply with the documentation for the assembly e.g. circuit diagrams and wiring diagram etc.

Each assembly shall be provided with a label displaying the assembly's identification number and describing the function of the assembly. The height of text applied shall be minimum 10 mm.

Labels identifying each front of assembly mounted devices e.g. ammeter, selector switches, push buttons, lamps, etc., shall be provided on the face of the assembly. Labels identifying and denoting the function of apparatus and group of equipment located behind doors e.g. motor controller etc., must be placed on the respective front door. The height of text applied shall be 4-5 mm.

All labels shall be with black engraved letters on white background. Only uppercase letters may be used.

Assemblies shall be fitted with a warning label, warning against electric shock. The warning label shall be engraved to give black letters on a yellow background and be preceded by the lightning flash symbol. Labels shall be fixed with countersunk chromium plated or stainless-steel screws. Self-adhesive labels will not be accepted.

Internal labels designating components shall be fixed to non-removable equipment. Internal labels must be visible and must not be obscured by assembly wiring, etc.

Labels on the face of assemblies shall be so placed that levers in any position do not cover them.

Each and every component or piece of equipment within assemblies must be tagged with an independent reference number. Marking shall be executed by adhesive marks of plastic impregnated tissue.

Each internal wire shall be identified pursuant to circuit diagrams by means of ring type plastic markers at both ends, placed on the wire before termination.

Terminals for connection of power cables shall be marked with phase nomination and group number. Terminals for connection of control and instrument cables shall be numbered.

6.9. INSTRUMENTATION

6.9.1. General

In the following are listed the minimum requirements for the instrumentation. Instruments shall be provided together with original installation accessories.

6.9.2. Signalling and Protection Circuits

Every digital signal in plant shall be provided as a volt free contact wired to terminals for telemetry. A fault and alarm situation shall be signalled via opening of a contact. The opposite i.e. by closing a contact will not be accepted. Operation is to be signalled by closing of a contact.

All faults, alarms and operation signals shall be wired to the PLC.

All 4-20 mA analogue signals from transmitters, measuring units, sensors etc. shall be wired to the PLC through loop isolators to assure galvanic separation.

Important: Every protection circuit shall be hardwired and based on the quiescent current principle i.e. when a fault is detected the control current is interrupted resulting in the disconnection of the equipment to be protected.

6.9.3. Instrumentation

Instruments shall have an analogue output signal 4-20 mA and a volt free error /fault contact to open in the event of malfunction. Accuracy shall for all instruments be better than 0.5 %. LCD indicators shall be provided together with instruments for reading in the field. At least IP65 degree shall be provided.

6.9.4. Level switches

Level switches shall be provided for measuring of high and low alarm levels and for control of drain pumps. High level alarm for the reservoir shall be with a level switch.

The level switches shall be the floating type with a built-in change-over contact system.

The contact system shall be casted in a polypropylene housing in protection class IP67.

A mercury free contact system is preferred.

Cables from the level switches shall be connected via junction boxes provided with terminals.

6.9.5. Level transmitters

Level transmitters shall be provided for continuously measuring of water levels and for control of the machinery.

Analogue level measuring shall be based on the hydrostatic measuring principle based on the pressure generated by the height of a liquid column. The pressure acting on the pressure measuring cell built-in the sensor shall be converted into a level-proportional electrical signal. The sensor shall be suitable for installation in wastewater/sludge and the sensor house shall be made of polypropylene or similar material. The housing shall be in protection class IP68. The level transmitter shall provide the PLC with a 4-20 mA level proportional signal and additionally provide the sensor with the necessary power supply. The

transmitter shall automatically compensate for the atmospheric pressure. The compensation shall be electronic. The accuracy of the level measuring system shall as a minimum be $\pm 0.5\%$ of the full scale. The full scale shall be selected according to the location of the level measuring. The linearity shall be better than 1%. It shall be possible to change the full scale for the sensor by using a special programming device connected to the sensor.

Alternatively, level measurement, will be performed by contact free, echo time measurement device that operates at ultrasonic frequency at locations where required. Equipment will transmit the vibration that is reflected to the detector from the surface of the liquid that is being measured. Equipment will be consisted of separate control system and a detector that has transmitter and receiver. Equipment will be provided with automatic temperature balancing mechanism and will be in compliance with the approved design for operation under defined weather conditions. Detector will be appropriate to be mounted in an open or covered tank and completely covered and protected against water that may reach on itself, IP67 rate protected from environmental effects. Control units must have independent balancing features between zero and certain interval and its output must be between 0/4–20 mA or 0–10 V as proportional with the level. General accuracy of the measurement device, must not be higher than $\pm 1,0\%$ of the measurement device level indicator. The connection between the detector and control units must be shielded type cable that is available in the market and equipment must be able to operate with cables up to 150 meters. The Contractor shall ensure that all equipment complies with the requirements and especially stoppage distance and angle and conicness of the heat dissipated must be taken into consideration.

6.9.6. Oxygen transmitter

Oxygen transmitters shall be provided for measuring of the oxygen content.

The analogue measuring of dissolved oxygen shall be based on a sensor with a multi electrode system.

Calibration of the system shall be easy and not require special tools or instruments. It shall be possible to calibrate the system from the front of the transmitter and the accuracy of the calibration shall be better than 5%.

Correction of temperature, relative humidity (RH), salt content and the atmospheric pressure shall be included.

It shall be possible to select % or ppm as the range.

The level of dissolved oxygen shall be indicated on a pointer instrument in the front of the transmitter.

Adjustments shall be done from the front of the transmitter.

The device shall include automatic compensation of temperature.

6.9.7. ORP transmitter

ORP transmitters shall be provided for measuring of the oxidizing or reducing tendency, where necessary.

6.9.8. Pressure Transmitter

Pressure transmitters shall be installed to measure the pressure where necessary.

- ceramic sensor shall be used to measure gauge or absolute pressure of the gas, steam or liquids used in the process.
- device's standard sensitiveness will be 0.5%.
- Measurement range of the devices for each individual installation shall be selected considering the minimum and maximum operating and testing pressures can be read without any fault
- For explosive and flammable environments Ex-proof types will be used.
- Connection type shall be 1/2" gear, flanged optionally.
- Mounting material shall be either aluminium or plastic (POM).
- For high temperatures types which are filled with oil resistant to special temperature will be usable.
- Supply voltage shall be 220 VAC
- Current output: 0...20mA or 4 mA, but by connecting LCD indicator, pressure shall be readable at the field.
- Protection type class is IP 65.

6.9.9. Flow transmitter

The flow meters shall be based on ultra-sonic transmitters on flumes or magnetic on pipes, if otherwise is not necessary depending on process requirements.

The transmitter shall include a pulse signal that gives a pulse for a specific accumulated flow.

The enclosure for all equipment shall be IP68.

The technique shall be microprocessor based.

Flowmeters shall be selected considering cavitation and irregularities in fluid profile so that continuous measurement will be assured. Process connections shall be flange type, if otherwise is not necessary depending on process requirements.

Working principles and technical features of the equipment will be as follows:

- Microprocessor controlled sensitive electromagnetic flow meters that are designed to measure the flow of liquid that has electrical conductance bigger than 5 micro/cm will be used.
- Failure rate, between 10-100% measurement zone, will not exceed 0.5% of the measured value. So, the device will keep its high sensitivity even in low flows.
- The calibration of the flowmeter will be possible by entering program values into the matrix inside the equipment by using the adequate number of buttons on itself.
- Indicator has two lines and momentary and total flow values will be monitored at the same time and also it will be possible to see from a distance whether momentary value and limit value is exceeded with two coloured graphical indicator bar.
- Even if all the data related to the application is not completely known, by pressing a button, the equipment will be able to program itself.
- During operation of the flow meter all calibration values will be saved in the memory of the equipment and even if an electronic part is replaced due to a failure, previous values will be able to be loaded again and they will not be allowed to disappear.
- Interior coating will either be hard rubber or teflon, etc. according to the characteristics of the liquid to be measured.
- Electrodes will be stainless steel 1.4571 and different material will be able to be used according to the characteristics of the liquid to be measured.
- Process connection: Flange (DIN or ANSI)
- Flange material: Steel (Option: Stainless steel)
- Protection type: For transmitter IP67 for primary unit IP68.
- Supply voltage: 85...260 VAC, 50/60 Hz
- Current output: 0/4...20 m A
- A relay output is going to be used for limit value, current direction or failure alarm and a second relay output is going to be provided for spare.
- Device will be compact as sensor and transmitter in one unit. Connection cable length for remote version up to 10 m. for FS version or up to 200 m. for FL version. Primary units, will be chosen as IP68 and they will be appropriate for accidental immersion in 3 m depth under water
- .
- Primary units will be chosen as IP68 and they will be appropriate for accidental immersion in 3 m depth under water
- The Contractor will provide primary units, pipes, flanges, fittings, etc. with flanges in compliance with related requirements.
- To enable dismounting for repair and maintenance each primary unit will be supplied with dismounting piece as a whole and will be installed.
- Primary of the flow meter will have an electrode to determine whether the pipe is completely full. The signal that this electrode transmits will control the circuits inside the convector and will turn on "Pipe Is Not Completely Full" mode analog signal circuit and indicate with an indicator.
- All flow meter measuring devices, distances up and down the flow, installation type will be determined by the manufacturer.
- Field windings will be completely guarded.

6.9.10. Temperature transmitter

The temperature range shall as minimum be 0 to 50°C with an accuracy better than 0.5 %.

6.9.11. pH transmitter

The pH meter shall cover a range 0 to 14 pH with an accuracy better than pH 0.02 at any temperature. It shall be installed so that easy access for calibration would be provided.

Electrode systems will consist of a combined measurement and reference electrode and a resistance thermometer for temperature compensation and all of these will be placed in an immersion or in-flow type mount to conform with each application. Electrode systems will be positioned in such a way that it will prevent accidental damages and will be easily accessible for standardization and maintenance.

In the locations where in-flow systems are used, system will be mounted on a surface plate together with all connection pipes, pressure, flow and isolation valves. Sample water will be connected to the construction site drainage system with a pipe uniformly.

Amplifiers will be located close to the measurement points in mounts that are IP55 protection type according to TS 3033 EN 60529. Amplifier and indicator will be 1500 to 1800 mm higher than ground level around.

The contractor will provide a spare electrode for each pH measurement system.

6.9.12. Automatic sampling device

Automatic sampling device shall be of industrial robust type, IP65, programmable, able to be manually used, compatible with intermittent discharges, have LCD screen and battery support. The device shall be able to close off when it is filled and shall be operated by a flow meter. It will be coupled by a peristaltic pump in order to avoid contamination. Sampling volume shall be adjustable. Recorded data shall be easily transferred to PC.

6.10. Electrical Installations

6.10.1. Lighting

Unless otherwise stated in design drawings or item/pose definitions;

Lighting shall be installed in all rooms of the plant as follows. Lighting outside shall be installed along roads, on structures, at the gateways and at each corner of the buildings. Lighting outside shall provide a light level sufficient for safe orientation. Lighting outside shall also include spotlights near installations that require regular maintenance or supervision such as bridges, screens, tanks etc.

The following average light intensities shall be obtained, the variations not exceeding 25%:

Control room: 500 lux

If there is suspended ceiling; recessed type fluorescent luminaires at 60x60 dimensions shall be used

If there is no suspended ceiling; surface type fluorescent luminaires shall be used

Luminaires shall be industrial type IP 67.

Working areas and tunnels: 200 lux

Waterproof type, external, industrial type luminaires shall be used.

Office: 500 lux

For suspended ceiling; recessed type fluorescent luminaires at 60x60 dimensions shall be used

Other rooms: 100 lux

According to ceiling structure compact fluorescent, luminaires can be used.

Gangways and ladders: To such extent that the safe passage is assured

Compact fluorescent lamps can be used.

Effectiveness of the luminaire shall not be less than %70. If required, the manufacturer must be capable of improving the effectiveness of the luminaire by reliable laboratory test reports.

The Contractor shall, if required, present a protocol of measurements to the Engineer.

All luminaires shall be delivered and installed complete with lamps, ballasts, power factor correcting equipment, starters, etc.

The power factor shall be a minimum of 0.9.

Luminaires for the control room, offices etc. shall be of the decorative type designed to be used with computer monitors. Other luminaires for the administration building shall be a type suitable for the specific use. Luminaires in the working areas of the plant shall be the industrial type and as a minimum be in protection class IP 67.

Luminaires for working areas shall be the fluorescent dust proof type with body: Glass reinforced polyester. Bowl: transparent polycarbonate. The luminaires shall be an anti-vandal type with reflector, mounted on a wall-fixed pipe support, on the building structures or suspended.

When luminaires are to be installed in rooms with a suspended ceiling they shall be suspended from the slab. No weight shall be applied to the ceiling structure.

The following luminaire types shall be provided for all locations, except working areas where luminaires with sodium bulbs or mercury bulbs may be used.

Each luminaire shall be connected through a connection box.

Lighting in each room shall be controlled by means of manual switches placed at each door in the respective room.

All luminaires and associated gear shall be subject to earthing protection.

In no cases shall a flexible cable be used for connection of more than one luminaire.

All cables to be used in lighting installation shall be PVC-insulated copper cables with a minimum cross-sectional area of 1.5 mm².

Cables for connection of the luminaires with fluorescent bulb to the fixed installation shall be flexible cables with a minimum cross-sectional area of 0.75 mm².

6.10.2. Outdoor lighting equipment

The outdoor lighting system shall be provided with all equipment necessary including poles, fixtures, cables, foundations etc.

No masts for road light must exceed a height of 4 m. Illumination of tanks etc. shall take place from equipment installed on railings etc. No equipment must be able to blind outside the plant.

Each lighting pole shall be provided with terminals and fuses housed inside the pole.

Fixtures shall be made of weather resistant material. Changing of bulbs shall be easy and not involve special tools. The protection class shall IP55 or higher.

Galvanized steel polygonal lighting poles, pole-mounted lighting fixtures and grounding cables shall be included in road and environment lighting. Road lighting shall have photocell and manual selections to switch on.

6.10.3. Emergency lighting

The devices shall have Ministry of Science, Industry and Technology Administration approved, guarantee certificates.

Unless otherwise stated in design drawings or item/pose definitions;

There shall be minimum one emergency lighting, maximum 2 km away from the locations where fire cabinet, fire extinguisher tube, fire alarm button, first aid equipment, security signs etc. exits.

Minimum 1 lux lighting level shall be provided at any point over the floor through the escape route up to 2 m in width.

Minimum 0.5 lux must be provided over the floor, regarding areas that bigger than 60 m² to the escaping route and collecting areas (except 0.5 m edge of the collecting area).

Minimum 15 lux lighting level shall be provided and around %10 of the general lighting level, regarding the areas that the devices shall be out of the circuit when electricity is OFF; at electricity distribution room, production and industrial process control rooms, boiler rooms, chemical bath rooms, areas where the devices cannot suddenly stop when electricity is OFF, areas where having risk and danger, the rooms that is important such as vault room.

The height of the luminaire mounting is 2-4.5 for emergency lighting devices and 2-2.5 m for emergency directing devices

The emergency lighting shall automatically switch ON when the normal power supply fails. The emergency units shall be supplied from a battery unit that can provide light in a minimum of 1 hour.

The units shall be complete units provided with housing (IP54), fluorescent light (18W), battery, charger, indication of battery OK etc.

Recharging of the battery shall be automatic.

6.10.4. Socket outlet stations

Unless otherwise stated in design drawings or item/pose definitions;

The socket outlets shall be installed in a socket outlet station, a box made of glass-reinforced polyester. The box shall be in protection class IP55.

All switches shall have TSE documents.

Inside of the all switches shall definitely be either porcelain or incombustible bakelite or equivalent.

Switches' properties are 10A, 500V at least with overturned cachet.

Colour and physical properties of switches shall be determined with the controllership jointly.

1- Flushed Sockets:

- Sockets shall definitely be grounded type.
- All switches shall have TSE documents.
- Single phase sockets shall be at least 16A.
- Sockets shall be lid-type if specified in the project (at WC's where flust mounted installation is done).
- Switches shall be mounted as per descriptions in the project.
- Sockets that are supplied from UPS shall be different from other sockets. It must have a tip except from grounding contacts.

2- Surface Sockets with Thermoplastic Casings:

- Inside of the sockets shall definitely be either porcelain or incombustible plastic.
- Sockets shall definitely be grounded type.
- All sockets shall have TSE documents
- Single phase sockets shall be at least 16A and three-phase sockets shall be at least 25A.
- Sockets shall have self-closing spring lids.
- Sockets shall be used at places where there is no water tightness and no impact effects.
- Switches shall be mounted as per descriptions in the project.

3- Metal Casting (Aluminium) Sheltered (Weatherproof) Sockets:

- Inside of the sockets shall definitely be either porcelain or incombustible bakelite insulated material.
- Sockets shall be grounded type.
- Single phase sockets shall be at least 16A and three-phase sockets shall be 25 A, 63 A.

6.10.5. Uninterruptible power supply (UPS)

Unless otherwise stated in design drawings or item/pose definitions;

A UPS system shall be provided for the whole control and monitoring system and the instrumentation at the treatment plant, which is double conversion on-line type. It shall include automatic transfer switch, manual maintenance bypass switch. Design shall be based on microprocessor/DSP controlled "pulse width modulation" technique.

The UPS system for the treatment plant shall ensure the operation of the control and monitoring system and protect the system from losing data in case of a power cut. The capacity of the battery shall be sufficient for operation in 1 hour. UPS shall have a means of on-line test procedure to test battery condition and battery management system to ensure 10 years of battery life time.

All equipment necessary for operation of the control and monitoring system shall be fed from the UPS system including the following:

- The operator station including all connected equipment
- The maintenance station including all connected equipment
- The PLC's
- The mimic panel and the paging modem
- The communication networks
- The instrumentation.
- The fire detection system

The UPS system for the treatment plant shall fulfil the following requirements:

- Efficiency AC/AC: min 90%
- Overload, 1 min.: 150%
- Disturbance: <10%
- Power factor: >0.9
- EMC: VDE 871-B/0875-E
- Acoustical noise: max. 55dBA.

It shall include indication of:

- Power source (grid or battery)
- Charging
- Battery OK
- Inverter OK
- Charger OK
- Grid OK
- Static Bypass
- Manual Bypass.

6.10.6. Earthing system and equipotential bonding

A five-conductor earthing system (TN-S) pursuant to IEC 60364 with separate protective conductor (PE) and neutral (N) conductor shall be established from the power transformer(s) and throughout the new installations to be established. The N-conductor must not be connected to the PE-conductor at any point within the installation. The solution shall be approved by the electricity company.

A common equipotential bonding bar (CEBB) shall be installed connecting:

- Power transformer low voltage (LV) earthing points.
- Plant protective conductor system (PE).
- Building reinforcement.
- Plant cross-bonding system.
- Earthing system for external lightning protection system.
- Lightning and overvoltage arresters.

The common equipotential bonding bar shall be made of copper and have a cross sectional area such that it can act as the circuit protective conductor on each item of the plant and equipment connected to it. The bar shall be clearly labelled to identify its purpose and bolted firmly to the building wall mounted on 50 mm distance pieces. Cable termination shall be made with compression-type cable lugs bolted to the bar.

An equipotential zone shall be created throughout all installations encompassing all metal structures. Extraneous metalwork, building reinforcement, metal supporting structures and machinery equipment i.e. pipes, conduits, pumps, motors etc. shall be cross-bonded and connected to the common equipotential bonding bar.

An earthing system for power transformers shall be established as specified in this specification.

The earth resistance of the earthing system shall be as low as practicable but shall in any event be such that the electrical resistance between the common equipotential bonding bar and the general mass of one earth

group shall not exceed 4 ohms when any one group of electrodes is disconnected. Connections to copper weld ground rods will be made by the Cadweld process.

Earth groups within the plant shall be interconnected forming the general earthing system of the plant with $R_p \leq 1\Omega$. Distance between 2 different earth groups shall be at least 20 m. Electrodes of earth socket shall be buried with the superior part at the minimal depth of 0.8 m.

Every construction shall be connected to the earth group through at least two points.

Protective conductors (PE) shall be made of stranded copper with overall green/yellow plastic covering.

6.10.7. Lightning and Overvoltage Protection

External Lightning Protection

An external lightning protection system of buildings shall be established to prevent damage to the building due to fire or mechanical destruction in the event of a lightning strike.

All devices to be installed outside the building for intercepting and discharging the lightning current to earth are described in DIN VDE 0185.

The lightning protection system to be adopted shall be performed according to the protection class I requirement of IEC 61024, Protection of structures against lightning.

For the gas holding tanks, the protective installation against lightning shall be constructed from an interception rod placed on pillars at least 5 m distance from these and from earth groups against lightning with $R_p \leq 1\Omega$. For any other buildings, the protective installation against lightning shall be carried out from the interception network on the covering connected to the earth group.

The earthing system for external lightning protection shall be connected to the building reinforcement

Internal Lightning Protection

The heart of the internal lightning protection system is the equipotential bonding system to be established. All from field incoming and outgoing to field power supply cables, signal and telecommunication lines shall indirectly be incorporated in lightning protection equipotential bonding system via lightning and overvoltage arresters.

Protection equipment for the power supply cables is classified in accordance with DIN VDE 0675 into specified classes A, B, C and D according to their application. The following arresters shall be adopted:

Installation position	Requirements
Incoming sections of direct by transformer fed panels.	Arrester class B (Arresters for lightning protection equipotentialization to DIN VDE 0185 for overvoltage category IV according to TS EN 60664).
Incoming section(s) of sub panels.	Arrester class C (Arrester for overvoltage protection to DIN VDE 0100 for overvoltage category 2I according to TS EN 60664).
Each power cable, signal cable and data communication line connected to field installed equipment.	Combined lightning (10/350) and overvoltage (8/20) protector furnished as modular terminal block to meet immunity class 1 according to DIN V ENV 50142, (EMC) 1995-10, TS EN 61000.

Every arrester shall have an alarm contact to open if the arrester becomes defective. The alarm contact shall be wired to the PLC.

6.11. POWER FACTOR CORRECTION

All necessary compensation systems shall be provided and installed so that power factor of the plant would be 1.

Furthermore; no load loss of the transformers shall be compensated via fixed capacitor banks.

Necessary measures shall be taken in order to suppress harmonics if required.

Automated power factor gear for correcting power factor shall be incorporated. Fixed capacitor banks are not permitted.

All required gear for power factor correction shall be supplied as one unit fully enclosed to a degree of IP54. The unit shall comply with EN 60439 and be designed to maintain: $\cos \varphi = 1$ at all load conditions.

On the front of the unit the following instruments are to be found:

- Power factor [0-1-0].
- Step indicator (to indicate the current step).
- Indicating lamps:
 - Alarm
 - Normal operation

The alarm signal shall be wired to the PLC.

Capacitors shall be PCB-free, with a loss < 0.2 W/kVar and comply with:

- TS EN 60891
- TS EN 60831.

Power factor correction units shall incorporate suitably rated internal overcurrent protection of the capacitors and be with common phase sensing for correction of all three phases simultaneously. Single-phase correction is not required. Delay between corrections shall be adjustable from 30 - 120 seconds and be set to suit the requirement of the local electricity authority. If no requirements, 40 sec shall be used as the default setting.

A six steep capacitor bank shall be provided as a minimum. Each step to be suitable sized with due regard to the inductive loads.

When installed in circuits with thyristor-controlled motors antiresonance coils must be fitted to suppress the influence of harmonics, in particular the influence of the 5 harmonic.

6.12. MOTOR INSTALLATIONS

Power and signal cables from a panel and to motor shall be terminated in a terminal box mounted in vicinity of the motor. From the terminal box, portable cords or flexible cores contained in flexible conduits shall be run to the motor.

Terminal boxes for motors are to be with bottom cable entry through cable glands.

6.13. JUNCTION BOXES

General junction boxes are to be constructed of marine grade aluminium complete with lid and captive gasket to a degree of IP 65. The necessary number and size of entries together with terminals are to be designed according to circuit requirements. General junction boxes shall be suitable for direct mounting with external fixing holes, and are to be labelled with reference number.

Terminals are to be arranged at different heights for different services and a barrier is to be provided to shield instrument circuits from power circuits at different voltages. Terminals are to be of the necessary number and size (20 % spare) and determined according to respective circuit requirements.

6.14. CABLE ENTRIES

Cable entries from one room to another or from outside to inside shall be performed by watertight and fireproof multi cable penetration seals to provide an efficient barrier against fire, smoke, flooding and vermin.

The cable penetration system shall comprise a steel-mounting frame packed with insert blocks to accommodate the cables and to fill out surplus room. After cable installation the insert blocks shall be compressed to complete the sealing.

Each mounting frame shall be embedded in walls.

6.15. CABLE GLANDS

All cable glands are to be of the compression type acting upon the cable sheath and where necessary provided with stockings, which grip the cable. All cable glands are to be of corrosion resistant metal; plastic cable glands will not be accepted. Cable glands are to be of a type, which will not reduce the degree of tightness of an enclosure and are to be correctly sized to the cable they seal.

6.16. CABLES

All cables used in the plant shall be of stranded type and shall have necessary protection against rodents. Power cables are cables having operating range $U \geq 50$ V. Signal cables are cables having operating range $U < 50$ V.

6.16.1. Power cables

Cable sizes, types and construction must be chosen with due regard to the connected equipment requirements, ambient conditions, installation method, and fault and overcurrent. Generally, the cable manufacturer's published data are to be used in determining cable adequacy.

Power cables shall be selected such that the voltage drop does not exceed the maximum value defined in TS HD 60364 at any point in the installation.

Power cables shall generally consist of two types:

- PVC for internal building.
- Cross-linked-polyethylene (XLPE) for all other locations.

PVC power cables shall comply with TS IEC 60227 and TS EN 60228 and shall not be less than 1.5 mm² cross section. Generally, PVC power cables are to comprise stranded copper conductors with an extruded PVC insulation, laid-up in an extruded PVC bedding with PVC oversheath. Where mechanical protection is required cables may be placed in metal conduits or be provided with armouring depending on the installation.

XLPE power cables shall comply with TS IEC 60228 and TS IEC 60502 and must not have less than 1.5 mm² cross section. Generally, XLPR power cables are to comprise stranded copper conductors with an extruded XLPE insulation, laid-up in an extruded bedding, galvanised steel wire armouring and an extruded PVC oversheath.

Selection of all the cables and capacity decreasing factors will be determined according to the items below:

- a) Environment and ground temperature
- b) Specific thermal resistance of the soil
- c) Cable depth O.G. 0.8 m
Cable depth A.G. 0.8 m.

Following factors will be taken into consideration in order to determine required capacity and width section for each cable:

- a) Short-circuit current
- b) Environment temperature conditions
- c) Installation of the cables inside air, channel or soil.

For power circuits minimum 1.5 mm², cables with appropriate section for electronic equipment will be chosen. Current density will be assumed as 2.5 A/mm² up to 50 A.

MV Cables:

High voltage connections between transformer stations shall be for 34.5 kV. 20.3/35 kV cross-linked polyethylene (XLPE) cables shall have bunched copper conductors, XLPE insulated cores, shielded sealed insulation mount, one galvanised steel wired sheath (and/or protected chemically against rodents) and finally on top a PVC mount. By conforming to all other requirements and corrections of TS IEC 60502 and by taking into consideration physical and chemical features of the PVC mount, red coloured PVC must be chosen. In cable connection; proper cable termination accessories and materials shall be used.

MV Cables will be laid as one core and a spare core will always be provided.

PVC mount will comply with TS IEC 60502 requirements, will keep its adhesiveness to the sheath wires and bedding and following long-lasting storage process, during direct sunlight exposure of the cable system, it will not be softened to be deformed or torn apart.

Also, in the condition where the line between the power generation point and the facility is aerial line, a conductor with appropriate cross-section and steel core shall be chosen and installation conforming to TEDAS Specifications will be performed.

LV Cables:

Generally, low voltage power cables shall be 600/1000 V grade.

Cable sizes, types and construction must be chosen with due regard to the connected equipment requirements, ambient conditions, installation method, and fault and over currents. Generally, the cable manufacturer's published data are to be used in determining cable adequacy.

Power cables shall be selected such that the voltage drop does not exceed the maximum value defined in IEC 60364 at any point in the installation.

Power cables shall generally consist of two types:

For Indoors

Cables that lead to the facility and machinery will be thermoplastic insulated type NYY, NYCY or NYMHY type, by using polyvinyl chloride (PVC) or cross-linked polyethylene.

For Outdoors

In case where indoor cables (NYY, NYCY or NYMHY) are used, these cables will not be laid directly into the ground. They will be passed through pipe or channel. In case where they are bedded into the ground they will have XLPE insulation, steel wire sheathed, and extruded PVC covered twisted copper conductor.

6.16.2. Signal cables

For signal cables thin multi-wired electrolytic copper conductor, PVC isolated, core, tinned copper mesh screened, out coating PVC in indoor environment, and PE in outdoor environment LIYCY cables will be used.

The cores of the signal cables will be numbered, and panel outputs will be labelled at the device inputs.

Cables shall be provided in five times two pairs, ten times two pairs, twenty times two pairs or thirty times two pairs, as circuits require.

6.16.3. Lighting cables

Lighting cables indoors will be NYM type. External lighting cables will be NYY type inside PVC pipe.

6.16.4. Earthing and bonding cables

Bare earthing cables shall comply with TS EN 60228 and shall not be less than 16 mm² stranded copper single conductor and sized according to the requirements of the TS HD 60364.

PVC insulated earthing cables shall comply with TS IEC 60227 and TS IEC 60228 and shall not be less than 2.5 mm² cross section with a single stranded copper conductor with an extruded PVC insulation coloured green/yellow in spiral stripes.

6.17. CABLE ROUTING

6.17.1. Cable segregation

Cables operating at different voltages and for different purposes shall be properly segregated.

Throughout installations four continuous separate tracks shall be established for:

- Power cables for technical power.
- Power cables for building services.
- Power cables energised by frequency converters.
- Signal cables.

Distance between the above-mentioned cables must not be less than 200 mm.

6.17.2. Cable trays, ladders and trunking

Cable trays, ladders and trunking shall generally comply with TS HD 60364 and shall be constructed from mild steel sheet either hot-dipped galvanised or zinc sprayed, perforated, and of such a design that it is rigid in construction. The choice of manufacturer is to ensure that bends, tees, intersections, reducers, risers,

and droppers are included as standard in the product range - the manufacture of these and the like items on site is expressly forbidden.

Cable trays, ladders and trunkings shall be sized and provided with isolating barriers in accordance with the spacing and segregation requirements of cables as mentioned above.

Where the cable trays, ladders and trunkings are cut, drilled or where the galvanising is damaged in any way the surfaces shall be adequately treated to restore them to the original galvanised standard.

Earthing will be applied to cable trays, ladders and spares.

All cables will be fixed by clamps (brackets) or crochets or plastic bands along the path that they are installed.

In cases where power and control cables are laid together; a cable pan will be placed in between power and control cables and cables will be separated with this separator.

Supports shall be provided at intervals to assure that the maximum deflection allowed by the manufacturer for the given loading is not achieved. The weight and quantity of cables placed in cable tray or ladder must not exceed the manufacturer's recommendations. On selected cable trays, ladders and trunking sufficient space must be left for additional cables necessary for the future plant extension. The number of cables installed shall be limited ensuring the resulting space factor will not exceed 45%.

Joints between sections of cable ladder or tray or trunkings shall only be made via fish plates and domed headed bolts forming part of the tray, ladder and trunking manufacturer's standard accessories - welded joints will not be permitted. Likewise, cable trays, ladders and trunkings shall only be bolted to supports.

All vertical cable trays, ladders and trunking must be provided with perforated covers of equal treatment fixed in place by means of bolts until 2 m above floor level.

6.17.3. Conduit systems

Conduits within buildings and structures shall be either super-high impact heavy gauge PVC conduit, installed with solvent welded joints, or shall be manufactured from galvanised steel and shall be installed with screwed fittings. Conduits installed external to buildings shall be galvanised steel. Where galvanized steel conduit is cut or where the galvanization is damaged in any way the surfaces shall be adequately treated to restore it to the original standard.

Fittings and accessories associated with conduit systems shall be either manufactured from non-corrodible materials or suitably coated to render them non-corrodible. No conduit shall be smaller than 20 mm diameter.

Pullboxes shall be spaced so that there is not more than two solid bends, or their equivalent, or more than nine metres of straight run between pullboxes.

6.17.4. Cables in ground

All main race trays in ground shall be constructed as channels of concrete in the ground. At the walls of the channel 2 or 3 cable trays shall be installed at each side. The channel shall be covered by concrete slabs. The installations are to ensure cables maintain required segregation by providing at least one cable tray for each type of cable (signal cables, power cables, machine installations and building installations).

In routes with fewer than 5 cables, cables can be installed in pipes, one pipe for each type of cable. Generally, pipes will be 100 mm diameter and, in any event, sized so that only half of their capacity is taken up by cables. Conduits are to extend beyond road edges by 500 mm. For the maximum length of every 50 meters the pipes must be connected to a manhole in order to ease installation of new cables.

6.17.5. Installation of cables

Cables installed on trays, ladders and trunkings must be so arranged that there are no crossings or interlacing of cables. The trays, ladders and trunkings must be sized for the cables' bending radius and weight. Cables shall be secured to the tray and ladder by means of ultra-violet stabilised tie-wraps at the necessary intervals commensurate with the cable size and weight. All cable tray, ladder and trunkings routes must be complete before cables are installed.

Cables individually run and direct mounted on walls or ceilings must only be installed after building trades and painters have finished their work. Cables may only be installed in vertical and horizontal planes and be

aesthetically acceptable taking the most unobtrusive routes possible. Single hole plastic fixing cleats only shall be used.

All cables terminating at equipment are to employ screwed cable glands only - the use of epoxy putty is expressly forbidden.

Cable runs shall be continuous throughout. Jointing shall not be carried out in conduits or at pulling points under any circumstances.

Cables exposed to direct sunlight shall be able to withstand exposure.

Cables with different voltage levels shall be laid in different trays. If they are designed to be laid in the same tray (by using separators) due to small cable quantity in certain tracks, the approval of the Engineer shall be taken.

In cable connection; proper cable termination accessories and materials shall be used where necessary.

6.17.6. Cable identification

Cables and cable cores shall be identified at both ends by means of sleeve bands bearing the cable/core reference number, which shall relate to the reference number shown on the drawings. Where multiple cables are laid in troughs, duets, clipped on tray over long runs through several rooms in buildings, or laid in ground close together, intermediate markings to identify specific cables shall be applied.

Where cables are installed in duets, the cables shall be identified with the cable reference number within each cable draw chamber.

6.18. CCTV SYSTEM

The CCTV system shall be used to observe all the critical equipment and places (building entrances, circulation areas, parking areas) such as monitoring of the entrance, the digesters, the inlet flow pumping station, the dewatering building and pumping stations. A monitor shall be installed in the control room. The picture shall toggle between the cameras automatically. Where cameras are installed, sufficient illumination shall be established.

The system mainly consists of a certain number of cameras, picture transmission systems and amplifiers, cross over video matrix and quadrant device, video switching system and video recording device.

The system and its transmission facilities shall be designed, constructed and installed in a way that a clear and sharp picture is obtained on the monitors under poor ambience and power supply conditions.

All cameras shall be state-of-the-art system cameras. The cameras shall be installed within explosion-proof housing, where necessary, suitable for the installation under the prevailing environmental conditions.

The camera to be installed in hazardous area must have explosion-proof housing suitable for hazardous area classification. Where the cameras will be installed in the severe environment, the housing shall be protected against the expected adverse effects.

The central control unit shall be installed in the control room. The panel with its associated marshalling and mounting cabinets shall include all the functional groups necessary for the faultless function of the complete CCTV system at its field and auxiliary devices.

A digital video recorder shall be supplied.

6.19. TOOLS AND MAINTENANCE EQUIPMENT

The Contractor shall provide all special hand tools needed for the proper maintenance of all the equipment delivered.

All the special tools shall be available and fully functional at the plant after Tests on Completion.

Special electrical tools are tools or instruments that are specifically used for testing of electrical circuits. The following is considered as special tools:

- Megger for measuring of insulation resistance
- Instrument for measuring of earth resistance
- Multimeter
- Instrument for measuring of direction of motors

- Instrument for indication of line voltage ON (screwdriver type).

The Contractor shall also provide necessary maintenance tools for electrical and control system such as insulating carpets, maintenance trucks, programming devices, etc.

6.20. CONTROL AND MONITORING SYSTEM

6.20.1. General system description

A computer-based control and monitoring system (also known as a SCADA system: Supervisory Control and Data Acquisition System) shall be provided for automatic control and monitoring of the treatment plant.

The system, in the following known as the CMS (Control and Monitoring System), shall be used for the following:

- Supervision of the treatment plant
- Monitoring of alarms and status of the treatment plant
- Changing of timers and parameters
- Calculations
- Real-time collection and storing of data and alarms
- Handling of data and alarms
- "Forced" stop and start of components from the operator station
- Automatic control of the treatment plant units

The monitoring part consists of one PC with monitoring software and a printer.

The control part shall have a distributed system with distributed local intelligent controllers (PLC's) to carry out the control and monitoring of the equipment connected to the PLC's. The PLC's will work autonomously if the communication network fails and the control will continue.

The system shall be designed to operate 24 hours a day without any necessity of attendance from the personnel.

The requirements for the control and monitoring system are described in the following.

Automatic control of the component shall be possible when the control switch for the component in the front of the panel is in the position "auto".

By-pass of the PLC control will be possible when the control switch is in the position "manual".

The CMS consist mainly of the following hardware components:

- Combined server and operator station
- Report and graphic printer
- Industrial network
- PLCs
- Distributed I/O modules

The CMS shall be provided with all hardware and software necessary for the operation including cables, modems, interfaces etc.

6.20.2. Hardware requirements

General

All equipment shall be standard factory manufactured components existing in at least 1000 units.

The CMS shall be prepared for an extension of the number of parameters (input/output signals, timers, counters, set points, measurements, calculations etc.) with a minimum of 20%.

The control and monitoring system shall as a whole have an accessibility which is better than 0.99 (i.e. the system is in average not in operation in 4 days during one year, or 8 hours every month).

Mean time between failures (MTBF) for the system as a whole shall be better than 1000 hours.

Mean time to repair (MTTR) for the system as a whole shall not be more than 8 hour including time for transport of the staff to the site, provision of spare parts and including time for locating of the fault.

Accessibility is defined as $MTBF/(MTBF+MTTR)$.

Accessibility for individual components shall as a minimum be as follows:

- PLC's 0.995
- I/O's 0.99
- PC 0.985
- Printers 0.98
- Network 0.995

Monitoring station

The computer shall be of the Personal Computer type, well-reputed make and in the firm's professional series.

As a minimum the computer shall fulfil with the following requirements:

- Mini tower or tower version
- Noise: Max 30 dB
- Processor: CPU: Intel Pentium4 3GHz or higher
- RAM: 1024MB or higher
- Hard disk: 160GB or more. Server shall be equipped with 2 hard disks, each 160 GB or more, running in parallel. One shall be hot back-up for the other (raid system). The average access time shall be less than 10 ms.
- CD-ROM/DVD drive: Min 24x speed
- CD/DVD ROM burner: Min 8 x speed.
- Network interface for local Ethernet 100 MBit
- Network interface for PLC network
- Interfaces: All other necessary interfaces
- Graphical card, min 256MB RAM
- 8 USB ports
- One parallel and 2 serial ports
- Spare slots: Two spare slots (PCI) for future connections.
- Keyboard,
- Mouse, wheel mouse, optical.

Monitor

The monitor shall be for presentation of graphical pictures and text in colour.

As a minimum the monitor shall comply with the following requirements:

- Resolution: 1220x1024
- Size: The actual size of the screen picture shall be 19"
- Frequency at high solution: Minimum 70 HZ, non-interlaced
- Flat screen of TFT type.

Report and Graphical Printer

The graphical printer shall be for alphanumeric and graphical printing of graphs and screens pictures from the colour monitor.

- Ink jet technology
- Resolution: 2400x 1200 dpi
- Speed 10 ppm
- Memory: Minimum 8 Mb

The printer shall be provided with two boxes of high quality printer paper.

Laptop Monitoring Station

Laptop is required to modify some settings of the PLCs at site. Remote control units shall be based on laptop computers with the following minimum specifications:

All laptop computers shall be of the Personal Computer type, well-reputed make, and in the firm's professional series.

As a minimum the computers shall fulfil with the following requirements:

- Laptop version
- Processor: Dual core, min. 2Mhz
- RAM: 2048 MB or higher
- Hard disk: 120 MB or more.
- CD-ROM/DVD drive: Min 24x speed
- Network interface for local Ethernet 100 MBit
- Interfaces: All other necessary interfaces
- 15" TFT display, min. resolution 1024 x 768 32 bit colour.
- Wireless LAN
- 3 USB ports

There shall be 3 laptops ready to use in the system.

The laptop shall run on rechargeable battery when it not connected to the external power supply. The battery capacity shall last app.4 hours. The weight with battery shall be less than 3.5 kg. An extra mouse similar to the mouse for the stationary computers shall be provided. A bag shall be included

Programmable Logic Controllers (PLCs)

The PLC's shall be an industrial type suitable for installation under the conditions on the site.

The PLC's shall mainly be used for the following:

- Control and monitoring of the equipment connected
- Collect and store data from the equipment connected
- Communicate with the other PLC's and the control centre.

PLCs shall be for installation inside the panels behind transparent windows.

The PLC's shall be provided with all hardware necessary for the operation including the following:

- CPU with indication of RUN, CPU FAULT etc. The scan time shall be less than 200 ms when running the final application software.
- Power supply
- Mounting base frames
- RAM or EEPROM memory. The RAM memory shall be provided with battery back-up for 2-4 years and indication of BATT LOW. The application shall be stored in EEPROM or other kind of memory not depending of battery. The data shall be stored in RAM with battery back-up. In case of battery fault and loss of data, a set of back-up data shall automatically be loaded from the EEPROM, so the PLC can be automatically restarted without use of the programming unit. An alarm shall be forwarded to the monitoring system.

The capacity of the CPU shall be sufficient for a 50% expansion of the programs and data.

- Digital I/O-modules
- Analog I/O-modules
- Interface for communication
- Interface for the programming unit
- Interface for the operator panel
- Other necessary interfaces

- Key operated switch with the following positions: Stop, Run, Programming mode
- Operator panel (for some PLCs only, see the block diagram).

If the communication fails, the PLC shall continue its operation without any interruption.

At a power cut the status of the I/O's shall be in a predefined position.

Start after a power cut shall be fully automatic with individually delayed starts of every motor

A system error shall automatically be transmitted to the control centre.

A drop-out of communication shall automatically be detected and monitored at the control centre.

The Analogue Input/output-modules shall fulfil the following requirements:

- Minimum resolution of 16 bit
- Accuracy of minimum $\pm 0,5\%$ of full scale
- Input channel filtering that rejects high frequency noise that couples into the analogue input signal
- Configurable per channel for current or voltage input
- Separately isolation of each channel.

The Digital Input-modules shall fulfil the following requirements:

- Be galvanic isolated from the internal PLC logic
- Be with indication of position
- Each signal shall separately be protected with fuses
- Be protected against high-voltage peaks of up to 1KV.

The Digital Output-modules shall fulfil the following requirements:

- Be provided with no-voltage contacts
- Have selectable OFF or ON position
- Be with indication of position
- Each signal shall separately be protected with fuses
- Be protected against high-voltage peaks of up to 2KV
- Be provided with surge suppressor diodes that is reverse wired across the load.

Telecommunication

The contractor shall establish telephone lines (1 for pager system and 2 for other use).

The pager system shall use SMS to alert operators in case alarm events are left unacknowledged for a longer time than an adjustable set delay time. The SMS message shall contain identity information on each specific alarm event. Paging is to be configured for each alarm event individual.

Telephone System

Establishment of a digital telephone communication switchboard centre in the administration building to be in line with ITU-T (CCITT) and TURK TELEKOM standards, consisted of completely solid-state half conductive circuit elements and modular structured with multi functions (IP, DECT, etc.). This communication switchboard shall have self-efficient power source. There shall also be robot operator and message record system. It shall be necessary that all the wire connected machines must be compatible with this system and the communication switchboard.

All wired telephone connections shall be shown as to have RJ-11 socket connections. The cable installation belonging to these shall be installed surface mounted PDV type cables inside the PVC lidded cable channels. All the cable connections shall be realized with termination modules. MDF (Main distribution floor) of the telephone central shall be ensured to be sufficient and with stand-by.

Also, DECT (Wireless telephone system) shall be installed in the facility. 5 of them shall be included in the contract. These wireless telephones shall be used by the authorized personnel in the facility. DECT system shall be in compatible with the central. The base stations regarding the DECT system shall be placed in a way to cover whole area of the facility. The base stations shall be connected to the system via a card located inside the telephone central.

Telephone sets shall be connected to the system via telephone socket outlets according to the relevant standards, in order to provide the exchange of telephone sets without any hardware or software. The service includes all required devices, cabinets, telephone sets, installations, accessories and any further equipment, that may be required to realise a complete and functioning telephone system.

The system shall include the complete service, including technical engineering, clarification, delivery, transportation, insurance's, installation, testing, documentation, commissioning, etc.

Communication Network

For PLC's:

The communication network for the PLC's at the treatment plant shall be the bus-type local area network for distributed control.

The operation of the network shall work on the principle that each PLC can decide when it wants to use the transmission medium. There must not be a master to arbitrate.

The network shall be insensitive to electromagnetic interference and be suitable to install in noisy electrical environment near electrical cables without causing any problems in the data transmission.

The transmission shall be provided with error detection facilities and data shall automatically be retransmitted in cause of transmission error.

The data transmission shall be carried out with a communication processor specifically dedicated for the data transmission. Data transmitted in blocks are preferred to data transmitted in 1-bits.

The network shall be based on shielded copper cables or coaxial cables of the best quality and with a heavy-duty sheath. Between buildings fibre optic cables shall be used.

If the communication fails it must only affect the failed PLC and not the remaining PLC's.

Access points

Secured LAN access points shall be established all over the plant's buildings to use for the PDAs and Laptops.

Remote Access to The Plant

SCADA system in the central control room shall be accessible from the internet. The security of this remote access shall be assured with passwords. Only the people having the authority to access shall be able to connect remotely to the plant using passwords for monitoring etc.

Equipotential Bonding

Equipotential bonding shall be provided between all components of the Control and Monitoring System including the computer and the communication network.

Equipotential bonding shall be carried out carefully and shall be in accordance with the manufactures requirements.

6.20.3. Software Requirements

General

All programs shall fulfil the following requirements:

- Be standard programs to the extent possible
- Be easy to modify and replace
- Be tested and free from faults.
- All software shall be in Turkish versions, however special software only relevant for the developer engineer can be in English version.

The operating system software for the PC shall be the latest Microsoft Windows operating system, Turkish version.

The PC shall have an updated virus protection system. The virus protection system shall be with conscription in order to keep the system updated all the time.

Function

The functional requirements for the program system shall fulfil the following:

- Be possible to configure
- Collect data as real-time values
- Store and handle the real-time data including performing of arithmetic and logical functions
- Undertake control and monitoring
- Undertake alarm and fault handling
- Undertake self-diagnosis of the computer.

The program system shall collect data, handle and store data while other activities are undergoing.

A number of flow pictures for the process shall be prepared. It shall be possible via these pictures to select a number of detailed pictures, which include the composition and data of these sections.

Additionally, a number of pictures shall be prepared to show the status of each process element (motor, valve, instrument, tank, etc).

Measurements, ON/OFF signals and alarms shall be collected continuously and be indicated on the flow pictures.

The interval between the collections of scanned data shall be adjustable between 1 and 30 sec.

The data base shall be arranged in a way that automatically connects a new signal to the report system and the system that generates curves.

Conversion of a measured value to a value in the data base shall be automatic.

The program for communication (driver) between the control centre and the PLC's must not limit the performance of the communication line.

Access Levels

The use of passwords shall limit the access to the control system for the operators. A minimum of three levels shall be included.

Level 1: Will allow the operator to acknowledge alarms, initiate prints, monitoring of data and screen pictures.

Level 2: As level 1 including changing of parameters, stop and start of motors and access to application programs in the PLC's.

Level 3: Will provide the operator with universal access to the system.

Operator Dialogue:

The man/machine-dialogue shall be user-friendly, and the system shall be easy to operate for persons with little or no knowledge of computer systems.

Frequently used commands shall be operated from function keys or via the mouse.

Operation of the system shall be based on an extensive use of the mouse to promote fast and easy selections.

The operation shall be interactive, and it shall be possible to display messages with information that is helpful for the operator.

After an uncontrolled stop of the control system it shall automatically restart.

The internal clock shall be supplied with battery back-up or it shall automatically be adjusted.

Programs for Control and Monitoring

System Software:

The system software for the PLC's shall control the data collection, storing and data handling.

Standard Functions:

Standard programs shall as a minimum include the following function modules:

- Analogue input and output with scale in metrical units and with max. and min. level
- Digital input and outputs
- Counters

- Oscillator
- Comparators
- Logical modules
- Arithmetical modules for calculations
- Timers
- Ramps
- Integrators
 - 1. grade filter
- 3-point regulator where the following parameters shall be adjustable:
 - death band
 - threshold zone
 - start and stop
- Limit on signals
- Internal check of PLC's.

6.20.4. Parameters

A parameter is a named specific numerical digit that can be changed by the operator.

Changing of Parameters

Changing of parameters shall be possible from the operator station including changing of parameters in the PLC's.

Changing of parameters shall among other things include the following:

- Timers
- Counters
- Limits
- Alarm level

Changing of parameters shall be easy and by using interactive messages.

Control and Monitoring

Control and regulation of equipment shall be undertaken of the PLC that the equipment is connected to and the control and monitoring shall continue even if the communication fails to the control centre.

Monitoring facilities shall be included in the programs.

Deviations shall be detected and monitored as a message or an alarm.

Data Handling

General:

All data necessary for control and monitoring of the plant shall be collected.

The program shall collect the real-time data that is necessary for a correct calculation and transmission of all service parameters.

The program shall be arranged in a way that allows the operator to select the service parameters. In addition, it shall be possible for the operator to extend the number of service parameters.

The data collection shall function independently of all other program facilities in the control centre.

All data shall be identified with the time of collection. The time interval shall not be higher than 0.5 sec.

The cycle time for data collection shall be adjustable by the operator from 1-30 sec. The data collected is named scandata. It is accepted that scandata only is logged when there is a change in the value. This is to reduce the extent of the logging. All changes shall nevertheless be logged. This goes for parameters, analogue values, states etc.

Calculation of the minimum mean-value of the scandata shall be possible within an interval of 1-30 min. (basic time). The calculated mean values are named basic data. These basic data are used for calculation of hour-, daily-, monthly and yearly mean values that are used in the reports.

The data shall be stored in accordance with the values indicated below:

TYPE:	DATA USED FOR:	STORED IN:
Scandata	Generating of basic data and curves	1 month
Basic data	Print of daily curves	180 days
Hour mean	Daily reports and curves	12 months
Daily mean	Monthly reports and curves	3 years
Monthly mean	Yearly reports and curves	10 years

It shall be possible to delete data. The program shall however automatically prevent data to be deleted that have been stored less than indicated in the above table.

It shall be possible to select the parameters for data collection and the time interval for the data collection.

In addition, it shall be possible to key in data manually. The manual keyed in data shall be included in the data collection program and be part of the reports.

A program for calculation shall be included. It shall include all common arithmetic functions.

The program for calculation shall have access to all elements, name, parameters and data in the system.

It shall be possible to include time marking of the calculation program in order to control the calculations after a calendar program.

Programming of the calculations shall be in a high-level language.

Data Presentation

Reports and Lists:

The format of reports for indication on the monitor and for printing shall be generated from data base programs. It shall be possible to select the data to be indicated on the monitor or printed from menu commands that automatically will start the report in question. It shall be possible to print reports automatically.

It shall be possible to select the following reports from the menu:

- Event list
- Alarm report
- Daily report
- Monthly report
- Yearly report.

The data base program shall include the possibility of configuration and editing the format of the reports.

Format and lay-out of all reports shall be approved by the Engineer.

General Lay-out of Reports:

- Date and time for printing of the reports shall be indicated.
- The period the report covers shall be indicated.
- In column no. 0 the period shall be indicated.
- Data shall be indicated in column no. 1 and onwards. A minimum of 8 characters shall be included in each line.
- In line 1 and 2 the name and component number shall be indicated (space for 16 characters).
- In line 3 the unity shall be indicated.
- In the following lines the measured value or calculated value shall be indicated for the data.
- The second last line shall include the mean value for the period of the report.
- The last line shall include the accumulated value for the period of the report for the data collections.

Daily Reports:

- The periods shall be of 1 hour each. The hour-mean value shall be included for each hour.
- The daily mean shall be included in the second last line.
- All measurements and parameters shall be included in the report.
- The accumulated value for sum up values (water quantities etc.) at the time the report ends shall be included in the last line.
- The daily report shall automatically be printed.

Monthly Reports:

- The periods shall be of 24 hours each. The daily mean value shall be included.
- The monthly mean value shall be included in the second last line.
- All measurements and parameters shall be included in the report.
- The accumulated values for measurements at the time the report ends shall be included in the last line.

Yearly Reports:

- The periods shall be of 1 month each. The monthly mean value shall be included.
- The yearly mean value shall be included in the second last line.
- All measurements and parameters shall be included in the report.
- The accumulated values for measurements and parameters at the time the report ends shall be included in the report.
- The report shall automatically be printed the 1st of January.

Alarm Report:

- The alarm report shall be printed at the operator's request. It shall be possible to select start and stop time for the period of report.
- Automatic printing of the report shall at a defined time be possible.

The report shall as a minimum include the following information:

- Component no.
- Alarm text (min. 25 characters)
- Time for start of the alarm
- Time for acknowledge of the alarm
- Time for stop of the alarm
- Alarm priority
- Name of person that acknowledged the alarm
- The actual alarm value
- The maximum value for the high alarm
- The minimum value for the low alarm.

Time shall be indicated with year, month, day, hour, min, and sec. in order to clearly identify the alarm.

Maintenance application

General:

The maintenance application shall mainly be for automatic planning of preventive maintenance.

The system shall manage all typical maintenance activities such as preventive maintenance, work orders, inventory, purchasing and organizing equipment and vendor data.

In addition to planning of preventive maintenance it shall include facilities for word processing and spread sheets. The program for preventive maintenance may be stopped when using word processing and spread sheet programs. When starting the maintenance program again data shall automatically be updated.

Operation of the station shall be interactive and suitable for operators with no computer skills.

Maintenance Management Facilities:

The system shall be designed as a card file system with an index card for each piece of equipment. The index cards shall contain detailed information of the equipment including the following:

- Component no.
- Name
- Location
- Make
- Model
- Serial no.
- Purchase vendor
- Maintenance vendor
- Warranty
- Parts usage
- Equipment history
- Date since last service
- Condition
- Work orders
- Hour run time (999999 hours)
- No. of starts (999999 hours).

The hour run time, the number of starts and other data necessary to plan the maintenance shall automatically be updated every second hour 24 hours a day.

The system shall contain the double number of cards necessary.

Preventive Maintenance Schedule Types:

It shall be possible for the system to generate the following schedules:

- A work order after a specific time period (days)
- A work order a certain length of time after the last maintenance has been done
- A work order after a certain meter interval (hours, Cycles)
- A work order after a certain meter interval or time period
- A work order on any number of different days in the year. Also used for seasonal work order.
- A work order based on high and low warning values.

It shall be possible for the operator to reset the counters if he has gained access.

Editing of Data:

The editing shall be carried out via a menu program.

It shall be possible to write text on screen pictures including on flow-diagrams and curves.

Curves:

Curves shall be selected via a menu. It shall be possible to select pictures of curves of 1 year, 1 month, 7 days, 24 hours, 6 hours, 1 hour and 1/4 hour.

It shall also be possible to select historical curves from and to a specific date. It shall for example be possible to shown curves of 24 hours duration from 5 days ago.

It shall be possible to indicate a minimum of 8 different curves on the same picture. Each curve shall be presented in a different colour.

The unit, the Y-axis and the name of the curve shall be indicated in the same colour as the curve.

Static and dynamic screen pictures shall be shown. For dynamic pictures the screen picture shall be updated every time new data is being recorded.

- Zoom-in and zoom-out shall be possible for the X- and Y-axis direction.

It shall be possible to print the actual digital values for the curves including the time for the actual value.

Print of curves shall be initiated by activating a function key or by operating the mouse.

Configuration of screen pictures of curves shall be easy and only involve a few commands.

Screen pictures of curves shall be provided with explanatory text and date and time for print shall be included. It shall as a minimum be possible to include up to 60 curves.

6.20.5. Flow pictures

A number of flow pictures of the process shall be provided. The flow pictures shall indicate the actual status of the process and the pictures shall continuously be updated. Updating of the pictures shall be less than the following time values:

- Updating of picture after change of picture: 2 sec.
- Updating of digital value after change: 2 sec.
- Updating of analogue value: 3 sec.
- Response of a command: 2 sec.

Updating does not include the cycle time for data collection of scandata.

The mouse must not be locked when the flow pictures are being updated.

The flow pictures shall be shown on the colour monitor and the graphical presentation shall utilize the maximum possibilities of the monitor.

The outline flow picture of the treatment plant including shall be the basic picture. It shall be possible to select sub-pictures, curves and other pictures from this picture.

It shall be possible to select flow pictures in a minimum of four levels via menu commands. Additionally, it shall be possible to select pictures directly by keying-in the id-no. for the picture.

Alarms shall be indicated on the flow pictures.

Modification of signatures for components shall be simple. The system shall include a library with all the commonly used signatures and it shall be easy for the operator to select the signatures from this library.

It shall be possible to design/draw new flow pictures by using a program specifically for this purpose. The program shall also be used for modification of the existing flow pictures.

Values shall be indicated in metric unit. All relevant measured values shall be indicated on the respective flow picture.

The indication can be:

- Metric values
- Bar graphs.

If the bar graphs are used values shall be indicated in percentage or in metric units.

Status of valves, motors etc. shall be indicated by colour shift or changing of signature.

A minimum of 40 flow pictures (exclusive pictures of each component) shall be provided. The following pictures shall as a minimum be included:

- Outline. Level 1.
- Simplified picture of the whole treatment plant. Level 2.
- Detailed picture of the status of the communication network. Level 2.
- Detailed picture no. 1 of the treatment plant. Level 3.
- Parameters and settings for detailed picture no. 1. Level 4
- Detailed picture no. 2 etc.

Detailed pictures of each component shall be provided as level 5.

It shall be possible to operate all PLC controlled components from the pictures, i.e. stop and start of motors, opening and closing of valves etc.

Operating shall be by pointing out the component via the mouse or by keying in the component no.

Alarm Handling

Any alarm shall be reported and indicated as follows:

- On the mimic panel
- By an acoustic signal
- On the monitor on the screen pictures
- By printing an alarm text on the monitor in a separate field of the monitor. The field shall be dedicated to alarm messages.
- By printing an alarm text on the alarm printer
- By sending an alarm text to the mobile telephone

Alarms on the mimic shall be indicated by flashing the respective LED. The flashing shall continue until the alarm has been acknowledged, it shall then turn to fixed light if the alarm is on. When the alarm has been acknowledged and the alarm has stopped the light in the LED shall be turned off.

It shall be possible to provide all alarms with an alarm priority. The indication of the alarm shall depend on the specific alarm priority. Up to 5 alarm priorities shall be provided.

Alarms shall always be indicated on the mimic, in the field on the monitor, on the screen picture (if the picture is on-line) and printed on the monitor.

The following information shall be stored in the alarm data base:

- Year, month, day
- Time for start of the alarm
- Alarm priority
- Description of component
- Component no.
- Alarm message (min. 25 characters)
- Time for acknowledgement of the alarm
- Time for stop of the alarm.

It shall only be possible to acknowledge (reset) the alarm from the operator's station.

It shall be possible to acknowledge single alarms, or all the alarms shown on the monitor. This applies for flow pictures as well as for alarm files.

It shall be possible to suppress commuting alarms. It shall be clearly indicated if an alarm is suppressed.

Alarm shall also be indicated on the process flow pictures and the picture for the individual component.

It shall be possible for the system to handle up to 1000 alarms and alarm messages.

It shall be possible for the operator to edit the alarm messages.

Each alarm shall be provided with a detailed description with instructions of how to handle the alarm situation. It shall be possible for the operator to activate the description with 1-2 operation by the mouse. The description shall include up to 400 characters and it shall be easy to edit the instructions.

Alarm Messages to the mobile telephone (SMS-messages):

Transmitting of alarm messages to the mobile telephone shall depend on the priority of the alarm and on the time when the alarm arises.

Alarm messages shall normally be transmitted via the modem connected to the server. The paging modem connected to PLC shall only be used for transmitting when the operator station is not functioning correct.

Alarm messages shall be transmitted to the telephone in accordance with a calendar-type schedule that indicates the working hours for the staff. Alarm messages shall only be transmitted outside normal working hours in accordance with the schedule.

It shall be possible to indicate what telephone the alarm shall be sent to.

It shall be easy for the operators to edit in the schedule.

Editing of the schedule shall be blocked by password.

In addition, it shall be possible to send messages to the telephone that the operator has keyed in via the operator's station.

6.20.6. Configuration

It shall be possible for the operator to extent and change the control and monitoring, the reporting and the process configuration.

The configuration shall be carried out via a well-documented standard program specifically designed for configuration of the system (not via programming in a standard high-level programming language).

The program shall be easily accessible, and it shall be easy to use the program. The program shall preferably be the interactive type with explanatory messages to the operator.

Changing or extension of the configuration shall include removing and/or adding of components (motors, valves, instruments etc.), and it shall include all disciplines such as addresses, conditions, alarms, reports, monitoring etc.

Access shall be limited via password.

The program for configuration shall include a check program that will detect and disclose all errors.

It shall be possible to print the configuration.

Only fault free configurations shall be operational.

It shall be possible to carry out the configuration by the following ways:

- By downloading of the new configuration from the programming unit connected to the communication network
- By direct connection of the programming unit to a PLC
- On-line.

Back-up of the configuration shall be stored on disks.

The programming language shall be self-documented.

And it shall be possible to print parameters, cross reference lists etc.

6.21. APPLICATION PROGRAMS, FUNCTIONS

6.21.1. General

The following is a description of the main control principles (functions) to be included in the application programs for the control and monitoring system.

The detailed control programs shall be designed by the Contractor in close cooperation with the Engineer.

The software for control, monitoring and regulating of the individual machines shall be based on relevant measurements and/or time control.

The software shall endeavour easy and fail-safe operation of the plant and protect the plant against any operator's fault.

All software shall be well structured and future modifications shall be easy.

The Contractor shall include a 10% extension/modification of the application programs in addition to the necessary modifications to fulfil the requirements.

Calculation of control parameters shall be carried out in the PLC's as a drop out in the communication between the control centre and the PLC's must not influence on the control.

In programs with multiple start of machines, starting between the individual machines shall be time delayed (adjustable 1-10 sec.).

Start/stop of machines that is part of the programs shall not be possible before the program is stopped, or the machine has been put into operator mode from the monitoring station. It shall be possible to operate all components when the program is stopped, including the following:

- Start/stop of motors

- Operating of a motor valve to a specific position
- Opening/closing of magnetic (solenoid) valves.

The programs in the PLC's shall in general be designed for adjusting of parameters via the operator station. Examples of such parameters are timers, limit values for measurements, limit values for step controls, constants used in calculations, pumping capacities, values for controllers etc.

The program system shall include facilities for 10 parameter sets for each component that is included in the control and monitoring system.

It shall be possible to store and modify the parameter sets. It shall be possible to recall, modify and activate the parameter sets from the screen pictures. Parameters for controllers shall be adjustable and included in the parameter sets.

The parameter sets shall include a stop/start function for programs.

Set points and other parameters shall be adjustable from the operator station and from the operator units.

Timer values shall be monitored on the screen as dynamical values.

All input/output signals shall be incorporated in the control and monitoring of the plant in accordance with their logical function and the description for the individual signal.

The descriptions of the individual applications programs groups are only intended as a guide for designing of the specific applications programs.

The descriptions include only the most essential parameters for the programs and it should be expected to include additional parameters in order to fulfil the requirements

Tag numbering

Individual signals and components are identified by means of tag numbers.

Tag numbers must be unique and matching in PLC software and main station software as well as in electrical installations and documentation.

6.21.2. Emergency control

The Contractor shall analyse any risk and effects of any failures of the system. The automation shall react in an appropriate way of any failure such as:

- Missing/bad signal from a transmitter
- Failure in a component
- Missing communication from a related PLC.

If appropriate, an emergency control for a function should be developed.

6.21.3. Group control

The group start object is a standard routine handling start/stop of a group of objects. (Ex. a pumping station includes all pumps, level meters, and automatic control)

6.21.4. Motor routine 1

The object is a standard motor routine handling motors with one direction.

The object can be in 3 different modes:

- Auto
- Operator (from operator station)
- Manual (from local panel)

It handles the following input signals:

- Auto
- Thermal Faults
- Moisture faults (if available)
- Safety switch

- Emergency stop
- Actual current
- Cos phi
- It handles the following output:
- Start contactor

A global function shall prevent more objects to start at the same time.

The fault inputs will make the object go into fault. The actual fault will be indicated on the SCADA system until the object is reset or as long as the fault is active.

The object supervises that a running signal is coming within a specific time after a start command has been given. If the running signal is not present before the time has elapsed the object will go into fault and the supervision fault will be indicated. The function works both ways, i.e. if the running signal is present when the start command is zero.

Hours and start counters are handled by the object.

6.21.5. Motor routine 1-1

The object is a standard motor routine handling motors with no command outputs (Motors controlled by local machine installations).

The object can be in 2 different modes:

- Auto
- Manual (from local panel)

It handles the following input signals:

- Auto
- Thermal Faults
- Moisture faults (if available)
- Safety switch
- Emergency stop
- Actual current
- Cos phi

The fault inputs will make the object go into fault. The actual fault will be indicated on the SCADA system until the object is reset or as long as the fault is active.

Hours and start counters are handled by the object.

6.21.6. Motor routine 2

The object is a standard motor routine handling motors with two directions or two speeds.

The object can be in 3 different modes:

- Auto
- Operator (from operator station)
- Manual (from local panel)

It handles the following input signals:

- Auto
- Thermal Faults
- Moisture faults (if available)

- Safety switch
- Emergency stop
- It handles the following output:
- Start contactor 1
- Start contactor 2
- Actual current
- Cos phi

A global function shall prevent more objects to start at the same time.

The fault inputs will make the object go into fault. The actual fault will be indicated on the SCADA system until the object is reset or as long as the fault is active.

The object supervises that a running signal is coming within a specific time after a start command has been given. If the running signal is not present before the time has elapsed the object will go into fault and the supervision fault will be indicated. The function works both ways, i.e. if the running signal is present when the start command is zero.

Hours and start counters are handled by the object.

6.21.7. Motor valve routine 1

The valve routine object is a standard routine handling a monostable motor valve control.

The object can be in 3 different modes:

- Auto
- Operator (from operator station)
- Manual (from local panel)

It handles the following input signals:

- Auto
- Thermal Faults
- Safety switch
- Emergency stop
- End limit switch high
- End limit switch low
- Moment fault
- It handles the following output:
- Start contactor open
- Start contactor close

The fault inputs will make the object go into fault. The actual fault will be indicated on the SCADA system until the object is reset or as long as the fault is active.

The object gives alarm if a maximum time for opening or closing is exceeded.

Start counters is handled by the object

6.21.8. Motor valve routine 1-1

The valve routine object is a standard routine for supervision only.

The object can be in 2 different modes:

- Auto

- Manual (from local panel).

It handles the following input signals:

- Auto
- Thermal Faults
- Safety switch
- Emergency stop
- End limit switch high
- End limit switch low
- Moment fault

The fault inputs will make the object go into fault. The actual fault will be indicated on the SCADA system until the object is reset or as long as the fault is active.

Start counters is handled by the object

6.21.9. Standard regulator (Controller)

A standard regulator shall as a minimum be provided with the following functions and parameters:

- Status of the regulator: Auto, Local, Manual
- PID-regulator with adjustable parameters. The I-time shall be adjustable from 5 sec. to 5 min.
- Calculation set-point, low and high (option)
- Limitation of regulator output, low and high
- Set point for regulator
- Manual adjusting by operator of set point
- Manual adjusting by operator of regulator output (regulator in manual).

Running in of all regulators shall be carried out by the Contractor.

6.21.10. Status/alarm handling 1

The status-handling object is a standard routine handling individual status/alarm inputs and command outputs. (Level switches etc.)

All input can by means of the option word individually be configured to be status or alarm.

Status inputs will be indicated in the status word as long as the input is activated.

Alarm inputs will make the object go into fault. The actual fault will be indicated in the status word until the object is reset or as long as the input is active

6.21.11. System alarm

The system alarm handling object is a standard routine handling specific system alarms generated by PLCs and communication units.

The following alarms shall be generated and displayed at the SCADA system.

- Cycles time limit exceeded
- Battery exhausted or missing
- I/O error with diagnostics
- Fault in expansion rack or remote IO-station
- Error in communication
- Programming error

6.21.12. Instruments

The object handles signals from a process instrument. It shall be able to handle:

- Scale incoming signal
- Freezes the output by request of the operator
- Indicated valid measurement
- Instrument warning
- Instrument alarm
- Measurement above limit (short current in loop)
- Measurement below limit (broken wire)

6.22. TESTS

The objective of the tests is to verify that the system works in accordance with the Contract.

All tests of equipment and of the complete system shall be performed in accordance with the Contractor's approved Quality Assurance system.

All tests have to be documented in test forms defined as part of Quality Assurance system covering:

- Date of test.
- Description of test.
- Actual method of test.
- Output of test.
- Remarks regarding deviations from the expected output.
- Accepted/rejected.
- Supervisor's signature.
- Comments.

Handling of Deviations

Before the report is completed and can be approved; all significant deviations have to be corrected.

In case of deviations, the following issues have to be decided:

- What are the consequences of the deviation? Which part of the installations will be influenced by a revision, and which tests already accepted will have to be done over again (if any)?
- Date of a new test of the revised system included repetition of already accepted tests.

The acceptance test report shall be approved when significant deviations have been corrected and tested.

All tests have to be planned so the Engineer has the possibility to comment on the tests planned and to supervise the tests. All tests and inspection including any repetition of the tests shall be in accordance with General Conditions of Contract, FIDIC Yellow book sub-clauses 7.3 and 7.4.

6.22.1. Electrical - General

The following electrical functions shall be tested, and shall be verified to be in accordance with the Technical Specifications and Design Drawings:

- Earth resistance and boundary system.
- Function of all emergency stop circuits.
- Function of all safety circuits.
- Lighting systems.
- Emergency power supply system. The external power supply shall be switched off and it shall be verified, that the emergency power supply system starts up automatically. Furthermore, it shall be verified, that all emergency control functions start up automatically (automatically by-pass of waste water, handling of alarms etc.)

- Signal test of all signals according to signal lists. All signals shall be tested from source to software. For analogue signals range and scale shall be verified. For level transmitters offset and range shall be related to fix points in the construction.

6.22.2. Panel factory test

The Panel factory test shall as minimum covers:

Power section

- Control of all power circuits
- Control of isolating
- Control of tightening moments
- Control of component sizes
- Control of conductor dimensions
- Control of conductor colours
- Control of wiring numbers
- Control of loose connections
- High voltage tests
- Control of phase orders
- Control of measurement transformers
- Operation of fuses, motor protection, disconnectors etc.
- Control of fault current relays with tester
- Control of setting of thermal relays etc
- Control of fuses
- Control of settings of soft starters etc
- Control of Cu rail connections
- Control of PE-conductors
- Control of PE-conductors for doors
- Control of PE-conductors to all flanges (EMC-requirement)
- Control of PE-conductors to all scomponents (transformer and DC-units)
- Control of PE-conductors to PLC-parts
- Control of PE-conductors to plug outlets
- Control of EMC correct connection of components (shields to back plates).

Control section

- Control of control voltage, primary and secondary
- Control of conductor dimensions, control circuits
- Control of conductor colours, control circuits
- Control of wiring numbers
- Control of loose connections
- Control of lamp test
- Control of lamps
- Control of operations (buttons etc.)
- Control of documentation
- Control of PLC digital inputs
- Control of PLC digital outputs
- Control of PLC analogue inputs
- Control of PLC analogue outputs

- Control of analogue loops
- Control of fixing and protection of wires
- Control of codes for components in sockets
- Control of tagging of components
- Control of dimensions of terminals
- Control of terminal numbers
- Control of tagging of internal wires
- Control of setting of electronic components.

Miscellaneous

- Control of section covers
- Control of labelling
- Control of panel marks and certificates
- Control of earth system
- Control of covered race trays
- Control of sufficient spare capacity and room
- Control of cleaning
- Control of drawings in panel
- Control of handles and locks
- Control of front layout
- Control of component layout in accordance with the documentation.

After installation on site

- Control of inside temperatures under max. load
- Control by use of thermal photographing under max. load .

6.22.3. Automation

- The automation system covers the PLC system and the SCADA system.

The test shall cover a number of different issues:

- Usability (general operation of the automation and SCADA system)
- Efficiency (performance)
- Accuracy (correct handling of values and calculations)
- Security (protection against unauthorised use of the SCADA system)
- Flexibility (verification that the automation system is suitable for upgrading)

Below, each issue is described. At the end of each item, a number of criteria for passing test are described.

Usability

This part describes the tasks to be performed to test the usability of the program.

Installation and start up

The purpose of this test is to make sure that the installation and start-up procedure functions well and is described correctly in the Operation and Maintenance Manual.

The test shall:

- Perform an installation procedure in accordance with the O&M Manual
- Check if the procedure is in accordance with instructions
- Check if the program can start up normally
- Perform a normal removal of program
- Make a subsequent reinstallation.

The criteria for passing the final test will be:

- No errors occur during the installation procedure
- The procedure is in accordance with the instructions
- The program is able to start up normally.

Normal Operation

The purpose of the test of the normal operation of the SCADA system is to make sure that it is possible to operate the program in a logical way and in accordance with the specifications/documentation/O&M Manual.

During the test of the normal user operation, the test operator shall:

- Guide him-/herself through a large number of menus and dialog boxes and test a large number of various commands
- Print different kinds of reports

The criteria for passing the final test will be:

- Every activity of normal operation leads to the expected result, and activating a command leads to the expected dialog box
- A printing command leads to printing of the correct output.

Handling of errors:

The purpose of this test is to verify correct and logical handling of errors.

The test operator shall:

- Provoke a number of errors and verify that the system responds to these errors as described in the requirements
- Report any unexpected error during all tests in order to verify robustness.

The criteria for passing the final test will be:

- Indications of errors must be reasonable, and the user shall be able to continue the work on a well-defined basis.

Handling of Help functions:

The purpose of the test of the handling of help functions (on-line or in manual) is to make sure that the on-screen help function is adequate and works in accordance with the requirements and the actual program. In particular, it shall be verified that terms are used consistently.

The operator shall perform the following tests:

- The help system shall be consulted a large number of times in different situations. The operator shall focus on the existence of relevant help, on clear language, on relevant link(s) to more help and on consistent use of terms.
- The text in the on-line help shall be read and compared with relevant specifications.

The criteria for passing the final acceptance test will be:

- The on-line help function provides relevant help to the operator in most situations, and the terminology is clear and consistent.

Efficiency

The purpose of the efficiency test is to verify that the operation and response times are at an acceptable level.

The verification of efficiency values shall be based on well-defined situations. The operator shall perform different kind of situations:

- Changing a set-point/sending a command.
- Open a new diagram.
- Open a graph.
- Require a report based on historical data's.

Five different types of response times have to be taken into account:

- Response time for a transaction, which is the time interval from sending a command until the result is visible, and the user can send a new command. Sending a command can be executed by the "Enter"-button, by a mouse click etc. This type of transaction is defined as typing data in an input data field with no calculations, change of diagram etc. related to the transaction.
- Response time for opening a new part of the program, such as a new diagram. Opening a diagram for the first time after start of the program may take longer time.
- Response time for opening a graph showing curves for 24 hours. In this case, the response time is the time interval from sending an "open graph" command until the result is visible.
- Response time for opening a report showing values for 1 month. In this case, the response time is the time interval from sending an "open report" command until the result is visible.
- Response time for creating a background job such as a printing command.

The criteria for passing the final acceptance test will be:

- The response time for sending a command is almost negligible (less than 1 second). Return of the value from the PLC shall be fulfilled within 2 seconds.
- The response time for opening a new diagram is less than 2 seconds.
- The response time for opening a graph is less than 10 seconds.
- The response time for opening a report is less than 20 seconds.

All tests shall take place from the secondary operator station (not the server).

Accuracy

The purpose of the accuracy test is to verify that the system generates correct output results.

Based on the detailed project for automation the functionality described here shall be verified.

All functions shall be simulated so electrical connections the software and correct parameter settings can be verified.

The real check of the results will be done manually. A selection of output data will be made, and manual recalculation of this output data will be performed. The documentation will include all the intermediate results.

The system shall be designed in a structure with well-defined modules or classes. The classes shall be defined with interfaces where inputs and outputs are available for investigation. A complete test is divided into several accounts. The number of accounts shall be sufficiently high to allow verification of the sequence between two accounts by use of a pocket calculator.

The criteria for passing the final test will be:

- Manual calculation proving correct relations between all generated accounts.

Security

The purpose of this test is to verify correct security functions in accordance with the requirements.

A number of security levels have been specified.

For each security level, the following shall be verified:

- A person at each level (if defined) shall be able to log into the system and have access to the system in accordance with his/her status. It shall also be verified that the user does not have access to part of the system not covered by his/her rights. This test shall be performed for a person at each level.
- Each person defined shall be able to change his/her own password.
- The administrator shall be able to define and remove users and to change a user's password. If specified, the administrator shall be able to look into database structures, as well.
- The designer shall be able to look into database structures and source codes. The test of access to source code can be carried out on the development system, only.

The criteria for passing the final acceptance test will be:

- The number of users has been successfully defined at different levels.
- A user has successfully logged in and out.
- A user successfully changed his/her own password.
- The administrator has successfully changed the password of a user.
- The system has been successfully accessed at the different levels.

Flexibility

The purpose of this task is to verify that the structure of the system is suitable for upgrading to additional functionality. The source code and programmers' documentation shall be investigated.

The test shall verify that:

- The program and database structure of the program developed have well defined interfaces in order to add new modules and new technical solutions under existing SCADA systems.
- The source code is well documented with comments and descriptions in the code and variables are described in a logical way.
- The compilation and installation of the software are well described.

The criteria for passing the final acceptance test will be:

The structure of the documentation is in accordance with the specifications.

- Investigation of several classes, selected arbitrarily proves a comprehensive amount of relevant code line comments so that the source code is understandable.
- The compilation and installation of the software are adequately described in the documentation.

7. TRAINING, OPERATION AND MAINTENANCE

7.1. GENERAL

The Contractor shall be overall responsible for operation, supervision and maintenance of the Hassa Wastewater Treatment Plant during the 12 Months Defect Liability Period in such a manner that it ensures the required quality of treated wastewater and sludge. The Contractor shall train the operational staff of HATSU for the last month of Defect Liability Period. Training shall be conducted as described in Section 7.3 below.

For the Defect Liability Period of 12 months, operational staff shall be hired and paid by the Contractor. The Contractor shall specify the necessary operational staff for operation and maintenance of the plants, including specification of the qualifications of the staff.

As a minimum, the Contractor shall provide the following personnel during the Defects Liability Period.

- Wastewater Treatment Process Engineer: (shall have bachelor's degree in environmental engineering or chemical engineering or chemistry)
- Laboratory Supervisor (Shall have a vocational school degree in a relevant field or bachelor's degree in a relevant field)
- Operators (For Mechanical and Electrical Systems, Mechanist, Electrician or Technician) and workers in adequate number.

These personnel will carry out all duties for the operation and maintenance of the plant in accordance with the requirements stipulated by legislations of Turkey related to the waste water treatment. will be carried out in order to solve the problems, which might occur during the operation of the collector.

The management of the wastewater treatment plants shall be carried out in an efficient and cost-effective manner in accordance with the requirements described hereunder.

All costs (e.g. labour costs, consumables, spare parts, energy and other utility costs) to operate and maintain the plant shall be borne by the Contractor during the 12 months Defects Liability Period.

7.2. QUALIFICATIONS, EXPERIENCE AND TRAINING

The Contractor's personnel shall be suitably qualified and have an appropriate level of training and experience in the operation and maintenance of municipal wastewater treatment plants. The skills to be provided shall be in the areas of, but not confined to:

- Operational management
- Maintenance management
- Wastewater treatment plant operation
- Analytical chemistry
- Plant and equipment maintenance
- Instrumentation and telemetry operation and maintenance
- Administration
- Quality systems implementation and management
- Health and safety planning and auditing.

7.3. TRAINING OF OPERATIONAL STAFF OF HATSU

7.3.1. General

The Contractor shall be responsible for ensuring that the operation and maintenance personnel acquire the skills necessary to operate, maintain, service and repair all equipment at the treatment plants during the 12-month defect liability period. The Contractor shall also be responsible for ensuring that the operation and maintenance personnel acquire full knowledge of the use of the Operation and Maintenance Manuals.

The Contractor shall conduct training to the staff who will hand over the operation and maintenance of the plant following the final acceptance. Those training shall be conducted during the one-month training and taking-over period which will be the last month of the Defect Liability Period.

The Contractor shall prepare a training plan for the staff for the approval of the HATSU and submit it to the HATSU at least one month before the intended start of the first training course/commissioning of the plant. The plan shall contain an outline of the courses, duration, subjects to be taught, documentation to be issued, names and qualifications of instructors etc.

The overall purpose of the training is to enable the staff to:

- Understand the wastewater and sludge treatment processes;
- Operate equipment in an optimal way;
- Improve energy efficiency of the overall plant;
- Use the WWTP modelling software for plant optimization;
- Assess the analyses required for biological treatment performance monitoring;
- Carry out the necessary adjustments and corrections;
- Undertake correct preventive and normal maintenance;
- Undertake trouble-shooting and repair of all equipment and auxiliaries installed;
- Adjust all equipment to optimise the plant;
- Operate and understand the SCADA system;
- Select the necessary spare parts;
- Intervene in case of disturbance; and
- Understand environmental aspects in relation to smell, safety, ergonomic working positions etc.

All equipment and manuals needed for the training shall be provided by the Contractor and handed over to the HATSU before commencement of the training.

Personnel having an expert knowledge of the subjects shall undertake the training. Instruction and demonstration shall be given at appropriate levels for skilled and semi-skilled personnel and for plant operators and their supervisors. Separate courses for different categories of staff may be necessary dependent on number of staffs to be trained.

