

SCHEDULE OF RATES - 2014

MILITARY ENGINEER SERVICES PAKISTAN

MILLITARY ENGINEERS SERVICES

MINISTRY OF DEFENCE MILITARY ENGINEER SERVICES PAKISTAN



SCHEDULE OF RATES - 2014

FOR

CONSTRUCTION AND MAINTENANCE WORKS

COMPILED UNDER THE ORDERS

ENGINEER IN CHIEF GENERAL HEADQUARTERS, RAWALPINDI

IMPORTANT

All works executed and paid for under this Schedule are to be measured in accordance with instructions and remarks detailed here in, without reference to any local custom or other practice, should that differ in any way from methods used in this Schedule.

Item rates, description of materials and workmanship, modes of measurement etc, contained in all previous Schedules are to be considered as obsolete. They shall not constitute a precedent for purposes of comparison with (or interpretation of) the contents of this Schedule.

Previous Issues of MES Schedule of Rates Published: 1948, 1961, 1963, 1970, 1975, 1981, 1988, 1993, 2000, 2004, 2009

MES Schedule of Rates - 2014 First Edition : August 2014

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This Schedule, however, may be used by an individual or department etc, **Provided** the **Contract Agreement** makes a clear mention, that the Contract has been based on the "**MES Schedule of Rates – 2014**".

For this purpose, copies of "MES Schedule of Rates – 2014" are available with the Engineer in Chief's Branch, GHQ, Rawalpindi.

FOREWORD

Last edition of "MES Schedule of Rates" was issued in Year 2009 with its reprinted copies incorporating amendments in 2010, 2012 & 2013. After previous revision, the market experienced extreme price hike and new trends which necessitated the revision of Schedule of Rates.

The revision team at E-in-C's Branch has made a deliberate effort in updating the new Schedule. New document incorporates details of contemporary trends in construction material. Not with standing suggested improvement in specifications, economy of effort has been accorded due importance.

By employing additional resources and computer software, the process of revision has been completed within a short span of four months. I appreciate the dedication and professional acumen displayed by every member of the team in compiling the revised edition of "**MES Schedule of Rates – 2014**".

I am sure this revised edition shall attend to most of the grey areas experienced previously, and shall provide improved parameters for planning and execution of Civil Engineering projects entrusted to the MES.

Lieutenant General Engineer in Chief General Headquarters (Khalid Asghar)

Rawalpindi:

September 2014

PREFACE

1. The "MES Schedule of Rates-2014" has been prepared under the instructions and guidance of the Engineer-in-Chief to replace the "MES Schedule of Rates-2009" and its reprinted editions in 2010, 2012, & 2013. Due to the varying degree of price hike in the market, the impact of rates as a composite entity was disturbed upto the extant of unmanageable estimation and execution of contracts.

2. Existing layout and format of MES Schedule of Rates has been transformed into software based application. Entire data has been fed on software design layout and verified and analyzed accordingly in different phases.

3. New section 27 – HVAC has been introduced creating around 69 new items, besides shifting of few items from Section 24 (Internal Electrification). This schedule has now 4962 items. These include compilation of assortment of new materials currently in use in the market.

4. The responsibility for execution, supervision and implementation of the specifications rests with the Engineer-in-Chief. However, other stake holders share the responsibility for correctness of rates, date etc and adherence to the rules, procedure and specifications. To verify the revision team efforts, a board composed of highly competent MES executives has vetted the rates/data and subsequently have been pre-audited by the auditors of DGADS.

5. The rates as specified are payable only, if specifications given in this Schedule of Rates are adhered in totality. However, where it is unavoidable to deviate from these specifications, prior approval of the respective competent Engineering authority will be obtained and unless specified otherwise, corresponding financial adjustment in the rates shall be made for payment.

6. In case of any dispute regarding applicability of any rate, the decision of Engineer-in-Chief shall be *Final, Binding* and *Conclusive*.

7. This Schedule supersedes all previous editions in their content and substance.

Brigadier

Director Research and Support Engineer in Chief's Branch General Headquarters (Muhammad Arif)

Rawalpindi:

CONTENTS

SECTION	DESCRIPTION	PAGE
-	Foreword	i
-	Preface	iii
-	Contents	V
1-	General Rules	vii
-//	Acronyms / Abbreviations	XV
	Conversion Tables	xxi
1	Excavation and Earth Work	1
2	Roads, Hard Standings and Landing Grounds	17
3	Concrete	59
4	Brick Masonry	87
5	Stone Masonry	99
6	Wood Work	109
7	Doors and Windows	121
8	Ancillary Items (Mongery)	153
9	Steel and Iron Work	169
10	Roof Coverings and Roof Treatments	189
11	Termite Treatment	209
12	Flooring and Tiling	211
13	Plastering	233
14	Ceilings and Paneling	239
15	Finishes (Distempering and Painting)	245
16	Glazing	261
17	Sanitary Fittings	265
18	Water Supply (Piping, Plumbing and Allied Works)	279
19	Water Supply Installations	345
20	Soil, Waste and Vent (SWV) - Pipes / Fixtures	359
21	Drainage / Sewage	373
22	Pre – Engineered Construction	387
23	Demolition and Dismantling	411
24	Internal Electrification	417
25	External Electrification	481

26	Natural Gas	543
SECTION	DESCRIPTION	PAGE
27	Heating, Ventilation And Air Conditioning And Refrigeration	563
28	"Material Supply Only" Rates - Buildings, Roads, Landing Grounds, etc	573
29	"Material Supply Only" Rates - Electrification, Water Supply, Natural Gas, etc	623
30	Calculation Sheet for Cement	653
31	Labour Rates	657
	Index	659
	A CANER SEE	R.

vi

1. **Generally:-** Unless stated or specified elsewhere to the contrary, these General Rules shall apply to all sections, where relevant.

2. **Component Parts:-** The component parts of this Schedule (Specification, Method of Measurements, Clarification of Rates etc) shall be read together.

3. **Application:**- This schedule is intended to apply to every description of work that may be required in the construction and maintenance of buildings of all kind belonging to, hired or occupied by the Government of Pakistan (Mindef) and also include fortifications, roads, landing grounds, drainage, water supply, electrification, together with other engineering works such as sea walls, groynes, harbours, dock works, bridges and railways etc, required by various Maintenance or Special contracts.

4. **Specification** or **"as Specified**" refers to the specifications in this Schedule.

5. **Engineer-in-Charge**:- The Officer nominated in the Contract by the Accepting Officer.

- 6. Definitions:
 - a. *Alternative:* Where alternative materials, processes etc, are specified, the selection will depend on local conditions and discretion of the Engineer in Charge.
 - b. "Approved", "Directed", "Ordered" means the approval etc, of the Engineer in Charge unless otherwise stated.
 - c. *Carriage* implies conveyance by any reasonable means over any negotiable surface and includes loading, unloading, etc.
 - d. The **Distance** refers to the distance from the place of origin to the final position in the work, irrespective of the number of processes (or stages) involved.
 - e. "*Ditto*" wherever used in this Schedule, includes the whole of the work described in detail in the preceding item, but with such modifications as may be specifically mentioned.
 - f. **Equal and Approved:-** Where specific materials, processes etc, are specified, the Engineer-in-Charge is at liberty to approve and accept suitable alternatives, should the original be not available. This discretion does not rest with the Contractor. Necessary adjustments in prices will be made under the appropriate sections of the Schedule.

- g. *Identification of Items:* Items shall be identified by quoting the Item number.
- h. "*Materials and Labour*" includes the supply of all materials, including lead for any distance, labour and workmanship necessary for complete execution of the item as described, together with use of all tools, plants, scaffolding and appliances that may be required.
- 1. "Labour only or except materials" are to be understood as including the performance of all labour necessary for properly carrying out a particular service complete with the provision and use, without extra charge, of all tools, plants, scaffolding and appliances required.
- j. "Except bricks" include all necessary labour, plants etc, as described in the foregoing clause, and in addition, all material required except those specifically exempted.
- k. "Fixing", "Fixing only", "Laying only" and "Setting only" include the performance of all labour necessary for proper execution of the items as described, together with the provision and use, without extra charge, of all tools, plants, scaffolding and appliances required. In addition to the foregoing, they also include provision including lead for any distance, without extra charge of all materials subsidiary to and not supplied as part of the principal material, but necessary for execution of the work e.g nails, screws, glue, packing pieces, joining, bedding materials and the like.
- I. "Fixing only in Repairs" includes all labour and subsidiary material required in fixing and in addition, all necessary labour, plants, tools etc, that may be required for taking out the old materials and removing to store. Similarly, the expression "Add if in Repairs" includes taking down old material including plugs and hold fasts etc, making good and removing to store. These rates include obtaining access by raising covers to fittings etc and replacing them, breaking up large trusses etc into portable parts and where applicable, painting one coat of paint on new wood work of eased edges and such like.
- m. **Orders:** Orders in writing shall be given for all approved direction. No verbal instructions shall be deemed to be binding, nor shall such work be measured.
- n. The Term "*Rates*" used in this Schedule shall imply rates in this Schedule and / or contract rates based on this Schedule of Rates.
- o. The Term *"Mindef Premises"* used in this Schedule means any premises (whether owned by Govt of Pakistan or otherwise), on which work is carried out under the supervision of the MES.

- p. "Store" used in connection with the supply of materials, or the disposal of old materials shall mean any MES store or place of deposit within the area of the Contract. In cases where outstations are included under a main Contract, the "Store" is to be understood as referring to the MES Store at those outstations, for all works so executed.
- q. **Tools, Plant and Machinery** implies the use of all tools, plant and machinery required for execution of the work and all charges in connection therewith.
- r. **Quality:** The Materials except where specified otherwise shall be of the best quality indigenous make, ASTM / BS / PSS Nos whatever specified shall deem to be the latest version of the relevant Standard.

7. **Full Provision**: The Contract rates will include every allowance necessary, without extra measurement or charge, for any or all of the following matters:-

- a. **Bad Work**:- Remedy and make good, all defective or bad work to the satisfaction of the Engineer-in-Charge.
- b. **Complete Work**:- Materials, labour, supervision, tools, plants, machinery, wages, insurance, overhead charges, profit, carriage, delivery, erection, laying, fixing, octroi charges, taxes, royalties, water charges etc.
- c. **Contract Document:** Full compliance with all matters in the contract documents including Schedules, Specifications and Drawings etc.
- d. *Curved Work etc*:- Work of any quantity, size or shape whether level, inclined, straight, curved, battered etc.
- e. Mindef Materials, Fittings and Fixing :-
 - (1) Load, remove from store, unload, unpack, assemble, prepare empty packages and return the same to stores.
 - (2) Any assumed loss of profit to the Contractor for stores, not supplied by him.
- f. **Difficult Position etc:** Accessibility or otherwise of site, easy or difficult positions, foul, clean, wet or dry situations.
- g. Dry Work etc:- Keep work clear of all water, except from powerful springs and subsoil water, in which case extra payment shall be admissible for pumping out water by any means, if specially ordered by the Engineer-in-Charge.
- h. *Errors:* Rectify all errors to the satisfaction of the Engineer-in-Charge (e.g when excavations are carried out deeper than ordered or required, level shall be made up with Cement Concrete.

- i. *Handing Over:* Hand over the work clean, perfect and ready for use or occupation upto general standard of all good works.
- j. *Maker's Instruction:* Comply with maker's instructions etc, in connection with use of proprietary articles.
- k. *Measurements:* Any contingencies involved in method of measurements (advantageous or disadvantageous) here in set forth.
- Rubbish:- Removal and disposal of rubbish:-
 - (1) Off Mindef premises.
 - (2) Anywhere on Mindef premises including spreading, leveling, stacking etc, as required.
- m. **Temporary Work etc:-** Provision of temporary roads, cart ways, fencing, handrails, lighting, watching, also any gangways, profiles, templates, gauges, measures etc.
- n. *Waste etc*:- All waste, laps, scams, joints, cutting (rough or fair) straight, raking or circular and making good.
- o. *Workers:* Provision of suitable skilled workers as required and all matters (accommodation, transport, health, sanitary services etc) in connection with the same.

MEASUREMENTS

8. **Money Unit:-** The money unit (or rate) of each item is expressed in decimal coinage i.e. in Rupees and Paisas.

9. **Net:-** Measurements shall be "Net" as fixed, with no allowances for cutting, waste, laps for joints, risk etc. No allowance is to be made for large or small quantities, easy or difficult positions, or other exceptional circumstances except where specifically provided for in the Schedule.

10. **Inclusive Description:-** The following principles apply to the whole Schedule:-

- a. Any description shall be assumed to comprehend any incidental processes.
- b. No extra measurement or description shall be made for any matter already described elsewhere.

11. Other Methods:-

a. All works executed and paid for under this Schedule are to be measured in accordance with instructions and remarks detailed here in, without reference to any local custom or other practice, should that differ in any way from methods used in this Schedule. b. Items, rates, description of materials and workmanship, modes of measurement etc, contained in all previous Schedules are to be considered as **obsolete**. They shall not constitute a precedent for purposes of comparison with (or interpretation of) the contents of this Schedule.

12. **Removal:-** This expression includes handle, load, convey by any means, unload, stack, weigh, measure and in the case of Mindef store, unpack, assemble, prepare and return empties to store in addition.

13. **Removal Distance:** This shall be measured by the shortest practicable route as approved.

14. Tolerance:-

- a. Take dimension to the nearest 25 mm (except as otherwise indicated in this Schedule) ignoring fraction under 15 mm.
- b. Work out areas to the nearest $1/10^{th}$ of a Sqm ignoring fractions under $1/100^{th}$ of a Sqm.
- c. Work out cubic contents to the nearest 1/10th of a Cum ignoring fractions under 1/100th of Cum.

RATES

15. The **Rates** throughout this Schedule shall be deemed to include everything incidental to the complete work, to the satisfaction of the Engineer-in-Charge and include among other matters:-

- a. *Generally:* Full compliance with General Rules etc, where relevant, specially Rule 7, sub rules (a) to (o) inclusive.
- b. *Particularly:* All relevant matters in the particular section in which an item and rate occur.
- c. Additionally:- Any relevant matter in any section.
- d. **Omissions**:- All matters generally necessary for complete performance and handing over of all works, in a clean serviceable condition, whether specially mentioned or not.

16. **General Applicability:-** The inclusion of a rate in one section shall not preclude its applicability for a work covered in another section. The rate shall be applied, if it covers the nature of work and the later Section does not include rate for such work. The decision of E-in-C / DW&CE on the applicability of the rate shall be final and binding.

17. Subject to the over-riding provisions of the conditions of the Contract, **payment** for work not specifically mentioned herein shall be made as explicated in this Para:-

- a. **Proportional Rate**:- If there are analogous items in the Schedule for articles or workmanship of similar character, then at prices equal to the prices of such items, if the articles or workmanship are of equivalent value, or, if differing in particulars and value, at prices determined by the applicable trade variations. The Schedule item on which a price is based is to be stated on the order.
- b. Star Price:-
 - (1) If the articles or workmanship are so dissimilar as not to admit direct assessment or proportioning as laid down in Rule 17 (a) above, then at the Agreed price, which shall be in conformity with the general standard of values in the Schedule, and shall whenever possible, be based upon suitable schedule items.
 - (2) If in special cases, prices have necessarily to be determined from the amount of labour expended and the value of the materials incorporated, payment will be made as follows:-
 - Labour at Schedule Rates given in "Labour Rate" (Section-31) to which the Contract percentage will be applied.
 - b. Materials not included in the "Material Supplied Only" rates in Section-28 and Section-29, shall be paid at their actual market cost (net cost after deduction of all discounts), duly verified by the Accepting officer, CMES/GE, with an addition of 25% to cover all charges, taxes and profit.
 - (3) Prices shall be determined before the execution of work. If a price should depend upon particulars which can't be ascertained before the order is put in hand, the procedure by which actual price is to be arrived at when the particulars are known, shall be previously settled.
 - (4) Should a **Star Price** (approved by the CMES) be inserted in an order, it will be understood that the Contractor accepts it, unless he objects in writing within six (6) days from the receipt of order.
- c. Unless expressly stated in the order or agreement to be "Net" (in which case it must be so shown when billed), all special prices, other than those assessed from actual cost under Para 17 (b) (2) above, shall be subject to the Contract percentage, if any.

18. Materials Supplied Only:-

- a. The rates for "Materials Supplied Only" are the rates which have been used in computing the rates for various Schedule items. The "Materials Supplied Only" rates, inter alia include, lead for any distance upto the site of work and cost of containers only.
- b. If the Contract provides issue of any of the materials listed under "Materials Supplied Only" to the Contractor on payment, the rates to be charged to the Contractor shall be the same as the Materials Supplied Only Rates, subject to following conditions:-
 - (1) The delivery shall be made at the MES store(s) mentioned in the Contract and the Contractor shall, except where rates may otherwise specifically provide for removal in this Schedule (e.g "*Remove from Store and Fix*"), be deemed to have made due allowance in his contract price for loading /unloading, transport to site and unpacking the stores etc as may be necessary.
 - (2) The containers will become property of the Contractor and will not be taken back by the MES.
- c. If the Contract provides for supply of any of the materials, listed in "Materials Supplied Only" (Section-28 and Section-29), the rates to be paid to the Contractor, shall be same as the Material Supplied Only rates (to which the Contractor's percentage will be applied).

19. **Old Materials:-** No extra charge shall be allowed for handling, fixing etc, of old materials as compared with new.

20. "Raise (Raising)" includes any hoisting or lowering.

21. **Remove from Store**, shall include removal from store to site of work or, if directed, anywhere within a 4 Km radius.

22. **Remove off Mindef Premises,** shall include as an alternative a distance of 4 Km in case non Mindef or other premises.

23. "Store" in Rules 18, 21, and 22 implies:--

- a. The Mindef or (MES) store referred to in the Contract,
- b. The MES Store in the Contract Area, OR
- c. Any other store or place not exc 4 Km from the site of work.

24. **Water:-** The conditions under which water for the works may be obtained from MES supply system, shall form the subject of a separate agreement between the Engineer-in-Charge and the contractor, unless otherwise specified in the Contract.

25. **GST:-** GST is included in the market rates of items, which were incorporated in the calculations of Schedule Rates, where applicable as per prevailing Govt. orders.

MILLITARY ENCINEERS SERVICE

Acronym /Abbreviation Description А Ampere AASHTO American Association of State Highways and Transportation Officials Asphalt Cement, Alternating Current, AC, ac Air conditioner, Air conditioning, Asbestos Cement. ACB Air Circuit Breaker ACE Additional Chief Engineer ACSR Aluminum Conductor Steel Reinforced ACV Aggregate Crushing Value AFC Automatic Frequency Control Ah Ampere hour Approximate, approximately Approx, approx ASTM American Society of Testing Materials Auto, auto Automatic, automatically Avg, avg Average AVR Automatic Voltage Regulator AWG American Wire Gauge Barg Bar gauge BBES **Bitumen Binding Enamel Surface** BC Bayonet Cap Birmingham Gauge BG Bit mac **Bituminous Premix Carpet** Bill or Bills of Quantities B/Q BS **British Standards** BSS British Standard Specifications BTU British Thermal Unit ⁰C Degrees Celsius / Centigrade CBR California Bearing Ratio CC Cement Concrete CG Cord Grip CGI Corrugated Galvd Iron CI Cast Iron

ACRONYMS / ABBREVIATIONS

Acronym /Abbreviation	Description		
Cm, cm	Centimetre		
CM	Cement Mortar		
CMA	Cable Manufactures Association,		
	Controller of Military Accounts		
CMES	Commander Military Engineering Services		
C Nos	Hundred Numbers		
СР	Chromium Plated, Chrome Plated		
CSW	Clerestory Window		
СТ	Current Transformer		
Cu	Cubic		
Cusec, cusec	Ft ³ / sec		
Cu Cm, cc, cm ³	Cubic Centimetre		
Cum, cum	Cubic Metre		
DC	Direct Current		
Dia, dia	Diameter		
DP	Double Pole		
DPC	Damp Proof Course		
Drg, dwg	Drawing		
DST	Double Surface Treatment		
DW&CE	Director Works & Chief Engineer		
EHT	Extra High Tension		
EHV	Extra High Voltage		
E-in-C	Engineer-in-Chief		
ES	Edison Screw Cap		
ET	Electrical Thread		
Exc, exc	Exceeding, exceed		
Excl, excl	Excluding, excluded		
°F	Degrees Fahrenheit		
FC	Fibre Cement		
FI	Flakiness Index		
FRP	Fibre Reinforced Pipe		
Ft, ft	Foot, Feet		
Gal, gal	gallon		

ACRONYMS / ABBREVIATIONS

Galvd	Galvanized		
Acronym /Abbreviation	Description		
GE	Garrison Engineer		
GF	Ground Floor		
GI	Galvanized Iron		
GL	Ground Level		
gm	Gram		
Govt	Government		
gpd	Gallons per Day		
GPM, gpm	Gallons per Minute		
нс	High Conductivity		
HD	Hard Drawn		
HDPE	High Density Poly Ethylene		
HP, hp	Horse Power		
Hr, hr	Hour		
HRC	High Rupturing Capacity		
HS	Heat Shrink		
HT	High Tension		
HV	High Voltage		
IC	Iron Clad		
In, in	Inch		
Incl, incl	Including, includes, included		
J	Joule		
JMF	Job Mix Formula		
K	Kilo (10 ³), Kip		
KA	Kilo Ampere		
Kg, kg	Kilogram		
Km, km	Kilometre		
Kmph	Kilometre per hour		
KVA	Kilo Volt Ampere		
Kw	Kilo watt		
KWh, kwh	Kilo Watt hour		
l, lit	Litre		
Lb, lb	Pound		
LL	Liquid Limit		

LT	Low Tension		
Acronym /Abbreviation	Description		
LV	Low Voltage		
M, m	Metre		
Max, max	Maximum		
MC	Medium Cutback		
MCB	Molded Circuit Breaker		
МССВ	Molded Case Circuit Breaker		
MDD	Max Dry Density		
MDF	Medium Density Fibre		
MDI	Max Demand Indicator		
MES	Military Engineer Services		
Mfd	Milli Faraday		
Mg, mg	Milligram		
Min, min	Minute (time), minimum		
Mindef	Ministry of Defence		
Mm, mm	Millimetre		
MS	Mild Steel		
mva	Milli Volt Ampere		
Ν	Newton		
Not exc, not exc, n. exc	Not exceeding, not exceed		
OCB	Oil Circuit Breaker		
Ω	Ohm View View View View View View View View		
Pa	Pascal (unit of stress)		
PCC	Plain Cement Concrete		
PCSIR	Pakistan Council on Scientific Research		
PE	Poly Ethylene		
PF	Power Factor		
PI	Plasticity Index		
PILC	Paper Insulated and Lead Cover		
PM	Phase Modulator		
POL	Petrol, Oil and Lubricants		
PPD, ppd	Pounds per Day		
PPGI	Pre painted Galvanized Iron		
ppm	Parts per million		

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Acronym /Abbreviation	Description		
PPR	Poly propylene Random		
PSS	Pakistan Standard Specifications		
PT	Potential Transformer		
PVC	Poly Vinyl Chloride		
RC	Rapid Cutback		
RCC	Reinforced Cement Concrete		
RM	Running Metre		
RPM, rpm	Revolutions per minute		
SC	Slow Cutback		
S Eq	Sand Equivalent		
SP	Single Pole, Single Phase		
Sq, sq	Square		
Sqm, sqm	Square Metre		
Sq Cm, sqcm	Square Centimetre		
ST	Single Surface Treatment		
STA	Steel Tape Armoured		
SW	Steel Wire		
SWA	Steel Wire Armoured		
SWG	Standard Wire Gauge		
SWV	Soil, Waste and Ventilation		
Sym	Symmetrical		
Т	Ton, tonne, Metric ton		
ТОИ	Time of Utilization		
T&P	Tools and Plants		
ТР	Triple Pole		
TPN	Triple Pole and Neutral		
TST	Triple Surface Treatment		
uPVC	Un-Plasticized Poly Vinyl Chloride		
V	Volt		
Vent	Ventilation		
VCB	Vacuum Circuit Breaker		
W	Watt		
WBM	Water Bound Macadam		

ACRONYMS / ABBREVIATIONS

WC	Water Closet
Acronym /Abbreviation	Description
Wc	Water Column
WI	Wrought Iron
Х	Ten
XPM	Expended Material
XLPE	Cross Linked Poly Ethylene
Yd, yd	Yard
	NONTERS CERTIFICATION

CONVERSION TABLE

 $\{B = (C) \times (A)\}$

Convert		Multiplication Factor	
From (A)	To (B)	(C)	
Length			
in	cm, mm	2.540 cm, 25.40 mm	
mm	in	0.0394	
M, m	ft	3.2810	
ft	M, m	0.3048	
yd	M, m	0.9144	
Mile	km	1.6090	
Nautical mile	km	1.8530	
Area			
sq in	sq cm	6.4516	
sq ft	sq m	0.0929	
sq yd	sq m	0.8361	
sq mile	sq km	2.5900	
acre	sq m	4046.9	
acre	hectare	0.4047	
Volume			
cu in	cu cm, cc, cm ³	16.3900	
cu m	cu ft	35.3100	
cu ft	in ³	1728	
cu ft	cum	0.0283	
cu yd	cu m	0.7646	
US gal	cu ft	7.4820	
British gal	cu ft	6.2400	
US gal	Litre, lit	3.7850	
British gal	Litre, lit	4.5460	
cu m	lit	0.0296	
gpm	cusec	2.228 x 10 ⁻³	
cusec	gpm	448.83	
acre ft	cu ft	43560	
Density / Unit Weight			
kN / m ³	lb / ft ³	6.3660	
lb / ft ³	kN / m ³	0.1571	
kN / m ³	M Ton /m ³	0.1020	
M Ton /m ³	kN / m ³	9.8070	

ft lb / min (ft lb /sec)

Ton/ m ³	lb / ft ³	62.4300			
		-			
(Convert	Multiplication Factor			
From (A)	To (B)	(C)			
Weight/ Force	Weight/ Force				
lb	kg	0.4536			
/ kg	N	9.8070			
lb	N	4.4480			
kip or K	lb	1000			
kN	kip or k	0.2248			
Cwt	kg	50.80			
T (British)	Tonne, M ton	1.0160			
T (British)	lb	2240			
Tonne	kg	1000			
Pressure					
atmosphere	K Pa	101.30			
atmosphere	lb / ft ² , psf	2117			
atmosphere	lb / in², psi	14.70			
barg	KPa	100			
kg / cm ²	K Pa	98.07			
kg / cm ²	lb / ft ² , psf	2048			
lb / ft ² , psf	KPa	20.89			
lb / in², psi	KPa	0.1450			
lb / ft ²	КРа	0.04787			
lb / ft ²	lb / in², psi	144			
MPa	lb / in², psi	145			
Energy / Power					
1 ⁰ F	1° C	0.555 ([°] F-32)			
J	ft lb	0.7373			
Nm	J	1			
Watt hr	J	3600			
Watt hr	BTU	3.4120			
1 Ton TNT	J	4.184 x 10 ⁹			
BTU/ hr	K Cal /hr , KW hr	0.2930			
1 T (air conditioning)	BTU	12000			
hp	KW, (Watt)	0.7457. (746)			

PREFIXES - FOR METRIC UNITS

hp

n Nano. (10^{-3}) C Centi. (10^{-2})
--

33,000, (550)

xxii

CONVERSION TABLE

μ	Micro, (10 ⁻⁶)	К	Kilo, (10 ³)
m	Milli, (10 ⁻³)	Μ	Mega, (10 ⁶)
		G	Giga, (10 ⁹)

MILLITARY ENCINE SERVICES

SECTION – 1 EXCAVATION AND EARTH WORK

SPECIFICATIONS

1.0.0. Excavation and Earth Work, pertaining to buildings and roads is covered under two separate sub-heads, since the requirements in both cases are different.