The training shall be given in the Turkish language, if necessary by use of interpreters provided by the Contractor. Documentation of the training carried out shall be submitted to the HATSU.

7.3.2. Training subjects in general

The subjects shall be treated theoretically and practically. Emphasis shall be given on practical exercises, which shall occupy at least fifty (50) percent of the training time.

The practical exercises shall include normal maintenance activities, adjustments, use of tools, measuring equipment and workshop facilities included in the plant.

Process:

The following disciplines shall be included in the training:

- Basic process design of the WWTP;
- Principles of basic unit processes;
- Principles of process optimisation;
- Process trouble shooting; and
- Laboratory operation for biological treatment performance analysis.

Mechanical Operation:

The following disciplines shall be included in the training:

- Basic principles of mechanical components of WWTP (screens, pumps, blowers, mixers, boilers, mechanical sludge thickeners, sludge dewatering, conveyors etc;
- Capacities;
- Maintenance works;
- Tuning in the plant for the optimum performance;
- Basic fault finding and remedy of simple/typical faults;
- Reading and understanding the Operation and Maintenance Manuals;
- Spare parts;
- Safety;
- Exercises, practical and theoretical.

Electrical Operation:

The following disciplines shall be included in the training:

- Switchboards including control equipment (frequency converters, controllers, instruments etc.)
- Basic principles of electrical components (relays, motor starters, ELCBs, etc.)
- Basic fault finding and remedy of simple/typical faults (reset of MCBs etc.)
- Basic principles and operation of the Combined Heat and Power unit (if proposed)
- Maintenance routines
- Detection and remedy of typical faults
- Reading and understanding of diagrams
- Spare parts
- Safety
- Exercises, practical and theoretical.

Training Courses

Theoretical courses are assumed to be carried out separately for each staff category, i.e. laboratory, electricians and operators. Practical courses may be for both categories.

For each course, a compendium including programme, details on the subjects, manuals, exercises (practical and theoretical) shall be prepared. The compendiums shall be submitted to the HATSU for approval at least fourteen (14) days prior to the start of the particular training course.

The number of approved compendiums to be issued is two to the HATSU and one for each of the trainees.

1st Training Course –Theoretical Introduction

Subjects:

- General layout of the plant
- Principles of function of the major components of the plant
- Methods of operating the plant
- Capacities of the plant
- Unit processes
- Process optimisation
- Check routines
- Operation and maintenance
- Occupational health and safety.

2nd Course – On-the-Job Training

Subjects:

- Acquaintance with the plant
- Participation in the running-in
- Fault finding
- Automatic and manual operation
- Maintenance requirements
- Safety precautions.

3rd Course – Understanding of the Operating and Maintenance Instructions

Subjects:

- Theoretical fault-finding procedures
- Operation and maintenance
- Process trouble shooting
- Ordering of spare parts
- Ordering of consumables
- Checking on capacity of plant
- Checking on all performance parameters.

4th Course – Re-training

Subjects: Repetition of all previous subjects with emphasis on subjects wanted by HATSU.

Duration of Training

It is proposed that each of the specified courses shall have duration of minimum three (3) days, apart from the "On-the Job" training course, which shall have the same duration as the training and taking-over period.

Training Location

Training shall take place at the Hassa WWTP.

7.4. OPERATION OF THE FACILITIES

After issuing of the Certificate of Substantial Completion, the Contractor shall operate and maintain the treatment plant with the staff as stated in Section 7.1.

The Contractor shall take full responsibility including all operation, maintenance and labour costs for the operation of the complete treatment works, including all plants and associated services (all civil, mechanical, electrical, telemetry and infrastructural items specified in the Contract), on a continuous basis (24 hours). Remedying of faults and defects, and deficiencies, if any, determined during temporary acceptance, and operating the plant in accordance with the operating instructions and within the desired performance values, revision of the drawings and the operating instructions of the installed plant, if necessary, performing routine maintenance and repair works, preparation of maintenance plans, keeping

inventories of stock and spare parts, if any, keeping operation records, directing laboratory works, and developing the knowledge and skills of the operation personnel during the operation and maintenance period are under the responsibility of the contractor and all of the above mentioned works shall be carried out by the contractor's personnel.

Routine maintenance tables shall be attached on all equipment used in the plant, and the maintenance works performed shall be indicated in these tables. The classes and types of the lubrication oils to be used for maintenance, lubrication frequency, protective painting, routine settings and similar issues shall be indicated in the routine maintenance tables.

The workshop and the warehouse shall be kept in working condition, and the spare parts supplied, if any, shall be stored properly.

7.4.1. Operating Procedures

The Contractor shall provide a detailed procedure for the operation of the facilities. A detailed control philosophy shall be provided for each process stage and it shall be accompanied by a procedure for each individual item of them. The operating manuals for the treatment plants and drying plant shall be used in the development of the operating procedures.

During the operational period the Contractor shall manage inspections at regular intervals and maintenance works as described in the Operation and Maintenance Manuals, The Contractor shall also direct, supervise and monitor the staff of HATSU for proper operation of the plants during one-month training and taking-over period.

The Contractor shall prepare the Monthly Reports and submit them to the inspection unit during the Operation and Maintenance period. These following issues shall be included in these reports.

- Flow, pollution load, unit and plant performances,
- Information which evaluating the measurement results related to the findings exceeding the specification values and detailed explanations,
- The analysis of the operating procedures performed during the month and explanations about the general plant operation strategy planned for the next month,
- The summary of the preventive maintenance procedures and regular repair procedures in the month and information about equipment repair and replacement works performed within the month,
- Situation of the laboratory works, summary of the analysis results,
- Changes that have to be made in the instructions for use,
- The situation of spare parts / stock inventory, if any, determination of the deficiencies, spare parts or consumable materials which have to be purchased,
- Assessments of the plant operation budget,
- Safety related events occurred within the month (including accidents involving personal injury)
- Detailed status notification of the equipment under guarantee,
- Training of operation personnel.

7.4.2. Monitoring, sampling and analyses

General

The Contractor shall carry out monitoring, sampling and analysis of the wastewater and sludge.

Analyses that are capable of being carried out with the analytical equipment provided under the Contract shall be performed at the plant by the operational staff. All other analyses shall be carried out by a recognised independent laboratory, as agreed with the HATSU. In this regard, the Contractor shall prepare a plan and submit for approval to the Engineer.

The Contractor shall carry out monitoring, sampling and analysis in accordance with all relevant regulations in force in Turkey.

The Contractor shall ensure that all on site analysis is carried out in a safe manner and that all waste chemicals and containers are disposed of in a proper fashion.

Sampling Equipment

Automatic flow proportional samplers are required as defined in this Technical Specification.

The Contractor shall ensure that all samplers, including sample bottles and pipelines, are cleaned regularly to avoid the build-up of grease, solid material and bacterial growth.

Laboratory and Analytical Equipment

The Contractor shall ensure that the laboratory and analytical equipment is kept in good condition. Analytical equipment shall be calibrated on a regular basis.

Analytical Methodology

The Contractor shall also abide by the requirements of the Turkish Regulations with respect to analytical methodology.

In cases where there are no applicable Turkish regulations, the analysis of samples taken at the wastewater treatment plant shall be carried out in accordance with the most up to date edition of "Standard Methods for the Examination of Water and Wastewater" produced by The American Public Health Association (APHA); the American Water Works Association (AWWA) and the Water Environment Federation (WEF).

Monitoring Requirements

For compliance purposes, the Contractor shall carry out sampling according to Table 5.1 given below. Sampling at the inlet and outlet shall be corresponding as regard time.

Independent Analysis

Analyses for all parameters, specified in Table 5.1 for the inlet and outlet, shall be carried out by a recognised independent laboratory, approved by the HATSU. A portion of the sample sent for independent analysis shall be kept on site and analysed as normal. The results shall then be compared. Any unusual variance between the results shall be brought to the attention of the HATSU for discussion. The Contractor shall make any necessary adjustments to his analytical procedures to ensure that any errors, considered to have occurred, are eliminated.

Remedy on Compliance Failure

In the event of any failure to comply with the treated wastewater discharge standards, the Contractor shall inform the Employer and HATSU, in writing, immediately upon becoming aware of the failure. The Contractor shall provide details of the reasons for failure and the remedies that have been put into effect to ensure that the treatment plant can meet the standards.

Sampling by HATSU

HATSU reserves the right to enter the wastewater treatment plant to take samples at any location and at any time without prior notice to the Contractor.

7.4.3. Records of data

Records of the continuous data measured at the station shall be kept at the wastewater treatment plant in electronic and hard copy formats and summary data shall be provided in the monthly report.

Table 5.1 Monitoring Programme

Location		Inlet	Outlet	Activated Sludge Tank	Return Sludge	Excess Sludge	Thickened Sludge	Dewatered Sludge
Flow	m ³ /day	Con	Con		Calculated	Calculated	Calculated	Amount
Temperature	°C	Day		Day				
pH	s.u.	Day		Day				
Parameters								
COD	mg/l	Reg/FPS	Reg/FPS					
BOD ₅	mg/l	Reg/FPS	Reg/FPS					
SS	mg/l	Reg/FPS	Reg/FPS	Day/GS				
Total-N	mg/l	Reg/FPS	Reg/FPS					
Ammonia N	mg/l	Reg/FPS	Reg/FPS					
Nitrate N	mg/l		Reg/FPS					
Phosphate P	mg/l	Reg/FPS						
Oxygen	mg/l		Day/GS	Con				
SVI	ml/g			Day/GS				
TS	%				Reg/GS	Reg/GS	Reg/GS	Day _{dw} /GS

Legend

Con Continuous
Day Daily
Reg Every 10th calendar day
FPS Flow proportional 24-hour sample
TPS Time proportional 24-hour sample
GS Grab sample.

Index

dw When dewatering plant in operation

7.4.4. Management of consumables

Chemicals Management

The Contractor shall keep records of all chemicals used for the treatment of wastewater or sludge. The Contractor shall put procedures in place to ensure that the treatment processes are optimised, to minimise the use of chemicals.

Energy Management

The Contractor shall keep records of the hours of operation of each item of electrical plant and the total energy usage of the treatment plant. The Contractor shall put procedures in place to ensure that the treatment processes are optimised, to minimise the energy consumption.

7.4.5. Recording of unusual or abnormal situations

Unusual circumstances arising from industrial disputes, accidental spillage, mechanical breakdown, power failure, stoppage for essential maintenance or abnormal weather conditions shall be noted by the Contractor in detail and taken into consideration when interpreting the analytical data from the treatment plant.

The Contractor shall notify HATSU of any unusual occurrence or incident in respect of the provision of the Operation and Maintenance Works. Notification shall be made by telephone with immediate effect and shall be followed by a written report of the occurrence or incident.

7.5. MAINTENANCE OF THE TREATMENT PLANT

7.5.1. General

The Contractor shall provide for the routine, planned, breakdown and repair maintenance of all assets relating to civil, mechanical, electrical and electronic plant, equipment and infrastructure at the WWTP.

Maintenance includes measures taken in order to avoid failure of the plants and equipment in addition to repair measures in case of failure.

7.5.2. Maintenance programme

Database software for maintenance programme to be put in place by the Contractor shall be based on a recognised maintenance methodology. The Contractor shall provide a statement of the methodology he proposes to adapt to HATSU for approval, before developing it in detail.

The maintenance regime adopted by the Contractor shall include:

- Schedules for the maintenance of the treatment plants to include but not be limited to:
 - a complete list of the assets to be maintained;
 - the frequency and type of routine and planned maintenance for each asset;
 - details of the calibration of all instrumentation; and
 - a listing of all essential spare parts to be carried.
- Methods for dealing with breakdown and repair of assets to include:
 - callout response times for each asset; and
 - communication with HATSU when breakdowns occur.
- Procedures for the maintenance of the assets incorporating manufacturers' instructions
- Methods for the planned replacement of assets at the treatment plants, waste water collection network, pumping station
- Records of all maintenance carried out at the treatment plants and waste water collection network, to be kept up to date and held electronically and in paper format at treatment plants, waste water collection network, pumping station at all times.

The Contractor shall ensure that the treatment plants are kept in a clean and tidy condition at all times and shall incorporate a cleaning routine in the maintenance schedules.

7.5.3. Building maintenance

The Contractor shall manage the maintenance of the all buildings, contained within the treatment plants, waste water collection network, pumping station to keep it in good repair throughout the term of the Contract including:

- Regular cleaning of all internal areas;
- Repair or replacement of internal and external fixtures and fittings when they become damaged;
- Cleaning of roof guttering and drainage, windows and doors; and
- Maintenance of ventilation systems.

The Contractor shall be responsible for the replacement of any part of the buildings that become damaged during the term of the Contract, excluding damage caused by a Force Majeure event.

7.5.4. Site infrastructural maintenance

The Contractor shall manage the maintenance of all infrastructures within the treatment plants, waste water collection network, pumping station to keep it in good condition throughout the term of the Contract including:

- All road and path surfaces;
- Gates and fences;
- Water supply facilities;
- Road and building drainage; and
- Landscaped and grassed areas.

The Contractor shall be responsible for the replacement of any part of the infrastructure that becomes damaged during the term of the Contract, excluding damage caused by a Force Majeure event.

7.5.5. Lifting mechanisms

The Contractor shall be responsible for the certification of all mechanical lifting mechanisms used at the treatment plants and pumping station and shall ensure that they are in good repair and capable of operating to the required standard at all times. The maintenance required for such mechanisms shall be detailed in

the Contractor's maintenance schedules. Certificates for lifting equipment shall be kept at the WWTP, based on the locations of the lifting equipment, as part of the Contractor's maintenance records.

7.6. HEALTH AND SAFETY

The Contractor shall comply with all aspects of current Turkish legislation in force or that subsequently comes into force during the term of the Contract.

The Contractor shall maintain and update the Safety File on an ongoing basis.

7.7. TAKING-OVER BY HATSU

At the date of expiration of the defects liability period, HATSU will take-over the treatment plants, with the presence of the Employer.

During the last month of 12-month Defect Liability Period, namely training and taking over period, the Contractor shall complete training of the staff employed by HATSU for operation and maintenance of the plant.

The treatment plants, pumping station shall be in good and maintained condition and the buildings and external works shall be well maintained.

As a guideline, the Contractor shall prior to the take-over ensure that:

- All mechanical and electrical equipment and installations are well functioning and well maintained;
- All metal parts are free from rust and/or oxide;
- Any damage to tarmac and paved surfaces has been repaired;
- The treatment plants, waste water collection network, pumping station sites are tidy and green areas well gardened; and
- Rooms in buildings and structures are tidy up and cleaned.

The inspection shall be conducted jointly by HATSU and the Employer.

7.8. PARTICULAR SPECIFICATIONS FOR COSTS OF OPERATION, MAINTENANCE AND TRAINING

The Contractor shall consider the cost for following requirements while preparation of the Bill of Quantities, since no payment will be made by Employer to the Contractor for those requirements. Furthermore, those requirements are also pre-conditions for issuance of Certificate of Final Completion, so the release of the Performance Security. Performance security will be used by the Employer for any cost of unfulfilled obligations of the Contractor in terms of operation, maintenance and training.

Preparation of Operation and Maintenance Guidelines

The cost for preparation of operation guidelines for the wastewater treatment plant, including the costs of all kinds of the necessary labour, tools, materials and equipment for the preparation of usage guidelines for equipment and instrumentation in compliance with the established plant design or operation design of the wastewater treatment plant, will be borne by the Contractor.

Training of Operating Personnel

The cost of training of operating personnel at the wastewater treatment plant, including making available at work, with transportation of any kind included, specialised personnel, tools and materials in such quality and number as will be found appropriate by the HATSU for delivering operation and maintenance training in line with the requirements set out in this Technical Specifications to the relevant personnel from the organisation who will operate the Wastewater Treatment Plant, and the training of the relevant personnel from HATSU so that they will operate the plant at the optimal level, and the costs of all kinds of the materials and the loss of material, all kinds of labour, tools and materials, will be borne by the Contractor.

12-Month Operation and Maintenance of The Plant

The cost of the 12-month operation and maintenance of the plant, including, as specified in the technical specifications, during the defect liability period, the operation of the plant in line with the usage guidelines of the plant and within the required performance rates and being not limited to these, the routine maintenance and repairs of the plant, and the preparation of maintenance plans, and keeping stock and spare parts, if any, inventories, and keeping operation records, and sampling, laboratory tests cost, and the

costs (including tax and insurance) of the contractor's personnel, as specified in the Technical Specifications, for the guidance of laboratory works, will be borne by the Contractor.

No amount will be paid to the Contractor for the cost (including the cost of operation personnel, all kinds of tools-parts, materials, tools-instruments, equipment, laboratory test costs, tax and insurance of any kind) of the works undertaken by the Contractor to achieve the process rates in the period elapsed until the provisional acceptance of the plant.

Continuous Power Consumption Connection (Subscription)

The cost of subscription to the power supplier organisation for the continuous consumption connection of power during the commissioning of the plant. All the points relating to the operations regarding the continuous power consumption connection (subscription) and the cost thereof are set out in the Technical Specifications for Electrical Works will be borne by the Contractor.

The Contractor shall also consider the annual growth of subscription fees (where the contract year differs from the implementation year).

The Contractor shall arrange subscription in their name. Subscription shall be transferred to the General Directorate of Hatay Water and Sewerage Administration (HATSU) (against the deposit amount paid to the distribution company) following the issuance of the Certificate for Final Completion. The Contractor shall pay all kinds of costs arising under whatsoever name during the transfer process.

The Contractor shall prepare the subscription documents and after the Contractor has TEDAŞ carry out preliminary investigation for subscription, an electrical installation number shall be formulated.

Energy and Other Utility Requirements for Operation and Maintenance of Plant

The cost of electricity and other utility costs such as water, natural gas will be borne by the Contractor until the taking over by HATSU. The Contractor shall carry out the periodical maintenance and inspections of the compensation system to avoid the accrual of Reactive Cost.

8. PARTICULAR SPECIFICATIONS FOR HASSA WASTE WATER TREATMENT PLANT³

- After the site delivery for the work, first of all topographic plan of the project area with 5-m intervals shall be prepared, this topographic plan values shall be taken as basis for the ground level in excavation and filling works, and site arrangement and site piping survey shall be carried out by applying the Hassa (HATAY) Waste Water Treatment Plant to its location.
- After the site delivery for the work, first of all topographic plan of the project area with 5-m intervals shall be prepared, this topographic plan values shall be taken as basis for the ground level in excavation and filling works, and site arrangement and site piping lengths shall be carried out by applying the Hassa (HATAY) Waste Water Treatment Plant to its location.
- According to updated version of Article 20 of "Water Pollution Control Regulation published in the Official Gazette of Republic of Turkey dated 13 February 2008; sampling structure, automatic sampling and flow measuring instruments shall be installed at the outlet point of the waste water treatment plant.

Employer and Engineer shall be notified that the installation of the equipment in the treatment plant has been completed, operation conditions of the plant are adequate and the relevant construction works have been implemented to an extent that will allow proper operation of the plant. Employer's representative, Engineer and the Contractor shall perform inspections related to construction, mechanical and electrical works in the work place before supply of water to the plant and it shall be determined that commissioning of the plant can be performed with the "Test on Completion Report".

After supply of water to the plant, it shall be notified to the Engineer by the contractor that the samples to be taken from inlet and outlet water meet the treated water quality criteria specified in the project and process general specification. The Engineer, after this notification, shall ensure analysis of 2 water samples to be received every day from inlet and outlet of the plant with 5-day intervals in the laboratories of the institutions affiliated to the Ministry of Health, Ministry of Agriculture and Forestry and Ministry of Environment and Urbanization and the institutions which have received authorization certificate from these Ministries. When the whole of the Works has been substantially completed and have satisfactorily passed any test on completion prescribed by the Contract, the Contractor may give a notice to that effect to the Engineer accompanied by an undertaking to finish any outstanding work during the Defects Liability Period.

If the test results are not complying with the project and the process general specification, the contractor shall continue sampling until the conformity is achieved.

- In case of presence of underground water at the base of road pavement; underground water drainage shall be implemented according to the "Specification of General Directorate of Highways of Turkey"
- The samples to be taken for test from a concrete to be deemed appropriate by the Engineer shall be received, maintained and transferred to the laboratory by the technical personnel of the certified laboratory approved by the Engineer with a record and in accordance with the TS EN 12350-1 "Fresh Concrete Tests- Section 1: Sampling" standard.

In the process of fresh sampling; as it is stated in the TS 500/February 2000 standard, six samples shall be received from each 100 m³ of concrete work or concrete poured in one day (if the amount of

³ In case of any discrepancies between the particular specifications (Section 8 of this statement of work/technical specifications), and technical specifications for Civil/Structural Works, Mechanical Works, Electrical Works (Section 4, 5, 6 of this statement of work/technical specifications) and specifications stipulated by Design Drawings, those shall take precedence over one another in the following order;

- Particular Specifications for Hassa Waste Water Treatment Plant
- Specifications stipulated by Design Drawings
- Technical Specifications for Civil/Structural Works, Mechanical Works, Electrical Works

concrete poured is less than 100 m3). In order to have the representative samples for the poured concrete; 2 concrete samples shall be taken from each one of three different transmixers (from one concrete batch) and one of the 2 samples taken to represent one transmixer shall be tested in the 7th day and the other one shall be tested in the 28th day. Therefore, three samples among six received samples shall be tested in the 7th day and the other three samples shall be tested in the 28th day.

The test methods in the Sampling- slump test TS EN 12350-1/July 2010 TS EN 12350-2/July 2010, test for temperature determination of fresh ready-mixed concrete TS EN 206-1 April 202 article 5.2.8 and preparation and curing of test samples to be used in strength tests TS EN12390-2/April 2010 shall be necessarily followed during fresh sampling process.

Concretes which are not complying with the standards according to the results of the tests shall not be accepted and the administration shall not make any payment. All of these procedures shall be performed free of charge by the Contractor.

- Concrete steel rods of all diameters, classes and types brought to the construction site for tensile test are received with a record as 1 set (3 pieces) up to 30 tons. The masses of the received specimens are determined and then determination of tensile strength and percentage elongation at break are determined in accordance with TS EN 15630-1 standard. Rib ratios specified in the TS 708/2013 standard are visually inspected. All tests requested by the Engineer shall be performed free of charge by the Contractor.
- The type of pavement specified in the treatment plant on site road project shall not be changed. Application of the road route shall be performed according to the treatment plant on site road project, in the regions formed by roadway with cut; research pits in adequate number and with depth requested by the administration shall be opened in the levelling elevation pursuant to the "Technical Specifications of General Directorate of Highways of Turkey" (Road Infrastructure, Engineering Structures, Bridge and Tunnels, Pavement and Miscellaneous Works-2013) and soil material tests (CBR, index, etc.) shall be performed on the soil samples taken. According to the result obtained, road pavement base shall be investigated pursuant to Technical Specifications of General Directorate of Highways of Turkey". In the regions formed by roadway with fill, road fill subsoil with similar nature shall be examined, in case of necessity to use selected material; suitable material to be obtained from road cut or borrow pits shall be determined again pursuant to "Technical Specifications of General Directorate of Highways of Turkey".

If it is required to establish the onsite roadway of the Treatment Plant with high cut and fills according to the final project, examination of cut and fill subsoil, evaluation of internal, external and total stability elements of cut-fill-engineering (engineering structures-walls, etc.) structures shall be performed by the contractor pursuant to "Technical Specifications of General Directorate of Highways of Turkey".

- Any quarry location will not be indicated by the Employer for supply of the materials (run-of-mine sand-gravel, stabilized, granulometric sand-gravel, crushed stone, stone, ... etc.) to be used for all kinds of works related to the construction of the mentioned plant and the contractor shall not make any request regarding these issues. The quarry location indicated by the contractor shall not be used for the work unless it is accepted by Engineer. If the quarry location accepted by the Engineer is changed, the new quarry location shall be notified to the Engineer for approval. The materials supplied from a quarry location that is used without receiving approval shall not be accepted by the Engineer.
- The contractor shall not receive any payment for any kinds of research, performance of laboratory experiments, tests and analysis and similar related works that will be requested from the contractor during construction of the mentioned plant, when necessary.
- After determination of suitability of the qualifications of the personnel to be assigned by the Municipality for operation of the plant, it shall be ensured that they shall be trained to perform the operation on their own, learn operation and maintenance instructions and be able to operate the plant alone by working with the contractor's personnel in one-month training and taking-over period. All kinds of expenses related to this training shall be borne by the contractor.

9. GAS DETECTION AND SAFETY SYSTEM TECHNICAL SPECIFICATION

9.1. SCOPE

This technical specification describes the system that will warn the user at the determined alarm levels by continuously monitoring Oxygen (O₂) Hydrogen Sulphide (H₂S) and Methane (CH₄) gases in the atmosphere in the Waste Water Treatment Plant.

The followings terms are included in the technical specification and:

“Control Unit” refers to the control equipment that evaluates the signals from the detectors installed in the measurement environment,

“Detector” refers to the equipment that is expressed as ex-proof type field instrument and transmits the Hydrogen sulphide (H₂S), Oxygen (O₂) and Methane (CH₄) concentrations in the environment to the control panel,

“Sensor”; refers to the sensing equipment that is used together with detector and measures Hydrogen sulphide (H₂S), Oxygen (O₂) and Methane (CH₄) concentrations and transmits them to the detector

“Breathing Apparatus with Clean Air Cylinder” is the breathing set that allows breathing of the users independently from the ambient air for a specific period of time and consists of backrest, clean air cylinder and full-face mask.

9.2. TECHNICAL SPECIFICATIONS OF SYSTEM COMPONENTS

9.2.1. Control Panel and Control Unit

Control Panel



(Note: The picture is representative.)

- It shall be standing type, wall mounted, suitable for operation outdoor and shall be made from minimum 1.5 mm Galvanized sheet (painted with rough coat epoxy, polyester powder paint, RAL 7035), GRP, Polyester or PVC material. Its inner frame and inside the door shall have rubber gasket.
- Panel frames shall also be bended from a sheet with the same characteristics.
- All panels shall have front doors or glass front doors, and front control and they shall be suitable for wall-mounting. It shall be possible to remove the devices in the panel from the front side.
- Panel protection class shall be IP 66. Protection class of the panels having glass doors shall be IP 55.
- Panel dimensions shall be minimum 400 mm x 500 mm x 200 mm (W:H:D).
- It is preferred to have the entries and exits of the wall mounted type panels from the bottom. However, it shall be possible to have exit from the top, if necessary.
- PVC panels shall have breakable holes for cable entries and exits.
- The panels with entries from the bottom shall have clamp supports made of perforated profile for fixing cables.
- In the panels with entries from the top, metal cable terminations shall be used for the cables with large cross-section (50 mm² and larger) and cable glands with suitable sizes made of PVC or brass shall be used for the cables with small cross-section.
- Cable entries and exits of the panel shall be through glands and entry and exit holes and the

- glands of all panels shall be covered with paste after completion of the manufacturing.
- Panels shall have rail terminal group, neutral and ground bus bar at the bottom and/or top of the panels according to the exit direction.
- According to the automation scenario specified in the annex of the specification "Gas Detection and Safety System Operation System", control panel of the system shall be designed together with all switching materials (contactor, fuse, relay, etc.).

Control Unit



(Note: The picture is representative.)

- Control unit shall have a structure that will allow connection of the gas detector supporting at least 4 (four) 4-20 mA analog and digital outputs.
- Control unit should have at least 4 relay outputs. It should be possible to direct the related warning systems by using the control unit software.
- It shall be possible to identify 2 alarm levels on the control unit for each detector on site that is connected to the control unit.
- There shall be user interfaces such as screen, buttons and status LEDs on the control unit.
- Measurement results of the gas detectors connected to the system shall be shown on the screen alternately (in the form of scanning) or on a single display.
- Control panel shall have ability to record information in order to be able to track of the results obtained from the detectors retrospectively. It should be possible to transfer the measurement values to the PLC- SCADA automation system. (Control panel should have RS232/485 and Modbus RTU communication port.)
- Configuration of the control panel shall be seen on the screen, however, login to the control panel shall be possible with password to make a change in the configuration in order to prevent unauthorized uses.
- Control panel shall be wall mounted type in the outdoor control panel. It shall be possible to mount it in the Motor Control or Automation panel, when necessary.
- Control unit shall operate between a temperature range of -20 and +50 °C and a relative humidity range of 10 and 95 %, and protection class of the control unit shall be IP55.
- 1 piece of non-ex combined horn - flasher shall be provided with the control panel. Horn – Flasher shall be capable of operating independently from each other with 220 VAC or 24 VDC.

System Cabling

- All power and control cables within the system shall be supplied by the company supplying the system and the company shall submit the list of cable types and quantities together with the project to be presented to the administration.
- All cables within the plant shall be laid in PVC cable channels (covered) or cable channels which are resistant against rusting/corrosion. In case of rusting and corrosion of the cable channels within the guarantee period, they shall be replaced free of charge by the company.
- Cable channels should be resistant against an operating temperature between -40°C and +60°C.

- Cable channels should be at least 2 mm standard.

9.2.2. Hydrogen Sulphide (H₂S) Detector



(Note: The picture is representative.)

- Detector shall operate as integrated with the hydrogen sulphide sensor with electrochemical structure and shall be capable of measuring H₂S (Hydrogen Sulphide) gas in a range of 0-100 ppm.
- There should be LCD screen on the detector and the measurement values should be observed on the LCD screen.
- The detector shall have 2 alarm relay outputs and 1 error relay output and 4-20 mA analog signal output according to the measurement result of hydrogen sulphide. The detector shall have both relay output and 4-20 mA analog signal output.
- The detector shall be wall mounted type. The detector shall be wall mounted type. There shall be no open electronic circuit on the detector. Ex gland shall be used for detector connection.
- The detector shall be capable of operating in the following ambient conditions without any problem.
 - Between the temperature range of -40 and +65 °C
 - Between the relative humidity range of 0-99%.
- The detector casing should be made of corrosion resistant GRP (Glass reinforced polyester) or Aluminium or Stainless-Steel material and the sensor casing should be made of stainless steel. Detector shall have IP 66 or IP 67 type protection.
- Detector should have ex-proof rating in category II 2G suitable for use in Zone 1 and Zone 2 in gas medium in accordance with ATEX.

9.2.3. Oxygen (O₂) Detector



(Note: The picture is representative.)

- The detector shall operate as integrated with the oxygen sensor having electrochemical structure and it shall be possible to measure the oxygen concentration between the range of 0-25% Vol.

- There should be LCD screen on the detector and the measurement values should be observed on the LCD screen.
- The detector shall have 2 alarm relay outputs and 1 error relay output and 4-20 mA analog signal output in accordance with the 0-25% Vol. measurement value, according to the measurement result of hydrogen sulphide. The detector shall have both relay output and 4-20 mA analog signal output.
- The detector shall be wall mounted type. There shall be no open electronic circuit on the detector. Ex gland shall be used for detector connection.
- The detector shall be capable of operating in the following ambient conditions without any problem.
- Between the temperature range of -40 and +65 0C
- Between the relative humidity range of 0-99%.
- The detector casing should be made of corrosion resistant GRP (Glass reinforced polyester) or Aluminium or Stainless-Steel material and the sensor casing should be made of stainless steel.
- Detector shall have IP 66 or IP 67 type protection.
- Detector should have ex-proof rating in category II 2G suitable for use in Zone 1 and Zone 2 in gas medium in accordance with ATEX.

9.2.4. Methane (CH₄) Detector



Note: The picture is representative.

- The detector should be capable of measuring methane (CH₄) gas which may be present in the medium by a sensor operating with catalytic combustion principle.
- The detector should be capable of measuring the amount of methane (CH₄) in the medium as the lower explosion limit within the range of 0 – 100 % LEL (0.0 – 5.0 % Vol).
- There should be LCD screen on the detector and the measurement values should be observed on the LCD screen.
- The detector shall be wall mounted type. There shall be no open electronic circuit on the detector. Ex gland shall be used for detector connection.
- The detector shall have 2 alarm relay outputs and 1 error relay output and 4-20 mA analog signal output according to the measurement result of methane gas. The detector shall have both relay output and 4-20 mA analog signal output.
- The detector should be capable of operating within the voltage range of 12 and 32 VDC.
- The detector shall be capable of operating in the following ambient conditions without any problem.
 - a. Between the temperature range of -40 and +65 0C
 - b. Between the relative humidity range of 0-99%.
- The t₉₀ response time of the detector should be less than 30 seconds for Methane (CH₄) gas.
- The detector casing should be made of corrosion resistant GRP (Glass reinforced polyester) or Aluminium or Stainless-Steel material and the sensor casing should be made of stainless

steel.

- Water and dust protection classes of the detector should be IP 66 or IP 67.
- Detector should have ex-proof rating in category II 2G suitable for use in Zone 1 and Zone 2 in gas medium in accordance with ATEX.

9.2.5. Breathing Apparatus with Clean Air Cylinder



(Note: The picture is representative.)

- Breathing apparatus shall consist of mask, Demand Valve, backrest and cylinder.
- Backrest of the breathing apparatus shall be made of antistatic composite material.
- Harness and waist part of the backrest should be designed ergonomically.
- The breathing apparatus shall have 6L steel cylinder.
- The pressure in the cylinder shall be 300 bars.
- Air in the cylinder shall be used 55 minutes for 30 L/minute and it shall be manufactured in accordance with EN 137 (2006) Type 2 norms.
- The breathing apparatus shall have a pressure gauge and warning mechanism indicating that the air pressure is below the danger level.
- There shall be a pressure indicator attached to the backrest and this indicator shall be phosphorous to facilitate reading in the dark.
- The full-face mask included in the set shall be suitable for use in case of a fire.
- The full-face mask shall be adjustable from 5 points.
- There shall be talking diaphragm on the mask.
- The mask will function with positive pressure.
- Demand Valve attached to the mask shall have plug-in connection to allow fast connection.
- Demand Valve (Lung automate) shall be connected to the medium pressure hose.
- An audible alarm shall be given to the user when the pressure inside the cylinder drops below 50 bars.
- The weight of the breathing apparatus including the cylinder shall not exceed 13 kilograms.

9.2.6. Portable Gas Detector



(Note: The picture is representative.)

- There should be the detector which can be used together with its sensors and having a casing that is resistant to clip and impact, made of stainless steel or corrosion resistant material, carried as attached to belt or pocket, Lithium / Nimh rechargeable battery (included in the detector, charging adapter, calibration hose (1 m), sampling hose (min. 3 m), tools specific to the detector (wrench, allen key set, etc.), spare pump filters (min. 2 pieces) and user's guide in the Portable Gas Detector .
- Measurement Principle: Catalytic Combustion (CH₄ – for Combustible Gas)
- Electrochemical (for H₂S, CO and O₂)
- Measuring Range: 0 – 5 %Vol CH₄ (by volume) – 0-%100 LEL
0-1000ppm CO
0-100ppm H₂S
0-25 % vol O₂
- Portable gas detector should be capable of measuring 4 gases and indicate the measurement value on the screen simultaneously. It should be possible to monitor for which gas the alarm is given on the indicator of the device.
- The device should have illuminated LCD display with digital indicator.
- The detector should have internal or external pump that will be used in confined areas and for remote sampling. Pump suction distance shall be min. 15 m.
- There should be a settable alarm level and light, audible and vibrating alarm for each gas measured in the detector. It should be possible to monitor for which gas the alarm is given on the indicator of the detector.
- Power source of the device: Lion or Nimh rechargeable battery should provide min. 12-hour operation.
- The detector should operate between the temperature range of -20 and +50C and a relative humidity range of 0-95%.
- Measurement Precision: Max. ±0.1 % Vol (by volume) of the Reading
- Measurement Type: Continuous Measurement
- Duration of Measurement: Detection of the concentration in the medium in a period less than T50 15 seconds and T90 20 seconds.
- Protection class of the detector should be IP 66 or IP 67.
- It should be rubber lined against the effects of pressure and temperature changes and vibrations.
- The device should be capable of storing the measurement made in its memory and the data storage capacities shall be indicated in the bids. The detector shall have an internal memory and it should be possible to transfer this information to computer. The detector shall be password-protected in order to prevent changing of the identified alarm values of the detector. The device should be capable of recording for at least 24 hours with 1-minute intervals. It should be possible to save at least 30-day measurement results in the memory of the device and to display them.
- Since the portable gas detector shall be used in the mediums containing Hydrogen Sulphide and Methane gas, ATEX I M1 or Ex ia I Ma, II 2G EEx ia certificate for suitability for use in such mediums and CE certificate of conformity shall be given together with the bid. The bids without the certificate or CE certificate of conformity and the bids that do not provide appropriate certificate and CE certificate shall not be evaluated.
- Expected sensor life shall be minimum 2 years and it shall be guaranteed by the bidder.
- The sensors in the device shall be guaranteed for a period of 2 years, the bidder shall be responsible for all kinds of problems of the portable gas detector and the user apparatus that will arise from rusting, corrosion, inadequate material quality, electrical/electronic failures, failure to recharge battery, short charging period and similar factors within the guarantee period and the bidder shall also be responsible for maintenance and repair, and

replacement of the mentioned materials free of charge.

9.2.7. Escape Mask



(Note: The picture is representative.)

- It shall be used to make the emergency escape safer against the poisoning risk due to sudden chemical gas formation in the medium.
- It shall have a carry bag allowing carrying it on the waist.
- Escape mask should not be heavier than 360 g when it is closed.
- Escape mask should comply with the DIN 58647-7 standard.
- The period of use should be 15 minutes according to the standard mentioned above.
- It should have ABEK filter and therefore should provide protection against poisonous gases and vapours.
- Escape mask should have a half mask in it and should provide protection against poisonous gases.
- Escape mask should have 12-year lifetime by changing the filter once in 4 years.

9.2.8. Danger and Warning Signs



Danger and warning signs shall be placed in the places which are deemed suitable by the administration inside and outside the Pumping Stations and Waste Water Treatment Plant Pumping Stations. They shall be suitable for use in outdoor conditions and humid and gaseous atmosphere in the pumping stations and resistant against corrosion.

9.2.9. Flasher and Siren



Flasher and siren shall be used in the Pumping Stations and Waste Water Treatment Plant Pumping Stations for warning and alarm according to the gas measurement results. They shall be suitable for use in outdoor conditions and humid and gaseous atmosphere in the pumping stations and resistant against corrosion. Flasher shall be place outside and inside the pumping stations and siren shall be placed only inside them.

9.3. SAFETY INSTRUCTIONS

Safety instructions in a size to be read easily by the personnel and including the safety and emergency information that should be followed by the personnel shall be put up to the places which are deemed suitable by the administration inside and outside the Pumping Stations and Waste Water Treatment Plant Pumping Stations.

Their material shall be suitable for use in outdoor conditions and humid and gaseous atmosphere in the pumping stations and resistant against corrosion.

The preliminary draft of the instructions shall be submitted to the administration and then the content of the safety instructions shall be agreed mutually by the administration and the company.

9.4. PERSONNEL TRAINING

The Contractor, following the commissioning of the Gas Detection and Safety System, shall provide trainings on the system equipment and operation of the system, the points to be considered during entry and exit to the plants and the actions to be taken in case of emergency to the employees authorized by the Municipality to work in the plants and the employees of the contractor.

A minute shall be written on performance of the training and it shall be signed by the trainer and the personnel participating in the training.

9.5. VENTILATION SYSTEM

9.5.1. General

The capacity and sizes of the equipment related to the ventilation system having the specified technical characteristics shall be determined according to the sizes and volume of the pumping stations. In practice, sizing shall be performed according to the pumping station where ventilation system shall be installed.

All air ducts and fittings should be fabricated, i.e., they should be cut and bended with automatic machines and their locks and seals should be made in workshop or factory. Manual manufacturing of duct and fitting on site cannot be accepted. Longitudinal welding of the fittings such as elbows, T, Reducer shall be carried out by using the machines specially developed for this work.

All duct parts, elbows and connections shall be designed most appropriately in terms of sound level and aerodynamics and installed precisely. The duct parts shall be connected with the parts having sealing gaskets on them. Hanger apparatus and all other mounting materials shall be galvanized unless stated otherwise.

All hanger elements and fasteners shall be fixed to the building concrete elements with threaded insert (or to steel construction with special fasteners). Vibration isolating spacer shall be placed between them to prevent vibration transfer from the hanger and the fastener to the building. All cut surfaces of the hanger elements and the fasteners shall be cleaned thoroughly and then painted with galvanized paint in two coats.

All openings of the mounted ducts shall be closed appropriately to prevent ingress of foreign objects and dust. It should be checked whether there is dust or unwanted materials in the duct before starting the system.

9.5.2. Duct Type Aspirator (Ex-Proof)

The duct type aspirator which can be mounted between two ducts shall have a housing made of ST37 galvanized steel sheet, painted with oven backed paint or epoxy paint, electrical connections made at the factory, motor and junction box with a protection class of at least IP 55, motor manufactured according to the international "Ex Standards (EN94/9, ATEX, IEC, IECEx) and a manufacturing certificate related to these standards, and this standard certificate shall be submitted with the bid. The blades shall be forward-curved or backward-curved type and the bearings shall be maintenance-free throughout their lifetimes. Fan body shall be mounted on vibration dampening wedges and there shall be a protective wire mesh at the fan outlet. There shall be standard thermal protection on the fan motors. Motor Insulation Class shall be Class F

for three-phase 380/400V- 50Hz operation values.

9.5.3. Roof Type Aspirator (Ex-Proof)

The roof type aspirator which can be mounted on the roof shall have a housing made of ST37 galvanized steel sheet, painted with oven backed paint or epoxy paint, electrical connections made at the factory, motor and junction box with a protection class of at least IP 55 and motor manufactured as Ex-Proof according to the international "Ex Standards (EN94/9, ATEX, IEC, IECEx) and a manufacturing certificate related to these standards, and this standard certificate shall be submitted with the bid. It shall be covered with cowl to protect the ventilator and motor. Motor Insulation Class shall be Class F for three-phase 380/400V- 50Hz operation values.

9.5.4. Window Type Aspirator (Ex-Proof)

The window type aspirator which can be mounted on window or wall shall have a housing made of ST37 galvanized steel sheet, painted with oven backed paint or epoxy paint, plastic blades, aluminium body, electrical connections made at the factory, motor with a protection class of at least IP 54 and manufactured as Ex-Proof according to the international "Ex Standards (EN94/9, ATEX, IEC, IECEx) and a manufacturing certificate related to these standards, and this standard certificate shall be submitted with the bid. Motor Insulation Class shall be Class F for three-phase 380/400V- 50Hz operation values.

9.6. MAINTENANCE AND GUARANTY CONDITIONS

The Contractor shall give at least 2-year guarantee for the Gas Detection and Safety System.

Gas measuring detectors (including sensors), control panel (including control panel and all switching materials), power and control cables of the detectors, cable channels, portable gas measuring devices, clean air breathing apparatus, warning signs, flasher and siren materials included in the Gas Detection and Safety System are guaranteed against the problems that may be resulted from corrosion, humidity and manufacturing defects (except those caused by improper use) and maintenance / repair and service fees shall not be charged. When rusting and corrosion are observed on these materials during the guaranty period and it is determined that the material is not working properly due to the manufacturing defect, the material shall be replaced free of charge by the supplier and/or the company installing the system.

Calibration and periodical maintenance are free of charge for 2 (two) times in the first 1 (one) year (in every six months) during the guarantee period and the fee for calibration and periodical maintenance (2 times in a year) for each remaining year of the guaranty period shall be indicated as a separate item.

Commissioning, installation and system training of the Gas Detection and Safety System shall be indicated as a separate item together with the bid.

A guarantee and maintenance contract shall be signed between the Municipality and the supplier / the company installing the system after commissioning of the Gas Detection and Safety System. The company shall undertake to accept all guaranty conditions specified in this specification under the maintenance contract.

9.7. OPERATING MANUALS AND OTHER ISSUES

All devices and equipment within the system (including ventilation system) shall have the certificates of the TSE and/or CE, EN standards as well as the standards specified in this specification.

Instructions for use related to the system and quality and guarantee certificates of the devices shall be delivered to the administration after commissioning of the system.

Commissioning of the installed system shall be performed after the acceptance to be performed by the Administration, the Municipality, the contractor and the company installing the system. The guarantee period is minimum 2 years following commissioning of the system.

The company shall submit the projects showing the locations of the installed elements and cable details (architectural projects can be provided to the contractor by the employer) and the control panel single line diagram to the employer as as-built projects in two copies. The contractor shall

not charge any fee for this work.

The company shall use its own teams in all kinds of installation works and commissioning of the system.

This issue should be taken into consideration in the bid.

According to the automation scenario specified in the annex of the specification "Gas Detection and Safety System Operation System", control panel of the system shall be designed together with all switching materials (contactor, fuse, relay, etc.).

9.8. GAS DETECTION AND SAFETY SYSTEM OPERATING PRINCIPLE

This system that will be used in the Waste Water Treatment Plant Pumping Stations, Sewage Network Pumping Stations and Sewage Network Pumping Stations and Deep-Sea Discharge Facilities consists of 2 parts.

The first part; Gas Detection System; It is the electronic system measuring Hydrogen Sulphide (H₂S), Methane (CH₄) gases formed in the pumping stations and Oxygen (O₂) gas in the air continuously. The control unit that can give necessary warning and alarm according to the gas measurement results from the gas detectors is used in this system.

The second part; Ventilation System; It is the ventilation system that will discharge the gases accumulated in the pumping stations according to the gas measurement results from the gas detectors to be placed in the pumping stations. Duct type, roof type and window type fans are used in this system.

9.8.1. General

The measurement of the gases in the medium should be necessarily made with portable gas detector before entering the pumping stations and Sewage Network manhole shafts. If the amount of gas accumulated in the medium is not at a dangerous level according to the measurement results, the personnel will enter the relevant units and manhole shafts.

Auxiliary equipment (Clean air breathing apparatus, half face escape mask) specified in the specification should be kept in the places which can be easily accessed in case of an incident. In addition, the relevant personnel shall have this equipment and portable gas detectors with them in case of a failure and maintenance.

According to the Communiqué of the Ministry of Labour and Social Security dated 08.19.2013 and numbered 103, at least 3 persons should be employed in the cleaning works performed at the inlet units of the Pumping Stations. Safety belts and safety ropes shall be used during going down and up in dangerous areas.

9.8.2. Submerged (Wet) Type Pumping Stations

Gas detectors with display and relay output were selected. Therefore, warning system will fail in case of a failure in the control unit. However, a backup system shall be established by continuing monitoring of the alarm status through gas detector.

In case of failure of the control unit, the warning and fan system shall be made operable with the relay outputs of the detector.

Measurement of Hydrogen Sulphide (H₂S) gas shall be ensured with the H₂S detector to be placed above the flood level of the lower waste water collection chamber of the pumping station. Gas suction from the waste water collection chamber shall be performed by means of duct type fan according to the measurement result from the detector. In case of failure of the control panel, fan shall be started from the relay output of the detector. Therefore, continuity of the system shall be ensured.

Measurement of methane (CH₄) gas shall be ensured with the methane (CH₄) detector to be placed to a location near the ceiling in the upper section of the pumping station. Gas suction shall be performed by means of roof type fan according to the measurement result from the detector. Window type aspirators shall be used in the places where roof type fan is not used. Window type aspirators will start according to the measurement result.

In case of failure of the control panel, fan shall be started from the relay output of the detector.

Therefore, continuity of the system shall be ensured.

Measurement of oxygen (O₂) gas shall be ensured with the oxygen (O₂) detector to be placed in the middle section of the pumping station (1.5 m above the walking platform). In addition, since oxygen and carbon dioxide gases are the gases balancing each other in the air, the amount of carbon dioxide (CO₂) gas in the environment will be determined by measurement of the oxygen gas and the oxygen/carbon dioxide ratio will be displayed in the control panel and the automation system. In case of failure of the control panel, fan will be started from the relay output of the detector. Therefore, continuity of the system shall be ensured.

The above-mentioned gases shall be measured continuously in the medium where they are present and audible and visual (flasher) warning will be made when the measured values are above the set values.

The duct type, roof type and window type suction fans will aspirate for 5 minutes per hour regardless of the result of the measurement or for any period of time to be determined according to the gas density which can be formed seasonally.

The clean air breathing set shall be used when the oxygen level in the medium falls below 18%.

Portable gas detectors shall provide performance of gas measurement by the traveling team members extending the measurement hose into the medium before entering the pumping station or the manhole shafts. In addition, the personnel performing maintenance and repair in the pump section of the pumping stations should also use this detector.

Control panel to be installed in the control board is the unit that records and evaluates the measurements from the gas detectors in the pumping stations, gives audible and visual warning as a result of evaluation, activates/deactivates the ventilation fans, and providing communication of the gas measurements from the detectors via PLC-SCADA system. This information transfer can also be provided via the automation system of the existing plant.

9.8.3. Dry Type Pumping Stations and Pumping Stations Without Superstructure

The gases in the medium will be removed through the fixed ventilation shaft located on the waste water collection chamber and gas suction will be achieved by means of duct type fan.

The duct type fan will aspirate according to the result from the fixed H₂S detector and also for 5 minutes per hour or for any period of time to be determined according to the gas density which can be formed seasonally and therefore continuous accumulation of gases in the medium shall be prevented.

The continuity of the system shall be achieved via the control unit to be installed in the control panel stated in the specification for activation and deactivation of the fan according to the result from the fixed H₂S detector and giving audible warning. It can also be installed in the MCC panel, when necessary.

9.8.4. Deep Sea Discharge Facilities

A system with above mentioned technical characteristics (submersible type or dry type) shall be designed according to the submersible type or dry type structure of the deep-sea discharge pumping station.

9.8.5. Sewage Networks Without Pumping Station

The equipment to be used by the personnel in case of clogging that may occur in the sewage networks without pumping station and manhole shafts are designed.

This equipment consists of the internal/external portable gas detectors with pump that are capable of measuring H₂S, CH₄ and O₂ gases and gas masks with filter.

9.8.6. Ready-To-Connect Pumping Station (Packaged Type Pumping Stations)

The equipment to be used by the personnel for measurement of the gases to be generated due to waste water accumulated in the pumping station in the facilities with Ready-to-Connect Type Pumping Station are designed.

This equipment consists of the internal/external portable gas detectors with pump that are capable

of measuring H₂S, CH₄ and O₂ gases, gas masks with filter and breathing apparatus with clean air cylinder.

9.8.7. Solid Waste Storage Facilities Pumping Stations

The equipment to be used by the personnel for measurement of the gases that will occur due to waste water accumulated in the pumping stations where water leaked through the wastes in the Solid Waste Storage Facilities are collected and pumped.

This equipment consists of the internal/external portable gas detectors with pump that are capable of measuring at least 4 gases (CH₄, O₂, etc.), gas masks with filter and breathing apparatus with clean air cylinder.

9.9. GAS DETECTION AND SAFETY SYSTEM TECHNICAL SPECIFICATIONS

9.9.1. Submersible Type Pumping Stations Gas Detection System

Material Name	Quantity
Fixed Hydrogen Sulphide Gas (H₂S) Detector (Having Digital Display, Both relay and 4-20mA Analog output)	1 Piece
Fixed Methane Gas (CH₄) Detector (Having Digital Display, Both relay and 4-20mA Analog output)	1 Piece
Fixed Oxygen Gas (O₂) Detector (Having Digital Display, Both relay and 4-20mA Analog output)	1 Piece
Control Panel Complete panel having the characteristics specified in the specification and including all switching materials which will start the system according to the automation scenario.)	1 Piece
Warning Signs (Manufactured from a material resistant against external environment and gaseous-humid environments.)	5 Pieces
Flasher (Manufactured from a material resistant against external environment and gaseous-humid environments.)	2 Pieces
Siren (Manufactured from a material resistant against external environment and gaseous-humid environments.)	1 Piece
Safety Instructions (Manufactured from a material resistant against external environment and gaseous-humid environments.)	2 Pieces
Portable Quad Gas Detector (Detector which can be used together with its sensors and having a casing that is resistant to clip and impact, made of stainless steel or corrosion resistant material, carried as attached to belt or pocket, Lithium / Nimh rechargeable battery (included in the detector), charging adapter, calibration hose (1 m), calibration hose (1 m), sampling hose (min. 3 m), tools specific to the detector (wrench, allen key set, etc.), spare pump filters (min. 2 pieces) with Internal or External Pump)	2 Pieces
Breathing Apparatus with Clean Air Cylinder (Complete set with full face mask and harness.)	1 Pieces
Half Face Escape Mask (With carry bag and special apparatus, can be carried on the waist, conforming to DIN 58647-7 Standard, with ABEK filter.)	2 Pieces
System Cabling Works (Together with cable list, including cable ducts)	1 Set
Commissioning, transportation and installation of the system, providing training on the system	1 Set
Free of charge calibration and maintenance services for the first 1(one) year and periodic maintenance and calibration services for each following year within the guarantee period	1 Set

Note: The materials specified above shall provide all characteristics specified in the "Waste Water Treatment Plants, Sewage Network Pumping Stations Deep Sea Discharge Facilities Gas Detection and Safety System Technical Specification".

9.9.2. Dry Type Pumping Stations and Pumping Stations Without Superstructure Gas Detection System

Material Name	Quantity
Fixed Hydrogen Sulphide Gas (H₂S) Detector (Having Digital Display, Both relay and 4-20mA Analog output)	1 Pieces
Control Panel Complete panel having the characteristics specified in the specification and including all switching materials which will start the system according to the automation scenario.)	1 Pieces
Flasher (Manufactured from a material resistant against external environment and gaseous-humid environments.)	2 Pieces
Siren (Manufactured from a material resistant against external environment and gaseous-humid environments.)	1 Pieces
Warning Signs (Manufactured from a material resistant against external environment and gaseous-humid environments.)	5 Pieces
Safety Instructions (Manufactured from a material resistant against external environment and gaseous-humid environments.)	2 Pieces
Portable Quad Gas Detector (Detector which can be used together with its sensors and having a casing that is resistant to clip and impact, made of stainless steel or corrosion resistant material, carried as attached to belt or pocket, Lithium / Nimh rechargeable battery (included in the detector), charging adapter, calibration hose (1 m), calibration hose (1 m), sampling hose (min. 3 m), tools specific to the detector (wrench, allen key set, etc.), spare pump filters (min. 2 pieces) with Internal or External Pump)	2 Pieces
Breathing Apparatus with Clean Air Cylinder (Complete set with full face mask and harness.)	1 Pieces
Half Face Escape Mask (With carry bag and special apparatus, can be carried on the waist, conforming to DIN 58647-7 Standard, with ABEK filter.)	2 Pieces
System Cabling Works (Together with cable list, including cable ducts)	1 Set
Commissioning, transportation and installation of the system, providing training on the system	1 Set
Free of charge calibration and maintenance services for the first 1(one) year and periodic maintenance and calibration services for each following year within the guarantee period	1 Set

Note: The materials specified above shall provide all characteristics specified in the "Waste Water Treatment Plants, Sewage Network Pumping Stations and Deep-Sea Discharge Facilities Gas Detection and Safety System Technical Specification".

9.9.3. Ready-To-Connect (Packaged Type) Pumping Station Gas Detection System

Material Name	Quantity
Warning Signs (Manufactured from a material resistant against external environment and gaseous-humid environments.)	4 Pieces
Portable Quad Gas Detector (Detector which can be used together with its sensors and having a casing that is resistant to clip and impact, made of stainless steel or corrosion resistant material, carried as attached to belt or pocket, Lithium / Nimh rechargeable battery (included in the detector), charging adapter, calibration hose (1 m), calibration hose (1 m), sampling hose (min. 3 m), tools specific to the detector (wrench, allen key set, etc.), spare pump filters (min. 2 pieces) with Internal or External Pump)	2 Pieces
Breathing Apparatus with Clean Air Cylinder (Complete set with full face mask and harness.)	1 Pieces
Half Face Escape Mask (With carry bag and special apparatus, can be carried on the waist, conforming to DIN 58647-7 Standard, with ABEK filter.)	2 Pieces
Transportation and training	1 Set

Free of charge calibration and maintenance services for the first 1(one) year and periodic maintenance and calibration services for each following year within the guarantee period	1 Set
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Note: The materials specified above shall provide all characteristics specified in the "Waste Water Treatment Plants, Sewage Network Pumping Stations and Deep-Sea Discharge Facilities Gas Detection and Safety System Technical Specification".

9.9.4. Solid Waste Storage Facilities Pumping Station (Without Superstructure) Gas Detection System

Material Name	Quantity
Warning Signs (Manufactured from a material resistant against external environment and gaseous-humid environments.)	4 Pieces
Portable Quad Gas Detector (Detector which can be used together with its sensors and having a casing that is resistant to clip and impact, made of stainless steel or corrosion resistant material, carried as attached to belt or pocket, Lithium / Nimh rechargeable battery (included in the detector), charging adapter, calibration hose (1 m), calibration hose (1 m), sampling hose (min. 3 m), tools specific to the detector (wrench, allen key set, etc.), spare pump filters (min. 2 pieces) with Internal or External Pump)	2 Pieces
Breathing Apparatus with Clean Air Cylinder (Complete set with full face mask and harness.)	1 Pieces
Half Face Escape Mask (With carry bag and special apparatus, can be carried on the waist, conforming to DIN 58647-7 Standard, with ABEK filter.)	2 Pieces
Transportation and training	1 Set
Free of charge calibration and maintenance services for the first 1(one) year and periodic maintenance and calibration services for each following year within the guarantee period	1 Set

Note: 1-) The materials specified above shall provide all characteristics specified in the "Waste Water Treatment Plants, Sewage Network Pumping Stations Deep Sea Discharge Facilities Gas Detection and Safety System Technical Specification".

Note: 2-) In case of Submersible Type (With superstructure) Pumping Station, the equipment specified in Submersible Type Pumping Station shall be used.

9.9.5. Sewage Network Gas Detection System

Material Name	Quantity
Portable Quad Gas Detector (Detector which can be used together with its sensors and having a casing that is resistant to clip and impact, made of stainless steel or corrosion resistant material, carried as attached to belt or pocket, Lithium / Nimh rechargeable battery (included in the detector), charging adapter, calibration hose (1 m), calibration hose (1 m), sampling hose (min. 3 m), tools specific to the detector (wrench, allen key set, etc.), spare pump filters (min. 2 pieces) with Internal or External Pump)	2 Pieces
Breathing Apparatus with Clean Air Cylinder (Complete set with full face mask and harness.)	1 Pieces
Half Face Escape Mask (With carry bag and special apparatus, can be carried on the waist, conforming to DIN 58647-7 Standard, with ABEK filter.)	2 Pieces
Transportation and training	1 Set
Free of charge calibration and maintenance services for the first 1(one) year and periodic maintenance and calibration services for each following year within the guarantee period	1 Set

Note: The materials specified above shall provide all characteristics specified in the "Waste Water Treatment Plants, Sewage Network Pumping Stations and Deep-Sea Discharge Facilities Gas Detection and Safety System Technical Specification".

9.9.6. Ventilation System Submersible Type Pumping Stations

Material Name	Quantity
Duct Type Aspirator - Exproof (It shall have the characteristics specified in the Gas Detection and Safety System Technical Specification.)	1 Pieces
Roof Type Aspirator - Exproof (It shall have the characteristics specified in the Gas Detection and Safety System Technical Specification.)	1 Pieces
Window Type Aspirator - Exproof (It shall have the characteristics specified in the Gas Detection and Safety System Technical Specification.)	The number shall be determined according to the volume of the Pumping Station.
Stainless Steel Air Duct (It shall have the characteristics specified in the Gas Detection and Safety System Technical Specification.)	The length of the air duct shall be determined according to the sizes of the Pumping Station.
Fan Grills (for Duct Type - Roof Type Fans) (It shall have the characteristics specified in the Gas Detection and Safety System Technical Specification.)	The number shall be determined according to the Ventilation System.
Air Duct Made of Stainless Steel Flexible Pipe (It shall have the characteristics specified in the Gas Detection and Safety System Technical Specification.)	The length of the air duct shall be determined according to the sizes of the Pumping Station.

Note-1: The number, capacity and sizes of the materials specified above shall be determined according to the pumping station where application will be performed.

Note-2: Window type aspirator instead of roof type aspirator shall be used in the existing pumping stations. The capacity and number of the aspirators to be used shall be determined according to the volume of the pumping station.

9.9.7. Ventilation System Dry Type Pumping Stations and Pumping Stations Without Superstructure

Material Name	Quantity
Duct Type Aspirator - Exproof (It shall have the characteristics specified in the Gas Detection and Safety System Technical Specification.)	1 Pieces
Stainless Steel Air Duct (It shall have the characteristics specified in the Gas Detection and Safety System Technical Specification.)	The length of the air duct shall be determined according to the sizes of the Pumping Station.
Fan Grills (for duct type fan) (It shall have the characteristics specified in the Gas Detection and Safety System Technical Specification.)	The number shall be determined according to the structure of the air duct.
Galvanized Steel Ventilation Shaft (It shall have the characteristics specified in the Gas Detection and Safety System Technical Specification.)	The number shall be determined according to the volume of the Pumping Station.

Note-1: The number, capacity and sizes of the materials specified above shall be determined according to the pumping station where application will be performed.

Note-2: Window type aspirator instead of roof type aspirator shall be used in the existing pumping stations. The capacity and number of the aspirators to be used shall be determined according to the volume of the pumping station.

SECTION 5A.2 SPECIFICATIONS FOR ITEMS/POSE DEFINITIONS

Official item definitions from the related book shall prevail, in case of any inconsistency and vagueness in terms of item/pose definition.

The related official items/pose definitions books are as follows;

- Items/Pose Definitions Book published and approved by the General Directorate of Iller Bank
- Items/Pose Definitions Book published by Republic of Turkey Ministry of Environment and Urban Planning, Supreme Technical Board
- Items/Pose Definitions Book published by Republic of Turkey General Directorate of Highways
- Items/Pose Definitions Book published by Turkey General Directorate of Turkish Electricity Distribution Corporation
- Items/Pose Definitions Book published by Turkish Telecommunication Corporation
- Items/Pose Definitions Book published by General Directorate of State Hydraulic Works

1. CIVIL/STRUCTURAL WORKS

PARTICULAR SPECIFICATION FOR CONSTRUCTION OF T101 COLLECTION CHAMBER, T102 MECHANICAL COARSE SCREEN AND T103 MECHANICAL FINE SCREEN

The construction of T101 Collection Chamber, T102 Coarse Screen Structure and T103 Fine Screen Structure shall be executed in line with the descriptions as given in the Items/Pose Definitions Book from the Ministry of Environment and Urban Planning, Supreme Technical Board and in the Items/Pose Definitions Book from the General Directorate of Iller Bank. The following works shall be executed in line with the definitions of stated item/pose number.

- Foundation excavation and foundation fill in compliance with 14.160040/41 and 14.1700.
- Foundation and sub-foundation fill by using stabilized material in compliance with 15.140/İB-2.
- Concrete pouring in compliance with items Y.16.050/13 and Y.16.050/16,
- Construction of plywood shuttering in compliance with item Y.21001/03,
- Construction of work scaffolding and shuttering scaffolding and the removal of them, and the preparation and placement of reinforcing bar pursuant to the relevant design, and pouring the reinforced concrete of the grade, as indicated in the relevant design, and the compaction of the same, wetting the same during the setting time,
- Addition of additives to concrete to provide impermeability in compliance with item 04.379/B07,
- If deemed necessary by the Engineer, cost of taking samples of concrete in the required number and the execution of laboratory tests on them shall be borne by the Contractor.
- Application of 3 layers of tar paint to sub-soil concrete works in compliance with item 25.052/İB-2,
- Construction of 15 cm blockage in compliance with item Y.17.136 for kerbstones around the structure
- Pouring C16/20 ready mixed reinforced concrete (single row of Ø188/188 wire mesh) in compliance with item Y.16.050/13,
- Flooring by using press-manufactured groove-non-groove colour-non-colour terrazzo tile slab (cement tile, class 1), with white cement applied on top and normal cement applied at bottom, in outdoor spaces in compliance with item Y.26.005/402,
- Construction of the ironworks shall be executed as indicated in the relevant design, hot dip galvanized

PARTICULAR SPECIFICATION FOR CONSTRUCTION OF T104 AERATED GRIT ARRESTER AND T105 INLET PARSHALL FLUME

The construction of T104 Aerated Grit Arrestor and T105 Inlet Parshall Flume shall be executed in line with the descriptions as given in the Items/Pose Definitions Book from the Ministry of Environment and Urban

Planning, Supreme Technical Board and in the Items/Pose Definitions Book from the General Directorate of Iller Bank. The following works shall be executed in line with the definitions of stated item/pose number.

- Foundation excavation and foundation fill in compliance with items 14.160040/41/42/43/44, 14.1700
- Foundation and sub-foundation fill by using stabilised material in compliance with item 15.140/iB-2,
- Concrete pouring in compliance with items Y.16.050/13 and Y.16.050/16,
- Construction of plywood shuttering in compliance with item Y.21001/03,
- Construction of work scaffolding and shuttering scaffolding and the removal of them, and the preparation and placement of reinforcing bar pursuant to the relevant design, and the construction of sealing and construction joints in compliance with the relevant design, and pouring the reinforced concrete of the grade, as indicated in the relevant design, and the compaction of the same, wetting the same during the setting time,
- Addition of additives to concrete to provide impermeability in compliance with item 04.379/B07,
- If deemed necessary by the Engineer, cost of taking samples of concrete in the required number and the execution of laboratory tests on them shall be borne by the Contractor.
- Application of 3 coats of tar paint to sub-soil concrete works in compliance with item 25.052/iB-2,
- Construction of 15 cm blockage in compliance with item Y.17.136 for kerbstones around the structure,
- Pouring C16/20 ready mixed reinforced concrete (single row of Ø188/188 wire mesh) in compliance with item Y.16.050/13,
- Flooring by using press-manufactured groove-non-groove colour-non-colour terrazzo tile slab (cement tile, class 1), with white cement applied on top and normal cement applied at bottom, in outdoor spaces in compliance with item Y.26.005/402,
- Construction of the ironworks shall be executed as indicated in the relevant design, hot dip galvanized,

PARTICULAR SPECIFICATION FOR CONSTRUCTION OF T106 INLET PUMP STATION (TM1)

The construction of T106 Inlet Pump Station shall be executed in line with the descriptions as given in the Items/Pose Definitions Book from the Ministry of Environment and Urban Planning, Supreme Technical Board and in the Items/Pose Definitions Book from the General Directorate of Iller Bank. The following works shall be executed in line with the definitions of stated item/pose number.

- Foundation excavation and foundation fill in compliance with items 14.160040/41/42/43, 14.1700,
- Foundation and sub-foundation fill by using stabilized material in compliance with item 15.140/iB-2,
- Concrete pouring in compliance with items Y.16.050/13 and Y.16.050/16,
- Construction of plywood shuttering in compliance with item Y.21001/03,
- Construction of work scaffolding and shuttering scaffolding and the removal of them, and the preparation and placement of reinforcing bar pursuant to the relevant design, and pouring the reinforced concrete of the grade, as indicated in the relevant design, and the compaction of the same, wetting the same during the setting time,
- Addition of additives to concrete to provide impermeability in compliance with item 04.379/B07,
- If deemed necessary by the Engineer, cost of taking samples of concrete in the required number and the execution of laboratory tests on them shall be borne by the Contractor,
- Application of 3 layers of tar paint to sub-soil concrete works in compliance with item 25.052/iB-2,
- Construction of 15 cm blockage in compliance with item Y.17.136 for kerbstones around the structure
- Pouring C16/20 ready mixed reinforced concrete (single row of Ø188/188 wire mesh) in compliance with item Y.16.050/13,
- Flooring by using press-manufactured groove-non-groove colour-non-colour terrazzo tile slab (cement tile, class 1), with white cement applied on top and normal cement applied at bottom, in outdoor spaces in compliance with item Y.26.005/402,
- Internal-external plastering pursuant to the relevant design and the application of internal facing paint in compliance with item Y.25.003/12/14,

- External facing in compliance with item Y.25.005/03/04,
- Flooring, as specified in the relevant design, and the construction of sills, parapets and steps in compliance with items Y.26.020/042A, Y.26.020/052A and Y.26.020/131A,
- Construction of brick wall and roof pursuant to the relevant design, the application of heat and water insulation in compliance with items Y.19.055/004 and Y.19.061/003,
- Construction of the guardrails indicated in the relevant design shall be hot dip galvanised,
- Construction of chamber covers shall be CTP,

PARTICULAR SPECIFICATION FOR CONSTRUCTION OF ANAEROBIC TANK, T107/A, B

The construction of ANAEROBIC TANK, T107/A, B shall be executed in line with the descriptions as given in the Items/Pose Definitions Book from the Ministry of Environment and Urban Planning, Supreme Technical Board and in the Items/Pose Definitions Book from the General Directorate of Iller Bank. The following works shall be executed in line with the definitions of stated item/pose number.

- Foundation excavation and foundation fill in compliance with items 14.160040/41, 14.1700,
- Foundation and sub-foundation fill by using stabilized material in compliance with item 15.140/İB-2,
- Concrete pouring in compliance with items Y.16.050/13 and Y.16.050/16,
- Construction of plywood shuttering in compliance with item Y.21001/03
- Construction of curved surface shuttering of steel sheet in compliance with item Y.21.001/04,
- Construction of work scaffolding and shuttering scaffolding and the removal of them, and the preparation and placement of reinforcing bar pursuant to the relevant design, and the construction of sealing and construction joints in compliance with the relevant design, and pouring the reinforced concrete of the grade, as indicated in the relevant design, and the compaction of the same, wetting the same during the setting time,
- Addition of additives to concrete to provide impermeability in compliance with item 04.379/B07,
- If deemed necessary by the Engineer, cost of taking samples of concrete in the required number and the execution of laboratory tests on them shall be borne by the Contractor
- Application of 3 layers of tar paint to sub-soil concrete works in compliance with item 25.052/İB-2,
- Construction of 15 cm blockage in compliance with item Y.17.136 for kerbstones around the structure,
- Pouring C16/20 ready mixed reinforced concrete (single row of Ø188/188 wire mesh) in compliance with item Y.16.050/13,
- Flooring by using press-manufactured groove-non-groove colour-non-colour terrazzo tile slab (cement tile, class 1), with white cement applied on top and normal cement applied at bottom, in outdoor spaces in compliance with item Y.26.005/402,
- Construction of the ironworks shall be executed as indicated in the relevant design, hot dip galvanized.

PARTICULAR SPECIFICATION FOR CONSTRUCTION OF DISTRIBUTION STRUCTURE (DY1), T108

The construction of DISTRIBUTION STRUCTURE (DY1), T108 shall be executed in line with the descriptions as given in the Items/Pose Definitions Book from the Ministry of Environment and Urban Planning, Supreme Technical Board and in the Items/Pose Definitions Book from the General Directorate of Iller Bank. The following works shall be executed in line with the definitions of stated item/pose number.

- Foundation excavation and foundation fill in compliance with items 14.160040/41, 14.1700,
- Foundation and sub-foundation fill by using stabilized material in compliance with item 15.140/İB-2,
- Concrete pouring in compliance with items Y.16.050/13 and Y.16.050/16,
- Construction of plywood shuttering in compliance with item Y.21001/03
- Construction of curved surface shuttering of steel sheet in compliance with item Y.21.001/04,
- Construction of work scaffolding and shuttering scaffolding and the removal of them, and the preparation and placement of reinforcing bar pursuant to the relevant design, and the construction of sealing and construction joints in compliance with the relevant design, and pouring the reinforced concrete of the grade, as indicated in the relevant design, and the compaction of the same, wetting the same during the setting time,

- Addition of additives to concrete to provide impermeability in compliance with item 04.379/B07,
- If deemed necessary by the Engineer, cost of taking samples of concrete in the required number and the execution of laboratory tests on them shall be borne by the Contractor
- Application of 3 layers of tar paint to sub-soil concrete works in compliance with item 25.052/IB-2,
- Construction of 15 cm blockage in compliance with item Y.17.136 for kerbstones around the structure,
- Pouring C16/20 ready mixed reinforced concrete (single row of Ø188/188 wire mesh) in compliance with item Y.16.050/13,
- Flooring by using press-manufactured groove-non-groove colour-non-colour terrazzo tile slab (cement tile, class 1), with white cement applied on top and normal cement applied at bottom, in outdoor spaces in compliance with item Y.26.005/402,
- Construction of the ironworks shall be executed as indicated in the relevant design, hot dip galvanized.

PARTICULAR SPECIFICATION FOR CONSTRUCTION OF AERATION TANK, T109/A, B

The construction of AERATION TANK, T109/A, B shall be executed in line with the descriptions as given in the Items/Pose Definitions Book from the Ministry of Environment and Urban Planning, Supreme Technical Board and in the Items/Pose Definitions Book from the General Directorate of Iller Bank. The following works shall be executed in line with the definitions of stated item/pose number.

- Foundation excavation and foundation fill in compliance with items 14.160040/41, 14.1700,
- Foundation and sub-foundation fill by using stabilized material in compliance with item 15.140/IB-2,
- Concrete pouring in compliance with items Y.16.050/13 and Y.16.050/16,
- Construction of plywood shuttering in compliance with item Y.21001/03
- Construction of curved surface shuttering of steel sheet in compliance with item Y.21.001/04,
- Construction of work scaffolding and shuttering scaffolding and the removal of them, and the preparation and placement of reinforcing bar pursuant to the relevant design, and the construction of sealing and construction joints in compliance with the relevant design, and pouring the reinforced concrete of the grade, as indicated in the relevant design, and the compaction of the same, wetting the same during the setting time,
- Addition of additives to concrete to provide impermeability in compliance with item 04.379/B07,
- If deemed necessary by the Engineer, cost of taking samples of concrete in the required number and the execution of laboratory tests on them shall be borne by the Contractor
- Application of 3 layers of tar paint to sub-soil concrete works in compliance with item 25.052/IB-2,
- Construction of 15 cm blockage in compliance with item Y.17.136 for kerbstones around the structure,
- Pouring C16/20 ready mixed reinforced concrete (single row of Ø188/188 wire mesh) in compliance with item Y.16.050/13,
- Flooring by using press-manufactured groove-non-groove colour-non-colour terrazzo tile slab (cement tile, class 1), with white cement applied on top and normal cement applied at bottom, in outdoor spaces in compliance with item Y.26.005/402,
- Construction of two 700*700*400 mm pump pits at different points inside each tank to train the tanks
- Construction of the ironworks shall be executed as indicated in the relevant design, hot dip galvanized.

PARTICULAR SPECIFICATION FOR CONSTRUCTION OF COLLECTION STRUCTURE FOR AERATION TANKS, T110

The construction of COLLECTION STRUCTURE FOR AERATION TANKS, T110 shall be executed in line with the descriptions as given in the Items/Pose Definitions Book from the Ministry of Environment and Urban Planning, Supreme Technical Board and in the Items/Pose Definitions Book from the General Directorate of Iller Bank. The following works shall be executed in line with the definitions of stated item/pose number.

- Foundation excavation and foundation fill in compliance with items 14.160040/41, 14.1700,

- Foundation and sub-foundation fill by using stabilized material in compliance with item 15.140/IB-2,
- Concrete pouring in compliance with items Y.16.050/13 and Y.16.050/16,
- Construction of plywood shuttering in compliance with item Y.21001/03
- Construction of curved surface shuttering of steel sheet in compliance with item Y.21.001/04,
- Construction of work scaffolding and shuttering scaffolding and the removal of them, and the preparation and placement of reinforcing bar pursuant to the relevant design, and the construction of sealing and construction joints in compliance with the relevant design, and pouring the reinforced concrete of the grade, as indicated in the relevant design, and the compaction of the same, wetting the same during the setting time,
- Addition of additives to concrete to provide impermeability in compliance with item 04.379/B07,
- If deemed necessary by the Engineer, cost of taking samples of concrete in the required number and the execution of laboratory tests on them shall be borne by the Contractor
- Application of 3 layers of tar paint to sub-soil concrete works in compliance with item 25.052/IB-2,
- Construction of 15 cm blockage in compliance with item Y.17.136 for kerbstones around the structure,
- Pouring C16/20 ready mixed reinforced concrete (single row of Ø188/188 wire mesh) in compliance with item Y.16.050/13,
- Flooring by using press-manufactured groove-non-groove colour-non-colour terrazzo tile slab (cement tile, class 1), with white cement applied on top and normal cement applied at bottom, in outdoor spaces in compliance with item Y.26.005/402,
- Construction of the ironworks shall be executed as indicated in the relevant design, hot dip galvanized.

PARTICULAR SPECIFICATION FOR CONSTRUCTION OF DISTRIBUTION STRUCTURE (DY2), T111

The construction of DISTRIBUTION STRUCTURE (DY2), T111 shall be executed in line with the descriptions as given in the Items/Pose Definitions Book from the Ministry of Environment and Urban Planning, Supreme Technical Board and in the Items/Pose Definitions Book from the General Directorate of Iller Bank. The following works shall be executed in line with the definitions of stated item/pose number.

- Foundation excavation and foundation fill in compliance with items 14.160040/41, 14.1700,
- Foundation and sub-foundation fill by using stabilized material in compliance with item 15.140/IB-2,
- Concrete pouring in compliance with items Y.16.050/13 and Y.16.050/16,
- Construction of plywood shuttering in compliance with item Y.21001/03
- Construction of curved surface shuttering of steel sheet in compliance with item Y.21.001/04,
- Construction of work scaffolding and shuttering scaffolding and the removal of them, and the preparation and placement of reinforcing bar pursuant to the relevant design, and the construction of sealing and construction joints in compliance with the relevant design, and pouring the reinforced concrete of the grade, as indicated in the relevant design, and the compaction of the same, wetting the same during the setting time,
- Addition of additives to concrete to provide impermeability in compliance with item 04.379/B07,
- If deemed necessary by the Engineer, cost of taking samples of concrete in the required number and the execution of laboratory tests on them shall be borne by the Contractor
- Application of 3 layers of tar paint to sub-soil concrete works in compliance with item 25.052/IB-2,
- Construction of 15 cm blockage in compliance with item Y.17.136 for kerbstones around the structure,
- Pouring C16/20 ready mixed reinforced concrete (single row of Ø188/188 wire mesh) in compliance with item Y.16.050/13,
- Flooring by using press-manufactured groove-non-groove colour-non-colour terrazzo tile slab (cement tile, class 1), with white cement applied on top and normal cement applied at bottom, in outdoor spaces in compliance with item Y.26.005/402,
- Construction of the ironworks shall be executed as indicated in the relevant design, hot dip galvanized.

PARTICULAR SPECIFICATION FOR CONSTRUCTION OF SEDIMENTATION TANK, T112/A, B

The construction of SEDIMENTATION TANK, T112/A, B shall be executed in line with the descriptions as given in the Items/Pose Definitions Book from the Ministry of Environment and Urban Planning, Supreme Technical Board and in the Items/Pose Definitions Book from the General Directorate of Iller Bank. The following works shall be executed in line with the definitions of stated item/pose number.

- Foundation excavation and foundation fill in compliance with items 14.160040/41,42,43, 14.1700,
- Foundation and sub-foundation fill by using stabilized material in compliance with item 15.140/İB-2,
- Concrete pouring in compliance with items Y.16.050/13 and Y.16.050/16,
- Construction of plywood shuttering in compliance with item Y.21001/03
- Construction of curved surface shuttering of steel sheet in compliance with item Y.21.001/04,
- Construction of work scaffolding and shuttering scaffolding and the removal of them, and the preparation and placement of reinforcing bar pursuant to the relevant design, and the construction of sealing and construction joints in compliance with the relevant design, and pouring the reinforced concrete of the grade, as indicated in the relevant design, and the compaction of the same, wetting the same during the setting time,
- Addition of additives to concrete to provide impermeability in compliance with item 04.379/B07,
- If deemed necessary by the Engineer, cost of taking samples of concrete in the required number and the execution of laboratory tests on them shall be borne by the Contractor
- Application of 3 layers of tar paint to sub-soil concrete works in compliance with item 25.052/İB-2,
- Construction of 15 cm blockage in compliance with item Y.17.136 for kerbstones around the structure,
- Pouring C16/20 ready mixed reinforced concrete (single row of Ø188/188 wire mesh) in compliance with item Y.16.050/13,
- Flooring by using press-manufactured groove-non-groove colour-non-colour terrazzo tile slab (cement tile, class 1), with white cement applied on top and normal cement applied at bottom, in outdoor spaces in compliance with item Y.26.005/402,
- Construction of the ironworks shall be executed as indicated in the relevant design, hot dip galvanized.

PARTICULAR SPECIFICATION FOR CONSTRUCTION OF PARSHALL FLUME AND DISCHARGE FLUME, T113

The construction of PARSHALL FLUME AND DISCHARGE FLUME, T113 shall be executed in line with the descriptions as given in the Items/Pose Definitions Book from the Ministry of Environment and Urban Planning, Supreme Technical Board and in the Items/Pose Definitions Book from the General Directorate of Iller Bank. The following works shall be executed in line with the definitions of stated item/pose number.

- Foundation excavation and foundation fill in compliance with items 14.160040/41,42,43, 14.1700,
- Foundation and sub-foundation fill by using stabilized material in compliance with item 15.140/İB-2,
- Concrete pouring in compliance with items Y.16.050/13 and Y.16.050/16,
- Construction of plywood shuttering in compliance with item Y.21001/03
- Construction of curved surface shuttering of steel sheet in compliance with item Y.21.001/04,
- Construction of work scaffolding and shuttering scaffolding and the removal of them, and the preparation and placement of reinforcing bar pursuant to the relevant design, and the construction of sealing and construction joints in compliance with the relevant design, and pouring the reinforced concrete of the grade, as indicated in the relevant design, and the compaction of the same, wetting the same during the setting time,
- Addition of additives to concrete to provide impermeability in compliance with item 04.379/B07,
- If deemed necessary by the Engineer, cost of taking samples of concrete in the required number and the execution of laboratory tests on them shall be borne by the Contractor
- Application of 3 layers of tar paint to sub-soil concrete works in compliance with item 25.052/İB-2,
- Construction of 15 cm blockage in compliance with item Y.17.136 for kerbstones around the structure,

- Pouring C16/20 ready mixed reinforced concrete (single row of Ø188/188 wire mesh) in compliance with item Y.16.050/13,
- Flooring by using press-manufactured groove-non-groove colour-non-colour terrazzo tile slab (cement tile, class 1), with white cement applied on top and normal cement applied at bottom, in outdoor spaces in compliance with item Y.26.005/402,
- Construction of grey cast screen complying with item 23.255/İB-3 on the discharge flume
- Construction of the ironworks shall be executed as indicated in the relevant design, hot dip galvanized.

PARTICULAR SPECIFICATION FOR CONSTRUCTION OF RETURN - EXCESS SLUDGE PUMP STATION, T114

The construction of RETURN - EXCESS SLUDGE PUMP STATION, T114 shall be executed in line with the descriptions as given in the Items/Pose Definitions Book from the Ministry of Environment and Urban Planning, Supreme Technical Board and in the Items/Pose Definitions Book from the General Directorate of İller Bank. The following works shall be executed in line with the definitions of stated item/pose number.

- Foundation excavation and foundation fill in compliance with items 14.160040, 14.1700,
- Foundation and sub-foundation fill by using stabilized material in compliance with item 15.140/İB-2,
- Concrete pouring in compliance with items Y.16.050/13 and Y.16.050/16,
- Construction of blockage in compliance with item Y.17.136
- Construction of plywood shuttering in compliance with item Y.21001/03
- Construction of curved surface shuttering of steel sheet in compliance with item Y.21.001/04,
- Construction of work scaffolding and shuttering scaffolding and the removal of them, and the preparation and placement of reinforcing bar pursuant to the relevant design, and the construction of sealing and construction joints in compliance with the relevant design, and pouring the reinforced concrete of the grade, as indicated in the relevant design, and the compaction of the same, wetting the same during the setting time,
- Addition of additives to concrete to provide impermeability in compliance with item 04.379/B07,
- If deemed necessary by the Engineer, cost of taking samples of concrete in the required number and the execution of laboratory tests on them shall be borne by the Contractor
- Application of 3 layers of tar paint to sub-soil concrete works in compliance with item 25.052/İB-2,
- Construction of 15 cm blockage in compliance with item Y.17.136 for kerbstones around the structure,
- Pouring C16/20 ready mixed reinforced concrete (single row of Ø188/188 wire mesh) in compliance with item Y.16.050/13,
- Flooring by using press-manufactured groove-non-groove colour-non-colour terrazzo tile slab (cement tile, class 1), with white cement applied on top and normal cement applied at bottom, in outdoor spaces in compliance with item Y.26.005/402,
- Internal-external plastering pursuant to the relevant design and the application of internal facing paint in compliance with item Y.25.003/14,
- External facing in compliance with item Y.25.005/03/04,
- Flooring, as specified in the relevant design, and the construction of sills, parapets and steps in compliance with items Y.26.020/042A, Y.26.020/052A and Y.26.020/131A,
- Construction of brick wall and roof pursuant to the relevant design, the application of heat and water insulation in compliance with items Y.19.055/004 and Y.19.061/003,
- Staircase flooring in compliance with item Y.26.020/305
- Construction of the guardrails indicated in the relevant design shall be hot dip galvanised,
- Construction of chamber covers shall be CTP

PARTICULAR SPECIFICATION FOR CONSTRUCTION OF T115 SCUM COLLECTION STRUCTURE

The construction of T115 SCUM COLLECTION STRUCTURE shall be executed in line with the descriptions as given in the Items/Pose Definitions Book from the Ministry of Environment and Urban Planning, Supreme Technical Board and in the Items/Pose Definitions Book from the General Directorate of İller Bank. The following works shall be executed in line with the definitions of stated item/pose number.

- Foundation excavation and foundation fill in compliance with items 14.160040/41,42,43, 14.1700,
- Foundation and sub-foundation fill by using stabilized material in compliance with item 15.140/IB-2,
- Concrete pouring in compliance with items Y.16.050/13 and Y.16.050/16,
- Construction of plywood shuttering in compliance with item Y.21001/03
- Construction of curved surface shuttering of steel sheet in compliance with item Y.21.001/04,
- Construction of work scaffolding and shuttering scaffolding and the removal of them, and the preparation and placement of reinforcing bar pursuant to the relevant design, and the construction of sealing and construction joints in compliance with the relevant design, and pouring the reinforced concrete of the grade, as indicated in the relevant design, and the compaction of the same, wetting the same during the setting time,
- Addition of additives to concrete to provide impermeability in compliance with item 04.379/B07,
- If deemed necessary by the Engineer, cost of taking samples of concrete in the required number and the execution of laboratory tests on them shall be borne by the Contractor
- Application of 3 layers of tar paint to sub-soil concrete works in compliance with item 25.052/IB-2,
- Construction of 15 cm blockage in compliance with item Y.17.136 for kerbstones around the structure,
- Pouring C16/20 ready mixed reinforced concrete (single row of Ø188/188 wire mesh) in compliance with item Y.16.050/13,
- Flooring by using press-manufactured groove-non-groove colour-non-colour terrazzo tile slab (cement tile, class 1), with white cement applied on top and normal cement applied at bottom, in outdoor spaces in compliance with item Y.26.005/402,
- Construction of the ironworks shall be executed as indicated in the relevant design, hot dip galvanized.

PARTICULAR SPECIFICATION FOR CONSTRUCTION OF T117 LEACHATE PUMP STATION

The construction of T117 LEACHATE PUMP STATION shall be executed in line with the descriptions as given in the Items/Pose Definitions Book from the Ministry of Environment and Urban Planning, Supreme Technical Board and in the Items/Pose Definitions Book from the General Directorate of Iller Bank. The following works shall be executed in line with the definitions of stated item/pose number.

- Foundation excavation and foundation fill in compliance with items 14.160040/41/42, 14.1700,
- Foundation and sub-foundation fill by using stabilized material in compliance with item 15.140/IB-2,
- Concrete pouring in compliance with items Y.16.050/13 and Y.16.050/16,
- Construction of blockage in compliance with item Y.17.136
- Construction of plywood shuttering in compliance with item Y.21001/03
- Construction of work scaffolding and shuttering scaffolding and the removal of them, and the preparation and placement of reinforcing bar pursuant to the relevant design, and the construction of sealing and construction joints in compliance with the relevant design, and pouring the reinforced concrete of the grade, as indicated in the relevant design, and the compaction of the same, wetting the same during the setting time,
- Addition of additives to concrete to provide impermeability in compliance with item 04.379/B07,
- If deemed necessary by the Engineer, cost of taking samples of concrete in the required number and the execution of laboratory tests on them shall be borne by the Contractor
- Application of 3 layers of tar paint to sub-soil concrete works in compliance with item 25.052/IB-2,
- Construction of 15 cm blockage in compliance with item Y.17.136 for kerbstones around the structure,
- Pouring C16/20 ready mixed reinforced concrete (single row of Ø188/188 wire mesh) in compliance with item Y.16.050/13,
- Flooring by using press-manufactured groove-non-groove colour-non-colour terrazzo tile slab (cement tile, class 1), with white cement applied on top and normal cement applied at bottom, in outdoor spaces in compliance with item Y.26.005/402,
- Construction of the ironworks shall be executed as indicated in the relevant design, hot dip galvanized.

PARTICULAR SPECIFICATION FOR CONSTRUCTION OF T118 B.A.G. WATER COLLECTION TANK WITH A VOLUME OF 100 M³ AND CONTROL HOUSE

The construction of Prismatic Service Depot with a volume of 100 m³, including designating and demarcating the borders of the area where Prismatic Service Depot with a volume of V=100 m³ shall be constructed and the preparation and application of the topographical plan of the area and before commencing the construction, carrying out general investigations of it shall be in compliance with the requirements of the Regulation on the Buildings to be Constructed in Earthquake-prone Zones. The water from the excavation pit shall be drained away via pumping or drainage channel so that the work and the construction is performed in the dry environment.

Contractor shall take all kinds of precautions and place warning signs of any kind to ensure the safety of life, property and labour and provide two-way traffic and pedestrian traffic around and in the excavation pit.

The Contractor shall supply and purchase of the necessary constructional materials of any kind, which have TSE or ISO 9000 Certificate and comply with the related specifications and standards, and tools and materials, instruments, parts, machinery, equipment, pipes and hardware and all kinds of other materials and the transportation of the same from the place of supply and purchase to the worksite for the construction Prismatic Service Tank with a volume of 100 m³ according to the Constructional Drawing attached to the Contract.

The Contractor shall take the necessary precautions of any kind for the safety of the existing buildings around the trench or foundation pit.

The Contractor shall prepare and place in compliance with the related specifications and standards of the concrete and reinforced concrete shuttering of foundation, wall concrete, the columns of superstructure, beams, floor, and the lintels of doors and windows in the size as indicated in the design, and the erection of bearing and work scaffolding, the preparation of reinforcement with any diameter and of any kind and the placement of it in the shuttering in a way it is connected with the other elements, and the connection of stirrups and ties.

The Contractor shall use BS 30 concrete and reinforced concrete either batched as per TS 500 or purchased in the shuttering.

The Contractor shall construct control house in the size and with the details as indicated in the relevant design, and cover floor with ceramic, and the covering of the floor and walls of prismatic depot with ceramic, and paint external walls with acrylic paint and apply tar paint to ceiling floor, and construct gutter.

The following works shall be executed in line with the definitions of stated item/pose number.

- Application of insulation to the deck concrete, as it is specified in the relevant design, and mounting 4-mm flat glass to windows, and the application of 3 coats of tar paint to sub-soil concrete works in compliance with item 25.052/İB-2,
- Construction of 15 cm blockage in compliance with item Y.17.136 for kerbstones around the structure,
- Pouring C16/20 ready mixed reinforced concrete (single row of Ø188/188 wire mesh) in compliance with item Y.16.050/13,
- Flooring by using press-manufactured groove-non-groove colour-non-colour terrazzo tile slab (cement tile, class 1), with white cement applied on top and normal cement applied at bottom, in outdoor spaces in compliance with item Y.26.005/402;
- Construction of base and fixation mass of pipes and equipment of any kind by using concrete with cement content of 250 kg/m³;
- Construction of the ironworks shall be executed as indicated in the relevant design, hot dip galvanized.

PARTICULAR SPECIFICATION FOR CONSTRUCTION OF B1 STACK

The construction of B1 STACK shall be executed in line with the descriptions as given in the Items/Pose Definitions Book from the Ministry of Environment and Urban Planning, Supreme Technical Board and in the Items/Pose Definitions Book from the General Directorate of İller Bank. The following works shall be executed in line with the definitions of stated item/pose number.

- Foundation excavation and foundation fill in compliance with items 14.160040, 14.1700,

- Foundation and sub-foundation fill by using stabilized material in compliance with item 15.140/IB-2,
- Concrete pouring in compliance with items Y.16.050/13 and Y.16.050/16,
- Construction of blockage in compliance with item Y.17.136
- Construction of plywood shuttering in compliance with item Y.21001/03
- Construction of work scaffolding and shuttering scaffolding and the removal of them, and the preparation and placement of reinforcing bar pursuant to the relevant design, and the construction of sealing and construction joints in compliance with the relevant design, and pouring the reinforced concrete of the grade, as indicated in the relevant design, and the compaction of the same, wetting the same during the setting time,
- Addition of additives to concrete to provide impermeability in compliance with item 04.379/B07,
- Construction of sealing and construction joints pursuant to the relevant design
- If deemed necessary by the Engineer, cost of taking samples of concrete in the required number and the execution of laboratory tests on them shall be borne by the Contractor
- Application of 3 layers of tar paint to sub-soil concrete works in compliance with item 25.052/IB-2,
- Construction of 15 cm blockage in compliance with item Y.17.136 for kerbstones around the structure,
- Pouring C16/20 ready mixed reinforced concrete (single row of Ø188/188 wire mesh) in compliance with item Y.16.050/13,
- Flooring by using press-manufactured groove-non-groove colour-non-colour terrazzo tile slab (cement tile, class 1), with white cement applied on top and normal cement applied at bottom, in outdoor spaces in compliance with item Y.26.005/402,
- Construction of the ironworks shall be executed as indicated in the relevant design, hot dip galvanized.

PARTICULAR SPECIFICATION FOR CONSTRUCTION OF V1, V2 TELESCOPIC VALVE ROOM

The construction of V1, V2 TELESCOPIC VALVE ROOM shall be executed in line with the descriptions as given in the Items/Pose Definitions Book from the Ministry of Environment and Urban Planning, Supreme Technical Board and in the Items/Pose Definitions Book from the General Directorate of Iller Bank. The following works shall be executed in line with the definitions of stated item/pose number.

- Foundation excavation and foundation fill in compliance with items 14.160040/41/42, 14.1700,
- Foundation and sub-foundation fill by using stabilized material in compliance with item 15.140/IB-2,
- Concrete pouring in compliance with items Y.16.050/13 and Y.16.050/16,
- Construction of blockage in compliance with item Y.17.136
- Construction of plywood shuttering in compliance with item Y.21001/03
- Construction of work scaffolding and shuttering scaffolding and the removal of them, and the preparation and placement of reinforcing bar pursuant to the relevant design, and the construction of sealing and construction joints in compliance with the relevant design, and pouring the reinforced concrete of the grade, as indicated in the relevant design, and the compaction of the same, wetting the same during the setting time,
- Addition of additives to concrete to provide impermeability in compliance with item 04.379/B07,
- If deemed necessary by the Engineer, cost of taking samples of concrete in the required number and the execution of laboratory tests on them shall be borne by the Contractor
- Application of 3 layers of tar paint to sub-soil concrete works in compliance with item 25.052/IB-2,
- Construction of 15 cm blockage in compliance with item Y.17.136 for kerbstones around the structure,
- Pouring C16/20 ready mixed reinforced concrete (single row of Ø188/188 wire mesh) in compliance with item Y.16.050/13,
- Flooring by using press-manufactured groove-non-groove colour-non-colour terrazzo tile slab (cement tile, class 1), with white cement applied on top and normal cement applied at bottom, in outdoor spaces in compliance with item Y.26.005/402,
- Construction of the ironworks shall be executed as indicated in the relevant design, hot dip galvanized.

PARTICULAR SPECIFICATION FOR CONSTRUCTION OF T119 DISCHARGE STRUCTURE

The construction of V1, V2 TELESCOPIC VALVE ROOM shall be executed in line with the descriptions as given in the Items/Pose Definitions Book from the Ministry of Environment and Urban Planning, Supreme Technical Board and in the Items/Pose Definitions Book from the General Directorate of İller Bank. The following works shall be executed in line with the definitions of stated item/pose number.

- Foundation excavation and foundation fill in compliance with items 14.160040/41/42, 14.1700,
- Concrete pouring in compliance with items Y.16.050/13 and Y.16.050/16,
- Construction of plywood shuttering in compliance with item Y.21001/03 for the gross concrete parts as indicated in the relevant design
- Construction of work scaffolding and shuttering scaffolding and the removal of them, and the preparation and placement of reinforcing bar pursuant to the relevant design, and the construction of sealing and construction joints in compliance with the relevant design, and pouring the reinforced concrete of the grade, as indicated in the relevant design, and the compaction of the same, wetting the same during the setting time,
- Addition of additives to concrete to provide impermeability in compliance with item 04.379/B07,
- According to the requirements set out in the Circular 2015/04 of 27/04/2015 on Concrete Samples from the Republic of Turkey, Ministry of Environment and Urban Planning, General Directorate of Building Affairs and if considered necessary by the Employer, taking samples of concrete in the required number and the execution of laboratory tests on them. If deemed necessary by the Engineer, cost of taking samples of concrete, blockage, sand-gravel fill in the required number and the execution of laboratory tests on them shall be borne by the Contractor
- Application of 3 layers of tar paint to sub-soil concrete works in compliance with item 25.052/İB-2,
- Construction of 15 cm blockage in compliance with item Y.17.136 for kerbstones around the structure,
- Pouring C16/20 ready mixed reinforced concrete (single row of Ø188/188 wire mesh) in compliance with item Y.16.050/13,
- Flooring by using press-manufactured groove-non-groove colour-non-colour terrazzo tile slab (cement tile, class 1), with white cement applied on top and normal cement applied at bottom, in outdoor spaces in compliance with item Y.26.005/402,
- Construction of the ironworks shall be executed as indicated in the relevant design, hot dip galvanized.

PARTICULAR SPECIFICATION FOR CONSTRUCTION OF MB 1959 BY-PASS STACK

The construction of MB 1959 BY-PASS STACK shall be executed in line with the descriptions as given in the Items/Pose Definitions Book from the Ministry of Environment and Urban Planning, Supreme Technical Board and in the Items/Pose Definitions Book from the General Directorate of İller Bank. The following works shall be executed in line with the definitions of stated item/pose number.

- Foundation excavation and foundation fill in compliance with items 14.160040/41/42, 14.1700,
- Pouring of concrete of relevant compressive strength grade in compliance with items Y.16.050/13 and Y.16.050/16,
- Construction of plywood shuttering in compliance with item Y.21001/03 for the gross concrete parts as indicated in the relevant design
- Construction of work scaffolding and shuttering scaffolding and the removal of them, and the preparation and placement of reinforcing bar pursuant to the relevant design, and the construction of sealing and construction joints in compliance with the relevant design, and pouring the reinforced concrete of the grade, as indicated in the relevant design, and the compaction of the same, wetting the same during the setting time,
- Addition of additives to concrete to provide impermeability in compliance with item 04.379/B07,
- According to the requirements set out in the Circular 2015/04 of 27/04/2015 on Concrete Samples from the Republic of Turkey, Ministry of Environment and Urban Planning, General Directorate of Building Affairs and if considered necessary by the Employer, taking samples of concrete in the required number and the execution of laboratory tests on them, and if necessary, soil improvement (blockage, sand-gravel fill, plain concrete, etc.) and stone bedding. If deemed necessary by the

Engineer, cost of taking samples in the required number and the execution of laboratory tests on them shall be borne by the Contractor

- Construction of kerbstones for the unit pursuant to the relevant design,
- Construction of the ironworks shall be executed as indicated in the relevant design, hot dip galvanized.

PARTICULAR SPECIFICATION FOR CONSTRUCTION OF B101 ADMINISTRATIVE BUILDING

The construction of B101 ADMINISTRATIVE BUILDING shall be executed in line with the descriptions as given in the Items/Pose Definitions Book from the Ministry of Environment and Urban Planning, Supreme Technical Board and in the Items/Pose Definitions Book from the General Directorate of Iller Bank. The following works shall be executed in line with the definitions of stated item/pose number.

- Foundation excavation and foundation fill in compliance with items 14.160040, 14.1700,
- Foundation and sub-foundation fill by using stabilized material in compliance with item 15.140/İB-2,
- Concrete pouring in compliance with items Y.16.050/13 and Y.16.050/16,
- Construction of blockage in compliance with item Y.17.136
- Construction of wooden flat surface shuttering in compliance with item Y.21001/02
- Construction of work scaffolding and shuttering scaffolding and the removal of them, and the preparation and placement of reinforcing bar pursuant to the relevant design, and the construction of sealing and construction joints in compliance with the relevant design, and pouring the reinforced concrete of the grade, as indicated in the relevant design, and the compaction of the same, wetting the same during the setting time,
- Addition of additives to concrete to provide impermeability in compliance with item 04.379/B07,
- If deemed necessary by the Engineer, cost of taking samples of concrete in the required number and the execution of laboratory tests on them shall be borne by the Contractor
- Application of 3 layers of tar paint to sub-soil concrete works in compliance with item 25.052/İB-2,
- Construction of 15 cm blockage in compliance with item Y.17.136 for kerbstones around the structure,
- Pouring C16/20 ready mixed reinforced concrete (single row of Ø188/188 wire mesh) in compliance with item Y.16.050/13,
- Flooring by using press-manufactured groove-non-groove colour-non-colour terrazzo tile slab (cement tile, class 1), with white cement applied on top and normal cement applied at bottom, in outdoor spaces in compliance with item Y.26.005/402,
- Internal-external plastering pursuant to the relevant design and the application of internal facing paint in compliance with items Y.25.003/12 and Y.25.003/14
- External facing in compliance with item Y.25.005/03/04
- Flooring, as specified in the relevant design, and the construction of sills, parapets or coping in compliance with item Y.26.015/251
- Construction of brick wall and roof pursuant to the relevant design, the application of heat and water insulation in compliance with items Y.19.055/004 and Y.19.061/003
- Construction of the aluminium guardrails as indicated in the relevant design
- Construction of other ironworks pursuant to the relevant design

PARTICULAR SPECIFICATION FOR CONSTRUCTION OF B102 BLOWER BUILDING

The construction of B102 BLOWER BUILDING shall be executed in line with the descriptions as given in the Items/Pose Definitions Book from the Ministry of Environment and Urban Planning, Supreme Technical Board and in the Items/Pose Definitions Book from the General Directorate of Iller Bank. The following works shall be executed in line with the definitions of stated item/pose number.

- Foundation excavation and foundation fill in compliance with items 14.160040, 14.1700,
- Foundation and sub-foundation fill by using stabilized material in compliance with item 15.140/İB-2,
- Concrete pouring in compliance with items Y.16.050/13 and Y.16.050/16,
- Construction of blockage in compliance with item Y.17.136
- Construction of wooden flat surface shuttering in compliance with item Y.21001/02

- Construction of work scaffolding and shuttering scaffolding and the removal of them, and the preparation and placement of reinforcing bar pursuant to the relevant design, and the construction of sealing and construction joints in compliance with the relevant design, and pouring the reinforced concrete of the grade, as indicated in the relevant design, and the compaction of the same, wetting the same during the setting time,
- Addition of additives to concrete to provide impermeability in compliance with item 04.379/B07,
- If deemed necessary by the Engineer, cost of taking samples of concrete in the required number and the execution of laboratory tests on them shall be borne by the Contractor
- Application of 3 layers of tar paint to sub-soil concrete works in compliance with item 25.052/İB-2,
- Construction of 15 cm blockage in compliance with item Y.17.136 for kerbstones around the structure,
- Pouring C16/20 ready mixed reinforced concrete (single row of Ø188/188 wire mesh) in compliance with item Y.16.050/13,
- Internal-external plastering pursuant to the relevant design and the application of internal facing paint in compliance with items Y.25.003/12 and Y.25.003/14
- External facing in compliance with item Y.25.005/03/04
- Flooring, as specified in the relevant design, and the construction of sills, parapets or coping in compliance with item Y.26.015/251
- Flooring and wall cladding in compliance with items Y.26.005/404 and Y.26.006/403
- Construction of brick wall and roof pursuant to the relevant design, the application of heat and water insulation in compliance with items Y.19.055/004 and Y.19.061/003
- Construction of the ironworks shall be executed as indicated in the relevant design, hot dip galvanized

PARTICULAR SPECIFICATION FOR CONSTRUCTION OF B103 DECANter BUILDING

The construction of B103 DECANter BUILDING shall be executed in line with the descriptions as given in the Items/Pose Definitions Book from the Ministry of Environment and Urban Planning, Supreme Technical Board and in the Items/Pose Definitions Book from the General Directorate of İller Bank. The following works shall be executed in line with the definitions of stated item/pose number.

- Foundation excavation and foundation fill in compliance with items 14.160040, 14.1700,
- Foundation and sub-foundation fill by using stabilized material in compliance with item 15.140/İB-2,
- Concrete pouring in compliance with items Y.16.050/13 and Y.16.050/16,
- Construction of blockage in compliance with item Y.17.136
- Construction of wooden flat surface shuttering in compliance with item Y.21001/02
- Construction of work scaffolding and shuttering scaffolding and the removal of them, and the preparation and placement of reinforcing bar pursuant to the relevant design, and the construction of sealing and construction joints in compliance with the relevant design, and pouring the reinforced concrete of the grade, as indicated in the relevant design, and the compaction of the same, wetting the same during the setting time,
- Addition of additives to concrete to provide impermeability in compliance with item 04.379/B07,
- If deemed necessary by the Engineer, cost of taking samples of concrete in the required number and the execution of laboratory tests on them shall be borne by the Contractor
- Application of 3 layers of tar paint to sub-soil concrete works in compliance with item 25.052/İB-2,
- Construction of 15 cm blockage in compliance with item Y.17.136 for kerbstones around the structure,
- Pouring C16/20 ready mixed reinforced concrete (single row of Ø188/188 wire mesh) in compliance with item Y.16.050/13,
- Internal-external plastering pursuant to the relevant design and the application of internal facing paint in compliance with items Y.25.003/12 and Y.25.003/14
- External facing in compliance with item Y.25.005/03/04
- Flooring, as specified in the relevant design, and the construction of sills, parapets or coping in compliance with item Y.26.015/251
- Flooring and wall cladding in compliance with items Y.26.005/404 and Y.26.006/403

- Construction of brick wall and roof pursuant to the relevant design, the application of heat and water insulation in compliance with items Y.19.055/004 and Y.19.061/003
- Construction of the ironworks shall be executed as indicated in the relevant design, hot dip galvanized

The Contractor shall erect brick wall around the bases of decanter, clad the wall with ceramic tile and drain leachate into discharge channel, giving certain gradient, in the chamber so that the leachate from the decanter is contained. The current situation shall be entered in the as-built drawings and the Contractor shall make no claim with respect to this work.

The Contractor shall revise the building plan of the decanter building in a way allowing sludge carrier to come close and the work shall commence following the Employer's approval

PARTICULAR SPECIFICATION FOR CONSTRUCTION OF B104 TRANSFORMER AND GENERATOR BUILDING

The construction of B104 TRANSFORMER AND GENERATOR BUILDING shall be executed in line with the descriptions as given in the Items/Pose Definitions Book from the Ministry of Environment and Urban Planning, Supreme Technical Board and in the Items/Pose Definitions Book from the General Directorate of Iller Bank. The following works shall be executed in line with the definitions of stated item/pose number.

- Foundation excavation and foundation fill in compliance with items 14.160040, 14.1700,
- Foundation and sub-foundation fill by using stabilized material in compliance with item 15.140/İB-2,
- Concrete pouring in compliance with items Y.16.050/13 and Y.16.050/16,
- Construction of blockage in compliance with item Y.17.136
- Construction of wooden flat surface shuttering in compliance with item Y.21001/02
- Construction of work scaffolding and shuttering scaffolding and the removal of them, and the preparation and placement of reinforcing bar pursuant to the relevant design, and the construction of sealing and construction joints in compliance with the relevant design, and pouring the reinforced concrete of the grade, as indicated in the relevant design, and the compaction of the same, wetting the same during the setting time,
- Addition of additives to concrete to provide impermeability in compliance with item 04.379/B07,
- If deemed necessary by the Engineer, cost of taking samples of concrete in the required number and the execution of laboratory tests on them shall be borne by the Contractor
- Application of 3 layers of tar paint to sub-soil concrete works in compliance with item 25.052/İB-2,
- Construction of 15 cm blockage in compliance with item Y.17.136 for kerbstones around the structure,
- Pouring C16/20 ready mixed reinforced concrete (single row of Ø188/188 wire mesh) in compliance with item Y.16.050/13,
- Internal-external plastering pursuant to the relevant design and the application of internal facing paint in compliance with items Y.25.003/12 and Y.25.003/14
- External facing in compliance with item Y.25.005/03/04
- Flooring, as specified in the relevant design, and the construction of sills, parapets or coping in compliance with item Y.26.015/251
- Flooring and wall cladding in compliance with items Y.26.005/404 and Y.26.006/403
- Construction of brick wall and roof pursuant to the relevant design, the application of heat and water insulation in compliance with items Y.19.055/004 and Y.19.061/003
- Construction of the ironworks (excluding doors) shall be executed as indicated in the relevant design, hot dip galvanized

PARTICULAR SPECIFICATION FOR CONSTRUCTION OF B105 GUARD HOUSE

The construction of B105 GUARD HOUSE shall be executed in line with the descriptions as given in the Items/Pose Definitions Book from the Ministry of Environment and Urban Planning, Supreme Technical Board and in the Items/Pose Definitions Book from the General Directorate of Iller Bank. The following works shall be executed in line with the definitions of stated item/pose number.

- Foundation excavation and foundation fill in compliance with items 14.160040, 14.1700,

- Foundation and sub-foundation fill by using stabilized material in compliance with item 15.140/IB-2,
- Concrete pouring in compliance with items Y.16.050/13 and Y.16.050/16,
- Construction of blockage in compliance with item Y.17.136
- Construction of wooden flat surface shuttering in compliance with item Y.21001/02
- Construction of work scaffolding and shuttering scaffolding and the removal of them, and the preparation and placement of reinforcing bar pursuant to the relevant design, and the construction of sealing and construction joints in compliance with the relevant design, and pouring the reinforced concrete of the grade, as indicated in the relevant design, and the compaction of the same, wetting the same during the setting time,
- Addition of additives to concrete to provide impermeability in compliance with item 04.379/B07,
- If deemed necessary by the Engineer, cost of taking samples of concrete in the required number and the execution of laboratory tests on them shall be borne by the Contractor
- Application of 3 layers of tar paint to sub-soil concrete works in compliance with item 25.052/IB-2,
- Construction of 15 cm blockage in compliance with item Y.17.136 for kerbstones around the structure,
- Pouring C16/20 ready mixed reinforced concrete (single row of Ø188/188 wire mesh) in compliance with item Y.16.050/13,
- Internal-external plastering pursuant to the relevant design and the application of internal facing paint in compliance with items Y.25.003/12 and Y.25.003/14
- Construction of brick wall and roof pursuant to the relevant design, the application of heat and water insulation in compliance with items Y.19.055/004 and Y.19.061/003
- Construction of the ironworks shall be executed as indicated in the relevant design, hot dip galvanized

PARTICULAR SPECIFICATION FOR CONSTRUCTION OF MANHOLE

Construction of manhole shall be executed at the locations to be determined according to relevant design. Contractor shall;

- Carry out foundation excavation of manhole in soils of any kind and in any depth and carry out foundation excavation in soils of any kind and in any depth as battered and shored (by using all kinds of shoring, including special shoring such as steel panel, etc.) to allow the performance of all kinds of works, and the removal of the excavation material out of the foundation pit.
- Take necessary precautions to ensure labour and labourer's safety and if necessary, arranging two-way pedestrian and vehicle traffic around the foundation excavation and enclosing the foundation pit with safety tape.
- Level the foundation base, and if there is water, dewater the base, and execute the compaction of the foundation base.
- Form bedding with a thickness of 0.10 m and with a diameter from 0 to 30 mm on the compacted excavation base by using materials such as sand-gravel, crushed stone, etc., and soil improvement on excavation bases with weak bearing capacities to such thickness as will be found appropriate by the Engineer by using stabilized material; and
- Purchase following materials from concrete pipe factories that operate in compliance with TSE 821 and TSE 3830, or manufacture at a concrete pipe factory to be established as per TSE 821 and TSE 3830 by the Contractor, himself; which are manufactured according to the requirements set out in item/pose definitions 12.2190/1, 12.2190/2, 12.2190/3, 12.2190/4, 12.2190/6 in the Unit Rate Descriptions for Sewerage, Drinking Water and Construction (APPENDIX 1) from the General Directorate of Ilir Bank and compatible with Standard Design for Prefabricated Manhole (KNL-TP-23A).
 - prefabricated steam-cured manhole base unit with cement content of 500 kg/m³ of which pipe inlets are rubber sealed, item/pose number 12.2190/1
 - steam-cured manhole chamber ring with a height of 0.50 m, item/pose number 12.2190/2;
 - steam-cured manhole chamber ring with a height of 0.25 m, item/pose number 12.2190/3;
 - steam-cured chamber height adjusting unit, item/pose number 12.2190/4;

- prefabricated reinforced concrete manhole cover manufactured by using BS 18 concrete (concrete with cement content of 350 kg/m³) which is framed with sectional iron, item/pose number 12.2190/6;
- Take the prefabricated manhole base unit from the side of the manhole excavation pit and lower it down to the manhole foundation base, which is levelled, without giving damage to the base unit, and the placement of the base unit in compliance with Standard Design for Prefabricated Manhole (KNL-TP-23A) attached to the contract,
- Shall place in a way being flush with the top of ground or top of road of chamber ring and chamber height adjusting unit (if necessary) one on top of the other, join them with mortar with cement content of 600 kg/m³ in a watertight manner,
- Test the top of prefabricated units so placed for leakage according to the relevant standards
- Prefabricated manhole covers framed with sectional iron shall be manufactured in compliance with pose/item definition 08.1574/6 in the Unit Rate Descriptions for Sewerage, Drinking Water and Construction (Appendix 1) and be installed according to the requirements set out in item 12.2190/6.
- backfill manhole sides in compliance with item 14.1700 by using the excavation material put on the manhole pit side. Coarse materials such as road pavement, block, rock, etc. shall be removed from the excavation material put on the foundation pit side.

PARTICULAR SPECIFICATION FOR CONSTRUCTION OF ENCLOSURE WALL (INCLUDING PANEL FENCE)

The construction of ENCLOSURE WALL (INCLUDING PANEL FENCE), designed as Type 1 and Type 2 pursuant to the relevant design and for the construction of 1.2 m high panel fence on top of the enclosure wall, shall be executed in line with the descriptions as given in the Items/Pose Definitions Book from the Ministry of Environment and Urban Planning, Supreme Technical Board and in the Items/Pose Definitions Book from the General Directorate of Ilker Bank. The following works shall be executed in line with the definitions of stated item/pose number.

- Pouring concrete with compressive strength C20/25, which is produced at the concrete batching plant, in compliance with item Y.16.050/14
- Construction of reinforced concrete shuttering in compliance with item Y.21.001/03
- Bending concrete bar in compliance with items Y.23.014 and Y.23.015 on the exposed surfaces
- If deemed necessary by the Engineer, cost of taking samples of concrete in the required number and the execution of laboratory tests on them shall be borne by the Contractor
- Construction of panel fence on the wall in compliance with Y.17.301/02.

PARTICULAR SPECIFICATION FOR CONSTRUCTION OF IN-FACILITY SITE ARRANGEMENT AND ROAD CONSTRUCTION BY USING STEAM-CURED PAVING STONE

The construction of IN-FACILITY SITE ARRANGEMENT AND ROAD CONSTRUCTION BY USING STEAM-CURED PAVING STONE shall be executed in line with the descriptions as given in the Items/Pose Definitions Book from the Ministry of Environment and Urban Planning, Supreme Technical Board and in the Items/Pose Definitions Book from the General Directorate of Ilker Bank, Unit Rate Descriptions Book from the General Directorate of Highways. The following works shall be executed in line with the definitions of stated item/pose number.

- Flooring by using steam-cured concrete paving stone (of any colour and size) in compliance with item Y.26.017/032
- If deemed necessary by the Engineer, cost of taking samples of concrete in the required number and the execution of laboratory tests on them shall be borne by the Contractor
- Soil improvement in compliance with 15.140/İB-2, 15.140/İB-1 and 04.002/2A.

PARTICULAR SPECIFICATION FOR LAYING OF NORMAL CEMENT STEAM-CURED CONCRETE KERBSTONES HAVING SIZE OF 75x30x15 CM

LAYING OF NORMAL CEMENT STEAM-CURED CONCRETE KERBSTONES HAVING SIZE OF 75x30x15 CM shall be executed in line with the descriptions as given in the Items/Pose Definitions Book from the Ministry of Environment and Urban Planning, Supreme Technical Board and in the Items/Pose Definitions Book from the General Directorate of Ilker Bank, Unit Rate Descriptions Book from the General Directorate of Highways. The following works shall be executed in line with the definitions of stated item/pose number.

- Pouring concrete with compressive strength C16/20, which is produced at the concrete batching plant, in compliance with item Y.16.050/13,
- Construction of wooden series formwork in compliance with item Y.21.00/01,
- Manufacturing and placement of prefabricated concrete kerbstone in compliance with item Y.26.017/067, and filling the joints of two kerbstones with cement mortar with cement content of 400 kg/m³
- If deemed necessary by the Engineer, cost of taking samples of concrete in the required number and the execution of laboratory tests on them shall be borne by the Contractor

PARTICULAR SPECIFICATION FOR PLANTING OF GRASS AND FLOWER

PLANTING OF GRASS AND FLOWER shall be executed in line with the descriptions as given in the Items/Pose Definitions Book from the Ministry of Environment and Urban Planning, Supreme Technical Board and in the Items/Pose Definitions Book from the General Directorate of İller Bank. The following works shall be executed in line with the definitions of stated item/pose number.

The Contractor shall;

- lay the irrigation system according to the requirements set out in the landscaping design provided by the Employer and make the system operable, and make available at work, with transportation of any kind included, of the soil, sand, grass seed, flower plant, fertiliser, tools, parts, machinery, equipment and materials, which are necessary for the arrangement of the sod and flower areas and of such quality as is acceptable to the Engineer/Employer.
- Dig the soil to 20-25 cm depth by using a spade, and hoeing the same, and rake the same, and remove stones, root and foreign materials from the soil, and transport the foreign materials so removed to the dump site designated by the Employer or the local governments concerned,
- Sieve the fertilizer, spread and compact the same, and sow the seed and wet the same until the period of operation,
- Prepare Landscaping Irrigation design free of charge based on the land of the facility, pursuant to the relevant design, which will be prepared by the Contractor free of charge according to the point where the irrigation water will be supplied, and which will be approved by the Employer.

ITEM/POSE DEFINITIONS FOR CIVIL/STRUCTURAL WORKS

No	Pose/Item No	Pose/Item Definition (in English) // Poz tanımı (in Turkish)	Unit
1	04.002/2A	Sand (fine aggregate) (08.008) (supply with machinery) // Kum (İnce agrega) (08.008) (Makina ile temin)	m ³
2	12.2190/1	Steam cured collection chamber base (H = 0.60, with rubber seal) // Buhar kürlü parsel bacası taban elemanı (H=0,60, lastik contalı)	pcs
3	12.2190/2	Forming Collection Chamber with Prefabricated body element (H = 0.50 m and joints with 600 doses of mortar) // Prefabrik gövde elemanı ile parsel bacası teşkili (H= 0,50 m ve birleşim yerleri 600 dozlu harç)	pcs
4	12.2190/3	Forming Collection Chamber with Prefabricated body element (H = 0.25 m and joints with 600 doses of mortar) // Prefabrik gövde elemanı ile parsel bacası teşkili (H= 0,25 m ve birleşim yerleri 600 dozlu harç)	Pcs
5	12.2190/4	Steam cured Collection chamber body adjustment part // Buhar kürlü parsel bacası gövde ayar elemanı	m
6	12.2190/6	Placing precasted (casted with C18 Concrete(350dose) class, framed with profile sections) collection chamber covers-of chambers in street and main streets // BS 18 Betonu (350 dozlu) ile imal edilmiş profil demiri ile çerçevelenmiş prefabrik betonarme kapağın parsel bacası üzerine yerleştirilmesi (Cadde ve sokaklardaki parsel bacaları için)	Pcs
7	14.160040	Unbraced trench excavation(0-2m) in all type of ground //Her cins zeminde (0-2 m) iksasız hendek kazısı	m ³

No	Pose/Item No	Pose/Item Definition (in English) // Poz tanımı (in Turkish)	Unit
8	14.160041	Unbraced trench excavation(2-3m) in all type of ground // Her cins zeminde (2-3 m) iksasız hendek kazısı	m ³
9	14.160042	Unbraced trench excavation (3-4 m) in all type of ground // Her cins zeminde (3-4 m) iksasız hendek kazısı	m ³
10	14.160043	Unbraced trench excavation (4-5 m) in all type of ground // Her cins zeminde (4-5 m) iksasız hendek kazısı	m ³
11	14.160044	Unbraced trench excavation (5-6 m) in all type of ground // Her cins zeminde (5-6 m) iksasız hendek kazısı	m ³
12	14.1700	Filling work (alligation) // Paçal dolgu	m ³
13	14.1717	Filling with material from borrow area //Ariyetten alınan toprakla dolgu yapılması	m ³
14	15.23283	Drainage and blinding of sewerage line trench floor with sand and gravel // Kum ve çakıl ile kanalizasyon hendek tabanı drenajı yapılması ve körletilmesi	m ³
15	15.140/İB-1	Trench base fill with stabilized (08.008) materials // Stabilize (08.008) malzeme ile hendek, temel dolgusu yapılması	m ³
16	15.140/İB-2	Base and subbase fill with stabilized materials // Stabilize malzeme ile temel ve temel altı dolgusu	m ³
17	15.140/İB-4	Pipe bedding-padding (side fill) with granular sand, gravel // Granülometrik kum-çakılın elle sıkıştır. boru tabanı yataklaması	m ³
18	Y.16.050/13	Pouring, purchased, C16/20(BS16) ready mix concrete with concrete pump (including transportation) // Satın alınan ve beton pompasıyla, basınç dayanım sınıfı C16/20 (BS16) olan hazır beton dökülmesi (beton nakli dahil)	m ³
19	Y.16.050/14	Pouring, purchased, C20/25(BS25) ready mix concrete with concrete pump (including transportation) // Beton santralinde üretilen veya satın alınan ve beton pompasıyla basılan, C20/25 basınç dayanım sınıfında beton dökülmesi (beton nakli dahil)	m ³
20	Y.16.050/16	Pouring, purchased, C30/37 (BS30) ready mix concrete with concrete pump (including transportation) // Satın alınan ve beton pompasıyla, basınç dayanım sınıfı C30/37 (BS30) olan hazır beton dökülmesi (beton nakli dahil)	m ³
21	Y.17.136	Rubble layer with Quarry stone // Ocak taşı ile blokaj	m ³
22	Y.17.301/02	Fence with 1.20 m high Ø 4.5 mm diameter 50 * 150 mm spacing min. 2 fretted hot-dipped galvanized with electrostatic polyester powder painted panels (application on the wall with a pole spacing of 2.5 m) // 1.20 m yükseklikte Ø4.5 mm çapında 50*150 mm göz aralıklı min. 2 bükümlü sıcak daldırma galvaniz üzeri elektrostatik polyester toz boyalı panel tellerile çit yapılması (Direk aralığı 2.5 m olacak şekilde duvar üzeri uygulama)	M
23	Y.18.001/C15	Wall construction with 190 mm thick horizontal perforated bricks (190 x 190 x 135 mm) // 190 mm kalınlığında yatay delikli tuğla (190 x 190 x 135 mm) ile duvar yapılması	m ²
24	Y.18.201/A01A	Roof covering with upper and lower tiles (wide type) (Alaturka) // Alt ve üst kiremit (geniş tip) ile çatı örtüsü yapılması (Alaturka)	m ²

No	Pose/Item No	Pose/Item Definition (in English) // Poz tanımı (in Turkish)	Unit
25	Y.18.245/001	Polymer bituminous cover with glass mesh under the roof cover on the sloped roof // Eğim.çatıda çatı ört. altına cam tülü taşıyıcılı polimer bitümlü örtü	m ²
26	Y.18.245/004	Water insulation with 3 mm thick plastomer-based, fiberglass meshed polymeric bituminous cover (-10 C cold bending) under sloped roof // Eğimli çatıda, çatı örtüsü altına, 3 mm kalın. plastomer esaslı, cam tülü taş. polimer bitümlü örtü (-10 C soğuk. bük.) ile su yalıtımı yapılması	m ²
27	Y.18.461/029	3 mm thick. plastomer based polymer bituminous cover (polyester felt meshed) // 3 mm kalın. plastomer esaslı polimer bitümlü örtü (polyester keçe taşıyıcılı)	m ²
28	Y.18.461/051B	Waterproofing with 2 mm thick PVC based geomembrane // 2 mm kalınlıkta, PVC esaslı, jeomembran ile su yalıtımı yapılması/	m ²
29	Y.18.461/059B	Waterproofing with 2 mm thick EPDM based geomembrane (durable to UV, reinforced) // 2 mm kalınlıkta, EPDM esaslı, (UV dayanımlı, donatılı) jeomembran ile su yalıtımı yapılması	m ²
30	18.500/İB-8	Sealing and forming construction joint with B (20/5) Type 1. quality P.V.C. waterstop band // B (20/5) Tipi 1. kalite P.V.C. su tutucu bandı ile sızdırmazlık ve inşaat derzi yapılması	m
31	18.500/İB-13	Forming construction joint in Reinforced Slab with B (25/8) Type 1. quality P.V.C. waterstop band // Bet.döşemede A (25/8) tipi 1.kal.PVC conta ile derz	m
32	18.500/İB-17	Forming expansion joint in Reinforced Slab with B (25/5) Type 1. quality P.V.C. waterstop band // Bet.döşemede DO (25/5) tipi 1.kal.PVC conta ile genleşme derzi yapılması	m
33	18.500/İB-21	Forming construction joint in Reinforced wall with B (25/8) Type 1. quality P.V.C. waterstop band // Bet.duvarıda A (25/8) tipi 1.kal.PVC conta ile derz yapılması	m
34	18.500/İB-28	Sealing and Forming construction joint in Reinforced Slab with B (25/5) Type 1. quality P.V.C. waterstop band // B (25/5) Tipi 1. kalite P.V.C. su tutucu bandı ile sızdırmazlık ve inşaat derzi yapılması	m
35	18.500/İB-33	Sealing and Forming construction joint in Reinforced Slab with B (15/5) Type 1. quality P.V.C. waterstop band // B (15/5) Tipi 1. kalite P.V.C. su tutucu bandı ile sızdırmazlık ve inşaat derzi yapılması	m
36	Y.19.055/004	Exterior heat insulation and heat insulation plastering on the outside walls with 6 cm thickness of extruded polystyrene plates (XPS - 200 kPa pressure resistant) with rough surface or rough channel (Jacketing-Sheating) // 6 cm kalınlıkta yüzeyi pürüzlü veya pürüzlü kanallı ekstrüde polistren levhalar (XPS - 200 kPa basınç dayanımlı) ile dış duvarlarda dıştan ısı yalıtımı ve üzerine ısı yalıtım sıvası yapılması (Mantolama) /	m ²
37	19.056/İB	2.5 cm polystyrene foam joint filler between the concrete cover // Beton kap. arasına 2,5 cm polistren köp.ile derz dolgusu	m ²
38	Y.19.057/004	Heat insulation on lateral (ground contacted floor) or reverse terrace with 6cm thick (XPS durable to 300Kpa pressure) flat plates // 6 cm kalınlıkta yüzeyi düzgün levhalar (XPS - 300 Kpa basınç dayanımlı) ile yatayda (zemine oturan (toprak temaslı) döşemelerde veya ters teras çatılarda) ısı yalıtımı yapılması	m ²

No	Pose/Item No	Pose/Item Definition (in English) // Poz tanımı (in Turkish)	Unit
39	Y.19.061/003	Lying 10cm thick glasswool mattres(18kg/m ³) with water isulation (vapor transmitted) above on slab under roof // Çatı arası döşeme üzerine, 10 cm kalın. camyünü şilte (18 kg/m ³) ve üzerine su buharı geçişine açık su yalıtım örtüsü serilmesi	m ²
40	04.379/B07	Impermeability admixture for concrete // Betona su geçirimsizlik temin edici katkı maddesi	kg
41	Y.21.001/02	Construction of concrete or reinforced concrete formwork -from flat surface wooden formwork // Ahsaptan düz yüzeyli beton ve betonarme kalıbı yapılması	m ²
42	Y.21.001/03	Construction of reinforced concrete formwork -from flat surface plywood // Plywood ile düz yüzeyli betonarme kalıbı yapılması	m ²
43	Y.21.001/04	Construction of concrete and concrete form with curved surface-from meatl sheet // Sac ile egri yüzeyli beton ve betonarme kalıbı yapılması	m ²
44	Y.21.050/C11	Scaffolding with steel pipe (between 0,00-4,00m) // Çelik borudan kalıp iskelesi yapılması (0,00-4,00m arası)	m ³
45	Y.21.050/C12	Scaffolding with steel pipe(between4,01-6,00m) // Çelik borudan kalıp iskelesi yapılması (4,01-6,00m arası)	m ³
46	Y.21.050/C13	Scaffolding with steel pipe(between6,01-8,00m) // Çelik borudan kalıp iskelesi yapılması (6,01-8,00m arası)	m ³
47	Y.21.051/C11	Full safety, exterior scaffolding consisting of prefabricated components. (0,00 - 51,50 m) // Çelik borudan tam güvenli cephe iş iskelesi yapıl. (0,00-51,50m arası)	m ³
48	Y.21.051/C13	Scaffolding with steel pipe(between6,01-8,00m) // Çelik borudan kalıp iskelesi yapılması (6,01-8,00m arası)	m ³
49	Y.21.101/01	Roof construction (with wooden sheating) // Ahşaptan oturtma çatı yapılması (çatı örtüsü altı tahta kaplamalı)	m ²
50	21.188905	Price increase for The height from the bottom of the foundation pit in industrial structures (3.00 m - 6.00 m) // Sınai yapılarda temel çuk.itibaren 3-6 m yükseklik zammı	m ³
51	21.188906	Price increase for The height from the bottom of the foundation pit in industrial structures (6.01 m - 9.00 m) // Sınai yapılarda temel çuk.itibaren 6.01-9 m yükseklik zammı	m ³
52	Y.21.280/01	Laminate parquet flooring (AC1 Class 21) (including baseboard) // Laminat parke döşeme kaplaması yapılması (AC1 Sınıf 21) (süpürgelik dahil)	m ²
53	Y.22.009/02	Construction and replacement massive wooden sheet of the door wing // Ahsaptan masif tablalı dış kapı kanadı yapılması ve yerine konulması	m ²
54	22.301/İB-3	Making oak-covered kitchen countertop cabinet // Meşe kaplamalı mutfak tezgah altı dolabı	m ²
55	Y.23.010	Installation of wiremesh reinforcement(1,500-3,000 kg/m ²) // İnce hasır çelik montajı (1,500-3,000 kg/m ²)	ton
56	Y.23.014	Cutting, bending and replacing Ø 8- Ø 12 mm ribbed concrete steel bar // (Ø8-Ø12) mm beton çelik çubuğunun (nervürlü) bükülmesi ve yerine konulması	ton

No	Pose/Item No	Pose/Item Definition (in English) // Poz tanımı (in Turkish)	Unit
57	Y.23.015	Cutting, bending and replacing Ø 14- Ø 28 mm ribbed concrete steel bar // (Ø14-Ø28) mm beton çelik çubuğunun (nervürlü) bükülmesi ve yerine konulması	ton
57	Y.23.152	Manufacturing and replacing windows and doors with square and rectangular profiles // Kare ve dikdörtgen profillerden pencere ve kapı yapılması ve yerine konulması	kg
57	Y.23.176	Making and replacing various iron works from lama and profile iron // Çeşitli demir işlerinin yapılması ve yerine konulması	kg
58	Y.23.220	Railings made from iron pipes, substitution // Demir borudan korkuluk	kg
59	Y.23.241	Manufacture and replacement of plastic joinery(Door,Window,) // PVC Kapı Pencere	kg
60	23.243/13	30*30 cm ebadında 0.50 mm kalınlığında min.20 mikron elektrostatik toz boyalı (polyester esaslı) deliksiz alüminyum plakadan (en aw 3000 serisi) sarkmalı sistem asma tavan yapılması /Suspended ceiling construction from a minimum of 20 micron electrostatic powder coated (polyester based) unperforated aluminum plate (EN AW 3000 series) with a thickness of 30x30 cm and a thickness of 0.50 mm	m ²
61	Y.23.244/L	Electrostatic powder coated heat insulated aluminum joinery production and replacement // Elektrostatik toz boyalı ısı yalıtımlı alüminyum doğrama imalatı yapılması ve yerine konulması	kg
62	23.255/İB-3	Gray cast iron steps and grating and replacement in sewage construction // Kanalizasyon inşaatlarında kırdöküm basamak ve ızgara yapımı, yerine konması	kg
63	23.301/İB-2	Construction of all kinds of iron covers (including cover lifting and sealing) // Her türlü demir kapak yapılması (Kapak kaldırma tertibatı ve sızdırmazlık dahil)	kg
64	24.018	Making and placing rainwater reservoir 30x40x30 cm from the No. 12 zinc plate // 12 nolu çinkodan yağmur suyu haznesi yapılması ve yerine konulması	pcs
65	Y.25.003/12	Three- layer whitewashing on new plaster surfaces (interior) // Yeni sıva yüzeylere üç kat beyaz kireç badana yapılması (iç cephe)	m ²
66	Y.25.003/14	Two layers of water-based matt paint applied on new plaster surfaces by putty and primer (interior) // Yeni sıva yüzeylere macun ve astar uyg.iki kat su bazlı mat boya yapılması	m ²
67	Y.25.004/04	Silicone based water-based paint application by applying primer to gross concrete, plastered or old painted surfaces (exterior)//Beton, sıvalı yüzeylere, astar uygulanarak silikon esaslı su bazlı boya yapılması (dis cephe)	m ²
68	Y.25.005/03	3 mm thick acrylic based color coating on concrete, plaster and similar surfaces(Exterior)//Beton, sıva ve benzeri yüzeylere 3 mm kalınlıkta akrilik esaslı renkli kaplama yapılması (dis cephe)	m ²
69	25.052	Tar(bitumen) Paint (3 layer) // Katran badana yapılması (3 kat)	m ²
70	25.052/İB-1	Three layers of bituminous asphalt emulsion on the exterior surface of the concrete and external surfaces of the prefabricated industrial production and the exterior and interior surfaces of the BA and concrete pipes by using motorized pulverizator (100 liters manually) and sulphate	m ²

No	Pose/Item No	Pose/Item Definition (in English) // Poz tanımı (in Turkish)	Unit
		or harmful // Beton dış yüzeyler, beton ve BA boruların 3 kat bitümlü asfalt emisyonu ile tecridi	
71	24.061	Ø 100 mm diameter rainwater pipe // Ø100 mm PVC yağmur borusu	m
72	Special/Civ/26	Hot-dip galvanizing to steel works comply with TSE 914 // Demir imalata TSE 914' e uygun olacak şekilde sıcak daldırma galvaniz kaplama yapılması Measurement: The amount of steel works to be galvanized in kilogram.	kg
73	Y.26.005/402	(30x30 cm) or (33x33 cm), all kinds of designs and surface features, first quality, colored ceramic flooring and 3 mm joint spacing (with tile adhesive) // Presleme ile üretilen, üstü beyaz çimentolu altı normal çimentolu, yivli-yivsiz renkli renksiz terrazo karo plak (karosiman sınıf 1) ile dış mekanlarda döşeme kaplaması yapılması	m ²
74	Y.26.005/403	Laying of flooring with a thickness of 40 mm and 40 mm and 40 mm, with all kinds of design and surface features, first quality, colored ceramic flooring and 3 mm joint spacing (with tile adhesive) // 40 x 40 cm anma ebatlarında, her türlü desen ve yüzey özelliğinde, ı.kalite, renkli seramik yer karoları ile 3 mm derz aralıklı döşeme kaplaması yapılması (karo yapıştırıcısı ile)	m ²
75	Y.26.005/404	(42.5x42.5 cm) or (45x45 cm), with all kinds of design and surface features, with first layer, colored ceramic flooring and 3 mm joint spacing (with tile adhesive) // (42,5 x 42,5 cm) veya (45 x 45 cm) anma ebatlarında, her türlü desen ve yüzey özelliğinde, ı.kalite, renkli seramik yer karoları ile 3 mm derz aralıklı döşeme kaplaması yapılması (karo yapıştırıcısı ile)	m ²
76	Y.26.006/403	20x25 cm or 20x30 cm, all kinds of designs and surface features, first level, colored ceramic wall joints and 3 mm joint spaced wall covering (with tile adhesive) // (20 x 25 cm) veya (20 x 30 cm) anma ebatlarında, her türlü desen ve yüzey özelliğinde, ı.kalite, renkli seramik duvar karoları ile 3 mm derz aralıklı duvar kaplaması yapılması (karo yapıştırıcısı ile)	m ²
77	Y.26.015/251	Ready-made, equipped flat sheet ,sill, parapet or wall coping (all kinds of surface treatment) made of Marble aggregated concrete // Mermer agregalı betondan yapılmış hazır, teçhizatlı, düz levha ile denizlik, parapet veya harpuşa yapılması (her türlü yüzey işlemleri)	m ²
78	Y.26.017/032	Covering with 8 cm height normal cement steam cured concrete paving stone (every size, color and texture) // 8 cm yüksekliğinde normal çimentolu buhar kürlü beton parke taşı ile döşeme kaplaması yapılması (her ebat, renk ve desende)	m ²
79	Y.26.017/067	75x30x15 cm normal cement steam cured concrete curbstone (bevelled, every color) // 75 X 30 X 15 cm boyutlarında normal çimentolu buhar kürlü beton bordür döşenmesi (pahlı, her renk)	m
80	Y.26.017/128	Laying 30 x 10 x free length cm in diemnsions normal cemented setam cured stone gutter(every color) // 30 x 10 x serbest boy cm boyutlarında normal çimentolu buhar kürlü beton oluk taşı döşenmesi (her renk)	m
81	Y.26.020/012A	Covering with 3 cm thick colored marble sheet (3 cmx30-40-50 cm x free length) (honed or polished) // 3 cm kalınlığında renkli mermer levha ile döşeme kaplaması yapılması	m ²
82	Y.26.020/021A	Wall covering with 2 cm thick white marble slab (2 cmx30-40-50 cmx free size) (honed or polished) // 2 cm kalınlığında beyaz mermer levha	m ²

No	Pose/Item No	Pose/Item Definition (in English) // Poz tanımı (in Turkish)	Unit
		ile duvar kaplaması yapılması (2cmx30-40-50cmx free length)(honlu veya cilalı)	
83	Y.26.020/042A	3 cm thick colored marble slab with exterior sill (3 cmx30-40-50 cmx free size) (honed or polished) // 3 cm kalınlığında renkli mermer levha ile dış denizlik yapılması	m ²
84	Y.26.020/052A	Parapet made of 3 cm thick colored marble slab (3 cmx30-40-50 cmx free size) (honed or polished) // 3 cm kalınlığında renkli mermer levha ile parapet yapılması	m ²
85	Y.26.020/131A	Coating of ladder step with light colored traverten plate (step 3 cm, riser 2 cm) (honed or polished) // Açık renkli traverten levha ile merdiven basamağı kaplaması yapılması (bas 3 cm, rıht 2 cm kalın.)	m ²
86	Y.26.020/305A	Paving with 4 cm thick andesite sheet (30 cmx free length) // 4 cm kalın. andezit levha ile döşeme kaplaması yapılması	m ²
87	Y.27.501/01	250/350 kg cement mortar with coarse and fine mortar (exterior) // 250/350 kg çimento dozlu kaba ve ince harçla sıva yapılması (dış cephe sıvası)	m ²
88	Y.27.501/02	200/250 kg lime/cement mix coarse and fine mortar plaster (interior wall plaster) // 200/250 kg kireç/çimento karışımı kaba ve ince harçla sıva yapılması (iç cephe sıvası)	m ²
89	Y.27.501/03	200/250 kg lime/cement mix coarse and fine mortar plaster (ceiling) // 250/350 kg çimento-kireç karışımı kaba ince harçla sıva yapılması (tavan)	m ²
90	Y.27.562/015	Preparation of 4 cm thick plaster on internal or external surfaces with inorganic binding ready (fabricated) coarse / fine plaster mortar (TI, WI, CSII) // İnorganik bağlayıcı hazır (fabrikasyon) kaba/ince sıva harcı (TI, WI, CSII) ile iç ve dış yüzeylere 4 cm kalınlıkta sıva yapılması	m ²
91	Y.27.581/MK	Construction of leveling layer with 200 kg cement dosage // 200 dz çimento harcıyla tesviye tabakası yapımı	m ²
92	Y.27.583	Construction of screed with 2.5 cm thickness and 400 kg cement dosage // 2.5 cm kalınlığında 400 kg çimento dozlu sap yapılması	m ²
93	Y.28.645/C41	PVC and aluminum joinery profile with 4 + 4 mm thickness and 12 mm intermediate space with double glazed window unit with solar and temperature control coating // PVC ve alüminyum doğramaya profil ile 4+4 mm kalınlıkta 12 mm ara boşluklu ilk camı güneş ve ısı kontrol kaplamalı çift camlı pencere ünitesi takılması	m ²
94	37.030/İB	Lawn and flower planting // Çim ve çiçek ekilmesi	da
95	Special/Civ/25	Sapling planting The plantation of 1000 saplings, including the performance in line with the descriptions as given in the Unit Rate Descriptions Book from the Ministry of Environment and Urban Planning, Supreme Technical Board and in the Unit Rate Descriptions Book from the General Directorate of İller Bank of the necessary construction works of any kind according to the relevant design, and making available at work the saplings indicated in the relevant design and in addition to these, the saplings of mandarin, orange, lemon, pine tree and palm tree and stakes to be determined by the Employer, and digging sapling pit in such diameter and depth as are required by the Employer, and the removal of sapling pit residues (stone, clay, greywacke, etc.), and the separation of the soil of good quality, and the transportation of the parts of poor quality such as stone, clay-	1000 pcs

No	Pose/Item No	Pose/Item Definition (in English) // Poz tanımı (in Turkish)	Unit
		<p>greywacke, etc. out of the site and piling of them, and the distribution of saplings within any distance to the pits dug, and unpacking the saplings, and the plantation of the saplings, and backfilling the pits with soil and the compaction of them, and watering the newly planted saplings for the first time by carrying the water within any space, and if necessary, unpacking the stakes and fastening them to the saplings and for the foregoing, all kinds of the necessary materials and the loss of material, labour, machinery, tools and equipment costs, and loading, horizontal and vertical handling and unloading of any kind, and the contractor's profit, and overhead.</p> <p>Measurement: Amount of the plantation of saplings as expressed in no. 1000 saplings, which is carried out actually according to the relevant design and found appropriate by the Employer.</p> <p>Note: It shall be deemed that in the scope of this unit price, the necessary operations, manufacturing and construction works for the completion of all works according to the relevant design are included.</p> <p>//</p> <p>Fidan dikilmesi</p> <p>Projesine göre gerekli her çeşit inşaat imalatının; Çevre ve Şehircilik Bakanlığı Yüksek Fen Kurulu Başkanlığı Birim Fiyat Tarifleri Kitabı ile İller Bankası A.Ş. Genel Müdürlüğü Birim Fiyat Tarifleri Kitabı'nda yer alan tariflerine uygun olarak yapılması, projesinde belirtilen fidan ve bunlara ek olarak idarece belirlenecek olan mandalina, portakal, limon, çam ve palmye fidanlarının ve hereklerin iş başında temini, idarece istenilen, çap ve derinlikle fidan çukurunun açılması fidan çukuru artıklarının(taş, kil, grovak vb.) ayıklanması, iyi vasıflı toprakların ayrılması, taş, kil-grovak v.b. gibi vasıfsız kısımların saha dışına taşınması ve yığılması, açılan çukurlara; her türlü mesafe dahilindeki fidanların tevzii ambalajlarının açılması, dikimi, çukurların toprakla doldurulması, bastırılması ve ilk suyun her türlü mesafe dahilinde taşınarak fidanlara verilmesi, lüzumunda hereklerin açılması ve fidanlara bağlanması için gerekli her türlü malzeme ve zayiati, işçilik makine, alet ve edevat giderleri, her türlü yükleme, yatay ve düşey taşıma, boşaltma, yüklenici karı ve genel giderler dahil 1000 adet fidan dikilmesidir.</p> <p>Ölçü: Projesine göre fiilen yapılan ve idarece uygun görülen fidan dikiminin 1000 adet üzerinden miktarıdır.</p> <p>Not: Bu birim fiyat kapsamında tüm işlerin projesine göre tamamlanması için gerekli işlemler, imalat ve inşaat işlerinin dahil olduğu kabul edilecektir.</p>	
96	37.092/3	Laying 10 -15 cm thickness topsoil on the field to be planted // Bitkisel kaplama yapılacak saha üzerine 10-15 cm kalınlıkta bitkisel toprağın serilmesi	m ³
97	37.092/2	Supply of topsoil // Bitkisel toprak temini	m ³
98	37.092/1	Fertilizing of the soil // Toprağın gübrelenmesi	ton
99	Special/Civ/01	<p>Aluminium Handrail // Alüminyum Korkuluk</p> <p>Construction of the aluminum guardrails as indicated in the relevant design including costs of safety, and the costs of all kinds of the necessary materials and the loss of material, the construction works, manufacturing and transportation of any kind according to the relevant design, and the costs of all kinds of labour, tools, materials, machinery, equipment and workshop, and the costs of horizontal and vertical</p>	m

No	Pose/Item No	Pose/Item Definition (in English) // Poz tanımı (in Turkish)	Unit
		handling and loading and unloading of any kind, and the price increase of any kind for difficulties, and the contractor's profit, and overhead.	
100	Special/Civ/02	<p>B106 CONSTRUCTION OF SAMPLING AND FLOWMETER CABINET</p> <p>Panels (CTP) serving as the walls and bottom of sampling cabinet shall be made of two-walled material, providing sound and heat insulation by injecting polyurethane in-between. Door and window joinery shall be 1st Class smoked PVC (Pimapen) and glazing shall be coloured, double-layer insulated glazing.</p> <p>Sampling cabinet base shall be constructed of box section frame 1.5 mm in thickness and painted with antirust paint.</p> <p>Sampling cabinet shall have a 2-year warranty against manufacturing and workmanship faults.</p> <p>Size:</p> <p>Width: 1500 mm</p> <p>Depth: 1500 mm</p> <p>Measurement: Number of 1500 x 1500 mm Sampling Cabinet, which is constructed actually according to the relevant design and found appropriate by the Employer.</p> <p>Note: It shall be deemed that in the scope of this unit price, the necessary operations, manufacturing and construction works for the completion of all works according to the relevant design are included.</p> <p>//</p> <p>B106 NUMUNE ALMA VE DEBİMETRE KABİNİ YAPILMASI</p> <p>Numune alma kabininin duvar ve tabanını oluşturan paneller (CTP) 2 cidarlı malzemeden ve arasında poliüretan enjekte ile ses ve ısı yalıtımı sağlanmış olacaktır. Kapı ve pencere Doğramaları 1.sınıf füme PVC (Pimapen), Camlar renkli çift kat ısıcam olacaktır.</p> <p>Numune alma kabininin zemini 1,5 mm kalınlığında ve kutu profil şase malzemeden ve antipas boya ile boyalı olacaktır.</p> <p>Numune alma kabini imalat ve işçilik hatalarına karşı 2 yıl garantili olacaktır.</p> <p>Ölçüler</p> <p>Genişlik : 1500 mm</p> <p>Derinlik : 1500 mm</p> <p>Ölçü: Projesine göre fiilen yapılan ve idarece uygun görülen 1500 x 1500 mm Boyutlarında Numune Alma Kabini adedidir.</p> <p>Not: Bu birim fiyat kapsamında tüm işlerin projesine göre tamamlanması için gerekli işlemler, imalat ve inşaat işlerinin dahil olduğu kabul edilecektir.</p>	lump-sum
101	Special/Civ/03	<p>SUPPLY AND INSTALLATION OF TREATMENT PLANT LABORATORY EQUIPMENT AND CONSUMABLES</p> <p>For use at the Wastewater Treatment Plant under the contract, the supply and installation of 1 (one) set of Treatment Plant Laboratory Equipment and Consumables comprising 43 (forty-three) individual items mentioned below, including the supply in compliance with the requirements of the relevant standard and specifications of Laboratory Equipment and Consumables comprising 1 Incubator (120 L), HASSA- 1 Distilled Water Device with a capacity of 8 l/h, 1 Analytical Balance, 1 Thermoreactor, 1 Spectrophotometer + laptop + tubs + kits, HASSA- 1</p>	lump-sum

No	Pose/Item No	Pose/Item Definition (in English) // Poz tanımı (in Turkish)	Unit
		<p>BOD Test set (6-unit), 1 Incubator, 1 PH meter, 1 Oxygen meter (with ph, conductivity and O2 probes), 1 Vacuum Filtration System, 1 Magnetic Mixer with Heater, 1 Digital Buret 50 ml, 1 Automatic Pipette (Set), 1 Desiccator (350 mm), 4 Imhoff Funnels (1000 ml), 2 Pliers without Claw, 2 Blunt-end Pliers, 6 Spatulas, 30 Glass Rods, 2 Wastewater Sampling Vessels (Drum) 10 l, Polyethylene, 2 Polyethylene Graduated Cylinders (set), 4 Beakers (set), 4 Erlenmeyer Flasks (set), 12 Washing Bottles (500 ml pietilene), 1 Hair Brush (set), 1 laboratory clock, 2 Sample Scoops (Teflon) 1000 ml, 15 Magnetic Stir Bars, 2 Thermometers, 2 Stands; stand for drying glass material, Plastic, 2 Imhoff stands, 1 Funnel (set), 5 Pendant Switches (Two-way), 1 Glass pipette (set), 2 Volumetric flasks (set), 6 Colour bottles for storing solution (1000ml), 25 Watch Glasses (100 mm), 1 Zephiran (10 l), 1 Alcohol (10 l), 1 Fridge (370 l), 1 Scale for coarse particles, 1 Microscope and 500 Pipettes (1ml) and the placement of them in the laboratory room space reserved in the Administrative Building, the assembly and installation of the same, making the same operable and for the foregoing, the costs of all kinds of materials and the loss of material, the purchase of materials of any kind and the transportation of them to the plant site, and the costs of all kinds of labour, materials, tools, machinery and equipment, and the costs of horizontal and vertical handling, loading and unloading of any kind, and the contractor's profit, and overhead.</p> <p>Measurement: Number of the complete set of the 43 (forty-three) individual items listed above, together with their quantities.</p> <p>Note: All of the aforesaid materials shall be placed following the completion of the construction of the Administrative Building and making the laboratory room space ready.</p> <p>The laboratory equipment shall, as a minimum, be capable of carrying out testing of suspended solids, COD, BOD5, ammonia-N, nitrate-N, total-N, Ortho-P, total-P, pH and alkalinity and for suspended solids and total solids, determination of SSVI and microscopic assessments for sludge.</p> <p>//</p> <p>ARITMA TESİSİ LABORATUVAR EKİPMANI VE SARF MALZEMELERİNİN TEMİN EDİLMESİ VE YERİNE KONULMASI</p> <p>İşin sözleşme kapsamındaki Atıksu Arıtma Tesisinde kullanılmak üzere;</p> <p>1 adet Etüv (120 L), 1 adet Distile Su Cihazı: 8 L/h Kapasiteli, 1 adet Analitik Terazı, 1 adet Termoreaktör cihazı, 1 adet Spektrofotometre + laptop + küvetler + kitler, 1 adet BOİ Deney seti (6'lı), 1 adet İnkübatör, 1 adet PH metre, 1 adet Oksijen metre (ph,iletkenlikve O2 problemleri ile), 1 adet Vakum Filtrasyon Sistemi, 1 adet Isıtıcılı Manyetik Karıştırıcı, 1 adet Digital Büret 50 ml, 1 adet Otomatik Pipet (Set), 1 adet Desikatör (350 mm), 4 adet İmhoff Konisi (1000 ml), 2 adet Tırnaksız Pens, 2 adet Küt uçlu Pens, 6 adet Spatül, 30 adet Cam Baget, 2 adet Atıksu Numune Alma kabı (Bidon) 10 lt Polietilen, 2 adet Polyetilen Mezür (set), 4 adet Beher(set), 4 adet Erlen(set), 12 adet Piset (500 ml piyetilen), 1 adet Kıl fırça (set), 1 adet Laboratuar saati, 2 adet Numune kepçesi (Teflon) 1000 ml, 15 adet Manyetik Karıştırıcı (Balık), 2 adet Termometre, 2 adet Stand; Cam Malzeme kurutma standı Plastik, 2 adet İmhoff standı, 1 adet Huni (set), 5 adet Puar (Çift yönlü), 1 adet Cam pipet (set), 2 adet Balon joje (set), 6 adet Renkli çözelti saklama şişesi (1000ml), 25 adet Saat Camı (100mm), 1 adet Zefiran (10 lt), 1 adet Alkol (10 lt), 1 adet Buzdolabı (370 lt), 1 adet Kaba terazı, 1 adet Mikroskop ve 500 adet Damlalık</p>	

No	Pose/Item No	Pose/Item Definition (in English) // Poz tanımı (in Turkish)	Unit
		<p>(1ml)'den oluşan, Laboratuvar Ekipmanı ve Sarf Malzemelerinin ilgili standart ve şartname esaslarında temin edilip, İdare Binasında mekan olarak ayrılmış olan laboratuvar odasına konulması, kurulum ve montajının yapılarak çalışır hale getirilmesi için, gerekli olan her türlü malzeme ve zayıyatı, her türlü malzeme alımı ve tesis mahalline nakliye ve taşıma giderleri, her türlü işçilik, araç, gereç, makine ve teçhizat giderleri, her türlü yatay ve düşey taşıma, yükleme ve boşaltma giderleri ile yüklenici karı ve genel giderler dahil yukarıda belirtilen 43 (kırk üç) ayrı kalem malzemeden ibaret 1 (bir) takım Arıtma Tesisi Laboratuvar Ekipmanı ve Sarf Malzemelerinin temin edilmesi ve yerine konulmasıdır.</p> <p>Ölçü: Yukarıda miktarlarıyla listelenen 43 (kırk üç) ayrı kalem malzemenin komple takım adedidir.</p> <p>Not: Söz konusu malzemelerin tümü; İdare Binası inşaatının tamamlanıp, laboratuvar odası mahallinin hazır edilmesini müteakip yerine konulacaktır.</p> <p>Laboratuvar ekipmanları, askıdaki katı madde analizi, kimyasal oksijen ihtiyacı analizi (COD), BOD5 analizi, amonyak-N analizi, nitrat-N, toplam azot, Orto-P, toplam fosfor, pH, alkalilik, toplam katı madde, SSVI determinasyonu, çamur için mikrobiyolojik analiz yapabilecek kapasite ve özellikte olmalıdır.</p>	
102	Special/Civ/04	<p>CONSTRUCTION OF THE PLANT'S GATE</p> <p>The construction of 1 (one) plant gate, including the performance in line with the descriptions as given in the Unit Rate Descriptions Book from the Ministry of Environment and Urban Planning, Supreme Technical Board and in the Unit Rate Descriptions Book from the General Directorate of İller Bank of the necessary construction works of any kind according to the relevant design, and making available at work, with transportation of any kind included, the necessary bars and sectional iron and steel sheet for the construction of iron gate in compliance with the relevant design provided by the Employer and with the relevant standards, and the cutting, bending, welding of the same, and the mounting of the same, and the painting of the same with two coats of red lead and two coats of oily paint and for the performance of these works, the costs of the necessary iron rivets, bolts, weld, paint and all kinds of materials and the loss of material, all kinds of labour, tools, materials, machinery, equipment and workshop, and the costs of horizontal and vertical handling, loading and unloading of any kind, and the contractor's profit, and overhead.</p> <p>NOTE: To be installed in-situ following the completion of the enclosure wall.</p> <p>Measurement: Number of plant gate, which is constructed actually according to the relevant design and found appropriate by the Employer.</p> <p>//</p> <p>TESİSİN GİRİŞ KAPISININ YAPILMASI</p> <p>Projesine göre gerekli her çeşit imalatın; Çevre ve Şehircilik Bakanlığı Yüksek Fen Kurulu Başkanlığı Birim Fiyat Tarifleri Kitabı ile İller Bankası A.Ş. Genel Müdürlüğü Birim Fiyat Tarifleri Kitabı'nda yer alan tariflerine uygun olarak yapılması, idarece verilen projesine ve ilgili standartlara uygun olarak demir giriş kapısı yapılması için gerekli çubuk ve profil demiri ile sac levhanın iş başında her türlü taşıma dahil temini, projesine göre kesilmesi, bükülmesi, kaynaklanması, yerine montajı, 2 kat sülyen</p>	lump-sum

No	Pose/Item No	Pose/Item Definition (in English) // Poz tanımı (in Turkish)	Unit
		<p>ve 2 kat yağlı boyayla boyanması, bu işlerin yapılması için gerekli demir perçin, cıvata, kaynak, boya ve her türlü malzeme ve zayıatı, her türlü işçilik, araç, gereç, makine, teçhizat ve atölye giderleri, her türlü yatay ve düşey taşıma, yükleme ve boşaltma giderleriyle, yüklenici karı ve genel giderler dahil 1 (bir) adet tesis giriş kapısı yapılmasıdır.</p> <p>NOT : Çevre duvarı tamamlanmasına müteakip yerinde montajı yapılacaktır. konulacaktır.</p> <p>Ölçü: Projesine göre fiilen yapılan ve idarece uygun görülen tesis giriş kapısı adedidir.</p>	
103	Special/Civ/05	<p>CONSTRUCTION OF SEWERAGE LINE BY USING STEAM-CURED (WITH MUFF) CONCRETE PIPE WITH Ø600 MM BORE AND HAVING INTEGRATED SEAL WITH CEMENT CONTENT OF 500 KG/M3 (WITH TRENCH BACKFILLED WITH EXCAVATION MATERIAL)</p> <p>The price for 1 (one) meter, including, in the scope of the sewerage network construction to be carried out in any depth by using steam-cured (with muff) concrete pipe with Ø600 mm bore and having integrated seal with cement content of 500 kg/m3;</p> <p>Carrying out trench excavation as battered or shored (by using shoring of any kind such as special shoring like steel panel, etc.) to such degree that it will allow the execution of works and laying operations of any kind in soils of any kind and ensure labour and labourer's safety; and</p> <p>Removal of the excavation material out of trench pit, and the performance of such additional works as might be needed owing to sewers and drinking water conduits, sewage pits, PTT lines and other utilities that might be encountered during the excavation, and dismounting or cutting road pavement of any kind at the place of excavation; and</p> <p>Taking the necessary precautions to ensure labour and labourer's safety and if necessary, arranging two-way pedestrian and vehicle traffic around the trench and enclosing the trench with safety tape; and</p> <p>Levelling the trench base, and if there is water, dewatering the base, and the compaction of the excavation base, and at the compacted excavation base, forming bedding at entire trench base by using the material with minimum D/10+10 cm (D: outer diameter) as described in item 15.140/İB-7f included in the Unit Rate Descriptions Book from the General Directorate of İller Bank, and soil improvement on excavation bases with weak bearing capacities to such length and thickness as will be found appropriate by the Employer by using stabilised material; and</p> <p>Purchase of the steam-cured (with muff) concrete pipe with Ø600 mm bore and having integrated seal with cement content of 500 kg/m3 and special parts thereof ("C" parts), which are manufactured in compliance with TS 821 EN 1916 and TS 3830 standards in the size and to the requirements as specified in the "Special Specifications for Concrete/ Reinforced Concrete Pipes and Fittings from the General Directorate of İller Bank" or manufacturing the concrete pipes and special parts ("C" parts) in question in compliance with TS 821 EN 1916 and TS 3830 standards in the size and to the requirements as specified in the "Special Specifications for Concrete/ Reinforced Concrete Pipes and Fittings from the General Directorate of İller Bank" at a concrete pipe factory to be established by the Contractor, and the execution of the tests of any kind of pipes and special parts ("C" part) by the Employer in compliance with TS 821 EN 1916 and following the execution of the necessary tests, the</p>	m

No	Pose/Item No	Pose/Item Definition (in English) // Poz tanımı (in Turkish)	Unit
		<p>transportation of pipes from the place of manufacturing or purchase to the side of the trench where they will be laid; and</p> <p>At the places shown on the approved constructional drawing enclosed to the contract, lowering the pipes down to the trench without giving damage to them, and laying of the pipes in compliance with item 12.218226, and the execution of the necessary leak tests of the pipes; and</p> <p>While laying the pipes, laying the necessary steam-cured "C" parts with integrated seal (at the places to be determined between two manholes by taking account of the actual situation in situ by the Construction Supervisor(s) appointed by the Employer) according to the housing layout plan; and</p> <p>Of the line made subject to leak test, encasing the pipes over the pipe and on sides of the pipe up to 0.30 m height above top of pipe in compliance with the requirements of item 15.140/IB-7f included in the Bills of Quantities from Iller Bank; and</p> <p>For backfilling the trench in compliance with item 14.1700 included in the Unit Rate Descriptions book from the General Directorate of Iller Bank by using the excavation material put on the trench side, the removal of coarse materials such as road pavement, block, rock, etc. from the excavation material, and taking manually or mechanically the excavation material so refined and placing the excavation material in the trench, and laying the excavation material in layers of 20 cm, and wetting and tamping the same, and levelling and arranging the top surfaces of the same, and the transportation of the remaining excavation material from trench backfill (as much as the volume of pipe-bedding material-road pavement, etc.) to the dump site designated by the Employer, and dumping the same in the dump site, and levelling and arranging the same in the dump site; and</p> <p>Execution pursuant to the Special Technical Specifications for Digital Operation Designs from Iller Bank of coordinate survey, calculation and benchmark of all the "C" parts provided on the sewerage lines, and the preparation of the as-built drawings, together with each progress payment, and the submission of the same to the Employer; and</p> <p>Preparing free of charge the modification designs of any kind that will be required by the Employer during the performance of the work, and the submission of the same to the Employer for approval; and</p> <p>Performance of concrete-reinforced concrete works at the places indicated in the final design and the purchase of bar, cement, sand-gravel, shuttering and all kinds of the other necessary materials as incorporated in these works, and the transportation of the same to the worksite, and loading the same onto vehicles, and unloading the same; and</p> <p>Purchase, including losses, of the cement, sand-gravel, stabilised or crushed stone and all kinds of other materials as incorporated in the aforesaid works, loading the same onto vehicles and unloading the same, stacking, all kinds of material and the losses of material, the transportation of all kinds of materials to the construction site and loading onto and unloading from vehicles, price increase of any kind for difficulties arising from sludge and for water drainage and depth and loading, horizontal and vertical handling, unloading, stacking of any kind on the construction site, labour, tools and materials costs, and test and laboratory costs of any kind, and depreciation, interest, maintenance,</p>	