SUB SECTION 1-1

BUILDINGS

1.1.1. Excavation:- Work under this section consists of excavation in all types of soil, lifting, transportation, disposal of excavated material within ten metre (10M), back filling and fill for building foundations and under floor etc. Lead beyond 10 M will be paid separately.

MATERIAL REQUIREMENTS

1.1.2. Borrow Pits:- These are to be made only in areas and of the size and shape, approved by the Engineer-in-Charge.

1.1.3. Classification of Excavation:- For the purpose of this section, excavations shall be classified and priced under following heads:-

1.1.3.1. Ordinary Soil incl:-

- 1.1.3.1.1. Spoil or rubbish of every description
- 1.1.3.1.2. Rubbish tip material etc
- 1.1.3.1.3. Loose/medium stiff clay, silt, sand, gravel and loam mud
- 1.1.3.1.4. Any other formation into which a shovel can be entered with a foot pressure

1.1.3.2. Hard Soil incl:-

- 1.1.3.2.1. Stiff heavy clay
- 1.1.3.2.2. Mooram, Kanker
- 1.1.3.2.3. Mud concrete
- 1.1.3.2.4. Boulders that can be individually lifted by hand
- 1.1.3.2.5. Conglomerate formations, shale, lime concrete, brick work / stone masonry in lime
- 1.1.3.2.6. Metalled surface of road, bottoming
- 1.1.3.2.7. Hard core under floor

1.1.3.2.8. Any other formation into which a shovel cannot enter with a foot pressure and the excavation requires force-able application of a pick

1.1.3.3. Rock not requiring blasting incl:-

- 1.1.3.3.1. CC, premix carpet, brick work and stone masonry in CM
- 1.1.3.3.2. Large boulders that cannot be individually lifted by hand
- 1.1.3.3.3. Soft rock or any other formation, which can be excavated by jumpers, wedges, hammers etc

1.1.3.4. **Rock requiring Blasting**:- This incl hard rock and similar other formations, which cannot be excavated by jumpers, wedges, hammers and light tools etc.

Note: Blasting shall not be performed without the prior written permission of the Engineer-in-Charge. The contractor shall take all necessary precautions for safety of persons, property etc, as required by regulations and shall implicitly observe all instructions on blasting as may be issued, without extra payment.

1.1.3.5. **Rock requiring Blasting but Blasting prohibited**:-This incl all as in Para 1.1.3.4 above, but blasting is prohibited by the Engineer-in-Charge.

1.1.4. The classification of excavation will be pre-determined by means of appropriate number of bore holes to the depths, required at the site. The approx quantities for different classification, based on the above bore-hole results, will be kept "Provisional" in the Work Orders, Requisitions and Bill of Quantities etc.

1.1.5. In case, hard soil or rock is encountered, during excavation of soils or rock is visible and has to be excavated, prior written approval of the Engineer-in-Charge will be obtained, before commencing excavation or blasting etc. The actual quantities and classification of rock will be determined and recorded by the Engineer-in-Charge.

1.1.6. In case of disagreement, the case will be referred to the next higher authority, whose decision will be final, conclusive and binding. Measurement and classification will be agreed in writing, by both the parties, before any foundation / construction work starts.

1.1.7. Where blasting has been prohibited by the Engineer-in-Charge, excavation shall be carried out by pneumatic concrete breakers, ripper of dozer, sledge-hammers and heavy points or similar methods.

1.1.8. Materials from Excavation:- Materials of any kind obtained from excavation, any finds made on the site, such as antiques, relics, coins, fossils, etc, shall remain the property of the Govt of Pakistan. The

rates incl separation of above mentioned materials from each other and depositing, as directed by the Engineer-in-Charge. Any of these materials, if ordered by the Engineer-in-Charge, to be used by the contractor on the works, shall be charged to him at the "Materials Supplied Only" rates given in this Schedule, subject to Contractor's percentage, or if, these are not available from the Schedule, then, at rates to be mutually agreed between the Engineer-in-Charge and the contractor, before the materials are used.

CONSTRUCTION REQUIREMENTS

1.1.9. Clay Puddle

- 1.1.9.1. Clay shall be of the quality, to be approved by the Engineer-in-Charge before use.
- 1.1.9.2. The clay shall be tempered by soaking in water for at least 12 hours before use.
- 1.1.9.3. The clay is to be worked into puddle, before use, by turning it over and over with tools (like "Phauras" etc.) and treading it under feet into a homogenous mass of tough consistency, approved by the Engineer-in-Charge.
- 1.1.9.4. The puddle, after being worked up, shall be kneaded into balls and laid in 15cm layer. Each layer will be well trodden and thoroughly rammed.
- 1.1.9.5. On no account shall puddle be allowed to crack. If it does, the cracked surface is to be dug up and the puddle remade.

1.1.10. In case filling other than brick bats is to be used, approval of Engineer-in-Charge will be obtained.

1.1.11. Measures

- 1.1.11.1. **Solid Measure**:- Materials in their natural state before excavation etc.
- 1.1.11.2. **Packed Measure**:- Materials, which have been spread, leveled and /or filled, watered and compacted (rammed) or equally consolidated (e.g. heaps, consolidated by exposure to weather etc for a period exc 6 months).
- 1.1.11.3. Loose Measure:- As packed measure, but not compacted (rammed) or equally consolidated.
- 1.1.11.4. **Conversion Factors**:- Table 1-1-1 shows the multiplying factors to convert in-situ measure into solid measure:-

In situ Measure	Multiplication Factors		Remarks
	Soils	Rocks	Komano
Loose Measure	0.80	0.60	These figures accurate or

TABLE 1-1-1

EXCAVATION AND EARTH WORK

Packed Measure	0.89	0.67	otherwise, shall be binding on all parties.
Solid Measure	1.00	1.00	
90-100 % Modified AASHTO	1.10	Nil	

Notes:-

i. Un-suitable soil and any vegetation matter shall be separated from other soils excavated, if so directed.

ii. Undergrowth, brushwood and trees shall not be cut without the prior approval of the Engineer-in-Charge

1.1.12. Compaction:-

1.1.12.1. Where building / structural foundations are to be laid, shall have compaction of min 95% of Maximum Dry Density (MDD) of Modified AASHTO achieved in the laboratory for the cohesion-less soil and 90% of MDD for cohesive soil. This criterion is strictly followed. Where foundation crust becomes disturbed during excavation of footing, compaction of soil where required, be decided by the Engineer-in-Charge.

1.1.12.2. Compaction of soil under floor and plinth protection shall be 90 % of MDD of Modified AASHTO.

1.1.12.3. Soil under footpath should be well compacted with suitable means of compaction i.e plate compactor, mini rollers etc, to achieve min 90% of MDD.

1.1.13. Survey and Setting Out Profiles etc:-

1.1.13.1. All excavations, embankments, revetments etc, are to be properly set out to the true line curve, level or slopes required and the rates incl the cost of all profiles, crossheads, boning rods etc, as well as tools and plants.

1.1.13.2. The Contractor shall provide Level, Theodolite or Total Station to carry out original ground survey, layouts and cross-sections etc, which will become the basis of measurement for various activities.

1.1.13.3. All survey record, prepared by the Contractor, shall be certified by the Engineer-in-Charge, before starting physical activities on ground. The contractor shall however, be responsible for any errors and omissions, in surveying record.

METHOD OF MEASUREMENTS

1.1.14. Authorized Quantities:- Authorized quantities and not those actually excavated will be paid for. Following are the authorized quantities:-

1.1.14.1. The dimensions of foundations (lengths, widths and depths etc), as shown on drawings.

1.1.14.2. The lengths and widths of concrete beds under drains as shown on drawings and the depth from GL.

- 1.1.14.3. For excavation of trenches for pipes:-
 - 1.1.14.3.1. The necessary length of trenches for pipes, etc
 - 1.1.14.3.2. The width for excavation of trenches for pipes etc shall be the external dia of the pipes (Not Socket), plus 225 mm on either side. For depth exc 1.5M, slope allowance of 125 mm/ M (in depth for each side of the trench) shall be made in addition to width, specified for full depth of the trench.

1.1.14.3.3. The depth from GL.

1.1.14.4. Excavation for cables; as in Section - 25 (External Electrification)

1.1.15. Measurements for Excavation and Earth Work:-

1.1.15.1. The measurements to be those of the voids from which the material has been taken out and not of the resultant spoil. Where this is impracticable, the measurement shall be converted to "Solid measure" in accordance with Table 1-1-1. No allowance is made for slips or falls.

1.1.15.2. Any pipes, cables etc met with and damaged during excavation, would be repaired / replaced as directed by Engineer-in-Charge without extra cost.

1.1.15.3. Excavations be restricted to the min dimensions necessary, and payment be made on the basis of net requirements.

1.1.15.4. In excavations through varying strata, the different layers are to be paid for at the rate for the respective formations.

1.1.16. Earth Filling under Floors / Areas:- The height be based on avg lift from the avg GL. The depth of borrow pit will not be incl in calculating the lift.

1.1.17. Site Clearance, Roots, Trees etc:- No extra measurements or allowance shall be made for clearing the site of grass, shrubs, brushwood, undergrowth, roots and small trees not exc 225 mm girth at 60 cm from the ground. The realized material, except trees exc 225 mm girth, shall become the property of contractor, if not otherwise specified elsewhere in the Contract. Trees exc 225 mm girth shall be cut and disposed off by the concerned / other agency.

1.1.18. No extra measurement or allowance will be made for work intercepted by roots.

1.1.19. Battering: Battering (or contents thereof) shall not be measured, when timbering is ordered and battering is carried out to save timbering.

1.1.20. Transportation of Spoils and Materials:-

1.1.20.1. The following shall be considered equal to 1 Cum of spoil under the rates for "soils".

1.1.20.1.1. 1,000 Lit of water.

1.1.20.1.2. 2.5 Cum of scantling, boarding etc.

1.1.20.1.3. 2.0 Cum of ashes, clinker, etc.

1.1.20.1.4. 1.8 Ton of any material not elsewhere listed.

1.1.20.2. Individual articles which weigh over 200 Kg each shall be paid for an extra of 10% over "rocks".

REAL SERVICE

1.1.21. Measurements not to be done:- Ignore following :-

- 1.1.21.1. Steps inside excavation to form platform etc, for raising earth.
- 1.1.21.2. Any slips or falls.

CLARIFICATION OF RATES

- 1.1.22. The rates, inter alia, incl particularly:-
 - 1.1.22.1. Any slips or falls (to be made good).
 - 1.1.22.2. Works in excess of requirements and for making good to same as required.
 - 1.1.22.3. Cleaning out sludge.
 - 1.1.22.4. Filling soft spots as required.
 - 1.1.22.5. Solid measures or conversion into solid measure.
 - 1.1.22.6. Landing grounds, buildings etc of any description.
 - 1.1.22.7. Any other relevant matters related to excavation and earthwork, stated elsewhere.
 - 1.1.22.8. For excavation in foundation, trenches / areas, forming sides and bottom surfaces to required shape, level and slope, and compacting (ramming) in case of ordinary and hard soils.

SUB SECTION 1-2

ROADS

1.2.1. Classification of Soil:- For the purpose of this sub-section, soil shall be classified as per Table 1-2-1

1.2.2. Survey and Setting Out Profiles etc:- Refer to Para 1.1.13.

1.2.3. Clearing and Grubbing:- It shall consist of:-

1.2.3.1. Removal upto 30 cm depth of stumps, roots, bushes, and trees with less than 225 mm girth, vegetation and other objectionable material and disposal of all surface objects as and where directed by the Engineer-in-Charge.

1.2.3.2. Operation of clearing and grubbing shall in no way be deemed to effect any level or volume change of the area.

1.2.4. Removal of Trees: - Refer to Para 1.1.17 and Para 1.1.18.

1.2.5. Stripping:-

1.2.5.1. The areas, from which stripping of topsoil is required, shall be as indicated on the drawings or as directed by Engineer-in-Charge.

1.2.5.2. The Contractor shall remove topsoil from these areas to depth as directed by the Engineer-in-Charge. Stripping of topsoil in any case shall not be less than 10 cm in depth.

1.2.5.3. The removed topsoil shall be deposited / spread at a location within one Km as directed by the Engineer-in-Charge.

1.2.5.4. Engineer-in-Charge shall identify the soil as unsuitable, through laboratory tests (if required) before ordering for start of stripping activity.

1.2.5.5. This item shall be paid as per the relevant item of the Schedule at the location, approved for such purpose.

1.2.6. Embankment:- The height be based on avg lift from avg GL. The depth of borrow pit is not incl in calculating the lift.

TABLE 1-2-1

TABLE 1-2-1											
AASHTO Soil Classification System											
General Classification	Granular Materials 35% or less passing 200 Sieve (0.075 mm)						Silt-Clay Materials > 35% passing 200 Sieve (0.075 mm)				
	A-1		A-2					A-6	A-7		
Group Classification	A-1-a	A-1-b	A-3	A-2-4	A-2-5	A-2-6	A-2-7	A-4	A-5		A-7-5 A-7-6
Sieve Analysis, % passing											
2.00 mm (No. 10)	50 max										
0.425 mm (No. 40)	30 max	50 max	51 max								
0.075 mm (No. 200)	15 max	25 max	10 max	35 max	35 max	35 max	35 max	36 min	36 min	36 min	36 min
Characteristics of fraction Passing 0.425 mm (No. 40)											
Liquid Limit (LL)	-			40 max	41 min	40 max	41 min	40 max	41 min	40 max	41 min
Plasticity Index (PI)	6 r	nax	N.P.	10 max	10 max	11 min	11 min	10 max	10 max	11 min	11 min ^{\$}
Usual types of significant constituent materials	Stone fra gravel a	fragments, and sand Fine sand		Silty	Silty or clayey gravel and sand			Silty soils		Clayey soils	
General Rating as a sub-grade	Excellent to Good Fair to Poor										
PI of A-7-5 subgroup is equal to or less than LL - 30. PI of A-7-6 subgroup is greater than LL – 30											

1.2.7. Compaction of Natural Ground:- Upto a depth of twenty (20) cm below the natural ground, all solids and vegetation shall be removed and clear surface shall be broken up by ploughing and scarifying. The natural ground will be compacted upto a depth of 20 cm to a degree as defined in Table 1-2-2 :-

Compaction of Natural Ground							
S.No.	When Height of Embankment above Natural GL (cm)	Percent of MDD (As determined by AASHTO T-180)					
1	0 to 30	95					
2	30 to 75	93					
3	Over 75	90					
4	Below the foundation of structures for Roads	95					

TABLE 1-2-2 compaction of Natural Ground

Note:- This item shall be paid as per the relevant item of Schedule at the location, approved for such purpose by the Engineer-in-Charge.

MATERIAL REQUIREMENTS

1.2.8. Material for embankment shall consist of suitable material, excavated from borrow pit, roadway excavation or structural excavation and shall incl lead up to One Km and lift (where applicable). Borrow material will be used only when material obtained from roadway or structural excavation is not suitable or is deficient for embankment formation. The material under this item shall conform to following specification.

1.2.8.1. Contractor shall use AASHTO Class A-1, A-2, A-3, A-4 or A-5 soil as specified in Table 1-2-1, or other material, approved by the Engineer-in-Charge.

1.2.8.2. CBR of the material shall not be less than five percent (5%), determined in accordance with AASHTO T-193. CBR value shall be obtained at a density corresponding to the degree of compaction, required for the corresponding layer.

1.2.8.3. Swell Value of the material for embankment formation shall not exc half percent (0.5 %). However, while establishing the swell value, surcharge weights representing the overburden will be used. In case sandy material is used for embankment formation, it shall be properly confined with cohesive material to the extent, as approved by
the Engineer-in-Charge but with no extra payment. Sandy material shall not be used on slopes of embankment.

1.2.8.4. In areas subject to flood and prolonged inundation of the embankment, such as bridge sites, the material used in embankment, unless rock, shall be AASHTO Class A-1-a, A-1-b and A-2-4 soils. Other soils may be used only with the written consent of the Engineer-in-Charge.

CONSTRUCTION REQUIREMENTS

1.2.9. Formation of Embankment from Borrow Excavation:- Material for embankment, obtained and approved as provided in Para 1.2.8, shall be placed in horizontal layers of uniform thickness and in conformity with the lines, grades, sections and dimensions shown on drawings or as directed by the Engineer-in-Charge.

1.2.9.1. The layers of loose material, other than rock shall not be more than 20 cm thick, unless otherwise allowed by the Engineer-in-Charge after a trial section is prepared and approved.

1.2.9.2. The material placed in layers and scarified to the designated depth for formation of embankment. Embankment shall be compacted to the density specified in Table 1-2-3.

S.No.	When Depth of the Embankment Layer below Sub grade (cm)	Percent of MDD (As determined by AASHTO T-180)
1	0 to 30	95
2	30 to 75	93
3	Over 75	90

TABLE 1-2-3

Compaction of Embankment in Layers

1.2.10. Formation of Embankment on Steep Slopes:

1.2.10.1. Where embankments are to be constructed on steep slopes, hill sides or where new fill is to be placed and compacted against existing pavement or where embankment is to be built along one half the width at a time, the original slope of the hill side of existing pavement or adjacent to half width of embankment, shall be cut in steps of 20 cm depth.

1.2.10.2. Benching shall be of sufficient width to permit operation of equipment possible during placing and compaction of material.

1.2.10.3. Cut waste without rock vegetation and other unsuitable material shall be incorporated with the new embankment material and compacted in horizontal layers. No extra payment will be allowed for such an operation.

1.2.11. Formation of Embankment on Existing Roads:-

1.2.11.1. Before fill is placed and compacted on an existing roadway, the existing embankment and /or pavement may be leveled by cutting, rooting or scarifying by approved mechanical means to a level, to be determined by the Engineer-in-Charge.

1.2.11.2. The earth, old asphalt or other material, arising as a result of this operation will be declared either suitable or unsuitable by the Engineer-in-Charge, for use in embankment or any other item.

1.2.11.3. The material will be measured under relevant item of Schedule, if declared suitable or un-suitable.

1.2.12. Formation of Embankment in Water Logged Areas:-

1.2.12.1. Where embankments are to be placed in Water Logged areas and which are inaccessible to heavy construction equipment, a special working platform shall be first established, consisting of a blanket of fill material, placed on top of the soft layer.

1.2.12.2. The material for the working table shall consist of normal or processed granular fill, obtained from borrow excavation. This material shall conform to the specifications given in Table 1-2-4:-

Sieve Designation	Percent Passing by Weight	
75 mm (3 inch)	100	

1.2.12.3. The remaining grading shall be such, that intrusion into the working platform material of sub grade or natural ground surface is avoided. To meet this condition, following relationship is required:-.

D₁₅ (for Working Platform Material)

----- < 5

D₈₅ (for Natural Ground Material)

Where

 D_{85} and D_{15} , mean the particle dia corresponding to 85% and 15% respectively, passing (by weight), in a Grain Size Analysis.

Construction of this working table shall proceed from one edge of the soft area by using the fill as a ramp for further material transport.

The thickness of the working table as prescribed above shall be approx 0.5 M unless directed otherwise by the Engineer-in-Charge, and the width shall be that of the embankment. The placement and compaction of the working table shall be carried out by use of light equipment, as directed by the Engineer-in-Charge.

No density requirements are specified for the working platform, however for subsequent layers above, it shall be compacted to the densities specified above.

METHOD OF MEASUREMENTS

1.2.13. Measurement:- The quantities to be paid for shall be the number of cubic meters (cum) calculated on theoretical designed lines and grades and the ground levels, as established earlier, compacted in place, accepted by the Engineer-in-Charge, formed with material resulting from:-

1.2.13.1 Formation of Embankment from Borrow Excavation:-Measurement shall be made as under:-

Formation from Borrow Excavation = Total Embankment Quantity

(*minus*) Roadway Excavation Quantity (*minus*) Structural Excavation Quantity.

1.2.13.2. Formation of Embankment from Structural Excavation:-This quantity shall be the same as calculated for structural excavation, irrespective of its haulage distance, except, that declared unsuitable by the Engineer-in-Charge.

1.2.13.3. Formation of Embankment from Roadway Excavation:-This quantity shall be the same as calculated for roadway excavation. The contractor will be supposed to use material from roadway excavation, irrespective of haulage distance. However, if contractor, for his own convenience, uses the material from borrow, the payment will still be made under the item of embankment from roadway excavation.

1.2.14. In measurement of "Formation of Embankment on steep slopes", no allowance will be made for the benching or volume of material, cut out from the hill side or from the first half width fill to accommodate the compacting equipment, but will be calculated only on the net volume of fill placed against the original hill sides, the old embankment or the first half width fill.

1.2.15. Clearing and Grubbing

1.2.15.1. This item shall be paid as per the relevant item of Schedule at the location where required and approved for such purpose by the Engineer-in-Charge.

1.2.15.2. It shall not be measured for payment of work carried out by Contractor in cut areas of roadway and borrow pits.

CLARIFICATION OF RATES

1.2.16. The rates, inter alia, incl particularly:-

1.2.16.1. Formation of embankment from borrow excavation incl cost of excavation, royalty, hauling within 1 Km and filling upto any height / lift, spreading, compaction, labour, equipment, tools and incidentals, necessary to complete the item.

1.2.16.2. No extra payment will be made for making ramps / platforms for borrow pits.

PSE CES

ITEM RATES

SI No	Description	Unit	Rate (Rs)
	Buildings		
	Foundation, Trenches, Wells etc		
1-1	Excavation as in Ordinary Soil upto 1.5 M depth , in foundation and pipe trenches upto 1.5 M wide, in shafts, wells and independent holes upto 30 sqm each and throw earth clear of edges of excavation within 10m. Timbering to be paid extra (<i>Foundation and Trench over</i> 1.5 M widths will be treated as Areas).	Cum	181.15
1-2	Same as item 01-1, but in Hard Soil.	Cum	299.66
1-3	Same as item 01-1, but in Rock not requiring blasting.	Cum	1166.00
1-4	Same as item 01-1, but in Rock requiring blasting.	Cum	1451.56
1-5	Same as item 01-1, but in Rock requiring blasting but blasting is prohibited	Cum	2290.35
	Areas		
1-6	Excavation over areas as in Ordinary Soil upto 1.5 M depth, in foundation / to obtain earth for filling under floors / areas etc, or for shafts, wells exc 30 sqm each, throw earth clear of edges of excavation within 10 M.	Cum	151.24
1-7	Same as item 01-6, but in Hard Soil.	Cum	249.53
1-8	Same as item 01-6, but in Rock not requiring blasting.	Cum	971.67
1-9	Same as item 01-06, but in Rock requiring blasting.	Cum	507.99
1-10	Same as item 01-6, but in Rock requiring blasting but blasting prohibited.	Cum	1886.19
1-11	Add to item 01-1 and 01-02 for each additional 1.5 M lift or part thereof.	Cum	135.86
1-12	Add to item 01-3, 01-4 and 01-5, for each additional 1.5 M lift or part thereof.	Cum	150.54
1-13	Add to item 01-6 and 01-7, for each additional 1.5 M lift or part thereof.	Cum	100.21

SI No	Description	Unit	Rate (Rs)
1-14	Add to item 01-8, 01-9 and 01-10, for each additional 1.5 M lift or part thereof.	Cum	150.54
	Earth Filling		
1-15	Earth filling as in Ordinary or hard soil , filling in foundation, pipe trenches, shafts, wells, independent holes, under floors or around plinths etc, 1.5 M below or above Ground Level (GL), with spoil obtained from excavation in trenches/over areas within 10M incl watering and compaction in 150 mm layer and dressing to required profile and shape.	Cum	160.33
1-16	Add to item 01-15, for each additional 1.5 M or part thereof, above / below GL.	Cum	32.07
1-17	Load " Excavated spoil ", as in soil / rock on truck / trolley or any other means, carry beyond 10 M (specified in items 01-1 to 01-10) upto 100 M or part thereof, unload and stack or spread.	Cum	280.12
1-18	Load " materials " (like demolished brick bats, bricks, sand and bitumen etc) on truck/ trolley or any other means, carry upto 100 M or part thereof, unload and stack or spread.	Cum	252.11
1-19	Add for carrying soil / rock beyond 100M upto 500M or part thereof, on Macadam / Katcha road.	Cum	30.38
1-20	Add for carrying soil / rock for each subsequent 500 M or part thereof, on Macadam / Katcha road.	Cum	24.31
1-21	Excavate hill side slips, or similar loose material of any description and remove to a distance not exc 25M and deposit where directed, (loose or packed measure to be converted into solid measure).	Cum	191,23
1-22	Finish the surface of existing embankments in repair to a neat and finished profile incl making up where necessary, (Earth utilized from borrow pits for making up be paid for extra).	Sqm	7.22
1-23	Compaction / Ramming Earth in 150mm layers.	Cum	41.69

SI No	Description	Unit	Rate (Rs)
1-24	Watering to item 01-23.	Cum	14.96
1-25	Clay puddle supplied and laid in layers not exc 150 mm, compacted and finished fair (lead upto 2 Km).	Cum	815.64
1-26	Deduct from item 01-25, if clay is available from spoil within 100 M distance.	Cum	375.08
1-27	Brick bats or other approved filling in soakage pits etc.	Cum	2314.15
1-28	Taking out brick bats, boulders, rubbish etc, from Soakage pits and dispose off as ordered (supply and filling of brick-bats or other approved filling not incl).	Cum	452.66
1-29	Pumping out water from excavation etc, incl all labour, use of pumps, plants etc (The net quantity raised to be paid for). The lift not to exc 8 M. <u>Conversion Factor 1000 lit = one Cum.</u> Roads, Hard Standing and Landing Grounds etc	Cum	181.14
1-30	Clearing and Grubbing, all as specified.	Sam	16.32
1-31	Compaction of Natural Ground upto 95% Modified AASHTO density all as specified.	Sqm	16.91
1-32	Same as item 01-31 but 93% Modified AASHTO density.	Sqm	16.57
1-33	Same as item 01-31 but 90% Modified AASHTO density.	Sqm	13.88
1-34	Making Embankment, with the specified /approved soil obtained from borrow excavation within one KM, incl compaction in 150mm layers upto 95% Modified AASHTO density, and dressing to required profile and shape as specified	Cum	378.71
1-35	Same as item 01-34 but 93% Modified AASHTO density.	Cum	376.51
1-36	Same as item 01-34 but 90% Modified AASHTO density.	Cum	341.32
1-37	Excavation, as in ordinary / hard soil of roadway / stripping etc, and dispose off / collect spoil within one KM, complete, all as specified.	Cum	219.89
1-38	Excavation as in Rock not requiring blasting	Cum	1298.68

SI No	Description	Unit	Rate (Rs)
	of roadway etc and dispose off / collect spoil within one KM, complete, all as specified.		
1-39	Same as item 01-38 but as in Rock requiring blasting.	Cum	894.56
1-40	Same as item 01-38 but as in Rock requiring blasting, but blasting prohibited.	Cum	2264.18
	12		
	S/		
			31

SECTION - 2

ROADS, HARD-STANDINGS AND LANDING GROUNDS

SPECIFICATIONS

2.0. This Section covers Roads, Hard standings and Landing grounds. Items related to excavation and earth work have been discussed in Section-1. The material and construction requirements for following items are covered in this section:-

- (i) Sub Base:- Granular Sub Base, Soil Aggregate Sub Base
- (ii) Base:- Aggregate Base Course, Water Bound Macadam (WBM)
- (iii) Bituminous Surface Treatment (Hot / Cold Dressing)
- (iv) Premix Carpet (Bit-Mac)
- (v) Prime Coat / Tack Coat / Seal Coat
- (vi) Asphaltic Courses (Plant Mix)
 - Asphaltic Base Course
 - Asphaltic Wearing Course
- (vii) Concrete Pavement for Roads, Hard standings and Landing Grounds
- (viii) Rapid Runway Repairs
- (ix) Runway Joints and Sealants

2.1. Sub Base

2.1.1. **Granular Sub Base:-** All naturally occurring materials, meeting the requirements mentioned in Table 2-1 and 2-2.

MATERIAL REQUIREMENTS

TABLE 2-1

Grading Requirements

Sieve D	esignation	Percent Passing by Weight		
mm	(inch / No.)	Grading A	Grading B	
60	2-1/2 in	100	-	
50	2 in	90-100	100	
25	1 in	50-80	-	
9.5	3/8 in	-	55-85	
4.75	No. 4	35-70	40-70	
2.0	No. 10	-	30-60	
0.425	No. 40	-	20-50	
0.075	No. 200	2-8	5-15	

Note:- The co-efficient of Uniformity, $Cu = (D_{60} / D_{10})$ shall not be less than 3, where D_{60} & D_{10} are the particle dia corresponding to 60% & 10% respectively, passing (by weight) in Grain Size Analysis curve.

Other Properties of Granular Sub-BaseCBR Value (tested as per AASHTO T-193)30% (Min)Plasticity Index (P.I)6(Max)Liquid Limit (L.L)25(Max)Abrasion Value50% (Max)Sand Equivalent (S.Eq)25(Min)

TABLE 2-2

2.1.2. **Soil Aggregate Sub Base:-** Soil aggregates (Ghera), available in nature consisting of pebbles, shingle and sand may be used as such, if approved by the Engineer-in-Charge. It may be a mixture of natural and crushed stone. The pebble size should not exc 60 mm $(2\frac{1}{2})$.

CONSTRUCTION REQUIREMENTS

2.1.3. Construction Requirements of Sub-Base material of a single layer are given in Table 2-3.

Compacted Single Layer Thickness		Min Compaction (Field Density)	Tolerance	
Max	Min		Thickness	Cross fall
15 cm	7.5 cm	98% of MDD determined as per ASTM -D 1557	+10 mm - 20 mm	± 0.3 %

TABLE 2-3

Note:-

- i. Use hard, suitable and approved locally used materials, unless otherwise required to suit above specification.
- ii. Lay to full depth, hand pack on edge, fill interstices with spalls of sub-base material.
- iii. Lay to gradients, camber and super-elevation required and dry roll to a solid even finish, with 8 - 12 Ton power roller. The actual weight of the roller may be changed at the discretion of the Engineer-in-Charge, according to the nature of soil and the (bottoming) sub base materials used.
- iv. Make good with spalls of bottoming materials any voids, which may appear during the process of compaction and rolling, so as to leave the finished surface solid and conforming to the required slopes, levels, etc.
- v. The thickness refers to the thickness after compaction.
- vi. If bricks are allowed to be used, they shall be over burnt, whole bricks close laid flat, or on edge. Spread sand to fill voids and interstices @ 0.15 Cum per 10 Sqm.

2.2. Base Course

2.2.1. **Aggregate Base Course:-** It is a foundation course, consisting of crushed hard durable gravel, rock or stone fragments. It shall be clean and free from organic matters, lumps of clay and other

deleterious substances. The material shall be of such a nature that it can be compacted readily under watering and rolling to form a firm, stable base for both Flexible and Rigid pavements.

MATERIAL REQUIREMENTS

2.2.1.1. The Aggregate Base Course shall comply with Grading and Quality requirements given in Table 2 - 4 and 2 - 5.

Grading Requirement of Aggregate base obtrise						
Sieve Designation		Percent Passing by Weight				
mm In / No		Grading A	Grading B			
50.0	2 in	100	100			
25.0	1 in	70-95	75-95			
9.5	3/8 in	30-65	40-75			
4.75	No. 4	25-55	30-60			
2.00	No. 10	15-40	20-50			
0.425	No. 40	8-20	12-25			
0.075	No. 200	2-8	5-10			

TABLE 2-4

Grading Requirement of Aggregate Base Course

Note: -

- i. The material shall be well graded such that Coefficient of Uniformity, $C_{u=}D_{60} / D_{10}$ shall be greater than 4.
- ii. The gradation curve of the material shall be smooth and within the limits for Grading A or B given in Table 2-4.

TABLE 2-5

Quality Requirements of Aggregate Base Course

Crush Aggregate particles by weight having min. of two fractured faces 90% (Min)					
Laminated Material Value	15% (Max)				
C.B.R Value	80% (Min) as determined according to AASHTO T-193				
Los -Angeles Abrasion Value	40% (Max)				
Loss when subject to five cycles of the $Na_2 SO_4$ Soundness Test	12% (Max) as determined according to AASHTO T-104				
S. Eq. Value	45% (Min) as determined according to AASHTO T-176				
P.I. Value 6 (Max) as determined according to AASHTO					

2.2.1.2 **Filler:-** The approved Filler for blending or addition to that already present in the Aggregate Base material shall conform to requirements given in Table 2-6.

TABLE 2-6

Requirements for Filler Material

Requirements	Sieve Designation			
·	9.5 mm (3/8 in.)	No. 4	No. 100	

Percent Passing by Weight	100	85-100	10-30
P.I. Value (AASHTO T-90)	6 (Max)	-	-
S. Eq. (AASHTO-T-176)	30 (Min)	-	-

CONSTRUCTION REQUIREMENT

2.2.1.3. Construction Requirements for Aggregate Base Course are given in Table 2–7

TABLE 2-7					
Laver Thickness	Field Compaction as per	Toler	ance		
Layer mickness	AASHTO T-180 (Method - D)	Layer Thickness	Cross Fall		
15 cm (Max)	100% (Min)	+50 mm -10 mm	± 0.2 %		

Note: For road works exc 10 Km in Length, prior to commencement of Aggregate Base Course operations, a trial section 4 M wide of 200 to 300 M length, if directed by the Engineerin-Charge shall be prepared at site by the Contractor, using same material and equipment as will be used at site to determine the adequacy of equipment & other construction parameters.

2.2.2. Water Bound Macadam (WBM) Base:- It consists of broken stones of irregular shape, keyed together by consolidation under a roller, the stones themselves being wedged together in position and prevented from moving by smaller stones. Water is used to wash smaller particles of stones and grit into voids from above. Stability of WBM depends upon binder material which holds the stones in position and prevents their being moved or displaced under traffic.

MATERIAL REQUIREMENTS

2.2.2.1. The requirements are highlighted in succeeding paras.

2.2.2.2. Coarse Aggregate:-

2.2.2.2.1. **Grading:** Crushed or broken stone shall conform to requirements as specified in Table 2-8.

TABLE 2-8

Sieve Designation		Percent Passing by Weight			
mm	In	Class-A	Class-B	Class-C	
102	4	100	-	-	
89	3-1/2	90-100	-	-	
76	3	-	100	-	
63.5	2-1/2	25-60	90-100	100	
50	2	-	25-75	90-100	

Grading Requirement - Coarse Aggregate

37.5	1-1/2	0-15	0-15	35-70
25	1	-	-	0-15
19	3/4	0- 5	0-5	0-5
12.5	1/2	-	-	-

2.2.2.2.2. **Physical Properties** of Coarse Aggregate are given in Table 2–9.

TABLE 2-9

Physical Properties of Coarse Aggregate

Los Angeles Abrasion Value	Flakiness Index (F.I.)	Loss as per Soundness Test when subjected to 5 cycles of $Na_2 SO_4$
45% (Max).	15% (Max).	20% (Max) tested as per AASHTO T-104

2.2.2.3. **Fine Aggregate** (Filler Material or Screening):- The Fine aggregate shall be of following gradation.

TABLE 2-10

Fine Aggregate – Gradation Requirement

Sieve Designation		Percent Passing by Weight
mm	In	
9.5	3/8	100
4.75	No. 4	85-100
0.15	No. 100	10-30

Note:- The material passing Sieve #. 40 shall have a Liquid Limit (LL) of not more than 25 and Plasticity Index (PI) of not more than 6.

CONSTRUCTION REQUIREMENTS

2.2.2.4. Following are the Construction Requirements of laying Water Bound Macadam (WBM) Base.

2.2.2.4.1. For existing road surface 50 mm x 50 mm furrows shall be cut at One meter (1M) interval at 45° to the centerline of the roadway before proceeding with the laying of Coarse aggregate.

2.2.2.4.2. Use approved hard, tough and durable stone.

2.2.2.4.3. Road metal to be graded, produced from broken or crushed quarried stone or large boulders, least dimension not less than 150 mm.

2.2.2.4.4. The completed Base course shall be maintained in an acceptable condition until necessary subsequent treatment is applied.

2.2.2.5. Spreading and Compaction

2.2.2.5.1. Crushed stone shall be deposited and spread over prepared surface to proper depth so that the compacted layer

shall not exc 2 ½ times the thickness of Max Size of Aggregate. Each layer shall be inspected thoroughly before rolling to detect high or low spots. Crushed stones shall be added or shifted to provide a true surface. The coarse aggregate layer, after being laid to proper thickness, shall be lightly rolled, sufficient only to establish the required grade and level of the stones.

2.2.2.5.2. Lay to gradient, camber and super-elevation as required and dry roll, filling the depressions which may appear during rolling. Spreading of aggregate shall be followed by rolling with a smooth wheel roller weighing 10 Tons. Rolling shall begin at the lower edge of the shoulders to lock the stones firmly at the edge, then progress gradually towards centre line. Rolling shall continue until aggregate is well keyed and does not creep ahead of the roller.

2.2.2.5.3. After the initial rolling, dry screening shall be applied uniformly over the surface. Dry rolling shall be continued while screenings are being applied. The surface shall be swept with mechanical or hand brooms to aid spreading of the screenings. In no case, shall coarse aggregates be stored in heaps directly on the area where these are to be laid nor shall their hauling over a partly completed base be permitted, however dumpers shall be allowed at the construction area, where material will be spread quickly after dumping.

2.2.2.5.4. When the interstices in the coarse aggregate are filled with screening, the surface shall be sprinkled with water until it is saturated. The rolling, sprinkling and application of additional screening shall continue until a grout is formed that fills all the voids and forms a wave of grout in front of the roller.

2.2.2.5.5. When more than one layer is required to complete the Macadam Base course to the thickness as per the drawings, each layer shall be constructed as described.

2.3. Bituminous Surface Treatment. It is the application of asphaltic materials on any type of road or pavement surface, with or without a cover of mineral aggregate, which produces an increase in thickness of less than 25 mm (1").

MATERIAL REQUIREMENTS

2.3.1. Aggregates

2.3.1.1. Properties of Aggregates given in Tables 2-11 & 2-12.

TABLE 2-11

Properties of Aggregates

ROAD WORK, HARD STANDINGS AND LANDING GROUNDS

Los Angeles Abrasion Value	40 (Max) as per ASTM C 131
Aggregate Crushing Value (ACV) 25% (Max) as per BS-812	
Weight loss when subjected to 5 cycles of $Na_2 SO_4$	10% (Max) as per AASHTO T-104
Flakiness Index (F.I.)	25% (Max) as per BS-812 & 30% (Max) for 9 mm nominal size
Moisture Content by Weight	3% (Max)

2.3.1.2. All aggregates shall be known by their grade / guage according to Table 2-12, subject to 10% excess or shortage of any material of any gauge enumerated therein.

TABLE 2-12 Grading of Aggregate

	Proportional parts by volume										
Grade of	Gauges										
Aggregates	63	50	38	25	19	13	10	6	3	2	1
	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
63 mm graded	10		5		3		2				
50 mm graded		10	5		3			2			
38 mm graded			10	5	<i></i>	3		2			
25 mm graded				10	5	3		2			
19 mm graded					10	5		3	2		
13 mm graded						10	5	3	2		
10 mm graded							10	5	3	2	
6 mm graded								10	5	3	2

2.3.2. Asphaltic Material for Surface Treatment:- The asphaltic material shall be Asphalt Cement (AC), emulsified or cutback asphalt as specified or directed by the Engineer in Charge.

2.3.2.1. **Bitumen**:- A class of black or dark coloured (solid, semisolid, or viscous) cementations substances, natural or manufactured, composed principally of high molecular weight hydrocarbons, of which asphalts, tars are typical.

2.3.2.2. **Asphalt Cement (AC)**:- Asphalt that is refined to meet specifications for paving, industrial and special purposes. Its penetration is usually 40–300. For AC, refer to ASTM-D 946 and AASHTO M-20 & M-226.

2.3.2.3. **Cut Back Asphalt**:- AC which has been liquefied by blending with petroleum solvents (also called diluents). On

exposure to atmosphere the diluents evaporate, leaving AC to perform its function. The types are given below:-

2.3.2.3.1. **Rapid Curing (RC)**:- It is composed of AC and a Naphtha or Gasoline type diluents of high volatility (ASTM D-2028 & AASHTO M-81).

2.3.2.3.2. **Medium Curing (MC)**:- It is composed of AC and Kerosene type diluents of medium volatility (ASTM D-2027 & AASHTO M-82).

2.3.2.3.3. Slow Curing (SC):- It is composed of AC and oil/ diluents of low volatility (ASTM D-2026 & AASHTO M-141).

2.3.2.4. **Emulsified Asphalt**:- An emulsion of AC and water that contains a small amount of Emulsifying agent, in which water forms a continuous phase of emulsion and minute globules of asphalt form the discontinuous phase.

CONSTRUCTION REQUIREMENTS

2.3.3. The Construction Requirements of Bituminous Surface Treatment are appended below.

2.3.3.1. At the time of application, the weather shall be warm & dry, and the road surface shall be clean / tidy and dry. Spraying shall not be done unless the road temperature is above 20°C for at least 1 hour prior to the commencement of operation.

2.3.3.2. Application Temperatures:- Spraying / mixing temperature for Hot Dressing / Treatment shall conform to Table 2-13, 2-14 and 2-15.

TABLE 2-13

Application Temperature for Asphalt Cement (AC)

Asphalt Cement	Spraying Temperature([°] C) (Min)
200 - 300 pen	130
120 -150 pen	130
80 -100 pen	140
60 - 70 pen	145
40 - 50 pen	150

TABLE 2-14

Application Temperature for Emulsified Asphalt

Emulsified Asphalt Mixing Temperature (°C)	Spraying Temperature (°C)
--	---------------------------

ROAD WORK, HARD STANDINGS AND LANDING GROUNDS

RS-1, RS-2	-	-
MS-1	10-70	20-70
MS-2	10-70	20-70
SS-1	10-70	20-70
CRS-1	10-70	20-70
CSS-1	10-70	20-70
M		
	TABLE 2-15	

TABLE 2-15

Application Temperature for Cutback Asphalt

Cut-back Asphalts (RC,MC,SC)	Mixing Temperature (^o C)	Spraying Temperature (° C) (Min)
70	-	20
250	55 - 80	40
800	75 -100	55
3000	80 -115	-

Application of Asphaltic materials shall be carried out 2.3.3.3. by means of approved Pressure distributor, manual or auto, at the temperature specified for the type & grade of asphalt being used. The rate of application for aggregate and bituminous material shall be as given in Table 2-16.

The mechanical / manual equipment should be 2.3.3.4. operated especially, by trained manpower for spraying.

Irregularities and surface damage e.g. pot-holes, 2.3.3.5. depressions and raveling be corrected prior to surface dressing.

TABLE 2-16

Quantities of Materials for Surface Treatment

Surface Treatment		Aggregate		Bituminous Material	
Туре	Application	Gauge	Quantity _{Cum/Sqm}	Quantity (Kg./Sqm)	Туре
	On Old Surface	6 mm	0.012	1.22	(a)
Single (ST)				1.465	(b)
	On Base Course	13 mm (2/3)	0.015	1.95	(a)
		10 mm (1/3)		-	(b)
Double	First Coat	13 mm	0.018	2.20	(a)

(on Base Course)			0.015	1.85	(b)
(031)		6	0.015	1.22	(a)
	Second Coal	0 mm	0.011	1.37	(b)
	First Cost	12 mm	0.018	2.2	(a)
Triple (on Base Course) (TST)	First Coat	13 11111	0.015	1.85	(b)
	Second Coat	6 mm	0.015	1.22	(a)
			0.011	1.37	(b)
	Third Coat	3 mm	0.008	0.61	(a)
			0.006	0.69	(b)

Note:- Bituminous material types (a) Asphalt Cement / Bitumen (b) Cut-back or Emulsified

2.3.4. Procedure for Bituminous Surface Treatment

2.3.4.1. **Single Coat work,** as in renewals of Surface Dressing on Old Asphaltic Surface.

2.3.4.1.1. Allow the surface to be perfectly dry, before priming.

2.3.4.1.2. Rake all caked mud, dust, dirt, or other deleterious materials, by hand/mechanical means with wire brushes and brooms and finally dust the surface with gunny bags to leave the surface perfectly clean.

2.3.4.1.3. Spray at the rate specified in Table 2-16. In case of Hot dressing, aggregates shall be heated in a proper heating plant to the temperature ranging between the min and max temperature, specified by the manufacturer or in these specifications and shall be applied to the road surface by means of pressure sprayer. The sprayer shall be operated in such a way as shall ensure an even and uniform distribution of the hot bitumen on the road surface.

2.3.4.1.4. Similarly, for Cold or Emulsified asphalt, proper equipment and temperature shall be used as recommended by the manufacturer. Before the cold bitumen had "broken", spread evenly and uniformly, aggregate consisting of broken or crushed stone or gravel or shingle, at the rate as shown in Table 2-16. Precaution shall be taken to ensure that whole of the surface spread over with dressing is covered with a uniform layer of aggregate without accumulation of surplus aggregate at any point.

2.3.4.1.5. Excessive deposits of bitumen on the road shall not be allowed. Spraying shall in all cases be carried out within the outer limits approved by the Engineer-in-Charge. The

edges of the surface to be treated with hot dressing shall be defined by wire, binder, twine or other cord line stretched and pegged in position.

2.3.4.1.6. Immediately following the application of the hot or cold dressing, spread aggregate consisting of broken or crushed stone, gravel or shingle. The aggregate shall be perfectly dry, free from foreign matter and shall be spread uniformly and evenly on the bituminous surface at the rate described above. Precaution shall be taken to ensure that whole of the surface is covered with a uniform layer of aggregate, without any accumulation of surplus aggregate at any point. Hand brooming or light drag brooming shall follow the application of the aggregate prior to rolling. The aggregate consisting of elongated material shall not be used.

2.3.4.1.7. Immediately after the completion of brooming as specified above, roll the whole area with appropriate compaction equipment / roller. The rolling shall continue till the aggregate is thoroughly embedded in the bituminous surface.

2.3.4.1.8. Open the road to traffic as directed by the Engineer-in-Charge or as otherwise specified by the manufacturer of the bituminous material used.

2.3.4.1.9. **Single Coat work**, as on Base Course not previously treated with hot / cold dressing:-

2.3.4.1.9.1. Allow Base Course surface to dry to depth of 50mm. 2.3.4.1.9.2. Rake all caked mud, dust, dirt or other deleterious material with wire brushes and brooms and finally dust the surface with gunny bags to leave the voids perfectly clean.

2.3.4.1.9.3 All as Paras 2.4.1.3 to 2.4.1.8.

2.3.4.1.10. **Two-Coat work**, as on Base Course Surface not previously treated with hot or cold dressing.

2.3.4.1.10.1. **First Coat:-** All procedures as for Single Coat work described above, but the rate of application of bitumen and aggregate as per Table 2-16.

2.3.4.1.10.2. **Second Coat:-** This shall be applied immediately after the First Coat. The work shall be done in all respects as described above, but the rate of application is as per Table 2-16.

2.3.4.1.11. Similarly, **Three-Coat work** is to be carried out as above, with the rate of application for TST as per Table 2-16.

2.4. Premix Carpet (Bit Mac):- This consists of furnishing and mixing aggregates with asphalt binder at site in mobile mixing plant, spreading, compacting on an approved primed base course, pot-hole

repair, leveling course and wearing course, in accordance with the specification and in conformity with the lines, grade, thickness and typical cross-section shown on drawings or as directed by Engineer-in-Charge.

MATERIAL REQUIREMENTS

2.4.1. **Mineral Aggregates:-** Mineral aggregates for Bit-mac shall consist of Coarse aggregate, Fine aggregate and Filler material, all conforming to specifications given below:-

2.4.1.1. Coarse aggregate is the material passing 25.4 mm (1") Sieve and retained on Sieve # 4, shall consist of crushed rock, crushed boulder, or crushed gravel. It shall be clean, hard, tough, sound, durable, and free from decomposed stones, organic matter, shale, clay lumps or other deleterious substances.

2.4.1.2 All aggregates shall be known by their grade according to Table 2-12, subject to 10% excess or shortage of any material of any gauge enumerated therein.

2.4.1.3. Fine aggregate is the material passing Sieve # 4 and shall consist of crushed sand. The grading requirements as per ASTM C - 33 are given in Table 2-17

2.4.1.4. When combined gradation of Coarse and Fine aggregates is deficient in material passing Sieve # 200, mineral filler shall be added, which shall consist of finely divided rock dust from sound rock, hydrated lime or hydraulic cement. At the time of use, it shall be sufficiently dry to flow freely, free from lumps.

2.4.1.5. Aggregate shall be stored on hard clean surface to facilitate prompt inspection and control. When aggregates containing a wide range of sizes are to be used, they must be stockpiled separately to prevent intermingling. Mineral filler must be protected from moisture to eliminate caking and hardening.

TABLE	2-17
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Fine Aggregates (Sand) - Grading Requirements

Normal size	Sieve No.	% age Passing by Weight
9.50 mm	3/8 inch	100
4.75 mm	No. 4	95-100
2.36 mm	No. 8	80-100
1.18 mm	No. 16	50-85
0.60 mm	No. 30	25-60
0.30 mm	No. 50	10-30

0.15 mm No. 100 2-10

2.4.2. **Bituminous Binder:-** Asphaltic binder used shall conform to Standard specification of petroleum asphalt having grades 60/70 or 80/100 penetration. Generally, it will meet the requirement of AASHTO M-20, as per Table 2-25.

2.4.3. Quantity of Material for Premix Carpet (Bit Mac):- Use Table 2-18 for laying 10 Sqm of 50 mm thick (0.50 Cum) consolidated carpet, mix of materials as per Table 2-18 has been incorporated in the Schedule items 02-58 to 02-65.