No	Pose/Item No	Pose/Item Definition (in English) // Poz tanımı (in Turkish)	Unit
		<p>power, repair and insurance costs, and the contractor's profit, and overhead.</p> <p>Measurement: For the completed network lines, measurement shall be made from the axis of manholes and 1.10 m shall be extracted.</p> <p>Note:</p> <p>1) Backfilling of the trench above encasing shall be up to the top of road for non-paved roads and to the sub-pavement elevation for paved roads.</p> <p>2) The steam-cured (with muff) concrete pipes with Ø600 mm bore and having integrated seal which are manufactured or purchased have to have TSE certificates so that they can be accepted by the Employer.</p> <p>3) Those steam-cured concrete pipes with Ø600 mm bore and having integrated seal and the special parts thereof ("C" parts) which are not compatible with Special Specifications for Concrete/ Reinforced Concrete Pipes and Fittings from the General Directorate of İller Bank enclosed to the contract, and with TS 821 EN 1916 and TS 3830 standards shall not be permitted to be used in the scope of the plant construction.</p> <p>//</p> <p>Ø600 MM İÇ ÇAPINDA 500 DOZLU ENTEGRE CONTALI, BUHAR KÜRLÜ (MUFLU) BETON BORU İLE KANALİZASYON HATTI YAPILMASI (HENDEK DOLGUSU KAZIDAN ÇIKAN MALZEME İLE)</p> <p>Ø600 mm. iç çapında 500 Doz.luEntegre contalı, buhar kürlü (muflu) beton boru ile her derinlikte yapılacak kanalizasyon şebeke inşaatı kapsamında;</p> <p>Her türlü klasta ve her cins zeminde her türlü imalat ve ferşiyatın yapılmasını mümkün kılacak, iş ve işçi emniyetini sağlayacak ölçüde şevli veya iksalı hendek kazısının yapılması (çelik pano vs. gibi özel iksadahlil her türlü iksa kullanılarak),</p> <p>Kazı malzemesinin hendek çukuru dışına atılması, kazı sırasında karşılaşılabilecek pıssu ve içmesuyu mecraları, lağım çukurları, PTT hatları ve diğer alt yapı tesisleri dolayısıyla gerekebilecek munzam çalışmaların yapılmasıile kazının yapıldığı yerdeki her türlü yol kaplamasının sökülmesi veya kesilmesi,</p> <p>İş ve işçi güvenliğinin sağlanması için gerekli tedbirlerin alınması, gerekmesi halinde hendek kenarında yaya ve taşıt trafiğinin geliş-gidişinin sağlanarak hendek kenarına emniyet bandı çekilmesi,</p> <p>Hendek tabanının tesviyesinin yapılması, varsa tabandaki suyun kurutulması, kazı tabanının sıkıştırılması, sıkıştırılmış kazı tabanına minimum D/10+10 cm.(D: dış çap), İller Bankası Genel Müdürlüğü Birim Fiyat Tarifleri Kitabında yer alan 15.140/İB-7f pozunun tarifine uygun malzeme ile hendek tabanının tamamının yataklanması, taşıma gücü zayıf kazı taban zemininde idarenin uygun göreceği uzunlukta ve kalınlıkta, stabilize malzeme ile zemin ıslahı yapılması,</p> <p>"İller Bankası Genel Müdürlüğü Beton / Betonarme Boru ve Bağlantı Parçaları Özel Şartnamesi" nde belirtilen ölçü ve şartlarda TS 821 EN 1916 ve TS 3830 standartlarına göre imal edilmiş Ø600 mm. iç çapında 500 Dozlu Entegre contalı, buhar kürlü (muflu) beton boru ile özel parçalarının ("C" parçaları) satın alınması veya söz konusu beton borular ile özel parçalarının ("C" parçalarının) yüklenici tarafından kurulacak beton boru fabrikasında "İller Bankası Genel Müdürlüğü Beton / Betonarme Boru ve Bağlantı Parçaları Özel Şartnamesi" nde belirtilen</p>	

No	Pose/Item No	Pose/Item Definition (in English) // Poz tanımı (in Turkish)	Unit
		<p>ölçü ve şartlarda TS 821 EN 1916 ve TS 3830 standartlarına göre imal edilmesi, boru ve özel parçalarına ("C" parçası) ait her türlü testlerinin idarece TS 821 EN 1916'ya göre yapılması, gerekli testler yapıldıktan sonra boruların imal edildikleri veya satın alındıkları yerden döşeneceği hendek kenarına kadar taşınması,</p> <p>Sözleşme eki tasdikli tatbikat projesinde gösterilen yerlerde; borulara hasar verilmeyecek şekilde hendek içine indirilmesi ve Poz No: 12.218226'nin tarifine uygun olacak şekilde döşenmesi ve gerekli sızdırmazlık testlerinin yapılması,</p> <p>Boruların döşenmesi sırasında gerekli Entegre contalı, buhar kürlü "C" parçalarının (idarece görevlendirilen yapı denetim görevlisi/görevlileri tarafından mahallindeki fiili durum esas alınarak iki baca arasında belirlenecek yerlerde) konut yerleşim planına göre döşenmesi,</p> <p>Sızdırmazlık deneyine tabi tutulan hattın İller Bankası Birim Fiyat cetvellerinde yer alan 15.140/İB-7f pozunun tarif esaslarına göre boru üstü 0,30 m. yüksekliğe kadar boru üstünün ve yanlarının gömleklemesinin yapılması,</p> <p>Hendek kenarında bulunan kazıdan çıkan malzeme kullanılarak İller Bankası Genel Müdürlüğü Birim Fiyat Tarifleri kitabında yer alan 14.1700 pozunun tarifine uygun olarak hendek dolgusunun yapılması için, kazı malzemesinin yol kaplaması, blok, kaya vs gibi iri malzemelerden ayıklanarak, el veya makine ile alınması, hendek içine konulması, 20cm tabakalar halinde serilerek, sulanıp tokmaklanarak üst yüzeylerinin tesviye ve tanziminin yapılması, hendek dolgusundan geriye kalan (boru- yataklama malzemesi- yol kaplaması vs. hacmi kadar) kazı malzemesinin idare tarafından gösterilen depoya taşınması ve boşaltılması, depo yerinde tesviye ve tanzimi,</p> <p>Kanalizasyon hatlarında yer alan bütün "C" bağlantı parçalarının, koordinat ölçü, hesap ve röperinin, sözleşme eki İller Bankası "Sayısal İşletme Projeleri Özel Teknik Şartnamesi"ne göre yapılması ve her hakedişle birlikte asbuilt projelerinin hazırlanarak idareye teslimi,</p> <p>İşin yapımı sırasında idare tarafından istenecek her türlü tadilat projelerinin bilabedel olarak hazırlanması ve onay için idareye sunulması,</p> <p>Kesin projesinde gösterilen yerlerde beton-betonarme imalatların yapılması, bu imalatların bünyesine giren demirin, çimentonun, kum çakılın, kalıbın ve diğer her türlü gerekli malzemelerin satın alınması ve iş yerine kadar taşınması, taşıtlara yüklenmesi ve boşaltılması,</p> <p>Yukarıda bahsedilen imalatların bünyesine giren çimento, kum-çakıl, stabilize veya kırmataş ile diğer her türlü malzemelerin zayıat dahil satın alınması, taşıtlara yüklenmesi ve boşaltılması, istif, figüre, her türlü malzeme ve zayıatı, her türlü malzemenin inşaat mahalline kadar taşınması, bu taşıtlara ait yükleme ve boşaltma, her türlü çamur müşkülât ve su boşaltma zammı, derinlik zammı, inşaat yerindeki her türlü yükleme, yatay ve düşey taşıma, boşaltma, istif, işçilik, araç ve gereç giderleri, her türlü deney ve laboratuvar giderleri, amortisman, faiz, bakım, enerji, onarım ve sigorta giderleri ile yüklenici karı ve genel giderler dahil, 1(bir) Metre fiyatıdır.</p> <p>Ölçü: İmalatı tamamlanan şebeke hatlarında ölçü, muayene bacalarının ekseninden alınıp, 1,10 mt. düşülecektir.</p> <p>Not :</p> <p>1) Gömlekleme üstü hendek dolgusu; kaplamasız yollarda yol üst kotuna kadar, kaplamalı yollarda kaplama altı kotuna kadar yapılacaktır.</p>	

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		<p>2) İmal edilen veya satın alınan Ø600 mm.likEntegre contalı, buhar kürlü (muflu) beton boruların idareimizce kabul edilebilmesi için, TSE belgelerinin bulunması zorunludur.</p> <p>3)Sözleşmesi eki İller Bankası Genel Müdürlüğü Beton / Betonarme Boru ve Bağlantı Parçaları Özel Şartnamesi, TS 821 EN 1916 ve TS 3830 standartlarına uygun olmayan Ø600 mm Entegre contalı, buhar kürlü beton borular ile özel parçalarının ("C" parçaları) tesis inşaatı kapsamında kullanılmasına müsaade edilmeyecektir.</p>	
104	Special/Civ/06	<p>CONSTRUCTION OF SEWERAGE LINE BY USING STEAM-CURED (WITH MUFF) CONCRETE PIPE WITH Ø200 MM BORE AND HAVING INTEGRATED SEAL WITH CEMENT CONTENT OF 500 KG/M3 (WITH TRENCH BACKFILLED WITH EXCAVATION MATERIAL)</p> <p>The price for 1 (one) meter, including, in the scope of the sewerage network construction to be carried out in any depth by using steam-cured (with muff) concrete pipe with Ø200 mm bore and having integrated seal with cement content of 500 kg/m3;</p> <p>Carrying out trench excavation as battered or shored (by using shoring of any kind such as special shoring like steel panel, etc.) to such degree that it will allow the execution of works and laying operations of any kind in soils of any kind and ensure labour and labourer's safety; and</p> <p>Removal of the excavation material out of trench pit, and the performance of such additional works as might be needed owing to sewers and drinking water conduits, sewage pits, PTT lines and other utilities that might be encountered during the excavation, and dismounting or cutting road pavement of any kind at the place of excavation; and</p> <p>Taking the necessary precautions to ensure labour and labourer's safety and if necessary, arranging two-way pedestrian and vehicle traffic around the trench and enclosing the trench with safety tape; and</p> <p>Levelling the trench base, and if there is water, dewatering the base, and the compaction of the excavation base, and at the compacted excavation base, forming bedding at entire trench base by using the material with minimum D/10+10 cm (D: outer diameter) as described in item 15.140/İB-7f included in the Unit Rate Descriptions Book from the General Directorate of İller Bank, and soil improvement on excavation bases with weak bearing capacities to such length and thickness as will be found appropriate by the Employer by using stabilised material; and</p> <p>Purchase of the steam-cured (with muff) concrete pipe with Ø200 mm bore and having integrated seal with cement content of 500 kg/m3 and special parts thereof ("C" parts), which are manufactured in compliance with TS 821 EN 1916 and TS 3830 standards in the size and to the requirements as specified in the "Special Specifications for Concrete/ Reinforced Concrete Pipes and Fittings from the General Directorate of İller Bank" or manufacturing the concrete pipes and special parts ("C" parts) in question in compliance with TS 821 EN 1916 and TS 3830 standards in the size and to the requirements as specified in the "Special Specifications for Concrete/ Reinforced Concrete Pipes and Fittings from the General Directorate of İller Bank" at a concrete pipe factory to be established by the Contractor, and the execution of the tests of any kind of pipes and special parts ("C" part) by the Employer in compliance with TS 821 EN 1916 and following the execution of the necessary tests, the</p>	m

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		<p>transportation of pipes from the place of manufacturing or purchase to the side of the trench where they will be laid; and</p> <p>At the places shown on the approved constructional drawing enclosed to the contract, lowering the pipes down to the trench without giving damage to them, and laying of the pipes in compliance with item 12.218222, and the execution of the necessary leak tests of the pipes; and</p> <p>While laying the pipes, laying the necessary steam-cured "C" parts with integrated seal (at the places to be determined between two manholes by taking account of the actual situation in situ by the Construction Supervisor(s) appointed by the Employer) according to the housing layout plan; and</p> <p>Of the line made subject to leak test, encasing the pipes over the pipe and on sides of the pipe up to 0.30 m height above top of pipe in compliance with the requirements of item 15.140/IB-7f included in the Bills of Quantities from Iller Bank; and</p> <p>For backfilling the trench in compliance with item 14.1700 included in the Unit Rate Descriptions book from the General Directorate of Iller Bank by using the excavation material put on the trench side, the removal of coarse materials such as road pavement, block, rock, etc. from the excavation material, and taking manually or mechanically the excavation material so refined and placing the excavation material in the trench, and laying the excavation material in layers of 20 cm, and wetting and tamping the same, and levelling and arranging the top surfaces of the same, and the transportation of the remaining excavation material from trench backfill (as much as the volume of pipe-bedding material-road pavement, etc.) to the dump site designated by the Employer, and dumping the same in the dump site, and levelling and arranging the same in the dump site; and</p> <p>Execution pursuant to the Special Technical Specifications for Digital Operation Designs from Iller Bank of coordinate survey, calculation and benchmark of all the "C" parts provided on the sewerage lines, and the preparation of the as-built drawings, together with each progress payment, and the submission of the same to the Employer; and</p> <p>Preparing free of charge the modification designs of any kind that will be required by the Employer during the performance of the work, and the submission of the same to the Employer for approval; and</p> <p>Performance of concrete-reinforced concrete works at the places indicated in the final design and the purchase of bar, cement, sand-gravel, shuttering and all kinds of the other necessary materials as incorporated in these works, and the transportation of the same to the worksite, and loading the same onto vehicles, and unloading the same; and</p> <p>Purchase, including losses, of the cement, sand-gravel, stabilised or crushed stone and all kinds of other materials as incorporated in the aforesaid works, loading the same onto vehicles and unloading the same, stacking, all kinds of material and the losses of material, the transportation of all kinds of materials to the construction site and loading onto and unloading from vehicles, price increase of any kind for difficulties arising from sludge and for water drainage and depth and loading, horizontal and vertical handling, unloading, stacking of any kind on the construction site, labour, tools and materials costs, and test and laboratory costs of any kind, and depreciation, interest, maintenance,</p>	

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		<p>power, repair and insurance costs, and the contractor's profit, and overhead.</p> <p>Measurement: For the completed network lines, measurement shall be made from the axis of manholes and 1.10 m shall be extracted.</p> <p>Note:</p> <p>1) Backfilling of the trench above encasing shall be up to the top of road for non-paved roads and to the sub-pavement elevation for paved roads.</p> <p>2) The steam-cured (with muff) concrete pipes with Ø200 mm bore and having integrated seal which are manufactured or purchased have to have TSE certificates so that they can be accepted by the Employer.</p> <p>3) Those steam-cured concrete pipes with Ø400 mm bore and having integrated seal and the special parts thereof ("C" parts) which are not compatible with Special Specifications for Concrete/ Reinforced Concrete Pipes and Fittings from the General Directorate of İller Bank enclosed to the contract, and with TS 821 EN 1916 and TS 3830 standards shall not be permitted to be used in the scope of the plant construction.</p> <p>//</p> <p>Ø200 MM İÇ ÇAPINDA 500 DOZLU ENTEGRE CONTALI, BUHAR KÜRLÜ (MUFLU) BETON BORU İLE KANALİZASYON HATTI YAPILMASI (HENDEK DOLGUSU KAZIDAN ÇIKAN MALZEME İLE)</p> <p>Ø200 mm. iç çapında 500 Doz.luEntegre contalı, buhar kürlü (muflu) beton boru ile her derinlikte yapılacak kanalizasyon şebeke inşaatı kapsamında;</p> <p>Her türlü klasta ve her cins zeminde her türlü imalat ve ferşiyatın yapılmasını mümkün kılacak, iş ve işçi emniyetini sağlayacak ölçüde şevli veya iksalı hendek kazısının yapılması (çelik pano vs. gibi özel iksadahlil her türlü iksa kullanılarak),</p> <p>Kazı malzemesinin hendek çukuru dışına atılması, kazı sırasında karşılaşılabilecek pıssu ve içmesuyu mecraları, lağım çukurları, PTT hatları ve diğer alt yapı tesisleri dolayısıyla gerekebilecek munzam çalışmaların yapılmasıile kazının yapıldığı yerdeki her türlü yol kaplamasının sökülmesi veya kesilmesi,</p> <p>İş ve işçi güvenliğinin sağlanması için gerekli tedbirlerin alınması, gerekmesi halinde hendek kenarında yaya ve taşıt trafiğinin geliş-gidişinin sağlanarak hendek kenarına emniyet bandı çekilmesi,</p> <p>Hendek tabanının tesviyesinin yapılması, varsa tabandaki suyun kurutulması, kazı tabanının sıkıştırılması, sıkıştırılmış kazı tabanına minimum D/10+10 cm.(D: dış çap), İller Bankası Genel Müdürlüğü Birim Fiyat Tarifleri Kitabında yer alan 15.140/İB-7f pozunun tarifine uygun malzeme ile hendek tabanının tamamının yataklanması, taşıma gücü zayıf kazı taban zemininde idarenin uygun göreceği uzunlukta ve kalınlıkta, stabilize malzeme ile zemin ıslahı yapılması,</p> <p>"İller Bankası Genel Müdürlüğü Beton / Betonarme Boru ve Bağlantı Parçaları Özel Şartnamesi" nde belirtilen ölçü ve şartlarda TS 821 EN 1916 ve TS 3830 standartlarına göre imal edilmiş Ø200 mm. iç çapında 500 Dozlu Entegre contalı, buhar kürlü (muflu) beton boru ile özel parçalarının ("C" parçaları) satın alınması veya söz konusu beton borular ile özel parçalarının ("C" parçalarının) yüklenici tarafından kurulacak beton boru fabrikasında "İller Bankası Genel Müdürlüğü Beton / Betonarme Boru ve Bağlantı Parçaları Özel Şartnamesi" nde belirtilen</p>	

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		<p>ölçü ve şartlarda TS 821 EN 1916 ve TS 3830 standartlarına göre imal edilmesi, boru ve özel parçalarına ("C" parçası) ait her türlü testlerinin idarece TS 821 EN 1916'ya göre yapılması, gerekli testler yapıldıktan sonra boruların imal edildikleri veya satın alındıkları yerden döşeneceği hendek kenarına kadar taşınması,</p> <p>Sözleşme eki tasdikli tatbikat projesinde gösterilen yerlerde; borulara hasar verilmeyecek şekilde hendek içine indirilmesi ve Poz No: 12.218222'nin tarifine uygun olacak şekilde döşenmesi ve gerekli sızdırmazlık testlerinin yapılması,</p> <p>Boruların döşenmesi sırasında gerekli Entegre contalı, buhar kürlü "C" parçalarının (idarece görevlendirilen yapı denetim görevlisi/görevlileri tarafından mahallindeki fiili durum esas alınarak iki baca arasında belirlenecek yerlerde) konut yerleşim planına göre döşenmesi,</p> <p>Sızdırmazlık deneyine tabi tutulan hattın İller Bankası Birim Fiyat cetvellerinde yer alan 15.140/İB-7f pozunun tarif esaslarına göre boru üstü 0,30 m. yüksekliğe kadar boru üstünün ve yanlarının gömleklemesinin yapılması,</p> <p>Hendek kenarında bulunan kazıdan çıkan malzeme kullanılarak İller Bankası Genel Müdürlüğü Birim Fiyat Tarifleri kitabında yer alan 14.1700 pozunun tarifine uygun olarak hendek dolgusunun yapılması için, kazı malzemesinin yol kaplaması, blok, kaya vs gibi iri malzemelerden ayıklanarak, el veya makine ile alınması, hendek içine konulması, 20cm tabakalar halinde serilerek, sulanıp tokmaklanarak üst yüzeylerinin tesviye ve tanziminin yapılması, hendek dolgusundan geriye kalan (boru- yataklama malzemesi- yol kaplaması vs. hacmi kadar) kazı malzemesinin idare tarafından gösterilen depoya taşınması ve boşaltılması, depo yerinde tesviye ve tanzimi,</p> <p>Kanalizasyon hatlarında yer alan bütün "C" bağlantı parçalarının, koordinat ölçü, hesap ve röperinin, sözleşme eki İller Bankası "Sayısal İşletme Projeleri Özel Teknik Şartnamesi"ne göre yapılması ve her hakedişle birlikte asbuilt projelerinin hazırlanarak idareye teslimi,</p> <p>İşin yapımı sırasında idare tarafından istenecek her türlü tadilat projelerinin bilabedel olarak hazırlanması ve onay için idareye sunulması,</p> <p>Kesin projesinde gösterilen yerlerde beton-betonarme imalatların yapılması, bu imalatların bünyesine giren demirin, çimentonun, kum çakılın, kalıbın ve diğer her türlü gerekli malzemelerin satın alınması ve iş yerine kadar taşınması, taşıtlara yüklenmesi ve boşaltılması,</p> <p>Yukarıda bahsedilen imalatların bünyesine giren çimento, kum-çakıl, stabilize veya kırmataş ile diğer her türlü malzemelerin zayıat dahil satın alınması, taşıtlara yüklenmesi ve boşaltılması, istif, figüre, her türlü malzeme ve zayıatı, her türlü malzemenin inşaat mahalline kadar taşınması, bu taşıtlara ait yükleme ve boşaltma, her türlü çamur müşkülât ve su boşaltma zammı, derinlik zammı, inşaat yerindeki her türlü yükleme, yatay ve düşey taşıma, boşaltma, istif, işçilik, araç ve gereç giderleri, her türlü deney ve laboratuvar giderleri, amortisman, faiz, bakım, enerji, onarım ve sigorta giderleri ile yüklenici karı ve genel giderler dahil, 1(bir) Metre fiyatıdır.</p> <p>Ölçü: İmalatı tamamlanan şebeke hatlarında ölçü, muayene bacalarının ekseninden alınıp, 1,10 mt. düşülecektir.</p> <p>Not :</p> <p>1) Gömlekleme üstü hendek dolgusu; kaplamasız yollarda yol üst kotuna kadar, kaplamalı yollarda kaplama altı kotuna kadar yapılacaktır.</p>	

No	Pose/Item No	Pose/Item Definition (in English) // Poz tanımı (in Turkish)	Unit
		<p>2) İmal edilen veya satın alınan Ø200 mm.likEntegre contalı, buhar kürlü (muflu) beton boruların idaremizce kabul edilebilmesi için, TSE belgelerinin bulunması zorunludur.</p> <p>3)Sözleşmesi eki İller Bankası Genel Müdürlüğü Beton / Betonarme Boru ve Bağlantı Parçaları Özel Şartnamesi, TS 821 EN 1916 ve TS 3830 standartlarına uygun olmayan Ø400 mm Entegre contalı, buhar kürlü beton borular ile özel parçalarının ("C" parçaları) tesis inşaatı kapsamında kullanılmasına müsaade edilmeyecektir.</p>	
105	Special/Civ/07	<p>CONSTRUCTION OF PREFABRICATED STEAM-CURED MANHOLE WITH CEMENT CONTENT OF 500 KG/M3 WITH Ø600 mm OUTLET DIAMETER</p> <p>The price for one (1) of the construction of Prefabricated Steam-cured Manhole with Cement Content of 500 kg/m3 with Ø600 mm Outlet Diameter which is manufactured according to the relevant design and of which filling of any kind is formed, and of the formation of manhole as indicated in the relevant approved design (including 1 inlet - 1 outlet, 2 inlets - 1 outlet, 3 inlets - 1 outlet) with prefabricated stea-cured base unit of which inlets and outlets are fitted with integrated seal, and chamber rings, tapered unit, collar ring, frame installation unit and sphero-cast cover, including, in the scope of the sewerage construction work to be performed in any depth for the construction of prefabricated steam-cured manhole having integrated seal (base unit inlets and outlets) with cement content of 500 kg/m3 of which manhole numbers and outlet diameters are indicated in the relevant approved design at the places as indicated in the relevant approved final design enclosed to the contract;</p> <p>Determining the sewerage line route according to the relevant approved final design, and the execution of the application of the place where the manhole will be constructed, and before carrying out foundation excavation works, taking all kinds of the safety precautions along and around the route where the excavation will take place, and cutting, dismounting the road pavement of any kind on the roads where the manhole will be constructed, and loading the same onto vehicles, and the transportation of the same to such dump site as will be designated by the Employer, and unloading the same; and</p> <p>Carrying out the FOUNDATION excavation manually and/or mechanically without and/or by using explosives in the soil of any kind and in any depth in compliance with the requirements of the specifications, standards and design enclosed to the contract, and the placement of the materials as incorporated in the excavation and the work out of minimum 0.60 m protection strip from the edge of foundation pit, and taking the necessary precautions to ensure labour and labourer's safety and the environmental safety, and supporting the foundation walls with wooden shoring of any kind (spaced - frequently spaced - fully covered wooden shoring) or steel panel shoring (by using shoring of any kind such as steel panels of Krings-Verbau type or similar type) complying with the requirements of the specifications, standards and design enclosed to the contract or if the Employer considers it appropriate and where allowed by the excavation site in compliance with the requirements of the specifications, standards and design enclosed to the contract, taking into consideration the type of soil and the width and depth of excavation, carrying out battered excavation, and taking the necessary precautions to ensure labour and labourer's safety of life and the environmental safety; and</p>	pcs

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		<p>Levelling the foundation pit base and wall surfaces in compliance with the relevant specifications and design, and draining away the groundwater, if any, and dewatering the foundation base, and levelling and compacting the excavation base, and the placement of the spoils generated during these works out of the foundation pit edge protection strip or the loading of the spoils onto vehicles and the transportation of them to such dump site as will be designated by the Employer and unloading them, and ensuring the safety of work, material, life and labour on the foundation side, in the foundation and on the worksite and providing two-way vehicle and pedestrian traffic, if any, and taking all kinds of the necessary precautions for the safety of the existing superstructure, if any, and the posting of warning signs of any kind; and Uniformly levelling the excavation base and after levelling, the compaction of the excavation base; and</p> <p>Forming bedding (*) to minimum 0.15 m thickness on the compacted foundation excavation base in compliance with item 15.140/İB-7f included in the Unit Rate Descriptions Book from the General Directorate of İller Bank; and</p> <p>Purchase of the following, which are manufactured in the size indicated in standard design KNL-TP-27A enclosed to the contract and according to TS EN 1917 and TS 3830 standards;</p> <ul style="list-style-type: none"> - Steam-cured manhole base units with cement content of 500 kg/m³ of which outlet diameter is indicated in the relevant approved design and inlets-outlets are fitted with integrated seal (*); - Prefabricated steam-cured manhole tapered unit with cement content of 500 kg/m³ and having rubber seal; - Steam-cured manhole chamber ring with a height of 0.60 m and having 1.00 m bore and having integrated seal; - Steam-cured manhole chamber ring with a height of 0.35 m and having 1.00 m bore and having integrated seal; - Prefabricated steam-cured manhole chamber height adjusting ring with height H=0.15-0.60 m and having 1.00 m bore and integrated seal; - Prefabricated steam-cured manhole collar ring with a height of H=0.15 m and with 0.62 m bore and with 0.13 m wall thickness and having integrated seal; and - Prefabricated steam-cured manhole frame installation unit, <p>or the manufacturing of the prefabricated manhole units in the size indicated in standard design KNL-TP-27A enclosed to the contract and according to TS EN 1917 and TS 3830 standards at the concrete pipe factory to be established by the Contractor, and the execution of the tests of any kind of the prefabricated manhole units according to TS EN 1917 by the personnel appointed by the Employer either at the factory site or at such laboratory as is designated by the Employer, and following the execution of the tests, the transportation of the prefabricated manhole units (base unit, tapered unit, chamber ring, chamber height adjusting ring, collar ring, frame installation unit) from the place of manufacturing or purchase to the side of the manhole excavation pit and making them ready; and</p> <p>Taking the prefabricated manhole base unit from the side of the manhole excavation pit and lowering it down to the manhole foundation base, where bedding is formed, without giving damage to the base unit, and the placement of the base unit in parallel with the design elevation,</p>	

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		<p>and taking the prefabricated chamber ring, chamber height adjusting ring (if necessary), tapered unit, collar ring and frame installation units from the side of the manhole excavation pit and commencing from the top of the base unit, the placement in a way being flush with the top of ground or top of road of prefabricated chamber ring, chamber height adjusting ring (if necessary), tapered unit, collar ring and frame installation units one on top of the other in a watertight manner, and testing the top of prefabricated units so placed for leakage according to the relevant standards and the specifications; and</p> <p>Purchase of the sphero-cast manhole cover manufactured in compliance with the unit rate description given with item 23.255/İB-6, and the transportation of the same to the side of the pit of the manhole to which it will be installed, and the installation of the same in compliance with the requirements of item 23.255/İB-6; and</p> <p>Backfilling of the foundation up to the top of road for non-paved roads and to the sub-pavement elevation for paved roads by using the excavation material in compliance with item 14.1700 included in the Bills of Quantities from İller Bank; and</p> <p>Execution pursuant to the Special Technical Specifications for Digital Operation Designs from İller Bank of coordinate survey, calculation and benchmark of the manholes present on the sewerage lines, and the preparation of the as-built drawings, together with each progress payment, and the submission of the same to the Employer; and</p> <p>Purchase, including losses, of the cement, sand-gravel, stabilised or crushed stone and all kinds of the other necessary materials as incorporated in the aforesaid works, loading the same onto vehicles and unloading the same, stacking, all kinds of material and the losses of material, the transportation of all kinds of materials (including manhole, sphero-cast cover) to the construction site and loading and unloading with respect to such transportation, price increase of any kind for difficulties arising from sludge and for water drainage and depth and loading, horizontal and vertical handling, unloading of any kind on the construction site, labour, tools and equipment costs, and test and laboratory costs of any kind, and depreciation, interest, maintenance, power, repair and insurance costs, and the contractor's profit, and overhead.</p> <p>Measurement: Number of the manholes constructed.</p> <p>Note: 1-) (*) The integrated seals to be used at the inlets - outlets of manhole base units shall be compatible with TS EN 681-1 standard and they shall be produced, being placed in shuttering during the casting of the base unit. In case an integrated seal not compatible with TS EN 681-1 standard is used in manhole base units, the Bank shall not permit the use of the manhole base units to be manufactured or purchased.</p> <p>2-) Chamber height adjusting ring with heights from H=0.15-0.60 m shall be used so that the manhole chamber height is compatible with road elevation and it shall never be less than 0.15 m.</p> <p>3-) No preparation payment shall be made for any material falling in the scope of this work.</p> <p>4-) Primarily, the manhole should be formed by using base unit + tapered unit + 35-chamber ring + 60-chamber ring + frame installation unit + height adjusting ring. However, maximum 1 collar ring can be used to adjust manhole to the top of road. The collar ring can be used for the construction above the ground elevation for the manholes of the</p>	

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		<p>sewerage lines that have already laid through the land. A collar ring shall not be used for the construction manholes other the ones mentioned above.</p> <p>//</p> <p>Ø600 mm ÇIKIŞ ÇAPINDA BUHAR KÜRLÜ PREFABRİK 500 DOZLU MUAYENE BACASI İMALATININ YAPILMASI (HENDEK DOLGUSU KAZIDAN ÇIKAN MALZEME İLE)</p> <p>Sözleşmesi ekindeki tasdikli kesin projesinde gösterilen yerlerde; baca numaraları ve çıkış çapları tasdikli projesinde belirtilen, 500 dozlu entegre contalı (taban elemanı giriş-çıkışları), buhar kürlü beton prefabrik muayene bacası teşkili için her derinlikte yapılacak kanalizasyon inşaatı kapsamında;</p> <p>Tasdikli kesin projesine göre kanalizasyon hattı güzergahının belirlenmesi, Muayene bacasının teşkil edileceği yerin aplikasyonunun yapılması, temel kazı çalışmaları yapılmadan önce kazının yapılacağı güzergahta ve çevresinde her türlü emniyet tedbirlerinin alınması, muayene bacasının teşkil edileceği yollardaki her türlü yol kaplamasının kesilmesi, sökülmesi ve taşıtlara yüklenerek idarenin göstereceği depo yerine nakledilmesi, boşaltılması,</p> <p>Sözleşme eki şartnameler, standartlar ve proje esaslarında her tür klas ve derinlikteki zeminde elle ve/veya makine ile Patlayıcı madde kullanılmadan ve/veya kullanılarak TEMEL kazısı yapılması, kazının ve imalatın bünyesine giren malzemelerin temel çukuru kenarından minimum 0,60 m koruma şeridi dışına konulması, iş ve işçi can güvenliği ile çevre emniyetinin sağlanması için gerekli tedbirlerin alınması, Temel kenarlarının Sözleşme eki şartnameler, standartlar ve proje esaslarına uygun her türlü ahşap iksa(aralıklı-sıkaraklıklı-tam kaplamalı ahşap iksa) veya çelik panolu (Krings-Verbau veya benzeri tipte çelik pano vs. her türlü iksa kullanılarak) iksa ile desteklenmesi veya idarenin uygun görmesi ve Sözleşme eki şartnameler, standartlar ve proje esaslarına göre kazı alanının uygun olması halinde zemin cinsi, temel genişliği ve derinliği dikkate alınarak şevli kazı yapılması, iş ve işçi can güvenliği ile çevre emniyetinin sağlanması için gerekli tedbirlerin alınması,</p> <p>Şartnamesine ve projesine uygun olarak kazı çukuru tabanı ve yan yüzeylerinin düzeltilmesi, varsa zemin suyunun temel çukurundan uzaklaştırılarak temel tabanının kuru hale getirilmesi, kazı tabanının tesviye edilmesi ve sıkıştırılması, bu çalışmalar sırasında çıkan kazı artık malzemenin temel çukuru kenarı koruma şeridi dışına konulması veya taşıtlara yüklenip idarenin göstereceği yere kadar taşınarak boşaltılması, temel kenarında, temel içinde, iş mahallinde imalat, malzeme, can ve iş güvenliğinin ve varsa trafik ve yaya gidiş-gelişinin sağlanması ve varsa mevcut üstyapı emniyeti için gerekli her türlü tedbirin alınması ve her türlü uyarı işaretinin konulması,</p> <p>Kazı tabanının üniform olarak düzeltilmesi, tesviye edilmesi ve tesviye edildikten sonra kazı tabanının sıkıştırılması,</p> <p>Sıkıştırılmış temel kazı tabanına en az 0,15 m. kalınlığında; İller Bankası Genel Müdürlüğü Birim Fiyat Tarifleri Kitabında yer alan 15.140/İB-7f pozunun tarifine uygun yataklamanın (*) yapılması,</p> <p>Sözleşme ekindeki tip projesinde KNL-TP-27A belirtilen ölçülere ve TS EN 1917 ile TS 3830 standartlarına göre imal edilmiş;</p> <p>- Çıkış çapı tasdikli projesinde belirtilen, Giriş - çıkışları entegre contalı (*) buhar kürlü 500 Dz.lu prefabrik muayene bacası taban elemanlarının;</p>	

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		<p>- Buhar kürlü lastik contalı 500 Dz.lu muayene bacası prefabrik konik elemanının,</p> <p>- 0,60 m yüksekliğinde 1.00 mt iç çapında buhar kürlü entegre contalı muayene bacası gövde bileziğinin,</p> <p>- 0,35 m yüksekliğinde 1.00 mt iç çapında buhar kürlü entegre contalı muayene bacası gövde bileziğinin,</p> <p>- H=0,15-0,60 m. arasında değişken yükseklikte 1.00 m. iç çapında buhar kürlü entegre contalı prefabrik muayene bacası gövde yükseklik ayar bileziğinin,</p> <p>- H=0,15 m yüksekliğinde, 0,62mt. iç çapında 0,13 mt. et kalınlığında buhar kürlü entegre contalı prefabrik muayene bacası boyun bileziğinin,</p> <p>- Buhar kürlü entegre contalı prefabrik muayene bacası çerçeve montaj elemanının,</p> <p>satın alınması veya söz konusu prefabrik muayene bacası elemanlarının yüklenici tarafından kurulacak beton boru fabrikasında sözleşme ekindeki tip projesinde KNL-TP-27A belirtilen ölçülere ve TS EN 1917 ile TS 3830 standartlarına göre imal edilmesi, prefabrik muayene bacası elemanlarına ait her türlü testlerinin idarece görevlendirilen elamanlarca TS EN 1917'ye göre test ve deneylerinin fabrika sahasında veya idare tarafından gösterilen laboratuarda yapılması, test ve deneylerinin yapımını müteakip prefabrik muayene bacası elemanlarının (Taban elemanı, konik, gövde bileziği, gövde yükseklik ayar bileziği, boyun bileziği, çerçeve montaj elemanı), imal edildikleri veya satın alındıkları yerden baca kazı çukuru kenarına taşınarak hazır hale getirilmesi,</p> <p>Prefabrik baca taban elemanının baca kazı çukuru kenarından alınarak hasar verilmeyecek şekilde yataklaması yapılmış baca temel tabanına indirilmesi, proje kotuna uygun olarak yerleştirilmesi, prefabrik gövde bileziği, gövde yükseklik ayar bileziği (gerekmesi halinde), konik, boyun bileziği, çerçeve montaj elemanlarının baca kazı çukuru kenarından alınarak hasar verilmeyecek şekilde taban elemanı üzerinden itibaren, sızdırmaz halde zemin seviyesi üst kotu veya yol üst kotu ile aynı seviyede olacak şekilde üst üste yerleştirilmesi, yerleştirilmiş prefabrik eleman başlarının ilgili standartlara ve şartnamesine göre sızdırmazlık tecrübesinin yapılması,</p> <p>23.255/İB-6 Poz No'lu birim fiyat tarifine uygun imal edilmiş sfero döküm baca kapağının satın alınması, konulacağı muayene bacası çukuru kenarına kadar taşınması, 23.255/İB-6 poz no.sunda belirtilen esaslara göre yerine konulması,</p> <p>Temel Dolgusunun kazıdan çıkan malzeme kullanılarak İller Bankası Birim Fiyat cetvellerinde yer alan 14.1700 pozunun tarifine uygun olarak Kaplamasız yollarda yol üst kotuna kadar, kaplamalı yollarda kaplama altı kotuna kadar yapılması,</p> <p>Kanalizasyon hatlarında bulunan bacaların, koordinat ölçü, hesap ve röperinin, sözleşme eki İller Bankası "Sayısal İşletme Projeleri Özel Teknik Şartnamesi"ne göre yapılması ve her hakedişle birlikte asbuit projelerinin hazırlanarak idareye teslimi,</p> <p>Yukarıda bahsedilen imalatların, bünyesine giren çimento, kum-çakıl, stabilize veya kırmataş ile diğer her türlü gerekli malzemelerin satın alınması, taşıtlara yüklenmesi ve boşaltılması, istif, figüre, her türlü malzeme ve zayiati, her türlü malzemenin(muayene baca, sfero kapak dahil) inşaat mahalline kadar taşınması, bu taşımalara ait yükleme ve boşaltma, her türlü çamur müşkülât ve su boşaltma zammı, derinlik</p>	

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		<p>zammı, inşaat yerindeki her türlü yükleme, yatay ve düşey taşıma, boşaltma, işçilik, alet edevat giderleri, her türlü deney ve laboratuvar giderleri, amortisman, faiz, bakım, enerji, onarım ve sigorta giderleri ile yüklenici karı ve genel giderler dahil, projesine göre imalatı yapılmış, her türlü dolgusu yapılmış, Çıkış Çapı Ø600 mm Olan Buhar Kürlü Prefabrik 500 Dozlu Muayene Bacası İmalatının Yapılması,</p> <p>Giriş - çıkışları entegre contalı buhar kürlü prefabrik taban elemanı, gövde bileziği elemanları, konik elemanı, boyun bileziği, çerçeve montaj elemanı, sfero döküm kapağı ile tasdikli projesinde belirtilen,(1 giriş - 1 çıkış, 2 giriş - 1 çıkış, 3 giriş - 1 çıkış dahil) muayene bacası teşkil edilmesinin, 1(bir) Adet fiyatıdır.</p> <p>Ölçü: Yapılan muayene bacasının adet cinsinden miktarıdır.</p> <p>Not: 1-) (*) Muayene bacası taban elemanlarının giriş - çıkışlarında kullanılacak olan entegre contalar; TS EN 681-1 standardına uygun olacak ve taban elemanının döküm aşamasında kalıp içerisine yerleştirilerek imalatı yapılacaktır. TS EN 681-1 standardına uygun olmayan entegre contanın muayene bacası taban elemanlarında kullanılması halinde, imal edilecek veya satın alınacak muayene bacası taban elemanlarının kullanılmasına, Bankamızca müsaade edilmeyecektir.</p> <p>2-) H=0,15-0,60m. arasında değişken yükseklikteki muayene bacası gövde yükseklik ayar bileziği, muayene bacası gövde yüksekliğinin yol kotu seviyesine uygun olması amacıyla kullanılacak ve hiçbir zaman 0,15 mt.den az olmayacaktır.</p> <p>3-) Bu imalat kapsamındaki hiçbir malzemeye ihzarat bedeli ödenmeyecektir.</p> <p>4-) Muayene bacası; Taban + konik + 35 lik gövde bileziği + 60'lık gövde bileziği + çerçeve montaj + yükseklik ayar bilezik elemanları kullanılarak teşkil edilmesi esastır. Ancak muayene bacasını yol üst kotuna ayarlamak için en fazla 1 adet boyun bileziği kullanılabilir. Halihazır araziden geçen kanalizasyon hatlarına ait muayene bacalarında ise zemin kotunun üstündeki imalatla kullanılabilecektir. Bunun dışındaki muayene baca teşkilleri boyun bileziği kullanılmayacaktır.</p>	
106	Special/Civ/08	<p>CONSTRUCTION OF PREFABRICATED STEAM-CURED MANHOLE WITH CEMENT CONTENT OF 500 KG/M3 WITH Ø200 mm OUTLET DIAMETER</p> <p>The price for one (1) of the construction of Prefabricated Steam-cured Manhole with Cement Content of 500 kg/m3 with Ø200 mm Outlet Diameter which is manufactured according to the relevant design and of which filling of any kind is formed, and of the formation of manhole as indicated in the relevant approved design (including 1 inlet - 1 outlet, 2 inlets - 1 outlet, 3 inlets - 1 outlet) with prefabricated stea-cured base unit of which inlets and outlets are fitted with integrated seal, and chamber rings, tapered unit, collar ring, frame installation unit and sphero-cast cover, including, in the scope of the sewerage construction work to be performed in any depth for the construction of prefabricated steam-cured manhole having integrated seal (base unit inlets and outlets) with cement content of 500 kg/m3 of which manhole numbers and outlet diameters are indicated in the relevant approved design at the places as indicated in the relevant approved final design enclosed to the contract;</p> <p>Determining the sewerage line route according to the relevant approved final design, and the execution of the application of the place where the</p>	lump sum

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		<p>manhole will be constructed, and before carrying out foundation excavation works, taking all kinds of the safety precautions along and around the route where the excavation will take place, and cutting, dismounting the road pavement of any kind on the roads where the manhole will be constructed, and loading the same onto vehicles, and the transportation of the same to such dump site as will be designated by the Employer, and unloading the same; and</p> <p>Carrying out the FOUNDATION excavation manually and/or mechanically without and/or by using explosives in the soil of any kind and in any depth in compliance with the requirements of the specifications, standards and design enclosed to the contract, and the placement of the materials as incorporated in the excavation and the work out of minimum 0.60 m protection strip from the edge of foundation pit, and taking the necessary precautions to ensure labour and labourer's safety and the environmental safety, and supporting the foundation walls with wooden shoring of any kind (spaced - frequently spaced - fully covered wooden shoring) or steel panel shoring (by using shoring of any kind such as steel panels of Krings-Verbau type or similar type) complying with the requirements of the specifications, standards and design enclosed to the contract or if the Employer considers it appropriate and where allowed by the excavation site in compliance with the requirements of the specifications, standards and design enclosed to the contract, taking into consideration the type of soil and the width and depth of excavation, carrying out battered excavation, and taking the necessary precautions to ensure labour and labourer's safety of life and the environmental safety; and</p> <p>Levelling the foundation pit base and wall surfaces in compliance with the relevant specifications and design, and draining away the groundwater, if any, and dewatering the foundation base, and levelling and compacting the excavation base, and the placement of the spoils generated during these works out of the foundation pit edge protection strip or the loading of the spoils onto vehicles and the transportation of them to such dump site as will be designated by the Employer and unloading them, and ensuring the safety of work, material, life and labour on the foundation side, in the foundation and on the worksite and providing two-way vehicle and pedestrian traffic, if any, and taking all kinds of the necessary precautions for the safety of the existing superstructure, if any, and the posting of warning signs of any kind; and</p> <p>Uniformly levelling the excavation base and after levelling, the compaction of the excavation base; and</p> <p>Forming bedding (*) to minimum 0.15 m thickness on the compacted foundation excavation base in compliance with item 15.140/iB-7f included in the Unit Rate Descriptions Book from the General Directorate of Iller Bank; and</p> <p>Purchase of the following, which are manufactured in the size indicated in standard design KNL-TP-27A enclosed to the contract and according to TS EN 1917 and TS 3830 standards;</p> <ul style="list-style-type: none"> - Steam-cured manhole base units with cement content of 500 kg/m3 of which outlet diameter is indicated in the relevant approved design and inlets-outlets are fitted with integrated seal (*); - Prefabricated steam-cured manhole tapered unit with cement content of 500 kg/m3 and having rubber seal; 	

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		<p>- Steam-cured manhole chamber ring with a height of 0.60 m and having 1.00 m bore and having integrated seal;</p> <p>- Steam-cured manhole chamber ring with a height of 0.35 m and having 1.00 m bore and having integrated seal;</p> <p>- Prefabricated steam-cured manhole chamber height adjusting ring with height H=0.15-0.60 m and having 1.00m bore and integrated seal;</p> <p>- Prefabricated steam-cured manhole collar ring with a height of H=0.15 m and with 0.62 m bore and with 0.13 m wall thickness and having integrated seal; and</p> <p>- Prefabricated steam-cured manhole frame installation unit,</p> <p>or the manufacturing of the prefabricated manhole units in the size indicated in standard design KNL-TP-27A enclosed to the contract and according to TS EN 1917 and TS 3830 standards at the concrete pipe factory to be established by the Contractor, and the execution of the tests of any kind of the prefabricated manhole units according to TS EN 1917 by the personnel appointed by the Employer either at the factory site or at such laboratory as is designated by the Employer, and following the execution of the tests, the transportation of the prefabricated manhole units (base unit, tapered unit, chamber ring, chamber height adjusting ring, collar ring, frame installation unit) from the place of manufacturing or purchase to the side of the manhole excavation pit and making them ready; and</p> <p>Taking the prefabricated manhole base unit from the side of the manhole excavation pit and lowering it down to the manhole foundation base, where bedding is formed, without giving damage to the base unit, and the placement of the base unit in parallel with the design elevation, and taking the prefabricated chamber ring, chamber height adjusting ring (if necessary), tapered unit, collar ring and frame installation units from the side of the manhole excavation pit and commencing from the top of the base unit, the placement in a way being flush with the top of ground or top of road of prefabricated chamber ring, chamber height adjusting ring (if necessary), tapered unit, collar ring and frame installation units one on top of the other in a watertight manner, and testing the top of prefabricated units so placed for leakage according to the relevant standards and the specifications; and</p> <p>Purchase of the sphero-cast manhole cover manufactured in compliance with the unit rate description given with item 23.255/İB-6, and the transportation of the same to the side of the pit of the manhole to which it will be installed, and the installation of the same in compliance with the requirements of item 23.255/İB-6; and</p> <p>Backfilling of the foundation up to the top of road for non-paved roads and to the sub-pavement elevation for paved roads by using the excavation material in compliance with item 14.1700 included in the Bills of Quantities from İller Bank; and</p> <p>Execution pursuant to the Special Technical Specifications for Digital Operation Designs from İller Bank of coordinate survey, calculation and benchmark of the manholes present on the sewerage lines, and the preparation of the as-built drawings, together with each progress payment, and the submission of the same to the Employer; and</p> <p>Purchase, including losses, of the cement, sand-gravel, stabilised or crushed stone and all kinds of the other necessary materials as incorporated in the aforesaid works, loading the same onto vehicles and</p>	

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		<p>unloading the same, stacking, all kinds of material and the losses of material, the transportation of all kinds of materials (including manhole, sphero-cast cover) to the construction site and loading and unloading with respect to such transportation, price increase of any kind for difficulties arising from sludge and for water drainage and depth and loading, horizontal and vertical handling, unloading of any kind on the construction site, labour, tools and equipment costs, and test and laboratory costs of any kind, and depreciation, interest, maintenance, power, repair and insurance costs, and the contractor's profit, and overhead.</p> <p>Measurement: The number of the manholes constructed.</p> <p>Note: 1-) (*) The integrated seals to be used at the inlets - outlets of manhole base units shall be compatible with TS EN 681-1 standard and they shall be produced, being placed in shuttering during the casting of the base unit. In case an integrated seal not compatible with TS EN 681-1 standard is used in manhole base units, the Bank shall not permit the use of the manhole base units to be manufactured or purchased.</p> <p>2-) Chamber height adjusting ring with heights from H=0.15-0.60 m shall be used so that the manhole chamber height is compatible with road elevation and it shall never be less than 0.15 m.</p> <p>3-) No preparation payment shall be made for any material falling in the scope of this work.</p> <p>4-) Primarily, the manhole should be formed by using base unit + tapered unit + 35-chamber ring + 60-chamber ring + frame installation unit + height adjusting ring. However, maximum 1 collar ring can be used to adjust manhole to the top of road. The collar ring can be used for the construction above the ground elevation for the manholes of the sewerage lines that have already laid through the land. A collar ring shall not be used for the construction manholes other the ones mentioned above.</p> <p>//</p> <p>Ø200 mm ÇIKIŞ ÇAPINDA BUHAR KÜRLÜ PREFABRİK 500 DOZLU MUAYENE BACASI İMALATININ YAPILMASI (HENDEK DOLGUSU KAZIDAN ÇIKAN MALZEME İLE)</p> <p>Sözleşmesi ekindeki tasdikli kesin projesinde gösterilen yerlerde; baca numaraları ve çıkış çapları tasdikli projesinde belirtilen, 500 dozlu entegre contalı (taban elemanı giriş-çıkışları), buhar kürlü beton prefabrik muayene bacası teşkili için her derinlikte yapılacak kanalizasyon inşaatı kapsamında;</p> <p>Tasdikli kesin projesine göre kanalizasyon hattı güzergahının belirlenmesi, Muayene bacasının teşkil edileceği yerin aplikasyonunun yapılması, temel kazı çalışmaları yapılmadan önce kazının yapılacağı güzergahta ve çevresinde her türlü emniyet tedbirlerinin alınması, muayene bacasının teşkil edileceği yollardaki her türlü yol kaplamasının kesilmesi, sökülmesi ve taşıtlara yüklenerek idarenin göstereceği depo yerine nakledilmesi, boşaltılması,</p> <p>Sözleşme eki şartnameler, standartlar ve proje esaslarında her tür klas ve derinlikteki zeminde elle ve/veya makine ile Patlayıcı madde kullanılmadan ve/veya kullanılarak TEMEL kazısı yapılması, kazının ve imalatın bünyesine giren malzemelerin temel çukuru kenarından minimum 0,60 m koruma şeridi dışına konulması, iş ve işçi can güvenliği ile çevre emniyetinin sağlanması için gerekli tedbirlerin alınması, Temel</p>	

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		<p>kenarlarının Sözleşme eki şartnameler, standartlar ve proje esaslarına uygun her türlü ahşap iksa(aralıklı-sıkaraklık-tam kaplamalı ahşap iksa) veya çelik panolu (Kriings-Verbau veya benzeri tipte çelik pano vs. her türlü iksa kullanılarak) iksa ile desteklenmesi veya idarenin uygun görmesi ve Sözleşme eki şartnameler, standartlar ve proje esaslarına göre kazı alanının uygun olması halinde zemin cinsi, temel genişliği ve derinliği dikkate alınarak şevli kazı yapılması, iş ve işçi can güvenliği ile çevre emniyetinin sağlanması için gerekli tedbirlerin alınması,</p> <p>Şartnamesine ve projesine uygun olarak kazı çukuru tabanı ve yan yüzeylerinin düzeltilmesi, varsa zemin suyunun temel çukurundan uzaklaştırılarak temel tabanının kuru hale getirilmesi, kazı tabanının tesviye edilmesi ve sıkıştırılması, bu çalışmalar sırasında çıkan kazı artık malzemenin temel çukuru kenarı koruma şeridi dışına konulması veya taşıtlara yüklenip idarenin göstereceği yere kadar taşınarak boşaltılması, temel kenarında, temel içinde, iş mahallinde imalat, malzeme, can ve iş güvenliğinin ve varsa trafik ve yaya gidiş-gelişinin sağlanması ve varsa mevcut üstyapı emniyeti için gerekli her türlü tedbirin alınması ve her türlü uyarı işaretinin konulması,</p> <p>Kazı tabanının üniform olarak düzeltilmesi, tesviye edilmesi ve tesviye edildikten sonra kazı tabanının sıkıştırılması,</p> <p>Sıkıştırılmış temel kazı tabanına en az 0,15 m. kalınlığında; İller Bankası Genel Müdürlüğü Birim Fiyat Tarifleri Kitabında yer alan 15.140/İB-7f pozunun tarifine uygun yataklamanın (*) yapılması,</p> <p>Sözleşme ekindeki tip projesinde KNL-TP-27A belirtilen ölçülere ve TS EN 1917 ile TS 3830 standartlarına göre imal edilmiş;</p> <ul style="list-style-type: none"> - Çıkış çapı tasdikli projesinde belirtilen, Giriş - çıkışları entegre contalı (*) buhar kürlü 500 Dz.lu prefabrik muayene bacası taban elemanlarının; - Buhar kürlü lastik contalı 500 Dz.lu muayene bacası prefabrik konik elemanının, - 0,60 m yüksekliğinde 1.00 mt iç çapında buhar kürlü entegre contalı muayene bacası gövde bileziğinin, - 0,35 m yüksekliğinde 1.00 mt iç çapında buhar kürlü entegre contalı muayene bacası gövde bileziğinin, - H=0,15-0,60 m. arasında değişken yükseklikte 1.00m. iç çapında buhar kürlü entegre contalı prefabrik muayene bacası gövde yükseklik ayar bileziğinin, - H=0,15 m. yüksekliğinde, 0,62 mt. iç çapında 0,13 mt. et kalınlığında buhar kürlü entegre contalı prefabrik muayene bacası boyun bileziğinin, - Buhar kürlü entegre contalı prefabrik muayene bacası çerçeve montaj elemanının, <p>satın alınması veya söz konusu prefabrik muayene bacası elemanlarının yüklenici tarafından kurulacak beton boru fabrikasında sözleşme ekindeki tip projesinde KNL-TP-27A belirtilen ölçülere ve TS EN 1917 ile TS 3830 standartlarına göre imal edilmesi, prefabrik muayene bacası elemanlarına ait her türlü testlerinin idarece görevlendirilen elamanlarca TS EN 1917'ye göre test ve deneylerinin fabrika sahasında veya idare tarafından gösterilen laboratuarda yapılması, test ve deneylerinin yapımını müteakip prefabrik muayene bacası elemanlarının (Taban elemanı, konik, gövde bileziği, gövde yükseklik ayar bileziği, boyun bileziği, çerçeve montaj elemanı), imal edildikleri veya satın alındıkları yerden baca kazı çukuru kenarına taşınarak hazır hale getirilmesi,</p>	

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		<p>Prefabrik baca taban elemanının baca kazı çukuru kenarından alınarak hasar verilmeyecek şekilde yataklaması yapılmış baca temel tabanına indirilmesi, proje kotuna uygun olarak yerleştirilmesi, prefabrik gövde bileziği, gövde yükseklik ayar bileziği (gerekmesi halinde), konik, boyun bileziği, çerçeve montaj elemanlarının baca kazı çukuru kenarından alınarak hasar verilmeyecek şekilde taban elemanı üzerinden itibaren, sızdırmaz halde zemin seviyesi üst kotu veya yol üst kotu ile aynı seviyede olacak şekilde üst üste yerleştirilmesi, yerleştirilmiş prefabrik eleman başlarının ilgili standartlara ve şartnamesine göre sızdırmazlık tecrübesinin yapılması,</p> <p>23.255/İB-6 Poz No'lu birim fiyat tarifine uygun imal edilmiş sfero döküm baca kapağının satın alınması, konulacağı muayene bacası çukuru kenarına kadar taşınması, 23.255/İB-6 poz no.sunda belirtilen esaslara göre yerine konulması,</p> <p>Temel Dolgusunun kazıdan çıkan malzeme kullanılarak İller Bankası Birim Fiyat cetvellerinde yer alan 14.1700 pozunun tarifine uygun olarak Kaplamasız yollarda yol üst kotuna kadar, kaplamalı yollarda kaplama altı kotuna kadar yapılması,</p> <p>Kanalizasyon hatlarında bulunan bacaların, koordinat ölçü, hesap ve röperinin, sözleşme eki İller Bankası "Sayısal İşletme Projeleri Özel Teknik Şartnamesi"ne göre yapılması ve her hakedişle birlikte asbuit projelerinin hazırlanarak idareye teslimi,</p> <p>Yukarıda bahsedilen imalatların, bünyesine giren çimento, kum-çakıl, stabilize veya kırmataş ile diğer her türlü gerekli malzemelerin satın alınması, taşıtlara yüklenmesi ve boşaltılması, istif, figüre, her türlü malzeme ve zayiati, her türlü malzemenin(muayene baca, sfero kapak dahil) inşaat mahalline kadar taşınması, bu taşımalara ait yükleme ve boşaltma, her türlü çamur müşkülât ve su boşaltma zammı, derinlik zammı, inşaat yerindeki her türlü yükleme, yatay ve düşey taşıma, boşaltma, işçilik, alet edevat giderleri, her türlü deney ve laboratuvar giderleri, amortisman, faiz, bakım, enerji, onarım ve sigorta giderleri ile yüklenici karı ve genel giderler dahil, projesine göre imalatı yapılmış, her türlü dolgusu yapılmış, Çıkış Çapı Ø200 mm Olan Buhar Kürlü Prefabrik 500 Dozlu Muayene Bacası İmalatının Yapılması,</p> <p>Giriş - çıkışları entegre contalı buhar kürlü prefabrik taban elemanı, gövde bileziği elemanları, konik elemanı, boyun bileziği, çerçeve montaj elemanı, sfero döküm kapağı ile tasdikli projesinde belirtilen,(1 giriş - 1 çıkış, 2 giriş - 1 çıkış, 3 giriş - 1 çıkış dahil) muayene bacası teşkil edilmesinin, 1(bir) Adet fiyatıdır.</p> <p>Ölçü: Yapılan muayene bacasının adet cinsinden miktarıdır.</p> <p>Not: 1-) (*) Muayene bacası taban elemanlarının giriş - çıkışlarında kullanılacak olan entegre contalar; TS EN 681-1 standardına uygun olacak ve taban elemanının döküm aşamasında kalıp içerisine yerleştirilerek imalatı yapılacaktır. TS EN 681-1 standardına uygun olmayan entegre contanın muayene bacası taban elemanlarında kullanılması halinde, imal edilecek veya satın alınacak muayene bacası taban elemanlarının kullanılmasına, Bankamızca müsaade edilmeyecektir.</p> <p>2-) H=0,15-0,60m. arasında değişken yükseklikteki muayene bacası gövde yükseklik ayar bileziği, muayene bacası gövde yüksekliğinin yol kotu seviyesine uygun olması amacıyla kullanılacak ve hiçbir zaman 0,15 mt.den az olmayacaktır.</p>	

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		<p>3-) Bu imalat kapsamındaki hiçbir malzemeye ihzarat bedeli ödenmeyecektir.</p> <p>4-) Muayene bacası; Taban + konik + 35 lik gövde bileziği + 60'lık gövde bileziği + çerçeve montaj + yükseklik ayar bilezik elemanları kullanılarak teşkil edilmesi esastır. Ancak muayene bacasını yol üst kotuna ayarlamak için en fazla 1 adet boyun bileziği kullanılabilir. Halihazır araziden geçen kanalizasyon hatlarına ait muayene bacalarında ise zemin kotunun üstündeki imalatla kullanılabilecektir. Bunun dışındaki muayene baca teşkilllerinde boyun bileziği kullanılmayacaktır.</p>	
107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117	Special/Civ/09, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19	<p>Special/Civ/09, Laying Ø32 PN10 Atü PE100 pipe (Trench filler with excavation material) // Ø32 PN10 Atü PE100 Boru Döşenmesi (Hendek Dolgusu Kazıdan Çıkan Malzeme İle)</p> <p>Special/Civ/10, Laying Ø40 PN10 Atü PE100 pipe (Trench filler with excavation material) // Ø40 PN10 Atü PE100 Boru Döşenmesi (Hendek Dolgusu Kazıdan Çıkan Malzeme İle)</p> <p>Special/Civ/11, Laying Ø63 PN10 Atü PE100 pipe (Trench filler with excavation material) // Ø63 PN10 Atü PE100 Boru Döşenmesi (Hendek Dolgusu Kazıdan Çıkan Malzeme İle)</p> <p>Special/Civ/12, Laying Ø75 PN10 Atü PE100 pipe (Trench filler with excavation material) // Ø75 PN10 Atü PE100 Boru Döşenmesi (Hendek Dolgusu Kazıdan Çıkan Malzeme İle)</p> <p>Special/Civ/13, Laying Ø90 PN10 Atü PE100 pipe (Trench filler with excavation material) // Ø90 PN10 Atü PE100 Boru Döşenmesi (Hendek Dolgusu Kazıdan Çıkan Malzeme İle)</p> <p>Special/Civ/14, Laying Ø125 PN10 Atü PE100 pipe (Trench filler with excavation material) // Ø125 PN10 Atü PE100 Boru Döşenmesi (Hendek Dolgusu Kazıdan Çıkan Malzeme İle)</p> <p>Special/Civ/15, Laying Ø250 PN10 Atü PE100 pipe (Trench filler with excavation material) // Ø250 PN10 Atü PE100 Boru Döşenmesi (Hendek Dolgusu Kazıdan Çıkan Malzeme İle)</p> <p>Special/Civ/16, Laying Ø280 PN10 Atü PE100 pipe (Trench filler with excavation material) // Ø280 PN10 Atü PE100 Boru Döşenmesi (Hendek Dolgusu Kazıdan Çıkan Malzeme İle)</p> <p>Special/Civ/17, Laying Ø400 PN10 Atü PE100 pipe (Trench filler with excavation material) // Ø400 PN10 Atü PE100 Boru Döşenmesi (Hendek Dolgusu Kazıdan Çıkan Malzeme İle)</p> <p>Special/Civ/18, Laying Ø450 PN10 Atü PE100 pipe (Trench filler with excavation material) // Ø450 PN10 Atü PE100 Boru Döşenmesi (Hendek Dolgusu Kazıdan Çıkan Malzeme İle)</p> <p>Special/Civ/19, Laying Ø560 PN10 Atü PE100 pipe (Trench filler with excavation material) // Ø560 PN10 Atü PE100 Boru Döşenmesi (Hendek Dolgusu Kazıdan Çıkan Malzeme İle)</p> <p>The laying of 1 (one) m.tulle polyethylene and high density polyethylene pipe of any kind pursuant to the relevant design, including the supply for the performance of the work pursuant to the relevant design of PE and HDPE pipes and fittings of any kind which are manufactured according to the relevant National and International Standards, Norms and Specifications and of which tests of any kind are made before they are received and which have the diameter and compression grade as specified in the relevant design, and bringing the same to the worksite,</p>	m

No	Pose/Item No	Pose/Item Definition (in English) // Poz tanımı (in Turkish)	Unit
		<p>with all kinds of transportation, loading-unloading included, and the performance in line with the descriptions as given in the Unit Rate Descriptions Book from the Ministry of Environment and Urban Planning, Supreme Technical Board and in the Unit Rate Descriptions Book from the General Directorate of İller Bank of the necessary construction works of any kind according to the relevant design, and the purchase of sand-gravel fitting for backfilling and construction and of all kinds of the other necessary materials, and the transportation of the same to the worksite, and loading the same onto vehicles and unloading the same, and the storage and ordering of the same on the work site in compliance with the relevant specifications and the manufacturer's recommendation, and testing the pipe, special parts both inside and outside before lowering them down to the trench and avoiding using defective pipes and the replacement of the same with the new one; and Determining the pipeline route according to the relevant design, and the execution of application and two-way benchmark of the same, and in case of conflict with the design, preparing free of charge the schematic profile of the same or if necessary, the design of the same again and having such profile or design approved by the Employer, and carrying out trench excavation manually or by using machinery of any kind in the soil of any kind and in any depth along the route according to the trench excavation section which will be determined by taking account of the excavation depths as indicated in the relevant profile and of the special specifications, and the removal of the excavation material out of the trench pit and loading the excavation materials onto vehicles, and the transportation of the same to such dump site as is jointly designated by the Employer and the local governments concerned, and unloading the same, and levelling and arranging the same in the dump site, and supporting the trench walls with wooden shoring of any kind (spaced - frequently spaced - fully covered wooden shoring) or steel panel shoring (of Krings-Verbau type or similar type) complying with TS 2519 and DIN 4124 standards or if the Employer considers it appropriate and where allowed by the excavation site in compliance with the requirements of the specifications, standards and design enclosed to the contract, taking into consideration the type of soil and the width and depth of excavation, carrying out battered excavation, and taking the necessary precautions to ensure labour and labourer's safety of life, and levelling the excavation pit base and wall surfaces in compliance with the relevant specifications and design, and levelling and compacting the excavation base; and</p> <p>Forming bedding to [(D/10) +10] cm thickness with D= pipe outer diameter in line with KNL-TP-19 Type A Bedding as indicated in the Standard Design for Forming Bedding for Sewerage Pipes on the compacted trench excavation base in compliance with item 15.140/İB-7f included in the Unit Rate Descriptions Book from the General Directorate of İller Bank; and</p> <p>Lowering the pipes and the fittings of any kind down to the trench base by using suitable means without causing loss and giving damage in a uniform manner without hitting, and laying all the pipes and fittings on the trench base without making any modification to gradients and directions other than the design data so that the pipes and fittings are seated on the trench base, and if necessary, cutting the pipes and cleaning pipe ends and joining all kinds of pipes and fitting via welding of any kind, making the laid pipeline (including, if any, the supply and</p>	

No	Pose/Item No	Pose/Item Definition (in English) // Poz tanımı (in Turkish)	Unit
		<p>installation of oval valves with valve chamber and garden taps pursuant to the relevant design) subject to test pressure at pressure 1.50 times the operating pressure of the pipe and for 1 hour, and of the line made subject to leak test, encasing the pipes over the pipe and on sides of the pipe up to 0.30 m height above top of pipe in compliance with the requirements of item 15.140/İB-7f included in the Bills of Quantities from İller Bank, and the backfilling of the trench above encasing in compliance with item 14.1700, and the removal of shoring of any kind and taking and putting the same out of the trench safely (if shoring is used); and</p> <p>Carrying out to the satisfaction of the Employer the works involving the suspended bridge crossing of the pipeline and/or the creek crossing of the pipeline in concrete/reinforced concrete encasement pursuant to the relevant approved design (as, if work items include a separate construction item with respect to this, the cost of it will be paid through that item separately, the construction works in question will not be taken into consideration in this case); and</p> <p>For the purpose of carrying out the excavation and the work in the dry, inclusion of the price increase for all kinds of water drainage, difficulties arising from sludge and for depth; and</p> <p>All kinds of materials and the loss of material, and all kinds of labour, tools and equipment, machinery, instruments, materials and the transportation of all kinds of other materials from the borrow pit or the place of supply and loading and unloading with respect to such transportation, and horizontal and vertical handling, loading and unloading of any kind at work, tests and laboratory of any kind, test water (including the test and laboratory costs of works), depreciation, insurance, interest, maintenance, power and repair and insurance costs, and the contractor's profit and overhead;</p> <p>Measurement: Amount of the laid pipeline as expressed in m.tulle, which is constructed actually according to the relevant design and found appropriate by the Employer.</p> <p>Note: 1- The Employer may have the Contractor conduct all kinds of tests and laboratory researches to establish the conformity of the materials and works of any kind with the relevant National and International Standards, Norms and Specifications.</p> <p>2- It shall be deemed that the necessary operations, manufacturing and construction works for the completion of all the works according to the relevant design are included in the scope of this unit price.</p> <p>3- Laying shall take place by using Ø400 PE 100 PN10 pipe for V1,V2 Telescopic Valve Rooms Return Pump Station although it is indicated as Ø400 BB in the relevant design and payment thereof shall be made through item HASSA -AAT - 50.</p> <p>4-On the lines which are indicated to be polyethylene in the relevant design, surface line shall be laid by using stainless steel pipe.</p> <p>//</p> <p>Projesine göre işin yapımı için Ulusal ve Uluslararası ilgili Standartlara, Normlara ve Şartnamelere göre imal edilmiş ve teslim almadan önce muayenesi ve her türlü deneyi yapılmış olarak projesinde belirtilen çapta, basınç sınıfında, her nevi PE ve HDPE boru ve fittings malzeme temini, her türlü nakliye, yükleme-boşaltma dahil iş yerine getirilmesi, projesine göre gerekli her çeşit inşaat imalatının; Çevre ve Şehircilik Bakanlığı</p>	

No	Pose/Item No	Pose/Item Definition (in English) // Poz tanımı (in Turkish)	Unit
		<p>Yüksek Fen Kurulu Başkanlığı Birim Fiyat Tarifleri Kitabı ile İller Bankası A.Ş. Genel Müdürlüğü Birim Fiyat Tarifleri Kitabı'nda yer alan tariflerine uygun olarak yapılması, dolguya ve imalata uygun kum-çakılın ve diğer her türlü gerekli malzemelerin satın alınması, iş yerine kadar taşınması, taşıtlara yüklenmesi ve boşaltılması, iş yerinde şartnamesine ve imalatçı firmanın tavsiyesine uygun şekilde depolanması ve sıraya konması, hendeğe indirilmeden önce borunun, özel parçaların dış ve içleri muayene edilmesi, arızalı boruların kullanılmaması ve yerine yenisinin alınması,</p> <p>Projesine göre boru hattı güzergahının belirlenmesi, aplikasyonunun ve gidiş-dönüş nivelmanının yapılması, proje ile farklılık olması halinde yeniden şematik profilinin veya gerekmesi halinde projesinin bila bedel hazırlanarak idareye tasdik ettirilmesi, güzergah boyunca tasdikli proje profilindeki kazı derinlikleri ve özel şartname dikkate alınarak belirlenecek hendek kazı kesitine göre, her derinlikte her cins ve klastaki zeminde elle ve her cins makineyle hendek kazısının yapılması, kazı malzemesinin hendek çukuru dışına atılması ve kazıdan çıkan malzemenin taşıtlara yüklenerek, İdare ve ilgili yerel yönetimler tarafından müştereken gösterilen depoya taşınması ve boşaltılması, depo yerinde tesfiye ve tanzimi ve hendek kenarlarının TS 2519 ve DIN 4124 standartlarına uygun her türlü ahşap iksa(aralıklı-sıkaraklık- tam kaplamalı ahşap iksa) veya çelik panolu (Krings-Verbau veya benzeri tipte) iksa ile desteklenmesi veya idarenin uygun görmesi ve Sözleşme eki şartnameler, standartlar ve proje esaslarına göre kazı alanının uygun olması halinde zemin cinsi, hendek genişliği ve derinliği dikkate alınarak şevli kazı yapılması, iş ve işçi can güvenliğinin sağlanması için gerekli tedbirlerin alınması, şartnamesine ve projesine uygun olarak kazı çukuru tabanı ve yan yüzeylerinin düzeltilmesi, kazı tabanının tesviye edilmesi ve sıkıştırılması,</p> <p>Sıkıştırılmış hendek kazı tabanına "Kanalizasyon Borularının Yataklama Tip Projesi "ndeki KNL-TP-19 "A Tipi Yataklama'ya uygun olarak D= boru dış çapı olmak üzere [(D/10) +10] cm. kalınlığında olacak şekilde, İller Bankası Genel Müdürlüğü Birim Fiyat Tarifleri Kitabında yer alan 15.140/İB-7f pozunun tarifine uygun yataklamanın yapılması,</p> <p>Boruların ve her türlü fittings malzemenin, zayıt ve zarar verilmeyecek şekilde hendek tabanına düzenli ve darbesiz olarak uygun araçlar ile indirilmesi, proje verileri dışında eğim ve yön değişikliği yapılmadan hendek tabanına tüm boruların ve fittings malzemenin, oturacak şekilde döşenmesi, gerekmesi halinde kesilerek ve boru uçları temizlenerek her türlü kaynak ile boruların ve her türlü fittings malzemenin eklenmesi, (varsa projesine göre oval buşakleli vanalar ve bahçe muslukları temini ve montajı dahil) döşenen boru hattının, boruya ait işletme basıncının 1,50 katı basınç ve 1 saat süre ile tecrübe basıncına tabi tutulması, Sızdırmazlık deneyine tabi tutulan hattın İller Bankası Birim Fiyat cetvellerinde yer alan 15.140/İB-7f pozunun tarif esaslarına göre boru üstü 0,30 m. yüksekliğe kadar boru üstünün ve yanlarının gömleklemesinin yapılması, 14.1700 pozunun tarifine uygun olarak gömlekleme üstü hendek dolgusunun yapılması, her türlü iksaların sökülmesi, hendek dışına emniyetli bir şekilde çıkarılması ve konması (iksa kullanılması durumunda),</p> <p>Tasdikli projesine göre boru hattının askıda köprü geçişi ve/veya beton/betonarme gömlek içinde dere geçişi işlerinin İdarenin uygun göreceği şekilde yapılması, (İş kalemlerinde eğer bununla ilgili ayrıca bir</p>	

No	Pose/Item No	Pose/Item Definition (in English) // Poz tanımı (in Turkish)	Unit
		<p>imalat pozu verilmişse bedeli o pozdan ayrıca ödeneceğinden belirtilen imalat çalışmaları bu durumda dikkate alınmayacaktır.)</p> <p>Kazının ve imalatın kuruda yapılması için her türlü su boşaltma, çamur müşkülâtı ve derinlik zammının dahil edilmesi,</p> <p>Her türlü malzeme ve zayıatı, her türlü işçilik, alet edevat, makine, araç, gereç, diğer her türlü malzemenin temin edildiği ocak veya yerden taşınması, bu taşıma ile ilgili yükleme ve boşaltma, iş başında her türlü yatay ve düşey taşıma, yükleme ve boşaltma, her türlü deney ve laboratuvar, tecrübe suyu,(imalata ait test ve laboratuvar masrafları dahil) amortisman, faiz, bakım enerji ve onarım ve sigorta giderleri ile yüklenici kârı ve genel giderleri dahil;</p> <p>1 (bir) metretül her nevi polietilen ve yüksek yoğunluklu polietilen borunun projesine göre döşenmesidir.</p> <p>Ölçü: Projesine göre fiilen yapılan ve idarece uygun görülen döşenmiş boru hattının metre tül cinsinden miktarıdır.</p> <p>Not: 1-İdare, her türlü malzemenin ve imalatın Ulusal ve Uluslararası ilgili Standartlara, Normlara ve Şartnamelere uygunluğunu belirlemek için yükleniciye her türlü deney ve laboratuvar araştırması yaptırabilir.</p> <p>2- Bu birim fiyat kapsamında tüm işlerin projesine göre tamamlanması için gerekli işlemler, imalat ve inşaat işlerinin dahil olduğu kabul edilecektir.</p> <p>3- Projesinde Ø400 BB olarak görünen V1,V2 Teleskobik Vana Odaları Geri Devir Terfi istasyonuna arası Ø400 PE 100 PN10 boru kullanılarak döşenecek olup HASSA -AAT - 50 pozu üzerinden ödemesi yapılacaktır.</p> <p>4-Projesinde polietilen gösterilen hatlarda toprak üstü imalatı paslanmaz çelik boru olacak şekilde imalatı yapılacaktır.</p>	
118, 119, 120, 121	Special/Civ/20, 21, 22, 23	<p>Special/Civ/20, Laying DN40 (4.5mm) SS 304 Pipe (Trench filler with excavation material) // DN40 (4.5mm) SS 304 Boru Döşenmesi (Hendek Dolgusu Kazıdan Çıkan Malzeme İle)</p> <p>Special/Civ/21, Laying DN200 (4.5mm) SS 304 Pipe (Trench filler with excavation material) // DN200 (4.5mm) SS 304 Boru Döşenmesi (Hendek Dolgusu Kazıdan Çıkan Malzeme İle)</p> <p>Special/Civ/22, Laying DN350 (4.5mm) SS 304 Pipe (Trench filler with excavation material) // DN350 (4.5mm) SS 304 Boru Döşenmesi (Hendek Dolgusu Kazıdan Çıkan Malzeme İle)</p> <p>Special/Civ/23, Laying DN550 (4.5mm) SS 304 Pipe (Trench filler with excavation material) // DN550 (4.5mm) SS 304 Boru Döşenmesi (Hendek Dolgusu Kazıdan Çıkan Malzeme İle)</p> <p>The laying of 1 (one) m.tulle SS304 grade stainless steel pipe of any kind pursuant to the relevant design, including the supply for the performance of the work pursuant to the relevant design of SS304 grade stainless steel pipes and fittings of any kind which are manufactured according to the relevant National and International Standards, Norms and Specifications and of which tests of any kind are made before they are received and which have the diameter and compression grade as specified in the relevant design, and bringing the same to the worksite, with all kinds of transportation, loading-unloading included, and the performance in line with the descriptions as given in the Unit Rate Descriptions Book from the Ministry of Environment and Urban Planning, Supreme Technical Board and in the Unit Rate Descriptions Book from the General Directorate of İller Bank of the necessary</p>	m

No	Pose/Item No	Pose/Item Definition (in English) // Poz tanımı (in Turkish)	Unit
		<p>construction works of any kind according to the relevant design, and the purchase of sand-gravel fitting for backfilling and construction and of all kinds of the other necessary materials, and the transportation of the same to the worksite, and loading the same onto vehicles and unloading the same, and the storage and ordering of the same on the work site in compliance with the relevant specifications and the manufacturer's recommendation, and testing the pipe, special parts both inside and outside before lowering them down to the trench and avoiding using defective pipes and the replacement of the same with the new one; and</p> <p>Determining the pipeline route according to the relevant design, and the execution of application and two-way benchmark of the same, and in case of conflict with the design, preparing free of charge the schematic profile of the same or if necessary, the design of the same again and having such profile or design approved by the Employer, and carrying out trench excavation manually or by using machinery of any kind in the soil of any kind and in any depth along the route according to the trench excavation section which will be determined by taking account of the excavation depths as indicated in the relevant profile and of the special specifications, and the removal of the excavation material out of the trench pit and loading the excavation materials onto vehicles, and the transportation of the same to such dump site as is jointly designated by the Employer and the local governments concerned, and unloading the same, and levelling and arranging the same in the dump site, and supporting the trench walls with wooden shoring of any kind (spaced - frequently spaced - fully covered wooden shoring) or steel panel shoring (of Krings-Verbau type or similar type) complying with TS 2519 and DIN 4124 standards or if the Employer considers it appropriate and where allowed by the excavation site in compliance with the requirements of the specifications, standards and design enclosed to the contract, taking into consideration the type of soil and the width and depth of excavation, carrying out battered excavation, and taking the necessary precautions to ensure labour and labourer's safety of life, and levelling the excavation pit base and wall surfaces in compliance with the relevant specifications and design, and levelling and compacting the excavation base; and</p> <p>Forming bedding to [(D/10) +10] cm thickness with D= pipe outer diameter in line with KNL-TP-19 Type A Bedding as indicated in the Standard Design for Forming Bedding for Sewerage Pipes on the compacted trench excavation base in compliance with item 15.140/IB-7f included in the Unit Rate Descriptions Book from the General Directorate of Iller Bank; and</p> <p>Lowering the pipes and the fittings of any kind down to the trench base by using suitable means without causing loss and giving damage in a uniform manner without hitting, and laying all the pipes and fittings on the trench base without making any modification to gradients and directions other than the design data so that the pipes and fittings are seated on the trench base, and if necessary, cutting the pipes and cleaning pipe ends and joining all kinds of pipes and fitting via welding of any kind, making the laid pipeline subject to test pressure at pressure 1.50 times the operating pressure of the pipe and for 1 hour, and of the line made subject to leak test, encasing the pipes over the pipe and on sides of the pipe up to 0.30 m height above top of pipe in compliance with the requirements of item 15.140/IB-7f included in the Bills of Quantities from Iller Bank, and the backfilling of the trench above</p>	

No	Pose/Item No	Pose/Item Definition (in English) // Poz tanımı (in Turkish)	Unit
		<p>encasing in compliance with item 14.1700, and the removal of shoring of any kind and taking and putting the same out of the trench safely (if shoring is used); and</p> <p>For the purpose of carrying out the excavation and the work in the dry, inclusion of the price increase for all kinds of water drainage, difficulties arising from sludge and for depth; and</p> <p>All kinds of materials and the loss of material, and all kinds of labour, tools and equipment, machinery, instruments, materials and the transportation of all kinds of other materials from the borrow pit or the place of supply and loading and unloading with respect to such transportation, and horizontal and vertical handling, loading and unloading of any kind at work, tests and laboratory of any kind, test water (including the test and laboratory costs of works), depreciation, insurance, interest, maintenance, power and repair and insurance costs, and the contractor's profit and overhead;</p> <p>Measurement: Amount of the laid pipeline as expressed in m.tulle, which is constructed actually according to the relevant design and found appropriate by the Employer.</p> <p>Note: 1- The Employer may have the Contractor conduct all kinds of tests and laboratory researches to establish the conformity of the materials and works of any kind with the relevant National and International Standards, Norms and Specifications.</p> <p>2- It shall be deemed that in the scope of this unit price, the necessary operations, manufacturing and construction works for the completion of all works according to the respective designs are included.</p> <p>//</p> <p>Projesine göre işin yapımı için Ulusal ve Uluslararası ilgili Standartlara, Normlara ve Şartnamelere göre imal edilmiş ve teslim almadan önce muayenesi ve her türlü deneyi yapılmış olarak projesinde belirtilen çapta, basınç sınıfında, SS304 kalite paslanmaz çelik boru ve fittings malzeme temini, her türlü nakliye, yükleme-boşaltma dahil iş yerine getirilmesi, projesine göre gerekli her çeşit inşaat imalatının; Çevre ve Şehircilik Bakanlığı Yüksek Fen Kurulu Başkanlığı Birim Fiyat Tarifleri Kitabı ile İller Bankası A.Ş. Genel Müdürlüğü Birim Fiyat Tarifleri Kitabı'nda yer alan tariflerine uygun olarak yapılması, dolguya ve imalata uygun kum-çakılın ve diğer her türlü gerekli malzemelerin satın alınması, iş yerine kadar taşınması, taşıtlara yüklenmesi ve boşaltılması, iş yerinde şartnamesine ve imalatçı firmanın tavsiyesine uygun şekilde depolanması ve sıraya konması, hendeğe indirilmeden önce borunun, özel parçaların dış ve içleri muayene edilmesi, arızalı boruların kullanılmaması ve yerine yenisinin alınması,</p> <p>Projesine göre boru hattı güzergahının belirlenmesi, aplikasyonunun ve gidiş-dönüş nivelmanının yapılması, proje ile farklılık olması halinde yeniden şematik profilinin veya gerekmesi halinde projesinin bila bedel hazırlanarak idareye tasdik ettirilmesi, güzergah boyunca tasdikli proje profilindeki kazı derinlikleri ve özel şartname dikkate alınarak belirlenecek hendek kazı kesitine göre, her derinlikte her cins ve klastaki zeminde elle ve her cins makineyle hendek kazısının yapılması, kazı malzemesinin hendek çukuru dışına atılması ve kazıdan çıkan malzemenin taşıtlara yüklenerek, İdare ve ilgili yerel yönetimler tarafından müştereken gösterilen depoya taşınması ve boşaltılması, depo yerinde tesfiye ve tanzimi ve hendek kenarlarının TS 2519 ve DIN 4124 standartlarına uygun her türlü ahşap iksa(aralıklı-sıkaraklıklı-tam</p>	

No	Pose/Item No	Pose/Item Definition (in English) // Poz tanımı (in Turkish)	Unit
		<p>kaplamalı ahşap iksa) veya çelik panolu (Krings-Verbau veya benzeri tipte) iksa ile desteklenmesi veya idarenin uygun görmesi ve Sözleşme eki şartnameler, standartlar ve proje esaslarına göre kazı alanının uygun olması halinde zemin cinsi, hendek genişliği ve derinliği dikkate alınarak şevli kazı yapılması, iş ve işçi can güvenliğinin sağlanması için gerekli tedbirlerin alınması, şartnamesine ve projesine uygun olarak kazı çukuru tabanı ve yan yüzeylerinin düzeltilmesi, kazı tabanının tesviye edilmesi ve sıkıştırılması,</p> <p>Sıkıştırılmış hendek kazı tabanına "Kanalizasyon Borularının Yataklama Tip Projesi "ndeki KNL-TP-19 "A Tipi Yataklama'ya uygun olarak D= boru dış çapı olmak üzere [(D/10) +10] cm. kalınlığında olacak şekilde, İller Bankası Genel Müdürlüğü Birim Fiyat Tarifleri Kitabında yer alan 15.140/İB-7f pozunun tarifine uygun yataklamanın yapılması,</p> <p>Boruların ve her türlü fittings malzemenin, zayıt ve zarar verilmeyecek şekilde hendek tabanına düzenli ve darbesiz olarak uygun araçlar ile indirilmesi, proje verileri dışında eğim ve yön değişikliği yapılmadan hendek tabanına tüm boruların ve fittings malzemenin, oturacak şekilde döşenmesi, gerekmesi halinde kesilerek ve boru uçları temizlenerek her türlü kaynak ile boruların ve her türlü fittings malzemenin eklenmesi, döşenen boru hattının, boruya ait işletme basıncının 1,50 katı basınç ve 1 saat süre ile tecrübe basıncına tabi tutulması, Sızdırmazlık deneyine tabi tutulan hattın İller Bankası Birim Fiyat cetvellerinde yer alan 15.140/İB-7f pozunun tarif esaslarına göre boru üstü 0,30 m. yüksekliğe kadar boru üstünün ve yanlarının gömleklemesinin yapılması, 14.1700 pozunun tarifine uygun olarak gömlekleme üstü hendek dolgusunun yapılması, her türlü iksaların sökülmesi, hendek dışına emniyetli bir şekilde çıkarılması ve konması (iksa kullanılması durumunda),</p> <p>Kazının ve imalatın kuruda yapılması için her türlü su boşaltma, çamur müşkülâtı ve derinlik zammının dahil edilmesi,</p> <p>Her türlü malzeme ve zayıtı, her türlü işçilik, alet edevat, makine, araç, gereç, diğer her türlü malzemenin temin edildiği ocak veya yerden taşınması, bu taşıma ile ilgili yükleme ve boşaltma, iş başında her türlü yatay ve düşey taşıma, yükleme ve boşaltma, her türlü deney ve laboratuvar, tecrübe suyu,(imalata ait test ve laboratuvar masrafları dahil) amortisman, faiz, bakım enerji ve onarım ve sigorta giderleri ile yüklenici karı ve genel giderleri dahil;</p> <p>1 (bir) metretül her nevi SS304 Kalite Paslanmaz çelik borunun projesine göre döşenmesidir.</p> <p>Ölçü: Projesine göre fiilen yapılan ve idarece uygun görülen döşenmiş boru hattının metre tül cinsinden miktarıdır.</p> <p>Not:1-İdare, her türlü malzemenin ve imalatın Ulusal ve Uluslararası ilgili Standartlara, Normlara ve Şartnamelere uygunluğunu belirlemek için yükleniciye her türlü deney ve laboratuvar araştırması yaptırabilir.</p> <p>2- Bu birim fiyat kapsamında tüm işlerin projesine göre tamamlanması için gerekli işlemler, imalat ve inşaat işlerinin dahil olduğu kabul edilecektir.</p>	

2. MECHANICAL WORKS

PARTICULAR SPECIFICATION FOR MECHANICAL WORKS

The Mechanical equipment to be supplied shall be subject to two-year manufacturer warranty (from the date of commissioning of the plant) as provided by both the Contractor and the Manufacturers and the warranty certificates shall be delivered to Engineer and the General Directorate of Hatay Water and Sewerage Administration (HATSU), being prepared in a folder.