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29

TABLE 2-18

Material Required for Premix Carpets (Bit Mac)

Item		Hot Dressing Asphalt Bitumen 60/70 or 80/100
1a	Tack Coat on bituminous / concrete surface	4.88 Kg
b	Prime Coat on Base Course	10 Kg
2	Bitumen for Pre mix	61.75 kg
3	Aggregate 13 mm graded, consisting of broken or crushed stone or gravel or shingle (gravel/shingle for light traffic only)	0.54 Cum
4	Sand	0.14 Cum

CONSTRUCTION REQUIREMENTS

2.4.4. Mixing Requirement:-

2.4.4.1. Asphalt Cement (AC) shall be heated to a max temperature of 163°C at the time of mixing. AC heated above 163 °C shall be rejected. Temperature of asphalt shall be checked frequently. Each aggregate ingredient shall be heated to temperature 150-160° C for at least six (6) mins before mixing of AC to ensure complete drying of aggregates. The range of heating of aggregates shall be strictly followed, to ensure proper coating of aggregates. Fine aggregates shall be introduced into the dryer (mixer) first, followed by the Coarse aggregates to ensure proper mixing. Quantity of aggregates fed to dryer (mixer) must be accurately controlled by suitable measuring device (Iron box) having predetermined volume of one (1) cuft or as instructed by Engineer-in-Charge.

2.4.4.2. Both bitumen and aggregates must be heated before they are combined in the mixer drum. Mixing temperature should be kept within the range of 140-163 °C.

2.4.4.3. To achieve uniform mixing and proper coating, aggregates and AC must be thoroughly mixed for min duration of ninety (90) seconds, which may be prolonged to hundred (100) seconds, if required.

2.4.5. **Deep Patches / Pot holes:-** The surface to receive Bit-Mac shall be prepared as mentioned under relevant item of these specifications and shall be primed to receive the pre-mix in a thickness as per drawing or as directed by the Engineer-in-Charge. Compaction shall be done with equipment suited to the job. A vibratory plate compactor is recommended for small patches, whereas roller may be more effective for larger areas. Straight edge or string-line shall be used to check riding quality and alignment of the patch.

2.4.6. **Leveling Course:-** All local depressions, corrugated surface, ripples across the pavement should be rectified before leveling course is placed. Clean the area free of dust or other loose material with mechanical broom or compressed air. Apply light Tack coat @ 0.488 Kg / Sqm of A.C 80/100 penetration grade. After drying dense graded hot Bit-Mac, it shall be spread in layer not more than 7cm in thickness. Spread shall be done carefully to prevent segregation and compact with steel wheeled and pneumatic tyre roller. For small pot-holes, hand tempers shall be allowed. Use string-line to check the riding quality of the leveling course.

2.4.7. **Mini Mixing Plant:-** Local made bitumen aggregate mixer equipment used for preparation of Bit-mac shall be in good working condition, of sufficient capacity, capable of being operated to produce uniform blend with given ingredients.

2.4.8. **Hauling Equipment:-** Bit-mac mixed material shall be delivered in tight, clean and smooth metal bed hand trolleys, or any method as convenient to the Contractor and approved by the Engineer-in-Charge.

2.4.9. For Prime and Tack Coats, the priming shall be done in a manner as described in item of Priming. The rate of application of Prime coat shall be 1.0 Kg / Sqm. Tack Coat shall be done in a manner as described in item of Tack Coat. The rate of application of Tack coat shall be 0.488 Kg / Sqm. When surface of existing pavement or old base is irregular, it shall be brought to uniform grade and cross-section by leveling course as described above.

2.4.10. **Spreading and Finishing:-** Bit-mac mixture shall be placed on approved surface, struck off to required section manually with rakes or hand tools by experienced foreman, distributed over the entire width or partial width as required. All mixtures shall be spread at temperature not less than 140 ^oC. Mixture shall not be placed on any wet surface or when atmospheric temperature is below 5 ^oC or when the weather is foggy or rainy.

2.4.11. **Compaction:-** Roller shall be Steel wheeled or Pneumatic tyred. The roller(s) shall be in good working condition, capable of reversing without backlash and capable to be operated at speeds slow enough to avoid displacement of Bit-mac. The number and weight of rollers shall be sufficient to compact the mixture while it is still in workable condition to obtain compaction to the satisfaction of the Engineer-in-Charge. The use of equipment which results in

excessive crushing of aggregates shall not be permitted. Following points shall be taken care of:-

2.4.11.1. Rolling will not be prolonged to avoid appearance of cracks. Rolling will be done longitudinally, beginning at the lower side of the spread and proceeding towards the higher side, overlapping successive trips by at least one half ($\frac{1}{2}$) the width of rear wheels of roller.

2.4.11.2. Along forms, curbs, headers, walls and other places not accessible to the roller, mixture shall be thoroughly compacted with hot hand tampers or mechanical tampers.

2.4.11.3. Any mixture that has become cold enough, mixed with dirt or is defective in any way shall be replaced with fresh hot mixture and compacted to conform the requirement.

2.4.12. **Cold Bit-Mac** (Premix Carpet with Cold Emulsion 25 mm & above):-The specification is applicable on all types of road surface.

MATERIAL REQUIREMENT

2.4.12.1. The material requirement is given in Table 2-19.

TABLE 2-19

Cold Emulsion

Quantity of Cold Emulsion Total Qtv Qty of Sand Size of Quantity (in Lit) for Thickness of Material of material for Seal Emulsion mm Seal Tack Cum Cum mm Premix (Lit) Coat Coat 19-6 0.18 17.62 25.00 7.34 4.90 0.05 41.48 0.12 11.62 6-3 25-19 0.33 16.10 38.00 0.05 7.34 4.90 47.14 10-3 0.15 18.80 38-19 0.46 18.35 50.00 7.34 4.90 0.05 56.29 13-3 0.23 25.70 50-25 0.61 24.40 75.00 7.34 4.90 0.05 74.71 13-3 0.36 38.07

(Materials required for carpets of various Thickness per 10 Sqm)

CONSTRUCTION REQUIREMENTS

2.4.12.2. Following process shall be followed.

- i Clean the surface to be treated.
- ii Premix should be laid in two courses, the larger graded aggregate providing the base for next finer one
- iii Use clean aggregate of required size.
- iv Mix clean emulsion and aggregate uniformly

- v Apply Tack Coat with Cold Emulsion. Do not apply any tack coat in between the two courses.
- vi Spread the premix evenly by means of rakes to the desired thickness or contour for each course.
- vii Leave each Premix course until emulsion has broken (generally 24 hours)
- viii Roll to compact each course, keeping the roller wheels damp and avoid diesel dripping (diesel being solvent).
- ix Apply Seal Coat only on the top of second course
- x Keep traffic off the finished surface for 24 hours.

2.4.12.3. Preparation of Surface

i.

- First clean the surface from dust and dirt.
- ii Pot-holes should then be repaired

2.4.12.4. Mixing of Cold Emulsion with the Aggregate.

- i Aggregate may be mixed with Cold Emulsion in a rotary drum, mechanical mixer or concrete mixer.
- ii In the absence of tools, noted above, mixing may be accomplished manually by means of shovel, if allowed.

2.4.12.5. First Course Application.

- i On the cleaned surface, brush or spray Cold Emulsion @ 7.34 lit per 10 Sqm. Brush in one direction to prevent premature breaking.
- ii Premix of larger graded aggregate should be laid to required thickness and contour, allowing for consolidation.
- iii Roll well after 24 hours, keeping roller wheels damp.

2.4.12.6. **Second Course Application:-** Immediately after the consolidation of the First course, premix of the well graded fine aggregate should be evenly spread to the required thickness and contours, allowing for compaction.

2.4.12.7. Final Consolidation:-

- i Roll after 24 hours.
- ii Keep roller wheels damp to avoid dislocation of premix.

2.4.12.8. Seal Coat (after Final Consolidation)

- i Spray Cold Emulsion @ 4.90 lit of Cold Emulsion per 10 Sqm.
- ii Blind the surface with 0.05 Cum of Sand per 10 Sqm.

2.4.12.9. Open to traffic after 24 hours.

2.4.12.10. **Pot Holes:-** Before laying premix or applying surface dressing, all pot-holes shall be properly repaired and humps removed.

2.4.12.11. **Rolling:-** Where rolling is impracticable e.g. angles, recesses and corners etc, compaction shall be done with iron rammers.

2.5. Prime Coat / Tack Coat / Seal Coat

2.5.1. **Prime Coat:-** It is application of a low viscosity liquid asphalt product to an absorbent surface. It is used to prepare an untreated base for an asphalt surface. The Prime penetrates into the base and plugs the voids, hardens the top and helps bind it to the overlying asphalt course. To be applied on Aggregate Base Course as well as WBM Base Course.

MATERIAL REQUIREMENTS

2.5.1.1. Asphaltic material for Prime Coat shall be either AC (bitumen), cut back or emulsified, whichever is specified, or as mentioned in Tables 2–13, 2-14 and 2-15.

CONSTRUCTION REQUIREMENTS

2.5.1.2. Prime coat shall be applied when the surface is dry & broomed. The surface may be reasonably moist when emulsified asphalt is used.

2.5.1.3. The application is prohibited when weather is foggy or rainy or when atmospheric temperature is below 15°C, unless otherwise directed by the Engineer-in-Charge.

2.5.1.4. Primed surface shall be kept un-disturbed for at-least 24 hrs, so that bituminous material travels beneath and leaves the top surface in non-tacky condition.

2.5.1.5. The liquid asphaltic material shall be sprayed by means of pressure distributor of approved capacity @ 1.0 kg / sqm on WBM Base Course and Aggregate Base Course.

2.5.1.6. Prime coated surface shall not be opened to traffic until it has penetrated and cured sufficiently.

2.5.2. **Tack Coat:-** It is a light application of asphalt, usually asphalt emulsion diluted with water. It is used to ensure bond between the surface being paved and the overlying course. To be applied on Asphaltic Base Course and on concrete surface.

MATERIAL REQUIREMENTS

2.5.2.1. Asphaltic material for Tack Coat shall conform to the requirements of AC, emulsified or cutback asphalt, as specified.

CONSTRUCTION REQUIREMENTS

2.5.2.2. The Tack Coat shall be applied only when surface treated by power brooms and / or blowers is dry, free from loose material dirt or any other objectionable matter.

2.5.2.3 However, for emulsified asphalt, application may be made on a reasonable moist surface.

2.5.2.4. Application of Tack Coat be avoided in fog or rain.

2.5.2.5. **Rate of Application**:- Tack Coat shall be sprayed by means of pressure distributor as given in Table 2-20:-

Asphalt Type	Rate of Application (Kg. / Sqm)	Remarks
Asphalt Cement (Bitumen)	0.488	on Existing Bituminous surface

TABLE 2 - 20

Note:- Care shall be taken that the application of asphaltic material is not in excess of the specified quantity. Any excess Asphalt shall be blotted by Sand or similar treatment.

2.5.2.6. Equipment of recognized manufacturer for spraying of Tack Coat shall be pressure distributor of not less than 1000 lit capacity mounted on pneumatic tyres. A hand power spray attachment to a bitumen pressure distributor or other container along with allied accessories shall be furnished and be approved by the Engineer-in-Charge.

2.5.3. **Seal Coat:-** It is a thin asphalt surface treatment used to waterproof and improve the texture of an Asphalt Wearing surface. Depending on the purpose, Seal Coat may or may not be covered with aggregate. The main types of seal coats are aggregate seals, fog seals, emulsion slurry seals and sand seals.

MATERIAL REQUIREMENTS

2.5.3.1. Asphaltic material for Seal Coat shall be either AC (bitumen), cut back or emulsified, whichever is specified or as mentioned in Tables 2–13, 2-14 and 2-15.

2.5.3.2. Fine aggregate is the material passing Sieve # 4 and shall consist of crushed sand.

CONSTRUCTION REQUIREMENTS

2.5.3.3. Generally, the Premix carpets may not require Seal Coat. However, in certain conditions, due to special considerations or technical reasons, the finished surface may require a Seal Coat. In case the Seal Coat is technically required, it shall be clearly specified and shown on the drawings by the designer. The work may only be undertaken after approval by the respective DW&CE.

2.5.3.4. If not specified differently by the designer, the Seal Coat shall consist of spraying heated bitumen @10 Kg, followed by uniform sprinkling of sand @ 0.10 Cum for every 10 Sqm of the surface.

2.6. Asphaltic Courses (Plant Mix) :-

2.6.1. Asphaltic Base Course (Plant Mix):- The requirements cover Coarse Aggregate, Fine Aggregate, Filler and Bituminous material.

MATERIAL REQUIREMENTS

2.6.1.1. The material requirements of Asphaltic Base Course layer are given in Table 2-21, 2-22, 2-23 and 2-24.

TABLE 2-21

Requirements of Asphaltic Base Course

Mineral Aggregates	Consist of Coarse aggregate, Fine aggregate and Filler material.
Coarse aggregates	Coarse aggregate retained on AASHTO Sieve # 4, shall consist of crushed rock, gravel or boulder. Crushing shall be at least 95% by weight of material retained on AASHTO Sieve # 4, having at least two mechanically fractured faces.
Fine aggregates	Fine aggregate material passing Sieve # 4, shall consist of 100% crushed material from rock or boulder.
Filler Material	Filler shall be finely divided rock dust, hydrated lime / or cement.

2.6.1.2. Table 2-22 gives Grading requirements of Asphaltic Base Course

TABLE 2-22

Combined Aggregate Grading Requirement

Mix		Mix Des	esignation	
US Star	ndard Sieve	Class-A	Class-B	
		Compacted thickness (70-90 mm)	Compacted thickness (50-80 mm)	
Mm	Inches	% Passing by Weight	%t Passing by Weight	
50	2"	100	-	
38	1-1/2"	90-100	100	
25	1"	-	75-90	
19	3/4"	56-75	65-80	
12.5	1/2"	-	55-70	
9.5	3/8"	-	45-60	
4.75	No. 4	23-40	30-45	

2.38	No. 8	15-30	15-35
0.300	No. 50	4-10	5-15
0.075	No. 200	3-6	2-7
Asphalt Content by weight (% of total mix)		3 (Min)	3 (Min)

Note:- Table 2-22 holds good for guidance only

2.6.1.3. Properties of Coarse & Fine Aggregate as given in Table 2–23.

TABLE 2 - 23 Properties of Coarse & Fine Aggregate

Los Angeles Abrasion Value	40% (Max) as per ASTM C-131
Loss when subjected to 5 cycles of Na ₂ SO ₄ Soundness	12% (Max) as per AASHTO T-104
Sand Equivalence (S.Eq)	45 (Min) as per T-176
Plasticity Index (P.I)	6 (Max) as per T-90
Flakiness Index (F.I)	15% (Max).
Elongation Index	15% (Max).

2.6.1.4. **Filler:-** When the combined grading of the Coarse & Fine aggregate is deficient in material passing Sieve # 200, additional Filler material shall be added which will conform to Table 2-24.

TABLE 2-24

Grading - Filler Material for Asphalt Concrete Base Course

US Standard Sieve	Percent Passing By Weight	
No. 30	100	
No. 50	95-100	
No. 200	70-100	

2.6.1.5. **Asphaltic Material:** Asphaltic binder to be mixed with the aggregate to Asphaltic base shall be AC having penetration grade 40/50, 60/70 or 80/100 as specified and shall meet the AASHTO M-20 requirements, provided in Table 2-25

TABLE	2 - 25
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Requirements for Asphalt Cement (AASHTO M-20)

Requirements	40 /	50	60 /	70	80 / [.]	100	120 /	150
	Min	Max	Min	Max	Min	Max	Min	Max
Penetration at 25°C (77°F), 100 g, 5 Sec.	40	50	60	70	80	100	120	150
Flash point, Cleveland	450	-	450	-	450	-	425	-

ROAD WORK, HARD STANDINGS AND LANDING GROUNDS

Open Cup, ° F (° C)	(232)	-	(232	-	(232)	-	(218)	-
Ductility at 25°C (77°F) 5 cm per min, cm.	100	-	100	-	100	-	100	-
Solubility in Tri Chloro- Ethylene (%)	99	-	99	-	99	-	99	-
Thin Film Oven test, 3.2mm (1/8in.),163°C(325°F), 5 hr Loss on heating (%)	-	0.80	-	0.80	-	1.0	-	1.3
Penetration, of residue, % of original.	58	-	54	-	50	-	46	-
Ductility of residue, at 25 °C (77°F) , 5 cm per min, cm.	-	-	50	-	75	-	100	-

2.6.1.6. **Marshall Test Criteria:-** Table 2-26 shows the limits for Asphaltic Base Course (Plant-Mix) material.

TABLE 2-26

Limits for Asphaltic Base Course (Plant-Mix) Material

Stability	1000 Kg. (Min)	
% Air Voids in Mix.	4 - 8	
Loss in Stability in 24 Hours	25% (Max).	
Flow 0.25 mm (0.01 in.)	8-14	
% Voids in Mineral Aggregate	According to Table 5.3 , MS-2 Asphalt Institute 6 th Edition 1993	
Compaction, No of blows each end of specimen	75	

2.6.1.7. JMF - Asphaltic Base Course (Plant-Mix)

2.6.1.7.1. JMF will be established at least one week prior to production, jointly by the Engineer-in-Charge & the Contractor.

2.6.1.7.2. JMF shall be established by Marshall Method of Mix Design according to the Asphalt Institute Manual series # 2 (MS-2), latest revision or as specified by designer.

2.6.1.7.3. The JMF, with the allowable tolerance shall be within the range specified as above.

2.6.1.7.4. The ratio of weight of Filler (passing Sieve # 200) to that of Asphalt shall range from 1 to 1.5, for areas where temperatures exc 40° C.

2.6.1.7.5. **Table No. 2-22 is for guidance only and JMF** will be prepared to establish the Final grading.

2.6.1.7.6. Following Specimen JMF for Asphaltic Base Course, applicable to MES Schedule Item 02- 82 has been given for estimation purposes. In case different mix formula is

141,

used, the rate shall be adjusted by deducting the cost of materials in the above formula and adding the material cost incorporated in the new JMF at "Material Supplied Only" rates given in Section-27 of this Schedule of Rates.

i	Bitumen Gde 60 / 70	4.00%
ii	Khaka (Stone dust)	24.00%
iii	Aggregate 1/2"	29.00%
iv	Aggregate 3/4"	24.00%
v	Aggregate 1-1/2"	19.00%

2.6.1.7.7. Density of Asphaltic Base Course be 2.24 T/ Cum.

2.6.1.7.8. **Max Variation in Material from JMF**:- Variation in Passing %age of materials as given below is allowed with respect to the gradation adopted for JMF.

2.6.1.7.8.1.	For Mineral Aggregates	
i	Retained No. 4 and larger	± 7%
ii	Passing No. 4 to No. 10 sieve	± 4%
iii /	Passing No. 200	±1.0%
2.6.1.7.8.2.	Asphalt Content	± 0.3%

CONSTRUCTION REQUIREMENTS

2.6.1.8. Table 2-27 and Table 2-28 show the Construction Requirements of laying Asphaltic Base Course layer.

TABLE 2-27

Temperature of Mixtures at various stages

Temperature of Asphaltic Mix discharged from Plant	150 ° C -163° C
Delivery / paving /rolling temperature of the Mixture	130° C -163°C
Rolling temperature (considering air temperature)	165° C -190° C (sum of air temperature & Asphaltic mix temperature)
Temperature for initial breakdown rolling	130° C (Min)
Final Compaction / Rolling Temperature	110° C (Min)

TABLE 2-28

Compaction Criterion

Equipment for initial breakdown rolling	Tandem Steel or three wheeled Steel roller (10-12 T)
Equipment for intermediate rolling	Pneumatic tyred roller (9 wheel) 21 T
Min Density	97% of Laboratory compacted specimen made from Asphaltic

		material for Daily Marshall Density		
Frequency for testing for Cores		One core per 100 RM of each lane (or as directed by Engineer-in-Charge)		
Toloropoo	Cross- Fall (%)	± 0.2		
Tolerance	Thickness (mm)	+ 3, - 5		

Note:-

- i. Hot asphaltic mixtures shall be placed only when the air temperature is 4°C or above. No. asphalt shall be laid under foggy or rainy weather or over moist surface.
- ii. When thickness is deficient by more than 5 mm, it shall be made up by Asphaltic Base Course / Wearing Course material, of reasonable thickness as approved by Engineer-in-Charge, without extra cost to the employer.

2.6.2. **Asphaltic Wearing Course (Plant Mix):-** Table 2-30 shows the material requirements of Asphaltic Wearing Course layer. The material requirements cover Coarse aggregates, Fine aggregates, Filler material and Bituminous materials.

MATERIAL REQUIREMENTS

2.6.2.1. **Mineral Aggregates** shall conform to physical properties given below:-

2.6.2.1.1. **Coarse Aggregate** is the material retained on an AASHTO Sieve # 4 consisting 100% crushed rock or crushed gravel having min 2 faces mechanically crushed.

2.6.2.1.2. **Fine Aggregate** is the material passing from AASHTO Sieve # 4 consisting 100% crushed material from rock or boulder.

2.6.2.1.3. When the Combined grading of Coarse and Fine aggregates is deficient in material passing Sieve # 200, approved mineral Filler material shall be added conforming to details shown in Table 2-29.

TABLE	2 -	29
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Sieve Designation		Borcont Passing by Weight
mm	Sieve No.	
0.600	No. 30	100
0.300	No. 50	95-100
0.075	No. 200	70-100

TABLE 2-30

Other Properties of Mineral Aggregates

Los Angeles Abrasion Value	30% (Max) as per ASTM C 131	
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Loss when subjected to 5 cycles of $Na_2 SO_4$ Soundness Test	12% (Max) as per AASHTO T-104
Sand Equivalence (S. Eq)	45 (Min) as per AASHTO T-176
Liquid Limit (L.L)	25 (Max) as per AASHTO T-89
Plasticity Index (P.I)	4 (Max) as per AASHTO T- 90
Flakiness Index (FI)	10% (Max)
Elongation Index	10% (Max)

2.6.2.2. Asphaltic Material:- Refer to Para 2.6.1.5. (Asphaltic material for Asphaltic Base Course).

2.6.2.3. **Asphaltic Concrete Wearing Course Mixture:-** The composition of asphaltic concrete paving mixture for wearing course shall conform to Class-A and / or Class-B as shown in Table 2-31, ranging in thickness from 30 to 80 mm.

TABLE 2-31

Asphaltic Wearing Course Requirements

Combined Aggregate Grading Requirements					
Sieve Designation		Class-A (50-80 mm) Compacted Thickness	Class-B (30-60 mm) Compacted Thickness		
Mm	Inch	Percent Passing by Weight			
25	1	100	0 -		
19	3/4	90-100	100		
12.5	1/2	-	75-90		
9.5	3/8	56-70	60-80		
4.75	No. 4	35-50	40-60		
2.38	No. 8	23-35	20-40		
1.18	No. 16	5-12	5-15		
0.075	No. 200	2-8	3-8		
Asphalt Content (% of total mix weight).		3.5 (Min).	3.5 (Min).		

Note:- Gradations in Table 2-31 are for guidance only to prepare JMF

2.6.2.3.1. **Marshall Criteria** of Asphaltic Wearing Course is shown in Table 2-32.

ROAD WORK, HARD STANDINGS AND LANDING GROUNDS

Stability	1000 Kg. (Min)
% Air Voids in Max.	4-7
Loss of stability in 24 Hours	20% (Max).
Flow, 0.25 mm (0.01 inch)	8-14
% Voids in Mineral Aggregate	According to Table 5.3 of MS-2 Asphalt Institute (6 th Edition)
Compaction, No. of blows on each end of specimen	75

2.6.2.3.2 JMF - Asphaltic Wearing Course (Plant Mix)

2.6.2.3.2.1. At least one week prior to production, the JMF shall be established by Marshall Method of Mix Design as per procedure described in the Asphalt Institute Manual Series No. 2 (MS-2) or as decided by the designer.

2.6.2.3.2.2 The ratio of weight of Filler (Passing Sieve # 200) to that of Asphalt shall range between 1-1.5 for hot climate areas with temperature more than 40°C.

2.6.2.3.2.3. After the JMF is established, all mixtures furnished for the project represented by samples taken from the asphalt plant during operation shall conform to following ranges of tolerances.

TABLE 2-33

Tolerances in Combined Aggregate Gradation and Asphalt Content

Retained # 4 & Larger Sieves	± 7.0%
Passing # 4 to 100 Sieves	± 4.0%
Passing # 200 Sieve	± 1.0%
Asphalt Content	± 0.3%

2.6.2.3.2.4. Loss of Marshall Stability by immersion of specimen in water at 60° C for 24 hrs as compared with the same for 20 mins shall not exc 20%. In case of failure, the JMF shall be modified or an anti-stripping agent be used.

2.6.2.3.2.5. A new JMF will be established subject to change of source of material, if any.

2.6.2.3.2.6. Following specimen JMF for Aggregate Wearing Course, applicable to MES Schedule Item 02 - 83

MIL,

has been given for estimation purposes. In case different mix formula is used, the rate shall be adjusted by deducting the cost of materials in the above formula and adding the material cost incorporated in the new JMF at "Material Supplied Only" rates as given in Section-27 of this Schedule of Rates.

i	Bitumen Gde 60 / 70	4.5%
ii	Khaka (Stone dust)	38.2%
iii	Aggregate 1/2"	33.40%
:	Λ managements $\Omega/4$	00.000/

iv Aggregate 3/4" 23.90%

2.6.2.3.2.7. Density of Plant-mix Asphaltic Wearing Course be 2.355 T /cum.

CONSTRUCTION REQUIREMENTS

2.6.2.4. Table 2-34 shows the Construction Requirements of laying Asphaltic Wearing Course Material. Other requirements shall conform to the one specified for Asphaltic Concrete Base Course (Plant Mix.)

Min. Compaction Requirement	97% of Laboratory compacted specimen obtained from daily Marshall Density
Tolerance in Compacted Thickness	±3 mm
Coring Criteria	1 Core / 100 M of each lane
Permissible variation of surface by straight edge	5 mm (Max)
Cross fall / Camber	± 0.2%

TABLE 2 - 34

2.6.2.5. **Criteria For Rejection Of Laid Asphalt:-** When the compaction or density of core is less than 97%, or thickness of cores is deficient by more than 10 mm, the area will be considered as rejected.

2.6.2.6. **Price Adjustment for Asphalt Wearing Course**:- If the thickness of cores is deficient by more than 3mm but not more than 10mm, payment will be made at an adjusted price as specified in Table 2-35, provided density achieved fulfills specified criteria.