If there is no in-built check-valve of aeration tank blowers and grit arrester blowers, check-valve shall be installed externally. Otherwise, no check-valve shall be installed.

Stainless steel pipe of SS304 grade shall be laid until diffuser collectors, instead of Ø110 PE pipe extending from the blower down to aeration tanks.

All piping in T 118 Water Tank building shall be of SS 304 grade.

The band conveyor under the decanters shall be manufactured and installed as screw band conveyor made of SS304 grade material.

The necessary facilities (maintenance platform, ladder, etc.) for the periodical maintenance of the cranes to be used at the plant shall be constructed.

No preparation payment shall be made as part of the payments for all mechanical equipment,

All the mechanical equipment to be established at the plant shall be supplied/manufactured and installed in compliance with the General Technical specifications for the Mechanical Equipment of Wastewater Treatment Facilities from the General Directorate of Ilıer Bank.

All the bolts, nuts, washers, etc. that will be used at the plant shall be stainless steel.

PARTICULAR SPECIFICATION FOR SUPPLY AND INSTALLATION OF THE MECHANICAL EQUIPMENT OF THE SANITARY AND COMMON INSTALLATIONS OF B-101 ADMINISTRATIVE BUILDING

Supply and installation of the mechanical equipment of the sanitary and common installations of B-101 administrative building shall be executed in line with the descriptions as given in the Items/Pose Definitions Book from the Ministry of Environment and Urban Planning, Supreme Technical Board and in the Items/Pose Definitions Book from the General Directorate of Ilıer Bank. The following works shall be executed in line with the definitions of stated item/pose.

The Contractor shall;

- manufacture /supply all the Mechanical Equipment [Lavatory and installations, Mirror, Shelf, Squat toilet and installation, embedded intermediate shut-off valves, urinal and installation, urinal partition, Sink and installations, Bathtub and installations, Bath faucet, sink faucet, Soap dispenser, Towel and toilet tissue holders with stainless steel frame, stainless steel floor drain, Float (die-cast), Single-walled (Open System) Solar Power Boiler - 150 l, Self-flapped aluminium panel collector, Electrical water heaters, 80 l, 2000 W, fire extinguishing cabinet (with fire extinguishers), sewage and clean water pipes, valves, various ironworks, etc.] for sanitary and common installation of B-101 Administration Building in the size and number as indicated in compliance with the relevant design, data sheets, the relevant standard, specifications and norms,
- Install equipment in compliance with the relevant approved design of the unit,
- Transport the equipment to the worksite, and make the equipment operable,
- Execute periodical maintenance and operate equipment until the final acceptance.

PARTICULAR SPECIFICATION FOR SUPPLY AND INSTALLATION OF THE MECHANICAL EQUIPMENT OF THE AIR-CONDITIONER INSTALLATION WORKS OF B-101 ADMINISTRATIVE BUILDING

Supply and installation of the mechanical equipment of the air-conditioner installation works of b-101 administrative building shall be executed in line with the descriptions as given in the Items/Pose Definitions Book from the Ministry of Environment and Urban Planning, Supreme Technical Board and in the Items/Pose

Definitions Book from the General Directorate of Iller Bank. The following works shall be executed in line with the definitions of stated item/pose.

The Contractor shall;

- manufacture /supply all the Mechanical Equipment [Inverter VRF indoor and outdoor units with capacity and in the number indicated in the relevant design, wired remote control devices, piping, insulation, drainage lines, Convecter-type electrical heaters, etc.] for air conditioners of B-101 Administration Building in the size and number as indicated in compliance with the relevant design, data sheets, the relevant standard, specifications and norms,
- Install equipment in compliance with the relevant approved design of the unit,
- Transport the equipment to the worksite, and make the equipment operable,
- Execute periodical maintenance and operate equipment until the final acceptance.

PARTICULAR SPECIFICATION FOR SUPPLY AND INSTALLATION OF THE MECHANICAL EQUIPMENT OF THE SANITARY AND COMMON INSTALLATIONS OF B-105 GUARD HOUSE

Supply and installation of the mechanical equipment of the sanitary and common installations of B-105 guard house shall be executed in line with the descriptions as given in the Items/Pose Definitions Book from the Ministry of Environment and Urban Planning, Supreme Technical Board and in the Items/Pose Definitions Book from the General Directorate of Iller Bank. The following works shall be executed in line with the definitions of stated item/pose.

The Contractor shall;

- manufacture /supply all the Mechanical Equipment [Inverter Split Air-conditioner with 18,000 Btu/h capacity, Lavatory and installations, Soap dispenser, Mirror with stainless steel frame, Shelf, Squat toilet and installation, sewage and clean water pipes, valves, etc.] for sanitary and common installation of B-101 Administration Building in the size and number as indicated in compliance with the relevant design, data sheets, the relevant standard, specifications and norms,
- Install equipment in compliance with the relevant approved design of the unit,
- Transport the equipment to the worksite, and make the equipment operable,
- Execute periodical maintenance and operate equipment until the final acceptance.
- Transport the equipment to the worksite, and make the equipment operable,
- Execute periodical maintenance and operate equipment until the final acceptance.

ITEM/POSE DEFINITIONS FOR MECHANICAL WORKS

No	Pose/Item No	Pose/Item Definition (in English) // Poz tanımı (in Turkish)	Unit
1	071.112	Semi pedestal Hand Wash basin 45x55 // Yarım ayaklı lavabo Tk. 45x55 cm	pcs
2	089.706	Sink and wash basin syphon with plastic plug 1.class // Lavabo ve Eviye sifonu, 1. sınıf özel plastik taslı	pcs
3	073.202	Crystal Glass wall mirror 40x60 // Ayna kristal cam 40x60 cm	pcs
4	074.102	Vitrified tile etagere 60x15 // Etajer fayans camlaşmış çini 60x15 cm	pcs
5	075.103	Vitrified pan closet with plastic syphon 50x60 // Alaturka hela taşı Fayans camlaşmış çini Plastik Sifonlu 50 x 60cm	pcs
6	089.1110	3/4" / 90 degree built-in seramic sealed cut off valve with rosette // Alaturka hela için, 3/4" / 90 derece, seramik salmastralı ankastre ara kesme valfi, rozeti ile (bas)	pcs
7	080.102	Brass Syphone, approx. 35x40x50 cm extra class normal type: Urinal and fittings // Pirinç sifonlu takriben 35x40x50 cm. ekstra sınıf normal tip: pisuar ve tesisatı	pcs
8	081.301	Approx. 40x50 cm extra vitrified urinal partition // Takriben 40x50 cm. ekstra. fayans camlaşmış çini: pisuar bölmesi	pcs

No	Pose/Item No	Pose/Item Definition (in English) // Poz tanımı (in Turkish)	Unit
9	083-104	Single, without drainboard Stainless steel sink 50x60x22 cm // Eviye Bir gözlü Damlalıksız Paslanmaz Çelik 50x60x22 cm	pcs
10	083-202	Single, with drainboard Stainless steel sink 50x100 cm // Eviye Bir gözlü Damlalıklı Paslanmaz Çelik 50x100 cm	pcs
11	083-401	Double Stainless steel sink ,with drainboard 50x160 cm // Eviye İki gözlü Damlalıklı Paslanmaz Çelik 50x160 cm/	pcs
12	087.602	Arcylic monobloc shower tray 80x80x11 // Duş teknesi akrilik monoblok 80x80x11 cm	pcs
13	089.602	Shower Mixer valve bath filler tap head handset // Duş bataryası, el duşu ve askısı ile komple batarya	pcs
14	089.1401	Single Lever Single handle sink tap // Tek kumandalı tek gövde eviye bataryası, döner uçlu	pcs
15	089.1505	Single lever single handle washbasin tap // Tek kumandalı tek gövde lavabo bataryası	pcs
16	090.201	Tile soap dish // Sabunluk10x16 cm kolsuz, fayans	pcs
17	Special/Mec/01	Stainless steel soap dispenser, wall mount // Sıvı sabun makinesi 400 gr Paslanmaz çelik gövdeli, duvara monteli	pcs
18	Special/Mec/02	Chrome finish towel bar 45cm wall screws // havluluk prınçten kromajlı sabit 45 cm.	pcs
19	094.400	Stainless steel roll paper holder // Kağıtlık paslanmaz çelik	pcs
20	097.504	17x17 mm ø70 mm brass-silver Anti -odor Floor drain // Yer süzgeci 17x17 mm ø70 mm çıkışlı koku fermatürlü prınç kromajlı ızgaralı	pcs
21	103.108/ÇŞB	Water flow meter // Soğuk Su Sayacı	pcs
22	104-103	Inlet Float valve(die casting) (Dia 20 mm, (3/4")) // Flotör (pres döküm) (çap 20 mm, (3/4"))	pcs
23	107-1203/ÇŞB	Supply and assembly of Hyrophore pump (1+1 Vertical Pump (P:3 x 5.5kW , Q:20 m³/h , H:50 mss) // Hidrafor (1+1 Dikey Pompa (P:3 x 5.5kW , Q:20 m³/h , H:50 mss) temini ve montajı	pcs
24	107-1303/ÇŞB	Supply and assembly of Hyrophore pump (2+1 Vertical Pump (P:3 x 9 kW , Q:30 m³/h , H:60 mss) // Hidrafor (2+1 Dikey Pompa (P:3 x 9 kW , Q:30 m³/h , H:60 mss) temini ve montajı	pcs
25	110-690-04	Single walled(open system) solar energy boiler-150 lt // Tek Cidarlı (Açık Sistem) Güneş Enerjisi Boyleri - 150 litre	pcs
26	110-701	Aluminium self corrugated solar panel collector // Güneş enerji toplayıcısı Kendinden kanatlı alüminyum panelli kollektör	m²
27	117.304	Electric water heater 80lt.2000w // Elektrikli Su Isıtıcıları 80 lt. 2000 W	pcs
28	1002.117	Fire cabinet with fire fire extinguisher in line with norm Dn25 25m ts en 671-1 // Dn25 25m ts en 671-1 normlarında tüplü model yangın dolabı	pcs
29	201.203	1/2"welded galvanized pipe (including screwed pipe installation material cost in line with 201.400 pose) // 1/2" dikişli galvanizli boru (201.400 pozuna uygun şekilde vidalı boru montaj malzeme bedeli dahil)	m
30	201.204	3/4" welded galvanized pipe (including screwed pipe installation material cost in line with 201.400 pose) // 3/4" dikişli galvanizli boru	m

No	Pose/Item No	Pose/Item Definition (in English) // Poz tanımı (in Turkish)	Unit
		(201.400 pozuna uygun şekilde vidalı boru montaj malzeme bedeli dahil)	
31	201.206	11/4" welded galvanized pipe (including screwed pipe installation material cost in line with 201.400 pose) // 11/4" dikişli galvanizli boru (201.400 pozuna uygun şekilde vidalı boru montaj malzeme bedeli dahil)	m
32	201.209	21/2" welded galvanized pipe (including screwed pipe installation material cost in line with 201.400 pose) // 21/2" dikişli galvanizli boru (201.400 pozuna uygun şekilde vidalı boru montaj malzeme bedeli dahil)	m
33	204.401	Ø50 mm PVC pipe (including PVC pipe installation material cost in line with 204.501 pose) // Ø50 mm PVC boru (204.501 pozuna uygun şekilde PVC Pissu borusu montaj malzeme bedeli dahil)	m
34	204.402	Ø70 mm PVC pipe (including PVC pipe installation material cost in line with 204.501 pose) // Ø70 mm PVC boru (204.501 pozuna uygun şekilde PVC Pissu borusu montaj malzeme bedeli dahil)	m
35	204.403	Ø100 mm PVC pipe (including PVC pipe installation material cost in line with 204.501 pose) // Ø100 mm PVC boru (204.501 pozuna uygun şekilde PVC Pissu borusu montaj malzeme bedeli dahil)	m
36	204.3102	Polypropilene pipe outer dia 20 mm (1/2") (including Polypropilene pipe installation cost in line with 204.3300 pose) // Polipropilen boru Dış çapı 20 mm (1/2") (204.3300 pozuna uygun şekilde Polipropilen boru montaj bedeli dahil)	m
37	204.3103	Polypropilene pipe outer dia 25 mm (3/4")(including Polypropilene pipe installation cost in line with 204.3300 pose) // Polipropilen boru Dış çapı 25 mm (3/4")(204.3300 pozuna uygun şekilde Polipropilen boru montaj bedeli dahil)	m
38	204.3104	Polypropilene pipe outer dia 32 mm (1") (including Polypropilene pipe installation cost in line with 204.3300 pose) // Polipropilen boru Dış çapı 32 mm (1")(204.3300 pozuna uygun şekilde Polipropilen boru montaj bedeli dahil)	m
39	207-405/ÇŞB	Ø100 ball valve // Ø100 mm Küresel vana	pcs
40	210-624	Pressed brass Ball valve, teflon sealed // Küresel vana, prinç pres, teflon contalı (çap: 20 mm)	pcs
41	210.708/790	65 ø mm.Full bore valve PN16 Cast Iron with stainless steel ball,stainless steel washer or spring reinforced teflon,flanged. // 65 ø mm. Tam geçişli PN.16 gövdesi pik döküm, küresi paslanmaz çelikten, paslanmaz çelikten veya teflon tabak yay takviyeli contalı, flanşlı/	pcs
42	210.783/790	1/2" mm.Full bore valve PN10-16 Cast Iron with stainless steel ball,stainless steel washer or spring reinforced teflon,screwed // 1/2" Tam geçişli PN.10-16 gövdesi pik döküm, küresi paslanmaz çelikten, paslanmaz çelikten veya teflon tabak yay takviyeli contalı, vidalı	pcs
43	210.784/790	3/4" mm.Full bore valve PN10-16 Cast Iron with stainless steel ball,stainless steel washer or spring reinforced teflon,screwed // 3/4" Tam geçişli PN.10-16 gövdesi pik döküm, küresi paslanmaz çelikten, paslanmaz çelikten veya teflon tabak yay takviyeli contalı, vidalı	pcs
44	210.785/790	1" mm.Full bore valve PN10-16 Cast Iron with stainless steel ball,stainless steel washer or spring reinforced teflon,screwed // 1" Tam	pcs

No	Pose/Item No	Pose/Item Definition (in English) // Poz tanımı (in Turkish)	Unit
		geçişli PN.10-16 gövdesi pik döküm, küresi paslanmaz çelikten, paslanmaz çelikten veya teflon tabak yay takviyeli contalı, vidalı	
45	210.786/790	11/4" mm.Full bore valve PN10-16 Cast Iron with stainless steel ball,stainless steel washer or spring reinforced teflon,screwed // 11/4" Tam geçişli PN.10-16 gövdesi pik döküm, küresi paslanmaz çelikten, paslanmaz çelikten veya teflon tabak yay takviyeli contalı, vidalı	pcs
46	Y.23.176	Making and installation of various steel/metal works from lama and profile sections // Lama ve profil demirlerden çeşitli demir işleri yapılması ve yerine konulması	kg
47	253.302	Window type aspirator (600 m ³ /hr) // Pencere tipi aspiratör (600 m ³ /sa)	pcs
48	269.103	Aluminium window shutter // Panjur Alüminyum	m ²
49	261.403	Stainless Steel Channel // Paslanmaz Çelik Kanal	m ²
50	280.1105	Variable Cooling Capacity/Variable Refrigerant Discharge (VRF) Multi inner unit air conditioner. Cooling capacity(nominal)49kW, Heating capacity(nominal)44kW, Outdoor Unit or Outdoor Unit group // Değişken Soğutkan Debili (DSD) Çok iç Üniteli Klima Sistemi Soğutma kapasitesi (nom):49 kW., ısıtma kapasitesi (nom):44 kW, Dış ünite veya Dış ünite grubu	pcs
51	280.2101	Indoor Unit: Wall type with air swinging wings (up-down,right-left) indoor unit group Cooling capacity of 2 kw and heating capacity of 2,5 kw// İç Ünite Grubu Soğutma kapasitesi (nom):2kw., ısıtma kapasitesi (nom):2,5 kw. duvar tipi iç ünite Duvar Tipi, Hava Yönlendirme Kanatları Aşağı/Yukarı ve sağa/sola yönlendirme yapabilen özellikte	pcs
52	280.2102	Indoor Unit: Wall type with air swinging wings (up-down,right-left) indoor unit group Cooling capacity of 2,5 kw and heating capacity of 3 kw // İç Ünite Grubu: Soğutma kapasitesi (nom):2,5 kw., ısıtma kapasitesi (nom):3 kw. duvar tipi iç ünite Hava Yönlendirme Kanatları Aşağı/Yukarı ve sağa/sola yönlendirme yapabilen özellikte/	pcs
53	280.2104	Indoor Unit: Wall type with air swinging wings (up-down, right-left) indoor unit group Cooling capacity of 4 kw and heating capacity of 4,5 kw // İç Ünite Grubu: Soğutma kapasitesi (nom):4 kw., ısıtma kapasitesi (nom):4,5 kw. duvar tipi iç ünite, Hava Yönlendirme Kanatları Aşağı/Yukarı ve sağa/sola yönlendirme yapabilen özellikte	pcs
54	280.2105	Indoor Unit: Wall type with air swinging wings (up-down, right-left) indoor unit group Cooling capacity of 5,5 kw and heating capacity of 6 kw // İç Ünite Grubu Soğutma kapasitesi (nom):5,5 kw., ısıtma kapasitesi (nom):6 kw. duvar tipi iç ünite, Hava Yönlendirme Kanatları Aşağı/Yukarı ve sağa/sola yönlendirme yapabilen özellikte	pcs

No	Pose/Item No	Pose/Item Definition (in English) // Poz tanımı (in Turkish)	Unit
55	281.301	Wired Remote Control device for VRF air conditioner // DSD Klima Sistemi Kablolı Uzaktan Kumanda Cihazı /	pcs
56	281.501	1/4" 0,8 mm (13 mm insulated) Copper tube group with copper piping installation parts of VRF air Conditioner // DSD Klima Sistemi Bakır Borulama Tesisatı montaj elemanları ile birlikte Bakır boru grubu 1/4" 0,8 mm (13 mm izoleli)	m
57	281.502	3/8" 0,8 mm (13 mm insulated) Copper tube group with copper piping installation parts of VRF air Conditioner // DSD Klima Sistemi Bakır Borulama Tesisatı montaj elemanları ile birlikte Bakır boru grubu 3/8" 0,8 mm (13 mm izoleli)	m
58	281.503	1/2" 0,8 mm (13 mm insulated) Copper tube group with copper piping installation parts of VRF air Conditioner // DSD Klima Sistemi Bakır Borulama Tesisatı montaj elemanları ile birlikte Bakır boru grubu 1/2" 0,8 mm (13 mm izoleli)	m
59	281.504	1/2" 0,8 mm (13 mm insulated) Copper tube group with copper piping installation parts of VRF air Conditioner // DSD Klima Sistemi Bakır Borulama Tesisatı montaj elemanları ile birlikte Bakır boru grubu 1/2" 0,8 mm (13 mm izoleli)	m
60	281.507	5/8" 1,0 mm (13 mm insulated) Copper tube group with copper piping installation parts of VRF air Conditioner // DSD Klima Sistemi Bakır Borulama Tesisatı montaj elemanları ile birlikte Bakır boru grubu 5/8" 1,0 mm (13 mm izoleli)	m
61	281.508	1 1/8" 1,2 mm (19 mm insulated) Copper tube group with copper piping installation parts of VRF air Conditioner // DSD Klima Sistemi Bakır Borulama Tesisatı montaj elemanları ile birlikte Bakır boru grubu 1 1/8" 1,2 mm (19 mm izoleli)	m
62	281.509	1 3/8" 1,5 mm (19 mm insulated) Copper tube group with copper piping installation parts of VRF air Conditioner // DSD Klima Sistemi Bakır Borulama Tesisatı montaj elemanları ile birlikte Bakır boru grubu 1 3/8" 1,5 mm (19 mm izoleli)	m
63	281.601	Joints Up to 25 kW (Joint elements of multi indoor unit VRF air Conditioner to 25 kW.) // 25 kw.'a kadar değişken soğutkan debili çok iç üniteli klima sistemi bağlantı (joint) elemanları	set
64	281.602	Joint elements of multi indoor unit VRF air Conditioner between 25 kW and 50 kW //25-50 Kw arası değişken soğutkan debili çok iç üniteli klima sistemi bağlantı (joint) elemanları	set
65	281.700	Header Elements // Dağıtım (Header) Elemanları	set
66	Special/Mec/03	Convactor Type Electric Heater 1.000W // Konvektör tipi elektrikli mekan ısıtıcısı 1.000 W	pcs
67	Special/Mec/04	SUPPLY AND INSTALLATION OF MECHANICAL EQUIPMENT FOR MB 1959 BY-PASS FLUME UNIT 1 unit, including, having manufactured/supplied all the Mechanical Equipment [Motor-controlled slide covers completely made of SS304 grade stainless steel, KT1 A, B] of MB 1959 By-pass Flume Unit in the size and number as indicated in compliance with the relevant design, data sheets, the relevant standard, specifications and norms, the installation of the equipment in compliance with the relevant approved design of the unit, and the transportation of the same to the worksite,	lump-sum

No	Pose/Item No	Pose/Item Definition (in English) // Poz tanımı (in Turkish)	Unit
		<p>and making the same operable, and the periodical maintenance and operation of the same until the final acceptance, and all kinds of material and the loss of material, all kinds of labour, tools, materials, transportation, loading, unloading, horizontal/vertical handling, insurance, taxes, duties and charges and similar costs, and the contractor's profit, and overhead.</p> <p>Measurement: Unit which is actually installed.</p> <p>//</p> <p>MB 1959 BY-PASS BACASI ÜNİTESİ MEKANİK EKİPMANLARININ TEMİNİ VE MONTAJI</p> <p>MB 1959 By-Pass Bacası Ünitesi Tüm Mekanik Ekipmanlarının [Komple SS304 Kalite paslanmaz çelik malzemeden imal edilmiş Motor Kumandalı sürgülü kapaklar, KT1 A, B] belirtilen ölçü ve sayıda projesine, bilgi föylerine, ilgili standart, şartname ve normlara uygun şekilde imal edilmesi/temini gerçekleştirildikten sonra, ilgili ünitenin tasdikli projesine uygun olarak yerlerine montajları, iş başına kadar taşınması, işlerliğinin sağlanması, kesin kabule kadar periyodik bakım ve işletmesi, her türlü malzeme ve zayıyatı, her türlü işçilik, araç gereç, taşıma yükleme, boşaltma, yatay/düşey taşımalar, sigorta vergi resim ve harçlar vb. giderler ile yüklenici karı ve genel giderler dahil 1 ünite.</p> <p>Ölçü : Fiilen yerine monte edilen ünitedir.</p>	
68	Special/Mec/05	<p>SUPPLY AND INSTALLATION OF THE MECHANICAL EQUIPMENT OF T-101 COLLECTION CHAMBER (INLET FLUME), T102 MECHANICAL COARSE GRID, T103 MECHANICAL FINE GRID UNIT</p> <p>1 unit, including, having manufactured/supplied all the Mechanical Equipment [Motor-controlled slide covers completely made of SS304 grade stainless steel, (Steel sheet thickness: minimum 5 mm) (KT2/ A, B, C, D - KT3/ A, B, C, D) Mechanically cleaned coarse screens (completely made of SS304 grade stainless steel), Mechanically cleaned fine screens (completely made of SS304 grade stainless steel), Band conveyors (of which frame is hot dip galvanised), Garbage container (Galvanised, steel sheet thickness: minimum 2 mm), etc.] of T 101 Inlet Structure, T 102 Mechanical Coarse Screen, T 103 Mechanical Fine Screen Unit in the size and number as indicated in compliance with the relevant design, data sheets, the relevant standard, specifications and norms, the installation of the equipment in compliance with the relevant approved design of the unit, and the transportation of the same to the worksite, and making the same operable, and the periodical maintenance and operation of the same until the final acceptance, and all kinds of material and the loss of material, all kinds of labour, tools, materials, transportation, loading, unloading, horizontal/vertical handling, insurance, taxes, duties and charges and similar costs, and the contractor's profit, and overhead.</p> <p>Measurement: Unit which is actually installed.</p> <p>//</p> <p>T-101 TOPLAMA ODASI (GİRİŞ BACASI), T102 MEKANİK KABA IZGARA, T103 MEKANİK İNCE IZGARA ÜNİTESİ MEKANİK EKİPMANLARININ TEMİNİ VE MONTAJI</p> <p>T 101 Giriş Yapısı, T 102 Mekanik Kaba Izgara, T 103 Mekanik İnce Izgara Ünitesi Tüm Mekanik ekipmanlarının [Komple SS304 Kalite paslanmaz çelik malzemeden imal edilmiş sürgülü kapaklar (Sac kalınlığı: en az 5 mm)(KT2/ A,B,C,D - KT3/ A,B,C,D) Mekanik temizlemeli</p>	lump-sum

No	Pose/Item No	Pose/Item Definition (in English) // Poz tanımı (in Turkish)	Unit
		<p>kaba ızgaralar (Komple SS304 Kalite paslanmaz çelik) , Mekanik temizlemeli ince ızgaralar (Komple SS304 Kalite paslanmaz çelik), Bant konveyörler (Şasisi sıcak daldırma galvaniz), Çöp konteyneri (Galvaniz kaplı, sac kalınlığı: en az 2 mm) v.s.] belirtilen ölçü ve sayıda, projesine, bilgi föylerine, ilgili standart, şartname ve normlara uygun şekilde imal edilmesi / temini gerçekleştirildikten sonra, ilgili ünitenin tasdikli projesine uygun olarak yerlerine montajları, iş başına kadar taşınması, işlerliğinin sağlanması, kesin kabule kadar periyodik bakım ve işletmesi, her türlü malzeme ve zayıtı, her türlü işçilik, araç gereç, taşıma yükleme, boşaltma, yatay/düşey taşımalar, sigorta vergi resim ve harçlar vb. giderler ile yüklenici karı ve genel giderler dahil 1 ünite.</p> <p>Ölçü : Fiilen yerine monte edilen ünedir.</p>	
69	Special/Mec/06	<p>SUPPLY AND INSTALLATION OF THE MECHANICAL EQUIPMENT OF T-104 AERATED GRIT ARRESTER, T105 INLET PARSHALL FLUME UNIT</p> <p>1 unit, including, having manufactured/supplied all the Mechanical Equipment [Slide covers completely made of SS304 grade stainless steel (steel sheet thickness: minimum 5 mm), Linearly Moving Grit Arrester Gantry and its stripper, Grit separator completely made of SS304 (with a capacity of 30 m³/h), Manually-controlled Jib Crane (lifting capacity, 500 kg), Grit arrester pumps (Q=15 m³/h, Hm= 9.5 mSS, Stainless chain/ rope, skid, etc. included, together with depot spare part), Oil pump (Q=3 l/s, Hm=8 Mss Stainless chain/ rope, skid, etc. included, together with depot spare part), Garbage Container, Tube Diffuser, Ø100 mm Disassembly part, Ø100 mm Check-valve, Ø25 SS steel pipe, Ø50 SS steel pipe, Ø80 SS steel pipe, Ø100 SS steel pipe, Ø150 SS steel pipe, Ø200 SS steel pipe, Ø160 PE 100 pipe, Oil Lamella made of SS 304 stainless steel, Parshall Flume made of SS 304 stainless steel (with wall thickness e=4 mm), Ball valve 1", etc.] of T-104 Aerated Grit Arrester, T105 Inlet Parshall Flume Unit in the size and number as indicated in compliance with the relevant design, data sheets, the relevant standard, specifications and norms, the installation of the equipment in compliance with the relevant approved design of the unit, and the transportation of the same to the worksite, and making the same operable, and the periodical maintenance and operation of the same until the final acceptance, and all kinds of material and the loss of material, all kinds of labour, tools, materials, transportation, loading, unloading, horizontal/vertical handling, insurance, taxes, duties and charges and similar costs, and the contractor's profit, and overhead.</p> <p>Measurement: Unit which is actually installed.</p> <p>//</p> <p>T-104 HAVALANDIRMALI KUM TUTUCU, T105 GİRİŞ PARSHALL SAVAĞI ÜNİTESİ MEKANİK EKİPMANLARININ TEMİNİ VE MONTAJI</p> <p>T-104 Havalandırılmalı Kum Tutucu, T105 Giriş Parshall Savağı Ünitesi</p> <p>Tüm Mekanik Ekipmanlarının [Komple SS304 Kalite paslanmaz çelik malzemeden imal edilmiş sürgülü kapaklar (Sac kalınlığı: en az 5 mm), Doğrusal Hareketli Kum Tutucu Gezer Köprü ve sıyırıcısı, Komple SS304 Kum Ayırıcı (30 m³/h kapasiteli), El Kumandalı Pergel vinç (500 kg Kaldırma Kapasiteli), Kum tutucu pompaları (Q=15 m³/sa, Hm= 9,5 mSS, Paslanmaz zincir / halat, kızak v.s. dâhil, depo yedeği ile birlikte), Yağ pompası (Q=3 lt/sn, Hm=8 Mss Paslanmaz zincir / halat, kızak v.s. dahil, depo yedeği ile birlikte), Çöp konteyneri, Tüp Difüzör, Ø100 mm Demontaj parçası, Ø100 mm Çekvalf, Ø25 SS çelik boru, Ø50 SS çelik</p>	lump-sum

No	Pose/Item No	Pose/Item Definition (in English) // Poz tanımı (in Turkish)	Unit
		<p>boru, Ø80 SS çelik boru, Ø100 SS çelik boru, Ø150 SS çelik boru, Ø200 SS çelik boru, Ø160 PE 100 boru, SS 304 Paslanmaz çelik malzemeden imal edilmiş Yağ Lamelleri, SS 304 Paslanmaz çelik malzemeden imal edilmiş Parshall Savağı (e=4 mm et kalınlığında), Küresel vana 1" v.s.] belirtilen ölçü ve sayıda projesine, bilgi föylerine, ilgili standart, şartname ve normlara uygun şekilde imal edilmesi / temini gerçekleştirildikten sonra, ilgili ünitenin tasdikli projesine uygun olarak yerlerine montajları, iş başına kadar taşınması, işlerliğinin sağlanması, kesin kabule kadar periyodik bakım ve işletmesi, her türlü malzeme ve zayıyatı, her türlü işçilik, araç gereç, taşıma yükleme, boşaltma, yatay/düşey taşımalar, sigorta vergi resim ve harçlar vb. giderler ile yüklenici karı ve genel giderler dahil 1 ünite.</p> <p>Ölçü : Fiilen yerine monte edilen ünedir.</p>	
70	Special/Mec/07	<p>SUPPLY AND INSTALLATION OF THE MECHANICAL EQUIPMENT OF T-106 INLET PUMP STATION (TM1) UNIT</p> <p>1 unit, including, having manufactured/supplied all the Mechanical Equipment [T-106 Inlet Pumps (Q=50 l/s, Hm=10 mSS Stainless steel chain/ rope, skid, etc. included), Motor-controlled monorail crane with 1-tonne lifting capacity, Ø100 Hard PVC sewage pipe, Ø200 mm butterfly valve, Ø200 mm Disassembly part, Ø200 mm Check-valve, Ø200 mm SS stainless steel flange, Ø400 mm SS stainless steel flange and blind flange, Ø200 SS steel pipe, Ø350 SS steel pipe, Ø400 SS steel pipe, Channel-type exproof aspirator (stainless channel, vent, etc. included), Roof-type exproof aspirator (channel, vent, etc. included), Inverter split air-conditioner with 12,000 Btu/h capacity, etc.] of T-106 Inlet Pump Station (TM1) Unit in the size and number as indicated in compliance with the relevant design, data sheets, the relevant standard, specifications and norms, the installation of the equipment in compliance with the relevant approved design of the unit, and the transportation of the same to the worksite, and making the same operable, and the periodical maintenance and operation of the same until the final acceptance, and all kinds of material and the loss of material, all kinds of labour, tools, materials, transportation, loading, unloading, horizontal/vertical handling, insurance, taxes, duties and charges and similar costs, and the contractor's profit, and overhead.</p> <p>Measurement: Unit which is actually installed.</p> <p>//</p> <p>T-106 GİRİŞ TERFİ MERKEZİ (TM1) ÜNİTESİ MEKANİK EKİPMANLARININ TEMİNİ VE MONTAJI</p> <p>T-106 Giriş Terfi Merkezi (TM1) Ünitesi Tüm Mekanik Ekipmanlarının [T-106 Giriş terfi pompaları (Q=50 Lt/sn, Hm=10 mSS Paslanmaz zincir / halat, kızak v.s. dâhil), 1 Ton kaldırma kapasiteli Motor kumandalı Monaray vinç, Ø100 Sert PVC pissu borusu, Ø200 mm kelebek vana, Ø200 mm Demontaj parçası, Ø200 mm Çekvalf, Ø200 mm SS Paslanmaz Çelik flanş, Ø400 mm SS Paslanmaz Çelik flanş ve kör flanş, Ø200 SS Çelik boru, Ø350 SS Çelik boru, Ø400 SS Çelik boru, Kanal tip exproof aspiratör (paslanmaz kanal, menfez v.s. dâhil), Çatı tip exproof aspiratör (kanal, menfez v.s. dahil), 12.000 Btu/h kapasiteli İnverter Split Klima v.s.] belirtilen ölçü ve sayıda; projesine, bilgi föylerine, ilgili standart, şartname ve normlara uygun şekilde imal edilmesi / temini gerçekleştirildikten sonra, ilgili ünitenin tasdikli projesine uygun olarak yerlerine montajları, iş başına kadar taşınması, işlerliğinin sağlanması, kesin kabule kadar periyodik bakım ve işletmesi, her türlü malzeme ve</p>	Lump-sum

No	Pose/Item No	Pose/Item Definition (in English) // Poz tanımı (in Turkish)	Unit
		<p>zayıatı, her türlü işçilik, araç gereç, taşıma yükleme, boşaltma, yatay/düşey taşımalar, sigorta vergi resim ve harçlar vb. giderler ile yüklenici karı ve genel giderler dahil 1 ünite.</p> <p>Ölçü : Fiilen yerine monte edilen ünitelerdir.</p>	
71	Special/Mec/08	<p>SUPPLY AND INSTALLATION OF THE MECHANICAL EQUIPMENT OF T-107/A,B ANAEROBIC TANKS UNIT</p> <p>1 unit, including, having manufactured/supplied all the Mechanical Equipment [Slide covers completely made of SS304 grade stainless steel, (Steel sheet thickness: minimum 5 mm) (KT5/ A, B) Submersible mixer (stainless rope, skid, etc. included), Jib Crane (lifting capacity, 500 kg) Ø400 mm SS steel pipe, Ø550 mm SS steel pipe, Ø400 SS stainless steel flange, Ø400 SS stainless steel blind flange. Etc.] of T -107/A.B Anaerobic Tanks Unit in the size and number as indicated in compliance with the relevant design, data sheets, the relevant standard, specifications and norms, the installation of the equipment in compliance with the relevant approved design of the unit, and the transportation of the same to the worksite, and making the same operable, and the periodical maintenance and operation of the same until the final acceptance, and all kinds of material and the loss of material, all kinds of labour, tools, materials, transportation, loading, unloading, horizontal/vertical handling, insurance, taxes, duties and charges and similar costs, and the contractor's profit, and overhead.</p> <p>Measurement: Unit which is actually installed.</p> <p>//</p> <p>T-107/A,B ANAEROBİK HAVUZLAR ÜNİTESİ MEKANİK EKİPMANLARININ TEMİNİ VE MONTAJI</p> <p>T-107/A,B Anaerobik Havuzlar Ünitesi Tüm Mekanik Ekipmanlarının [Komple SS304 Kalite paslanmaz çelik malzemeden imal edilmiş sürgülü kapaklar (Sac kalınlığı: en az 5 mm) (KT5/A,B), Dalgıç mikser (Paslanmaz halat, kızak v.s. dahil), Pergel vinç (500 kg), Ø400 SS Çelik boru, Ø550 SS Çelik boru, Ø400 SS paslanmaz Çelik flanş, Ø400 SS paslanmaz Çelik kör flanş v.s.] belirtilen ölçü ve sayıda; projesine, bilgi föylerine, ilgili standart, şartname ve normlara uygun şekilde imal edilmesi / temini gerçekleştirildikten sonra, ilgili ünitenin tasdikli projesine uygun olarak yerlerine montajları, iş başına kadar taşınması, işlerliğinin sağlanması, kesin kabule kadar periyodik bakım ve işletmesi, her türlü malzeme ve zayıatı, her türlü işçilik, araç gereç, taşıma yükleme, boşaltma, yatay/düşey taşımalar, sigorta vergi resim ve harçlar vb. giderler ile yüklenici karı ve genel giderler dahil 1 ünite.</p> <p>Ölçü : Fiilen yerine monte edilen ünitelerdir.</p>	lump-sum
72	Special/Mec/09	<p>SUPPLY AND INSTALLATION OF THE MECHANICAL EQUIPMENT OF T-108 (DY1) AERATION TANKS FLOW DISTRIBUTION STRUCTURE (DY1) AND T110 AERATION TANKS COLLECTION STRUCTURE UNIT</p> <p>1 unit, including, having manufactured/supplied all the Mechanical Equipment [Slide covers completely made of SS304 grade stainless steel (steel sheet thickness: minimum 5 mm) (KT6/ A, B, C), etc.] of T-108 (DY1) Aeration Tanks Flow Distribution Structure (DY1) and T110 Aeration Tanks Collection Structure Unit in the size and number as indicated in compliance with the relevant design, data sheets, the relevant standard, specifications and norms, the installation of the equipment in compliance with the relevant approved design of the unit, and the transportation of the same to the worksite, and making</p>	lump-sum

No	Pose/Item No	Pose/Item Definition (in English) // Poz tanımı (in Turkish)	Unit
		<p>the same operable, and the periodical maintenance and operation of the same until the final acceptance, and all kinds of material and the loss of material, all kinds of labour, tools, materials, transportation, loading, unloading, horizontal/vertical handling, insurance, taxes, duties and charges and similar costs, and the contractor's profit, and overhead.</p> <p>Measurement: Unit which is actually installed.</p> <p>//</p> <p>T-108 (DY1) HAVALANDIRMA HAVUZLARI DEBİ DAĞITMA YAPISI (DY1) VE T110 HAVALANDIRMA HAVUZLARI TOPLAMA YAPISI ÜNİTESİ MEKANİK EKİPMANLARININ TEMİNİ VE MONTAJI</p> <p>T-108 (DY1) Havalandırma Havuzları Debi Dağıtma Yapısı (DY1) Ve T110 Havalandırma Havuzları Toplama Yapısı Ünitesi Tüm Mekanik Ekipmanlarının [Komple SS304 Kalite paslanmaz çelik malzemeden imal edilmiş sürgülü kapaklar (Sac kalınlığı: en az 5 mm) (KT6/A,B,C), v.s.] belirtilen ölçü ve sayıda; projesine, bilgi föylerine, ilgili standart, şartname ve normlara uygun şekilde imal edilmesi / temini gerçekleştirildikten sonra, ilgili ünitenin tasdikli projesine uygun olarak yerlerine montajları, iş başına kadar taşınması, işlerliğinin sağlanması, kesin kabule kadar periyodik bakım ve işletmesi, her türlü malzeme ve zayıtı, her türlü işçilik, araç gereç, taşıma yükleme, boşaltma, yatay/düşey taşımalar, sigorta vergi resim ve harçlar vb. giderler ile yüklenici karı ve genel giderler dâhil 1 ünite.</p> <p>Ölçü : Fiilen yerine monte edilen ünitedir.</p>	
73	Special/Mec/10	<p>SUPPLY AND INSTALLATION OF THE MECHANICAL EQUIPMENT OF T-109/A,B AERATION TANKS UNIT</p> <p>1 unit, including, having manufactured/supplied all the Mechanical Equipment [Submersible Mixer (Stainless rope, skid, etc. included), Jib Crane (500 kg), Disc Diffusers, Ball Valve 1", DIN100 Ball Valve, DN125 Manually-controlled Butterfly Valve, DN150 Manually-controlled Butterfly Valve, DN125 Disassembly part, DN150 Disassembly part, DN125 Stainless Steel Flange, DN125 Stainless Steel Blind Flange, DN150 Stainless Steel Flange, DN150 Stainless Steel Blind Flange, Ø200/150 mm Stainless Steel reducer part, Ø25 PE pipe, Ø90 PE pipe, Ø110 PE pipe, Ø100 SS stainless steel pipe, Ø125 SS stainless steel pipe, Ø150 SS stainless steel pipe, Ø200 SS stainless steel pipe, etc.] of T-109/A,B Aeration Tanks Unit in the size and number as indicated in compliance with the relevant design, data sheets, the relevant standard, specifications and norms, the installation of the equipment in compliance with the relevant approved design of the unit, and the transportation of the same to the worksite, and making the same operable, and the periodical maintenance and operation of the same until the final acceptance, and all kinds of material and the loss of material, all kinds of labour, tools, materials, transportation, loading, unloading, horizontal/vertical handling, insurance, taxes, duties and charges and similar costs, and the contractor's profit, and overhead.</p> <p>Measurement: Unit which is actually installed.</p> <p>//</p> <p>T-109/A,B HAVALANDIRMA HAVUZLARI ÜNİTESİ MEKANİK EKİPMANLARININ TEMİNİ VE MONTAJI</p> <p>T-109/A,B Havalandırma Havuzları Ünitesi Tüm Mekanik Ekipmanlarının [Dalgıç Mikser (Paslanmaz halat, kızak v.s. dâhil) ,</p>	lump-sum

No	Pose/Item No	Pose/Item Definition (in English) // Poz tanımı (in Turkish)	Unit
		<p>Pergel Vinç (500 kg), Disk Difüzörler, Küresel Vana 1", DN100 Küresel Vana, DN125 mm El Kumandalı Kelebek Vana, DN150 mm El Kumandalı Kelebek Vana, DN125 mm Demontaj Parçası, DN150 mm Demontaj Parçası, DN 125 Paslanmaz Çelik Flanş, DN 125 Paslanmaz Çelik Kör Flanş DN 150 Paslanmaz Çelik Flanş, DN 150 Paslanmaz Çelik Kör Flanş Ø200/150mm SS Paslanmaz Çelik redüksiyon parçası, Ø25 PE boru, Ø90 PE boru, Ø110 PE boru, Ø100 SS Paslanmaz Çelik boru, Ø125 SS Paslanmaz Çelik boru, Ø150 SS Paslanmaz Çelik boru, Ø200 SS Paslanmaz Çelik boru v.s.] belirtilen ölçü ve sayıda; projesine, bilgi föylerine, ilgili standart, şartname ve normlara uygun şekilde imal edilmesi / temini gerçekleştirildikten sonra, ilgili ünitenin tasdikli projesine uygun olarak yerlerine montajları, iş başına kadar taşınması, işlerliğinin sağlanması, kesin kabule kadar periyodik bakım ve işletmesi, her türlü malzeme ve zayıtı, her türlü işçilik, araç gereç, taşıma yükleme, boşaltma, yatay/düşey taşımalar, sigorta vergi resim ve harçlar vb. giderler ile yüklenici karı ve genel giderler dahil 1 ünite.</p> <p>Ölçü: Fiilen yerine monte edilen ünite.</p>	
74	Special/Mec/11	<p>SUPPLY AND INSTALLATION OF THE MECHANICAL EQUIPMENT OF T-111 (DY2) SEDIMENTATION TANKS DISTRIBUTION STRUCTURE UNIT</p> <p>1 unit, including, having manufactured/supplied all the Mechanical Equipment [Slide covers completely made of SS304 grade stainless steel (steel sheet thickness: minimum 5 mm) (KT7/ A, B, C), Ø350 SS304 stainless steel flange, Ø350 SS304 stainless steel blind flange, etc.] of T-111 (DY2) Sedimentation Tanks Distribution Structure Unit in the size and number as indicated in compliance with the relevant design, data sheets, the relevant standard, specifications and norms, the installation of the equipment in compliance with the relevant approved design of the unit, and the transportation of the same to the worksite, and making the same operable, and the periodical maintenance and operation of the same until the final acceptance, and all kinds of material and the loss of material, all kinds of labour, tools, materials, transportation, loading, unloading, horizontal/vertical handling, insurance, taxes, duties and charges and similar costs, and the contractor's profit, and overhead.</p> <p>Measurement: Unit which is actually installed.</p> <p>//</p> <p>T-111 (DY2) ÇÖKELTME HAVUZLARI DAĞITMA YAPISI ÜNİTESİ MEKANİK EKİPMANLARININ TEMİNİ VE MONTAJI</p> <p>T-111 (DY2) Çökeltme Havuzları Dağıtma Yapısı Ünitesi Tüm Mekanik Ekipmanlarının [Komple SS304 Kalite paslanmaz çelik malzemeden imal edilmiş sürgülü kapaklar (Sac kalınlığı: en az 5 mm) (KT7/A,B,C), Ø350 SS304 paslanmaz Çelik flanş, Ø350 SS304 paslanmaz Çelik kör flanş v.s.] belirtilen ölçü ve sayıda; projesine, bilgi föylerine, ilgili standart, şartname ve normlara uygun şekilde imal edilmesi / temini gerçekleştirildikten sonra, ilgili ünitenin tasdikli projesine uygun olarak yerlerine montajları, iş başına kadar taşınması, işlerliğinin sağlanması, kesin kabule kadar periyodik bakım ve işletmesi, her türlü malzeme ve zayıtı, her türlü işçilik, araç gereç, taşıma yükleme, boşaltma, yatay/düşey taşımalar, sigorta vergi resim ve harçlar vb. giderler ile yüklenici karı ve genel giderler dahil 1 ünite.</p> <p>Ölçü: Fiilen yerine monte edilen ünite.</p>	lump-sum

No	Pose/Item No	Pose/Item Definition (in English) // Poz tanımı (in Turkish)	Unit
75	Special/Mec/12	<p>SUPPLY AND INSTALLATION OF THE MECHANICAL EQUIPMENT OF T115 SCUM COLLECTION STRUCTURE, V 1/2 TELESCOPIC VALVE ROOMS, T112/A,B SEDIMENTATION TANKS UNIT</p> <p>1 unit, including, having manufactured/supplied all the Mechanical Equipment [Sedimentation outlet flumes made of SS 304 grade stainless steel, Steingel parts, submersible screen, Deflector structure and Scum Collection Funnel, Circular Gantry (strippers at top and below, etc.), Motor-controlled Telescopic Valve made of SS 304 material, Scum Pump (Q= 3 l/s, Hm= 5.0 Mss, Stainless chain/ rope, skid, etc. included, together with depot spare part), Ø100 SS Stainless steel pipe, DN100 mm SS304 Stainless steel flange, DN100 mm Disassembly part, DN100 mm Check-valve, DN100 mm Gate Valve, Garbage Container, etc.] of T115 Scum Collection Structure, Telescopic Valve Rooms, T112/A,B Sedimentation Tanks Unit in the size and number as indicated in compliance with the relevant design, data sheets, the relevant standard, specifications and norms, the installation of the equipment in compliance with the relevant approved design of the unit, and the transportation of the same to the worksite, and making the same operable, and the periodical maintenance and operation of the same until the final acceptance, and all kinds of material and the loss of material, all kinds of labour, tools, materials, transportation, loading, unloading, horizontal/vertical handling, insurance, taxes, duties and charges and similar costs, and the contractor's profit, and overhead.</p> <p>Measurement: Unit which is actually installed.</p> <p>//</p> <p>T115 KÖPÜK TOPLAMA YAPISI, V 1/2 TELESKOPIK VANA ODALARI, T112/A,B ÇÖKELTME HAVUZLARI ÜNİTESİ MEKANİK EKİPMANLARININ TEMİNİ VE MONTAJI</p> <p>T115 Köpük Toplama Yapısı, Teleskopik Vana Odaları, T112/A,B Çökeltme Havuzları Ünitesi Tüm Mekanik Ekipmanlarının [SS 304 kalite paslanmaz çelik malzemedan imal çökeltme Çıkış Savakları, Steingel parçaları, dalgıç perde, Deflektör yapısı ve Köpük Toplama Hunisi, Dairesel Gezer köprü (alt ve üst sıyrıcıları v.s.), SS 304 malzemedan imal Motor Kumandalı Teleskopik Vana, Köpük Pompası (Q= 3 lt/sn, Hm= 5,0 Mss, Paslanmaz zincir / halat, kızak v.s. dâhil, depo yedeği ile birlikte), Ø100 SS Paslanmaz Çelik boru, DN100 mm SS304 Paslanmaz Çelik Flanş, DN100 mm Demontaj Parçası, DN100 mm Çekvalf, DN100 mm Sürgülü Vana, Çöp Konteynırı v.s.] belirtilen ölçü ve sayıda; projesine, bilgi föylerine, ilgili standart, şartname ve normlara uygun şekilde imal edilmesi / temini gerçekleştirildikten sonra, ilgili ünitenin tasdikli projesine uygun olarak yerlerine montajları, iş başına kadar taşınması, işlerliğinin sağlanması, kesin kabule kadar periyodik bakım ve işletmesi, her türlü malzeme ve zayıtı, her türlü işçilik, araç gereç, taşıma yükleme, boşaltma, yatay/düşey taşımalar, sigorta vergi resim ve harçlar vb. giderler ile yüklenici karı ve genel giderler dahil 1 ünite.</p> <p>Ölçü : Fiilen yerine monte edilen ünite.</p>	lump-sum
76	Special/Mec/13	<p>SUPPLY AND INSTALLATION OF THE MECHANICAL EQUIPMENT OF T-113 PARSHALL FLUME-CHANNEL AND B2 STACK UNIT</p> <p>1 unit, including, having manufactured/supplied all the Mechanical Equipment [Parshall flume made of SS 304 stainless steel (with wall thickness e=4 mm)] of T113 Parshall Flume-Channel and B2 Stack Unit</p>	lump-sum

No	Pose/Item No	Pose/Item Definition (in English) // Poz tanımı (in Turkish)	Unit
		<p>in the size and number as indicated in compliance with the relevant design, data sheets, the relevant standard, specifications and norms, the installation of the equipment in compliance with the relevant approved design of the unit, and the transportation of the same to the worksite, and making the same operable, and the periodical maintenance and operation of the same until the final acceptance, and all kinds of material and the loss of material, all kinds of labour, tools, materials, transportation, loading, unloading, horizontal/vertical handling, insurance, taxes, duties and charges and similar costs, and the contractor's profit, and overhead.</p> <p>Measurement: Unit which is actually installed.</p> <p>//</p> <p>T-113 PARSHALL SAVAĞI - KANALI VE B2 BACASI ÜNİTESİ MEKANİK EKİPMANLARININ TEMİNİ VE MONTAJI</p> <p>T-113 Parshall Savağı - Kanalı Ve B2 Bacası Ünitesi Tüm Mekanik Ekipmanlarının [SS 304 Paslanmaz çelik malzemeden imal edilmiş Parshall Savağı (e= 4mm et kalınlığında)] belirtilen ölçü ve sayıda; projesine, bilgi föylerine, ilgili standart, şartname ve normlara uygun şekilde imal edilmesi / temini gerçekleştirildikten sonra, ilgili ünitenin tasdikli projesine uygun olarak yerlerine montajları, iş başına kadar taşınması, işlerliğinin sağlanması, kesin kabule kadar periyodik bakım ve işletmesi, her türlü malzeme ve zayıtı, her türlü işçilik, araç gereç, taşıma yükleme, boşaltma, yatay/düşey taşımalar, sigorta vergi resim ve harçlar vb. giderler ile yüklenici karı ve genel giderler dahil 1 ünite.</p> <p>Ölçü : Fiilen yerine monte edilen ünitedir.</p>	
77	Special/Mec/14	<p>SUPPLY AND INSTALLATION OF THE MECHANICAL EQUIPMENT OF T-114 (TM2) RETURN AND EXCESS SLUDGE PUMP STATION UNIT</p> <p>1 unit, including, having manufactured/supplied all the Mechanical Equipment [Return Pumps (25 l/s, 11 mSS), Excess Sludge Pumps (2.78 l/s, 8 mSS), Drainage Pump (3 l/s, 4 mSS-together with depot spare part), Motor-controlled monorail crane with 1-tonne lifting capacity, Ø 80 mm Flanged Ball Valves, Ø125 mm Butterfly valves, Ø150 mm Butterfly valves, Ø125 mm Disassembly parts, Ø150 mm Disassembly parts, Ø80 mm Check-valves, Ø125 mm Check-valves, DN 125 Stainless Steel Flanges, DN 150 Stainless Steel Flanges, DN 125 Stainless Steel Blind Flange, DN 150 Stainless Steel Blind Flanges, DN 250 Stainless Steel Blind Flanges, DN 250 Stainless Steel Flanges, Ø80 mm SS Steel pipe, Ø125 mm SS Steel pipe, Ø150 mm SS Steel pipe, Ø250 mm SS Steel pipe, Ø63 PE pipe, SS304 Reducer, Channel-type exproof aspirator (stainless channel, culvert, etc. included), Ø400 Air Vents, etc.] of T-114 (TM2) Return and Excess Sludge Pump Station Unit in the size and number as indicated in compliance with the relevant design, data sheets, the relevant standard, specifications and norms, the installation of the equipment in compliance with the relevant approved design of the unit, and the transportation of the same to the worksite, and making the same operable, and the periodical maintenance and operation of the same until the final acceptance, and all kinds of material and the loss of material, all kinds of labour, tools, materials, transportation, loading, unloading, horizontal/vertical handling, insurance, taxes, duties and charges and similar costs, and the contractor's profit, and overhead.</p> <p>Measurement: Unit which is actually installed.</p>	lump-sum

No	Pose/Item No	Pose/Item Definition (in English) // Poz tanımı (in Turkish)	Unit
		<p>//</p> <p>T-114 (TM2) GERİ DEVİR VE FAZLA ÇAMUR TERFİ MERKEZİ ÜNİTESİ MEKANİK EKİPMANLARININ TEMİNİ VE MONTAJI</p> <p>T-114 (TM2) Geri Devir Ve Fazla Çamur Terfi Merkezi Ünitesi Tüm Mekanik Ekipmanlarının [Geri Devir Pompaları (25 Lt/sn, 11 mSS), Fazla Çamur Pompaları (2,78 lt/sn, 8 mSS), Drenaj Terfi Pompası (3 lt/sn, 4 mSS-depo yedeği ile birlikte), 1 Ton Kaldırma Kapasiteli Motor Kumandalı Monaray Vinç, Ø 80 mm. Flanşlı Küresel Vanalar, Ø125 mm Kelebek vanalar, Ø150 mm Kelebek vanalar, Ø125 mm Demontaj parçaları, Ø150 mm Demontaj parçaları, Ø80mm Çekvalfler, Ø125mm Çekvalfler, DN 125 Paslanmaz Çelik Flanşlar, DN 150 Paslanmaz Çelik Flanşlar, DN 125 Paslanmaz Çelik Kör Flanş, DN 150 Paslanmaz Çelik Kör Flanşlar, DN 250 Paslanmaz Çelik Kör Flanşlar, DN 250 Paslanmaz Çelik Flanşlar, Ø80mm SS Çelik boru, Ø125mm SS Çelik boru, Ø150mm SS Çelik boru, Ø250mm SS Çelik boru, Ø63 PE boru, SS304 Redüksiyon, Kanal tip exproof aspiratör (paslanmaz kanal, menfez v.s. dâhil), Ø400 Havalandırma Bacaları v.s.] belirtilen ölçü ve sayıda; projesine, bilgi föylerine, ilgili standart, şartname ve normlara uygun şekilde imal edilmesi / temini gerçekleştirildikten sonra, ilgili ünitenin tasdikli projesine uygun olarak yerlerine montajları, iş başına kadar taşınması, işlerliğinin sağlanması, kesin kabule kadar periyodik bakım ve işletmesi, her türlü malzeme ve zayıyatı, her türlü işçilik, araç gereç, taşıma yükleme, boşaltma, yatay/düşey taşımalar, sigorta vergi resim ve harçlar vb. giderler ile yüklenici karı ve genel giderler dahil 1 ünite.</p> <p>Ölçü : Fiilen yerine monte edilen ünitedir.</p>	
78	Special/Mec/15	<p>SUPPLY AND INSTALLATION OF THE MECHANICAL EQUIPMENT OF B103 DECANter BUILDING</p> <p>1 unit, including, having manufactured/supplied all the Mechanical Equipment [Decanter (10 m3/h, 1+1), Polyelectrolite Preparation Unit, Mixing Pumps, Screw conveyor, Horizontal screw conveyor (sub-decanter), Crane with 5-tonne lifting capacity, Ø40 mm Ball valve, Ø80 mm Ball valve, Ø40 mm SS Steel pipe, Ø50 mm SS Steel pipe, Ø80 mm SS Steel pipe, DN 80 Stainless Steel Flanges, DN 80 Stainless Steel Blind Flange, PE Pipe, Inverter Split Air-conditioner with 12,000 Btu/h capacity, Aspirators (600 m³/h), Sanitary and Common Installation Works, etc.] of B103 Decanter Building in the size and number as indicated in compliance with the relevant design, data sheets, the relevant standard, specifications and norms, the installation of the equipment in compliance with the relevant approved design of the unit, and the transportation of the same to the worksite, and making the same operable, and the periodical maintenance and operation of the same until the final acceptance, and all kinds of material and the loss of material, all kinds of labour, tools, materials, transportation, loading, unloading, horizontal/vertical handling, insurance, taxes, duties and charges and similar costs, and the contractor's profit, and overhead.</p> <p>Measurement: Unit which is actually installed.</p> <p>//</p> <p>B103 DEKANTÖR BİNASI MEKANİK EKİPMANLARININ TEMİNİ VE MONTAJI</p> <p>B103 Dekantör Binası Tüm Mekanik Ekipmanlarının [Dekantör (10 m3/sa, 1+1), Polielektrolit Hazırlama Ünitesi, Dozlama Pompaları, Vidalı</p>	lump-sum

No	Pose/Item No	Pose/Item Definition (in English) // Poz tanımı (in Turkish)	Unit
		<p>konveyör , Yatay Vidalı Konveyör (dekantörlerin altında), 5 ton kaldırma kapasiteli Kreyn Vinç, Ø40 mm Küresel vana, Ø80 mm. Küresel Vana, Ø40 mm SS Çelik boru, Ø50 mm SS Çelik boru ,Ø80 mm SS Çelik boru, DN 80 Paslanmaz Çelik Flanşlar, DN 80 Paslanmaz Çelik Kör Flanş, PE Boru, 12.000 Btu/h kapasiteli İnverter Split Klima, Aspiratörler (600 m³/h), Sıhhi ve Müsterek Tesisat İmalatları, v.s.] belirtilen ölçü ve sayıda; projesine, bilgi föylerine, ilgili standart, şartname ve normlara uygun şekilde imal edilmesi / temini gerçekleştirildikten sonra, ilgili ünitenin tasdikli projesine uygun olarak yerlerine montajları, iş başına kadar taşınması, işlerliğinin sağlanması, kesin kabule kadar periyodik bakım ve işletmesi, her türlü malzeme ve zayıatı, her türlü işçilik, araç gereç, taşıma yükleme, boşaltma, yatay/düşey taşımalar, sigorta vergi resim ve harçlar vb. giderler ile yüklenici karı ve genel giderler dahil 1 ünite.</p> <p>Ölçü : Fiilen yerine monte edilen ünedir.</p>	
79	Special/Mec/16	<p>SUPPLY AND INSTALLATION OF THE MECHANICAL EQUIPMENT OF T117 (TM3) LEACHATE PUMP STATION UNIT</p> <p>1 unit, including, having manufactured/supplied all the Mechanical Equipment [Leachate Pump (Q=10 l/s, Hm=8 mSS, Stainless chain/rope, skid, etc. included), Ø125 mm Check-valve, DN 125 SS304 Stainless Steel Flange, Ø125 mm Butterfly Valve, Ø125 mm Disassembly Part, Ø125 mm SS304 Stainless Steel pipe, Jib crane (500 kg), etc.] of T-117 (TM3) Leachate Pump Station Unit in the size and number as indicated in compliance with the relevant design, data sheets, the relevant standard, specifications and norms, the installation of the equipment in compliance with the relevant approved design of the unit, and the transportation of the same to the worksite, and making the same operable, and the periodical maintenance and operation of the same until the final acceptance, and all kinds of material and the loss of material, all kinds of labour, tools, materials, transportation, loading, unloading, horizontal/vertical handling, insurance, taxes, duties and charges and similar costs, and the contractor's profit, and overhead.</p> <p>Measurement: Unit which is actually installed.</p> <p>//</p> <p>T117 (TM3) SÜZÜNTÜ SUYU TERFİ MERKEZİ ÜNİTESİ MEKANİK EKİPMANLARININ TEMİNİ VE MONTAJI</p> <p>T117 (TM3) Süzüntü Suyu Terfi Merkezi Ünitesi Tüm Mekanik Ekipmanlarının [Süzüntü Suyu Terfi Pompası (Q=10 lt/sn, Hm=8 mSS, Paslanmaz zincir / halat, kızak v.s. dâhil), Ø125mm Çekvalf, DN 125 SS304 Paslanmaz Çelik Flanş, Ø125 mm Kelebek vana, Ø125 mm Demontaj parçası, Ø125mm SS304 Paslanmaz Çelik boru, Pergel vinç (500 kg) v.s.] belirtilen ölçü ve sayıda; projesine, bilgi föylerine, ilgili standart, şartname ve normlara uygun şekilde imal edilmesi / temini gerçekleştirildikten sonra, ilgili ünitenin tasdikli projesine uygun olarak yerlerine montajları, iş başına kadar taşınması, işlerliğinin sağlanması, kesin kabule kadar periyodik bakım ve işletmesi, her türlü malzeme ve zayıatı, her türlü işçilik, araç gereç, taşıma yükleme, boşaltma, yatay/düşey taşımalar, sigorta vergi resim ve harçlar vb. giderler ile yüklenici karı ve genel giderler dahil 1 ünite.</p> <p>Ölçü: Fiilen yerine monte edilen ünedir.</p>	lump-sum
80	Special/Mec/17	<p>SUPPLY AND INSTALLATION OF THE MECHANICAL EQUIPMENT OF B102 BLOWER BUILDING</p>	lump-sum

No	Pose/Item No	Pose/Item Definition (in English) // Poz tanımı (in Turkish)	Unit
		<p>1 unit, including, having manufactured/supplied all the Mechanical Equipment [B 102 Aeration Tanks Blowers-Turbo (1272 m³/h, 600 mbar), Grit arrester blowers (38 m³/h, 300 mbar), Crane (with 3-tonne lifting capacity), Ø50 mm Ball valve, Ø200 mm Butterfly valve, Ø200 mm Disassembly part, Ø50 mm Check-valve, DN 200 Stainless Steel Flanges, DN 200 Stainless Steel Blind Flanges, Ø50 SS Steel pipe, Ø200 SS Steel pipe, Inverter Split Air-conditioner with 18,000 Btu/h capacity, Window-mount aspirators (600 m³/h), etc.] of B102 Blower Building in the size and number as indicated in compliance with the relevant design, data sheets, the relevant standard, specifications and norms, the installation of the equipment in compliance with the relevant approved design of the unit, and the transportation of the same to the worksite, and making the same operable, and the periodical maintenance and operation of the same until the final acceptance, and all kinds of material and the loss of material, all kinds of labour, tools, materials, transportation, loading, unloading, horizontal/vertical handling, insurance, taxes, duties and charges and similar costs, and the contractor's profit, and overhead.</p> <p>Measurement: Unit which is actually installed.</p> <p>//</p> <p>B102 BLOWER BİNASI MEKANİK EKİPMANLARININ TEMİNİ VE MONTAJI</p> <p>B102 Blower Binası Tüm Mekanik Ekipmanlarının [B 102 Havalandırma havuzları Blowerları -Turbo (1272 m³/sa, 600 mbar), Kum tutucu Blowerları (38 m³/sa, 300 mbar), Kreyin vinç (3 ton kaldırma kapasiteli), Ø50 mm Küresel vana, Ø200 mm Kelebek vana, Ø200 mm Demontaj parçası, Ø50 mm Çekvalf, DN 200 Paslanmaz Çelik Flanşlar, DN 200 Paslanmaz Çelik Kör Flanşlar, Ø50 SS Çelik boru, Ø200 SS Çelik boru, 18.000 Btu/h kapasiteli İnverter Split Klima, Pencere tipi aspiratörler (600 m³/h'), v.s.] belirtilen ölçü ve sayıda; projesine, bilgi föylerine, ilgili standart, şartname ve normlara uygun şekilde imal edilmesi / temini gerçekleştirildikten sonra, ilgili ünitenin tasdikli projesine uygun olarak yerlerine montajları, iş başına kadar taşınması, işlerliğinin sağlanması, kesin kabule kadar periyodik bakım ve işletmesi, her türlü malzeme ve zayıatı, her türlü işçilik, araç gereç, taşıma yükleme, boşaltma, yatay/düşey taşımalar, sigorta vergi resim ve harçlar vb. giderler ile yüklenici karı ve genel giderler dahil 1 ünite.</p> <p>Ölçü: Fiilen yerine monte edilen ünite.</p>	
81	Special/Mec/18	<p>SUPPLY AND INSTALLATION OF THE MECHANICAL EQUIPMENT OF T-118 100 M3 BAG WATER TANK UNIT</p> <p>1 unit, including, having manufactured/supplied all the Mechanical Equipment [SS304 Stainless Steel Pipes in the size and number indicated in the relevant design, Disassembly part, Butterfly and ball valves, Strainer, SS304 Stainless Steel Flanges, Float valve, Booster pump (together with expansion tanks with 1+1 and 2+1 vertical pump, frequency converter), cold water meter, Water level gauge, etc.] of T-118 100 m3 BAG Water Tank Unit in the size and number as indicated in compliance with the relevant design, data sheets, the relevant standard, specifications and norms, the installation of the equipment in compliance with the relevant approved design of the unit, and the transportation of the same to the worksite, and making the same operable, and the periodical maintenance and operation of the same until the final acceptance, and all kinds of material and the loss of</p>	lump-sum

No	Pose/Item No	Pose/Item Definition (in English) // Poz tanımı (in Turkish)	Unit
		<p>material, all kinds of labour, tools, materials, transportation, loading, unloading, horizontal/vertical handling, insurance, taxes, duties and charges and similar costs, and the contractor's profit, and overhead.</p> <p>Measurement: Unit which is actually installed.</p> <p>//</p> <p>T-118 100 M³ BAG SU DEPOSU ÜNİTESİ MEKANİK EKİPMANLARININ TEMİNİ VE MONTAJI</p> <p>T-118 100 m³ BAG Su Deposu Ünitesi Tüm Mekanik Ekipmanlarının [Projesinde belirtilen ölçü ve sayıda SS304 Paslanmaz Çelik Borular, Demontaj parçası, Kelebek ve küresel vanalar, Krepin, SS304 Paslanmaz Çelik Flanşlar, Flatörlü vana, Hidrafor (1+1 ve 2+1 Dikey Pompalı, frekans konvertörlü, genişleme tankları ile birlikte), soğuk su sayacı, Su seviye göstergesi, v.s.] belirtilen ölçü ve sayıda; projesine, bilgi föylerine, ilgili standart, şartname ve normlara uygun şekilde imal edilmesi / temini gerçekleştirildikten sonra, ilgili ünitenin tasdikli projesine uygun olarak yerlerine montajları, iş başına kadar taşınması, işlerliğinin sağlanması, kesin kabule kadar periyodik bakım ve işletmesi, her türlü malzeme ve zayıtı, her türlü işçilik, araç gereç, taşıma yükleme, boşaltma, yatay/düşey taşımalar, sigorta vergi resim ve harçlar vb. giderler ile yüklenici karı ve genel giderler dahil 1 ünite.</p> <p>Ölçü : Fiilen yerine monte edilen ünite.</p>	
82	Special/Mec/19	<p>SUPPLY AND INSTALLATION OF THE GENERAL MECHANICAL EQUIPMENT OF THE TREATMENT PLANT</p> <p>1 unit, including, having manufactured/supplied mobile, lobe drainage pump [25-30 m³/h - no. 1 (100 m Ø150 pumping hose included)] in the size and number as indicated in compliance with the relevant design, data sheets, the relevant standard, specifications and norms, the installation of the equipment in compliance with the relevant approved design of the unit, and the transportation of the same to the worksite, and making the same operable, and the periodical maintenance and operation of the same until the final acceptance, and all kinds of material and the loss of material, all kinds of labour, tools, materials, transportation, loading, unloading, horizontal/vertical handling, insurance, taxes, duties and charges and similar costs, and the contractor's profit, and overhead.</p> <p>Measurement: Unit which is actually installed.</p> <p>//</p> <p>ARITMA TESİSİ GENEL MEKANİK EKİPMANLARININ TEMİNİ VE MONTAJI</p> <p>Mobil, loblu tahliye pompası [25-30 m³/h - 1 adet (100mt. Ø150 basma hortumu dâhil)] belirtilen ölçü ve sayıda; projesine, bilgi föylerine, ilgili standart, şartname ve normlara uygun şekilde imal edilmesi / temini gerçekleştirildikten sonra, ilgili ünitenin tasdikli projesine uygun olarak yerlerine montajları, iş başına kadar taşınması, işlerliğinin sağlanması, kesin kabule kadar periyodik bakım ve işletmesi, her türlü malzeme ve zayıtı, her türlü işçilik, araç gereç, taşıma yükleme, boşaltma, yatay/düşey taşımalar, sigorta vergi resim ve harçlar vb. giderler ile yüklenici karı ve genel giderler dâhil 1 ünite.</p> <p>Ölçü: Fiilen yerine monte edilen ünite.</p>	lump-sum

3. ELECTRICAL WORKS

PARTICULAR SPECIFICATION FOR POWER TRANSMISSION LINE (PTL)

Power transmission line shall be constructed in line with the descriptions as given in the Items/Pose Definitions for Electrical Projects and Installations Book from the General Directorate of Turkish Electricity Distribution Company (TEDAŞ), Items/Pose Definitions Book from the Ministry of Environment and Urban Planning, Supreme Technical Board and in the Items/Pose Definitions Book from the General Directorate of İller Bank.

The Contractor shall execute the construction of Power Transmission Line in accordance with High Voltage(HV) Supply Project, single-line diagram, energy permit and standard plan and technical specifications of General Directorate of Turkish Electricity Distribution Company (TEDAŞ).

The Contractor shall make Power Transmission Line operable and shall include all kinds of transportation, loading, unloading, base, losses and insurance costs to his price proposal.

The Contractor shall;

- lay 4(1×150ş/25 mm²), 35 KV YAXC7-R (A2XSY) aluminium cable (XPLE insulated, with PVC outer sheath) properly along the route indicated in the power transmission line (PTL) design,
- execute all necessary excavations,
- execute construction of earth channel and concrete-protected road crossings in compliance with the section detail, and internal and external cable termination,
- manufacture and install galvanised welded iron poles and pole-top equipment (ties, insulators, insulator bars, disconnector, high voltage (HV) fuses, suspension-tension assembly, surge arrester, etc.) and pole earth
- supply and instal swallow AWG 3 (109.96 kg/m) conductors,
- have the Power Transmission Line granted acceptance by such organisation as is authorised by the Ministry of Energy

150-cm deep excavation shall be performed for PTL.

PARTICULAR SPECIFICATION FOR GENERAL EARTHING INSTALLATION

GENERAL EARTHING INSTALLATION shall be conducted in line with the descriptions as given in the Items/Pose Definitions for Electrical Projects and Installations Book from the General Directorate of Turkish Electricity Distribution Company (TEDAŞ), Items/Pose Definitions Book from the Ministry of Environment and Urban Planning, Supreme Technical Board and in the Items/Pose Definitions Book from the General Directorate of İller Bank.

The Contractor shall execute the installation of general earthing in accordance with Specifications from the Ministry of Environment and Urban Planning and TEDAŞ and in the relevant standards in accordance with the General Technical Specifications for Electrical Works from İller Bank and the Regulation on Earthing according to the installation earthing designs.

The Contractor shall make general earthing installation operable and shall include all kinds of transportation, loading, unloading, base, losses and insurance costs to his price proposal.

The Contractor shall;

- Execute the earthing of all buildings of the installation and of the foundation earthing of hydraulic structures by using 30x3.5 mm² hot dip galvanised steel strip and 2-m long 65x65x7 galvanised angle bar,
- execute the protective earthing of Transformer and Generator (operation earthing will be by using 1x50 mm² NYY Cable and 1.75 m long electrolytic copper bar earthing electrodes having Ø20 diameter as thermo-welded),
- execute the earthing of all metal parts (switchboard frames, metal cable ducts, metal bases, engine frames, guardrails, doors and windows, etc.),
- join switchboard earthing, foundation earthing and all protective earthing with 1x50mm² NYY cable and potential balancing bars (building of a ring),
- build a separate ring with PLC earthing (1x50mm² NYA)

The Contractor shall make an electrical engineer authorized by EMO perform metering of earth transition resistance of all the earthing installations following the completion of the earthing installations and submit the signed and stamped reports for metering to the Employer.

PARTICULAR SPECIFICATION FOR LV, TRANSFER, COMPENSATION AND SITE SWITCHBOARDS

LV, TRANSFER, COMPENSATION AND SITE SWITCHBOARDS shall be manufactured and installed in line with the descriptions as given in the Items/Pose Definitions for Electrical Projects and Installations Book from the General Directorate of Turkish Electricity Distribution Company (TEDAŞ), Items/Pose Definitions Book from the Ministry of Environment and Urban Planning, Supreme Technical Board and in the Items/Pose Definitions Book from the General Directorate of İller Bank.

The Contractor shall execute manufacturing and installation of LV, TRANSFER, COMPENSATION AND SITE SWITCHBOARDS in accordance with Specifications from the Ministry of Environment and Urban Planning and in the Technical Specifications for LV Distribution Boards with Metal Enclosure from TEDAŞ according to the single-line diagrams in the relevant design (Copper busbars, thermal-magnetic switches, Automatic fuses, LV surge arresters, Energy analysers, switches, compensation batteries, Reactors, Reactive power control relays, blade fuses, current transformers, metering instruments, meters, frequency converters, switchboard LED lights, relays and contactors, etc. will be delivered as installed and in working condition) and standard plans.

The Contractor shall make general earthing installation operable and shall include all kinds of transportation, loading, unloading, base, losses and insurance costs to his price proposal.

The Contractor shall manufacture and install;

- Indoor type LV switchboards,
- Automatic Compensation Switchboards with Harmonic Filter,
- Generator Transfer Switchboards
- Site Control Switchboards (To control in situ the equipment indicated in the relevant design, outdoor type switchboard made of galvanised steel sheet and fitted with a selector switch and control buttons and of IP 65 protection class)

The reactors and discharge coils indicated to be included in the compensation switchboards in the LV Single-line Drawing shall be added to the switchboards by the manufacturer, making the necessary calculations.

Switchboards shall be installed at the places indicated in the relevant design. All cable connections shall be established and made operable.

All switchboards shall be manufactured by using 2 mm steel sheet in compliance with the specifications.

PARTICULAR SPECIFICATION FOR CABLE CARRYING SYSTEMS

CABLE CARRYING SYSTEMS shall be manufactured and installed in line with the descriptions as given in the Items/Pose Definitions for Electrical Projects and Installations Book from the General Directorate of Turkish Electricity Distribution Company (TEDAŞ), Items/Pose Definitions Book from the Ministry of Environment and Urban Planning, Supreme Technical Board and in the Items/Pose Definitions Book from the General Directorate of İller Bank.

Concrete Cable Duct:

Covered concrete cable duct which shall have 100x100 cm depth and width from interior to interior shall be constructed according to the number of cables to be laid in line with the route indicated in the relevant design.

Contractor shall execute; backfilling, compaction of backfilling, transportation of the remaining material to dump site.

Concrete Cable Manhole

The Contractor shall execute all kinds of excavations, backfilling, shuttering, materials and bringing the material to worksite for the construction at such places as are required according to the relevant design of covered cable manhole which have minimum 80x80x100 cm size from interior to interior.

Concrete cable ducts shall be manufactured with reinforcement and ready-made manhole shall be used.

Earth Cable Channel:

Earth cable channel shall be constructed to the depth and width complying with the detailed drawings included in the relevant design according to the number of the cables to be laid in line with the route indicated in the relevant design and in compliance with the relevant specifications. The Contractor shall manufacture and install earth cable channel, including cutting the channel to the size and depth indicated in the relevant design on the routes where the cable is laid through HDPE (SN8) corrugated pipe, and laying the corrugated pipes, as it is specified in the plans provided, and backfilling as required, and the compaction of the backfill and laying bricks on the backfill, and if necessary, soil improvement of the trench base, and enclosing with warning tape, and the transportation of the remaining material to dump site, and the supply of all kinds of materials and the transportation, installation, testing of the same.

Earth Cable Channel (Road Crossings):

Concrete-protected earth cable channel shall be constructed to the depth and width complying with the detailed drawings included in the relevant design according to the number of the cables to be laid in line with the route indicated in the relevant design and in compliance with the relevant specifications. The Contractor shall manufacture and install concrete-protected earth cable channel, including cutting the channel to the size and depth indicated in the relevant design on the routes where the cable is laid through HDPE (SN8) corrugated pipe, and laying the corrugated pipes, as it is specified in the plans provided, and pouring the protective concrete, and backfilling as required, and the compaction of the backfill, and if necessary, soil improvement of the trench base, and the transportation of the remaining material to dump site, and the supply of all kinds of materials and the transportation, installation, testing of the same.

Galvanised Steel Sheet Cable Rack:

The Contractor shall manufacture and install Galvanised Steel Sheet Cable Rack as made operable, including the provision as covered on worksite, with all kinds of transportation, loading, unloading, losses and insurance costs included, of hot dip galvanised steel sheet cable carrying rack of heavy-duty type with a wall thickness of 1.5 mm and widths of 100, 200, 300 mm and with a wall thickness of 2.0 mm and widths of 400, 500, 600 mm of which the characteristics of material and manufacturing are described in the specifications from the Ministry of Environment and Urban Planning and from TEDAŞ, and which is provided in the size and at the places indicated in the relevant design, and the installation of the rack at the places indicated in the relevant design by using small installation materials of any kind.

Cable Casing Pipes

The Contractor shall manufacture and install Cable Casing Pipes as made operable, including the supply, with fittings and all kinds of material included, and provision on worksite, with all kinds of transportation, loading, unloading, losses and insurance costs included, of HDPE (SN8) corrugated cable casing pipes and hot dip galvanised metal cable casing pipes, which are manufactured in compliance with the route and the diameter indicated in the relevant design and with the specifications from the Ministry of Environment and Urban Planning and from TEDAŞ and the relevant standards, and the installation of the same at the places indicated in the relevant design by using small installation materials of any kind.

Cable Carrying Systems

The Contractor shall manufacture and install cable carrying systems including provision on worksite, with all kinds of transportation, loading, unloading, , and the installation of the same by using small installation materials of any kind.

PARTICULAR SPECIFICATION FOR POWER, CONTROL AND SIGNAL CABLES

POWER, CONTROL AND SIGNAL CABLES shall be manufactured and installed in line with the descriptions as given in the Items/Pose Definitions for Electrical Projects and Installations Book from the General Directorate of Turkish Electricity Distribution Company (TEDAŞ), Items/Pose Definitions Book from the Ministry of Environment and Urban Planning, Supreme Technical Board and in the Items/Pose Definitions Book from the General Directorate of Iller Bank.

The Contractor shall execute manufacturing and installation of POWER, CONTROL AND SIGNAL CABLES in accordance with the power-control, single-line diagram, lighting, weak current and automation designs of all the units of the treatment plant and bearing the technical characteristics given on the cable lists the supply and installation, in a way allowing making the connections indicated in the relevant design, of all the cables which are manufactured in compliance with the relevant specifications from the Ministry of

Environment and Urban Planning, Iller Bank and TEDAŞ and in a way bearing the characteristics set out in the standards.

PARTICULAR SPECIFICATION FOR SITE ILLUMINATION

SITE ILLUMINATION shall be manufactured and installed in line with the descriptions as given in the Items/Pose Definitions for Electrical Projects and Installations Book from the General Directorate of Turkish Electricity Distribution Company (TEDAŞ), Items/Pose Definitions Book from the Ministry of Environment and Urban Planning, Supreme Technical Board and in the Items/Pose Definitions Book from the General Directorate of Iller Bank.

The Contractor shall execute manufacturing and installation of SITE ILLUMINATION in accordance with the site illumination design and with the relevant specifications from the Ministry of Environment and Urban Planning and from TEDAŞ.

The Contractor shall make general earthing installation operable and shall include all kinds of transportation, loading, unloading, base, losses and insurance costs to his price proposal.

The Contractor shall manufacture and install;

- LED external lighting fixtures (IP65) with minimum 16000 lumen of luminous intensity,
- 8-m galvanised steel polygon TEDAŞ type lighting poles,
- site illumination switchboard controlled by photocell and astronomic time relay,
- earthing of poles to be provided with electrolytic copper earth electrodes with a length of 1.75 m and 16 mm² NYY cable,
- earth channel and cabling operations,

For the site illumination, earth channel shall be constructed along the route and in the sections indicated in the relevant design.

PARTICULAR SPECIFICATION FOR INDOOR ELECTRICAL INSTALLATIONS

INDOOR ELECTRICAL INSTALLATIONS shall be manufactured and installed in line with the descriptions as given in the Items/Pose Definitions for Electrical Projects and Installations Book from the General Directorate of Turkish Electricity Distribution Company (TEDAŞ), Items/Pose Definitions Book from the Ministry of Environment and Urban Planning, Supreme Technical Board and in the Items/Pose Definitions Book from the General Directorate of Iller Bank.

The Contractor shall execute manufacturing and installation of indoor lighting, switches, sockets, weak current installation, telephone, data, fire alarm, emergency lighting fixtures, telephone exchange for Administrative Building, Guard House, Inlet Pump Station Building, Transformer Building, Generator Building, Blower Building, Decanter Building, Return and Excess Sludge Pump station, Water Tank, Sampling and Flowmeter Cabinet, in accordance with the indoor electrical installations design and with the relevant specifications from the Ministry of Environment and Urban Planning and from TEDAŞ.

Fire alarm panel shall be of Intelligent Analogue Address type and it shall be installed and put into operation. Intelligent Analogue Address Optical Smoke Detectors compatible with this panel shall be used.

All the lighting and socket outlets of administrative building and watch hut shall be flush-mounted by using HO7Z cables with safety line. Auxiliary switchboard feeders shall be N2XH and surface-mounted feeding cables shall be NHXMH. Fire cables shall be 2x2x0.8+0.8 mm² J-Y(st)Y. Indoor parts of Data and Telephone Cables shall be CAT-6. All the cables in the administrative building and watch hut shall be of halogen-free type.

Building lighting switchboards shall be made of steel sheet in compliance with the relevant specifications.

ITEM/POSE DEFINITIONS FOR ELECTRICAL WORKS

Item/Pose Definitions for POWER TRANSMISSION LINE (PTL)

No	Pose/Item No	Pose/Item Definition (in English) // Poz tanımı (in Turkish)	Unit
1	32.11.4/006	1×150ş/25 mm ² , 20.3/35 KV YAXC7-R (A2XSY); YAXC8V3V-R (A2XSEYFGY) Aluminum Cable, XLPE Insulated, PVC Outer Sheath (1. cable to the ground) // 1×150ş/25 mm ² , 20.3/35 kv yaxc7-r (a2xsy); yaxc8v3v-r	m

No	Pose/Item No	Pose/Item Definition (in English) // Poz tanımı (in Turkish)	Unit
		(a2xseyfgy) alüminyum kablo (xlpe yalıtkanlı, pvc dış kılıflı) [1. kablo toprağa]	
2	32.19.1/006	35kV, 1x150s / 25 mm ² Aluminum Cable, XLPE Insulated, PVC Outer Sheath (same ground duct additional furnished) // 1×150ş/25 mm ² , 20.3/35 kv yaxc7v-r (a2xsy); yaxc8vz3v-r (a2xseyfgy) alüminyum kablo, xlpe yalıtkanlı, pvc dış kılıflı [2, 3 ve 4 kablo toprağa]	m
3	32.15.1/006	35kV, 1x150s / 25 mm ² Aluminum Cable, XLPE Insulated, PVC Outer Sheath (concrete channel, pole, wall) // 1×150ş/25 mm ² , 20.3/35 kv yaxc7v-r (a2xsy); yaxc8vz3v-r (a2xseyfgy) alüminyum kablo (xlpe yalıtkanlı, pvc dış kılıflı) [direğe ve beton kan.]	m
4	32.11.4.M.1A	10 cm deepening of the earth cable channel (not-1) // Toprak kablo kanalının 10 cm derinleştirilmesi (not-1) 80 cm standart kablo kanalının 70cm derinleştirilmesi	m
5	5.3/II	Large spaced overhead-line masts (galvanized and galvanized masts) // BÜYÜK ARALIKLI HAVA HATTI DİREKLERİ (GALV.CİVATALI VE GALV.DEMİR DİREK)	kg
6	5.5/II	Large spaced overhead-line masts (galv. Bolt and galv. steel traverses and consoles) // Büyük aralıklı hava hattı direkleri (galv.civatalı ve galv.demir travers kon.)	kg
7	8.1/001	2 mm galvanized steel Tray/duct or shelves // 2 mm.lik galvanizli sac tava veya rafları	kg
8	9.3.1/002	Swallow AWG 3 (109.96 kg / km) steel aluminum conductors // Swallow AWG 3 (109.96 kg/km) çelik alüminyum iletkenler	kg
9	11.4/006	36 kV VHD-35 / Overhead -Line Normal Bearing Isolator // 36 KV VHD 35 (20 mm/kV) normal tip hava hattı mesnet izolatörleri	pcs
10	11.5/023	Insulator bar (middle) for C 35 concrete power pole sleeper/traverse // C 35 beton travers için (orta) izolatör demiri	pcs
11	11.5/020	C-35 Concrete Traverse (Carrier) Insulator bar // C 35 beton travers için (taşıyıcı) izolatör demiri	pcs
12	15.2/010	36 kV, 10 kA ZnO Parafudr // 36 KV 10 kA metal oksit (ZnO) parafudr	pcs
13	17.8/008	36kV, 630A, 12.5kA External Type Fused Grounding Disconnecter // 36 KV, 630 A, 12.5 kA harici tip sigortalı topraklamalı ayırıcılar	pcs
14	17.9/025	36 KV, 30-40 A, L=635 mm. O= 45 mm. M.V fuse // 36 KV, 30-40 A, L=635 mm. O= 45 mm. O.G. sigorta patronları	pcs
15	30.3/001	2 m. Galvanized 65 × 65 × 7. angle bracket, 5 mt. bands and their embedding // 2 m. galvanizli 65×65×7.LİK köşebent, 5 mt. şerit ve bunların gömülmesi	pcs
16	32.34.14.1/006	1×150 s/25 mm ² , 20.3/35 KV YAXC7V-R (A2XSY); YAXC8VZ3V-R (A2XSEYFGY) External Type shrinkable Aluminium cable connection // 1×150 s/25 mm ² , 20.3/35 KV YAXC7V-R (A2XSY); YAXC8VZ3V-R (A2XSEYFGY) harici tip büzüşmeli alüminyum kablo başlığı	pcs
17	32.34.11.1/006	1×150 s/25 mm ² , 20.3/35 KV YAXC7V-R (A2XSY); YAXC8VZ3V-R (A2XSEYFGY) Internal Type shrinkable Aluminium cable connection // 1×150 s/25 mm ² , 20.3/35 KV YAXC7V-R (A2XSY); YAXC8VZ3V-R (A2XSEYFGY) DAHİLİ TİP BÜZÜŞMELİ ALÜMİNYUM KABLO BAŞLIĞI	pcs

Item/Pose Definitions for GENERAL GROUNDING INSTALLATION

No	Pose/Item No	Pose/Item Definition (in English) // Poz tanımı (in Turkish)	Unit
1	982.101	Building encicture conductor 50 mm ² copper wire // Bina ihata iletkeni 50 mm ² bakır tel	m
2	982.102	Building encicture conductor 30 × 3.5 mm galvanized steel lama // Bina ihata iletkeni 30×3.5 mm galvanizli çelik lama	m
3	30.1/001	Burial of Galvanized 30x3,5 grounding strip // 30x3,5 topraklama şeridi ve gömülmesi	m
4	30.4.2	Burial of 2 m, 65x65x7 galvanized grounding electrode // 2 mt uzunluğunda galvanizli 65x65x7'lik galvanizli toprak elektrot ve gömülmesi	pcs
5	983.102	The ground electrode (rod), electrolytic copper // Toprak elektrodu (çubuk), elektrolitik bakır	pcs
6	727.544	Column and feed line with 1kV underground cables 1 * 50 mm ² nyy (ts IEC 60502-1 + a1) // 1kv y.altı kabloları ile kolon ve besleme hattı 1*50 mm ² nyy (TS IEC 60502-1+A1)	m
7	780.126	Plastic insulated conductor (nya) 1 * 50 mm ² // Plastik izoleli iletken (nya) 1*50 mm ²	m
8	710.100	Supply and installation of copper bars suitable for TSE requirements to be placed in the casting box and panel, and coloring of ts en 60445 // Döküm kutu içine ve panolara konulacak TSE şartlarına uygun bakır bara temin ve montajı ve TS EN 60445'deki renklere boyanması	kg
9	727.541	Column and feed line with 1kV underground cables 1 * 16 mm ² nyy (ts IEC 60502-1 + a1) // 1kv y.altı kabloları ile kolon ve besleme hattı 1*16 mm ² nyy (TS IEC 60502-1+A1)	m

Item/Pose Definitions for LC, TRANSFER, COMPENSATION AND FIELD PANEL-SWITCHBOARD

No	Pose/Item No	Pose/Item Definition (in English) // Poz tanımı (in Turkish)	Unit
1	701.201	Frontal cover metal switchboard // Önden kapaklı saç pano (ts en 61439-1/2)	pcs
2	3.1.1/011	Rectangular section copper bar, 50 × 10 mm ² , 4.45 kg / m // Dikdörtgen kesitli bakır bara, 50×10 mm ² , 4.45 Kg/m	kg
3	3.1.1/008	Rectangular section copper bar, 40 × 5 mm ² , 1,78 kg / m // Dikdörtgen kesitli bakır bara, 40×5 mm ² , 1.78 Kg/m	kg
4	718.53	Residual current circuit breaker from 3*300.to 3*1250 // Kaçak akım koruma şalteri 3*300a.den 3*1250e kadar	pcs
5	718.529	Residual current circuit breaker from 3*380.to 3*250 // Kaçak akım koruma şalteri 3*80 a.den 3*250 e kadar	pcs
6	715.307	Thermal, magnetic protective switch 3 * 40 a. (Behind the panel (ts en 60947-2) // Termik, mağnetik koruyuculu şalter 3*40 a. (tablo arkası (ts en 60947-2)	pcs
7	715.309	Thermal, magnetic protective switch 3 * 100 a. (Behind the panel (ts en 60947-2) // Termik, mağnetik koruyuculu şalter 3*100 a.(tablo arkası (ts en 60947-2)	pcs

No	Pose/Item No	Pose/Item Definition (in English) // Poz tanımı (in Turkish)	Unit
8	715.31	Thermal, magnetic protective switch 3 * 200 a. (Behind the panel (ts en 60947-2) // Termik, mađnetik koruyuculu řalter 3*200 a.(tablo arkası (ts en 60947-2)	pcs
9	715.311	Thermal, magnetic protective switch 3 * 300 a. (Behind the panel (ts en 60947-2) // Termik, mađnetik koruyuculu řalter 3*300 a.(tablo arkası (ts en 60947-2)	pcs
10	715.312	Thermal, magnetic protective switch 3 * 600 a. (Behind the panel (ts en 60947-2) // Termik, mađnetik koruyuculu řalter 3*600 a.(tablo arkası (ts en 60947-2)	pcs
11	715.313	Thermal, magnetic protective switch 3 * 1000 a. (Behind the panel (ts en 60947-2) // Termik, mađnetik koruyuculu řalter 3*1000 a.(tablo arkası (ts en 60947-2)	pcs
12	723.301	Manualy controlled center compensation batteries up to 400 V // Elle kumandalı merkezi kompanzasyon bataryaları	kVAR
13	723.401	Automatic centralized compensation batteries up to 400 V // Otomatik kumandalı merkezi kompanzasyon bataryaları	kVAR
14	723.511	Reactive power control relay // Reaktif Güç Kontrol Rölesi	pcs
15	724.102	Knife Type Fuse up to 63 A (TS 86 EN 60269-1) // Bıçaklı sigorta 63 A.e kadar (TS 86 EN 60269-1)	pcs
16	724.401	Automatic fuse with switch (up to 16 a) (3k) (ts 5018-1 en 60898-1) // Anahtarlı otomatik sigorta 16 A. (3KA) (TS 5018-1 EN 60898-1)	pcs
17	724.406	Three- Phased Automatic fuse with switch (up to 16 a) (3k) (ts 5018-1 en 60898-1) // 3 fazlı anahtarlı otomatik sigorta 16 A. (3KA) (TS 5018-1 EN 60898-1)	pcs
18	725.402	Current measurement transformer (Flow tracing) 501 - 2000/5 a. // Akım ölçü trafosu 501 - 2000/5 a.	pcs
19	725.511	Energy analyzer (ts 4417) // Enerji analizörü (ts 4417)	pcs
20	725.731	Three-phase time-scheduled electronic type (active-reactive) counters 3x230/400 v..3x5 (7,5) a // Üç fazlı zaman tarifeli elektronik tip (aktif-reaktif) sayaçlar 3x230/400 v..3x5 (7,5) a	pcs
21	725.904	Sign lamp up to 250 watts // İşaret lambası 250 v.a kadar	pcs
22	704.101	Sheet metal plate Switchboard up to 0,05 - 0,10 m2 (including 0,10 m2) (ts 3367 en 60439-1) // Sıva üstü sac tablo 0,05 - 0,10m2'ye kadar (0,10 m2 dahil) (TS 3367 EN 60439-1)	pcs
23	713.101	Selective type pacho switch 2 * 16 a. (on the switchboard) (ts 4915 en 60669-1, ts en 60947-3) // Seçici tip pako řalter 2*16 a. (tablo üzerine) (ts 4915 en 60669-1, ts en 60947-3)	pcs
24	780.171	Supply and assembly noormal start-stop button // Normal start-stop butonu temini ve montajı	pcs
25	Special/Ele/01	LC Circuit Breaker 4*1000A (with turn on/off coil) Main Input Switch // AG devre kesici 4*1000A (Açma ve kapama bobinli, motorlu) (Ana giriş řalteri)	pcs

Item/Pose Definitions for CABLE INSTALLATION SYSTEMS

No	Pose/Item No	Pose/Item Definition (in English) // Poz tanımı (in Turkish)	Unit
1	782.100	Cable duct -tray system // Kablo tava sistemleri	kg
2	782.101	Cable tray systems cover plate // Kablo Tava Sistemleri Kapak Sacı	kg
3	7.5.1/003	1 "galvanized pipe // 1 " galvanizli boru	m
4	7.5.1/005	2 "galvanized pipe // 2 " galvanizli boru	m
5	8.2.2/004	110 mm cable sleeve tube 450 n (non-metallic, underground) //110 mm kablo muhafaza borusu 450 n (metalik olmayan, yeraltına)	m
6	Special/Ele/02	Concrete Manhole Including the excavation of the canal acc. dimensions shown in projects, the necessary filling, the compaction and the transfer of the excess material to the waste dump and all kinds of materials, transportation, montage, tests // Beton Rögar Projelerde gösterilen ölçü ve özellikte kanalın açılması, gerekli dolgularının yapılması, sıkıştırılması ve artan malzemenin atık kısmına kadar nakliyesi ve her nevi malzeme temini, nakliyesi, montajı, testleri dahil komple;	pcs
7	Special/Ele/03	Concrete Canal Including the excavation of the canal acc.dimensions shown in projects, the necessary filling, the compaction and the transfer of the excess material to the waste dump and all kinds of materials, transportation, montage, tests // Beton Kanal Projelerde gösterilen ölçü ve özellikte kanalın açılması, gerekli dolgularının yapılması, sıkıştırılması ve artan malzemenin atık kısmına kadar nakliyesi ve her nevi malzeme temini, nakliyesi, montajı, testleri dahil komple;	m
8	Special/Ele/04	Earth Canal (Road Passing) Including the excavation of the canal acc. dimensions shown in projects, the necessary filling, the compaction and the transfer of the excess material to the waste dump and all kinds of materials, transportation, montage, tests // Toprak Kanal (Yol Geçişi) Projelerde gösterilen ölçü ve özellikte kanalın açılması, gerekli dolgularının yapılması, sıkıştırılması ve artan malzemenin atık kısmına kadar nakliyesi ve her nevi malzeme temini, nakliyesi, montajı, testleri dahil komple.	m
9	Special/Ele/05	Earth Canal Including the excavation of the canal acc. dimensions shown in projects, the necessary filling, the compaction and the transfer of the excess material to the waste dump and all kinds of materials, transportation, montage, tests // Toprak Kanal	m

No	Pose/Item No	Pose/Item Definition (in English) // Poz tanımı (in Turkish)	Unit
		Projelerde gösterilen ölçü ve özellikte kanalın açılması, gerekli dolgularının yapılması, sıkıştırılması ve artan malzemenin atık kısmına kadar nakliyesi ve her nevi malzeme temini, nakliyesi, montajı, testleri dahil komple.	

Item/Pose Definitions for POWER, CONTROL AND SIGNAL CABLES

No	Pose/Item No	Pose/Item Definition (in English) // Poz tanımı (in Turkish)	Unit
1	727.511	Column and feed line with 1kV underground cable with 3 * 6 mm2 nyy (ts IEC 60502-1 + a1) // 1kv yeraltı kablosu ile kolon ve besleme hattı 3*6 mm2 nyy (ts iec 60502-1)	m
2	727.512	Column and feed line with 1kV underground cable with 3*4 mm2 nyy (ts iec 60502-1) // 1kv yeraltı kablosu ile kolon ve besleme hattı 3*4 mm2 nyy (ts iec 60502-1)	m
3	727.513	Column and feed line with 1kV underground cable with 3*2.5 mm2 nyy (ts iec 60502-1 //1kv yeraltı kablosu ile kolon ve besleme hattı 3*2.5 mm2 nyy (ts iec 60502-1)	m
4	727.516	Column and feed line with 1kV underground cable with 3*185+95 mm2 nyy (ts iec 60502-1) // 1kv yeraltı kablo.kolon ve besleme hattı 3*185+95 mm2 nyy (ts iec 60502-1)	m
5	727.518	Column and feed line with 1kV underground cable with 3*120+70 mm2 nyy (ts iec 60502-1) // 1kv yeraltı kablo.kolon ve besleme hattı 3*120+70 mm2 nyy (ts iec 60502-1)	m
6	727.519	Column and feed line with 1kV underground cable with 3*95+50 mm2 nyy (ts iec 60502-1) // 1kv yeraltı kablo.kolon ve besleme hattı 3*95+50 mm2 nyy (ts iec 60502-1)	m
7	727.521	Column and feed line with 1kV underground cable with 3*50+25 mm2 nyy (ts iec 60502-1) // 1kv yeraltı kablo.kolon ve besleme hattı 3*50+25 mm2 nyy (ts iec 60502-1)	m
8	727.522	Column and feed line with 1kV underground cable with 3*35+16 mm2 nyy (ts iec 60502-1) // 1kv yeraltı kablo.kolon ve besleme hattı 3*35+16 mm2 nyy (ts iec 60502-1)	m
9	727.523	Column and feed line with 1kV underground cable with 3*25+16 mm2 nyy (ts iec 60502-1) // 1kv yeraltı kablo.kolon ve besleme hattı 3*25+16 mm2 nyy (ts iec 60502-1)	m
10	727.524	Column and feed line with 1kV underground cable with 4*16 mm2 nyy (ts iec 60502-1) // 1kv yeraltı kablo.kolon ve besleme hattı 4*16 mm2 nyy (ts iec 60502-1)	m
11	727.525	Column and feed line with 1kV underground cable with 4*10 mm2 nyy (ts iec 60502-1) // 1kv yeraltı kablo.kolon ve besleme hattı 4*10 mm2 nyy (ts iec 60502-1)	m
12	727.526	Column and feed line with 1kV underground cable with 4*6 mm2 nyy (ts iec 60502-1) // 1kv yeraltı kablo.kolon ve besleme hattı 4*6 mm2 nyy (ts iec 60502-1)	m
13	727.527	Column and feed line with 1kV underground cable with 4*4 mm2 nyy (ts iec 60502-1) // 1kv yeraltı kablo.kolon ve besleme hattı 4*4 mm2 nyy (ts iec 60502-1)	m

No	Pose/Item No	Pose/Item Definition (in English) // Poz tanımı (in Turkish)	Unit
14	727.528	Column and feed line with 1kV underground cable with 4*2.5 mm2 nyy (ts iec 60502-1 // 1kv yeraltı kablo.kolon ve besleme hattı 4*2.5 mm2 nyy (ts iec 60502-1)	m
15	727.507	Column and feed line with 1kV underground cable with 2*1.5 mm2 nyy (ts iec 60502-1) // 1kv yeraltı kablosu ile kolon ve besleme hattı 2*1.5 mm2 nyy (ts iec 60502-1)	m
16	727.514	Column and feed line with 1kV underground cable with 3*1.5 mm2 nyy (ts iec 60502-1) // 1kv yeraltı kablosu ile kolon ve besleme hattı 3*1.5 mm2 nyy (ts iec 60502-1)	m
17	727.529	Column and feed line with 1kV underground cable with 4*1.5 mm2 nyy (ts iec 60502-1) // 1kv yeraltı kablo.kolon ve besleme hattı 4*1.5 mm2 nyy (ts iec 60502-1)	m
18	727.530	Column and feed line with 1kV underground cable with 5*1.5 mm2 nyy (ts iec 60502-1) // 1kv yeraltı kablo.kolon ve besleme hattı 5*1.5 mm2 nyy (ts iec 60502-1)	m
19	727.538	Column and feed line with 1kV underground cable with 30*1.5 mm2 nyy (ts iec 60502-1) // 1kv yeraltı kablo.kolon ve besleme hattı 30*1.5 mm2 nyy (ts iec 60502-1)	m
20	880.396/1	LYCY, LYC2Y signal cable 2x1.5 mm2 // Lıycy sinyal kablosu 2x1.5 mm2	m
21	880.396/3	LYCY, LYC2Y signal cable 4x1.5 mm2 // Lıycy sinyal kablosu 4x1.5 mm2	m
22	880.563	Utp cat6 cable(Data Cable) // Data Kablosu (Utp cat6 kablo)	m
23	880.617	8 core sm armored f / o cable // 8 core sm zırhlı f/o kablo	m

Item/Pose Definitions for SITE LIGHTING

No	Pose/Item No	Pose/Item Definition (in English) // Poz tanımı (in Turkish)	Unit
1	5.5.3.2.1/012	Ad1-80 / 10 type, 90 kg single console galvanized steel polygon lighting pole // AD1-80/10 TİPİ, 90 kg.tek konsollu galvanizli çelik poligon aydınlatma direği	pcs
2	5.5.3.2.2/012	Ad2-80 / 10 type, 95 kg.concontent galvanized steel polygon lighting pole // AD2-80/10 TİPİ, 95 kg.iki konsollu galvanizli çelik poligon aydınlatma direği	pcs
3	724.401	Automatic fuse with switch (up to 16 a) (3k) (ts 5018-1 en 60898-1) // 16 a.'e kadar anahtarlı otomatik sigorta (3ka)	pcs
4	727.513	Column and feed line with 1kV underground cable with 3*2.5 mm2 nyy (TS IEC 60502-1+A1) // 1kv yeraltı kablosu ile kolon ve besleme hattı 3*2.5 mm2 nyy (TS IEC 60502-1+A1)	m
5	727.505	Column and feed line with 1kV underground cable with 2*4 mm2 nyy (TS IEC 60502-1+A1) // 1kv yeraltı kablosu ile kolon ve besleme hattı 2*4 mm2 nyy (TS IEC 60502-1+A1)	m
6	727.512	Column and feed line with 1kV underground cable with 3*4 mm2 nyy (TS IEC 60502-1+A1) // 1kv yeraltı kablosu ile kolon ve besleme hattı 3*4 mm2 nyy (TS IEC 60502-1+A1)	m

No	Pose/Item No	Pose/Item Definition (in English) // Poz tanımı (in Turkish)	Unit
7	727.526	Column and feed line with 1kV underground cable with 4*6 mm2 nyy (TS IEC 60502-1+A1) // 1kv yeraltı kablo.kolon ve besleme hattı 4*6 mm2 nyy (TS IEC 60502-1+A1)	m
8	727.527	Column and feed line with 1kV underground cable with 4*4 mm2 nyy (TS IEC 60502-1+A1) // 1kv yeraltı kablo.kolon ve besleme hattı 4*4 mm2 nyy (TS IEC 60502-1+A1)	m
9	727.541	Column and feed line with 1kV underground cable with 1*16 mm2 nyy (TS IEC 60502-1+A1) // 1kv y.altı kabloları ile kolon ve besleme hattı 1*16 mm2 nyy (TS IEC 60502-1+A1)	m
10	983.102	The ground electrode (rod), electrolytic copper // Toprak elektrodu (çubuk), elektrolitik bakır	pcs
11	742.1655	The light flux is at least 12750 lm and the consumption value is at most 150 w. Led Projectors // Işık akısı en az 12750 lm, tüketim değeri en fazla 150 w olan. Led Projektörler	pcs
12	8.2.2/002	75 mm cable Sleeve tube 450 n (non-metallic, underground) // 75 mm kablo muhafaza borusu 450 n (metalik olmayan, yeraltına)	m
13	Y.16.050/03	Concrete pouring in c 16/20 pressure durability class, produced or bought in concrete plant and pouring by concrete pump (including concrete conveyance)(to be used for road passing 0.4m*0.15m in dimension) // Beton santralinde üretilen veya satın alınan ve beton pompasıyla basılan, C16/20 basınç dayanım sınıfında beton dökülmesi (beton nakli dahil) (yol geçişlerinde 0,4m*0.15m ölçülerinde dökülecek beton)	m ³
14	704.102	Sheet metal plate Switchboard up to 0,05 - 0,20 m2 (including 0,20 m2) (ts 3367 en 60439-1) // Sıva üstü sac tablo 0,10 - 0,20m2'ye kadar (0,20 m2 dahil) (TS 3367 EN 60439-1)	pcs
15	715.306	Thermal, magnetic protective switch 3 * 25 a. (Behind the Switchboard (ts en 60947-2) // Termik, manyetik koruyuculu şalter 3*25 a.(tablo arkası (ts en 60947-2) /	pcs
16	718.102	Dry type encapsulated contactor 3*16 a // Kuru tip koruyucusuz kontaktör 3*16 a.	pcs
17	718.400	Photocell switch // Fotosel şalter	pcs
18	718.507	Residual current circuit breaker up to 4*25 a.(30ma) // Kaçak akım koruma şalteri 4*25 a.e kadar(30ma)	pcs
19	724.406	Three-phase auto-fuse (3ka) with switch up to 16 a (ts 5018-1 en 60898-1) // Üç fazlı anahtarlı 16 a.'e kadar otomatik sigorta (3ka)	pcs
20	Special/Ele/05	Earth Canal Including the excavation of the canal acc. dimensions shown in projects, the necessary filling, the compaction and the transfer of the excess material to the waste dump and all kinds of materials, transportation, montage, tests // Toprak Kanal Projelerde gösterilen ölçü ve özellikte kanalın açılması, gerekli dolgularının yapılması, sıkıştırılması ve artan malzemenin atık kısmına kadar nakliyesi ve her nevi malzeme temini, nakliyesi, montajı, testleri dahil komple.	m

Item/Pose Definitions for BUILDING INDOOR ELECTRICAL INSTALLATIONS

No	Pose/Item No	Pose/Item Definition (in English) // Poz tanımı (in Turkish)	Unit
1	704.101	Sheet metal plate Switchboard up to 0,05 - 0,10 m2 (including 0,10 m2) (ts 3367 en 60439-1/2) // Sıva üstü sac tablo 0.05-0.10 m2. (ts en 61439-1/2)	pcs
2	704.102	Sheet metal plate Switchboard up to 0,1 - 0,20 m2 (including 0,20 m2) (ts 3367 en 60439-1/2) // Sıva üstü sac tablo 0.10-0.20 m2. (ts en 61439-1/2)	pcs
3	704.103	Sheet metal plate Switchboard up to 0,20 - 0,30 m2 (including 0,30 m2) (ts 3367 en 60439-1/2) // Sıva üstü sac tablo 0.20-0.30 m2. (ts en 61439-1/2)	pcs
4	705.102	Embedded type sheet metal plate switchboard 0.10-0.20 m2. (ts en 61439-1/2) // Gömme tip sac tablo 0.10-0.20 m2. (ts en 61439-1/2)	pcs
5	705.105	Embedded type sheet metal plate switchboard 0.40-0.50 m2. (ts en 61439-1/2) // Gömme tip sac tablo 0.40-0.50 m2. (ts en 61439-1/2)	pcs
6	715.308	Thermal, magnetic protective switch 3 * 63 a. (Behind of the panel (ts en 60947-2) // Termik, mağnetik koruyuculu şalter 3*63 a.(tablo arkası (ts en 60947-2)	pcs
7	715.309	Thermal, magnetic protective switch 3 * 100 a. (Behind the panel (ts en 60947-2) // Termik, mağnetik koruyuculu şalter 3*100 a.(tablo arkası (ts en 60947-2)	pcs
8	718.203	Dry-type thermal protection contactor 3 * 25 a. // Kuru tip termik koruyuculu kontaktör 3*25 a.	pcs
9	718.501	Residual current circuit breaker up to 2*25 a.(30ma) // Kaçak akım koruma şalteri 2*25 a.e kadar(30ma)	pcs
10	718.507	Residual current circuit breaker up to 4*25 a.(30ma) // Kaçak akım koruma şalteri 4*25 a.e kadar(30ma)	pcs
11	718.508	Residual current circuit breaker up to 4*40 a.(30ma) // Kaçak akım koruma şalteri 4*40 a.e kadar(30ma)	pcs
12	718.509	Residual current circuit breaker up to 4*60 a.(30ma) // Kaçak akım koruma şalteri 4*60 a.e kadar(30ma)	pcs
13	718.524	Residual current circuit breaker up to 4*100 a.(300ma) // Kaçak akım koruma şalteri 4*100 a.e kadar(300ma)	pcs
14	724.401	Automatic fuse with switch (up to 16 a) (3ka) (ts 5018-1 en 60898-1) // 16 a.'e kadar anahtarlı otomatik sigorta (3ka)) (ts 5018-1 en 60898-1)	pcs
15	724.601	Automatic fuse with switch (up to 16 a) (6ka) (ts 5018-1 en 60898-1) // 16 a.'e kadar anahtarlı otomatik sigorta (6ka)) (ts 5018-1 en 60898-1)	pcs
16	724.602	Automatic fuse with switch (up to 25 a) (6ka) (ts 5018-1 en 60898-1) // 25 a.'e kadar anahtarlı otomatik sigorta (6ka)) (ts 5018-1 en 60898-1)	pcs
17	724.606	Three-phase automatic fuse with switch up to 25 a. (6ka) (ts 5018-1 en 60898-1) // Üç fazlı anahtarlı 25 a.'e kadar anahtarlı otomatik sigorta (6ka) (ts 5018-1 en 60898-1)	pcs
18	724.607	Three-phase automatic fuse with switch upto 40 a. (6ka) (ts 5018-1 en 60898-1) // Üç fazlı anahtarlı 40 a.'e kadar anahtarlı otomatik sigorta (6ka) (ts 5018-1 en 60898-1)	pcs
19	724.702	Automatic fuse with switch up to 25 a. (10ka) // 25 a.'e kadar anahtarlı otomatik sigorta (10ka)	pcs

No	Pose/Item No	Pose/Item Definition (in English) // Poz tanımı (in Turkish)	Unit
20	724.707	Three-phase automatic fuse with switch up to 40 a. (10ka) (ts 5018-1 en 60898-1) // Üç fazlı anahtarlı 40 a.'e kadar anahtarlı otomatik sigorta (10ka)	pcs
21	724.708	Three-phase automatic fuse with switch up to 63 a. (10ka) (ts 5018-1 en 60898-1) // Üç fazlı anahtarlı 63 a.'e kadar anahtarlı otomatik sigorta (10ka)	pcs
22	725.904	Sign lamp up to 250 v.a // İşaret lambası 250 v.a kadar	pcs
23	727.514	Column and feed line with 1kV underground cable with 3*1.5 mm2 nyy (ts iec 60502-1) // 1kv yeraltı kablosu ile kolon ve besleme hattı 3*1.5 mm2 nyy (ts iec 60502-1)	m
24	727.525	Column and feed line with 1kV underground cable with 4*10 mm2 nyy (ts iec 60502-1) // 1kv yeraltı kablo.kolon ve besleme hattı 4*10 mm2 nyy (ts iec 60502-1)	m
25	727.527	Column and feed line with 1kV underground cable with 4*4 mm2 nyy (ts iec 60502-1) // 1kv yeraltı kablo.kolon ve besleme hattı 4*4 mm2 nyy (ts iec 60502-1)	m
26	727.528	Column and feed line with 1kV underground cable with 4*2.5 mm2 nyy (ts iec 60502-1) // 1kv yeraltı kablo.kolon ve besleme hattı 4*2.5 mm2 nyy (ts iec 60502-1)	m
27	734.201	Normal sorti with security line // Güvenlik hatlı normal sorti	pcs
28	734.202	Comutator sorti with security line // Güvenlik hatlı komütatör sorti	pcs
29	734.204	Güvenlik hatlı paralel sorti / Parallel sorti with security line	pcs
30	734.300	Darbe akım anahtar kumandalı sorti/ Pulse current switch control sortie	pcs
31	734.401	1 contact 1 na, 16a. remote control pulse current switch and mounting // 1 kontaklı 1 na, 16a. uzaktan kumanda darbe akım anahtarı ve montajı	pcs
32	735.102	Plug sortie with security line // Güvenlik hatlı priz sortisi	pcs
33	736.501	Normal Waterproof Lighting sortie,Line and Sortie with unleaded antigron material // Linye-sorti hattı kurş.suz antigron malz.etanş aydınlatma sortisi, normal	pcs
34	736.502	Comutator Waterproof Lighting sortie,Line and Sortie with unleaded antigron material // Linye-sorti hattı kurş.suz antigron malz.etanş aydınlatma sortisi, komütatör	pcs
35	736.503	Vavien Waterproof Lighting sortie,Line and Sortie with unleaded antigron material // Linye-sorti hattı kurş.suz antigron malz.etanş aydınlatma sortisi, vavien	pcs
36	736.504	Parallel Waterproof Lighting sortie,Line and Sortie with unleaded antigron material // Linye-sorti hattı kurş.suz antigron malz.etanş aydınlatma sortisi, paralel	pcs
37	740.105	Waterproof plug sortie with unleaded antigron material // Kurşunsuz antigron malzemeye etanş priz sortisi	pcs
38	741.101	3-phase cast iron plug socket and mounting 3 * 25 a. // Dökme demirden 3 fazlı fiş priz ve montajı 3*25 a.	pcs
39	742.1351	The light flux is at least 1800 lm, the consumption value is at most 20W (having a protection rating of at least IP 40). LED Glop Armature-Luminaire // Işık akısı en az 1800 lm, tüketim değeri en fazla 20W olan (en az IP 40 koruma derecesine sahip olan). LED Glop Armatür	pcs

No	Pose/Item No	Pose/Item Definition (in English) // Poz tanımı (in Turkish)	Unit
40	794.301	Normal sorti (line and sorti lines lead free antigron (nhxmh) material.) // Normal sorti (linye ve sorti hatları kurşunsuz antigron (nhxmh) malzemeyle.)	pcs
41	794.302	Comutator sorti (line and sorti lines lead free antigron (nhxmh) material.) // Komutator sorti (linye ve sorti hatları kurşunsuz antigron (nhxmh) malzemeyle)	pcs
42	794.304	Parallel sorti (line and sorti lines lead free antigron (nhxmh) material.) // Paralel sorti (linye ve sorti hatları kurşunsuz antigron (nhxmh) malzemeyle)	pcs
43	796.103	Normal plug sorti (line and sorti lines lead free antigron (nhxmh) material.) // Linye ve sorti hatları kurşunsuz antigron (nhxmh) nevinden malzeme ile normal priz sortisi	pcs
44	791.311	3x2.5 mm2 lead-free pvc insulation. cable.feeder line (nhxmh) // 3x2.5 mm2 kurşunsuz pvc izol.kablo.besleme hattı (nhxmh)	m
45	791.312	3x1.5 mm2 lead-free pvc insulation.cable.feeder line (nhxmh) // 3x1.5 mm2 kurşunsuz pvc izol.kablo.besleme hattı (nhxmh)	m
46	791.614	2x1.5rea fire -resistant n2xhfe 180 0.6 1kv cable // 2x1.5re aleve dayanıklı n2xhfe 180 0.6/1kv kablo	m
47	818.205	Outdoor main line installation 0.5 mm. 30 pairs. // Bina harici ana hat tesisatı 0.5 mm. 30 çift.	m
48	819.201	Fireproof plastic phone distribution box 20 pairs // Yanmaz plastik telefon dağıtım kutusu 20 çift	pcs
49	819.203	Fireproof plastic phone distribution box 50 pairs // Yanmaz plastik telefon dağıtım kutusu 50 çift	pcs
50	833.301	1 loop, 12 zone addressable fire alarm control panel, 127 addressable, 12 fire zone indicators // 1 çevrimli, 12 bölgesi adresli yangın alarm santralı 127 adres kapasiteli, 12 yangın bölgesi göstergeli	pcs
51	833.555	Addressable resettable fire alarm button // Adresli sıfırlanabilir yangın ihbar butonu	pcs
52	833.500	Addressable optical smoke detector // Adresli optik duman dedektörü	pcs
53	833.520	Addressable temperature detector // Adresli sıcaklık dedektörü	pcs
54	833.530	Addressable combined optical smoke and temperature detectors // Adresli kombine optik duman ve sıcaklık dedektörü	pcs
55	833.592	Electronic fire alarm with internal type flasher siren // Dahili tip flaşörlü elektronik yangın ihbar sireni	pcs
56	833.594	Electronic fire alarm with external type flasher siren // Harici tip flaşörlü elektronik yangın ihbar sireni	pcs
57	833.734	3-hour double-sided, intermittent emergency lighting fixture (Led) // 3 saat süreli çift yüzlü, kesintide yanan acil durum yönlendirme armatürü (Ledli)	pcs
58	880.563	Utp cat6 cable // Utp cat6 kablo	m
59	880.573	Utp cat6 surface mounted single plug // Utp cat6 siva üstü tekli priz	pcs
60	880.575	Utp cat6 flush mounted single plug // Utp cat6 siva altı tekli priz	pcs
61	880.584	24 port utp cat6 patch panel // 24 portlu utp cat6 patch panel	pcs

No	Pose/Item No	Pose/Item Definition (in English) // Poz tanımı (in Turkish)	Unit
62	890.536	Electronic type fully automatic telephone central 4/16 // Elektronik tip tam otomatik tel.santralı 4/16	pcs
63	880.4002	2x2x0,8 + 0,8 mm ² , JE-H (St) H FE180 PH120 fire resistant halogen free fire alarm cable (VDE 0815) // 2x2x0,8+0,8 mm ² Je-H(St)H Fe180 Ph120 Yangına dayanıklı halojensiz yangın alarm kabloları (VDE 0815)	m
64	742.1102	Under plaster (Flush Mounted), min. 30 x 30 in size LED ceiling luminaire (Tip LD1A 26W) // Sıva altı, min. 30x30 ebatlarında LED li tavan armatürü (Tip LD1A 26W)	pcs
65	742.1108	Under plaster (Flush Mounted), min. 30 x120 in size LED ceiling luminaire (Tip LD1 52W) // Sıva altı, min. 30x120 ebatlarında LED li tavan armatürü (Tip LD1 52W)	pcs
66	742.1106	Under plaster (flush mounted), min. 60x60 in size LED ceiling luminaire(Tip LD2 36W) // Sıva altı, min. 60x60 ebatlarında LED li tavan armatürü (Tip LD2 36W)	pcs
67	742.1151	Flush Mounted, downlight fitting with LED (Tip LD3 20W) // Sıva altı, LED'li dairesel (downlight) armatür (Tip LD3 20W)	pcs
68	742.1600	Sensored led lighting fixture price difference (Tip LD3 20W) // Sensörlü led aydınlatma armatürü fiyat farkı (Tip LD3 20W)	pcs
69	742.1550	Emergency lighting kit price difference for led lighting fixtures // Led aydınlatma armatürleri için acil durum aydınlatma kiti fiyat farkı	pcs
70	742.1152	(Luminous flux of at least 1700 lmUnder-plaster (flush mounted), downlight luminaires with LED, consumption value up to 24 W) // Sıva altı, LED'li dairesel (downlight) armatür (Tip LD4 60W)	pcs
71	742.1253	Luminous flux of at least 3,600 lm, Consumption value of maximum 40 W, LED Surface Mounted Luminaires (Polycarbonate body) // Işık akısı en az 3600 lm, tüketim değeri en fazla 40 W. LED Sıva Üstü Etanj Armatür (Polikarbon gövdeli) (Tip LD5 52W)	pcs
72	742.1252	Luminous flux of at least 2,700 lm, consumption value of maximum 30 W, LED Surface Mounted Waterproofing Fixture (Polycarbon body) // Işık akısı en az 2700 lm, tüketim değeri en fazla 30 W. LED Sıva Üstü Etanj Armatür (Polikarbon gövdeli) (Tip LD5A 26W)	pcs
73	742.1107	Surface mounted, min. 30x120 ceiling luminaires with LED (with a luminous flux of at least 3300 lm and a consumption value of at most 36 W) // Sıva üstü, min. 30x120 ebatlarında LED li tavan armatürü (Tip LD6 52W)	pcs
74	742.1202	LED Ceiling Armatures with a luminous flux of at least 15,000 lm and a consumption value of at most 160 W // Işık akısı en az 15000 lm, tüketim değeri en fazla 160 W olan LED Yüksek Tavan Armatürü (Tip LD7 - 128W)	pcs
75	833.712	3-hour emergency lighting fixture (Led, capable of providing at least 130 lm light flux for 3 hours) // Kesintide yanan, sıva üstü tip, 3 saat süreli acil durum aydınlatma armatürü (Ledli, 3 saat süre boyunca en az 130 lm ışık akısı verebilecek) (Tip LD8 - 14W ACİL AYD)	pcs
76	742.1401	LED Indirect Lighting Fixture with a luminous flux of at least 2,000 lm and a consumption value of at most 30 W // Işık akısı en az 2000 lm, tüketim değeri en fazla 30W olan. LED Endirek Aydınlatma Armatürü (Tip AP 15W APLİK)	pcs

No	Pose/Item No	Pose/Item Definition (in English) // Poz tanımı (in Turkish)	Unit
77	782.702	Grounded UPS sockets (red colored) 16 A to 250 V, (45 x 45 mm), Cable Duct Sockets // Topraklı ups prizi (kırmızı renkli) 16 a.- 250 v. (45 x 45 mm)	pcs
78	791.431/3	5 x 10 mm ² , 1 kV underground cables and column and feeder line installation (N2XH, 0.6 / 1 kV) // 5x10 mm ² 1KV yer altı kabloları ile kolon ve besleme hattı tesisi (N2XH)	m
79	791.431/2	5x6 mm ² , 1 kV underground cables and column and feeder line installation (N2XH, 0.6 / 1 kV) // 5x6 mm ² 1KV yer altı kabloları ile kolon ve besleme hattı tesisi (N2XH)	m

Item/Pose Definitions for OTHER ELECTRICAL WORKS

No	Pose/Item No	Pose/Item Definition (in English) // Poz tanımı (in Turkish)	Unit
1	Special/Ele/06	<p>INSTALLATION OF 630 KVA TRANSFORMER AND MODULAR CUBICLE</p> <p>The Construction of 1 (one) Set 630 KVA Transformer and Modular Cubicle as made operable, including the provision on worksite, with all kinds of transportation, loading, unloading, base, losses and insurance costs included, of the work, which involves the installation of one 33/0.4-0.231 kV 630 KVA hermetic-type oil-cooled, indoor transformer with A0-Ak grade energy efficiency and one output cubicle with breaker (36 kV 630 A 16 kA, with SF6 gas and motor-powered) and one 36 kV 630 A 16 kA current and voltage metering cubicle and one 36 kV 630 A 16 kA input-output cubicle with load disconnecter and Fault Indicator Assembly (AGD) for high voltage and buried cables which complies with the current TEDAŞ MYD technical specifications and 4 (1x95/16) mm² XLPE and 3x120+70 mm² NYY cable and cable termination, and the supply and installation of 3 m² insulated carpet, 1 insulated stand, 1 pair of insulated gloves and 1 three-phase active-reactive time scheduled electronic electricity meter, one 24 V maintenance-free rectifier group and danger of death warning signs, and which is manufactured or supplied in compliance with the relevant specifications from TEDAŞ and with the relevant items in the Unit Rate Descriptions for Electrical Projects and Installations Book from TEDAŞ according to the high voltage (HV) - low voltage (LV) single-line diagram and standard plans, and the installation of the foregoing at the place indicated in the relevant design by using small installation materials of any kind, and the contractor's profit, and overhead.</p> <p>Measurement: It's for the set of the 630 KVA Transformer and Modular Cubicle Installation, which is actually installed and made operable.</p> <p>//</p> <p>630 KVA TRAFO VE MODÜLER HÜCRE TESİSİ</p> <p>YG-AG tek hat şemasına ve tip planlarına göre; TEDAŞ'ın ilgili şartnamelerine ve "TEDAŞ Elektrik Proje ve Tesis Birim Fiyat Kitabı"ndaki ilgili pozlara uygun olarak imal veya temin edilen; 1 adet 33/0,4-0,231 kV 630 KVA hermetik tip, yağ soğutmalı, A0-Ak sınıfı enerji verimliliğine haiz bina tipi trafonun; 1 adet kesicili çıkış (36 kV 630 A 16 kA, SF6 gazlı ve motorlu) hücresinin; 1 adet 36 kV 630 A 16 kA akım ve gerilim ölçü hücresinin; 1 adet 36 kV 630 A 16 kA yük ayırıcılı giriş-çıkış hücresinin; güncel TEDAŞ MYD teknik şartnamesine uygun yüksek gerilim yer altı kabloları için Arıza Gösterge Düzenekinin (AGD) kurulması; 4 (1x95/16) mm² XLPE ve 3x120+70 mm² NYY kablunun ve kablo başlığının montajı; 3 m² izole halı, 1 adet izole sehpa, 1 çift izole eldiven ve 1 adet üç fazlı aktif-reaktif zaman tarifeli elektronik elektrik sayacının, 1 adet 24 Volt</p>	lump-sum

No	Pose/Item No	Pose/Item Definition (in English) // Poz tanımı (in Turkish)	Unit
		<p>bakımsız akü redresör grubunun, ölüm tehlike levhalarının temin ve tesis edilmesi işinin; Her tür taşıma, yükleme boşaltma, kaide, zayıat ve sigorta giderleri dâhil iş başında temini, her tür ufak montaj malzemesi kullanılarak projesindeki yere monte edilmesi, yüklenici karı ve genel giderler dâhil işler hale getirilen;</p> <p>1 (bir) Takım 630 KVA Trafo ve Modüler Hücre Tesisi Yapılması.</p> <p>Ölçü: Fiilen yerine monte edilerek işler hale getirilen 630 KVA Trafo ve Modüler Hücre Tesisi Yapılmasının takımı içindir.</p>	
2	Special/Ele/07	<p>INSTALLATION OF 625 KVA (PRIME) DIESEL GENERATOR</p> <p>The diesel engine, alternator and set of the Generator manufactured and supplied in compliance with the relevant items included in the Unit Rate Descriptions Book from the Ministry of Environment and Urban Planning and with the General Technical Specifications for Electrical Works from Iller Bank according to the relevant design shall individually have CE certificate. The Construction of 1 (one) Set 625 KVA (Prime) Diesel Generator Installation as made operable, including the provision on worksite, with all kinds of transportation, loading, unloading, the construction of base, the construction of ventilation (hood), losses and insurance costs included, of one 325 kVA (prime) Indoor-type Diesel Generator Set with Automatic Activation Assembly, and the installation of the foregoing at the place indicated in the relevant design by using small installation materials of any kind, and the contractor's profit, and overhead.</p> <p>Measurement: It's for the set of the Construction of the 625 KVA (Prime) Diesel Generator Installation, which is actually installed and made operable.</p> <p>NOTE 1: The generator shall be selected as 625 kVA although it is indicated as 550 kVA in the relevant design. No additional amount shall be paid to the Contractor for this.</p> <p>NOTE 2: The fuel tank (no. 1) of the generator shall be delivered as filled by 1/2. No additional amount shall be paid to the Contractor for this.</p> <p>NOTE 3: Spare Tools of Generator shall be delivered according to the relevant design.</p> <p>//</p> <p>625 KVA (PRIME) DİZEL JENERATÖR TESİSİ</p> <p>Projesine göre; "Çevre ve Şehircilik Bakanlığı Birim Fiyat Kitabı"ndaki ilgili pozlara ve İller Bankası Elektrik İşleri Genel Teknik Şartnamesine uygun olarak imal ve temin edilen Jeneratörün dizel motoru, alternatörü ve grubu ayrı ayrı CE belgesine sahip olacaktır. Otomatik devreye girme tertibatlı, 1 adet 625 kVA (prime) Dâhili Tip Dizel-Elektrojen Grubunun; Her tür taşıma, yükleme boşaltma, kaide yapılması, havalandırma (davlumbaz) yapılması, zayıat ve sigorta giderleri dâhil iş başında temini, her tür ufak montaj malzemesi kullanılarak projesindeki yere monte edilmesi, yüklenici karı ve genel giderler dâhil işler hale getirilen;</p> <p>1 (bir) Takım 625 KVA (Prime) Dizel Jeneratör Tesisi Yapılması.</p> <p>Ölçü: Fiilen yerine monte edilerek işler hale getirilen 625 KVA (Prime) Dizel Jeneratör Tesisi Yapılmasının takımı içindir.</p> <p>NOT-1: Projesinde 550 kVA olarak gösterilen jeneratör 625 kVA olarak seçilecektir. Bunun için yükleniciye ek bir ücret ödenmeyecektir.</p> <p>NOT-2: Jeneratörün (1 adet) yakıt tankı 1/2 oranında dolu olarak teslim edilecektir. Bunun için yükleniciye ek bir ücret ödenmeyecektir.</p>	lump-sum

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		NOT-3: Şartnamesine göre Jeneratör Yedek Avadanlık malzemeleri teslim edilecektir.	
3	Special/Ele/08	<p>MCC SWITCHBOARDS</p> <p>The Construction of 1 (one) Set MCC-1, MCC-2, MCC-3 Switchboards as made operable, including the manufacturing or supply of MCC-1, MCC-2, MCC-3 switchboards, which are manufactured or supplied in modular structure in compliance with the electrical and structural characteristics set out in the Specifications from the Ministry of Environment and Urban Planning and in the Technical Specifications for LV Distribution Boards with Metal Enclosure from TEDAŞ according to the switchboard designs (Copper busbars, thermal-magnetic switches, Automatic fuses, LV surge arresters, Energy analysers, switches, motor protection relays, time relays, blade fuses, current transformers, metering instruments, electricity meters, switchboard LED lights, frequency converters, soft starters, water leak relays for pumps operating in the water, control relays, contactors, etc.) (will be delivered as installed and in working condition), according to IP44 protection class together with all switch materials, ventilation aspirators, dehumidifying heater and cover seals, and the installation of the same, and the calibration and testing of the same, and the provision of the same on worksite, with all kinds of transportation, loading, unloading, base, losses and insurance costs included, and the installation of the same at the places indicated in the relevant design by using small installation materials of any kind, and the contractor's profit, and overhead.</p> <p>Measurement: It's for the set of the Construction of MCC-1, MCC-2, MCC-3 Switchboards, which is actually installed and made operable.</p> <p>NOTE 1: The power of the mechanical equipment (especially the power of the pump) shall be checked before MCC switchboards work. In case of any change, the works shall be performed, accordingly.</p> <p>NOTE 2: Switchboards shall be installed at the places indicated in the relevant design. All cable connections shall be established and made operable.</p> <p>NOTE 3: All switchboards shall be manufactured by using 2 mm steel sheet in compliance with the specifications.</p> <p>NOTE 4: PLC and MCC switchboards shall be manufactured separately.</p> <p>//</p> <p>MCC PANOLARI</p> <p>Pano projelerine (Bakır Baralar, TMS'ler, otomatik sigortalar, AG parafudrlar, enerji analizörleri, şalterler, motor koruma röleleri, zaman röleleri, bıçaklı sigortalar, akım trafoları, ölçü aletleri, elektrik sayacı, pano LED aydınlatma lambaları, frekans konvertörleri, soft starterler, su altında çalışan pompalar için su kaçak röleleri, kumanda röleleri, kontaktörler vb.) (montajları yapılmış çalışır vaziyette teslim edilecek) ve Çevre ve Şehircilik Bakanlığı Şartnameleri ile TEDAŞ'ın Metal Mahfazalı AG Dağıtım Panoları Teknik Şartnamesinde belirtilen elektriksel ve yapısal özelliklere uygun olarak Modüler yapıda imal veya temin edilen; MCC-1, MCC-2, MCC-3 panolarının tüm şalt malzemeleri, havalandırma aspiratörleri, nem giderme ısıtıcısı, kapak contaları ile IP44 koruma sınıfına göre imal veya temin edilmesi, yerine montajı, kalibrasyon ve testleri; Her tür taşıma, yükleme boşaltma, kaide, zayıat ve sigorta giderleri dâhil iş başında temini, her tür ufak montaj malzemesi kullanılarak projesindeki yerlere monte edilmesi, yüklenici karı ve genel giderler dâhil işler hale getirilen;</p>	Lump-sum

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		<p>1 (bir) Takım MCC-1, MCC-2, MCC-3 Panoları Yapılmasıdır.</p> <p>Ölçü: Fiilen yerine monte edilerek işler hale getirilen MCC-1, MCC-2, MCC-3 Panoları Yapılmasının takımı içindir.</p> <p>NOT-1: MCC panoları imalatı yapılmadan önce mekanik ekipmanların (özellikle pompaların gücü) güçleri kontrol edilecektir. Herhangi bir değişiklik olması durumunda imalatlar buna göre yapılacaktır.</p> <p>NOT-2: Panoların projesinde gösterilen yerlere montajları yapılacaktır. Her türlü kablo bağlantıları yapılarak çalışır hale getirilecektir.</p> <p>NOT-3: Tüm panolar şartnameye uygun olarak 2 mm sacdan imal edilecektir.</p> <p>NOT-4: PLC ve MCC Panoları ayrı ayrı imal edilecektir.</p>	
4	Special/Ele/09	<p>PLC SWITCHBOARDS, SCADA AND AUTOMATION SYSTEM</p> <p>The Construction and Establishment of 1 (one) Set PLC Switchboards and SCADA Automation System as made operable, the provision on worksite, with all kinds of transportation, loading, unloading, base, losses and insurance costs included, of the work, which involves the installation and calibration and tests of PRIMARY PLC (1 set), PLC-1 (1 set), PLC-2 (1 set), PLC-3 (1 set) switchboards (being manufactured or supplied according to IP44 protection class together with all switch materials, 10" touch panels for operators, ventilation aspirators, dehumidifying heater, cover seals), and the transfer of the same to SCADA via fibre-optic cables, and the supply of PLC and SCADA software, hardware and licences, SCADA Computer (including original program CD's) (no. 2), 46" LED TV (no. 1), Printers (no. 2), 15 kVA-20 minute period (with 380/220 V bypass function, online) UPS (no. 1), 2 kVA-10 minute period online UPS (no. 3), the hardware parts of Power-Central Processing-Communication Modules, etc., and the necessary computer table and chair, etc. for the SCADA room, and which is manufactured or supplied in compliance with the Scada Architecture, PLC Switchboard Designs, the General Technical Specifications for Electrical Works from Iller Bank and with the electrical and structural characteristics set out in the Specifications from the Ministry of Environment and Urban Planning and in the Technical Specifications for LV Distribution Boards with Metal Enclosure from TEDAŞ, and the installation of the foregoing at the places indicated in the relevant design by using small installation materials of any kind, and the contractor's profit, and overhead.</p> <p>Measurement: It's for the set of the construction and establishment of the PLC Switchboards and SCADA Automation System, which is actually installed and made operable.</p> <p>NOTE 1: PLC-1, PLC-2, PLC-3 switchboards (2 kVA-10 minute period online) and SCADA Automation System (15 kVA-20 minute period (with 380/220 V bypass function, online) shall be supplied from UPS.</p> <p>NOTE 2: All the energy analysers in the installation shall be connected to the automation system via PLC's and current, active and reactive power consumption values shall be monitored from SCADA. When reactive rates are above a certain rate, a warning shall be generated from SCADA.</p> <p>NOTE 3: All the materials described should have such certificates as are issued by TSE, IEC or equivalent bodies while the manufacturers should have ISO series certificates.</p>	lump-sum

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		<p>NOTE 4: All switchboards shall be manufactured by using 2 mm steel sheet in compliance with the specifications.</p> <p>NOTE 5: One of the printers shall be a laser printer with A3, colour, Fax and scan features and the other printer shall be an A4 black/white laser printer.</p> <p>//</p> <p>PLC PANOLARI, SCADA VE OTOMASYON SİSTEMİ</p> <p>Scada Mimarisine, PLC Pano Projelerine, İller Bankası Elektrik İşleri Genel Teknik Şartnamesi'ne, Çevre ve Şehircilik Bakanlığı Şartnameleri ile TEDAŞ'ın Metal Mahfazalı AG Dağıtım Panoları Teknik Şartnamesinde belirtilen elektriksel ve yapısal özelliklere uygun olarak imal veya temin edilen; ANA PLC (1 takım), PLC-1 (1 takım), PLC-2 (1 takım), PLC-3 (1 takım) panolarının (tüm şalt malzemeleri, 10 inç Dokunmatik Operatör Panelleri, havalandırma aspiratörleri, nem giderme ısıtıcısı, kapak contaları ile IP44 koruma sınıfına göre imal veya temin edilmiş şekilde) yerine montajı, kalibrasyon ve testleri, fiber optik kablolar ile SCADA'ya aktarılması, PLC ve SCADA yazılımı, donanımı ve lisanslarının, SCADA Bilgisayarı (orijinal program CD'leri dâhil) (2 adet), 46" LED TV (1 adet), Yazıcı (2 adet), 15 kVA-20 dakika süreli (380/220 V bypass fonksiyonlu online) UPS (1 adet), 2 kVA-10 dakika süreli online UPS (3 adet), Güç-Merkezi İşlem-Haberleşme Modülleri vs. donanım parçalarının, SCADA odası için gerekli bilgisayar masası sandalye vs. temini işinin; Her tür taşıma, yükleme boşaltma, kaide, zayıt ve sigorta giderleri dâhil iş başında temini, her tür ufak montaj malzemesi kullanılarak projesindeki yerlere monte edilmesi, yüklenici karı ve genel giderler dâhil işler hale getirilen;</p> <p>1 (bir) Takım PLC Panoları ve SCADA Otomasyon Sistemi Yapılmasıdır.</p> <p>Ölçü: Fiilen yerine monte edilerek işler hale getirilen PLC Panoları ve SCADA Otomasyon Sistemi yapılması işinin takımı içindir.</p> <p>NOT-1: PLC-1, PLC-2, PLC-3 panoları (2 kVA-10 dakika süreli online) ve SCADA Otomasyon Sistemi (15 kVA-20 dakika süreli (380/220 V bypass fonksiyonlu online) UPS cihazları üzerinden beslenecektir.</p> <p>NOT-2: Tesiste Tüm Enerji analizörleri PLC'lerle otomasyon sistemine bağlanacak, SCADA'dan akım, gerilim, aktif ve reaktif güç tüketim değerleri takip edilecektir. SCADA'dan reaktif oranları belli bir değeri geçtiğinde uyarı verdirilecektir.</p> <p>NOT-3: Tanımları verilen tüm malzemeler, TSE, IEC veya dengi kuruluşlardan alınan belgelere, imalatçılar ise ISO serisi belgelere sahip olmalıdır.</p> <p>NOT-4: Tüm panolar şartnameye uygun olarak 2 mm sacdan imal edilecektir.</p> <p>NOT-5: Yazıcılardan biri A3, renkli, Fax ve tarama özellikli lazer yazıcı olacak diğer yazıcı ise A4 siyah beyaz lazer yazıcı olacak.</p>	
5	Special/Ele/10	<p>LIGHTNING CONDUCTOR INSTALLATION</p> <p>The Construction of 1 (one) Set Lightning Conductor Installation as made operable, including the provision on worksite, with all kinds of transportation, loading, unloading, losses and insurance costs included, of the installation of 1 lightning conductor with active lightning rod having minimum $\Delta L=60$ m excitation distance, and one 16 m long galvanised steel polygon pole, and $2 \times 50 \text{ mm}^2$ electrolytic copper roof envrioning and down conductor, and conductor casing pipe, and 175 m long electrolytic copper earth electrodes having $\varnothing 20$ diameter (in sufficient number to</p>	lump-sum

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		<p>provide the required earthing rate) in compliance with the technical rates indicated in the lightning conductor installation design and the relevant specifications and with the items included in the Unit Rate Descriptions Book from the Ministry of Environment and Urban Planning, and the installation of the foregoing at the places indicated in the relevant design by using small installation materials of any kind in compliance with the general technical specifications for power, and the contractor's profit, and overhead.</p> <p>Measurement: It's for the set of the Construction of Lightning Conductor Installation of which mounting is completed.</p> <p>//</p> <p>PARATONER TESİSATI</p> <p>Paratoner tesisatı Projesinde ve teknik şartnamesinde belirtilen teknik değerlerde ve "Çevre ve Şehircilik Bakanlığı Birim Fiyat Kitabı"ndaki pozlara uygun olarak; en az $\Delta L=60$ mt. uyarım mesafesine sahip aktif tip yakalama uçlu 1 adet paratonerin, 1 adet 16 mt uzunluğunda galvanizli çelik poligon direğin, $2 \times 50 \text{ mm}^2$ elektrolitik bakır çatı ihata ve indirme iletkeninin, iletken koruyucu borusunun, 1,75 mt boyunda $\varnothing 20$ çapında elektrolitik bakır topraklama elektrotlarının (topraklamada istenen değeri sağlayacak yeter sayıda) montajı işinin; Her tür taşıma, yükleme boşaltma, zayıat ve sigorta giderleri dâhil iş başında temini, her tür ufak montaj malzemesi kullanılarak projesindeki yerlere elektrik genel teknik şartnamesine göre monte edilmesinin, yüklenici karı ve genel giderler dâhil işler hale getirilen;</p> <p>1 (bir) Takım Paratoner Tesisatı Yapılmasıdır.</p> <p>Ölçü: Montajı tamamlanmış Paratoner Tesisatı Yapılmasının takımı içindir.</p>	
6	Special/Ele/11	<p>INSTRUMENTATION</p> <p>The Construction of 1 (one) set Instrumentation Installation as made operable, including the provision on worksite, with all kinds of transportation, loading, unloading, losses and insurance costs included, of work, which involves the installation of pH metering set (no. 2), ORP metering set (no. 4), O2 metering set (no. 4), NH4 metering set (no. 2), Ultrasonic Level Transmitter (no. 2), Pear Shaped Float Switch, Automatic Composite Sampler (fixed type) (no. 2), Electromagnetic flowmeter set (no. 3) and Channel-type Ultrasonic Flowmeter Set (no. 2) at the places indicated in the relevant design, and making the same operable, and the calibration of the same, and the installation of the foregoing at the places indicated in the relevant design by using small installation materials of any kind in compliance with the general technical specifications for power, and the contractor's profit, and overhead;</p> <p><u>pH Metering Set</u></p> <p>2 (two) sets of pH Metering Set which have the characteristics laid down in the instrumentation report, with the necessary sensor, transmitter, switchboard and site type indicators for pH metering in the aeration tanks, and all kinds of installation cable connections, labour, transportation, all kinds of materials included and with delivery in working condition included.</p> <p><u>ORP Meter</u></p>	lump-sum

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		<p>4 (Four) sets of ORP Device which have the characteristics laid down in the instrumentation report, with the necessary sensor, transmitter, switchboard and site type indicators for ORP metering in the aeration tanks, and all kinds of installation cable connections, labour, transportation, all kinds of materials included and with delivery in working condition included.</p> <p><u>Oxygen Metering Set</u></p> <p>4 (Four) sets of Oxygen Metering Set which have the characteristics laid down in the instrumentation report, with the necessary sensor, (CO2) carbon to oxygen ratio indicator, transmitter, switchboard and site type indicators for metering the oxygen gas formed at the pump stations and lower and upper alarm contact and one lower and upper level adjusted controller, and all kinds of installation cable connections, labour, transportation, all kinds of materials included and with delivery in working condition included.</p> <p><u>NH₄ Meter</u></p> <p>2 (Two) sets of NH₄ Metering Set which have the characteristics laid down in the instrumentation report, with the necessary sensor, transmitter, switchboard and site type indicators for NH₄ metering in the aeration tanks and lower and upper alarm contact and one lower and upper level adjusted controller, and all kinds of installation cable connections, labour, transportation, all kinds of materials included and with delivery in working condition included.</p> <p><u>Ultrasonic Level Transmittir</u></p> <p>The supply of 2 (Two) sets of Ultrasonic Level Transmitter, with the supply of the instrument fitted with element, transmitter, indicator and the necessary adjustable level contacts which can meter the water level in an ultrasonic manner, and all kinds of installation cable connections, labour, transportation, all kinds of materials included and with delivery in working condition included.</p> <p><u>Pear Shaped float Switch</u></p> <p>Pear Shaped Float Switch in the number in compliance with the relevant design which is as indicated in the relevant design and has the characteristics given in the instrumentation report and data sheets, with the supply of 6-m cable and pear shaped level switch with contact having IP 65 protection class, and all kinds of installation cable connections, labour, transportation, all kinds of materials included and with delivery in working condition included.</p> <p><u>Automatic Composite Sampler</u></p> <p>2 (two) Sets of Automatic Sampler which has the technical characteristics given in the instrumentation report and data sheets, with the supply of 2 (two) (for inlet and outlet) Automatic Samplers, and all kinds of installation cable connections, labour, transportation, all kinds of materials included and with delivery in working condition included.</p> <p><u>Electromagnetic Type Flowmeter Set</u></p> <p>3 (three) Sets of Electromagnetic Type Flowmeter Set which has magnetic flowmeter and 4-20mA signal output and is supplied by 220 VAc and resistant to outdoor conditions and has IP67 protection class and is fitted with transmitter, with, together with the necessary original apparatus for installation and probe with minimum 13-m cable, and all kinds of installation cables for the operation of the complete device, and labour,</p>	

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		<p>transportation, and the contractor's profit included and with delivery in working condition included.</p> <p>NOTE 1: All the data obtained from the instruments shall be transmitted to the PLC-SCADA automation system.</p> <p>NOTE 2: All the instruments shall be selected in compliance with the General Technical Specifications from Iller Bank.</p> <p>Measurement: It's for the set of the Construction of the complete Instrumentation Installation which includes calibration, user manuals, spare parts and maintenance warranties and in the scope of which the instruments having the characteristics specified are supplied and all kinds of transportation and installation are completed, and which is made operable.</p> <p>//</p> <p>ENSTRÜMANTASYON</p> <p>Projesinde gösterildiği yerlere; pH Ölçüm seti (2 adet), ORP Ölçüm Seti (4 adet), O2 Ölçüm Seti (4 adet), NH4 Ölçüm Seti (2 adet), Ultrasonik Seviye Transmitteri (2 adet), Armut Tip Şamandıralı Şalter, Otomatik Kompozit Numune Alma Cihazı (Sabit tip) (2 adet), Elektromanyetik Debi Ölçüm Seti (3 adet), Kanal Tipi Ultrasonik Debi Ölçüm Seti (2 adet) montajının yapılarak çalışır hale getirilmesi, kalibrasyonlarının yapılması işinin; Her tür taşıma, yükleme boşaltma, zayıat ve sigorta giderleri dâhil iş başında temini, her tür ufak montaj malzemesi kullanılarak projesindeki yerlere elektrik genel teknik şartnamesine göre monte edilmesinin, yüklenici karı ve genel giderler dâhil işler hale getirilen;</p> <p><u>PH Ölçüm Seti</u></p> <p>Enstrüman raporunda verilen özelliklerde, havalandırma havuzlarındaki pH nin ölçülmesi için gerekli sensörü transmitter, pano ve mahal tipi göstergeleri ile her türlü montaj kablo bağlantıları, işçilik, nakliye,her nevi malzemesi dâhil çalışır vaziyette teslimi dâhil;</p> <p>2 (iki) takım Ph Ölçüm Setidir.</p> <p><u>ORP Ölçer</u></p> <p>Enstrüman raporunda verilen özelliklerde, havalandırma havuzlarındaki ORP nin ölçülmesi için gerekli sensörü transmitter, pano ve mahal tipi göstergeleri ile her türlü montaj kablo bağlantıları, işçilik, nakliye,her nevi malzemesi dâhil çalışır vaziyette teslim edilen;</p> <p>4 (dört) takım ORP Cihazıdır.</p> <p><u>Oksijen Ölçüm Seti</u></p> <p>Enstrüman raporunda verilen özelliklerde, terfi merkezlerin de oluşan oksijen gazının ölçülmesi için gerekli sensörü, (CO2) karbon oksijen oranı göstergesi, transmitter, pano ve mahal tipi göstergeleri, alt ve üst alarm kontaklı ve 1 Adet alt ve üst seviye ayarlı kontrolör cihazı ile her türlü montaj kablo bağlantıları, işçilik, nakliye, her nevi malzemesi dâhil çalışır vaziyette teslimi dâhil;</p> <p>4 (dört) takım Oksijen Ölçüm Setinin teminidir.</p> <p><u>NH₄ Ölçer</u></p> <p>Enstrüman raporunda verilen özelliklerde, havalandırma havuzlarındaki NH₄'ün ölçülmesi için gerekli sensörü transmitter, pano ve mahal tipi göstergeleri, alt ve üst alarm kontaklı ve 1 Adet alt ve üst seviye ayarlı kontrolör cihazı ile her türlü montaj kablo bağlantıları, işçilik, nakliye, her nevi malzemesi dâhil çalışır vaziyette teslimi dâhil;</p>	

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		<p>2 (iki) takım NH4 Ölçüm Setidir.</p> <p><u>Ultrasonik Seviye Transmitteri</u></p> <p>Suyun seviyesini ultrasonik olarak ölçebilen elementi, transmitteri, gösterge ve gerekli ayarlanabilir seviye kontakları bulunan enstrüman cihazının temini ile her türlü montaj kablo bağlantıları, işçilik, nakliye, her nevi malzemesi dâhil çalışır vaziyette teslimi dâhil;</p> <p>2 (iki) takım Ultrasonik Seviye Transmitterinin teminidir.</p> <p><u>Armut Tip Şamandıralı Salter</u></p> <p>Projesinde gösterildiği şekilde, Enstrüman raporunda ve bilgi föylerinde verilen özelliklerde 6mt kablosu IP 65 koruma sınıflı kontaklı armut tipi seviye anahtarının temini ile her türlü montaj kablo bağlantıları, işçilik, nakliye, her nevi malzemesi dâhil çalışır vaziyette teslimi dâhil;</p> <p>Projesine uygun sayıda Armut Tip Şamandıralı Seviye Anahtarıdır.</p> <p><u>Otomatik Kompozit Numune Alma Cihazı</u></p> <p>Enstrüman raporunda ve bilgi föylerinde verilen teknik özelliklere haiz (giriş ve çıkış için olmak üzere) 2 (iki) adet Otomatik Kompozit Numune alma Cihazının temini ile her türlü montaj kablo bağlantıları, işçilik, nakliye, her nevi malzemesi dâhil çalışır vaziyette teslimi dâhil;</p> <p>2 (iki) takım Otomatik Kompozit Numune Alma Cihazıdır.</p> <p><u>Elektromanyetik Tip Debi Ölçüm Seti</u></p> <p>Manyetik debi ölçer, 4-20mA sinyal çıkışlı 220 VAC beslemeli harici şartlara dayanıklı IP67 koruma sınıfında transmitterli montaj için gerekli orijinal aparatları ile birlikte 0-50 derece çalışma sıcaklığına sahip minimum 13m kablolu ultrasonik probu ile komple cihazın çalışması için her türlü montaj kablo bağlantıları, işçilik, nakliye yüklenici karı dâhil çalışır vaziyette teslimi dâhil;</p> <p>3 (üç) takım Elektromanyetik Tip Debi Ölçüm Setidir.</p> <p>NOT-1: Enstrümanlardan alınan tüm bilgiler PLC-SCADA otomasyon sistemine aktarılacaktır.</p> <p>NOT-2: Tüm enstrümanlar İller Bankası Genel Teknik Şartnamesine uygun olarak seçilecektir.</p> <p>1 (bir) Takım Enstrümantasyon tesisatının Yapılmasıdır.</p> <p>Ölçü: Kalibrasyonu, kullanım kılavuzları, yedek parçaları ile bakım garantileri dâhil, belirtilen özelliklerdeki enstrümanların temin edilerek her tür taşıma, montaj işlemleri tamamlanmış ve işler hale getirilmiş komple Enstrümantasyon Tesisatı Yapılmasının takımı içindir.</p>	
7	Special/Ele/12	<p>CCTV INSTALLATION</p> <p>The Construction of 1 (one) set CCTV Installation as made operable, including provision on worksite, with all kinds of auxiliary materials that might be required for the operation of the system, and transportation, loading, unloading, base, losses and insurance costs included, of the work, which involves the installation at the places indicated in the preliminary design of 4 MP (1080p) IP Infrared Security Camera (Outdoor Type), 64-channel Professional Video Recorder (H.264 Full HD (1080P)), Poe Switch and fibre termination, Outdoor type Site Cabinet (with double-walled 10 cm base), 48 TB 7/24 Security Hard Disk, 55" LED TV, NYY cable (between the recorder and site switch and between the site switch and cameras) camera and switch feeding cable, UTP Cat6 cable (Outdoor type, protected), Multi Mode Fibre-optic Cable (8 Core SM sheathed) and</p>	lump-sum

No	Pose/Item No	Pose/Item Definition (in English) // Poz tanımı (in Turkish)	Unit
		<p>galvanised steel pipe, and the installation of the foregoing at the place indicated in the relevant design by using small installation materials of any kind, and the contractor's profit, and overhead.</p> <p>Measurement: It's for the set of the Construction of CCTV Installation, which is actually installed and made operable/functional.</p> <p>NOTE 1: The Contractor shall prepare the constructional drawing of the closed circuit camera system and the work shall commence after the constructional drawing is made to be approved by the Employer.</p> <p>NOTE 2: During the manufacturing, cameras and outdoor type site cabinets shall be installed at such places as will be found appropriate by the Employer. The feeding cables and data cables of the cameras shall be drawn in compliance with the relevant standard. Data cables and feeding cables shall be laid through Corrugated Pipes depending on the cable density. No cable shall be laid in an exposed manner in any case whatsoever. The camera cables to be mounted on building wall shall be installed through galvanised steel pipes. The products of the internationally recognised quality brands shall be preferred in selecting materials. The Contractor shall if deemed appropriate by the Employer relocate the cameras (without demanding any payment in respect thereof) and reflect such relocation in the constructional drawing and carry out the installation, accordingly.</p> <p>//</p> <p>CCTV TESİSATI</p> <p>Avan projesinde gösterilen yerlere; 4 MP (1080p) IP Infrared Güvenlik Kamerasının (Harici Tip), 64 kanal profesyonel Video Kayıt Cihazının (H.264 Full HD (1080P)), Poe Switch ve fiber sonlandırmanın, Harici Tip Saha Dolabının (Çift Cidar 10 cm Bazalı), 48 TB 7/24 Güvenlik Hard diskinin, adet 55"LED TV'nin, NYY kablo(Kayıt cihazı-saha switchi arası ve saha switchi-kameralar arası) kamera ve switch besleme kablusunun, UTP Cat6 kablusunun (Harici tip korumalı), Multi Mod Fiber optik Kablusunun (8 Core SM zırlı), Galvaniz çelik Borunun tesis edilmesi işinin; sistemin çalışması için gerekli olabilecek Her tür yardımcı malzeme, taşıma, yükleme boşaltma, kaide, zayıt ve sigorta giderleri dâhil iş başında temini, her tür ufak montaj malzemesi kullanılarak projesindeki yere monte edilmesi, yüklenici karı ve genel giderler dâhil işler hale getirilen;</p> <p>1 (bir) Takım CCTV Tesisatı Yapılması.</p> <p>Ölçü: Fiilen yerine monte edilerek işler/çalışır hale getirilen CCTV Tesisatı Yapılmasının takımı içindir.</p> <p>NOT-1: Kapalı devre kamera sistemi uygulama projesi yüklenici tarafından bilabedel hazırlanarak idareye onaylatıldıktan sonra imalata başlanacaktır.</p> <p>NOT-2: İmalat aşamasında Kameralar ve harici tip saha dolaplarının idarenin uygun bulacağı yerlere montajı yapılacaktır. Kameraların besleme kabloları ve data kabloları standardına uygun olarak çekilecektir. Data kabloları ve besleme kabloları kablo yoğunluğuna göre Koruge Borular içerisinde taşınacaktır. Asla açıktan kablo geçmeyecektir. Bina duvarına montajı yapılacak olan kamera kabloları Galvaniz çelik Borular ile montajı yapılacaktır. Malzeme seçiminde uluslararası kabul görmüş kaliteli markaların ürünleri tercih edilecektir. Kameraların yerlerinin idare tarafından uygun görüldüğü takdirde (yüklenici herhangi bir bedel talep etmeksizin) değiştirecek değişikliği uygulama projesinde gösterecek ve montajlarını bu değişikliğe göre yapacaktır.</p>	

No	Pose/Item No	Pose/Item Definition (in English) // Poz tanımı (in Turkish)	Unit
8	Special/Ele/13	<p>GAS DETECTION AND SAFETY SYSTEM</p> <p>The Installation of 1 Set Gas Metering and Safety System (in Inlet and Return Pump Stations), as part of making operable, including the Gas Metering and Safety System which is foreseen to be used in the Inlet and Return (Excess Sludge) Pump Stations of the Wastewater Treatment Plant, as it is required by the Communiqué no. 29303 of 22/03/2015 issued by the Ministry of Social Security and Labour, the Office of the Head of Labour Inspection Board, and the following which complies with the relevant design and the characteristics set out in the Technical Specifications for Gas Detection Metering and Safety System and with the relevant standards, fixed hydrogen sulphur H₂S detector, fixed methane gas detector (CH₄), fixed oxygen detector, all the electrical switch materials with control panel and control unit included, breathing apparatus (together with full face mask and hanging set), portable gas meter which is capable of metering 4 gases and comprises external/internal pump, and half-face escape mask, warning signs and safety guidelines resistant to outdoor conditions which will be used inside and outside the pump stations, audible warning flasher and siren, cabling and cable duct use in compliance with the relevant design and the specifications, all the electrical and mechanical connection elements relating to the system, the transfer to the central SCADA-Automation system, the commissioning of the system, the test and calibration of the system, the delivery of training about the system, and the provision on worksite, with all kinds of transportation, loading, unloading, losses and insurance costs, and the installation of the foregoing by using small installation materials of any kind and the free of charge calibration and maintenance of the same for the first year during the warranty period, and the continuance of calibration and maintenance services after the first year, and the contractor's profit, and overhead.</p> <p>Measurement: It's for the set of the Construction of complete Gas Detection and Safety System of which installation is completed and which is made operable.</p> <p>//</p> <p>GAZ ALGILAMA VE GÜVENLİK SİSTEMİ</p> <p>Çalışma ve Sosyal Güvenlik Bakanlığı İş Teftiş Kurulu Başkanlığının 22.03.2015 gün ve 29303 sayılı tebliği gereğince, Atıksu Arıtma Tesisi Giriş ve Geri Devir (Fazla Çamur) Terfi Merkezlerinde kullanılması öngörülen Gaz Ölçüm ve Güvenlik Sistemi;</p> <p>"Projesine ve Gaz Algılama Ölçüm ve Güvenlik Sistemi Teknik Şartnamesi"nde belirtilen özellikleri ve ilgili standartları sağlayan; Sabit Hidrojen sülfür H₂S Dedektörü, Sabit Metan gazı detektörü (CH₄), Sabit Oksijen Dedektörü, Kumanda Panosu ve Kontrol Ünitesi dâhil tüm elektrik şalt malzemeleri, Temiz hava solunum setinin (Tam yüz maskesi ve askı takımı ile birlikte), Harici/dâhili pompalı 4 gaz ölçüm yapabilen portatif gaz ölçüm cihazının, yarım yüz kaçış maskesinin, terfi merkezlerinin iç ve dış kısmında kullanılacak harici ortam şartlarına dayanıklı uyarı levhalarının ve güvenlik talimatnamesinin, sesli uyarı flaşör ve sirenin, Projesine ve şartnamesine uygun Kablolama ve kablo kanalı kullanılması, sistemle ilgili tüm elektriksel ve mekaniksel bağlantı elemanlarının, merkezi SCADA-Otomasyon sistemine aktarımının sağlanması, sistemin devreye alınması, test ve kalibrasyonlarının yapılması, sistem hakkında eğitim verilmesi, her tür taşıma, yükleme boşaltma, zayıat ve sigorta giderleri dâhil iş başında</p>	lump-sum