Deficiency in Thickness as Determined by Cores	Proportional Rate of Schedule Price Allowed
0.0 mm to 3.0 mm	100%
3.1 mm to 5.0 mm	90%
5.1 mm to 10.0 mm	80%

Note:- Table for reference only, final decision to be given by Engineer-in-Charge.

2.6.2.7. Considerations for JMF Asphaltic Concrete:-

2.6.2.7.1. The Job Mix Formula (JMF) is to be prepared by Marshall Method. In order to develop proper Job Mix Design, DD&C or any other reputed laboratory shall be approached to select different gradation of materials, their blending conditions and performance criteria.

2.6.2.7.2. The rates incl in the Schedule are based on the above formula. In case different mix formula is used, the rates shall be adjusted by deducting the cost of materials in above formula and adding the material cost incorporated in the new JMF at "Material Supply only" rates given in the Schedule (Section–27).

2.6.2.7.3 Asphaltic plant, paver and allied equipment / T&P etc, being integral part of Weigh batched Asphaltic Concrete has been accounted for in rates of Schedule Item 02-82 & 02-83.

2.7. Concrete Pavement (Roads, Hard standings, Landing Grounds)

MATERIAL REQUIREMENTS

2.7.1. Coarse Aggregates, Fine Aggregates, Cement and water shall conform to Material requirements shown in "Concrete" Section-3.

CONSTRUCTION REQUIREMENTS

2.7.2. Following are the Construction requirements of Concrete pavement for Roads, Hard standings and Landing Grounds:-

2.7.3. Formation:-

2.7.3.1. Line, level and extent of formation shall be as shown on the drawings or as directed by the Engineer-in-Charge.

2.7.3.2. Quality of material and workmanship for earthwork formation and sub-grade shall conform to the applicable requirements, mentioned in Section-1.

2.7.4. Concrete Pavement

2.7.4.1. Max Size Aggregate and its gradation shall be provided in the drawings, with relation to Pavement thickness. Similarly,
strength and other requirements shall be as per drawing with reference to Section-3 "Concrete".

2.7.4.2. Provide sand cushion and / or bottoming as required. Where bottoming (Sub-base) is specified, fill in interstices in the bottoming with sand.

2.7.4.3. Ensure that the surface over which the concrete is to be laid is finished to the required gradients, camber and super elevation.

2.7.4.4. Immediately before laying of concrete, wet the surface over which the concrete paving is to be laid or spread approved building paper over lapped 38 mm at the joints between the sheets.

2.7.4.5. Total design thickness of Concrete shall be laid in one layer, if not specified otherwise with care that no cold joint is made in one slab. The slabs shall be of the sizes as ordered by the Engineer-in-Charge and shall be laid in alternate bays. The form work shall be of steel or timber as approved by the Engineer-in-Charge. If wooden formwork is used, planks shall not be less than 25 mm thick and stays shall not be more than 300 mm apart.

2.7.4.6. Composition and min strength of Concrete shall be as specified by the Designer, with reference to Section-3 "Concrete".

2.7.4.7. Form Expansion joints between the slabs to the full depth of the concrete. The expansion joints shall be 13 mm wide or as per drawings.

2.8. Rapid Runway Repairs:-

2.8.1. Pre-cast RCC slab (double reinforced top and bottom) 2 M x 2 M x 14 cm shall be laid / used for riding surface as shown in Figure 2-1 and Figure 2-2. The slabs shall have a $38mm \times 38mm \times 3mm$ angle iron fixed on all four sides, so that edges do not break in handling. Each slab shall have two holes for lifting.

2.8.2. Craters shall be cut in multiple of 2 M plus 6 cm, either side. These shall be filled and completed with a portion of debris and rock ballast, compacted and provided with a level surface stone chips upto 140 mm, below from top. Special leveling and slab lifting arrangement shall be provided. The RCC slabs shall be lifted 3- 4 in numbers (max) at a time by means of a lifting beam attached to Front End loader having lifting hooks. The slabs after laying shall be rolled and joints filled with sand.

2.8.3. Where use of Quick Setting / Rapid Hardening Cement is required for Rapid Runway Repairs, approved admixtures shall be added to the cement at the ratio specified by the manufacturer.

2.9. Joint Sealants and Joint Fillers

2.9.1. Joint Sealant:-

2.9.1.1. Joint Sealant shall conform to specifications required vide ASTM – D 1850-74 or BS 5212, Types W, F and FB.

2.9.1.2. Thickness of sealant shall be as recommended by the Pavement Designer or min one (1.0) inch on top of joint filler.

2.9.1.3. Joint sealant shall be laid in place as recommended by the manufacturer and allowed to cure (harden) for the time period recommended, before opening it for use.

2.9.2. Seal Coat Runway Sealant:-

2.9.2.1. Fuel Resistant Sealant constitutes a protective coal-tar emulsion with heavy paint consistency. It gives better appearance besides giving protective shield coating to old or new asphalt pavements which are under heavy traffic and experience fuel leakages. The Sealer, in addition protects pavement from damage and deterioration caused by destructive sun-rays, oxidation, water penetration and frost.

2.9.2.2. The Runway sealant should preferably comply with specifications laid down in Table 2 – 36.

i	Water	47-53%
ii	Non volatiles (solid contents)	50-51.5%
iii	Ash of Non volatiles	30-40%
iv	Solubility of non volatiles in Carbon disulphide (CS2)	20-47%
v	Specific Gravity @ 25 ⁰ C	1.0-1.25
vi	Drying time (hrs)	6 - 8
vii	Adhesion and resistance to Kerosene	No softening or loss of adhesion
viii	Adhesion & resistance to Water	No blistering, loss of adhesion or re- emulsification
ix	Resistance to heat	No blistering, sagging or slipping
х	Flexibility	No flaking, cracking or loss of adhesion
xi	Resistance to impact	Not more than ¼, cracking or flaking.
xii	Resistance to volatilization	8-10 %
xiii	Wet film continuity	Uniformly smooth, non granular, free from Coarse particles.

TABLE 2 - 36

2.9.3. Joint Filler:-

- 2.9.3.1. The following types may be used as Joint filler:-
 - 2.9.3.1.1. Sand Bitumen Mixture.
 - 2.9.3.1.2. Joint fillers based on chemical compositions as recommended by the manufacturers of various brands available in the market along with necessary instructions.

2.9.3.2. In case of Sand-Bitumen Mixture, a stiff paste shall be prepared by mixing Hot bitumen and Coarse sand. The mixture shall be rammed in the expansion joint gap, so that no void / open spaces are left in gap.

2.9.3.3. Top level of filler shall be dressed so as to leave appropriate space on top to receive Joint sealant as recommended by the manufacturer.

2.9.3.4. The work of Joint Filler and Joint Sealant shall be finished neatly as directed by the Engineer-in-Charge.

2.10. Asphalt Wearing Course for Run-ways and Taxi-way etc:-Design criteria for Asphalt Wearing Course will be governed by the Marshall Design Criteria and will be decided by the Designer.

METHOD OF MEASUREMENTS

2.11. Measurement of Work. Measurement of various items under this Section will be linear Meters (M), square meters (Sqm), cubic meter (Cum) and Tons. Details are as under:-

2.11.1. Granular Sub-Base, WBM and Aggregate Base Course shall be measured in Cum, based on the provision of drawings.

2.11.2. Asphaltic Base Course and Asphaltic Wearing Course shall be measured in Tons. The Tonnage shall be established by multiplication of length, breadth and thickness (L x B x T). The thickness will be determined by Asphalt cores in laid / compacted asphaltic layer. Unit weight will be taken as established by JMF.

2.11.3. Generally, the limits of measurements for above items shall be as per drawings or as approved by the Engineer-in-Charge.

2.11.4. Measurement of Bit-mac :-

2.11.4.1. Unless otherwise shown on the plans or as directed by the Engineer-in-Charge, quantity of Bit-mac shall be measured by theoretical volume of compacted mix in place, in Cum.

2.11.4.2. No measurement will be made for unauthorized areas or for extra thickness than specified. Min quantity for pot hole shall be 0.05 cum.

2.12. Measurements for Road Materials:-

2.12.1. Sand, bajri, shingle, broken stones, broken bricks, or the like, shall be measured net when in measurement box or in carts or lorries at the site of work.

2.12.2. In measuring stacked sand, bajri, shingle, broken stone broken bricks, or the like, a deduction of one-twelfth (1/12th) shall be made from the measured quantity to allow for unevenness in ground, loose stacking etc.

2.12.3. Boulders and quarried stone for road metal will be measured after breaking as in Para 2.12.2 above. Boulders and quarried stone for bottoming shall be measured net after incorporation in the work. Where either of the above methods of measurements of boulders and quarried stone is impracticable, these materials shall be stacked in tightly packed stacks, not less than one metre in height and a deduction of 15% made from Gross measurements to allow for voids.

2.12.4. All 'carpeting' material for either new work or repairs shall be stacked in regular heaps and measurement of same taken before spreading. In case of pretreated materials, the deliveries may be measured in the lorries or carts.

CLARIFICATION OF RATES

2.13. The rates, inter alia, incl particularly:-

2.13.1. Rolling incl compaction of small area inaccessible to a roller, with Hand Guided Roller, Plate Compactor or Jumping Vibrator or with iron rammers (if allowed).

2.13.2. Pot-holes, each exc one Sqm shall be paid for as new work under the relevant item.

2.13.3. Formation surfaces and bottoming (Sub base) for Concrete surfaces be paid for separately under relevant rates in this section.

2.13.4. Wetting surfaces before laying Concrete in roads, hard standings and landing grounds etc.

2.13.5. Forming Expansion joints to be paid extra.

2.13.6. Pre-cast RCC slabs and equipment for lifting and placing of slabs for Rapid Runway Repairs shall be supplied by the Engineer-in-Charge. Carriage upto 3 Km is incl in the rates specified. Extra carriage if required shall be paid separately.

2.13.7. Compaction, if not mentioned, shall be to the specified percentage of AASHTO density or as for the item of work in this Schedule of Rates.

2.13.8. For Bit-mac, the accepted quantities measured above shall be paid at the MES Schedule of Rates, which price and payment shall constitute full compensation for furnishing all materials, hauling, placing, rolling, labour, equipment, tools and incidentals necessary to complete the item.

REAL SERVICE

RCC SLAB FOR RAPID RUNWAY REPAIRS

Drawing # CEP 2860



Figure 2-1



(Not to Scale)

Figure 2-2 (Not to Scale) ITEM RATES

SI No	Description	Unit	Rate (Rs)
	Collection of Materials		
2-1	Collection of sand, bajri and shingle within a radius of 25M and stacking to template (1/12th to be deducted from measured quantum of stack).	Cum	282.09
2-2	Screening Bajri, Shingle or Metal as directed and stacking to template (Measurement to be taken before screening) Using one screen.	Cum	192.88
	Cut Or Fill		
2-3	Cut or fill in Granular Soil not exc 150 mm, compact formation surface by compacting equipment and roller upto 100% Modified AASHTO density, incl filling in depression with hard soil.	Sqm	13.42
2-4	Cut or fill in Granular Soil not exc. 150 mm, compact formation surface by compaction equipment and roller, upto 95% Modified AASHTO density, incl filling in depression with hard soil.	Sqm	12.77
2-5	Same as item 02-04, but 90% Modified AASHTO density	Sqm	12.11
2-6	Cut or fill, soft or hard soil not exc 150 mm, dry roll and compact formation surface by power roller incl filling in depression with hard soil.	Sqm	12.15
	Compaction		28
2-7	Roll and compact, Granular Soil formation surface / embankments upto 150mm layers, by compaction equipment and roller upto 100% Modified AASHTO density, incl filling in depression with hard soil.	Cum	83.71
2-8	Roll and compact, Cohesive Soil formation surfaces/embankments upto 150mm layer, by compaction equipment and roller upto 95% Modified AASHTO density, incl filling in	Cum	80.84

SI No	Description	Unit	Rate (Rs)
	depression with hard soil.		
2-9	Same as item No. 02-8, but 90% Modified AASHTO density.	Cum	76.48
2-10	Roll and compact, Formation Surface , embankment upto 150mm layers,by roller, incl filling in depression, with hard soil.	Cum	74.01
	Bottoming /Sub Base		
2-11	Bottoming /sub base 115 mm thick as specified using over burnt bricks (without compaction).	Sqm	906.02
2-12	Same as item 02-11, but 150 mm thick.	Sqm	1134.59
2-13	Same as item 02-11, but 230 mm thick.	Sqm	1812.06
2-14	Bottoming /sub base of any thickness as specified using Soil Aggregate of CBR 30% , laid and compacted to 100% Modified AASHTO density, by appropriate compaction equipment and roller.	Cum	1336.64
2-15	Bottoming /Sub base of any thickness as specified, using Granular Sub Base material , laid and compacted to 100% Modified AASHTO density by appropriate compaction equipment and roller.	Cum	1791.63
2-16	Bottoming /sub base of any thickness as specified using Soil Aggregate compacted, incl dry rolling by animal or power roller and filling in depression.	Cum	1256.00
	Base Course		
2-17	Water Bound Macadam (WBM), Base Course of CBR 100%, any thickness as	Cum	1945.53
	Modified AASHTO density, by appropriate compaction equipment and roller		N∕∕
2-18	Aggregate Base Course , of any thickness as specified, laid and compacted to 100% Modified AASHTO density, by appropriate compaction equipment and roller.	Cum	1921.10
2-19	WBM, of any thickness as specified (compacted), incl rolling, filling in depression and watering during rolling.	Cum	1582.38
	Surface Treatment – (Hot)		

SI No	Description	Unit	Rate (Rs)
2-20	Hot Surface Dressing, Single Coat work , in renewals of surface dressing or on old premix surface, using Broken or Crushed stone , all as specified.	Sqm	181.54
2-21	Same as item 02-20, but except the cost of bitumen.	Sqm	54.49
2-22	Hot Surface Dressing, Single Coat work, in renewals of surface dressing or on old premix surface, using Shingle or Gravel , all as specified.	Sqm	177.97
2-23	Same as item 02-22, but except the cost of bitumen.	Sqm	49.22
2-24	Hot Surface Dressing, Single Coat work, on WBM surface, not previously treated with Hot or Cold Surface Dressing, using Broken or Crushed stone , all as specified.	Sqm	278.98
2-25	Same as item 02-24, but except the cost of bitumen	Sqm	72.71
2-26	Hot Surface Dressing Single Coat work on WBM surface, not previously treated with Hot or Cold Surface Dressing, using Shingle or Gravel.	Sqm	272.93
2-27	Same as item 02-26, but except the cost of bitumen	Sqm	63.45
2-28	Hot Surface Dressing, Two Coat work on WBM surface, not previously treated with Hot or Cold Dressing, using Broken or Crushed stone .	Sqm	499.20
2-29	Same as item 02-28, but except the cost of bitumen	Sqm	136.87
2-30	Hot Surface Dressing, Two Coat work on WBM surface, not previously treated with Hot or Cold surface Dressing, using Shingle or Gravel.	Sqm	486.78
2-31	Same as item 02-30, but except the cost of bitumen	Sqm	118.51
2-32	Hot Surface Dressing, Three Coat work on WBM surface, not previously treated with hot or cold surface dressing, using Broken or Crushed stone .	Sqm	604.20
2-33	Same as item 02-32, but except the cost of bitumen	Sqm	172.63

SI No	Description	Unit	Rate (Rs)
2-34	Hot Surface Dressing, Three Coat work on WBM surface, not previously treated with hot or cold surface dressing, using Shingle or Gravel.	Sqm	590.90
2-35	Same as item 02-34, but except the cost of bitumen	Sqm	157.15
1	Surface Treatment (Cold)		
2-36	Cold Surface Dressing, Single Coat work in renewals of surface dressing or on old premix surface, using Broken or Crushed stone , all as specified.	Sqm	288.32
2-37	Same as item 02-36, but except the cost of cold emulsion.	Sqm	162.57
2-38	Cold Surface Dressing, single coat work in renewals of surface dressing or on old premix surface, using Shingle or Gravel , all as specified.	Sqm	164.50
2-39	Same as item 02-38, but except the cost of cold emulsion.	Sqm	40.41
2-40	Cold surface Dressing, Two Coat work on WBM surface, not previously treated with hot or cold dressing, using Broken or Crushed stone , all as specified.	Sqm	372.20
2-41	Same as item 02-40, but except the cost of cold emulsion.	Sqm	95.81
2-42	Cold Surface Dressing, two coat work on WBM surface, not previously treated with hot or cold dressing, using Shingle or Gravel , all as specified.	Sqm	362.42
2-43	Same as item 02-42, but except the cost of cold emulsion.	Sqm	86.04
2-44	Cold Surface Dressing, Three Coat work on WBM surface not previously treated with hot or cold dressing, using Broken or Crushed stone , all as specified.	Sqm	466.35
2-45	Same as item 02-44, but except the cost of cold emulsion.	Sqm	130.54

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SI No	Description	Unit	Rate (Rs)
2-46	Cold Surface Dressing, three coat works on WBM surface, not previously treated with hot or cold dressing, using Shingle or Gravel , all as specified.	Sqm	454.32
2-47	Same as item 02-46, but except the cost of cold emulsion.	Sqm	118.51
	Repairs etc		
2-48	Scarifying WBM surface, by hand or by power, not exc 50 mm deep incl removing not exc 50 M and stacking for re-use.	Sqm	19.75
2-49	Add to item 02-48, for every 25mm or part thereof beyond 50mm deep incl removing not exe 50 M and stacking for re-use.	Sqm	9.88
2-50	Repair Pot-holes not exc One sqm each in surface of roads by scarifying surfaces, cutting edges at least 25mm deep, sweeping free from dust and mud, coating surface with Hot Dressing and filling with premix of gravel or shingle and asphalt bitumen, and ramming it well.	Sqm	544.85
2-51	Same as item No. 02-50, but coating surface with Cold Dressing and filling with premix of gravel or shingle and cold emulsion, and ramming it well.	Sqm	441.19
2-52	Same as item 02-50, but except the cost of bitumen.	Sqm	160.05
2-53	Same as item 02-51, but except the cost of cold emulsion shingle or crushed.	Sqm	112.35
2-54	Repair Pot holes , not exc One Sqm each in surface of roads by scarifying surfaces, cutting edges at least 25 mm deep, sweeping free from dust and mud. Coating surface with Asphalt bitumen and filling premix of broken or crushed stone, and ramming it well.	Sqm	554.80
2-55	Repair Pot holes , not exc One Sqm each in surface of roads by scarifying surfaces cutting edges at least 25 mm deep, sweeping free from dust and mud. Coating	Sqm	452.47

SI No	Description	Unit	Rate (Rs)
	surface with Cold dressing and filling premix of crushed stone, and ramming it well.		
2-56	Same as item 02-54, but except the cost of bitumen.	Sqm	170.01
2-57	Same as item 02-55, but except the cost of Cold emulsion.	Sqm	112.36
	Premix Carpet (Bit-Mac) On Bituminous Surface		
2-58	Providing and laying Premix Carpet of any thickness, compacted on Bituminous surface, as specified, using asphalt bitumen 60/70 or 80/100 and Broken / Crushed stone incl Tack coat	Cum	19600.12
2-59	Same as item 02-58, but except the cost of bitumen.	Cum	5257.04
2-60	Providing and laying, premix carpet of any thickness, compacted on Bituminous surface, as specified, using asphalt bitumen 60/70 or 80/100, and Shingle / Gravel, incl Tack coat.	Cum	19193.82
2-61	Same as item 02-60, but except the cost of bitumen.	Cum	4850.48
	Premix Carpet (Bit-Mac) On WBM Surface		
2-62	Providing and laying, premix carpet of any thickness, compacted on WBM surface, as specified, using asphalt bitumen 60/70 or 80/100 and Broken or Crushed stone , incl Prime coat.	Cum	21000.54
2-63	Same as item 02-62, but except the cost of bitumen.	Cum	5606.68
2-64	Providing and laying, premix carpet of any thickness, compacted on WBM surface as specified, using asphalt bitumen 60/70 or 80/100 and Shingle or Gravel , incl Prime coat.	Cum	20594.24
2-65	Same as item 02-64, but except the cost of bitumen.	Cum	260.02
	Premix Carpet (Bit-Mac) Using Cold Emulsion		
2-66	Providing and laying, premix carpet 25mm	Sqm	444.45

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SI No	Description	Unit	Rate (Rs)
	thick, compacted, using Cold Emulsion and Broken or Crushed stone , as specified, incl Tack coat.		
2-67	Same as item 02-66, but except the cost of cold emulsion.	Sqm	104.33
2-68	Providing and laying, premix carpet 25mm thick, compacted, using cold emulsion and Shingle or Gravel , as specified, incl Tack coat.	Sqm	433.17
2-69	Same as item 02-68, but except cost of cold emulsion.	Sqm	93.04
2-70	Providing and laying, premix carpet 38mm thick, compacted, using cold emulsion and broken or crushed stone, as specified, incl Tack coat.	Sqm	523.78
2-71	Same as item 02-70, but except the cost of cold emulsion.	Sqm	138.56
2-72	Providing and laying, premix carpet 38mm thick , compacted, using cold emulsion and shingle or gravel as specified, incl Tack coat.	Sqm	505.15
2-73	Same as item 02-72, but except the cost of cold emulsion.	Sqm	120.54
2-74	Providing and laying, premix carpet 50mm thick, compacted, using cold emulsion and broken or crushed stone as specified, incl Tack coat.	Sqm	1323.68
2-75	Same as item 02-74, but except the cost of cold emulsion	Sqm	173.54
2-76	Providing and laying, premix carpet 50mm thick, compacted, using cold emulsion and shingle or gravel, incl Tack coat.	Sqm	608.25
2-77	Same as item 02-76, but except the cost of cold emulsion.	Sqm	148.30
2-78	Providing and laying, premix carpet 75mm thick, compacted, using cold emulsion and broken or crushed stone, as specified.	Sqm	844.44
2-79	Same as item 02-78, but except the cost of cold emulsion.	Sqm	233.98
2-80	Providing and laying, premix carpet 75mm	Sqm	808.59

SI No	Description	Unit	Rate (Rs)
	thick, compacted using cold emulsion and shingle or gravel, as specified.		
2-81	Same as item 02-80, but except the cost of cold emulsion.	Sqm	199.13
	Asphaltic Courses (Premix – Plant Mix)		
2-82	Providing and laying, premix Asphaltic Base Course of any thickness, as specified, with bitumen 60/70 or 80/100 using JMF (except prime coat).	Ton	8248.54
2-83	Providing and laying, premix Asphaltic Wearing Course of any thickness, as specified, with asphalt bitumen 60/70 or 80/100, using JMF (except Tack coat).	Ton	8768.92
	Prime Coat / Tack Coat / Seal Coat		
2-84	Prime Coat, on Base Course surface.	Sqm	129.74
2-85	Tack Coat, on Bituminous surface.	Sqm	68.07
2-86	Providing and laying Seal Coat using sand and bitumen, all as specified.	Sqm	150.83
	Concrete – Roads, Hard Standings, Landing Grounds etc.		
2-87	Providing and laying CC Type A slabs for roads, hard standings, landing grounds etc, of any thickness, using	Cum	8122.44
2-88	Same as item 02-87, but CC Type B.	Cum	7147.45
2-89	Providing and laying, CC Type A slabs for roads, hard standings, landing grounds etc of any thickness using shingle or gravel .		7792.05
	incl use and waste of form work (wooden or steel as ordered) and finishing surfaces even and fair (not smooth).		S/
2-90	Same as item 02-89 but CC Type B.	Cum	6798.70
2-91	Providing Sand Cushion in layers as specified, under concrete roads, hard standings and landing grounds etc.	Cum	972.02
	Wire Mattresses		
2-92	Supply No 8 SWG, GI wire made up into	Sqm	389.66

SI No	Description	Unit	Rate (Rs)
	mattress 100 x100 mm mesh, fix and bind with 14 SWG wire (mattresses and laps measured).		
2-93	Same as item 02-92 but mattress 150 x 150 mm mesh	Sqm	262.93
1.	Rapid Runway Repair		
2-94	Lifting and placing of pre-cast RCC slabs, with a special lifting beam incl carriage as required, for Rapid Runway Repairs.	Sqm	452.52
2-95	Filling Sand between joints (3-6mm thick) of pre-cast RCC slabs for Rapid Runway Repairs and rolling with 6-8 ton roller, to make the surface perfectly level with adjacent surface.	Sqm	17.00
	Expansion Joints		
2-96	Labour and necessary material for forming of Expansion joint 13 mm wide and leaving the joint clear for filling (length of joint multiplied by thickness of joint). The filling of the joint with requisite filler will be carried out by the specialists or by the Departmental labour.	Sqm	332.52
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SECTION - 3

CONCRETE

SPECIFICATIONS

- 3.0. This section covers following:
 - i. Classification of Concrete
 - ii. Material Requirements
 - iii. Construction Requirements for materials, mixing, handling, placing, curing and testing etc.
 - iv. Reinforced Concrete
 - v. Pre-stressed Concrete
 - vi. Pre-Cast Concrete; Concrete Blocks (Solid/Hollow), Kerb-Stones etc

3.1. All Concrete works shall be carried out in accordance with the applicable requirements of ACI / ASTM / BS Standards as approved by Engineer in Charge before commencement of works.

3.2. Classification of Concrete. In order to meet the strength and durability requirements, the concrete is divided into following categories in the context of this MES Schedule of Rates.

3.2.1. **Regular / Normal Concrete**. Concrete made by using Ordinary Portland Cement (OPC) and other basic ingredients i.e. Coarse aggregate, Fine aggregate and Water, having min 28 days Cylinder Compressive strength less than **28 MPa** (4000psi). For ease of use, it is further classified into following types:-

3.2.1.1. **Type A**:- The Concrete having min 28 days Cylinder Compressive strength **24 MPa** (3500 psi). It shall be used for Structural members (RCC slabs, beams, columns, PCC works etc) or any other structural work where such strength is specified by the Designer.

3.2.1.2. **Type B**:- The Concrete having min 28 days Cylinder Compressive strength **21 MPa** (3000 psi). It shall be used for Structural members (RCC slabs, beams, columns, walls, partitions) and any other structural work where such strength is specified by the Designer.