No	Pose/Item No	Pose/Item Definition (in English) // Poz tanımı (in Turkish)	Unit
		<p>temini, her tür ufak montaj malzemesi kullanılarak monte edilmesi, garanti süresi içerisinde ilk bir yıl ücretsiz kalibrasyon ve periyodik bakımın yapılması, ilk bir yıldan sonra kalibrasyon ve bakım hizmetlerinin devam ettirilmesi, yüklenici karı ve genel giderler dâhil işler hale getirilmesi kapsamında,</p> <p>1 Takım (Giriş ve Geri Devir Terfi Merkezlerinde) Gaz Ölçüm ve Güvenlik Sisteminin tesis edilmesidir.</p> <p>Ölçü: Montajı tamamlanmış ve işler hale getirilmiş komple Gaz Algılama ve Güvenlik Sistemi Yapılmasının takımı içindir.</p>	

SECTION 5A.3 DESIGN DRAWINGS

LAYOUTS	
No	Drawing No-DRAWING NAME
1	G01_1_Genel_Yerlesim2_200- G-01.1 GENREAL LAYOUT-200
2	G01_2_Genel_Yerlesim3_500- G-01.2 GENERAL LAYOUT -500
3	G01_2_1_2_Yerlesim_Kesitleri2- G-01.2.1 GENERAL LAYOUT SECTIONS-1
4	G01_2_1_2_Yerlesim_Kesitleri2- G-01.2.2 GENERAL LAYOUT SECTIONS 2
5	G02_1_Borulama3_200- G-02.1-PIPING PLAN
6	G02_2_Borulama_Detay3- G-02.2 PIPING DETAILS
7	G02_3_1_Isale_plan-prf2_500- G-02.3.1 D WATER PIPELINE PLAN AND PROFILE
8	G02_3_2_OtomatikSulama_pln2- G - 02.3.2 IIRIGATION WATER PIPING PLAN
9	G02_4_1_2_Borulama_kesitleri3- G-02.4.1 PIPING SECTIONS-1
10	G02_5_Borulama_Profilleri3- G-02.05 HIGHLIFT-AERATION DRAIN LINE-DISCHARGE CHANNELL PROFILES
11	G02_6_Ek_Kollektor_Profil- G-02.6 ADD.MAIN SEWER LINE PROFILE
12	G03_1_Yol_Plani2_200- G-03.1 SITE ROAD PLAN
13	G03_2_Yol_Profil- G-03.2 IN SITE ROAD PROFILES
14	G03_3_Saha_ici_yol_tip_enkesiti- G-03.3 ROAD AND SIDEWALK TYPICAL SECTIONS
15	G04_1_Cevre_Duvari3_200- G-04.1 SURROUND WALL SITE PLAN
16	G05_Cevre_Duzeni_Plani3_200- G-05 LANDSCPAING PLAN
17	HASSA_Elektrik_Guzergah2_500- G-01.1.1 SINGLE POWER LINE ALIGNMENT MAP
18	HASSA_Sondaj_Plani2_200- G-01.1 WWTP DRILLING PLAN
19	KA-PLN_KAZI_PLANI3- KZ-PLN-EXCAVTION PLANS
20	KAZI-KST_1_2_KAZI_KESITLERI2- KZ-KST-1-EXCAVATION SECTIONS -1
21	KAZI-KST_1_2_KAZI_KESITLERI2- KZ-KST-2-EXCAVTION SECTIONS -2
22	P01_Hidrolik_Profil3- P-01 MAIN LINES HYDRAULIC PROFILES
23	P02_P&I_3- P-02 P&I DIAGRAM
ARCHITECTURAL DRAWINGS/BUILDINGS	
No	Drawing No-DRAWING NAME
1	ENG-B01_1_10_Idare_Binasi_Mim_Prj3- B-01.1 B101 ADMINISTARTION BUILDING ARCHITECTURAL PLAN
2	ENG-B01_1_10_Idare_Binasi_Mim_Prj3- B-01.2 B101 ADMINISTARTION BUILDING ARCHITECTURAL SECTIONS
3	ENG-B01_1_10_Idare_Binasi_Mim_Prj3- B-01.3 B101 ADMINISTARTION BUILDING ARCHITECTURAL VIEWS
4	ENG-B01_1_10_Idare_Binasi_Mim_Prj3- B-01.4 B101 ADMINISTARTION BUILDING ROOF PLAN AND SECTIONS
5	ENG-B01_1_10_Idare_Binasi_Mim_Prj3- B-01.5 B101 ADMINISTARTION BUILDING ROOF SYSTEM AND POINT DETAILS

6	ENG-B01_1_10_Idare_Binasi_Mim_Prj3-B-01.6 B101 ADMINISTARTION BUILDING PVC WINDOW SYSTEM AND DETAILS
7	ENG-B01_1_10_Idare_Binasi_Mim_Prj3-B-01.7 B101 ADMINISTARTION BUILDING PVC-ALUMINIUM CASING and WOEDN DOOR SYSTEM DETAILS
8	ENG-B01_1_10_Idare_Binasi_Mim_Prj3-B-01.8 B101 ADMINISTARTION BUILDING SYSTEM DETAILS AND ZONE LIST
9	ENG-B01_1_10_Idare_Binasi_Mim_Prj3-B-01.9 B101 ADMINISTARTION BUILDING WET ZONE SYSTEM DETAILS (WC-LOCKER ROOM-SHOWER)
10	ENG-B01_1_10_Idare_Binasi_Mim_Prj3-B-01.10 B101 ADMINISTARTION BUILDING KITCHEN SYSTEM DETAILS
11	ENG-B02_1_7_Blower_Binasi_Mimari2_Prj3-B.02.1 B102 BLOWER BUILDING ARCHITECURAL PLAN and SECTIONS
12	ENG-B02_1_7_Blower_Binasi_Mimari2_Prj3-B.02.2 B102 BLOWER BUILDING ARCHITECTURAL VIEWS
13	ENG-B02_1_7_Blower_Binasi_Mimari2_Prj3-B.02.3 B102 BLOWER BUILDING ROOF PLAN AND SECTIONS
14	ENG-B02_1_7_Blower_Binasi_Mimari2_Prj3-B-02.4 BLOWER BUILDING ROOF SYSTEM DETAILS
15	ENG-B02_1_7_Blower_Binasi_Mimari2_Prj3-B-02.5 B102 BLOWER BUILDING DOOR and WINDOW SYSTEM DETAILS
16	ENG-B02_1_7_Blower_Binasi_Mimari2_Prj3-B-02.6 B102 BLOWER BUILDING STEEL DOOR SYSTEM DETAILS
17	ENG-B02_1_7_Blower_Binasi_Mimari2_Prj3-B-02.7 B102 SYSTEM DETAILS AND ZONE LIST
18	ENG-B03_1_7_Dekantor_Binasi_Mim_Prj4-B-03.1 B103 DECANter BUILDING PLAN AND SECTIONS
19	ENG-B03_1_7_Dekantor_Binasi_Mim_Prj4-B-03.2 B103 DECANter BUILDING ARCHITECTURAL VIEWS
20	ENG-B03_1_7_Dekantor_Binasi_Mim_Prj4-B-03.3 B103 DECANter BUILDING ROOF PLAN SECTION AND DETAILS
21	ENG-B03_1_7_Dekantor_Binasi_Mim_Prj4-B-03.4 B103 DECANter BUILDING DOOR WINDOW SYSTEM DETAILS
22	ENG-B03_1_7_Dekantor_Binasi_Mim_Prj4-B-03.5 B103 DECANter BUILDING STEEL DOOR SYSTEM DETAILS
23	ENG-B03_1_7_Dekantor_Binasi_Mim_Prj4-B-03.6 B103 DECANter BUILDING SYSTEM DETAILS and ZONE LIST
24	ENG-B03_1_7_Dekantor_Binasi_Mim_Prj4-B-03.7 B103 DECANter BUILDING WET ZONE SYSTEM DETAILS
25	ENG-B04_1_6_Trafo_Bina_Mim_Prj3-B-04.1 B104 TRANSFORMER-GENERATOR BUILDING ARCHITECTURAL PLAN AND SECTIONS
26	ENG-B04_1_6_Trafo_Bina_Mim_Prj3-B-04.2 B104 TRANSFORMER-GENERATOR BUILDING ARCHITECTURAL VIEWS
27	ENG-B04_1_6_Trafo_Bina_Mim_Prj3-B-04.3 B104 TRANSFORMER-GENERATOR BUILDING ROOF PLAN AND SECTION DETAILS
28	ENG-B04_1_6_Trafo_Bina_Mim_Prj3-B-04.4 B104 TRANSFORMER-GENERATOR BUILDING STEEL DOOR SYSTEM DETAILS
29	ENG-B04_1_6_Trafo_Bina_Mim_Prj3-B-04.5 B104 TRANSFORMER-GENERATOR BUILDING WINDOW DETAILS
30	ENG-B04_1_6_Trafo_Bina_Mim_Prj3-B-04.6 B104 TRANSFORMER-GENERATOR BUILDING SYSTEM DETAILS AND ZONE LIST
31	ENG-B05_1_2_3_Bekci_Mimari_Prj-B-05.1 B105 GUARD HOUSE ARCHITECTURAL PLAN-SECTION AND VIEWS
32	ENG-B05_1_2_3_Bekci_Mimari_Prj-B-05.2 B105 GUARD HOUSE ROOF PLAN SECTION AND DETAILS
33	ENG-B05_1_2_3_Bekci_Mimari_Prj-B-05.3 B105 GUARD HOUSE DOOR WINDOW SYSTEM DETAILS
34	ENG-B05_1_2_3_Bekci_Mimari_Prj-B-05.4 B105 GUARD HOUSE ZONE LIST
ARCHITECTURAL DRAWINGS / HYDRAULIC STRUCTURES	
No	Drawing No-DRAWING NAME
35	A01_ByPassBaca_mim3-A-01 MB1959 BY-PASS MANHOLE PLAN AND SECTIONS

36	A02_1_2_3_Izgaralar_mim3- A-02.1 T101-T102 and T103 PLAN
37	A02_1_2_3_Izgaralar_mim3- A-02.2 LONGITUDINAL SECTION(A-A) OF T101-T102 and T103
38	A02_1_2_3_Izgaralar_mim3- A-02.3 SECTIONS AND DETAILS OF T101-T102 and T103
39	A03_1_6_Kumtutucu_mim3- A-03.1 ARC PLAN OF T104 AND T105
40	A03_1_6_Kumtutucu_mim3- A-03.2 LONGITUDINAL SECTION OF T104 AND T105
41	A03_1_6_Kumtutucu_mim3- A-03.3 CROSS SECTION-I OF T104 AND T105
42	A03_1_6_Kumtutucu_mim3- A-03.4 CROSS SECTION-II OF T104 AND T105
43	A03_1_6_Kumtutucu_mim3- A-03.5 CROSS SECTION-III OF T104 AND T105
44	A03_1_6_Kumtutucu_mim3- A-03.6 T105 PLAN -SECTIONS AND DETAILS
45	A04_1_5_Giris_TM1_mim2- A-04.1 T106(TM1) PLAN AND SECTION
46	A04_1_5_Giris_TM1_mim2- A-04.2 T106 (TM1)ARCHITECTURAL VIEWS
47	A04_1_5_Giris_TM1_mim2- A-04.3 T106(TM1)ROOF PLAN SECTIONS SYSTEM and POINT DETAILS
48	A04_1_5_Giris_TM1_mim2- A-04.4 T106 (TM1) SLIDING GATE -DOOR WINDOW POINT nad SYSTEM DETAILS
49	A04_1_5_Giris_TM1_mim2- A-04.5 T106(TM1)SYSTEM DETAILS AND ZONE LIST
50	A05_1_2_Anaerobik_mim2- A-05.1 T107 A-B-(C) PLAN AND LONGITUDINAL SECTION
51	A05_1_2_Anaerobik_mim2- A-05.2 T107 A-B-(C) CROSS SECTIONS
52	A06_1_2_DY1_TO_mim2- A-06.1 T110 AERATION POND COLL.STRUCTURE PLAN
53	A06_1_2_DY1_TO_mim2- A-06.2 T110 AERATION POND COLL.STRUCTURE SECTIONS
54	A07_1_5_Havalandirma_mim2- A-07.1 T109 A-B AERATION PONDS PLAN
55	A07_1_5_Havalandirma_mim2- A-07.2 T109 -C (IIStage) PLAN
56	A07_1_5_Havalandirma_mim2- A-07.3 T 109 A-B AERATION PONS SECTION AND DETAILS
57	A07_1_5_Havalandirma_mim2- A-07.4 T109 A-B AERATION PONDS DIFFUSER LAYOUT PLAN
58	A07_1_5_Havalandirma_mim2- A-07.5 T109 A-B AERATION PONDS DIFFUSER LAYOUT PLAN SECTIONS AND SYSTEM DETAILS
59	A08_DY2_mim2/ A-08 T111 (DY2) DISRTIBUTION STRUCTURE PLAN AND SECTIONS
60	A09_1_6_Cokeltme_mim3-- A-09.1 T111(DY2) DISTRIBUTION STRUCTURE -T112 A-B-(C) SETLING TANK PLANS
61	A09_1_6_Cokeltme_mim3/ A-09.2 T111 (DY2) DISTRIBUTION STRUCTURE -T112 A-B-(C) SETLING TANK SECTION nad DETAILS
62	A09_1_6_Cokeltme_mim3/ A-09.3 V 1-2-3 TELECCOBIC VALVE CHAMBER SECTIONS AND DETAILS
63	A09_1_6_Cokeltme_mim3/ A-09.4 T 112 A-B-(C) SETTLING POND PIVOT CENTERED SCRAPER DETAILS
64	A09_1_6_Cokeltme_mim3/ A-09.5 T 112 A-B-(C) SETTLING TANKS SCUM TROUGH DETAILS
65	A09_1_6_Cokeltme_mim3/ A-09.6 T112 A-B-(C) SETTLING TANKS SCUM BAFFLE AND SPILLWAY DETAILS
66	A10_1_2_Desarj_Kanali_Parshall_B2_mim3/ A10.1 T113 OUTLET PARSHALL FLUME-CHANNELand B2 MANHOLE PLAN -SECTION and DETAILS
67	A10_1_2_Desarj_Kanali_Parshall_B2_mim3/ A10.2 T113 OUTLET PARSHALL FLUME PLAN -SECTION and DETAILS
68	A12_TM3_mim2/ A-12 (TM3) LEACHATE PUMP STATION PLAN AND SECTIONS
69	A13_Kopuk_Topl_Baca_mim/ A-13 SCUM COLLECTION STRUCTURE PLAN AND SECTIONS
70	P02_P&I_3/ P-02 P&I DIAGRAM
STRUCTURAL DRAWINGS / BUILDINGS	
No	Drawing No-DRAWING NAME
1	ENG-B101_IDARE BINASI- SB-01.01 B101 ADMINISTRATION BUILDING FOUNDATION FORMWORK AND REBAR PLAN
2	ENG-B101_IDARE BINASI- SB-01.02 B101 ADMINISTRATION BUILDING COLUMN APPLICATION PLAN

3	ENG-B101_IDARE BINASI-SB-01.03 B101 ADMINISTRATION BUILDING +3.5 AND +4.00 ELEV FORMWORK AND REBAR PLAN
4	ENG-B101_IDARE BINASI-SB-01.04 B101 ADMINISTRATION BUILDING BEAM DETAILS
5	ENG-B101_IDARE BINASI-SB-01.05 B101 ADMINISTRATION BUILDING BEAM DETAIL 2-2
6	ENG-B102_BLOWER BINASI-SB-02.01 B102 ADMINISTRATION BUILDING FOUNDATION FORMWORK AND REBAR DETAILS
7	ENG-B102_BLOWER BINASI-SB-02.02 B102 BLOWER BUILDING COLUMN APPLICATION PLAN
8	ENG-B102_BLOWER BINASI-SB-02.03 B-102 BLOWER BUILDING +4.30 +4.80 ELEV (CRANE STORY) FORMWORK and REBAR PLAN
9	ENG-B102_BLOWER BINASI-SB-02.04 B-102 BLOWER BUILDING +6.50 ELEV.FORMWORK AND REBAR PLAN-
10	ENG-B102_BLOWER BINASI-SB-02.05 B-102 BLOWER BUILDING BEAM DETAILS
11	ENG-B103_DEKANTOR BINASI-SB-03.01 B103 DECANter BUILDING FOUNDATION PLAN AND REBAR DETAILS
12	ENG-B103_DEKANTOR BINASI-SB-03.02 B103 DECANter BUILDING COLUMN APPLICATION PLAN
13	ENG-B103_DEKANTOR BINASI-SB-03.03 B103 DECANter BUILDING 379.00ELEV (CRANE CONSOLEFORMWORK PLAN AND REBAR DETAILS
14	ENG-B103_DEKANTOR BINASI-SB-03.04 B103 DECANter BUILDING 377.2 and 381.25 FORMWORK AND REBAR PLAN
15	ENG-B103_DEKANTOR BINASI-SB-03.05 B103 DECANter BUILDING BEAM DETAILS
16	ENG-B104_TRAFO-JEN_BINASI-SB-04.01 B104 TRANSFORMER AND GENERATOR BUILDING FOUNDATION F. WORK AND REBAR DETAIL
17	ENG-B104_TRAFO-JEN_BINASI-SB-04.02 B104 TRANSFORMER AND GENERATOR BUILDING COLUMN APPLICATION PLAN
18	ENG-B104_TRAFO-JEN_BINASI-SB-04.03 B104 TRANSFORMER AND GENERATOR BUILDING +4.70 ELEV F. WORK AND REBAR DETAIL
19	ENG-B104_TRAFO-JEN_BINASI-SB-04.04 B104 TRANSFORMER AND GENERATOR BUILDING BEAM DETAIL
20	ENG-B104_TRAFO-JEN_BINASI-SB-04.05 B104 TRANSFORMER AND GENERATOR BUILDING OIL COLLECTION PIT AND CHAMBER REBAR DETAIL
21	ENG-B105_BEKCI BINASI-SB-05.01 B104 GUARD HOUSE STRUCTURAL DRAWINGS
STRUCTURAL DRAWINGS / HYDRAULIC STRUCTURES	
No	Drawing No-DRAWING NAME
22	ENG-1.DERZ DETAYLARI-S-DD.01 JOINT DETAILS
23	ENG-2.By_Pass Bacasi-SA-01-MB1959 BY-PASS MANHOLE STRUCTURAL PROJECT
24	ENG-3.S02_1_2_3_Izgaralar_BA-SA-02.1 T101-102-103 STRUCTURES FORMWORK PLANS and SECTION A-A
25	ENG-3.S02_1_2_3_Izgaralar_BA-SA-02.2 T101-102-103 STRUCTURES FORMWORK SECTIONS
26	ENG-3.S02_1_2_3_Izgaralar_BA-/SA-02.3 T101-102-103 STRUCTURES REBAR PLANS
27	ENG-3.S02_1_2_3_Izgaralar_BA-/SA-02.4 T101-102-103 STRUCTURES SHEARWALL REBAR DETAILS
28	ENG-4.S03_4_5_Kumtutucu_BA-/SA-03.1 T104-105 STRUCTURES FORMWORK PLANS and SECTION A-A
29	ENG-4.S03_4_5_Kumtutucu_BA-/SA-03.2 T104-105 STRUCTURES FORMWORK SECTIONS
30	ENG-4.S03_4_5_Kumtutucu_BA-/SA-03.3 T104-105 STRUCTURES REBAR PLAN
31	ENG-4.S03_4_5_Kumtutucu_BA-/SA-03.4 T104-105 STRUCTURES SHEARWALL REBAR DETAIL(P1- P3)
32	ENG-4.S03_4_5_Kumtutucu_BA-/SA-03.5 T104-105 STRUCTURES SHEARWALL REBAR DETAIL(P4- P6)
33	ENG-4.S03_4_5_Kumtutucu_BA-/SA-03.6 T104-105 STRUCTURES SHEARWALL REBAR DETAIL(P7- P11)
34	ENG-4.S03_4_5_Kumtutucu_BA-/SA-03.7 T104-105 STRUCTURES SHEARWALL REBAR DETAIL(P12- P14)

35	ENG-4.S03_4_5_Kumtutucu_BA-/SA-03.8 T104-105 STRUCTURES CHANNEL AND BEAM REBAR DETAILS
36	ENG-5.T-106 Giriş Terfi Merkezi-/SA-04.01-T106(TM1)FOUNDATION FORMWORK AND REBAR DETAIL
37	ENG-5.T-106 Giriş Terfi Merkezi-/SA-04.02-T106(TM1)INLET PUMP STATION SECTIONS (A-A B-B C-C)
38	ENG-5.T-106 Giriş Terfi Merkezi-/SA-04.03-T106(TM1)FOUNDATION SHEARWALL REBAR DETAIL(P1-P1A-P2-P3-P4)
39	ENG-5.T-106 Giriş Terfi Merkezi-/SA-04.04 T106 (TM1) COLUMN APPLICATION PLAN
40	ENG-5.T-106 Giriş Terfi Merkezi-/SA-04.05 T106 (TM1) 375.05 ELEV FORMWORK AND REBAR PLAN
41	ENG-5.T-106 Giriş Terfi Merkezi-/SA-04.06 T106 (TM1) 379.20 ELEV FORMWORK AND REBAR PLAN
42	ENG-5.T-106 Giriş Terfi Merkezi-/SA-04.07 T106(TM1)PANEL ROOM FORMWORK AND REBAR PLANS
43	ENG-5.T-106 Giriş Terfi Merkezi-/SA-04.08 T106 (TM1) BEAM DETAILS
44	ENG-6.T-107 Anaerobik Havuz-/SA-05.01 T107 A-B-(C)ANAEROBIC TANKS FORMWORK PLANS and SECTIONS
45	ENG-6.T-107 Anaerobik Havuz-/SA-05.02 T107 A-B-(C)ANAEROBIC TANKS REBAR PLANS and SECTIONS
46	ENG-7.T-108 Dagıtma Yapısı-/SA-06.01 T108 DISTRIBUTION STRUCTURE STRUCTURAL PROJECT
47	ENG-8.T-109 Havalandırma Havuzu-/SA-07.01 T109 AERATION TANK FORMWORK PLANS AND SECTIONS
48	ENG-8.T-109 Havalandırma Havuzu-/SA-07.02 T109 AERATION TANK FOUNDATION REBAR PLAN
49	ENG-8.T-109 Havalandırma Havuzu-/SA-07.03 T109 AERATION TANK SHEARWALL REBAR PLAN
50	ENG-8.T-109 Havalandırma Havuzu-/SA-07.04 T109 AERATION TANK PLATFORM STAIRS AND BEAM REBAR DETAIL
51	ENG-9.T-110 Hav.Havuzu Toplama Odası-/SA-08.01 T110 AERATION TANK COLLECTION STRUCTURE STRUCTURAL PROJECT
52	ENG-10.T-111 Dagıtma Yapısı-/SA-09.01 T111 (DY2) DISTRIBUTION STRUCTURE STRUCTURAL PROJECT
53	ENG-11.T-112 Çökeltme Havuzu-/SA-10.01-T112 A-B-(C) SETTLING TANKS FORMWORK PLAN and SECTIONS
54	ENG-11.T-112 Çökeltme Havuzu-/SA-10.02-T112 A-B-(C) SETTLING TANKS FOUNDATION REBAR PLAN
55	ENG-11.T-112 Çökeltme Havuzu-/SA-10.03-T112 A-B-(C) SETTLING TANKS SHEARWALL REBAR PLAN
56	ENG-11.T-112 Çökeltme Havuzu-/SA-10.04-T112 A-B-(C) SETTLING TANKS SEVERAL FORMWORK PLAN -REBAR PLANS and DETAILS
57	ENG-12.B1 Bacası-/SA-11.01 SETTLING TANK B1 MANHOLE-STACK STRUCTURAL PROJECT
58	ENG-13.T-113 Parshall Savajı-/SA-12.01 T113 OUTLET PARSHALL FLUME-DISCHARGE CHANNEL STRUCTURAL PROJECT
59	ENG-14.Desarj Yapısı BA-/SA-13.01 DISCHARGE STRUCTURE STRUCTURAL PROJECT
60	ENG-15.T-115 Kopuk Toplama Bacası-/SA-14.01 SCUM COLLECTION CHAMBER STRUCTURAL PROJECT
61	ENG-16.Teleskobik Vana Odası-/SA-15.01 SETTLING TANK V1-V2 TELESCOPIC VALVE CHAMBER STRUCTURAL PROJECT
62	ENG-17.T-114 Geri Devir Terfi Merkezi-/SA-16.01 T114(TM2)FOUNDATION FORMWORK AND REBAR PLAN
63	ENG-17.T-114 Geri Devir Terfi Merkezi-/SA-16.02 T114 (TM2) SECTIONS(A-A B-B)
64	ENG-17.T-114 Geri Devir Terfi Merkezi-/SA-16.03 T114(TM2)SHEARWALL DETAILS(P1-P2-P3-P4-P5)
65	ENG-17.T-114 Geri Devir Terfi Merkezi-/SA-16.04 T114(TM2) COLUMN APPLICATION PLAN
66	ENG-17.T-114 Geri Devir Terfi Merkezi-/SA-16.05 T114(TM2) 374.30 ELEV FORMWORK and REBAR DETAIL

67	ENG-17.T-114 Geri Devir Terfi Merkezi-/SA-16.06 T114(TM2) 378.50 ELEV FORMWORK and REBAR DETAIL
68	ENG-17.T-114 Geri Devir Terfi Merkezi-/SA-16.07 T114(TM2) STAIRS DETAIL
69	ENG-17.T-114 Geri Devir Terfi Merkezi-/SA-16.08 T114(TM2) BEAM DETAIL
70	ENG-19.T-117 Süzüntü Suyu Terfi Merkezi-/SA-17-.01 T117(TM3)LEACHATE PUMP STATION STRUCTURAL PROJECT
71	ENG-20.CEVRE DUVARI_BA-1-/S-İD.01 FACILITY SURROUND WALL LAYOUT PLAN
72	ENG-21.CEVRE DUVARI_BA-2-/S-İD.02 SURROUND WALL PROFILE and REBAR DETAIL
ELECTRICAL DRAWINGS / Power Supply	
No	Drawing No-DRAWING NAME
1	E01-YG-AG_TK HAT SEMASI_R-E-01 HV -LV SINGLE LINE SCHEMA
2	E02-HASSA_ENH-E-02 PLT ROUTE
3	E03_TRAFO-JEN_KK_R-E-03 B104 TRANSFORMER CENTER HV-LV LAYOUT nad INSTALLATION PLAN
4	E04_TRAFO-JEN_AYD_R-E-04 B104 TRANSFORMER CENTER LIGHTING and PLUG INSTALLATION PLAN
5	E05_TRAFO-JEN_TT_R-E-05 B104 TRANSFORMER CENTER GROUNDING PLAN
6	E06_TRAFO-JEN_ZA_R-E-06 B104 TRANSFORMER CENTER LOW VOLTAGE INSTALLATION PLAN
7	HASSA ENERJİ MÜSADESİ
ELECTRICAL DRAWINGS / Annexes	
No	Drawing No-DRAWING NAME
8	HASSA MCC 1
9	HASSA PLC 2
10	HASSA PLC PRENSİP SEMASI/ PLC PRINCIPLE SCHEMA
11	HASSA kablo hesapları /Cable Section Calculations
12	HASSA KUMANDA Kablosu / Control Cables
13	HASSA MCC 2
14	HASSA MCC 3
15	HASSA og tek hat /MV SINGLE LINE
16	HASSA PLC 1
17	HASSA PLC 3
18	HASSA TEK HAT ŞEMASI /SINGLE LINE SCHEMA
19	HASSA EKİPMAN GÜÇLERİ/EQUIPMENT's POWER
20	HASSA TRAFO JEN KOM HESA/ HASSA TRANSFORMER-GENERATOR COMPENSATION CALCULATIONS
ELECTRICAL DRAWINGS / Layouts	
No	Drawing No-DRAWING NAME
21	02- Hassa_Pano-Kanal Yerleşim-HASSA-AAT-GY-KK-01 CABLE CHANNEL and PANEL LAYOUT PLAN
22	03- Hassa_saha aydınlatma-HASSA-AAT-GY-SA-01 SITE LIGHTING PLAN
23	04- Hassa_CCTV-HASSA-AAT-GY-CC-01 CLOSED LOOP TV INSTALLATION PLAN
24	05- Hassa_Genel Topraklama-HASSA-AAT-GY-TT-01 FOUNDATION GROUNDING and NETWORK PLAN
25	06- Hassa_Paratoner-HASSA-AAT-GY-PAR-01 LIGHTNING PROTECTION INSTALLATION PLAN
26	07- Hassa_P&I-P-02 P &I DIAGRAM
27	08- Hassa_saha sulama-HASSA-AAT-GY-SS-01 SITE IRRIGATION CONTROL PLAN
ELECTRICAL DRAWINGS / High Current-Control Installation and Plans	
No	Drawing No-DRAWING NAME
28	B101_İDARİ BİNA_KK-HASSA-AAT-B101-EK-01 HIGH CURRENT -CONTROL INSTALLATION PLAN

29	B102_BLOWER_KK-HASSA-AAT-B 102 -EK-01 HIGH CURRENT-CONTROL INSTALLATION PLAN AND SECTIONS
30	B103_DEKANTÖR_KK-HASSA-AAT-B103 EK-01 B103 AND T117 HIGH CURRENT -CONTROL INSTALLAION PLAN &SECTIONS
31	B104_TRAFO-JEN_KK B104 TRANSFORMER AND GENERETOR HIGH CURRENT -CONTROL INSTALLAION PLAN &SECTIONS
32	B106-T113_KK-HASSA-AAT-B106-EK-01- B106 AND T 113 HIGH CURRENT -CONTROL INSTALLATION PLAN
33	HASSA-AAT- T-111-T112-EK-01 T1122 A-B-(C) SETTLING TANK AND T115 HIGH CURRENT - CONTROL INSTALLATION PLAN &SECTIONS
34	HASSA-AAT-T114-EK-01 T114 RETURN EXCESS SLUDGE PUMP STATION HIGH CURRENT-CONTROL INSTALLATION PLAN AND SECTIONS
35	MB 1959 BY-PASS BACASI_KK-HASSA-AAT-1959-EK-01 MB 1959 BAY PASS MANHOLE HIGH CURRENT-CONTROL INSTALLATION PLAN AND SECTIONS
36	T101...105_KK-HASSA-AAT-T100-EK-01 T101-T102-T103-T104 AND T105 HIGH CURRENT-CONTROL INSTALLATION PLAN& SECTIONS
37	T106 GİRİS TERFİ_KK-HASSA-AAT-T106-EK-01 T106 INLET PUMP STATION HIGH CURRENT - CONTROL INSTALLATION PLAN AND SECTIONS
38	T107 ANAEROBİK HAVUZ_KK-HASSA-AAT-T-107-EK-01 T017 A-B-(C) ANAEROBIC TANKS HIGH CURRENT -CONTROL INSTALLATION .PLAN&SECTIONS
39	T109A-B HAVALANDIRMA_KK-HASSA-AAT-T109-EK-01 T109A-B AERATIONNTANKS HIGH CURRENT CONTROL INSTALLATION PLAN & SECTIONS
ELECTRICAL DRAWINGS / Illumination	
No	Drawing No-DRAWING NAME
40	B101 IDARE_BINASI_AYD-HASSA-/AAT-B101-EA-01- B101 ADMIN BULDING ILLUMINATION-PLUG INSTALLATION PLAN&SECTIONS
41	B102_BLOWER_AYD-HASSA-AAT-B102-EA-01 B102 BLOWER BUILDING ILLUMINATION -PLUG INSTALLATION PLAN &SECTIONS
42	B103_DEKANTÖR_AYD-HASSA-AAT-B103-EA-01 B103 DECANTER BUILDING ILLUMINATION - PLUG INSTALLATION PLAN&SECTION
43	B104_TRAFO-JEN_AYD-HASSA-AAT-B104-EA-01-B104 TRANSFORMER -GENERATOR ILLUMINATION AND PLUG INSTALLAION PLAN AND SECTIONS
44	B105_BEKÇİ_BINASI_AYD-HASSA-AAT-B105-EA-01 B105 GUARD HOUSE ILLUMINATION-PLUG INSTALLATION PLAN & SECTION
45	B106-T113_AYD-HASSA-AAT-B106-EA-01 B106 COMPOSITE SAMPLING CABINET -T113 ILLUMINATION -PLUG INSTALLATION PLAN
46	HASSA-AAT-T114-EA-01 T114 RETURN and EXCESS SLUDGE PUMP STATION ILLUMINATION-PLUG INSTALLATION PLAN&SECTIONS
47	T106 GİRİS TERFİ_AYD-HASSA-AAT-T106-EA-01 T106 INLET PUMP STATION ILLUMINATION - PLUG INSTALLATION PLAN
48	T116_SU DEPOSU_AYD-HASSA-AAT-T116 -EA-01 T116 WATER TANK ILLUMINATION-PLUG INSTALLATION PLAN
ELECTRICAL DRAWINGS / Low Current	
No	Drawing No-DRAWING NAME
49	B101 IDARE BINASI_ZA-HASSA-AAT-B101-EZ-01 B101 ADMINISTRATION BUILDING LOW VOLTAGE INSTALLATION PLAN
50	B102_BLOWER_ZA-HASSA-AAT-B102-EZ-01 B012 BLOWER BUILDING LOW VOLTAGE INSTALLATION PLAN
51	B103_DEKANTOR_ZA-HASSA-AAT-B-103-EZ-01 B013 DECANTER BUILDING LOW VOLTAGE INSTALLATION PLAN
52	B104_TRAFO-JEN_ZA-HASSA-AAT-B104-EZ-01 B104 TRANSFORMER-GENERATOR BUILDING LOW VOLTAGE INSTALLATION PLAN
53	B105_BEKÇİ_ZA-HASSA-AAT-B105 -EZ-01 B105 GUARD HOUSE LOW VOLTAGE INSTALLATION PLAN

54	B106-T113_ZA-HASSA-AAT-B106-EZ-01 B106 -T113 LOW VOLTAGE INSTALLATION PLAN
55	T106_GİRİŞ TERFİ_ZA-HASSA-AAT-T106-EZ-01 -T106 INLET PUMP STATION LOW VOLTAGE INSTALLATION PLAN
56	T114_GERİ DEVİR TERFİ_ZA-HASSA-AAT-T114-EZ-01 T114 LOW VOLATAGE INSTALLATION PLAN
ELECTRICAL DRAWINGS / Grounding Plans	
No	Drawing No-DRAWING NAME
57	B101_İDARE_TT-HASSA-AAT-B101-TT-01 B101 ADMINISTRATION BUILDING GROUNDING PLAN
58	B102_BLOWER_TT-HASSA-AAT-B102-TT-01 B102 BLOWER BUILDING GROUNDING PLAN
59	B103_DEKANTÖR_TT-HASSA-AAT-B103-TT-01 B103 DECANter BUILDING GROUNDING PLAN
60	B104_TRAFO-JEN_TT-HASSA-AAT-B-104-TT-01-B014 TRANSFORMER -GENERATOR BUILDING GROUNDING PLAN
61	B105_BEKÇİ_TT-HASSA-AAT-B-106-TT-01 B106 GUARD HOUSE GROUNDING PLAN
62	B106-T113_TT-HASSA-AAT-B106-TT-01 B106-T113 GROUNDING PLAN
63	T106_GİRİŞ TERFİ_TT-HASSA-AAT-T106-TT-01 T106 INLET PUMP STATION GROUNDING PLAN
64	T114_GERİ DEVİR TERFİ_TT-HASSA-AAT-T114-TT-01 T114 RETURN AND EXCESS SLUDGE PUMP STATION GROUNDING PLAN
65	T116_SU DEPOSU_TT-HASSA-AAT-T116-TT-01 T116 WATER TANK GROUNDING PLAN
MECHANICAL DRAWINGS / Hydraulic Structures Mechanical Equipments	
No	Drawing No-DRAWING NAME
1	MEK-01/ MB 1959 BY PASS MANHOLE MECH.EQUIPMENT LAYOUT PLAN AND SECTIONS
2	MEK-02.1 T01 COLECTION CHAMBER T102 MECH.COARSE SCREEN T103 MECH FINE SCREEN MECH EQUIP.LAYOUT PLAN
3	MEK-02.2 T101-T102 T103 LAYOUT MECHANICAL EQUIPMENT LOGITUDINAL (A-A)SECTION
4	MEK-02.3 T101-T102 T103 MECHANICAL EQUIPMENT LAYOUT SECTION AND DETAILS
5	MEK-03.1 T104 AERETED GRITARRESTER AND T105 INLET PARSHALL FLUME MECH EQUIPMENT LAYOUT PLAN
6	MEK-03.2 T104 AERETED GRITARRESTER AND T105 INLET PARSHALL FLUME MECH EQUIPMENT LAYOUT LONGITUDINAL(A-A) SECTION
7	MEK-03.3 T104 AERETED GRITARRESTER AND T105 INLET PARSHALL FLUME MECH EQUIPMENT LAYOUT CROSS SECTIONS-I
8	MEK-03.4 T104 AERETED GRITARRESTER AND T105 INLET PARSHALL FLUME MECH EQUIPMENT LAYOUT CROSS SECTIONS-II
9	MEK-03.5 T104 AERETED GRITARRESTER AND T105 INLET PARSHALL FLUME MECH EQUIPMENT LAYOUT CROSS SECTIONS-III
10	MEK-03.6 T104 AERETED GRITARRESTER AND T105 INLET PARSHALL FLUME MECH EQUIPMENT LAYOUT PLAN SECTIONS AND DETAILS
11	MEK-04 T106 INLET PUMP STATION (TM1) MECH.EQUIPMENT LAYOUT PLAN AND SECTIONS
12	MEK-05.1 T107 A-B-(C) ANAEROBIC TANKS MECH EQUIPMENT LAYOUT PLAN and LONGITUDINAL SECTION
13	MEK-05.2 T107 A-B-(C) ANAEROBIC TANKS MECH EQUIPMENT LAYOUT CROSS SECTIONS
14	MEK-06.1 T108 (DY1) DISTRIBUTION CHMABER AND T110 AERATION TANKS COLLECTION STRUCTURE MECH EQUIPMNET LAYOUT PLAN
15	MEK-06.2 T108 (DY1) DISTRIBUTION CHMABER AND T110 AERATION TANKS COLLECTION STRUCTURE MECH EQUIPMNET LAYOUT SECTIONS
16	MEK-07.1 T109 A-B AERATION TANK MECHEQUIPMNET AND DIFFUSER LAYOUT PLAN
17	MEK-07.2 T109 -B AERATION TANK MECHEQUIPMNET AND DIFFUSER LAYOUT SECTIONS
18	MEK-08 T11 (DY2) DISTRIBUTION CHAMBER MECH EQUIPMENT LAYOUT PLAN and SECTIONS
19	MEK-09.1 T111 (DY2) DISRIBUTION CHAMBER -T112 A-B-(C)SETTLING TANKS MECH.EQUIPMENT LAYOUT PLAN
20	MEK-09.2 T111 (DY2) DISRIBUTION CHAMBER -T112 A-B-(C)SETTLING TANKS MECH.EQUIPMENT LAYOUT SECTION AND DETAILS
21	MEK-09.3 V 1-2-3 TELESCOBIC VALVE CHAMBERS LAYOUT SECTION AND DETAILS

22	MEK-09.4 T112 A-B-(C)SETTLING TANKS BAFFLE WALL and SPILLWAY DETAILS
23	MEK-09.5 T112 A-B-(C)SETTLING TANKS PIVOT SCRAPER DETAILS
24	MEK-09.6 T112 A-B-(C)SETTLING TANKS SCUM COLECTION FUNNEL DETAILS
25	MEK-10 T113 PARSHALL FLUME MECH EQUIPMENT LAYOUT PLAN -SECTIONS AND DETAILS
26	MEK-11 T114 (TM2) RETURN and EXCESS SLUDGE PUMP STATION MECH EQUIPMENT LAYOU PLAN-SECTION and DETAILS
27	MEK-12 B-103 DECANter BUILDING MECH EQUIPMENT LAYOUT PLAN-SECTION and DETAILS
28	MEK-13 B-102 BLOWER BUILDING MECH EQUIPMENT LAYOUT PLAN and SECTIONS
29	MEK-14 T117 (TM3) LEACHATE PUMP STATION MECH. EQUIPMENT PLAN AND SECTIONS
30	MEK-15 T115 SCUM COLLECTION STRUCTURE MECH.EQUIPMENT LAYOUT PLAN and SECTIONS
31	MEK-16 P & I DIAGRAM
MECHANICAL DRAWINGS / Information Sheets	
No	Drawing No-DRAWING NAME
30	T 112 A-B-(C) SETTLING TANK TRAVVELLING BRIDGE INFORMATION SHEET
31	WASTE CONTAINERS 1000LT-320LT INFORMATION SHEET
32	DECANter INFORMATION SHEET
33	MECHANICAL EQUIPMENT INFORMATION SHEETS
34	PENSTOCK-SLIDE GATE MATERIAL LIST
MECHANICAL DRAWINGS / Details	
No	Drawing No-DRAWING NAME
35	D-01.1 STEEL COVER SYSTEM DETAIL-T106 INLET PUMP STATION (TM1)
36	D-01.2 STEEL COVER SYSTEM DETAIL-II
37	D-01.3 STEEL COVER SYSTEM DETAIL-III
38	MAIN GATE SYSTEM and POINT DETAIL
39	D-03 PANEL FENCING DETAIL
40	D-04 TYPICAL RAILING SYSTEM DETAILS
41	D-05 DECK LADDER and RAILING SYSTEM DETAILS
MECHANICAL DRAWINGS / Buildings Mechanical Installations	
No	Drawing No-DRAWING NAME
42	ID-ST-01 B101 ADMINISTRATION BUILDING PLUMBING PROJECT
43	ID-KT-01 B101 ADMINISTARTION BUILDING AIR CONDITION PROJECT
44	B-ST-01 B -105 GUARD HOUSE PLUMBING PORJECT
45	B-KT-01 B-105 GUARD HOUSE AIR CONDITION PROJECT
46	DB-MT-01 B103 DECANter BUILDING MECHANICAL INSTALLATION PROJECT
47	TM1-HT-01 T106 INLET PUMP STATION VENTILATION PROJECT
48	TM2-HT-01 T114 (TM2)RETURN AND EXCESS SLUDGE PUMPING STATION VENTILATION PROJECT
49	BB-MT-01 B102 BLOWER BUILDING MECHANICAL INSTALLATION PROJECT
50	SD-ST-01 T118 WATER TANK(100M3)PLUMBING PROJECT
51	TB-MT-01 B104 TRANSFORMER-GENERATOR BUILDING MECHANICAL INTALLATION PROJECT
DRAWINGS OF 100 M3 BAG WATER TANK	
No	Drawing No-DRAWING NAME
1	DEST-23383 to DEST-23425-Typical Drawings of 100 m3 BAG Water Tank (43 Drawings)
2	DEST-24719 to DEST-24735 - Typical Drawings of 100 m3 BAG Water Tank (17 Drawings)
DRAWINGS OF GAS DETECTION AND SAFETY SYSTEM	
No	Drawing No-DRAWING NAME
1	Typical Drawings OF GAS DETECTION AND SAFETY SYSTEM

SECTION 5B: OTHER RELATED REQUIREMENTS

Further to the SECTION 5A: SCHEDULE OF REQUIREMENTS AND TECHNICAL SPECIFICATIONS/BILL OF QUANTITIES, Bidders are requested to take note of the following additional requirements, conditions, and related services pertaining to the fulfilment of the requirements:

Commencement of work	The Contractor shall commence work within 7 days from the date on which he shall have been given access to the Site and received the notice to commence from the Engineer
Time limit for submission of Programme of Work (Clause 13 of UNDP General Conditions of Contract for Civil Works)	The Contractor shall submit to the Engineer the Programme of Work in 7 days from the contract signature date.
Price and Payment Terms	The contract is based on unit price, and the final price of the Contract will be determined on the basis of actual quantities of work and materials utilized in the complete and satisfactory performance of the Works as certified by the Engineer and the unit prices contained in the Contractor's financial proposal. Such unit prices are fixed and are not subject to any variation whatsoever.
Currency of Payment	United States Dollar If the Contractor is registered and operating in Turkey, the payment shall be realized in Turkish Liras (TRY). Contract price will be converted from United States Dollar (USD) to Turkish Liras (TRY) by the UN operational rate of exchange ⁴ valid on the date of money transfer. Otherwise, the payments shall be affected in United States Dollar.
Interim Payment	The Contractor shall submit an invoice for the work performed and materials utilized every month .
Repayment amortisation of advance payment	The amounts of the interim payments above shall be subject to a deduction of 40 % the amount accepted for payment until the cumulative amount of the deductions so effected shall equal the amount of the advance payment.
Insurance of work	For all risks stipulated by Clause 21 of UNDP General Conditions of Contract for Civil Works for the 110 % of the total estimated price of the Contract.
Minimum amount of liability insurance (Clause 23 of UNDP General Conditions of Contract for Civil Works)	15 % of the total estimated price of the Contract

⁴ Available at the website: <https://treasury.un.org/operationalrates/OperationalRates.php#E>

SECTION 6: RETURNABLE BIDDING FORMS / CHECKLIST

This form serves as a checklist for preparation of your Bid. Please complete the Returnable Bidding Forms in accordance with the instructions in the forms and return them as part of your Bid submission. No alteration to format of forms shall be permitted and no substitution shall be accepted.

Before submitting your Bid, please ensure compliance with the Bid Submission instructions of the BDS 22.

Technical Bid:

Have you duly completed all the Returnable Bidding Forms?	
▪ Form A: Bid Submission Form	<input type="checkbox"/>
▪ Form B: Bidder Information Form	<input type="checkbox"/>
▪ Form C: Qualification Form	<input type="checkbox"/>
▪ Form D: Format of Technical Bid/Bill of Quantities	<input type="checkbox"/>
▪ Form G: Form of Bid Security	
Have you provided the required documents to establish compliance with the evaluation criteria in Section 4?	<input type="checkbox"/>

Price Schedule:

▪ Form E: Price Schedule Form	<input type="checkbox"/>
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Form A: Bid Submission Form

Name of Bidder:	[Insert Name of Bidder]	Date:	Select date
ITB reference:	[Insert ITB Reference Number]		

We, the undersigned, offer to complete civil works "Construction of Waste Water Treatment Plant in Hassa/Hatay" in accordance with your Invitation to Bid No. UNDP-TUR(MC2)-2018/06 and our Bid. We hereby submit our Bid, which includes this Technical Bid and Price Schedule.

Our attached Price Schedule is for the sum of [Insert amount in words and figures and indicate currency].

We hereby declare that our firm, its affiliates or subsidiaries or employees, including any JV/Consortium /Association members or subcontractors or suppliers for any part of the contract:

- a) is not under procurement prohibition by the United Nations, including but not limited to prohibitions derived from the Compendium of United Nations Security Council Sanctions Lists;
- b) have not been suspended, debarred, sanctioned or otherwise identified as ineligible by any UN Organization or the World Bank Group or any other international Organization;
- c) have no conflict of interest in accordance with Instruction to Bidders Clause 4;
- d) do not employ, or anticipate employing, any person(s) who is, or has been a UN staff member within the last year, if said UN staff member has or had prior professional dealings with our firm in his/her capacity as UN staff member within the last three years of service with the UN (in accordance with UN post-employment restrictions published in ST/SGB/2006/15);
- e) have not declared bankruptcy, are not involved in bankruptcy or receivership proceedings, and there is no judgment or pending legal action against them that could impair their operations in the foreseeable future;
- f) undertake not to engage in proscribed practices, including but not limited to corruption, fraud, coercion, collusion, obstruction, or any other unethical practice, with the UN or any other party, and to conduct business in a manner that averts any financial, operational, reputational or other undue risk to the UN and we embrace the principles of the United Nations Supplier Code of Conduct and adhere to the principles of the United Nations Global Compact.

We declare that all the information and statements made in this Bid are true and we accept that any misinterpretation or misrepresentation contained in this Bid may lead to our disqualification and/or sanctioning by the UNDP.

We offer to supply the goods and related services in conformity with the Bidding documents, including the UNDP General Conditions of Contract and in accordance with the Schedule of Requirements and Technical Specifications.

Our Bid shall be valid and remain binding upon us for the period specified in the Bid Data Sheet.

We understand and recognize that you are not bound to accept any Bid you receive.

I, the undersigned, certify that I am duly authorized by [Insert Name of Bidder] to sign this Bid and bind it should UNDP accept this Bid.

Name: _____

Title: _____

Date: _____

Signature: _____

[Stamp with official stamp of the Bidder]

Form B: Bidder Information Form

Legal name of Bidder	[Complete]
Legal address	[Complete]
Year of registration	[Complete]
Bidder's Authorized Representative Information	Name and Title: [Complete] Telephone numbers: [Complete] Email: [Complete]
Are you a UNGM registered vendor?	<input type="checkbox"/> Yes <input type="checkbox"/> No If yes, [insert UGNM vendor number]
Are you a UNDP vendor?	<input type="checkbox"/> Yes <input type="checkbox"/> No If yes, [insert UNDP vendor number]
Countries of operation	[Complete]
No. of full-time employees	[Complete]
Quality Assurance Certification (e.g. ISO 9000 or Equivalent) (If yes, provide a Copy of the valid Certificate):	[Complete]
Does your Company hold any accreditation such as ISO 14001 or ISO 14064 or equivalent related to the environment? (If yes, provide a Copy of the valid Certificate):	[Complete]
Does your Company have a written Statement of its Environmental Policy? (If yes, provide a Copy)	[Complete]
Does your organization demonstrate significant commitment to sustainability through some other means, for example internal company policy documents on women empowerment, renewable energies or membership of trade institutions promoting such issues	[Complete]
Is your company a member of the UN Global Compact	[Complete]
Contact person that UNDP may contact for requests for clarifications during Bid evaluation	Name and Title: [Complete] Telephone numbers: [Complete] Email: [Complete]
Please attach the following	<ul style="list-style-type: none"> Company Profile, which should <u>not</u> exceed fifteen (15) pages,

documents:

- Certificate of Incorporation/ Business Registration
- Tax Registration/Payment Certificate issued by the Internal Revenue Authority evidencing that the Bidder is updated with its tax payment obligations, or Certificate of Tax exemption, if any such privilege is enjoyed by the Bidder
- Trade name registration papers, if applicable
- Power of Attorney.
- Official Letter of Appointment as local representative, if Bidder is submitting a Bid on behalf of an entity located outside the country

Form C: Eligibility and Qualification Form

Name of Bidder:	[Insert Name of Bidder]	Date:	Select date
ITB reference:	[Insert ITB Reference Number]		

History of Non- Performing Contracts

<input type="checkbox"/> Non-performing contracts did not occur during the last 3 years. (reference period to be taken into account: from November 12, 2015 to November 12, 2018)			
<input type="checkbox"/> Contract(s) not performed in the last 3 years. (reference period to be taken into account: from November 12, 2015 to November 12, 2018)			
Year	Non- performed portion of contract	Contract Identification	Total Contract Amount (current value in US\$)
		Name of Client: Address of Client: Reason(s) for non-performance:	

Litigation History (including pending litigation)

<input type="checkbox"/> No litigation history for the last 3 years. (reference period to be taken into account: from November 12, 2015 to November 12, 2018)			
<input type="checkbox"/> Litigation History as indicated below			
Year of dispute	Amount in dispute (in US\$)	Contract Identification	Total Contract Amount (current value in US\$)
		Name of Client: Address of Client: Matter in dispute: Party who initiated the dispute: Status of dispute: Party awarded if resolved:	

Previous Relevant Experience

Please list only previous similar assignments successfully completed in the **last 5 years**. (reference period to be taken into account: from November 12, 2013 to November 12, 2018)

List only those assignments for which the Bidder was legally contracted or sub-contracted by the Client as a company or was one of the Consortium/JV partners. Assignments completed by the Bidder's individual experts working privately or through other firms cannot be claimed as the relevant experience of the Bidder, or that of the Bidder's partners or sub-consultants, but can be claimed by the Experts themselves in their CVs. **The Bidder shall provide proof documents for the claimed experience by presenting copies of relevant documents and references with the Bid.**

Project name & Country of Assignment	Client & Reference Contact Details	Contract Value (in USD equivalent*)	Period of activity and status	Types of activities undertaken

- Bidders shall convert the currency quoted in the "Certificate of Completion" into USD, in accordance with the prevailing UN operational rate of exchange on the issuance date of "Certificate of Completion". UN operational rate of exchange are available at the following website: <https://treasury.un.org/operationalrates/OperationalRates.php#E>

Bidders may also attach their own Project Data Sheets with more details for assignments above.

☐ Attached are the Statements of Satisfactory Performance from the Top 3 (three) Clients or more.

Financial Standing⁵

Annual Turnover for the last 3 years (in US\$ equivalent)	Year 2015	USD
	Year 2016	USD
	Year 2017	USD
Latest Credit Rating (if any), indicate the source		

Financial information (in US\$ equivalent)	Historic information for the last 3 years		
	2015	2016	2017
	<i>Information from Balance Sheet</i>		
Total Assets (TA)			
Total Liabilities (TL)			
Current Assets (CA)			
Current Liabilities (CL)			
	<i>Information from Income Statement</i>		
Total / Gross Revenue (TR)			
Profits Before Taxes (PBT)			
Net Profit			
Current Ratio			

☐ Attached are copies of the audited financial statements (balance sheets, including all related notes, and income statements) for the years required above complying with the following condition:

- Must reflect the financial situation of the Bidder or party to a JV, and not sister or parent companies;
- Historic financial statements must be audited by a certified public accountant;
- Historic financial statements must correspond to accounting periods already completed and audited. No statements for partial periods shall be accepted.

⁵ Bidders shall convert the currency into USD by using the UN operational rate of exchange which was effective for December of each corresponding year. UN operational rate of exchange are available at the following website: <https://treasury.un.org/operationalrates/OperationalRates.php#E>

Form D: Format of Technical Bid

Name of Bidder:	[Insert Name of Bidder]	Date:	Select date
ITB reference:	[Insert ITB Reference Number]		

The Bidder's Bid should be organized to follow this format of the Technical Bid. Where the bidder is presented with a requirement or asked to use a specific approach, the bidder must not only state its acceptance, but also describe how it intends to comply with the requirements. **Where a descriptive response is requested, failure to provide the same will be viewed as non-responsive.**

SECTION 1: Bidder's qualification, capacity and expertise

- 1.1 General organizational capability which is likely to affect implementation: management structure, financial stability and project financing capacity, project management controls, extent to which any work would be subcontracted (if so, provide details).
- 1.2 Relevance of specialized knowledge and experience on similar engagements done in the region/country.
- 1.3 Quality assurance procedures and risk mitigation measures.
- 1.4 Organization's commitment to sustainability.

SECTION 2: Method Statement

This section should demonstrate the Bidder's responsiveness to the specification by identifying the specific components proposed, addressing the requirements, as specified, point by point; providing a detailed description of the essential performance characteristics proposed; and demonstrating how the proposed bid meets or exceeds the requirements/specifications. All important aspects should be addressed in sufficient detail.

- 2.1 A detailed description of how the Bidder will complete civil works, keeping in mind the appropriateness to local conditions and project environment. Details how the different service elements shall be organized, controlled and delivered.
- 2.2 Explain whether any work would be subcontracted, to whom, how much percentage of the requirements, the rationale for such, and the roles of the proposed sub-contractors and how everyone will function as a team.
- 2.3 The bid shall also include details of the Bidder's internal technical and quality assurance review mechanisms.
- 2.4 Implementation plan including a Gantt Chart or Project Schedule indicating the detailed sequence of activities that will be undertaken and their corresponding timing.
- 2.5 Demonstrate how you plan to integrate sustainability measures in the execution of the contract. (e.g. Environmental Management Plan)

SECTION 3: Management Structure and Key Personnel

- 3.1 Describe the overall management approach toward planning and implementing the project. Include an organization chart for the management of the project describing the relationship of key positions and designations. Provide a spreadsheet to show the activities of each personnel and the time allocated for his/her involvement.

- 3.2 Provide CVs for key personnel that will be provided to support the implementation of this project using the format below. CVs should demonstrate qualifications in areas relevant to the scope of goods and/or services.

Format for CV of Proposed Key Personnel

Name of Personnel	[Insert]
Position for this assignment	[Insert]
Nationality	[Insert]
Language proficiency	[Insert]
Education/ Qualifications	<i>[Summarize college/university and other specialized education of personnel member, giving names of schools, dates attended, and degrees/qualifications obtained.]</i> [Insert]
Professional certifications	<i>[Provide details of professional certifications relevant to the scope of goods and/or services]</i> <ul style="list-style-type: none"> ▪ Name of institution: [Insert] ▪ Date of certification: [Insert]
Employment Record/ Experience	<i>[List all positions held by personnel (starting with present position, list in reverse order), giving dates, names of employing organization, title of position held and location of employment. For experience in last five years, detail the type of activities performed, degree of responsibilities, location of assignments and any other information or professional experience considered pertinent for this assignment.]</i> [Insert]
References	<i>[Provide names, addresses, phone and email contact information for two (2) references]</i> Reference 1: [Insert] Reference 2: [Insert]

I, the undersigned, certify that to the best of my knowledge and belief, the data provided above correctly describes my qualifications, my experiences, and other relevant information about myself.

Signature of Personnel

Date (Day/Month/Year)

FORM E: Price Schedule Form

Name of Bidder:	[Insert Name of Bidder]	Date:	Select date
ITB reference:	[Insert ITB Reference Number]		

The Bill of Quantities is the document containing an itemized breakdown of the works to be carried out in a unit price contract, indicating a quantity for each item and the corresponding unit price. The quantities set out in the Bill of Quantities are estimated quantities.

The amounts due shall be determined through the measurement of the actual quantities of the works executed and by applying the unit rates to the quantities actually executed for the respective items.

Contingencies for use can only be executed by administrative order of the Engineer in accordance with the terms of the contract.

The prices inserted in the Bill of Quantities are to be the full inclusive values of the works described under the items, including all costs and expenses which may be required in and for the construction of the works described together with any temporary works and installations which may be necessary, and all general risks, liabilities and obligations set forth or implied in the documents on which the tender is based. It will be assumed that establishment charges, profit and allowances for all obligations are spread evenly over all the unit rates.

The Contractor shall consider inclusion of the costs which will be Borne by the Contractor during defect liability period in terms of operation and maintenance of plant and training of operational staff, while inserting the prices in the Bill of Quantities. The cost related to operation, maintenance and training are defined in detail at Article 7.8 of the Technical Specifications. No specific payment will be made against operation, maintenance and training.

Unless the technical specifications or the Bill of Quantities specifically and expressly state otherwise, only permanent works are to be measured and paid for by UNDP.

No allowance will be made for loss of materials or volume thereof during transport or compaction.

The prices do not include the taxes and fiscal duties, whose exoneration is explicitly given for the contract. The non-exonerated taxes and fiscal duties are, apart from those which are stated separately in these financial offer documents, covered in the prices of the Bill of Quantities.

In the bill of quantities, rates and prices shall be entered by the Contractor in the appropriate columns in USD. In the Unit Price column in the Bill of Quantities Unit Rates shall include the overheads. "Overheads" shall be deemed to cover:

- i. Profit
- ii. Head Office charges
- iii. Site Supervision and Site Staff costs and expenses
- iv. Transport of labour and travelling allowances
- v. Use of protective clothing or equipment
- vi. Any statutory or incidental charges levied on the employment of labour
- vii. Overtime, unless specifically ordered or subsequently sanctioned in writing by the Engineer
- viii. Time lost due to inclement weather
- ix. Insurances of whatsoever nature
- x. Holiday and sickness pay or benefits
- xi. Use, repair and sharpening of small tools

- xii. All non-mechanically operated equipment, erected scaffolding, staging and trestles, protective clothing, artificial lighting, storage facilities and the like that may be in general use on the site
- xiii. All other liabilities and obligations whatsoever

The units of measurement used in the annexed technical documentation are those of the International System of Units (SI). No other units may be used for measurements, pricing, detail drawings etc. (Any units not mentioned in the technical documentation must also be expressed in terms of the SI.) Abbreviations used in the bill of quantities are to be interpreted as follows:

mm	means	millimetre
m	means	metre
da	means	decare
mm ²	means	square millimetre
m ²	means	square metre
m ³	means	cubic metre
kg	means	kilogram
ton	means	tonne (1000 kg)
pcs	means	pieces
h	means	hour
L.s.	means	Lump sum
km	means	kilometre
l	means	litre
kVAR	means	kilovolt ampere reactive
%	means	per cent

Currency of the Bid: United States Dollar, USD

Price Schedule

Item #	Description	Total Price
1	Civil Works	
2	Mechanical Works	
3	Electrical Works	
Total estimated price (item 1 +item 2 +item 3)		

Excel format of Bill of Quantities shall also be provided with the Bid. In case of any discrepancy between the excel format and the following formats, the prices given in the below format shall prevail.

BILL OF QUANTITIES FOR CIVIL WORKS;

No	Pose/Item No	Pose/Item Definition // Poz tanımı	UNIT	Quantity	Unit Price (USD)	Price (USD)
1	04.002/2A	Sand (fine aggregate) (08.008) (supply with machinery) // Kum (ince agrega) (08.008) (Makina ile temin)	m3	250.00		

No	Pose/Item No	Pose/Item Definition // Poz tanımı	UNIT	Quantity	Unit Price (USD)	Price (USD)
2	12.2190/1	Steam cured collection chamber base (H = 0.60, with rubber seal) // Buhar kürlü parsel bacası taban elemanı (H=0,60, lastik contalı)	pcs	5.00		
3	12.2190/2	Forming Collection Chamber with Prefabricated body element (H = 0.50 m and joints with 600 doses of mortar) // Prefabrik gövde elemanı ile parsel bacası teşkili (H= 0,50 m ve birleşim yerleri 600 dozlu harç)	pcs	5.00		
4	12.2190/3	Forming Collection Chamber with Prefabricated body element (H = 0.25 m and joints with 600 doses of mortar) // Prefabrik gövde elemanı ile parsel bacası teşkili (H= 0,25 m ve birleşim yerleri 600 dozlu harç)	Pcs	5.00		
5	12.2190/4	Steam cured Collection chamber body adjustment part // Buhar kürlü parsel bacası gövde ayar elemanı	m	0.75		
6	12.2190/6	Placing precasted (casted with C18 Concrete(350dose) class, framed with profile sections) collection chamber covers-of chambers in street and main streets // BS 18 Beton (350 dozlu) ile imal edilmiş profil demiri ile çerçevelemiş prefabrik betonarme kapağın parsel bacası üzerine yerleştirilmesi (Cadde ve sokaklardaki parsel bacaları için)	Pcs	1.00		
7	14.160040	Unbraced trench excavation(0-2m) in all type of ground //Her cins zeminde (0-2 m) iksasız hendek kazısı	m3	13,078.78		
8	14.160041	Unbraced trench excavation(2-3m) in all type of ground // Her cins zeminde (2-3 m) iksasız hendek kazısı	m3	1,978.12		
9	14.160042	Unbraced trench excavation (3-4 m) in all type of ground // Her cins zeminde (3-4 m) iksasız hendek kazısı	m3	1,502.26		
10	14.160043	Unbraced trench excavation (4-5 m) in all type of ground // Her cins zeminde (4-5 m) iksasız hendek kazısı	m3	676.72		

No	Pose/Item No	Pose/Item Definition // Poz tanımı	UNIT	Quantity	Unit Price (USD)	Price (USD)
11	14.160044	Unbraced trench excavation (5-6 m) in all type of ground // Her cins zeminde (5-6 m) iksasız hendek kazısı	m3	120.55		
12	14.1700	Filling work (alligation) // Paçal dolgu	m3	8,032.53		
13	14.1717	Filling with material from borrow area //Ariyetten alınan toprakla dolgu yapılması	m3	50.00		
14	15.23283	Drainage and blinding of sewerage line trench floor with sand and gravel // Kum ve çakıl ile kanalizasyon hendek tabanı drenajı yapılması ve körletilmesi	m3	20.00		
15	15.140/İB-1	Trench base fill with stabilized (08.008) materials // Stabilize (08.008) malzeme ile hendek, temel dolgusu yapılması	m3	696.09		
16	15.140/İB-2	Base and subbase fill with stabilized materials // Stabilize malzeme ile temel ve temel altı dolgusu	m3	2,719.96		
17	15.140/İB-4	Pipe bedding-padding (side fill) with granular sand, gravel // Granülometrik kum-çakılın elle sıkıştır. boru tabanı yataklaması	m3	10.00		
18	Y.16.050/13	Pouring, purchased, C16/20(BS16) ready mix concrete with concrete pump (including transportation) // Satın alınan ve beton pompasıyla, basınç dayanım sınıfı C16/20 (BS16) olan hazır beton dökülmesi (beton nakli dahil)	m3	1,024.06		
19	Y.16.050/14	Pouring, purchased, C20/25(BS25) ready mix concrete with concrete pump (including transportation) // Beton santralinde üretilen veya satın alınan ve beton pompasıyla basılan, C20/25 basınç dayanım sınıfında beton dökülmesi (beton nakli dahil)	m3	1,315.50		
20	Y.16.050/16	Pouring, purchased, C30/37 (BS30) ready mix concrete with concrete pump (including transportation) // Satın alınan ve beton pompasıyla, basınç dayanım sınıfı C30/37 (BS30) olan hazır beton dökülmesi (beton nakli dahil)	m3	3,799.55		

No	Pose/Item No	Pose/Item Definition // Poz tanımı	UNIT	Quantity	Unit Price (USD)	Price (USD)
21	Y.17.136	Rubble layer with Quarry stone // Ocak taşı ile blokaj	m3	472.22		
22	Y.17.301/02	Fence with 1.20 m high Ø 4.5 mm diameter 50 * 150 mm spacing min. 2 fretted hot-dipped galvanized with electrostatic polyester powder painted panels (application on the wall with a pole spacing of 2.5 m) // 1.20 m yükseklikte Ø4.5 mm çapında 50*150 mm göz aralıklı min. 2 bükümlü sıcak daldırma galvaniz üzeri elektrostatik polyester toz boyalı panel tellerile çit yapılması (Direk aralığı 2.5 m olacak şekilde duvar üzeri uygulama)	m	800.00		
23	Y.18.001/C15	Wall construction with 190 mm thick horizontal perforated bricks (190 x 190 x 135 mm) // 190 mm kalınlığında yatay delikli tuğla (190 x 190 x 135 mm) ile duvar yapılması	m2	1,250.23		
24	Y.18.201/A01A	Roof covering with upper and lower tiles (wide type) (Alaturka) // Alt ve üst kiremit (geniş tip) ile çatı örtüsü yapılması (Alaturka)	m2	980.93		
25	Y.18.245/001	Polymer bituminous cover with glass mesh under the roof cover on the sloped roof // Eğim çatıda çatı ört. altına cam tülü taşıyıcı polimer bitümlü örtü	m2	980.93		
26	Y.18.245/004	Water insulation with 3 mm thick plastomer-based, fiberglass meshed polymeric bituminous cover (-10 C cold bending) under sloped roof // Eğimli çatıda, çatı örtüsü altına, 3 mm kalın. Plastomer esaslı, cam tülü taş. polimer bitümlü örtü (-10 C soğuk. bük.) ile su yalıtımı yapılması	m2	600.00		
27	Y.18.461/029	3 mm thick. plastomer based polymer bituminous cover (polyester felt meshed) // 3 mm kalın. plastomer esaslı polimer bitümlü örtü (polyester keçe taşıyıcı)	m2	170.00		
28	Y.18.461/051B	Waterproofing with 2 mm thick PVC based geomembrane // 2 mm kalınlıkta, PVC esaslı, jeomembran ile su yalıtımı yapılması/	m2	1,374.86		

No	Pose/Item No	Pose/Item Definition // Poz tanımı	UNIT	Quantity	Unit Price (USD)	Price (USD)
29	Y.18.461/059B	Waterproofing with 2 mm thick EPDM based geomembrane (durable to UV, reinforced) // 2 mm kalınlıkta, EPDM esaslı, (UV dayanımlı, donatılı) jeomembran ile su yalıtımı yapılması	m2	40.00		
30	18.500/İB-8	Sealing and forming construction joint with B (20/5) Type 1. quality P.V.C. waterstop band // B (20/5) Tipi 1. kalite P.V.C. su tutucu bandı ile sızdırmazlık ve inşaat derzi yapılması	m	600.00		
31	18.500/İB-13	Forming construction joint in Reinforced Slab with B (25/8) Type 1. quality P.V.C. waterstop band // Bet.döşemede A (25/8) tipi 1.kal.PVC conta ile derz	m	4.00		
32	18.500/İB-17	Forming expansion joint in Reinforced Slab with B (25/5) Type 1. quality P.V.C. waterstop band // Bet.döşemede DO (25/5) tipi 1.kal.PVC conta ile genişleme derzi yapılması	m	80.00		
33	18.500/İB-21	Forming construction joint in Reinforced wall with B (25/8) Type 1. quality P.V.C. waterstop band // Bet.duvarı A (25/8) tipi 1.kal.PVC conta ile derz yapılması	m	290.00		
34	18.500/İB-28	Sealing and Forming construction joint in Reinforced Slab with B (25/5) Type 1. quality P.V.C. waterstop band // B (25/5) Tipi 1. kalite P.V.C. su tutucu bandı ile sızdırmazlık ve inşaat derzi yapılması	m	200.00		
35	18.500/İB-33	Sealing and Forming construction joint in Reinforced Slab with B (15/5) Type 1. quality P.V.C. waterstop band // B (15/5) Tipi 1. kalite P.V.C. su tutucu bandı ile sızdırmazlık ve inşaat derzi yapılması	m	210.00		

No	Pose/Item No	Pose/Item Definition // Poz tanımı	UNIT	Quantity	Unit Price (USD)	Price (USD)
36	Y.19.055/004	Exterior heat insulation and heat insulation plastering on the outside walls with 6 cm thickness of extruded polystyrene plates (XPS - 200 kPa pressure resistant) with rough surface or rough channel (Jacketing-Sheating) // 6 cm kalınlıkta yüzeyi pürüzlü veya pürüzlü kanallı extrüde polistren levhalar (XPS - 200 kPa basınç dayanımlı) ile dış duvarlarda dıştan ısı yalıtımı ve üzerine ısı yalıtım sıvası yapılması (Mantolama) /	m2	1,466.00		
37	19.056/İB	2.5 cm polystyrene foam joint filler between the concrete cover // Beton kap. arasına 2,5 cm polistren köp.ile derz dolgusu	m2	100.00		
38	Y.19.057/004	Heat insulation on lateral (ground contacted floor) or reverse terrace with 6cm thick (XPS durable to 300Kpa pressure) flat plates // 6 cm kalınlıkta yüzeyi düzgün levhalar (XPS - 300 Kpa basınç dayanımlı) ile yatayda (zemine oturan (toprak temaslı) döşemelerde veya ters teras çatılarda) ısı yalıtımı yapılması	m2	784.72		
39	Y.19.061/003	Lying 10cm thick glasswool mattres(18kg/m3) with water isulation (vapor transmitted) above on slab under roof // Çatı arası döşeme üzerine, 10 cm kalın. camyünü şilte (18 kg/m3) ve üzerine su buharı geçişine açık su yalıtım örtüsü serilmesi	m2	881.17		
40	04.379/B07	Impermeability admixture for concrete // Betona su geçirimsizlik temin edici katkı maddesi	kg	7,781.48		
41	Y.21.001/02	Construction of concrete or reinforced concrete formwork -from flat surface wooden formwork // Ahsaptan düz yüzeyli beton ve betonarme kalıbı yapılması	m2	4,314.38		
42	Y.21.001/03	Construction of reinforced concrete formwork -from flat surface plywood // Plywood ile düz yüzeyli betonarme kalıbı yapılması	m2	11,935.25		

No	Pose/Item No	Pose/Item Definition // Poz tanımı	UNIT	Quantity	Unit Price (USD)	Price (USD)
43	Y.21.001/04	Construction of concrete and concrete form with curved surface- from meatl sheet // Sac ile egri yüzeyli beton ve betonarme kalıbı yapılması	m2	2,046.99		
44	Y.21.050/C11	Scaffolding with steel pipe (between 0,00-4,00m) // Çelik borudan kalıp iskelesi yapılması (0,00-4,00m arası)	m3	6,533.18		
45	Y.21.050/C12	Scaffolding with steel pipe(between4,01-6,00m) // Çelik borudan kalıp iskelesi yapılması (4,01-6,00m arası)	m3	4,866.15		
46	Y.21.050/C13	Scaffolding with steel pipe(between6,01-8,00m) // Çelik borudan kalıp iskelesi yapılması (6,01-8,00m arası)	m3	4,563.79		
47	Y.21.051/C11	Full safety, exterior scaffolding consisting of prefabricated components. (0,00 - 51,50 m) // Çelik borudan tam güvenli cephe iş iskelesi yapıl. (0,00-51,50m arası)	m3	1,663.14		
48	Y.21.051/C13	Scaffolding with steel pipe(between6,01-8,00m) // Çelik borudan kalıp iskelesi yapılması (6,01-8,00m arası)	m3	3,183.81		
49	Y.21.101/01	Roof construction (with wooden sheating) // Ahşaptan oturtma çatı yapılması (çatı örtüsü altı tahta kaplamalı)	m2	1,154.47		
50	21.188905	Price increase for The height from the bottom of the foundation pit in industrial structures (3.00 m - 6.00 m) // Sınai yapılarda temel çuk.itibaren 3-6 m yükseklik zammı	m3	270.00		
51	21.188906	Price increase for The height from the bottom of the foundation pit in industrial structures (6.01 m - 9.00 m) // Sınai yapılarda temel çuk.itibaren 6.01-9 m yükseklik zammı	m3	195.00		
52	Y.21.280/01	Laminate parquet flooring (AC1 Class 21) (including baseboard) // Laminat parke döşeme kaplaması yapılması (AC1 Sınıf 21) (süpürgelik dahil)	m2	100.00		

No	Pose/Item No	Pose/Item Definition // Poz tanımı	UNIT	Quantity	Unit Price (USD)	Price (USD)
53	Y.22.009/02	Construction and replacement massive wooden sheet of the door wing // Ahsaptan masif tablalı dış kapı kanadı yapılması ve yerine konulması	m2	50.00		
54	22.301/İB-3	Making oak-covered kitchen countertop cabinet // Meşe kaplamalı mutfak tezgah altı dolabı	m2	12.00		
55	Y.23.010	Installation of wiremesh reinforcement (1,500-3,000 kg/m ²) // İnce hasır çelik montajı (1,500-3,000 kg/m ²)	ton	0.50		
56	Y.23.014	Cutting, bending and replacing Ø 8-Ø 12 mm ribbed concrete steel bar // (Ø8-Ø12) mm beton çelik çubuğunun (nervürlü) bükülmesi ve yerine konulması	ton	165.46		
57	Y.23.015	Cutting, bending and replacing Ø 14- Ø 28 mm ribbed concrete steel bar // (Ø14-Ø28) mm beton çelik çubuğunun (nervürlü) bükülmesi ve yerine konulması	ton	342.50		
57	Y.23.152	Manufacturing and replacing windows and doors with square and rectangular profiles // Kare ve dikdörtgen profillerden pencere ve kapı yapılması ve yerine konulması	kg	3,712.17		
57	Y.23.176	Making and replacing various iron works from lama and profile iron // Çeşitli demir işlerinin yapılması ve yerine konulması	kg	1,761.37		
58	Y.23.220	Railings made from iron pipes, substitution // Demir borudan korkuluk	kg	4,247.96		
59	Y.23.241	Manufacture and replacement of plastic joinery (Door, Window,) // PVC Kapı Pencere	kg	2,036.45		

No	Pose/Item No	Pose/Item Definition // Poz tanımı	UNIT	Quantity	Unit Price (USD)	Price (USD)
60	23.243/13	Suspended ceiling construction from a minimum of 20-micron electrostatic powder coated (polyester based) unperforated aluminium plate (EN AW 3000 series) with a thickness of 30x30 cm and a thickness of 0.50 mm // 30*30 cm ebadında 0.50 mm kalınlığında min.20 mikron elektrostatik toz boyalı (polyester esaslı) deliksiz alüminyum plakadan (en aw 3000 serisi) sarkmalı sistem asma tavan yapılması	m2	292.65		
61	Y.23.244/L	Electrostatic powder coated heat insulated aluminium joinery production and replacement // Elektrostatik toz boyalı ısı yalıtımlı alüminyum doğrama imalatı yapılması ve yerine konulması	kg	2,051.60		
62	23.255/İB-3	Gray cast iron steps and grating and replacement in sewage construction // Kanalizasyon inşaatlarında kırdöküm basamak ve ızgara yapımı, yerine konması	kg	6,832.50		
63	23.301/İB-2	Construction of all kinds of iron covers (including cover lifting and sealing) // Her türlü demir kapak yapılması (Kapak kaldırma tertibatı ve sızdırmazlık dahil)	kg	3,187.05		
64	24.018	Making and placing rainwater reservoir 30x40x30 cm from the No. 12 zinc plate // 12 nolu çinkodan yağmur suyu haznesi yapılması ve yerine konulması	pcs	38.00		
65	Y.25.003/12	Three- layer whitewashing on new plaster surfaces (interior) // Yeni sıva yüzeylere üç kat beyaz kireç badana yapılması (iç cephe)	m2	693.03		
66	Y.25.003/14	Two layers of water-based matt paint applied on new plaster surfaces by putty and primer (interior) // Yeni sıva yüzeylere macun ve astar uyg.iki kat su bazlı mat boya yapılması	m2	1,615.27		

No	Pose/Item No	Pose/Item Definition // Poz tanımı	UNIT	Quantity	Unit Price (USD)	Price (USD)
67	Y.25.004/04	Silicone based water-based paint application by applying primer to gross concrete, plastered or old painted surfaces (exterior)//Beton, sıvalı yüzeylere, astar uygulanarak silikon esaslı su bazlı boya yapılması (dış cephe)	m2	1,876.83		
68	Y.25.005/03	3 mm thick acrylic based color coating on concrete, plaster and similar surfaces (Exterior)//Beton, sıva ve benzeri yüzeylere 3 mm kalınlıkta akrilik esaslı renkli kaplama yapılması (dış cephe)		923.64		
69	25.052	Tar(bitumen) Paint (3 layer) // Katran badana yapılması (3 kat)	m2	300.00		
70	25.052/İB-1	Three layers of bituminous asphalt emulsion on the exterior surface of the concrete and external surfaces of the prefabricated industrial production and the exterior and interior surfaces of the BA and concrete pipes by using motorized pulverizator (100 liters manually) and sulphate or harmful // Beton dış yüzeyler, beton ve BA boruların 3 kat bitümlü asfalt emisyonu ile tecridi	m2	300.00		
71	24.061	Ø 100 mm diameter rainwater pipe // Ø100 mm PVC yağmur borusu	m	174.20		
72	Special/Civ/26	Hot-dip galvanizing to steel works comply with TSE 914 // Demir imalata TSE 914' e uygun olacak şekilde sıcak daldırma galvaniz kaplama yapılması	kg	11,147.18		
73	Y.26.005/402	(30x30 cm) or (33x33 cm), all kinds of designs and surface features, first quality, colored ceramic flooring and 3 mm joint spacing (with tile adhesive) // Presleme ile üretilen, üstü beyaz çimentolu altı normal çimentolu, yivli-yivsiz renkli renksiz terrazo karo plak (karosiman sınıf 1) ile dış mekanlarda döşeme kaplaması yapılması	m2	1,202.20		

No	Pose/Item No	Pose/Item Definition // Poz tanımı	UNIT	Quantity	Unit Price (USD)	Price (USD)
74	Y.26.005/403	Laying of flooring with a thickness of 40 mm and 40 mm and 40 mm, with all kinds of design and surface features, first quality, colored ceramic flooring and 3 mm joint spacing (with tile adhesive) // 40 x 40 cm anma ebatlarında, her türlü desen ve yüzey özelliğinde, ı. kalite, renkli seramik yer karoları ile 3 mm derz aralıklı döşeme kaplaması yapılması (karo yapıştırıcısı ile)	m2	1,550.64		
75	Y.26.005/404	(42.5x42.5 cm) or (45x45 cm), with all kinds of design and surface features, with first layer, colored ceramic flooring and 3 mm joint spacing (with tile adhesive) // (42,5 x 42,5 cm) veya (45 x 45 cm) anma ebatlarında, her türlü desen ve yüzey özelliğinde, ı. kalite, renkli seramik yer karoları ile 3 mm derz aralıklı döşeme kaplaması yapılması (karo yapıştırıcısı ile)	m2	790.85		
76	Y.26.006/403	20x25 cm or 20x30 cm, all kinds of designs and surface features, first level, colored ceramic wall joints and 3 mm joint spaced wall covering (with tile adhesive) // (20 x 25 cm) veya (20 x 30 cm) anma ebatlarında, her türlü desen ve yüzey özelliğinde, ı. kalite, renkli seramik duvar karoları ile 3 mm derz aralıklı duvar kaplaması yapılması (karo yapıştırıcısı ile)	m2	965.44		
77	Y.26.015/251	Ready-made, equipped flat sheet, sill, parapet or wall coping (all kinds of surface treatment) made of Marble aggregated concrete // Mermer agregalı betondan yapılmış hazır, teçhizatlı, düz levha ile denizlik, parapet veya harpuşta yapılması (her türlü yüzey işlemleri)	m2	8.93		
78	Y.26.017/032	Covering with 8 cm height normal cement steam cured concrete paving stone (every size, color and texture) // 8 cm yüksekliğinde normal çimentolu buhar kürlü beton parke taşı ile döşeme kaplaması yapılması (her ebat, renk ve desende)	m2	3,080.43		

No	Pose/Item No	Pose/Item Definition // Poz tanımı	UNIT	Quantity	Unit Price (USD)	Price (USD)
79	Y.26.017/067	75x30x15 cm normal cement steam cured concrete curbstone (bevelled, every color) // 75 X 30 X 15 cm boyutlarında normal çimentolu buhar kürlü beton bordür döşenmesi (pahlı, her renk)	m	1,266.60		
80	Y.26.017/128	Laying 30 x 10 x free length cm in dimensions normal cemented steam cured stone gutter(every colour) // 30 x 10 x serbest boy cm boyutlarında normal çimentolu buhar kürlü beton oluk taşı döşenmesi (her renk)	m	671.10		
81	Y.26.020/012A	Covering with 3 cm thick colored marble sheet (3 cmx30-40-50 cm x free length) (honed or polished) // 3 cm kalınlığında renkli mermer levha ile döşeme kaplaması yapılması	m2	16.00		
82	Y.26.020/021A	Wall covering with 2 cm thick white marble slab (2 cmx30-40-50 cmx free size) (honed or polished) // 2 cm kalınlığında beyaz mermer levha ile duvar kaplaması yapılması (2cmx30-40-50cmxfree length) (honlu veya cilalı)	m2	9.19		
83	Y.26.020/042A	3 cm thick colored marble slab with exterior sill (3 cmx30-40-50 cmx free size) (honed or polished) // 3 cm kalınlığında renkli mermer levha ile dış denizlik yapılması	m2	3.79		
84	Y.26.020/052A	Parapet made of 3 cm thick colored marble slab (3 cmx30-40-50 cmx free size) (honed or polished) // 3 cm kalınlığında renkli mermer levha ile parapet yapılması	m2	3.79		
85	Y.26.020/131A	Coating of ladder step with light colored traverten plate (step 3 cm, riser 2 cm) (honed or polished) // Açık renkli traverten levha ile merdiven basamağı kaplaması yapılması (bas 3 cm, rıht 2 cm kalın.)	m2	26.24		
86	Y.26.020/305A	Paving with 4 cm thick andesite sheet (30 cmx free length) // 4 cm kalın. andezit levha ile döşeme kaplaması yapılması	m2	79.00		

No	Pose/Item No	Pose/Item Definition // Poz tanımı	UNIT	Quantity	Unit Price (USD)	Price (USD)
87	Y.27.501/01	250/350 kg cement mortar with coarse and fine mortar (exterior) // 250/350 kg çimento dozlu kaba ve ince harçla sıva yapılması (dış cephe sıvası)	m2	1,932.60		
88	Y.27.501/02	200/250 kg lime/cement mix coarse and fine mortar plaster (interior wall plaster) // 200/250 kg kireç/çimento karışımı kaba ve ince harçla sıva yapılması (iç cephe sıvası)	m2	2,814.10		
89	Y.27.501/03	200/250 kg lime/cement mix coarse and fine mortar plaster (ceiling) // 250/350 kg çimento-kireç karışımı kaba ince harçla sıva yapılması (tavan)	m2	892.16		
90	Y.27.562/015	Preparation of 4 cm thick plaster on internal or external surfaces with inorganic binding ready (fabricated) coarse / fine plaster mortar (TI, WI, CSII) // İnorganik bağlayıcı hazır (fabrikasyon) kaba/ince sıva harcı (TI, WI, CSII) ile iç ve dış yüzeylere 4 cm kalınlıkta sıva yapılması	m2	676.00		
91	Y.27.581/MK	Construction of leveling layer with 200 kg cement dosage // 200 dz çimento harcıyla tesviye tabakası yapımı	m2	1,915.96		
92	Y.27.583	Construction of screed with 2.5 cm thickness and 400 kg cement dosage // 2.5 cm kalınlığında 400 kg çimento dozlu sap yapılması	m2	391.59		
93	Y.28.645/C41	PVC and aluminum joinery profile with 4 + 4 mm thickness and 12 mm intermediate space with double glazed window unit with solar and temperature control coating // PVC ve alüminyum doğramaya profil ile 4+4 mm kalınlıkta 12 mm ara boşluklu ilk camı güneş ve ısı kontrol kaplamalı çift camlı pencere ünitesi takılması	m2	110.92		
94	37.030/İB	Lawn and flower planting // Çim ve çiçek ekilmesi	da	17.98		
95	Special/Civ/25	Sapling planting // Fidan dikilmesi	1000 pcs	1.00		

No	Pose/Item No	Pose/Item Definition // Poz tanımı	UNIT	Quantity	Unit Price (USD)	Price (USD)
96	37.092/3	Laying 10 -15 cm thickness topsoil on the field to be planted // Bitkisel kaplama yapılacak saha üzerine 10-15 cm kalınlıkta bitkisel toprağın serilmesi	m3	2,250.00		
97	37.092/2	Supply of topsoil // Bitkisel toprak temini	m3	2,250.00		
98	37.092/1	Fertilizing of the soil // Toprağın gübrelenmesi	ton	120.00		
99	Special/Civ/01	Aluminium Handrail // Alüminyum Korkuluk	m	90.20		
100	Special/Civ/02	B106 CONSTRUCTION OF SAMPLING AND FLOWMETER CABINET // B106 NUMUNE ALMA VE DEBİMETRE KABİNİ YAPILMASI	lump sum	1.00		
101	Special/Civ/03	SUPPLY AND INSTALLATION OF TREATMENT PLANT LABORATORY EQUIPMENT AND CONSUMABLES // ARITMA TESİSİ LABORATUVAR EKİPMANI VE SARF MALZEMELERİNİN TEMİN EDİLMESİ VE YERİNE KONULMASI	lump sum	1.00		
102	Special/Civ/04	CONSTRUCTION OF THE PLANT'S GATE // TESİSİN GİRİŞ KAPISININ YAPILMASI	lump sum	1.00		
103	Special/Civ/05	CONSTRUCTION OF SEWERAGE LINE BY USING STEAM-CURED (WITH MUFF) CONCRETE PIPE WITH Ø600 MM BORE AND HAVING INTEGRATED SEAL WITH CEMENT CONTENT OF 500 KG/M3 (WITH TRENCH BACKFILLED WITH EXCAVATION MATERIAL) // Ø600 MM İÇ ÇAPINDA 500 DOZLU ENTEGRE CONTALI, BUHAR KÜRLÜ (MUFLU) BETON BORU İLE KANALİZASYON HATTI YAPILMASI (HENDEK DOLGUSU KAZIDAN ÇIKAN MALZEME İLE)	m	120.00		

No	Pose/Item No	Pose/Item Definition // Poz tanımı	UNIT	Quantity	Unit Price (USD)	Price (USD)
104	Special/Civ/06	CONSTRUCTION OF SEWERAGE LINE BY USING STEAM-CURED (WITH MUFF) CONCRETE PIPE WITH Ø200 MM BORE AND HAVING INTEGRATED SEAL WITH CEMENT CONTENT OF 500 KG/M3 (WITH TRENCH BACKFILLED WITH EXCAVATION MATERIAL) // Ø200 MM İÇ ÇAPINDA 500 DOZLU ENTEGRE CONTALI, BUHAR KÜRLÜ (MUFLU) BETON BORU İLE KANALİZASYON HATTI YAPILMASI (HENDEK DOLGUSU KAZIDAN ÇIKAN MALZEME İLE)	m	71.00		
105	Special/Civ/07	CONSTRUCTION OF PREFABRICATED STEAM-CURED MANHOLE WITH CEMENT CONTENT OF 500 KG/M3 WITH Ø600 mm OUTLET DIAMETER // Ø600 mm ÇIKIŞ ÇAPINDA BUHAR KÜRLÜ PREFABRİK 500 DOZLU MUAYENE BACASI İMALATININ YAPILMASI (HENDEK DOLGUSU KAZIDAN ÇIKAN MALZEME İLE)	pcs	2.00		
106	Special/Civ/08	CONSTRUCTION OF PREFABRICATED STEAM-CURED MANHOLE WITH CEMENT CONTENT OF 500 KG/M3 WITH Ø200 mm OUTLET DIAMETER // Ø200 mm ÇIKIŞ ÇAPINDA BUHAR KÜRLÜ PREFABRİK 500 DOZLU MUAYENE BACASI İMALATININ YAPILMASI (HENDEK DOLGUSU KAZIDAN ÇIKAN MALZEME İLE)	lump sum	1.00		
107	Special/Civ/09	Laying Ø32 PN10 Atü PE100 pipe (Trench filler with excavation material) // Ø32 PN10 Atü PE100 Boru Döşenmesi (Hendek Dolgusu Kazıdan Çıkan Malzeme İle)	m	101.80		
108	Special/Civ/10	Laying Ø40 PN10 Atü PE100 pipe (Trench filler with excavation material) // Ø40 PN10 Atü PE100 Boru Döşenmesi (Hendek Dolgusu Kazıdan Çıkan Malzeme İle)	m	25.50		
109	Special/Civ/11	Laying Ø63 PN10 Atü PE100 pipe (Trench filler with excavation material) // Ø63 PN10 Atü PE100 Boru Döşenmesi (Hendek Dolgusu Kazıdan Çıkan Malzeme İle)	m	28.00		

No	Pose/Item No	Pose/Item Definition // Poz tanımı	UNIT	Quantity	Unit Price (USD)	Price (USD)
110	Special/Civ/12	Laying Ø75 PN10 Atü PE100 pipe (Trench filler with excavation material) // Ø75 PN10 Atü PE100 Boru Döşenmesi (Hendek Dolgusu Kazıdan Çıkan Malzeme İle)	m	406.08		
111	Special/Civ/13	Laying Ø90 PN10 Atü PE100 pipe (Trench filler with excavation material) // Ø90 PN10 Atü PE100 Boru Döşenmesi (Hendek Dolgusu Kazıdan Çıkan Malzeme İle)	m	25.50		
112	Special/Civ/14	Laying Ø125 PN10 Atü PE100 pipe (Trench filler with excavation material) // Ø125 PN10 Atü PE100 Boru Döşenmesi (Hendek Dolgusu Kazıdan Çıkan Malzeme İle)	m	145.00		
113	Special/Civ/15	Laying Ø250 PN10 Atü PE100 pipe (Trench filler with excavation material) // Ø250 PN10 Atü PE100 Boru Döşenmesi (Hendek Dolgusu Kazıdan Çıkan Malzeme İle)	m	158.00		
114	Special/Civ/16	Laying Ø280 PN10 Atü PE100 pipe (Trench filler with excavation material) // Ø280 PN10 Atü PE100 Boru Döşenmesi (Hendek Dolgusu Kazıdan Çıkan Malzeme İle)	m	16.00		
115	Special/Civ/17	Laying Ø400 PN10 Atü PE100 pipe (Trench filler with excavation material) // Ø400 PN10 Atü PE100 Boru Döşenmesi (Hendek Dolgusu Kazıdan Çıkan Malzeme İle)	m	90.00		
116	Special/Civ/18	Laying Ø450 PN10 Atü PE100 pipe (Trench filler with excavation material) // Ø450 PN10 Atü PE100 Boru Döşenmesi (Hendek Dolgusu Kazıdan Çıkan Malzeme İle)	m	6.50		
117	Special/Civ/19	Laying Ø560 PN10 Atü PE100 pipe (Trench filler with excavation material) // Ø560 PN10 Atü PE100 Boru Döşenmesi (Hendek Dolgusu Kazıdan Çıkan Malzeme İle)	m	157.00		
118	Special/Civ/20	Laying DN40 (4.5mm) SS 304 Pipe (Trench filler with excavation material) // DN40 (4.5mm) SS 304 Boru Döşenmesi (Hendek Dolgusu Kazıdan Çıkan Malzeme İle)	m	174.00		

No	Pose/Item No	Pose/Item Definition // Poz tanımı	UNIT	Quantity	Unit Price (USD)	Price (USD)
119	Special/Civ/21	Laying DN200 (4.5mm) SS 304 Pipe (Trench filler with excavation material) // DN200 (4.5mm) SS 304 Boru Döşenmesi (Hendek Dolgusu Kazıdan Çıkan Malzeme İle)	m	287.50		
120	Special/Civ/22	Laying DN350 (4.5mm) SS 304 Pipe (Trench filler with excavation material) // DN350 (4.5mm) SS 304 Boru Döşenmesi (Hendek Dolgusu Kazıdan Çıkan Malzeme İle)	m	79.50		
121	Special/Civ/23	Laying DN550 (4.5mm) SS 304 Pipe (Trench filler with excavation material) // DN550 (4.5mm) SS 304 Boru Döşenmesi (Hendek Dolgusu Kazıdan Çıkan Malzeme İle)	m	2.00		
Total						

BILL OF QUANTITIES FOR MECHANICAL WORKS;

No	Pose/Item No	Pose/Item Definition // Poz tanımı	UNIT	Quantity	Unit Price (USD)	Price (USD)
1	071.112	Semi pedestal Hand Wash basin 45x55 // Yarım ayaklı lavabo Tk. 45x55 cm	pcs	6.00		
2	089.706	Sink and wash basin syphon with plastic plug 1.class // Lavabo ve Eviye sifonu, 1. sınıf özel plastik taslı	pcs	11.00		
3	073.202	Crystal Glass wall mirror 40x60 // Ayna kristal cam 40x60 cm	pcs	6.00		
4	074.102	Vitrified tile etagere 60x15 // Etajer fayans camlaşmış çini 60x15 cm	pcs	6.00		
5	075.103	Vitrified pan closet with plastic syphon 50x60 //Alaturka hela taşı Fayans camlaşmış çini Plastik Sifonlu 50 x 60cm	pcs	3.00		
6	089.1110	3/4" / 90-degree built-in seramic sealed cut off valve with rosette // Alaturka hela için, 3/4" / 90 derece, seramik salmastralı ankastre ara kesme valfi, rozeti ile (bas)	pcs	3.00		

No	Pose/Item No	Pose/Item Definition // Poz tanımı	UNIT	Quantity	Unit Price (USD)	Price (USD)
7	080.102	Brass Syphone, approx. 35x40x50 cm extra class normal type: Urinal and fittings // Piriç sifonlu takriben 35x40x50 cm. ekstra sınıf normal tip: pisuar ve tesisatı	pcs	2.00		
8	081.301	Approx. 40x50 cm extra vitrified urinal partition // Takriben 40x50 cm. ekstra. fayans camlaşmış çini: pisuar bölmesi	pcs	1.00		
9	083-104	Single, without drainboard Stainless steel sink 50x60x22 cm // Eviye Bir gözlü Damlalıksız Paslanmaz Çelik 50x60x22 cm	pcs	2.00		
10	083-202	Single, with drainboard Stainless steel sink 50x100 cm // Eviye Bir gözlü Damlalıklı Paslanmaz Çelik 50x100 cm	pcs	1.00		
11	083-401	Double Stainless steel sink ,with drainboard 50x160 cm // Eviye İki gözlü Damlalıklı Paslanmaz Çelik 50x160 cm/	pcs	1.00		
12	087.602	Arcylic monobloc shower tray 80x8x11 // Duş teknesi akrilik monoblok 80x80x11 cm	pcs	2.00		
13	089.602	Shower Mixer valve bath filler tap head handset // Duş bataryası, el duşu ve askısı ile komple batarya	pcs	2.00		
14	089.1401	Single Lever Single handle sink tap // Tek kumandalı tek gövde eviye bataryası, döner uçlu	pcs	4.00		
15	089.1505	Single lever single handle washbasin tap // Tek kumandalı tek gövde lavabo bataryası	pcs	6.00		
16	090.201	Tile soap dish // Sabunluk10x16 cm kolsuz, fayans	pcs	2.00		
17	Special/Mec/01	Stainless steel soap dispenser, wall mount // Sıvı sabun makinesi 400 gr Paslanmaz çelik gövdeli, duvara monteli	pcs	6.00		
18	Special/Mec/02	Chrome finish towel bar 45cm wall screws // havluluk princi kromajlı sabit 45 cm.	pcs	2.00		
19	094.400	Stainless steel roll paper holder // Kağıtlık paslanmaz çelik	pcs	2.00		

No	Pose/Item No	Pose/Item Definition // Poz tanımı	UNIT	Quantity	Unit Price (USD)	Price (USD)
20	097.504	17x17 mm ø70 mm brass-silver Anti-odor Floor drain // Yer süzgeci 17x17 mm ø70 mm çıkışlı koku fermatürlü prinç kromajlı ızgaralı	pcs	3.00		
21	103.108/ÇŞB	Water flow meter // Soğuk Su Sayacı	pcs	1.00		
22	104-103	Inlet Float valve (die casting) (Dia 20 mm, (3/4")) // Flotör (pres döküm) (çap 20 mm, (3/4"))	pcs	1.00		
23	107-1203/ÇŞB	Supply and assembly of Hyrophore pump (1+1 Vertical Pump (P:3 x 5.5kW, Q:20 m³/h , H:50 mss) // Hidrafor (1+1 Dikey Pompa (P:3 x 5.5kW , Q:20 m³/h , H:50 mss) temini ve montajı	pcs	1.00		
24	107-1303/ÇŞB	Supply and assembly of Hyrophore pump (2+1 Vertical Pump (P:3 x 9 kW, Q:30 m³/h , H:60 mss) // Hidrafor (2+1 Dikey Pompa (P:3 x 9 kW , Q:30 m³/h , H:60 mss) temini ve montajı	pcs	1.00		
25	110-690-04	Single walled (open system) solar energy boiler-150 lt // Tek Cidarlı (Açık Sistem) Güneş Enerjisi Boyleri - 150 litre	pcs	1.00		
26	110-701	Aluminium self corrugated solar panel collector // Güneş enerji toplayıcısı Kendinden kanatlı alüminyum panelli kollektör	m2	4.00		
27	117.304	Electric water heater 80lt.2000w // Elektrikli Su Isıtıcıları 80 lt. 2000 W	pcs	2.00		
28	1002.117	Fire cabinet with fire fire extinguisher in line with norm Dn25 25m ts en 671-1 // Dn25 25m ts en 671-1 normlarında tüplü model yangın dolabı	pcs	1.00		
29	201.203	1/2"welded galvanized pipe (including screwed pipe installation material cost in line with 201.400 pose) // 1/2" dikişli galvanizli boru (201.400 pozuna uygun şekilde vidalı boru montaj malzeme bedeli dahil)	m	40.00		

No	Pose/Item No	Pose/Item Definition // Poz tanımı	UNIT	Quantity	Unit Price (USD)	Price (USD)
30	201.204	3/4" welded galvanized pipe (including screwed pipe installation material cost in line with 201.400 pose) // 3/4" dikişli galvanizli boru (201.400 pozuna uygun şekilde vidalı boru montaj malzeme bedeli dahil)	m	6.00		
31	201.206	1 1/4" welded galvanized pipe (including screwed pipe installation material cost in line with 201.400 pose) // 1 1/4" dikişli galvanizli boru (201.400 pozuna uygun şekilde vidalı boru montaj malzeme bedeli dahil)	m	6.00		
32	201.209	2 1/2" welded galvanized pipe (including screwed pipe installation material cost in line with 201.400 pose) // 2 1/2" dikişli galvanizli boru (201.400 pozuna uygun şekilde vidalı boru montaj malzeme bedeli dahil)	m	20.00		
33	204.401	Ø50 mm PVC pipe (including PVC pipe installation material cost in line with 204.501 pose) // Ø50 mm PVC boru (204.501 pozuna uygun şekilde PVC Pissu borusu montaj malzeme bedeli dahil)	30 %	13.00		
34	204.402	Ø70 mm PVC pipe (including PVC pipe installation material cost in line with 204.501 pose) // Ø70 mm PVC boru (204.501 pozuna uygun şekilde PVC Pissu borusu montaj malzeme bedeli dahil)	m	34.00		
35	204.403	Ø100 mm PVC pipe (including PVC pipe installation material cost in line with 204.501 pose) // Ø100 mm PVC boru (204.501 pozuna uygun şekilde PVC Pissu borusu montaj malzeme bedeli dahil)	m	59.00		
36	204.3102	Polypropilene pipe outer dia 20 mm (1/2") (including Polypropilene pipe installation cost in line with 204.3300 pose) // Polipropilen boru Dış çapı 20 mm (1/2") (204.3300 pozuna uygun şekilde Polipropilen boru montaj bedeli dahil)	m	53.00		

No	Pose/Item No	Pose/Item Definition // Poz tanımı	UNIT	Quantity	Unit Price (USD)	Price (USD)
37	204.3103	Polypropilene pipe outer dia 25 mm (3/4") (including Polypropylene pipe installation cost in line with 204.3300 pose) // Polipropilen boru Dış çapı 25 mm (3/4")(204.3300 pozuna uygun şekilde Polipropilen boru montaj bedeli dahil)	45%	39.00		
38	204.3104	Polypropilene pipe outer dia 32 mm (1") (including Polypropylene pipe installation cost in line with 204.3300 pose) // Polipropilen boru Dış çapı 32 mm (1") (204.3300 pozuna uygun şekilde Polipropilen boru montaj bedeli dahil)	m	28.00		
39	207-405/ÇŞB	Ø100 ball valve // Ø100 mm Küresel vana	pcs	11.00		
40	210-624	Pressed brass Ball valve, teflon sealed // Küresel vana, prinç pres, teflon contalı (çap: 20 mm)	pcs	4.00		
41	210.708/790	65 ø mm. Full bore valve PN16 Cast Iron with stainless steel ball, stainless steel washer or spring reinforced Teflon, flanged. // 65 ø mm. Tam geçişli PN.16 gövdesi pik döküm, küresi paslanmaz çelikten, paslanmaz çelikten veya teflon tabak yay takviyeli contalı, flanşlı/	pcs	1.00		
42	210.783/790	1/2" mm. Full bore valve PN10-16 Cast Iron with stainless steel ball, stainless steel washer or spring reinforced Teflon, screwed // 1/2" Tam geçişli PN.10-16 gövdesi pik döküm, küresi paslanmaz çelikten, paslanmaz çelikten veya teflon tabak yay takviyeli contalı, vidalı	pcs	3.00		
43	210.784/790	3/4" mm. Full bore valve PN10-16 Cast Iron with stainless steel ball, stainless steel washer or spring reinforced Teflon, screwed // 3/4" Tam geçişli PN.10-16 gövdesi pik döküm, küresi paslanmaz çelikten, paslanmaz çelikten veya teflon tabak yay takviyeli contalı, vidalı	pcs	3.00		

No	Pose/Item No	Pose/Item Definition // Poz tanımı	UNIT	Quantity	Unit Price (USD)	Price (USD)
44	210.785/790	1" mm. Full bore valve PN10-16 Cast Iron with stainless steel ball, stainless steel washer or spring reinforced Teflon, screwed // 1" Tam geçişli PN.10-16 gövdesi pik döküm, küresi paslanmaz çelikten, paslanmaz çelikten veya teflon tabak yay takviyeli contalı, vidalı	pcs	2.00		
45	210.786/790	1 1/4" mm. Full bore valve PN10-16 Cast Iron with stainless steel ball, stainless steel washer or spring reinforced Teflon, screwed // 1 1/4" Tam geçişli PN.10-16 gövdesi pik döküm, küresi paslanmaz çelikten, paslanmaz çelikten veya teflon tabak yay takviyeli contalı, vidalı	pcs	2.00		
46	Y.23.176	Making and installation of various steel/metal works from lama and profile sections // Lama ve profil demirlerden çeşitli demir işleri yapılması ve yerine konulması	kg	170.00		
47	253.302	Window type aspirator (600 m ³ /hr) // Pencere tipi aspiratör (600 m ³ /sa)	pcs	6.00		
48	269.103	Aluminium window shutter // Panjur Alüminyum	m2	1.00		
49	261.403	Stainless Steel Channel // Paslanmaz Çelik Kanal	m2	7.80		
50	280.1105	Variable Cooling Capacity/Variable Refrigerant Discharge (VRF) Multi inner unit air conditioner. Cooling capacity(nominal)49kW, Heating capacity(nominal)44kW, Outdoor Unit or Outdoor Unit group // Değişken Soğutkan Debili (DSD) Çok iç Üniteli Klima Sistemi Soğutma kapasitesi (nom):49 kW., ısıtma kapasitesi (nom):44 kW, Dış ünite veya Dış ünite grubu	pcs	1.00		

No	Pose/Item No	Pose/Item Definition // Poz tanımı	UNIT	Quantity	Unit Price (USD)	Price (USD)
51	280.2101	Indoor Unit: Wall type with air swinging wings (up-down, right-left) indoor unit group Cooling capacity of 2 kw and heating capacity of 2,5 kw// İç Ünite Grubu Soğutma kapasitesi (nom):2kw., ısıtma kapasitesi (nom):2,5 kw. duvar tipi iç ünite Duvar Tipi, Hava Yönlendirme Kanatları Aşağı/Yukarı ve sağa/sola yönlendirme yapabilen özellikte	pcs	1.00		
52	280.2102	Indoor Unit: Wall type with air swinging wings (up-down, right-left) indoor unit group Cooling capacity of 2,5 kw and heating capacity of 3 kw // İç Ünite Grubu: Soğutma kapasitesi (nom):2,5 kw., ısıtma kapasitesi (nom):3 kw. duvar tipi iç ünite Hava Yönlendirme Kanatları Aşağı/Yukarı ve sağa/sola yönlendirme yapabilen özellikte/	pcs	3.00		
53	280.2104	Indoor Unit: Wall type with air swinging wings (up-down, right-left) indoor unit group Cooling capacity of 4 kw and heating capacity of 4,5 kw // İç Ünite Grubu: Soğutma kapasitesi (nom):4 kw., ısıtma kapasitesi (nom):4,5 kw. duvar tipi iç ünite, Hava Yönlendirme Kanatları Aşağı/Yukarı ve sağa/sola yönlendirme yapabilen özellikte	pcs	7.00		
54	280.2105	Indoor Unit: Wall type with air swinging wings (up-down, right-left) indoor unit group Cooling capacity of 5,5 kw and heating capacity of 6 kw // İç Ünite Grubu Soğutma kapasitesi (nom):5,5 kw., ısıtma kapasitesi (nom):6 kw. duvar tipi iç ünite, Hava Yönlendirme Kanatları Aşağı/Yukarı ve sağa/sola yönlendirme yapabilen özellikte	pcs	2.00		
55	281.301	Wired Remote Control device for VRF air conditioner // DSD Klima Sistemi Kablolu Uzaktan Kumanda Cihazı /	pcs	13.00		

No	Pose/Item No	Pose/Item Definition // Poz tanımı	UNIT	Quantity	Unit Price (USD)	Price (USD)
56	281.501	1/4" 0,8 mm (13 mm insulated) Copper tube group with copper piping installation parts of VRF air Conditioner // DSD Klima Sistemi Bakır Borulama Tesisatı montaj elemanları ile birlikte Bakır boru grubu 1/4" 0,8 mm (13 mm izoleli)	m	35.00		
57	281.502	3/8" 0,8 mm (13 mm insulated) Copper tube group with copper piping installation parts of VRF air Conditioner // DSD Klima Sistemi Bakır Borulama Tesisatı montaj elemanları ile birlikte Bakır boru grubu 3/8" 0,8 mm (13 mm izoleli)	m	5.00		
58	281.503	1/2" 0,8 mm (13 mm insulated) Copper tube group with copper piping installation parts of VRF air Conditioner // DSD Klima Sistemi Bakır Borulama Tesisatı montaj elemanları ile birlikte Bakır boru grubu 5/8" 1,0 mm (13 mm izoleli)	m	51.00		
59	281.504	1/2" 0,8 mm (13 mm insulated) Copper tube group with copper piping installation parts of VRF air Conditioner // DSD Klima Sistemi Bakır Borulama Tesisatı montaj elemanları ile birlikte Bakır boru grubu 5/8" 1,0 mm (13 mm izoleli)	m	11.00		
60	281.507	5/8" 1,0 mm (13 mm insulated) Copper tube group with copper piping installation parts of VRF air Conditioner // DSD Klima Sistemi Bakır Borulama Tesisatı montaj elemanları ile birlikte Bakır boru grubu 5/8" 1,0 mm (13 mm izoleli)	m	10.00		
61	281.508	1 1/8" 1/2 mm (19 mm insulated) Copper tube group with copper piping installation parts of VRF air Conditioner // DSD Klima Sistemi Bakır Borulama Tesisatı montaj elemanları ile birlikte Bakır boru grubu 1 1/8" 1/2 mm (19 mm izoleli)	m	6.00		

No	Pose/Item No	Pose/Item Definition // Poz tanımı	UNIT	Quantity	Unit Price (USD)	Price (USD)
62	281.509	13/8" 1,5 mm (19 mm insulated) Copper tube group with copper piping installation parts of VRF air Conditioner // DSD Klima Sistemi Bakır Borulama Tesisatı montaj elemanları ile birlikte Bakır boru grubu 13/8" 1,5 mm (19 mm izoleli)	m	6.00		
63	281.601	Joints Up to 25 kW (Joint elements of multi indoor unit VRF air Conditioner to 25 kW.) // 25 kw.'a kadar değişken soğutkan debili çok iç üniteli klima sistemi bağlantı (joint) elemanları	set	7.00		
64	281.602	Joint elements of multi indoor unit VRF air Conditioner between 25 kW and 50 kW //25-50 Kw arası değişken soğutkan debili çok iç üniteli klima sistemi bağlantı (joint) elemanları	set	5.00		
65	281.700	Header Elements // Dağıtım (Header)Elemanları	set	1.00		
66	Special/Mec/03	Convactor Type Electric Heater 1.000W // Konvektör tipi elektrikli mekan ısıtıcısı 1.000 W	pcs	4.00		
67	Special/Mec/04	SUPPLY AND INSTALLATION OF MECHANICAL EQUIPMENT FOR MB 1959 BY-PASS FLUME UNIT // MB 1959 BY-PASS BACASI ÜNİTESİ MEKANİK EKİPMANLARININ TEMİNİ VE MONTAJI	lump sum	1.00		
68	Special/Mec/05	SUPPLY AND INSTALLATION OF THE MECHANICAL EQUIPMENT OF T-101 COLLECTION CHAMBER (INLET FLUME), T102 MECHANICAL COARSE GRID, T103 MECHANICAL FINE GRID UNIT // T-101 TOPLAMA ODASI (GİRİŞ BACASI), T102 MEKANİK KABA IZGARA, T103 MEKANİK İNCE IZGARA ÜNİTESİ MEKANİK EKİPMANLARININ TEMİNİ VE MONTAJI	lump sum	1.00		

No	Pose/Item No	Pose/Item Definition // Poz tanımı	UNIT	Quantity	Unit Price (USD)	Price (USD)
69	Special/Mec/06	SUPPLY AND INSTALLATION OF THE MECHANICAL EQUIPMENT OF T-104 AERATED GRIT ARRESTER, T105 INLET PARSHALL FLUME UNIT // T-104 HAVALANDIRMALI KUM TUTUCU, T105 GİRİŞ PARSHALL SAVAĞI ÜNİTESİ MEKANİK EKİPMANLARININ TEMİNİ VE MONTAJI	lump sum	1.00		
70	Special/Mec/07	SUPPLY AND INSTALLATION OF THE MECHANICAL EQUIPMENT OF T-106 INLET PUMP STATION (TM1) UNIT // T-106 GİRİŞ TERFİ MERKEZİ (TM1) ÜNİTESİ MEKANİK EKİPMANLARININ TEMİNİ VE MONTAJI	lump sum	1.00		
71	Special/Mec/08	SUPPLY AND INSTALLATION OF THE MECHANICAL EQUIPMENT OF T-107/A, B ANAEROBIC TANKS UNIT // T-107/A, B ANAEROBİK HAVUZLAR ÜNİTESİ MEKANİK EKİPMANLARININ TEMİNİ VE MONTAJI	lump sum	1.00		
72	Special/Mec/09	SUPPLY AND INSTALLATION OF THE MECHANICAL EQUIPMENT OF T-108 (DY1) AERATION TANKS FLOW DISTRIBUTION STRUCTURE (DY1) AND T110 AERATION TANKS COLLECTION STRUCTURE UNIT // T-108 (DY1) HAVALANDIRMA HAVUZLARI DEBİ DAĞITMA YAPISI (DY1) VE T110 HAVALANDIRMA HAVUZLARI TOPLAMA YAPISI ÜNİTESİ MEKANİK EKİPMANLARININ TEMİNİ VE MONTAJI	lump sum	1.00		
73	Special/Mec/10	SUPPLY AND INSTALLATION OF THE MECHANICAL EQUIPMENT OF T-109/A, B AERATION TANKS UNIT // T-109/A, B HAVALANDIRMA HAVUZLARI ÜNİTESİ MEKANİK EKİPMANLARININ TEMİNİ VE MONTAJI	lump sum	1.00		
74	Special/Mec/11	SUPPLY AND INSTALLATION OF THE MECHANICAL EQUIPMENT OF T-111 (DY2) SEDIMENTATION TANKS DISTRIBUTION STRUCTURE UNIT // T-111 (DY2) ÇÖKELTME HAVUZLARI DAĞITMA YAPISI ÜNİTESİ MEKANİK EKİPMANLARININ TEMİNİ VE MONTAJI	lump sum	1.00		

No	Pose/Item No	Pose/Item Definition // Poz tanımı	UNIT	Quantity	Unit Price (USD)	Price (USD)
75	Special/Mec/12	SUPPLY AND INSTALLATION OF THE MECHANICAL EQUIPMENT OF T115 SCUM COLLECTION STRUCTURE, V 1/2 TELESCOPIC VALVE ROOMS, T112/A, B SEDIMENTATION TANKS UNIT // T115 KÖPÜK TOPLAMA YAPISI, V 1/2 TELESKOPIK VANA ODA LARI, T112/A, B ÇÖKELTME HAVUZ LARI ÜNİTESİ MEKANİK EKİPMAN LARININ TEMİNİ VE MONTAJI	lump sum	1.00		
76	Special/Mec/13	SUPPLY AND INSTALLATION OF THE MECHANICAL EQUIPMENT OF T-113 PARSHALL FLUME-CHANNEL AND B2 STACK UNIT // T-113 PARSHALL SAVAĞI - KANALI VE B2 BACASI ÜNİTESİ MEKANİK EKİPMAN LARININ TEMİNİ VE MONTAJI	lump sum	1.00		
77	Special/Mec/14	SUPPLY AND INSTALLATION OF THE MECHANICAL EQUIPMENT OF T-114 (TM2) RETURN AND EXCESS SLUDGE PUMP STATION UNIT // T-114 (TM2) GERİ DEVİR VE FAZLA ÇAMUR TERFİ MERKEZİ ÜNİTESİ MEKANİK EKİPMAN LARININ TEMİNİ VE MONTAJI	lump sum	1.00		
78	Special/Mec/15	SUPPLY AND INSTALLATION OF THE MECHANICAL EQUIPMENT OF B103 DECANter BUILDING // B103 DEKANTÖR BİNASI MEKANİK EKİPMAN LARININ TEMİNİ VE MONTAJI	lump sum	1.00		
79	Special/Mec/16	SUPPLY AND INSTALLATION OF THE MECHANICAL EQUIPMENT OF T117 (TM3) LEACHATE PUMP STATION UNIT // T117 (TM3) SÜZÜNTÜ SUYU TERFİ MERKEZİ ÜNİTESİ MEKANİK EKİPMAN LARININ TEMİNİ VE MONTAJI	lump sum	1.00		
80	Special/Mec/17	SUPPLY AND INSTALLATION OF THE MECHANICAL EQUIPMENT OF B102 BLOWER BUILDING //	lump sum	1.00		
81	Special/Mec/18	SUPPLY AND INSTALLATION OF THE MECHANICAL EQUIPMENT OF T-118 100 M3 BAG WATER TANK UNIT // T-118 100 M³ BAG SU DEPOSU ÜNİTESİ MEKANİK EKİPMAN LARININ TEMİNİ VE MONTAJI	lump sum	1.00		

No	Pose/Item No	Pose/Item Definition // Poz tanımı	UNIT	Quantity	Unit Price (USD)	Price (USD)
82	Special/Mec/19	SUPPLY AND INSTALLATION OF THE GENERAL MECHANICAL EQUIPMENT OF THE TREATMENT PLANT // ARITMA TESİSİ GENEL MEKANİK EKİPMANLARININ TEMİNİ VE MONTAJI	lump sum	1.00		
Total for Mechanical Works						

BILL OF QUANTITIES FOR ELECTRICAL WORKS;

Bill of Quantities for POWER TRANSMISSION LINE (PTL)

No	Pose/Item No	Pose/Item Definition // Poz tanımı	UNIT	Quantity	Unit Price (USD)	Price (USD)
1	32.11.4/006	1×150ş/25 mm ² , 20.3/35 KV YAXC7-R (A2XSY); YAXC8V3V-R (A2XSEYFGY) Aluminum Cable, XLPE Insulated, PVC Outer Sheath (1. cable to the ground) // 1×150ş/25 mm ² , 20.3/35 kv yaxc7-r (a2xsy); yaxc8v3v-r (a2xsefygy) alüminyum kablo (xlpe yalıtkanlı, pvc dış kılıflı) [1. kablo toprağa]	m	300.00		
2	32.19.1/006	35kV, 1x150s / 25 mm ² Aluminum Cable, XLPE Insulated, PVC Outer Sheath (same ground duct additional furnished) // 1×150ş/25 mm ² ,20.3/35 kv yaxc7v-r (a2xsy); yaxc8vz3v-r (a2xsefygy) alüminyum kablo, xlpe yalıtkanlı, pvc dış kılıflı [2, 3 ve 4 kablo toprağa]	m	900.00		
3	32.15.1/006	35kV, 1x150s / 25 mm ² Aluminum Cable, XLPE Insulated, PVC Outer Sheath (concrete channel, pole, wall) // 1×150ş/25 mm ² , 20.3/35 kv yaxc7v-r (a2xsy); yaxc8vz3v-r (a2xsefygy) alüminyum kablo (xlpe yalıtkanlı, pvc dış kılıflı) [direğe ve beton kan.]	m	65.00		
4	32.11.4.M.1A	10 cm deepening of the earth cable channel (not-1) // Toprak kablo kanalının 10 cm derinleştirilmesi (not-1) 80 cm standart kablo kanalının 70cm derinleştirilmesi	m	300.00		
5	5.3/II	Large spaced overhead-line masts (galvanized and galvanized masts) // BÜYÜK ARALIKLI HAVA HATTI DİREKLERİ (GALV.CİVATALI VE GALV.DEMİR DİREK)	kg	475.00		

No	Pose/Item No	Pose/Item Definition // Poz tanımı	UNIT	Quantity	Unit Price (USD)	Price (USD)
6	5.5/II	Large spaced overhead-line masts (galv. Bolt and galv. steel traverses and consoles) // Büyük aralıklı hava hattı direkleri (galv. civatalı ve galv.demir travers kon.)	kg	220.00		
7	8.1/001	2 mm galvanized steel Tray/duct or shelves // 2 mm.lik galvanizli sac tava veya rafları	kg	45.00		
8	9.3.1/002	Swallow AWG 3 (109.96 kg / km) steel aluminum conductors // Swallow AWG 3 (109.96 kg/km) çelik alüminyum iletkenler	kg	6.00		
9	11.4/006	36 kV VHD-35 / Overhead -Line Normal Bearing Isolator // 36 KV VHD 35 (20 mm/kV) normal tip hava hattı mesnet izolatörleri	pcs	9.00		
10	11.5/023	Insulator bar (middle) for C 35 concrete power pole sleeper/traverse // C 35 beton travers için (orta) izolatör demiri	pcs	3.00		
11	11.5/020	C-35 Concrete Traverse (Carrier) Insulator bar // C 35 beton travers için (taşıyıcı) izolatör demiri	pcs	6.00		
12	15.2/010	36 kV, 10 kA ZnO Parafudr // 36 KV 10 kA metal oksit (ZnO) parafudr	pcs	3.00		
13	17.8/008	36kV, 630A, 12.5kA External Type Fused Grounding Disconnecter // 36 KV, 630 A, 12.5 kA harici tip sigortalı topraklamalı ayırıcılar	pcs	1.00		
14	17.9/025	36 KV, 30-40 A, L=635 mm. O= 45 mm. M.V fuse // 36 KV, 30-40 A, L=635 mm. O= 45 mm. O.G. sigorta patronları	pcs	3.00		
15	30.3/001	2 m. Galvanized 65 × 65 × 7. angle bracket, 5 mt. bands and their embedding // 2 m. galvanizli 65×65×7.LİK köşebent, 5 mt. şerit ve bunların gömülmesi	pcs	2.00		

No	Pose/Item No	Pose/Item Definition // Poz tanımı	UNIT	Quantity	Unit Price (USD)	Price (USD)
16	32.34.14.1/006	1×150 s/25 mm ² , 20.3/35 KV YAXC7V-R (A2XSY); YAXC8VZ3V-R (A2XSEYFGY) External Type shrinkable Aluminium cable connection // 1×150 s/25 mm ² , 20.3/35 KV YAXC7V-R (A2XSY); YAXC8VZ3V-R (A2XSEYFGY) harici tip büzüşmeli alüminyum kablo başlığı	pcs	4.00		
17	32.34.11.1/006	1×150 s/25 mm ² , 20.3/35 KV YAXC7V-R (A2XSY); YAXC8VZ3V-R (A2XSEYFGY) Internal Type shrinkable Aluminium cable connection // 1×150 s/25 mm ² , 20.3/35 KV YAXC7V-R (A2XSY); YAXC8VZ3V-R (A2XSEYFGY) DAHİLİ TİP BÜZÜŞMELİ ALÜMİNYUM KABLO BAŞLIĞI	pcs	4.00		
Total for POWER TRANSMISSION LINE (PTL)						

Bill of Quantities for GENERAL GROUNDING INSTALLATION

No	Pose/Item No	Pose/Item Definition // Poz tanımı	UNIT	Quantity	Unit Price (USD)	Price (USD)
1	982.101	Building enciture conductor 50 mm ² copper wire // Bina ihata iletkeni 50 mm ² bakır tel	m	200.00		
2	982.102	Building enciture conductor 30 × 3.5 mm galvanized steel lama // Bina ihata iletkeni 30×3.5 mm galvanizli çelik lama	m	1,600.00		
3	30.1/001	Burial of Galvanized 30x3,5 grounding strip // 30x3,5 topraklama şeridi ve gömülmesi	m	500.00		
4	30.4.2	Burial of 2 m, 65x65x7 galvanized grounding electrode // 2 mt uzunluğunda galvanizli 65x65x7'lik galvanizli toprak elektrot ve gömülmesi	pcs	34.00		
5	983.102	The ground electrode (rod), electrolytic copper // Toprak elektrodu (çubuk), elektrolitik bakır	pcs	27.00		
6	727.544	Column and feed line with 1kV underground cables 1 * 50 mm ² nyy (ts IEC 60502-1 + a1) // 1kv y. altı kabloları ile kolon ve besleme hattı 1*50 mm ² nyy (TS IEC 60502-1+A1)	m	1,150.00		

No	Pose/Item No	Pose/Item Definition // Poz tanımı	UNIT	Quantity	Unit Price (USD)	Price (USD)
7	780.126	Plastic insulated conductor (nya) 1 * 50 mm ² // Plastik izoleli iletken (nya) 1*50 mm ²	m	505.00		
8	710.100	Supply and installation of copper bars suitable for TSE requirements to be placed in the casting box and panel, and coloring of ts en 60445 // Döküm kutu içine ve panolara konulacak TSE şartlarına uygun bakır bara temin ve montajı ve TS EN 60445'deki renklere boyanması	kg	12.00		
9	727.541	Column and feed line with 1kV underground cables 1 * 16 mm ² nyy (ts IEC 60502-1 + a1) // 1kv y. altı kabloları ile kolon ve besleme hattı 1*16 mm ² nyy (TS IEC 60502-1+A1)	m	64.00		
Total for GENERAL GROUNDING INSTALLATION						

Bill of Quantities for LC, TRANSFER, COMPENSATION AND FIELD PANEL-SWITCHBOARD

No	Pose/Item No	Pose/Item Definition // Poz tanımı	UNIT	Quantity	Unit Price (USD)	Price (USD)
1	701.201	Frontal cover metal switchboard // Önden kapaklı saç pano (ts en 61439-1/2)	pcs	8.00		
2	3.1.1/011	Rectangular section copper bar, 50 × 10 mm ² , 4.45 kg / m // Dikdörtgen kesitli bakır bara, 50×10 mm ² , 4.45 Kg/m	kg	98.00		
3	3.1.1/008	Rectangular section copper bar, 40 × 5 mm ² , 1,78 kg / m // Dikdörtgen kesitli bakır bara, 40×5 mm ² , 1.78 Kg/m	kg	22.00		
4	718.53	Residual current circuit breaker from 3*300.to 3*1250 // Kaçak akım koruma şalteri 3*300a.den 3*1250e kadar	pcs	3.00		
5	718.529	Residual current circuit breaker from 3*380.to 3*250 // Kaçak akım koruma şalteri 3*80 a.den 3*250 e kadar	pcs	1.00		
6	715.307	Thermal, magnetic protective switch 3 * 40 a. (Behind the panel (ts en 60947-2) // Termik, manyetik koruyuculu şalter 3*40 a. (tablo arkası (ts en 60947-2)	pcs	2.00		

No	Pose/Item No	Pose/Item Definition // Poz tanımı	UNIT	Quantity	Unit Price (USD)	Price (USD)
7	715.309	Thermal, magnetic protective switch 3 * 100 a. (Behind the panel (ts en 60947-2) // Termik, mađnetik koruyuculu řalter 3*100 a.(tablo arkası (ts en 60947-2)	pcs	2.00		
8	715.31	Thermal, magnetic protective switch 3 * 200 a. (Behind the panel (ts en 60947-2) // Termik, mađnetik koruyuculu řalter 3*200 a.(tablo arkası (ts en 60947-2)	pcs	2.00		
9	715.311	Thermal, magnetic protective switch 3 * 300 a. (Behind the panel (ts en 60947-2) // Termik, mađnetik koruyuculu řalter 3*300 a. (tablo arkası (ts en 60947-2)	pcs	1.00		
10	715.312	Thermal, magnetic protective switch 3 * 600 a. (Behind the panel (ts en 60947-2) // Termik, mađnetik koruyuculu řalter 3*600 a. (tablo arkası (ts en 60947-2)	pcs	1.00		
11	715.313	Thermal, magnetic protective switch 3 * 1000 a. (Behind the panel (ts en 60947-2) // Termik, mađnetik koruyuculu řalter 3*1000 a. (tablo arkası (ts en 60947-2)	pcs	2.00		
12	723.301	Manually controlled center compensation batteries up to 400 V // Elle kumandalı merkezi kompanzasyon bataryaları	kVAR	20.00		
13	723.401	Automatic centralized compensation batteries up to 400 V // Otomatik kumandalı merkezi kompanzasyon bataryaları	kVAR	310.00		
14	723.511	Reactive power control relay // Reaktif Güç Kontrol Rölesi	pcs	1.00		
15	724.102	Knife Type Fuse up to 63 A (TS 86 EN 60269-1) // Bıçaklı sigorta 63 A.e kadar (TS 86 EN 60269-1)	pcs	3.00		
16	724.401	Automatic fuse with switch (up to 16 a) (3k) (ts 5018-1 en 60898-1) // Anahtarlı otomatik sigorta 16 A. (3KA) (TS 5018-1 EN 60898-1)	pcs	8.00		

No	Pose/Item No	Pose/Item Definition // Poz tanımı	UNIT	Quantity	Unit Price (USD)	Price (USD)
17	724.406	Three- Phased Automatic fuse with switch (up to 16 a) (3k) (ts 5018-1 en 60898-1) // 3 fazli anahtarli otomatik sigorta 16 A. (3KA) (TS 5018-1 EN 60898-1)	pcs	3.00		
18	725.402	Current measurement transformer (Flow tracing) 501 - 2000/5 a. // Akım ölçü trafosu 501 - 2000/5 a.	pcs	12.00		
19	725.511	Energy analyzer (ts 4417) // Enerji analizörü (ts 4417)	pcs	2.00		
20	725.731	Three-phase time-scheduled electronic type (active-reactive) counters 3x230/400 v..3x5 (7,5) a // Üç fazlı zaman tarifeli elektronik tip (aktif-reaktif) sayaçlar 3x230/400 v..3x5 (7,5) a	pcs	1.00		
21	725.904	Sign lamp up to 250 watts // İşaret lambası 250 v.a kadar	pcs	9.00		
22	704.101	Sheet metal plate Switchboard up to 0,05 - 0,10 m2 (including 0,10 m2) (ts 3367 en 60439-1) // Sıva üstü sac tablo 0,05 - 0,10m2'ye kadar (0,10 m2 dahil) (TS 3367 EN 60439-1)	pcs	27.00		
23	713.101	Selective type pacho switch 2 * 16 a. (on the switchboard) (ts 4915 en 60669-1, ts en 60947-3) // Seçici tip pako şalter 2*16 a. (tablo üzerine) (ts 4915 en 60669-1, ts en 60947-3)	pcs	27.00		
24	780.171	Supply and assembly noormal start-stop button // Normal start-stop butonu temini ve montajı	pcs	54.00		
25	Special/Ele/01	LC Circuit Breaker 4*1000A (with turn on/off coil) Main Input Switch // AG devre kesici 4*1000A (Açma ve kapama bobinli, motorlu) (Ana giriş şalteri)	pcs	2.00		
Total for LC, TRANSFER, COMPENSATION AND FIELD PANEL-SWITCHBOARD						

Bill of Quantities for CABLE INSTALLATION SYSTEMS

No	Pose/Item No	Pose/Item Definition // Poz tanımı	Unit	Quantity	Unit Price (USD)	Price (USD)
1	782.100	Cable duct -tray system // Kablo tava sistemleri	kg	3,358.00		
2	782.101	Cable tray systems cover plate // Kablo Tava Sistemleri Kapak Sacı	kg	2,056.00		

No	Pose/Item No	Pose/Item Definition // Poz tanımı	Unit	Quantity	Unit Price (USD)	Price (USD)
3	7.5.1/003	1 "galvanized pipe // 1 " galvanizli boru	m	485.00		
4	7.5.1/005	2 "galvanized pipe // 2 " galvanizli boru	m	98.00		
5	8.2.2/004	110 mm cable sleeve tube 450 n (non-metallic, underground) //110 mm kablo muhafaza borusu 450 n (metalik olmayan, yeraltına)	m	1,795.00		
6	Special/Ele/02	Concrete Manhole // Beton Rögar	pcs	39.00		
7	Special/Ele/03	Concrete Canal // Beton Kanal	m	115.00		
8	Special/Ele/04	Earth Canal (Road Passing) // Toprak Kanal (Yol Geçişi)	m	99.00		
9	Special/Ele/05	Earth Canal // Toprak Kanal	m	515.00		
Total for CABLE INSTALLATION SYSTEMS						

Bill of Quantities for POWER, CONTROL AND SIGNAL CABLES

No	Pose/Item No	Pose/Item Definition // Poz tanımı	UNIT	Quantity	Unit Price (USD)	Price (USD)
1	727.511	Column and feed line with 1kV underground cable with 3 * 6 mm2 nyy (ts IEC 60502-1 + a1) // 1kv yeraltı kablosu ile kolon ve besleme hattı 3*6 mm2 nyy (ts iec 60502-1)	m	55.00		
2	727.512	Column and feed line with 1kV underground cable with 3*4 mm2 nyy (ts iec 60502-1) // 1kv yeraltı kablosu ile kolon ve besleme hattı 3*4 mm2 nyy (ts iec 60502-1)	m	33.00		
3	727.513	Column and feed line with 1kV underground cable with 3*2.5 mm2 nyy (ts iec 60502-1 //1kv yeraltı kablosu ile kolon ve besleme hattı 3*2.5 mm2 nyy (ts iec 60502-1)	m	1,480.00		
4	727.516	Column and feed line with 1kV underground cable with 3*185+95 mm2 nyy (ts iec 60502-1) // 1kv yeraltı kablo.kolon ve besleme hattı 3*185+95 mm2 nyy (ts iec 60502-1)	m	135.00		
5	727.518	Column and feed line with 1kV underground cable with 3*120+70 mm2 nyy (ts iec 60502-1) // 1kv yeraltı kablo. kolon ve besleme hattı 3*120+70 mm2 nyy (ts iec 60502-1)	m	108.00		

No	Pose/Item No	Pose/Item Definition // Poz tanımı	UNIT	Quantity	Unit Price (USD)	Price (USD)
6	727.519	Column and feed line with 1kV underground cable with 3*95+50 mm2 nyy (ts iec 60502-1) // 1kv yeraltı kablo. kolon ve besleme hattı 3*95+50 mm2 nyy (ts iec 60502-1)	m	108.00		
7	727.521	Column and feed line with 1kV underground cable with 3*50+25 mm2 nyy (ts iec 60502-1) // 1kv yeraltı kablo.kolon ve besleme hattı 3*50+25 mm2 nyy (ts iec 60502-1)	m	140.00		
8	727.522	Column and feed line with 1kV underground cable with 3*35+16 mm2 nyy (ts iec 60502-1) // 1kv yeraltı kablo.kolon ve besleme hattı 3*35+16 mm2 nyy (ts iec 60502-1)	m	285.00		
9	727.523	Column and feed line with 1kV underground cable with 3*25+16 mm2 nyy (ts iec 60502-1) // 1kv yeraltı kablo.kolon ve besleme hattı 3*25+16 mm2 nyy (ts iec 60502-1)	m	95.00		
10	727.524	Column and feed line with 1kV underground cable with 4*16 mm2 nyy (ts iec 60502-1) // 1kv yeraltı kablo. kolon ve besleme hattı 4*16 mm2 nyy (ts iec 60502-1)	m	12.00		
11	727.525	Column and feed line with 1kV underground cable with 4*10 mm2 nyy (ts iec 60502-1) // 1kv yeraltı kablo. kolon ve besleme hattı 4*10 mm2 nyy (ts iec 60502-1)	m	125.00		
12	727.526	Column and feed line with 1kV underground cable with 4*6 mm2 nyy (ts iec 60502-1) // 1kv yeraltı kablo. kolon ve besleme hattı 4*6 mm2 nyy (ts iec 60502-1)	m	625.00		
13	727.527	Column and feed line with 1kV underground cable with 4*4 mm2 nyy (ts iec 60502-1) // 1kv yeraltı kablo. kolon ve besleme hattı 4*4 mm2 nyy (ts iec 60502-1)	m	300.00		
14	727.528	Column and feed line with 1kV underground cable with 4*2.5 mm2 nyy (ts iec 60502-1) // 1kv yeraltı kablo. kolon ve besleme hattı 4*2.5 mm2 nyy (ts iec 60502-1)	m	2,650.00		

No	Pose/Item No	Pose/Item Definition // Poz tanımı	UNIT	Quantity	Unit Price (USD)	Price (USD)
15	727.507	Column and feed line with 1kV underground cable with 2*1.5 mm2 nyy (ts iec 60502-1) // 1kv yeraltı kablosu ile kolon ve besleme hattı 2*1.5 mm2 nyy (ts iec 60502-1)	m	650.00		
16	727.514	Column and feed line with 1kV underground cable with 3*1.5 mm2 nyy (ts iec 60502-1) // 1kv yeraltı kablosu ile kolon ve besleme hattı 3*1.5 mm2 nyy (ts iec 60502-1)	m	425.00		
17	727.529	Column and feed line with 1kV underground cable with 4*1.5 mm2 nyy (ts iec 60502-1) // 1kv yeraltı kablo.kolon ve besleme hattı 4*1.5 mm2 nyy (ts iec 60502-1)	m	990.00		
18	727.530	Column and feed line with 1kV underground cable with 5*1.5 mm2 nyy (ts iec 60502-1) // 1kv yeraltı kablo.kolon ve besleme hattı 5*1.5 mm2 nyy (ts iec 60502-1)	m	125.00		
19	727.538	Column and feed line with 1kV underground cable with 30*1.5 mm2 nyy (ts iec 60502-1) // 1kv yeraltı kablo. kolon ve besleme hattı 30*1.5 mm2 nyy (ts iec 60502-1)	m	150.00		
20	880.396/1	LYCY, LYC2Y signal cable 2x1.5 mm2 // Lıycy sinyal kablosu 2x1.5 mm2	m	1,340.00		
21	880.396/3	LYCY, LYC2Y signal cable 4x1.5 mm2 // Lıycy sinyal kablosu 4x1.5 mm2	m	46.00		
22	880.563	Utp cat6 cable (Data Cable) // Data Kablosu (Utp cat6 kablo)	m	165.00		
23	880.617	8 core sm armored f / o cable // 8 core sm zırlı f/o kablo	m	275.00		
Total for POWER, CONTROL AND SIGNAL CABLES						

Bill of Quantities for SITE LIGHTING

No	Pose/Item No	Pose/Item Definition // Poz tanımı	UNIT	Quantity	Unit Price (USD)	Price (USD)
1	5.5.3.2.1/012	Ad1-80 / 10 type, 90 kg single console galvanized steel polygon lighting pole // AD1-80/10 TİPİ, 90 kg.tek konsollu galvanizli çelik poligon aydınlatma direği	pcs	7.00		

No	Pose/Item No	Pose/Item Definition // Poz tanımı	UNIT	Quantity	Unit Price (USD)	Price (USD)
2	5.5.3.2.2/012	Ad2-80 / 10 type, 95 kg. concontent galvanized steel polygon lighting pole // AD2-80/10 TİPİ, 95 kg.iki konsollu galvanizli çelik poligon aydinlatma direği	pcs	14.00		
3	724.401	Automatic fuse with switch (up to 16 a) (3k) (ts 5018-1 en 60898-1) // 16 a.'e kadar anahtarlı otomatik sigorta (3ka)	pcs	35.00		
4	727.513	Column and feed line with 1kV underground cable with 3*2.5 mm2 nyy (TS IEC 60502-1+A1) // 1kv yeraltı kablosu ile kolon ve besleme hattı 3*2.5 mm2 nyy (TS IEC 60502-1+A1)	m	335.00		
5	727.505	Column and feed line with 1kV underground cable with 2*4 mm2 nyy (TS IEC 60502-1+A1) // 1kv yeraltı kablosu ile kolon ve besleme hattı 2*4 mm2 nyy (TS IEC 60502-1+A1)	m	98.00		
6	727.512	Column and feed line with 1kV underground cable with 3*4 mm2 nyy (TS IEC 60502-1+A1) // 1kv yeraltı kablosu ile kolon ve besleme hattı 3*4 mm2 nyy (TS IEC 60502-1+A1)	m	225.00		
7	727.526	Column and feed line with 1kV underground cable with 4*6 mm2 nyy (TS IEC 60502-1+A1) // 1kv yeraltı kablo.kolon ve besleme hattı 4*6 mm2 nyy (TS IEC 60502-1+A1)	m	75.00		
8	727.527	Column and feed line with 1kV underground cable with 4*4 mm2 nyy (TS IEC 60502-1+A1) // 1kv yeraltı kablo.kolon ve besleme hattı 4*4 mm2 nyy (TS IEC 60502-1+A1)	m	335.00		
9	727.541	Column and feed line with 1kV underground cable with 1*16 mm2 nyy (TS IEC 60502-1+A1) // 1kv y. altı kabloları ile kolon ve besleme hattı 1*16 mm2 nyy (TS IEC 60502-1+A1)	m	725.00		
10	983.102	The ground electrode (rod), electrolytic copper // Toprak elektrodu (çubuk), elektrolitik bakır	pcs	7.00		
11	742.1655	The light flux is at least 12750 lm and the consumption value is at most 150 w. Led Projectors // Işık akısı en az 12750 lm, tüketim değeri en fazla 150 w olan. Led Projektörler	pcs	35.00		

No	Pose/Item No	Pose/Item Definition // Poz tanımı	UNIT	Quantity	Unit Price (USD)	Price (USD)
12	8.2.2/002	75 mm cable Sleeve tube 450 n (non-metallic, underground) // 75 mm kablo muhafaza borusu 450 n (metalik olmayan, yeraltına)	m	710.00		
13	Y.16.050/03	Concrete pouring in c 16/20 pressure durability class, produced or bought in concrete plant and pouring by concrete pump (including concrete conveyance) (to be used for road passing 0.4m*0.15m in dimension) // Beton santralinde üretilen veya satın alınan ve beton pompasıyla basılan, C16/20 basınç dayanım sınıfında beton dökülmesi (beton nakli dahil) (yol geçişlerinde 0,4m*0.15m ölçülerinde dökülecek beton)	m3	3.00		
14	704.102	Sheet metal plate Switchboard up to 0,05 - 0,20 m2 (including 0,20 m2) (ts 3367 en 60439-1) // Sıva üstü sac tablo 0,10 - 0,20m2'ye kadar (0,20 m2 dahil) (TS 3367 EN 60439-1)	pcs	1.00		
15	715.306	Thermal, magnetic protective switch 3 * 25 a. (Behind the Switchboard (ts en 60947-2) // Termik, mağnetik koruyuculu şalter 3*25 a. (tablo arkası (ts en 60947-2) /	pcs	1.00		
16	718.102	Dry typeencapsulated contactor3*16 a // Kuru tip koruyucusuz kontaktör 3*16 a.	pcs	2.00		
17	718.400	Photocell switch // Fotosel şalter	pcs	1.00		
18	718.507	Residual current circuit breaker up to 4*25 a.(30ma) // Kaçak akım koruma şalteri 4*25 a.e kadar(30ma)	pcs	1.00		
19	724.406	Three-phase auto-fuse (3ka) with switch up to 16 a (ts 5018-1 en 60898-1) // Üç fazlı anahtarlı 16 a.'e kadar otomatik sigorta (3ka)	pcs	2.00		
20	Special/Ele/05	Earth Canal // Toprak Kanal	m	685.00		
Total for SITE LIGHTING						

Bill of Quantities for BUILDING INDOOR ELECTRICAL INSTALLATIONS

No	Pose/Item No	Pose/Item Definition // Poz tanımı	UNIT	Quantity	Unit Price (USD)	Price (USD)
1	704.101	Sheet metal plate Switchboard up to 0,05 - 0,10 m2 (including 0,10 m2) (ts 3367 en 60439-1/2) // Siva üstü sac tablo 0.05-0.10 m2. (ts en 61439-1/2)	pcs	3.00		
2	704.102	Sheet metal plate Switchboard up to 0,1 - 0,20 m2 (including 0,20 m2) (ts 3367 en 60439-1/2) // Siva üstü sac tablo 0.10-0.20 m2. (ts en 61439-1/2)	pcs	5.00		
3	704.103	Sheet metal plate Switchboard up to 0,20 - 0,30 m2 (including 0,30 m2) (ts 3367 en 60439-1/2) // Siva üstü sac tablo 0.20-0.30 m2. (ts en 61439-1/2)	pcs	1.00		
4	705.102	Embedded type sheet metal plate switchboard 0.10-0.20 m2. (ts en 61439-1/2) // Gömme tip sac tablo 0.10-0.20 m2. (ts en 61439-1/2)	pcs	1.00		
5	705.105	Embedded type sheet metal plate switchboard 0.40-0.50 m2. (ts en 61439-1/2) // Gömme tip sac tablo 0.40-0.50 m2. (ts en 61439-1/2)	pcs	1.00		
6	715.308	Thermal, magnetic protective switch 3 * 63 a. (Behind of the panel (ts en 60947-2) // Termik, mađnetik koruyuculu řalter 3*63 a. (tablo arkası (ts en 60947-2)	pcs	1.00		
7	715.309	Thermal, magnetic protective switch 3 * 100 a. (Behind the panel (ts en 60947-2) // Termik, mađnetik koruyuculu řalter 3*100 a. (tablo arkası (ts en 60947-2)	pcs	1.00		
8	718.203	Dry-type thermal protection contactor 3 * 25 a. // Kuru tip termik koruyuculu kontaktör 3*25 a.	pcs	1.00		
9	718.501	Residual current circuit breaker up to 2*25 a.(30ma) // Kaçak akım koruma řalteri 2*25 a.e kadar(30ma)	pcs	1.00		
10	718.507	Residual current circuit breaker up to 4*25 a.(30ma) // Kaçak akım koruma řalteri 4*25 a.e kadar(30ma)	pcs	11.00		
11	718.508	Residual current circuit breaker up to 4*40 a.(30ma) // Kaçak akım koruma řalteri 4*40 a.e kadar(30ma)	pcs	2.00		

No	Pose/Item No	Pose/Item Definition // Poz tanımı	UNIT	Quantity	Unit Price (USD)	Price (USD)
12	718.509	Residual current circuit breaker up to 4*60 a.(30ma) // Kaçak akım koruma şalteri 4*60 a.e kadar(30ma)	pcs	1.00		
13	718.524	Residual current circuit breaker up to 4*100 a.(300ma) // Kaçak akım koruma şalteri 4*100 a.e kadar(300ma)	pcs	1.00		
14	724.401	Automatic fuse with switch (up to 16 a) (3ka) (ts 5018-1 en 60898-1) // 16 a.'e kadar anahtarlı otomatik sigorta (3ka)) (ts 5018-1 en 60898-1)	pcs	33.00		
15	724.601	Automatic fuse with switch (up to 16 a) (6ka) (ts 5018-1 en 60898-1) // 16 a.'e kadar anahtarlı otomatik sigorta (6ka) (ts 5018-1 en 60898-1)	pcs	82.00		
16	724.602	Automatic fuse with switch (up to 25 a) (6ka) (ts 5018-1 en 60898-1) // 25 a.'e kadar anahtarlı otomatik sigorta (6ka) (ts 5018-1 en 60898-1)	pcs	3.00		
17	724.606	Three-phase automatic fuse with switch up to 25 a. (6ka) (ts 5018-1 en 60898-1) // Üç fazlı anahtarlı 25 a.'e kadar anahtarlı otomatik sigorta (6ka) (ts 5018-1 en 60898-1)	pcs	2.00		
18	724.607	Three-phase automatic fuse with switch upto 40 a. (6ka) (ts 5018-1 en 60898-1) // Üç fazlı anahtarlı 40 a.'e kadar anahtarlı otomatik sigorta (6ka) (ts 5018-1 en 60898-1)	pcs	3.00		
19	724.702	Automatic fuse with switch up to 25 a. (10ka) // 25 a.'e kadar anahtarlı otomatik sigorta (10ka)	pcs	1.00		
20	724.707	Three-phase automatic fuse with switch up to 40 a. (10ka) (ts 5018-1 en 60898-1) // Üç fazlı anahtarlı 40 a.'e kadar anahtarlı otomatik sigorta (10ka)	pcs	10.00		
21	724.708	Three-phase automatic fuse with switch up to 63 a. (10ka) (ts 5018-1 en 60898-1) // Üç fazlı anahtarlı 63 a.'e kadar anahtarlı otomatik sigorta (10ka)	pcs	3.00		
22	725.904	Sign lamp up to 250 v.a // İşaret lambası 250 v.a kadar	pcs	31.00		

No	Pose/Item No	Pose/Item Definition // Poz tanımı	UNIT	Quantity	Unit Price (USD)	Price (USD)
23	727.514	Column and feed line with 1kV underground cable with 3*1.5 mm2 nyy (ts iec 60502-1) // 1kv yeraltı kablosu ile kolon ve besleme hattı 3*1.5 mm2 nyy (ts iec 60502-1)	m	32.00		
24	727.525	Column and feed line with 1kV underground cable with 4*10 mm2 nyy (ts iec 60502-1) // 1kv yeraltı kablo. kolon ve besleme hattı 4*10 mm2 nyy (ts iec 60502-1)	m	16.00		
25	727.527	Column and feed line with 1kV underground cable with 4*4 mm2 nyy (ts iec 60502-1) // 1kv yeraltı kablo. kolon ve besleme hattı 4*4 mm2 nyy (ts iec 60502-1)	m	45.00		
26	727.528	Column and feed line with 1kV underground cable with 4*2.5 mm2 nyy (ts iec 60502-1) // 1kv yeraltı kablo. kolon ve besleme hattı 4*2.5 mm2 nyy (ts iec 60502-1)	m	11.00		
27	734.201	Normal sorti with security line // Güvenlik hatlı normal sorti	pcs	1.00		
28	734.202	Comutator sorti with security line // Güvenlik hatlı komütatör sorti	pcs	2.00		
29	734.204	Güvenlik hatlı paralel sorti / Paralel sorti with security line	pcs	1.00		
30	734.300	Darbe akım anahtar kumandalı sorti/ Pulse current switch control sortie	pcs	7.00		
31	734.401	1 contact 1 na, 16a. remote control pulse current switch and mounting // 1 kontaklı 1 na, 16a. uzaktan kumanda darbe akım anahtarı ve montajı	pcs	7.00		
32	735.102	Plug sortie with security line // Güvenlik hatlı priz sortisi	pcs	7.00		
33	736.501	Normal Waterproof Lighting sortie, Line and Sortie with unleaded antigron material // Linye-sorti hattı kurş.suz antigron malz. etanş aydınlatma sortisi, normal	pcs	6.00		
34	736.502	Comutator Waterproof Lighting sortie, Line and Sortie with unleaded antigron material // Linye-sorti hattı kurş.suz antigron malz. etanş aydınlatma sortisi, komütatör	pcs	13.00		

No	Pose/Item No	Pose/Item Definition // Poz tanımı	UNIT	Quantity	Unit Price (USD)	Price (USD)
35	736.503	Vavien Waterproof Lighting sortie, Line and Sortie with unleaded antigron material // Linye-sorti hattı kurş.suz antigron malz. etanş aydınlatma sortisi, vavien	pcs	1.00		
36	736.504	Parallel Waterproof Lighting sortie, Line and Sortie with unleaded antigron material // Linye-sorti hattı kurş.suz antigron malz. etanş aydınlatma sortisi, parallel	pcs	39.00		
37	740.105	Waterproof plug sortie with unleaded antigron material // Kurşunsuz antigron malzemeyle etanş priz sortisi	pcs	21.00		
38	741.101	3-phase cast iron plug socket and mounting 3 * 25 a. // Dökme demirden 3 fazlı fiş priz ve montajı 3*25 a.	pcs	5.00		
39	742.1351	The light flux is at least 1800 lm, the consumption value is at most 20W (having a protection rating of at least IP 40). LED Glop Armature-Luminaire // Işık akısı en az 1800 lm, tüketim değeri en fazla 20W olan (en az IP 40 koruma derecesine sahip olan). LED Glop Armatür	pcs	7.00		
40	794.301	Normal sorti (line and sorti lines lead free antigron (nhxmh) material.) // Normal sorti (linye ve sorti hatları kurşunsuz antigron (nhxmh) malzemeyle.)	pcs	10.00		
41	794.302	Comutator sorti (line and sorti lines lead free antigron (nhxmh) material.) // Komutator sorti (linye ve sorti hatları kurşunsuz antigron (nhxmh) malzemeyle)	pcs	14.00		
42	794.304	Parallel sorti (line and sorti lines lead free antigron (nhxmh) material.) // Paralel sorti (linye ve sorti hatları kurşunsuz antigron (nhxmh) malzemeyle)	pcs	25.00		
43	796.103	Normal plug sorti (line and sorti lines lead free antigron (nhxmh) material.) // Linye ve sorti hatları kurşunsuz antigron (nhxmh) nevinden malzeme ile normal priz sortisi	pcs	74.00		

No	Pose/Item No	Pose/Item Definition // Poz tanımı	UNIT	Quantity	Unit Price (USD)	Price (USD)
44	791.311	3x2.5 mm2 lead-free pvc insulation. cable. feeder line (nhxmh) // 3x2.5 mm2 kurşunsuz pvc izol. kablo.besleme hattı (nhxmh)	m	30.00		
45	791.312	3x1.5 mm2 lead-free pvc insulation. cable. feeder line (nhxmh) // 3x1.5 mm2 kurşunsuz pvc izol.kablo.besleme hattı (nhxmh)	m	220.00		
46	791.614	2x1.5rea fire -resistant n2xhfe 180 0.6 1kv cable // 2x1.5re aleve dayanıklı n2xhfe 180 0.6/1kv kablo	m	30.00		
47	818.205	Outdoor main line installation 0.5 mm. 30 pairs. // Bina harici ana hat tesisatı 0.5 mm. 30 çift.	m	5.00		
48	819.201	Fireproof plastic phone distribution box 20 pairs // Yanmaz plastik telefon dağıtım kutusu 20 çift	pcs	1.00		
49	819.203	Fireproof plastic phone distribution box 50 pairs // Yanmaz plastik telefon dağıtım kutusu 50 çift	pcs	1.00		
50	833.301	1 loop, 12 zone addressable fire alarm control panel, 127 addressable, 12 fire zone indicators // 1 çevrimli, 12 bölgesli adresli yangın alarm santrali 127 adres kapasiteli, 12 yangın bölgesi göstergeli	pcs	1.00		
51	833.555	Addressable resettable fire alarm button // Adresli sıfırlanabilir yangın ihbar butonu	pcs	13.00		
52	833.500	Addressable optical smoke detector // Adresli optik duman dedektörü	pcs	32.00		
53	833.520	Addressable temperature detector // Adresli sıcaklık dedektörü	pcs	3.00		
54	833.530	Addressable combined optical smoke and temperature detectors // Adresli kombine optik duman ve sıcaklık dedektörü	pcs	6.00		
55	833.592	Electronic fire alarm with internal type flasher sireni // Dahili tip flaşörlü elektronik yangın ihbar sireni	pcs	1.00		
56	833.594	Electronic fire alarm with external type flasher sireni // Harici tip flaşörlü elektronik yangın ihbar sireni	pcs	8.00		

No	Pose/Item No	Pose/Item Definition // Poz tanımı	UNIT	Quantity	Unit Price (USD)	Price (USD)
57	833.734	3-hour double-sided, intermittent emergency lighting fixture (Led) // 3 saat süreli çift yüzölü, kesintide yanan acil durum yönlendirme armatürü (Ledli)	pcs	2.00		
58	880.563	Utp cat6 cable // Utp cat6 kablo	m	556.00		
59	880.573	Utp cat6 surface mounted single plug // Utp cat6 sıva üstü tekli priz	pcs	2.00		
60	880.575	Utp cat6 flush mounted single plug // Utp cat6 sıva altı tekli priz	pcs	26.00		
61	880.584	24 port utp cat6 patch panel // 24 portlu utp cat6 patch panel	pcs	1.00		
62	890.536	Electronic type fully automatic telephone central 4/16 // Elektronik tip tam otomatik tel. santralı 4/16	pcs	1.00		
63	880.4002	2x2x0,8 + 0,8 mm ² , JE-H (St) H FE180 PH120 fire resistant halogen free fire alarm cable (VDE 0815) // 2x2x0,8+0,8 mm ² Je-H(St)H Fe180 Ph120 Yangına dayanıklı halojensiz yangın alarm kabloları (VDE 0815)	m	295.00		
64	742.1102	Under plaster (Flush Mounted), min. 30 x 30 in size LED ceiling luminaire (Tip LD1A 26W) // Sıva altı, min. 30x30 ebatlarında LED li tavan armatürü (Tip LD1A 26W)	pcs	1.00		
65	742.1108	Under plaster (Flush Mounted), min. 30 x120 in size LED ceiling luminaire (Tip LD1 52W) // Sıva altı, min. 30x120 ebatlarında LED li tavan armatürü (Tip LD1 52W)	pcs	19.00		
66	742.1106	Under plaster (flush mounted), min. 60x60 in size LED ceiling luminaire (Tip LD2 36W) // Sıva altı, min. 60x60 ebatlarında LED li tavan armatürü (Tip LD2 36W)	pcs	14.00		
67	742.1151	Flush Mounted, downlight fitting with LED (Tip LD3 20W) // Sıva altı, LED'li dairesel (downlight) armatür (Tip LD3 20W)	pcs	12.00		
68	742.1600	Sensored led lighting fixture price difference (Tip LD3 20W) // Sensörlü led aydınlatma armatürü fiyat farkı (Tip LD3 20W)	pcs	4.00		

No	Pose/Item No	Pose/Item Definition // Poz tanımı	UNIT	Quantity	Unit Price (USD)	Price (USD)
69	742.1550	Emergency lighting kit price difference for led lighting fixtures//Led aydınlatma armatürleri için acil durum aydınlatma kiti fiyat farkı	pcs	31.00		
70	742.1152	Luminous flux of at least 1700 lmUnder-plaster (flush mounted), downlight luminaires with LED, consumption value up to 24 W // Sıva altı, LED'li dairesele (downlight) armatür (Tip LD4 60W)	pcs	12.00		
71	742.1253	Luminous flux of at least 3,600 lm, Consumption value of maximum 40 W, LED Surface Mounted Luminaires (Polycarbonate body) // Işık akısı en az 3600 lm, tüketim değeri en fazla 40 W. LED Sıva Üstü Etanj Armatür (Polikarbon gövdeli) (Tip LD5 52W)	pcs	43.00		
72	742.1252	Luminous flux of at least 2,700 lm, consumption value of maximum 30 W, LED Surface Mounted Waterproofing Fixture (Polycarbon body) // Işık akısı en az 2700 lm, tüketim değeri en fazla 30 W. LED Sıva Üstü Etanj Armatür (Polikarbon gövdeli) (Tip LD5A 26W)	pcs	7.00		
73	742.1107	Surface mounted, min. 30x120 ceiling luminaires with LED (with a luminous flux of at least 3300 lm and a consumption value of at most 36 W) // Sıva üstü, min. 30x120 ebatlarında LED li tavan armatürü (Tip LD6 52W)	pcs	3.00		
74	742.1202	LED Ceiling Armatures with a luminous flux of at least 15,000 lm and a consumption value of at most 160 W // Işık akısı en az 15000 lm, tüketim değeri en fazla 160 W olan LED Yüksek Tavan Armatürü (Tip LD7 - 128W)	pcs	15.00		
75	833.712	3-hour emergency lighting fixture (Led, capable of providing at least 130 lm light flux for 3 hours) // Kesintide yanan, sıva üstü tip, 3 saat süreli acil durum aydınlatma armatürü (Ledli, 3 saat süre boyunca en az 130 lm ışık akısı verebilecek) (Tip LD8 - 14W ACİL AYD)	pcs	17.00		

No	Pose/Item No	Pose/Item Definition // Poz tanımı	UNIT	Quantity	Unit Price (USD)	Price (USD)
76	742.1401	LED Indirect Lighting Fixture with a luminous flux of at least 2,000 lm and a consumption value of at most 30 W // Işık akısı en az 2000 lm, tüketim değeri en fazla 30W olan. LED Endirek Aydınlatma Armatürü (Tip AP 15W APLİK)	pcs	2.00		
77	782.702	Grounded UPS sockets (red colored) 16 A to 250 V, (45 x 45 mm), Cable Duct Sockets // Topraklı ups prizi (kırmızı renkli) 16 a.- 250 v. (45 x 45 mm)	pcs	27.00		
78	791.431/3	5 x 10 mm ² , 1 kV underground cables and column and feeder line installation (N2XH, 0.6 / 1 kV) // 5x10 mm ² 1KV yer altı kabloları ile kolon ve besleme hattı tesisi (N2XH)	m	35.00		
79	791.431/2	5x6 mm ² , 1 kV underground cables and column and feeder line installation (N2XH, 0.6 / 1 kV) // 5x6 mm ² 1KV yer altı kabloları ile kolon ve besleme hattı tesisi (N2XH)	m	15.00		
Total for BUILDING INDOOR ELECTRICAL INSTALLATIONS						

Bill of Quantities for OTHER ELECTRICAL WORKS

No	Pose/Item No	Pose/Item Definition // Poz tanımı	UNIT	Quantity	Unit Price (USD)	Price (USD)
1	Special/Ele/06	INSTALLATION OF 630 KVA TRANSFORMER AND MODULAR CUBICLE // 630 KVA TRAFO VE MODÜLER HÜCRE TESİSİ	lump sum	1.00		
2	Special/Ele/07	INSTALLATION OF 625 KVA (PRIME) DIESEL GENERATOR // 625 KVA (PRIME) DİZEL JENERATÖR TESİSİ	lump sum	1.00		
3	Special/Ele/08	MCC SWITCHBOARDS // MCC PANOLARI	lump sum	1.00		
4	Special/Ele/09	PLC SWITCHBOARDS, SCADA AND AUTOMATION SYSTEM // PLC PANOLARI, SCADA VE OTOMASYON SİSTEMİ	lump sum	1.00		
5	Special/Ele/10	LIGHTNING CONDUCTOR INSTALLATION // PARATONER TESİSATI	lump sum	1.00		
6	Special/Ele/11	INSTRUMENTATION // ENSTRÜMANTASYON	lump sum	1.00		

No	Pose/Item No	Pose/Item Definition // Poz tanımı	UNIT	Quantity	Unit Price (USD)	Price (USD)
7	Special/Ele/12	CCTV INSTALLATION // CCTV TESİSATI	lump sum	1.00		
8	Special/Ele/13	GAS DETECTION AND SAFETY SYSTEM // GAZ ALGILAMA VE GÜVENLİK SİSTEMİ	lump sum	1.00		
Total for OTHER ELECTRICAL WORKS						

Name of Bidder: _____

Authorised signature: _____

Name of authorised signatory: _____

Functional Title: _____

FORM F: Form of Bid Security

**Bid Security must be issued using the official letterhead of the Issuing Bank.
Except for indicated fields, no changes may be made on this template.**

To: UNDP
[Insert contact information as provided in Data Sheet]

WHEREAS [Name and address of Bidder] (hereinafter called "the Bidder") has submitted a Bid to UNDP dated [Click here to enter a date](#). To complete the works stipulated in the ITB with reference UNDP-TUR-ITB(MC2)-2018/06 with the title "Construction of Waste Water Treatment Plant in Hassa/Hatay" (hereinafter called "the Bid"):

AND WHEREAS it has been stipulated by you that the Bidder shall furnish you with a Bank Guarantee by a recognized bank for the sum specified therein as security if the Bidder:

- a) Fails to sign the Contract after UNDP has awarded it;
- b) Withdraws its Bid after the date of the opening of the Bids;
- c) Fails to comply with UNDP's variation of requirement, as per ITB instructions; or
- d) Fails to furnish Performance Security, insurances, or other documents that UNDP may require as a condition to rendering the contract effective.

AND WHEREAS we have agreed to give the Bidder such Bank Guarantee:

NOW THEREFORE we hereby affirm that we are the Guarantor and responsible to you, on behalf of the Bidder, up to a total of *[amount of guarantee] [in words and numbers]*, such sum being payable in the types and proportions of currencies in which the Price Bid is payable, and we undertake to pay you, upon your first written demand and without cavil or argument, any sum or sums within the limits of *[amount of guarantee as aforesaid]* without your needing to prove or to show grounds or reasons for your demand for the sum specified therein.

This guarantee shall be valid up to 30 days after the final date of validity of bids,

SIGNATURE AND SEAL OF THE GUARANTOR BANK

Signature: _____

Name: _____

Title: _____

Date: _____

Name of Bank _____

Address _____

[Stamp with official stamp of the Bank]