3.2.1.3. **Type C**:- The Concrete having min 28 days Cylinder Compressive strength **10.5 MPa** (1500 psi). It shall be generally used for some structural members like foundations, hard standings, concrete blocks etc, and any other works where such strength is specified.

3.2.1.4. **Type D**:- The Concrete having 28 days Cylinder Compressive strength lesser than **10.5 MPa** (1500 psi). It shall be used for non structural works like floor underlay, lean concrete etc requiring low strength, or where specified as 1:4:8 and 1:6:12 etc.

3.2.2. **Special Concrete:-** The Concrete requiring min 28 days estimated Cylinder Compressive strength, equal or more than **28 MPa** (4000 psi) or requiring special features to meet higher strength, environmental, architectural and survivability requirements. Such Concrete will be comprehensively designed by the DD&C (Engineer in Chief's Branch). In case the Mix Design is prepared by any other consultant or designer, the use of this Concrete will be in accordance with the instructions by the concerned Consultant / Designer, duly verified by an authenticated laboratory.

MATERIAL REQUIREMENT

3.3. Cement. Various types of Cement commonly used in Concrete works are given in Table 3-1.

3.3.1 Cement shall conform to the specifications for Portland Cement ASTM C-150 / BS-12, unless otherwise specified to be of any particular quality, shall mean Ordinary Portland Cement.

TABLE 3-1

TYPES OF CEMENT

Туре	Use	
I	Ordinary Portland Cement; General purpose cement, when there are no extenuating conditions	
II	Modified Cement; Aids in providing moderate resistance to Sulphate attack	
	Rapid Hardening Cement; When high-early strength is required	
IV	Low Heat Cement; When low heat of hydration is desired (in massive structures)	
V	Sulphate Resistant Cement; When high Sulphate resistance is required	
IA	Type I Cement, containing an integral air-entraining agent	
II A	Type II Cement, containing an integral air-entraining agent	
III A	Type III Cement, containing an integral air-entraining agent	

3.3.2. Where Sulphate Resistant Cement is ordered and used, it shall be Sulphate Resistant Portland Cement of the approved make fully conforming to ASTM C - 150 / BSS 4027. The relevant rate for payment shall be increased by the ratio of increase in the rates of Sulphate Resistant Cement over Ordinary Portland Cement only.

3.3.3. For selection of a particular type of Sulphate Resistant Cement, Table 3-2 given below may be used as a guide, for approval by the Designer or the Engineer in Charge in prevalent Sulphate environment, prior to commencement of work.

TABLE 3-2

Exposuro	Conc	entration of Solubl	e Sulphates (SO₄)
Exposure	In Soil (%)	In Water (ppm)	Cement Type
Mild	< 0.1	< 150	Any Type
Moderate	0.1 to 0.2	150 to 1500	Type II or Type I blended*
Severe	0.2 to 2.0	1500 to 10000	Type V
Very Severe	> 2.0	> 10000	Type V blended*

Recommended Types of Cements for Severity of Sulfate Attack

* Cement may be blended with Pozzolana (25 - 40%), or Blast Furnace Slag (≥70%) of types proven to improve Sulphate resistance.

3.4. Aggregate (General)

3.4.1. Aggregate shall conform to the "Specifications for Concrete Aggregates" (ASTM - C 33). All Fine and Coarse aggregates to be used shall be supplied from an approved source, which shall not be changed without prior written permission of the Engineer in Charge.

3.4.2. Aggregates must be clean, inert, hard, non-porous and free from dust, laminated particles, loam, clay, organic or other impurities and silt. Coarse aggregates shall be hard and durable broken / crushed stone, gravel or shingle. Alternatives, like "Hard broken bricks" and "Broken CC" may be used for plain concrete only under exceptional circumstances, and when pre-specified in the Contract.

3.4.3. **Fine Aggregate**. The Fine aggregate shall be non plastic material and shall consist of sand, stone screenings or other approved inert materials with similar characteristics or a combination thereof and shall not contain more than 3% of material passing Sieve # 200 by washing and not more than 1% of clay lumps or shale. The Fine aggregate shall be uniformly graded and when tested as per ASTM C-117 & C-136, shall meet gradation requirements given in Table 3-3:-

Gradii	ig- i lile Agglegale
Sieve Designation	Percentage Passing by Weight
9.52 mm (3/8")	100
No. 4	95-100
, No. 8	80 - 100
No. 16	50-85
No. 30	25 - 60
No. 50	5 -30
No. 100	0 -10

TABLE 3-3 Grading- Fine Aggregate

3.4.4. **Coarse Aggregate:-** It shall consist of crushed or broken stone, gravel or other approved inert material with similar characteristics or a combination.

3.4.4.1. **Grading:**- It shall be of uniform grading with max size as required for various types / classes of concrete meeting the grading requirements, when tested in accordance with ASTM C 117 & C 136, as given in Table 3-4.

TABLE 3-4

Grading- Coarse Aggregate

Designation		% age by weight passing Laboratory sieves with square openings mm (in)							
Siz	es	63	50	38	25	19	13	9	# 4
mm	in	(21/2)	(2)	(1½)	(1)	(3/4)	(1/2)	(3/8)	
13mm to # 4	½"to # 4	-	-	-	-	100	90-100	40-70	0-15*
19mm to # 4	³ ⁄4" to # 4	-	-	-	100	90-100		20-55	0-10*
25mm to # 4	1" to #	-	-	100	95-100	-	25-60		0-10*
38mm to # 4	1 ½"to # 4	-	100	95-100	-	35-70	-	10-30	0-5
50mm to # 4	2" to #	100	95-100	-	35-70	-	10-30	_	0-5
38mm to 19mm	1½" to ¾"	-	100	90-100	20-55	0-15	-	0-5	-
50mm to 25mm	2" to 1"	100	90-100	35-70	0-15	-	0-5	-	-

*Not more than 5% shall pass Sieve # 8.

3.4.4.2. Other Properties of Aggregates

Los Angeles Abrasion	Loss of weight when	Weight of material passing
Value	immersed in Na ₂ So ₄	# 200 sieve by washing

40% (max) as per	12% (max) as per	One (1) % (max)
ASTM C 131	AASHTO T-104	

3.5. Water

3.5.1. The quality of mixing water shall be determined by ASTM-C 1602 and ASTM-C 1603. Water used in Concrete shall be clean and free form injurious amount of acids, alkalis, salts, organic material or substances deleterious to concrete or reinforcement.

3.5.2. Water for curing, washing aggregates & mixing shall be free from oil and shall not contain more than 1,000 ppm of Chlorides, nor more than 150 ppm of Sulphates (SO_4) .

3.6. Admixtures:- Admixtures shall only be allowed for use with written permission of the Engineer-in-Charge. This will be treated as an additional item and would be used as per manufacturer's instructions.

3.6.1. **Types:** An admixture can be defined as a chemical product which, except in special cases, is added to concrete mix in quantities not more than 5% by mass of cement during mixing or during an additional mixing operation prior to the placing of concrete, for the purpose of achieving a specific modification, to normal properties of concrete. Admixtures may be organic or inorganic in composition, but their chemical character as distinct from mineral, is their essential feature. Admixtures are commonly classified by their function in concrete. The classification as per ASTM C - 494 is as follows:-

- Type A Water-reducing
- Type B Retarding
- Type C Accelerating
- Type D Water-reducing and retarding
- Type E Water-reducing and accelerating
- Type F High Range, water-reducing or super plasticizing,
- Type G. High Range, water-reducing and retarding or super-plasticizing and retarding

3.6.2. The British Standards for Admixtures are BS 5075, Part 1, deals with accelerating, retarding, and water-reducing admixtures, and BS 5075, Part 3, (super-plasticizers), now superseded by European Standard EN 934-2, where available.

3.6.3 In practice, admixtures are marketed as proprietary products whose promotional literature sometimes incl claims of varied and wide-ranging benefits. Hence, it is important to understand specific effects of admixtures before they are used. Moreover, ASTM C 494 points out that the specific effects produced may vary with the properties and proportions of other ingredients of the mix. It is

recommended that any type of admixture be used after considering the history of results and on the specific instructions of the Designer / Engineer -in- Charge.

3.7. Reinforced Concrete:- The materials for Concrete shall conform to the requirements as mentioned above. The reinforcement shall be provided as per the design. The material for reinforcement shall conform to the specifications given in Section-9 (Steel and Iron works).

3.8. Pre-stressed Concrete:- The Pre-stressed Concrete shall be treated as Special Concrete as per Para 3.2.2. The materials for concrete shall conform to requirements mentioned above. The material for pre-stressing shall conform to Specifications for Pre-stressed Concrete given in this Schedule, Section-9 (Steel and Iron works).

CONSTRUCTION REQUIREMENTS

3.9. Materials

3.9.1. **Aggregate:** Max Size of Aggregate to be selected for use in various types of construction is given in Table 3-5. This shall be used in light of the provisions made above. However, the gradation shall be adopted as per Material Requirements highlighted in Para 3.4 above.

	Max Size of Aggregate			
Type of Construction	mm	in		
Plain Footings, caissons and Sub structure walls	50	2		
Reinforced Foundation Walls and footings	37.5	1-1/2		
Beams and Reinforced walls	25	1		
Columns	25	1		
Pavements and Slabs	19	3/4		
Mass Concrete	>50	2		

TABLE 3-5 Selection of Max Size of Aggregate

Note:- The Max Size of Aggregate is subject to condition that Concrete shall not contain any aggregate greater in size than 1/5 of the narrowest dimension between sides of the forms, nor 1/3 of the least dimension of the concrete nor ³/₄ of the min clear spacing between the individual reinforcing bars or wires, bundles of bars, individual tendons, bundled tendons or ducts.

3.9.2. General Characteristics of Aggregate:-

3.9.2.1. Coarse aggregates shall be crushed aggregate from approved sources and conform to quality requirements mentioned in Para 3.4 of this Section. If allowed for a specific work, ballast,

gravel or shingle may be used, mixed with sand to various proportions. However, these materials must conform to strength and gradation requirements, approved by Engineer-in Charge.

3.9.2.2. **Alternative aggregates** of hard broken bricks and broken CC will **NOT** be used in RCC and Pre-stressed concrete in any position.

3.9.2.3. **Natural aggregates** (Bajri) shall be clean, round and smooth; where available ballast or gravel will be given preference over bajri.

3.9.2.4 Mixed aggregates are not required to be uniformly graded and shall be known as **Mixed Aggregate**. The size shall be specified in terms of the largest gauge required, but not exc 50 mm and shall consist of various gauges to correspond to the sample approved by Engineer-in-Charge.

3.10. Water-Cement Ratio. The max water cement ratio for Normal Concrete shall not exc 0.50 or as specified by the designer or as stated in the JMF prepared for the purpose. For Special Concrete, it shall be as specified in the design. Depending on the purpose of use, the recommended Slump for Normal Concrete is selected from Table 3-6.

Type of Construction	Slump, mm			
	Max *	Min		
Reinforced Foundation Walls and footings	75	25		
Plain Footings, caiss0ns and Sub structure walls	75	25		
Beams and Reinforced walls	100	25		
Building Columns	100	25		
Pavements and Slabs	75	2 5		
Mass Concrete	75	25		

TABLE 3-6

Recommended slumps for various types of construction

Note:- May be increased by 25 mm for methods of consolidation other than vibration

3.11. Min Cement Content: It shall be worked out as per the Concrete Mix Design for different strength and survivability requirements, based on ACI specifications. The Min Cement Content shall not be less than the survivability requirement, corresponding to the purpose of use.

3.12. Concrete:-

3.12.1. Concrete Mix Design

3.12.1.1. **Special Concrete:-** For all Special jobs involving RCC construction, specifying limits for design strength, it is

mandatory to get the Concrete Mix Design, prescribing exact quantities of Cement, Coarse and Fine aggregates with their size / gradation, water cement ratio and slump. It is recommended to get the JMF designed from a Consultant or DD & C. Where it has been prepared by a private laboratory, it shall be vetted by the concerned Designer and incl some or all of the following:-

- 3.12.1.1.1. Max water cement ratio
- 3.12.1.1.2. Min cement content
- 3.12.1.1.3. Air content (if required)
- 3.12.1.1.4. Slump
- 3.12.1.1.5. Max Size of aggregate
- 3.12.1.1.6. Min Strength
- 3.12.1.1.7. Other requirements relating to strength, durability, admixtures and special type of cement.

3.12.1.2. **Proportions**:- The proportions given for Normal Concrete are by volume. A cement bag of 50 Kg, forms a unit of 0.035 Cum (Gauge box of 30cm x 30cm x 39cm). In case of proportions by weight, the contents shall be adjusted by relevant conversion constants.

3.12.1.3. Regular / Normal Concrete:- The Engineer in Charge shall ensure preparation of the Design Mix formulae / Mix proportions for various strength requirements, based on the availability of local materials. The proportions for Mix Design (Mix specified) given in Table 3-7, form the basis for working out the item rates given in the Schedule. They may act only as a guideline. Depending upon the variations in site condition and the specifications of the locally available aggregate (Coarse and Fine), the Engineer in Charge shall ensure preparation of Concrete Mix designs as specified by the Designer and get them tested from a bonafide Govt Material Testing laboratory at the expense of the Contractor before commencement of the job. In case of any variation in materials based on the Design mix approved by the Engineer in Charge and that given in Table 3-7, the rates be derived on-proportionate basis using cost of materials as given in Material Supply Only Section (Section-27) and adjusted accordingly.

TABLE 3-7

Estimated Mix Proportions for Regular / Normal Concrete

For Various Strength Requirements

Min 28 Days	-	Approx	Estimat	ed Quantitie	s per Cum
Cylinder Compressive Strength*	гуре	for Estimation	Cement kg	Aggregate (Cum)	
				Fine	Coarse

24 MPa (3500 psi)	А	1 : 1.5 : 3	415.5	0.436	0.872
21 MPa (3000 psi)	В	1:2:4	327	0.457	0.914
10.5 MPa (1500 psi)	С	1:3:6	228.5	0.480	0.960

Note:-

* 28 days Min Compressive strength of concrete with 150 mm dia and 300 mm long cylinder

3.12.1.4. **Weigh-Batched Concrete (Plant Mix):**- Concrete Mix Design by weight for Special Concrete along with testing standards and criteria shall be arranged from a reputed Consultant or DD&C. The design shall be approved by Accepting Officer of the Contract before commencement of the work. In this Schedule, the rate for Weigh Batched Concrete (Plant Mix) for a desired Min Cylinder Compressive Strength of 28 MPa (4000 psi), has been worked out on the basis of a sample Mix Design given below. In case of any variation in the materials based on the Design mix, approved by the Engineer in Charge, the rates be derived on proportionate basis using cost of materials given in Material Supply Only (Section-27) and adjusted accordingly.

a.	Cement	=	425.0 Kg	(8.5 bags)
b.	Water	=	200.9 Kg	
c.	Crush 20 – 10 mm	=	665.4 Kg	
d.	Crush 10 – 05 mm	_	442.0 Kg	
e.	Fine Aggregate		🔨 652.9 Kg	
f.	Admixture	-	💛 2.98 Kg	

3.12.2. Handling of Concrete

3.12.2.1. The temperature of mixed concrete immediately before placing shall not be more than 32° C.

3.12.2.2. Concrete shall be mixed for a period not less than 1¹/₂ minute after all materials incl water is in mixer.

3.12.2.3. In case of Plant mixing, the mixing time shall neither be less than 50 seconds, nor more than 90 seconds.

3.12.2.4. In Transit mixing truck, mixing shall be continued for not less than 50 revolutions after all ingredients incl water are in the drum. The mixing speed shall be 6-10 rpm and total number of revolutions should be limited to 300.

3.12.2.5. In case of "Hauling"; mixed concrete may be transported to delivery point in truck agitators or truck mixers, operating at the speed designated by the manufacture. For zero slump to be laid by paver, concrete will be hauled in open trucks, which will be protected against rain or exposure to the sun for "more than 20 mins, when the ambient temperature exc 25° C".

3.12.2.6. When a truck mixer or agitator is used for transporting concrete to delivery point, discharge is completed within one (1) hr or earlier, or less than max 300 revolutions of the drum, whichever comes first.

3.12.2.7. When non-agitating hauling equipment is used, discharge shall be completed within one (1) hr, after adding cement to the aggregates.

3.12.2.8. The rate of delivery of the concrete during concreting operations shall be such that the interval between batches shall not exc 20 mins.

3.12.3. **Placing of Concrete:-** Concrete shall not be poured in the forms until the Engineer-in-Charge has inspected the placing of the reinforcement, conduits, anchorages, and pre-stressing steel and has given his approval in writing. Following be ensured during pouring or placing of Concrete.

3.12.3.1. Concrete, during and immediately after placing, shall be thoroughly vibrated, except lean concrete under footings and concrete deposited under water. Concrete in walls, beams, columns etc shall be placed in horizontal layers, not more than 30 cm thick.

3.12.3.2. The Concrete shall be vibrated internally or externally or both, as ordered by the Engineer-in-Charge. The vibration shall be done with care in such a manner as to avoid displacement of reinforcement, conduits, or wires.

3.12.3.3. The compaction shall be done by mechanical vibration. The intensity of vibration shall be such as visible to affect a mass of Concrete with a 3cm slump over a radius of at least 0.5M. Concrete should not be over vibrated to avoid segregation of materials.

3.12.3.4. Internal vibration shall be supplemented by such external vibrator as is necessary to ensure smooth surface and dense Concrete.

3.12.3.5. Construction joints shall be made only where shown or described in drawings or called for in the pouring schedule, unless otherwise approved by Engineer-in-Charge.

3.12.3.6. The temperature of Concrete under hot weather shall not exc 32° C at the time of pouring. Following actions may keep Concrete temperature below the above limit.

- i. Chilling of Concrete water by heat exchange coils or addition of broken ice.
- ii. Cooling Aggregate by watering.

iii. Night work, provided that above are rendered inadequate or un-satisfactory in their results. However, permission of the Engineer-in-Charge will be essential for night work.

3.12.3.7. Concreting operations in Cold weather shall not be continued without the written approval of the Engineer-in-Charge, when a descending air temperature in the shade and away from artificial heat falls below 5°C, nor resumed until an ascending air temperature in the shade and away from artificial heat reaches 20°C. In such case, the mixing water and / or aggregates shall be heated to not less than 21°C nor more than 66°C prior to being placed in the mixer, so that temperature of 30–90 mm (12" to 36") thick Concrete shall not be less than 10°C and not more than 27°C at the time of placing.

3.12.4. **Depositing:-** Concrete shall be used as soon as mixed, deposited and well consolidated in layers not exc 30 cm thick. CC in which the initial set has taken place shall be rejected.

3.12.5. **Working up:** Carefully work up and pun Concrete, against surfaces and around reinforcement so that later is not displaced.

3.12.6. **Curing of Concrete:-** Curing is essential to prevent loss of moisture from concrete, due to sun, drying winds, and traffic, until the specified curing has been completed. Concrete shall be protected from heavy rains for 24 hours and shall be cured for 14 days. All galleries, conduits and other formed openings through the Concrete shall be closed during entire curing period. Concrete shall be kept wet for 15 days after laying. Following methods are used for effective curing:-

3.12.6.1. **Water Method:-** Unless otherwise approved, the concrete shall be moistened by maintaining all surfaces continuously (not periodically) wet for at least 14 days after initial setting. The temperature difference between curing water and Concrete shall not be more than 11°C (20°F). When in contact with mass concrete, steel forms shall be kept wet. Horizontal construction joints and finished horizontal surfaces shall be covered with uniform thickness of 50mm (2 inch) of Sand and kept continuously saturated to protect Concrete from frost or any other damages.

3.12.6.2. **Curing Compound Method:-** Surfaces exposed to the air may be cured by the application of an impervious membrane, if approved by the Engineer-in-Charge, and if water / cement ratio of concrete is not less than 0.5. The liquid membrane-forming curing compound shall conform to ASTM C-309. The compound shall be applied with a pressure sprayer in such a

manner, so as to cover the entire Concrete surface with a uniform film, and shall be of such character that it will harden within 30 min after application. The amount of compound applied shall be ample to seal the surface of the Concrete thoroughly. Power operated spraving equipment shall be equipped with an operational pressure gauge and means of controlling the pressure. The curing compound shall be applied to the Concrete following the surface finishing operation, immediately after the moisture sheen begins to disappear from the surface, but before any drying shrinkage or craze cracks begin to appear. Should the film of compound be damaged from any cause before the expiry of seven (7) days, after the Concrete is placed in the case of structures, the damaged portion shall be repaired immediately with additional compound. The curing compound shall be packaged in clean barrels or steel containers or shall be supplied from a suitable storage tank located at the job-site. Containers shall be well sealed with ring seals and lug type crimp lids. The linings of the containers shall be of a character that will resist the solvent of the curing compound. Each container shall be labeled with the manufacturer's name, specification number, batch number, number of gallons, and date of manufacture. It shall have a label warning concerning flammability. Curing compound may be sampled by the Engineer-in-Charge at the source of supply or at the job-site.

3.12.6.3. For all Pre-stressed Concrete operations, the curing procedures shall be well established and properly controlled. Curing shall commence immediately after the final set of Concrete.

3.12.7. **Testing of Concrete**:- Compressive Strength of Concrete will be determined from test cylinders in accordance with ASTM C-31 & ASTM C-39.

3.12.7.1 A set of 6 cylinders (150mm dia and 300mm length) be taken from each 50 cum of Concrete mix or fraction thereof placed each day. Three of the 6 cylinders, be tested after 7 days and the remaining three after 28 days.

3.12.7.2. The min avg 28 days test result of all samples tested at any time shall be the specified 28 days Min Cylinder Compressive strength.

3.12.7.3. No individual sample tested after 28 days shall show a test result lower than 85% of the required 28 days.

3.12.7.4. Concrete represented by any single test cylinder that fails to comply with the requirement as above will be rejected unless the Contractor at his expense provides evidence that the strength and quality of the Concrete placed in the work are

acceptable. If such evidence consists of tests made on cores taken from the work, the cores shall be obtained and tested in accordance with ASTM C-42. Test results of the cores should meet following requirements.

3.12.7.4.1. Avg test result of the cores shall NOT be less than the min required 28 days strength.

3.12.7.4.2. No. Individual core shall show strength less than 95% of the required 28 days strength.

3.12.7.4.3. Other non-destructive methods of concrete tests may be allowed by the Engineer-in-Charge.

3.12.8. **Rejection of Concrete.** If above test results fail to comply with the requirements, concrete of that particular pour will be rejected and removed as directed by the Engineer-in-Charge.

3.13. Finishing Works

3.13.1. **Exposed Faces:** Exposed faces of cast in situ, pre-cast and reinforced concrete shall be brought to fair and even surface by thoroughly punning (by working the Concrete against the casings and the centering) and tamping, whilst the Concrete is being poured-in and also by working over the surface with a trowel. Immediately after the removal of casings or centering, remove any irregularities and stop up air holes using CM where necessary, that will give an appearance as that of the original concrete. Unless otherwise stated, fair finish shall imply fair and smooth finish with or without rendering.

3.13.2. **Channels:-** Channels formed in Concrete shall be finished fair to proper falls with bends, stopped ends etc, as required.

3.13.3. **Pointing:-** The joints of Concrete block walling shall be raked out as the work proceeds and the surface cleaned and brushed. Flush pointing in addition shall be executed as required.

3.13.4. Linear Labours (Small):- Refer to chamfers, splays, rounded angles, coved angles, bead, grooves, rebates not exc 100 mm girth, and moldings not exc 150 mm girth.

3.13.5. **Incidental Labours:-** Refer to stops, meters, rounded ends, junctions, dishing etc, in connection with Linear or Super labour.

3.14. Construction and Expansion Joints:- Will be provided as per Information Sheet Number IS-STR-59,66 or as shown on drawing. Following be adhered during construction.

3.14.1. Construction Joints.

3.14.1.1 Construction joints shall be as few as possible; and shall be made on horizontal & vertical planes only or at places shown on the drawings or approved by the Engineer-in-Charge. Where concreting is stopped on a vertical plane, as in beams, provide lap joint with approved stop board. Make provisions to allow the reinforcement to pass through the joints without being temporarily bent or otherwise displaced.

3.14.1.2. In case of slabs or walls, nail a 50mm (2") x 25mm (1") fillet slightly splayed (to permit easy removal) on the joint stop board to form a joggle running throughout the length of the joint. Remove any concrete flowing pass the joint as soon as initial set occur. When concreting against a hardened surface is resumed, well roughen, wet, clean surface and apply cement sand slurry of same ratio as of mortar used in the concrete.

3.14.1.3. Provide approved water proofer in lieu of mortar at joint, in basement and water retaining walls more than 7.5M (30 ft) long, carry out concreting such that vertical gap of about 0.7M (2ft) width with vertical joggled ends at both sides is left out at about 7.5M (30 ft). Distances are filled in after 14 days of concreting the adjacent sections.

3.14.2. **Expansion Joints:-** Form expansion joints accurately in the position and to the dimensions and details shown on the drawing and as instructed by the Engineer-in-Charge.

3.15. Reinforcement:- It shall be worked out as per the design, fixed and measured separately as supplied and fixed under Section-9 of this Schedule (Steel and Iron work).

3.16. Pre-Stressed Concrete Structures:- This work shall consist of pre-stressing, precast or cast-in-place concrete by furnishing, placing and tensioning of prestressing steel in accordance with details shown on the plans, and as specified in these specifications or as directed by the Engineer-in-Charge. The work shall also incl furnishing and installation of any hardware item necessary for the pre-stressing system to be used, incl but not limited to ducts, anchorage assemblies and grout, used for pressure grouting ducts.

3.17. Pre-Cast Concrete:-

3.17.1. **Concrete Blocks:-** Concrete blocks shall be made on site or at a Concrete pre-cast factory, with proper quality control procedures in place. Concrete blocks shall be of sizes required as per drawings and shall conform to the requirements of ASTM C-90 "Standard Specification for Load Bearing Concrete Masonry Units" unless specified otherwise.

3.17.1.1. Crushing strength shall be min 13 MPa (1900psi) unless otherwise required, considering overall dimension on the axis on which test is performed.

3.17.1.2. The blocks shall be Solid or Hollow as required and shall be carefully made, so that they are true in line and face with square corners and free from all defects. The cavities in Hollow blocks shall not be more than 25% of the total volume.

3.17.1.3. The Concrete for the blocks shall be prepared in Batching plant or a Concrete mixer in the proportion, determined by Concrete JMF, to give the required strength. Hand mixing shall not be allowed in any case, what so ever.

3.17.1.4. Concrete blocks shall be machine moulded. The Concrete be well worked into the moulds, vibrated, tamped and pressed to ensure that blocks are dense and free from voids. The blocks shall be cured by keeping moist, continuously for a period of at least ten (10) days and then shall be allowed to dry in shade for at least twenty (20) days before use in masonry.

3.17.1.5. All blocks shall have clean cut, straight and true edges, smooth dense faces of uniform appearance without voids, honeycombs, projections and be free from cracks, spalls, chips, rugged edges or other defects detrimental to their use.

3.17.1.6. Where blocks are to be plastered or rendered, the block surface shall have a coarse texture without compromising the strength, suitable for bonding the plaster as approved.

3. 17.1.7. Sizes of Blocks:- The commonly used and available sizes in the market are given below for guidance:-

3.17.1.7.1. Solid Blocks

i.	200mm x 200mm x 300mm	(8" x 8" x 12")
ii	150mm x 200mm x 300mm	(6" x 8" x 12")
iii	100mm x 200mm x 300mm	(4" x 8" x 12")
3.17.1	.7.2. Hollow Blocks	
i	200mm x 200mm x 400mm	(8" x 8" x 16")
ii	150mm x 200mm x 400mm	(6" x 8" x 16")

100mm x 200mm x 400mm (4" x 8" x 16") iii

Testing of Concrete Blocks:- The avg 28 days 3.17.1.8. Compressive strength of any six blocks picked at random, after curing and drying shall not be less than 13 MPa (1900 psi) for load bearing walls and 6.9 MPa (1000 Psi) for non load bearing walls, when tested in accordance with ASTM C-140. Appropriate strength

requirement shall be considered to be satisfied, if none of the strength of the six samples is below the specified strength, or if the avg strength of the six (6) samples is not less than the specified strength and the difference between the highest and the least strength is not more than 20 % of the avg.

3.17.2. Kerb Stones:- The Kerb Stones shall have min 28 days Cylinder Compressive Strength of 21 MPa (3000 psi). It shall be cast using Plant Mix Concrete with proper shuttering and compaction arrangements to ensure strength, finish and quality. The Kerb Stones are marketed in various sizes, shapes and qualities. However, for the purpose of this Schedule, the rates have been worked out for following specifications of Kerb Stones given in Table 3-8:-

ΤΔΡ	RI	F	3-9	R
	ᄓ		3-0	0

Size and Specifications of Common Kerb Stones

S.No	Size (mm)	Dropper (mm)	Top (mm)	Chamfered (mm)	Strength MPa (psi)
1	450 x 300 x 150	160	125	10	21.0 (3000)
2	350 x 300 x 150	160	110	10	21.0 (3000)

3.18. Form-work:-

3.18.1. **General:-** Construct formwork and falsework such that it is strong to support the load, imposed on them, by fresh Concrete and stresses imposed by vibrating equipment and traffic. Prevent settlement of support. All joints be tight against the escape of cement and fines. Make due allowance (incl camber) for settlement and movement of forms under fresh Concrete. If metal ties are used in conjunction with bolts to pass through the Concrete, do not leave the metal closer than 50 mm (2") from the face of Concrete.

3.18.2. Do not use damaged formwork. Provide shear bars as per Engineer in Charge's instructions at all construction joints. Maintain formwork fabrication tolerances and surface irregularities, as follows:-

3.18.2.1 Variations from Plumb in lines and surfaces of piers, walls and rises, 6mm (¼") per 3M (10 ft) but not more than 25mm (1").

- 3.18.2.2. For exposed corners, columns, central joints, grooves and other construction lines, 6mm (¼") in any bay or 6M (20 ft).
- 3.18.2.3. Variation from position of linear building lines and related columns, walls and partitions, 13mm (½") in any bay or 6M (20 ft) max and 25mm (1") in 12M (40 ft) or more.
- 3.18.2.4 Variation in size & location of sleeves, floors & wall openings, 6mm (¼").
- 3.18.2.5 Variation in cross-sectional thickness of slab & walls be between minus $6mm(-\frac{1}{2})$ and plus $12mm(+\frac{1}{2})$.
- 3.18.2.6 Variation in footing plan dimensions to be between
 (-) 12mm (-½") and (+) 50mm (+2"). Layout displacement not more than 12mm (½") and verticality deviation not more than 1.0% of the footing width, in direction of displacement, but not more than 50mm (2") on top.
- 3.18.2.7 Suitable openings as required shall be provided in the formwork for the passage of piping ducts, channels etc. All forms shall be so constructed that they can be removed without damaging the Concrete. All exposed joints, edges and external corners shall be chamfered 37.5 mm (1½") at 45°, except as otherwise shown. Internal corners are filleted where indicated or required. Forms that are to be used more than once shall be maintained in serviceable condition and shall be thoroughly cleaned before reuse.

3.18.3. Design of Formwork:-

- 3.18.3.1. All scaffolding and shuttering shall be of Steel unless specifically allowed by Engineer-in-Charge.
- 3.18.3.2. Forms shall result in final structure that conforms to shapes, lines, and dimensions of the members as per the design, drawing and specifications.
- 3.18.3.3. Forms shall be substantial and sufficiently tight to prevent leakage of mortar.
- 3.18.3.4. Forms shall be properly braced or tied together to maintain position and shape.
- 3.18.3.5. Forms and their support shall be designed so as not to damage previously placed structure.
- 3.18.3.6. Design of form work shall incl consideration of the following factors;
 - 3.18.3.6.1. Rate and method of placing Concrete.

- 3.18.3.6.2. Construction loads incl vertical, horizontal and impact loads.
- 3.18.3.6.3. Special form requirements for construction of shells, folded plates, domes, architectural concrete or similar types of elements.
- 3.18.3.7. Forms shall be removed in a manner as not to impair safety and serviceability of the structure. Concrete to be exposed by form removal, shall have enough strength, not to be damaged by removal operation.

3.18.4. Coating / Oiling: Shortly before Concrete is placed, forms for exposed surfaces shall be coated with approved non-staining form oil, which shall not interfere with the setting of the Concrete nor be otherwise deleterious. After oiling, surplus oil on the form surfaces and any oil on the reinforcing steel or other surfaces requiring bond with the Concrete shall be removed. Forms for unexposed surfaces may be thoroughly wetted in lieu of oiling, immediately before placing the Concrete.

3.18.5. Removal of Formwork:- The Contractor shall be responsible for ensuring that sufficient time has elapsed for the Concrete to attain sufficient strength before removal of forms, but, no form be removed without prior approval of the Engineer in Charge. Forms shall be removed with care so as to avoid injury to Concrete. Forms shall be removed as soon as practicable, keeping in view the min Concrete setting time requirements, to avoid delay in water curing, and to enable earliest practicable repair of surface imperfections. In order to avoid excessive stresses in the Concrete that might result from swelling of the forms, wooden forms for wall openings shall be loosened, as soon as this can be accomplished without damage to the Concrete. Forms for the openings shall be constructed in such a manner as to be removed until the strength of the Concrete is such that form removal will not result in perceptible cracking, spalling and breaking of edges of surfaces or other damage to the Concrete. In general, the approx elapsed time before removal of forms shall be as per Table 3-9

Position of Formwork	Min Period for Temps Over 10 ⁰ C	Min Strength to be Attained
Vertical or near vertical faces of mass concrete	24 hours	0.2 C
Vertical or near vertical faces of reinforced walls beams and columns	48 hours	0.3 C
Undersides of arches, beams and	14 days	0.5 C

TABLE 3 - 9 Min Period for Formwork Removal

slabs (formwork only)		
Supports to underside of arches, beams and slab upto 3M (10 ft) span	14 days	С
Supports and underside of beams, slabs larger than 3M (10 ft) span	21 days	С

Notes:-

a. "C" is the Nominal strength for the grade of concrete used.

b. At temperature below 10° C or if Cement other than Ordinary Portland (Type I) is used, the Engineer-in-Charge may instruct for longer periods.

METHOD OF MEASUREMENTS

3.19. Attached Work:- In Reinforced Concrete (Pilasters, buttresses, string courses, beams, girders etc.):-

3.19.1. **Walls:-** Measure all projection portions, with the walls and pay at the same rate.

3.19.2. **Floors or Roofs:-** Measure all projecting portions (beams, haunches, etc) separately and pay at the rate for beams, girders, columns etc.

3.20. No deductions or additions (on any account) be made for:-

- 3.20.1. Ends of dissimilar materials, i.e joists, beams, posts, girders, rafters, purlins, trusses, corbels, steps etc, not exc 460 Sq cm in section:
- 3.20.2. Opening not exc 0.2 Sqm area.
- 3.20.3. Linear (locking, rebated, tongued and grooved etc).
- 3.20.4. Linear labour (small) and incidental labour.
- 3.20.5. The portions shaded at Fig 3-1 *(measuring throughout as a x b)*, where these do not exc 40 Sq cm in section. If they exc 40 Sq cm each, the work will be measured net.
- 3.20.6. Channels (Fig.3-1) shall be measured as;
 (a x b) ¾ (c x d), except where the shaded portion does not exc 40 Sq cm in section
- 3.20.7. Other sections shall be measured net.



Figure – 3-1

3.21. Hollow Block:- Measure as solid, under rate for hollow blocks.

3.22. Staircases:-

- 3.22.1 Measure spandrel steps net.
- 3.22.2 Measure half and quarter space landing as floors.

3.23. Channel Formed in Poured Concrete:- When over 40 Sq. cm. in section, the curved waterway shall be deducted at $\frac{3}{4}$ x width x depth (max dimensions).

3.24. Pre-cast Pre-stressed Concrete Member:- The quantity to be paid for, shall be Concrete work of structural members of different types and sizes, constructed and installed in place, complete incl enclosures for pre-stressing formwork, shuttering and centering.

3.25. Cast-in-Place Pre-stressed Concrete:- The work to be paid for, under this item will be only Pre-stressed Concrete work as specified, shown on drawings or required by the Engineer-in-Charge, and shall incl formwork, shuttering, centering, false work etc.

CLARIFICATION OF RATES

3.26. The rates, inter alia, incl particularly:-

- 3.26.1. All requirements specified here-above, as applicable.
- 3.26.2. All materials and activities.
- 3.26.3. Work in 150 mm (or less) layers.
- 3.26.4. Work in any position and of any dimensions.
- 3.26.5. Linear and incidental labour produced by formwork, cores.
- 3.26.6. Curing and protection.
- 3.26.7. Roughen surface of old concrete (where adjoining new), sweeping clean and watering.
- 3.26.8. Hoisting upto 12M above or below ground.
- 3.26.9. Cement shall **not** be issued under Schedule-B, for pre-cast or manufactured items like Solid /Hollow Blocks, Kerb Stones etc, which are procured from manufacturers. However, in case pre-casting is carried out at site as per the specifications, the required quantity of cement may be issued under Schedule 'B', as per the laboratory report for the Concrete mix, with prior written approval of the Engineer in Charge.

3.27. Walls incl attached work (pilasters, buttresses, strings, cornices, plinths etc) also partition and other works not specifically mentioned.

3.28. Stairs incl stairs of any type, straight, doglegged, winding open or closed, and steps of square or spandrel section, any shape or plan, string carriages and landings less than ¹/₄ space.

3.29. The rates for the following incl all necessary form work/shuttering and fair faces to exposed surfaces:-

- 3.29.1. Concrete cast in situ.
- 3.29.2. Pre-cast Concrete.
- 3.29.3. Reinforced Concrete.

3.30. Rates for Weigh Batched Formula–(Plant Concrete):- Special Concrete having 28 days Min Cylinder Compressive strength 28 MPa (4,000 psi), incl arrangement and use of Weigh Batching plant, concrete pumps, vibrators etc and transportation upto 5Km by Transit Mixer have been accounted for in the rates.

ITEM RATES

SI. No	Description	Unit	Rate (Rs)
	Foundations		
3-1	Providing and laying of Plum Concrete 1:4:8, with coarse aggregate graded as specified using 15 % boulders.	Cum	4537.59
3-2	Same as item 03-1, but plum concrete 'Type C' .	Cum	5040.79
3-3	Providing and laying of CC 1:6:12 , using Shingle or Gravel as specified.	Cum	4205.21
3-4	Same as item 03-3, but CC 1:4:8.	Cum	4808.64
3-5	Same as item 03-3, but CC 'Type C'.	Cum	5399.59
3-6	Same as item 03-3, but CC Type 'B'.	Cum	6485.44
3-7	Providing and laying of CC 1:6:12, using Crushed or Broken stone graded as specified	Cum	4582.50
3-8	Same as item 03-7, but CC 1:4:8.	Cum	5173.94
3-9	Same as item 03-7 but CC Type 'C' .	Cum	5758.09
3-10	Same as item 03-7, but CC Type 'B'.	Cum	6827.47
3-11	Providing and laying of CC (1:8), using Mixed aggregate .	Cum	6046.15
3-12	Providing and laying of CC (1:10) using Mixed aggregate.	Cum	5556.27
3-13	Providing and laying of CC Type 'C' using Shingle or Gravel as specified in walls, sills, copings, channels, drains, steps, string courses, corbels, pier caps, hinge stone, bed plates etc, incl form work and fair faces to exposed surfaces.	Cum	6867.24
3-14	Same as item 03-13, but using Crushed or Broken stone.	Cum	7225.74
3-15	Providing and laying of CC Type 'B' using Shingle or Gravel as specified, in walls, sills, copings, channels, drains, steps, string courses, corbels pier caps, hinge stone, bed plates etc, incl formwork and fair faces to exposed surfaces.	Cum	7953.10
3-16	Same as item 03-15, but using Crushed	Cum	8295.05

SI. No	Description	Unit	Rate (Rs)
	or Broken stone.		
3-17	Reinforced Concrete Providing and laying RCC Type 'B' using shingle or gravel in foundation, independent column footings, solid floors etc incl from work as specified. Reinforcement measured and paid separately	Cum	7008.10
3-18	Same as item 03-17, but using crushed or broken stone.	Cum	7350.07
3-19	Providing and laying RCC Type 'B' , using shingle or gravel in foundation, independent column footings, solid floors etc, as specified except form work. Reinforcement measured and paid separately.	Cum	6549.51
3-20	Same as item 03-19, but using crushed or broken stone.	Cum	6891.57
3-21	Providing and laying RCC Type 'B ,' using shingle or gravel in roof slabs, landings, walls, plinth beams and bands etc as specified requiring shuttering. Reinforcement measured and paid separately.	Cum	9863.78
3-22	Same as item 03-21, but using crushed or broken stone.	Cum	10205.81
3-23	Providing and laying RCC Type 'B,' using shingle or gravel in columns, beams, stairs, posts, struts, piers, lintels, and the like requiring shuttering, as specified. Reinforcement measured and paid separately.	Cum	10117.62
3-24	Same as item 03-23, but using crushed or broken stone.	Cum	10459.74
3-25	Providing and laying RCC Type 'A' , using shingle or gravel as specified in roof slabs, landings, walls, plinth beams and bands, etc, requiring shuttering. Reinforcement measured and paid separately.	Cum	10834.23
3-26	Same as item 03-25, but using crushed or broken stone.	Cum	11159.96
3-27	Providing and laying RCC Type 'A' , using shingle or gravel as specified in beams, columns, stairs, posts, struts,	Cum	11088.17

SI. No	Description	Unit	Rate (Rs)
	piers, lintels and the like. Reinforcement measured and paid separately.		
3-28	Same as item 3-27, but using crushed or broken stone.	Cum	11413.74
3-29	Providing and laying RCC Type 'A' , using shingle or gravel in foundations, independent column footings, solid floors etc incl form work as specified. Reinforcement measured and paid separately.	Cum	7977.57
3-30	Same as item 03-29, but using crushed or broken stone.	Cum	8306.15
3-31	Add to item 03-17 to 03-24, if Pudlo or other similar approved water proofing materials is added to cement at the rate of 5% by weight.	Cum	2097.05
3-32	Providing and fixing of PVC water stopper 190 mm wide.	Metre	258.31
	Pre-Stressed Concrete		
3-33	Providing and laying Pre-stressed Concrete 35 MPa (5000 Psi) in beams/girders etc incl shuttering and launching complete as specified. (Steel Reinforcement and Post Tensioning measured and paid separately).	Cum	22271.01
	Weigh Batched Concrete		
3-34	Providing and laying RCC 28 MPa (4000 Psi) cylinder strength incl lead upto 5km, using weigh batch, as in roof, slabs, walls, landings, plinth beams and bands etc as specified, requiring shuttering. Reinforcement to be measured and paid separately	Cum	13391.32
3-35	Providing and laving RCC 28 MPa (4000 Psi)	Cum	13645.03
	cylinder strength as in columns, beams, stairs, posts, struts, piers, lintels and the like, incl lead upto 5km as specified, requiring shuttering. Reinforcement to be measured and paid separately.		
3-36	Providing and laying RCC 28 MPa (4000 Psi) cylinder strength as in piers,	Cum	10076.82

SI. No	Description	Unit	Rate (Rs)
3-37	foundations etc, incl lead upto 5km without the use of shuttering Reinforcement to be measured and paid separately. Extra, for lead beyond 5km, to 10km or part	Cum	371.95
	thereot, for Weigh Batched Concrete. Pre Cast Concrete		
3-38	Providing and laying of CC Type 'C' using shingle or gravel as in walls, partitions, slabs, sills, copings, channels, steps, string courses, corbels, pier caps, hinge stones, mantel pieces, louvers, chimney tops etc, incl setting, jointing and pointing in CM 1:4 all as specified.	Cum	7901.06
3-39	Same as item 03-38, but using crushed or broken stone.	Cum	8259.56
3-40	Providing and laying of CC Type 'B' using shingle or gravel as in walls, partitions, slabs, sills, copings, channels, steps, string courses, corbels, pier caps, hinge stones, mantel pieces, louvers, chimney tops etc, incl setting, jointing and pointing in CM 1:4 all as specified.	Cum	9050.42
3-41	Same as item 03-40, but using crushed or broken stone.	Cum	9392.46
3-42	Providing and laying of CC Type 'C' using shingle or gravel as in walls, partitions, slabs, sills, copings, channels, steps, kerbs, string courses, corbels, pier caps, hinge stones, mantel pieces, louvers, chimney tops etc, but except jointing and pointing.	Cum	6544.05
3-43	Same as item 03-42, but using crushed or broken stone.	Cum	6902.55
3-44	Providing and laying of CC Type 'B,' using shingle or gravel as in walls, partitions, slabs, sills, copings, channels, steps, string courses, corbels, pier caps, hinge stones, mantel pieces, louvers, chimney tops etc, but except jointing and pointing.	Cum	7629.89

SI. No	Description	Unit	Rate (Rs)
3-45	Same as item 03-44, but using crushed or broken stone.	Cum	7971.91
	Pre Cast Solid / Hollow Blocks		
3-46	Providing and laying of PCC Solid Blocks , for load bearing walls , as specified in building blocks walls incl setting and jointing in CM 1:6, upto GF roof level.	Cum	9550.45
3-47	Same as item 03-46, but upto 1st floor roof level.	Cum	9671.53
3-48	Same as item 03-46, but upto 2nd floor roof level.	Cum	9793.04
3-49	Providing and laying of PCC Solid Blocks for non load bearing walls as specified in building blocks walls incl setting and jointing in CM 1:6 upto GF roof level.	Cum	9282.92
3-50	Same as item 03-49, but upto 1st floor roof level.	Cum	9500.66
3-51	Same as item 03-49, but upto 2nd floor roof level.	Cum	9525.17
3-52	Providing and laying of PCC Hollow Blocks for load bearing walls as specified in building blocks walls incl setting and jointing in CM 1:6 upto GF roof level.	Cum	7848.42
3-53	Same as item 03-52, but upto 1st floor roof level.	Cum	7964.75
3-54	Same as item 03-52, but upto 2nd floor roof level.	Cum	8090.64
3-55	Providing and laying of PCC Hollow Blocks, for non load bearing walls, as specified in building block walls, incl setting and jointing in CM 1:6 upto GF roof level.	Cum	7646.48
3-56	Same as item 03-55, but upto 1st floor roof level.	Cum	7804.17
3-57	Same as item 03-55, but upto 2nd floor roof level.	Cum	7889.10
3-58	Providing and laying of PCC Solid Blocks, for load bearing walls, as specified in	Cum	9697.55

SI. No	Description	Unit	Rate (Rs)
	building blocks walls, incl setting and jointing in CM 1:3 upto GF roof level.		
3-59	Same as item 03-58, but upto 1st floor roof level.	Cum	9818.67
3-60	Same as item 03-58, but upto 2nd floor roof level.	Cum	9939.80
3-61	Providing and laying of PCC Solid Blocks , for non load bearing walls, as specified in building blocks walls, incl setting and jointing in CM 1:3 upto GF roof level.	Cum	9430.06
3-62	Same as item 03-61, but upto 1st floor roof level.	Cum	9551.16
3-63	Same as item 03-61, but upto 2nd floor roof level.	Cum	9672.67
3-64	Providing and laying PCC Hollow Blocks, for load bearing walls, as specified in building block walls, incl setting and jointing in CM 1:3 upto GF roof level.	Cum	7983.17
3-65	Same as item 03-64, but upto 1st floor roof level.	Cum	8104.28
3-66	Same as item 03-64, but upto 2nd floor roof level.	Cum	8225.42
3-67	Providing and laying of PCC Hollow Blocks, for non load bearing walls , as specified in building blocks walls, incl setting and jointing in CM 1:3 upto GF roof level.	Cum	7781.24
3-68	Same as item 03-67, but upto 1st floor roof level.	Cum	7902.34
3-69	Same as item 03-67, but upto 2nd floor roof level.	Cum	8023.47
3-70	Pointing to PCC Solid / Hollow Blocks in CM (1:4).	Sqm	163.57
	Additional Labour Cost		
3-71	Add labour cost for hoisting / lowering of concrete (Cast in situ) for each storey beyond 12 M above or below GL.	Cum	80.83
3-72	Same as item 03-71, but Pre-cast PCC Solid / Hollow blocks .	Cum	127.97

SI. No	Description	Unit	Rate (Rs)
	RCC Jali		
3-73	Supply and fix, 38mm thick Precast RCC jali , incl setting and jointing in CM 1:1, all as specified.	Sqm	422.03
3-74	Same as item 03-73, but 50 mm thick.	Sqm	496.94
3-75	Same as item 03-73, but 75 mm thick.	Sqm	642.53
3-76	Fixing only of item 03- 73 and 03-74.	Sqm	260.11
3-77	Add to item 03-73 and 03-74, if fixed in repair.	Sqm	71.25
3-78	Fixing only of item 03-75.	Sqm	390.51
3-79	Add to item 03-75, if fixed in repair.	Sqm	108.48
	Kerb Stone		
3-80	Providing and laying Precast PCC Kerb- stone , size 350 x 300 x 150 mm incl setting, jointing and pointing in CM 1:4, all as specified.	Metre	422.74
3-81	Same as item 03-80, but size 450 x 300 x 150 mm.	Metre	388.22
	Expansion Joints		
3-82	Form expansion joint 13mm thick in RCC roof or floor slabs etc, and fill in with bitumen 10-20.	Sqm	2225.81
3-83	Same as item 03-82, but except bitumen 10-20.	Sqm	578.58
3-84	Supply and fix, Copper sheet 24 gauge in expansion joint (girth measurement).	Sqm	5906.37
3-85	Same as item 03-84, but using 26 gauge copper sheet.	Sqm	4808.47
3-86	Supply and fix, GI sheet 24 gauge, in expansion joints (girth measurement).	Sqm	2661.64
3-87	Supply and fix, Aluminium cover strip 100 mm wide with all fittings complete for walls and ceiling joints.	Metre	266.14
3-88	Supply and fix Aluminium cover strip 60mm wide with all fittings complete for corner joints.	Metre	311.03

SI. No	Description	Unit	Rate (Rs)
3-89	Supply and fix Aluminium cover strip 100 mm wide and 2mm thick with all fittings complete for floor joints (plain).	Metre	270.13
3-90	Same as item 03-89, but in sections.	Metre	586.79
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SECTION - 4

BRICK MASONRY

SPECIFICATIONS

4.0. The section covers brick work and Damp Proof Course (DPC) etc.

MATERIAL REQUIREMENTS

4.1. Bricks:-

4.1.1. Sun-dried bricks shall be made of stiff clay free from stones, lime and other impurities.

4.1.2. Burnt bricks (Hand made or machine made) to be hard square and well burnt, even in size, and to be free from modules of lime. Bricks may be either sand or soap molded.

4.1.3. Fire bricks to be of best quality, country made of same size as ordinary burnt bricks, and to be of approved quality.

4.1.4. Size of Bricks

- 4.1.4.1. Sun dried bricks shall be of any size not exc (229 mm x 115 mm x 75 mm)
- 4.1.4.2. Hand made burnt bricks shall not be less than (220 mm x 105 mm x 67 mm)
- 4.1.4.3. Machine made burnt bricks shall not be less than (228 mm x 114 mm x76 mm)

4.1.5. Bricks shall be well burnt, of uniform color, regular in shape and size with square corners & parallel faces, and should emit a clear ringing sound when struck. Table 4-1 shows max limit of water absorption test and compressive strength of bricks.

Description	Water Absorption by weight	Compressive strength Kg / Sq.cm (psi)
Hand- made burnt bricks	16.67% (Max) when soaked for 1 hr	 a. 105.46 Kg / Sq. cm. (1500 psi Min) for ordinary brick masonry b. 126.55 Kg / Sq. cm (1800 psi Min) for water bearing brick masonry

TABLE 4-1

4.2. Cement:-

4.2.1. The Cement shall be Ordinary Portland normal setting, of any brand, complying in all respects with BS # 12.

4.2.2. Cement, unless otherwise, specified to be of any particular quality, shall mean Ordinary Normal Setting Cement.

4.2.3. Sulphate Resistant Cement shall comply with manufacturer's specifications.

4.3. Sand:- Shall be sharp, cubical, hard and dense, the whole of which shall pass through 5mm Sieve and 2-10% through Sieve # 100. It should be free from organic impurities and clay lumps.

CONSTRUCTION REQUIREMENTS

4.4. Brickwork:-

4.4.1. All **burnt bricks** to be thoroughly soaked in water, before being laid in CM. Burnt bricks, built in mud mortar, will only be dipped in water before use. The joints of brickwork shall not be less than 6 mm or more than 10 mm in thickness.

4.4.2. All joints to be well flushed up at every course. The walls shall be carried up regularly, not leaving any part more than one meter (1M) lower than another, unless special circumstances render this impracticable.

4.4.3. Any wall left at different level to be raked back, courses be properly leveled, jambs and other angles plumbed as the work proceeds.

4.4.4. With the use of burnt bricks of traditional size, as specified in Para 4.1.4, four courses of brickwork incl four joints in case of **Handmade bricks** measured between 292 mm (6 mm thick joints) and 308mm (10mm thick joints) in height and for **Machine made bricks**, measured between 328mm (6mm thick joints) and 344mm (10mm thick joints). However, in alteration work, the brick work shall gauge with existing work, unless otherwise directed. Internal walling and backings to be in even courses with external facing, but bricks may be thicker and joint thinner, provided courses bond with the work.

4.4.5. All brickwork to be built in English bond, unless otherwise specified. No half brick (bats) to be used, except, where necessary to complete the bond.

4.4.6. External facing be of sound hard bricks of good shape and uniform colour (Unless mottled or multi-coloured bricks are required) with square and sharp edges, selected from stacks, deposited on site.

4.4.7. Joints of brickwork will be struck, cleaned and the mortar pressed while the brickwork proceeds, using additional mortar, if required. Raking out joints will NOT be done.

4.4.8. Pointing the brickwork will be a separate process, incl raking out joints and using different mortar from that of brickwork mortar. Pointing will NOT be done in the same mortar.

4.4.9. The joints on faces, which are to be plastered or pointed, should be raked 10mm deep, while the mortar is green, but not later than 24 hours after the brick work is done.

4.4.10. The **pointing** or striking out joints will normally be adopted as given below:-

- 4.4.10.1. Flush pointing with CM be used on both faces of walls built in mud.
- 4.4.10.2. Weather struck joints / pointing will generally be adopted for external work where the walls are not plastered.
- 4.4.10.3. Recessed joints / pointing will generally be adopted for pillars, fireplaces or other ornamental work / faces, required both internally and externally, where so ordered.
- 4.4.10.4. Tuck-pointing will be done on surfaces, specially ordered by the Engineer-in-Charge.

4.4.11. All new work in CM will be kept watered and damp for such periods as directed, not exc 14 days and where it is to be built on old work, it will be kept watered for 2 days before hand.

4.5. Brickwork in Arches: Bricks to be properly made or dressed (cut and rubbed) to template, as specified and joints not to exc 6mm in thickness, where half brick rings are permitted. Header brick or lacing courses will be executed as directed by the Engineer-in-Charge.

4.6. Mortar:- The proportions given are by volume. A 50 Kg bag of cement forms a unit of 0.035 Cum (gauge box of 30 cm x 30 cm x 39 cm).

4.6.1. **Cement Mortar (CM):-** To be composed of one part of cement to number of parts of sand specified. The ingredients of CM shall be mixed dry, sufficient water added through a rose to make the mixture workable and then thoroughly mixed.

4.6.2. **Mud Mortar:-** To be prepared from stiff clay worked up to the consistency of clay for brick making. Sand is added, if required.

4.7. Cavity Walls:- The thickness of skin be as specified. The skins to have 57mm cavity in between, and be tied together with cranked galvanized wrought iron wall ties 19mm x 5mm with end spilt and fish-tailed, spaced one Metre(1M) apart to every third course of brick work.

4.8. Damp Proof Course (DPC)

4.8.1. Using Hessian Cloth impregnated with bitumen.

- 4.8.1.1. Prepare surface clean of all dust etc.
- 4.8.1.2. Apply coat of hot bitumen using 7.5 Kg / 10 Sqm on smooth finished concrete/plastered surface leaving no pinholes etc. to safeguard against any possibility of capillary action.
- 4.8.1.3. Spread one layer of Hessian Cloth # 2 on full width of the wall with a lap of 51 mm, where required.
- 4.8.1.4. Thoroughly soak the Hessian cloth, laid with hot bitumen using 9.75 Kg / Sqm.
- 4.8.1.5. Blind top surface with sand, using 0.12 Cum / 10 Sqm and proceed with the super-structures.

4. 8.2. **Using Polythene Sheet:-** It shall be of uniform thickness not less than 0.20 mm thick and laid evenly on smooth surface. There should be no perforation, cracks, cuts etc. No overlaps are allowed, as far as possible.

4.9. Watering and Protection:- All brick work, after pointing shall be kept wet for such periods as directed, not exc 14 days. Cover up and protect all brick work from damage by frost or otherwise, until curing process is completed.

METHOD OF MEASUREMENTS

4.10. Thickness, etc:- The following shall be allowed when measuring:-

- 4.10.1. Measure length and height to the nearest cm.
- 4.10.2. Thickness of walls, built in sun-dried or burnt bricks will be measured in multiple of 115mm i.e 115, 230, 345, 460 mm and so on, without considering the increased width on account of the mortar in the joints. In case of cavity or similar walls, built in brick on edge, the thickness will be measured as 75mm or multiple of 75mm.

4.11. Deductions:- No deductions shall be made in brick work for opening, not exc 0.35 Sqm in area. No deduction shall be made for plates, strings, relieving arches, lintels, sills etc, 150mm deep and fire place flues.

4.12. Arches: Arches, built in cut and rubbed bricks will be measured separately and the rate incl use and waste of shuttering. The contents of arches will be deducted from brick work. No deduction will be made for cambers of arches.

BRICK MASONRY

4.13. Cavity Wall:- In cavity wall, the width of cavity will not be included in thickness of the wall.

4.14. Honeycomb Brick Work:- Pattern holes shall not be deducted.

4.15. Cornices, etc:- Only girth of the actual projection shall be measured for the "extra only" payment.

4.16. Attached Work:- Measure pillars, pilasters, corbelling and similar projection, as brick work.

4.17. No deduction or addition shall be made on any account for ends of dissimilar materials. i.e joints, beams, posts, girders, rafters, purlins, trusses, corbels, steps etc, not exc 450 cm in section.

CLARIFICATION OF RATES

- **4.18.** The rates, inter alia incl particularly:-
 - 4.18.1. Rough relieving arches
 - 4.18.2. Beam filling (measured solid)
 - 4.18.3. Rough and fair cutting
 - 4.18.4. Striking joints as work proceeds, raking out joints if pointing to be done in mortar, other than brick work mortar;
 - 4.18.5. Raking out joints for plaster and pointing
 - 4.18.6. Forming chases, etc
 - 4.18.7. Leveling up and preparing walls for DPC
 - 4.18.8. Bedding wall plates in or on wall, bedding and pointing frames in mortar, bedding roof tiles and corrugated sheets in or on wall solidly in mortar and making good the same
 - 4.18.9. Holes (cut and form holes, for fixing pipes etc.) and making good the same
 - 4.18.10. Coring and pargeting flues, with cow-dung mortar for flues not exc 900 Sq cm sectional area
 - 4.18.11. Building exposed faces fair
 - 4.18.12. Work in cavity walls
 - 4.18.13. Work in any position, in small or large quantities and in any thickness
 - 4.18.14. Connecting up new work and old (brick work in toothing to be measured with new work)
 - 4.18.15. Re-facing with new bricks incl headers and stretchers
 - 4.18.16. Height of each floor upto 4 M. If height exc 4M, rate of next storey will be applicable to that portion

4.19. Rates for burnt brickwork also apply to Reinforced brick work (*Reinforcement and shuttering to be paid separately*)

4.20. Pointing in a different mortar, when specified or ordered, will be paid for extra

- 4.21. Bricks in cut and rubbed arches incl:-
 - 4.21.1. Centering and brick work in soffits
 - MILLITARY ENCINE SERVICES 4.21.2. Skew cutting.

ITEM RATES

SI No.	Description	Unit	Rate (Rs)
	Brickwork		
4-1	Sun dried brick work in mud mortar.	Cum	3958.06
4-2	Burnt brick work, straight or to curve with inner radius of 6m and over, laid and jointed in mud mortar.	Cum	8113.03
4-3	Burnt brick work, straight or to curve with inner radius of less than 6m etc, laid and jointed in mud mortar.	Cum	8548.71
	Brickwork (Ground Floor)		
4-4	Burnt brick work, in walls 115mm thick, laid and jointed in CM 1:3, straight or to curve with inner radius of 6m and over, upto G.F roof level.	Cum	10258.30
4-5	Same as item 04-4, but CM 1:4.	Cum	9992.70
4-6	Same as item 04-4, but CM 1:6	Cum	9685.67
4-7	Burnt brick work, in wall over 115mm thick, laid and jointed in CM 1.3, straight or to curve with inner radius of 6m and over, upto G.F roof level.	Cum	9624.36
4-8	Same as item 04-7, but CM 1:4	Cum	9356.68
4-9	Same as item 04-7, but CM 1:6	Cum	9052.60
	Brickwork (First Floor)		
4-10	Burnt brick work, in wall 115mm thick, laid and jointed in CM 1:3, straight or to curve with inner radius of 6m and over, upto lst floor roof level.	Cum	10420.88
4-11	Same as item 04-10, but CM 1:4	Cum	10153.44
4-12	Same as item 04-10, but CM 1:6	Cum	9851.13
4-13	Burnt brick work, in wall over 115mm thick, laid and jointed in CM 1:3, straight or to curve with inner radius of 6m and over, upto 1st floor roof level.	Cum	9755.72
4-14	Same as item 04-13, but CM 1:4	Cum	9488.28
4-15	Same as item 04-13, but CM 1:6	Cum	9188.89

SI No.	Description	Unit	Rate (Rs)
	Brickwork (Second Floor)		
4-16	Burnt brick work, in walls 115mm thick, laid and jointed in CM 1:3, straight or to curve with inner radius of 6m and over, upto 2nd floor roof level.	Cum	10583.19
4-17	Same as item 04-16, but CM 1:4	Cum	10315.91
4-18	Same as item 04-16, but CM 1:6	Cum	10013.44
4-19	Burnt brick work, in walls over 115mm thick, laid and jointed in CM 1:3, straight or to curve with inner radius of 6m and over, upto 2nd floor roof level.	Cum	9886.96
4-20	Same as item 04-19, but CM 1:4	Cum	9619.53
4-21	Same as item 04-19, but CM 1:6	Cum	9317.20
	Brickwork (Below Floor)		
4-22	Burnt brick work, in wall 115mm thick, laid and jointed in CM 1:3, straight or to curve with inner radius of 6m and over, upto 4.25m depth.	Cum	10906.86
4-23	Same as item 04-22, but CM 1:4	Cum	10639.59
4-24	Same as item 04-22, but CM 1:6	Cum	10337.27
4-25	Burnt brick work, in wall over 115mm thick, laid and jointed in CM 1:3, straight or to curve with inner radius of 6m and over, upto 4.25m depth.	Cum	10059.79
4-26	Same as item 04-25, but CM 1:4	Cum	9792.35
4-27	Same as item 04-25, but CM 1:6	Cum	9491.08
4-28	Burnt brickwork, in wall 115mm thick, laid and jointed in CM 1:3, straight or to curve with inner radius of 6m and over, from 4.25m to 8.25m depth	Cum	11101.99
4-29	Same as item 04-28, but CM 1:4.	Cum	10852.02
4-30	Same as item 04-28, but CM 1:6	Cum	10532.24
4-31	Burnt brick work, in wall over 115mm thick, laid and jointed in CM 1:3 straight or to curve with inner radius of 6m and over, from 4.25m to 8.25m depth.	Cum	10091.81

SI No.	Description	Unit	Rate (Rs)
4-32	Same as item 04-31, but CM 1:4	Cum	9824.39
4-33	Same as item 04-31, but CM 1:6	Cum	9522.06
4-34	Burnt brick work, in wall 115mm thick, laid and jointed in CM 1:3, straight or to curve with inner radius of 6m and over, from 8.25m to 12m depth.	Cum	11306.48
4-35	Same as item 04-34, but CM 1:4	Cum	11039.04
4-36	Same as item 04-34, but CM 1:6	Cum	10736.73
4-37	Burnt brick work, in walls over 115mm thick, laid and jointed in CM 1:3 straight or to curve with inner radius of 6m and over, from 8.25m to 12m depth.	Cum	10258.30
4-38	Same as item 04-37, but CM 1:4	Cum	10132.75
4-39	Same as item 04-37, but CM 1:6	Cum	9657.99
	Brickwork (Machine Made)		
4-40	Machine made burnt brick work, in wall 115mm thick, laid and jointed in CM 1:3, straight or curve with inner radius of 6 m and over, upto GF level	Cum	15678.32
4-41	Same as item 04-40, but in CM 1:4	Cum	15473.48
4-42	Same as item 04-40, but in CM 1:6	Cum	15242.74
4-43	Machine made burnt brick work, in wall over 115mm thick, laid and jointed in CM 1:3, straight or curve with inner radius of 6m and over, upto GF roof level	Cum	15481.43
4-44	Same as item 04-43, but in CM 1:4	Cum	15276.59
4-45	Same as item 04-43, but in CM 1:6	Cum	15045.85
4-46	Machine made burnt brick work, in wall 115mm thick, laid and jointed in CM 1:3, straight or curve with inner radius of 6 m and over, upto 1st floor roof level	Cum	15905.18
4-47	Same as item 04-46, but in CM 1:4	Cum	15700.34
4-48	Same as item 04-46, but in CM 1:6	Cum	15469.60
4-49	Machine made burnt brick work, in wall over 115mm thick, laid and jointed in CM 1:3 straight or curve with inner radius of	Cum	15698.60

SI No.	Description	Unit	Rate (Rs)
	6m and over, upto 1st floor roof level.		
4-50	Same as item 04-49, but in CM 1:4	Cum	15493.75
4-51	Same as item 04-49, but in CM 1:6	Cum	15263.01
4-52	Machine made burnt brick work, in wall 115mm thick, laid and jointed in CM 1:3, straight or curve with inner radius of 6m and over, upto 2nd floor roof level	Cum	16131.50
4-53	Same as item 04-52, but in CM 1:4	Cum	15926.66
4-54	Same as item 04-52, but in CM 1:6	Cum	15694.96
4-55	Machine made burnt brick work, in wall over 115mm thick, laid and jointed inCM 1:3, straight or curve with inner radius of 6m and over, upto 2nd floor roof level	Cum	15914.94
4-56	Same as item 04-55, but in CM 1:4	Cum	15710.13
4-57	Same as item 04-55, but in CM 1:6	Cum	15479.38
	Additional Labour Cost		
4-58	Additional labour cost, for each storey of building above 2nd floor roof level, for burnt brick work, straight or curve with inner radius 6m and over, in any mortar.	Cum	291.13
4-59	Additional labour cost ,for each storey of building above 2nd floor roof level, for machine made burnt brick work, straight or to curve with inner radius 6m and over, in any mortar.	Cum	406.40
	Brickwork (Well etc)		
4-60	Burnt brick work, in wall 115mm thick, laid and jointed in CM 1:3, straight or to curve with inner radius of less than 6m and upto 4.25 m depths.	Cum	12856.91
4-61	Same as item 04-60, but CM 1:4.	Cum	12589.47
4-62	Same as item 04-60, but CM 1:6	Cum	12287.15
4-63	Burnt brick work, in wall over 115mm thick, laid and jointed in CM 1:3 straight or to curve with inner radius less than 6m, upto 4.25m depth.	Cum	11411.62
4-64	Same as item 04-63, but CM 1:4	Cum	11144.18

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SI No.	Description	Unit	Rate (Rs)
4-65	Same as item 04-63, but CM 1:6	Cum	10841.86
4-66	Burnt brick work, in wall 115mm thick laid and jointed in CM 1:3, straight or to curve with inner radius less than 6m, above 4.25m to 8.25m depth.	Cum	13149.96
4-67	Same as item 04-66, but CM 1:4	Cum	12882.53
4-68	Same as item 04-66, but CM 1:6	Cum	12580.21
4-69	Burnt brick work in wall over 115mm thick laid and jointed in CM 1:3 straight or curve with inner radius less than 6m, above 4.25m to 8.25m depth.	Cum	11633.78
4-70	Same as item 04-69, but CM 1:4	Cum	11555.52
4-71	Same as item 04-69, but CM 1:6	Cum	11253.21
4-72	Burnt brick work in wall 115mm thick laid and jointed in CM 1:3 straight or to curve with inner radius of less than 6m, above 8.25m to 12m depth.	Cum	13456.94
4-73	Same as item 04-72, but CM 1:4	Cum	13189.50
4-74	Same as item 04-72, but CM 1:6	Cum	12887.18
4-75	Burnt brick work, in wall over 115mm thick, laid and jointed in CM 1:3, straight or to curve with inner radius of less than 6m, above 8.25m to 12m depth.	Cum	12088.79
4-76	Same as item 04-75, but CM 1:4	Cum	11821.36
4-77	Same as item 04-75, but CM 1:6	Cum	11519.04
	Arches:		
4-78	Cut or rubbed brick work, in arches and vaults etc, laid and jointed in CM 1:3.	Cum	25371.03
4-79	Same as item 04-78, but CM 1:4	Cum	25103.60
	Honeycomb Brickwork:		
4-80	Brick work in honey comb walls, any description, laid and jointed in CM 1:3	Cum	5961.44
4-81	Same as item 04-80, but in CM 1:4	Cum	5846.92
4-82	Same as item 04-80, but in CM 1:6	Cum	5737.06
	Fire Bricks:		
4-83	Fire brick work, Set and jointed in fire clay.	Cum	63671.89

SI No.	Description	Unit	Rate (Rs)
4-84	Same as item 04-83, but except cost of bricks.	Cum	8602.12
	Cavity Walls:		
4-85	Extra to brick for forming cavity, 57mm wide, laid and jointed in CM 1:3, as specified, one face of the wall to be measured.	Sqm	696.26
4-86	Same as item 04-85, but CM 1:4.	Sqm	696.26
4-87	Same as item 04-85, but CM 1:6.	Sqm	696.26
4-88	Facing with machine tiles built in CM(1:3) (228 x 114 x 43mm to 47mm thick)	Sqm	2763.30
	Pointing to Brickwork:		
4-89	Pointing, flush or recessed in CM 1:3, to old or new brick work, built in any mortar.	Sqm	284.35
4-90	Same as item 04-89, but in CM 1:4	Sqm	279.11
4-91	Same as item 04-89, but in CM 1:6	Sqm	273.69
4-92	Tuck pointing, in CM 1:3, to old or new brick work, built in any mortar.	Sqm	337.24
4-93	Same as item 04-92, but in CM 1:4.	Sqm	331.99
4-94	Same as item 04-92, but in CM 1:6.	Sqm	326.57
4-95	Struck pointing, in CM 1:1, to old or new brick work, built in any mortar.	Sqm	364.79
4-96	Same as item 04-95, but in CM 1:2.	Sqm	330.15
4-97	Racking out joints of old walls, built in any mortar, incl preparing surface for re-pointing	Sqm	253.86
	Damp Proof Course (DPC)		
4-98	13mm thick DPC, of CM 1:3 mixed with Pudlo (or other similar approved material) 3% by weight.	Sqm	350.37
4-99	Same as item 04-98, but 20mm thick.	Sqm	525.78
4-100	DPC of Hessien Cloth # 2 , impregnated with bitumen as specified (hot application).	Sqm	280.69
4-101	DPC of double layer of Polythene sheet , as specified.	Sqm	495.40

50mm thick P.C.C 1:2:4, using 3mm 4-102 Sqm 658.83

SI No.	Description	Unit	Rate (Rs)
	aggregate and finished smooth with steel float, covered with two coats, each of hot bitumen 0.75 kg per Sqm and blinded with 0.012 cum of sand per Sqm.		
	Miscellaneous		
4-103	Extra, only to brick work, built in any mortar, for splayed bull-nosed or molded angle bricks.	Metre	229.26
4-104	Extra, only to brick work, built in any mortar, for Splayed or Bull-nosed brick on edge , window sills, any width, set tilting to project 40mm grooved for water bar and throated.	Metre	343.90
4-105	Extra, only to brick work, built in any mortar, for plain or molded purpose made brick cornices, over-sailing courses, neckings, strings or copings incl weathering or throating, if required.	Sqm	562.74
4-106	Cutting out, in any mortar, and facing up with brick work in CM 1:3, where old walls had been binded in and removed.	Sqm	1233.12
4-107	Cutting out, Decayed brick work in any mortar, and re-facing with new bricks (any bond) in CM 1:3 and pointing/ striking in same mortar 115 mm thick.	Sqm	1492.55
4-108	Cutting out, Old Air bricks , gratings, soot door and similar (incl frames etc) and fix only new replacements, incl beddings and joining in CM, removal to and from stores, 230mm x 75mm upto 330mm and 230mm.	C.No	20842.22
4-109	Same as item 04-108, but 460 x 230 mm upto 610mm x 380mm.	C.No	26052.81
4-110	Sweeping chimneys, incl removal of soot and other obstruction, Single Storey.	C.No	5643.44
4-111	Same as 04-110, but Double Storey.	C.No	11286.88
	Shuttering For Brick Lintels:		
4-112	Shuttering for slabs, landing, lintels,	Sqm	455.43

SI No.	Description	Unit	Rate (Rs)
	beams, columns and the like etc.		
	Flue Pipe:		
4-113	Supply and fix, AC building pipe Class A , 80mm dia, with spigot and socket joint for flue etc incl jointing.	Metre	224.13
4-114	Same as 04-113, but 100mm dia.	Metre	278.64
4-115	Same as 04-113, but 150mm dia.	Metre	431.76
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SECTION – 5 STONE MASONRY

SPECIFICATIONS

5.0. This section covers stone masonry and pointing etc.

MATERIAL REQUIREMENTS

5.1. Stone for walling, etc, shall be:-

5.1.1. Of the best quality, obtained in the locality

5.1.2. Hard, sound, free from veins flaws or defects

5.1.3. Laid in its natural bed as required

5.1.4. Of suitable sizes and in one piece, where ordered

5.1.5. Any of the Sandstone, limestone, granite, trap, quartzite, etc, according to the locality

5.1.6. All other stones for walling etc, e.g Laterite and stone inferior to the one in Para 5.1.1 to 51.4 above shall be classified as of second quality and payment made accordingly

5.2. Cement:- The Cement shall be Portland ordinary, normal setting cement of brand, complying in all respects with BS #.12. Cement, unless, otherwise, specified to be of any particular quality, shall mean Ordinary Normal Setting cement.

5.3. Sand:- Shall be from approved source and free of dust and salt.

5.4. Mortar:- The proportions given are by volume. A Cement bag of 50 Kg forms a unit of 0.035 Cum (gauge box of 30cm x 30cm x 39cm).

5.4.1. **Cement Mortar (CM):-** To be prepared of one part of cement to the number of parts of sand specified. The ingredients of CM shall be mixed dry, sufficient water be added through a shower rose to make the mixture workable and then thoroughly mixed.

5.4.2. **Mud Mortar:-** To be prepared from stiff clay worked up to the consistency of clay for brick making and sand is added, if required.

5.5. Stone Walling:- See plates I to IV.

5.5.1. Random Rubble Brought Up To Courses - Plate-I



- 5.5.1.1. Face:- Roughly hammer dressed. No face stone to be narrower or shorter than its height.
- 5.5.1.2. **Beds & Joints:** Not to exc 19 mm thick. Side joints in each course shall break joint at least 75 mm with those of courses above and below and not form an angle with bed joints less than 60°.
- 5.5.1.3. Through Bonding Stone (TBS) & Lap Bonding Stone (LBS):- Three per 1 Sqm of face and staggered, No stone to tail to a point. In walls over 600 mm thick LBS may be used in lieu of TBS.
- 5.5.1.4. Quoins:- Face beds to be squared back 100 mm and joints 63 mm.
- 5.5.1.5. **Hearting:-** Stone be not less than 150 mm in any direction, bedded with mortar, chips and spalls, being wedged in to avoid thick beds and joints of mortar. Vertical plumbs are placed wherever possible, projecting not less than 150 mm to form bond between successive courses.



5.5.2. Squared Rubble Un-Coursed - Plate- II PLATE-II

LBS- Lap bonding stone TBS- Through bonding stone

- 5.5.2.1. Beds & Joints:- Not to exc 13 mm thick. Face beds to be squared back 100 mm and joints 63mm. No spall or pinning to show on face.
- 5.5.2.2. **Height of Course:-** Un-coursed, but no stone to exc 200 mm in height to avoid long vertical joints.
- 5.5.2.3. TBS & LBS:- As per Plate I
- 5.5.2.4. **Quoins:-** As for Plate I, but corner of each quoin to have chisel drafted margin of 25mm on each side to facilitate plumbing.
- 5.5.2.5. Hearting:- As per Plate I

5.5.3. Squared Rubble Regular Coursed - Plate-III

- 5.5.3.1. Face:- As per Plate 1
- 5.5.3.2. Bed & Joints:- As per Plate II.
- 5.5.3.3. TBS & LBS:- As per Plate I.
- 5.5.3.4. **Quoins:-** As per Plate II.
- 5.5.3.5. **Hearting:-** As per Plate I. The hearting must not be brought to same level as the facing stones with

spalls or pinning, which are only to be used as edges in the hearts.



PLATE-III



5.5.4. Block in Course and Ashlar - Plate-IV

PLATE-IV



One-line Dressed Means Sparrow picked or Chisel dressed so that no portion of the face dressed is more than 6 mm from a straight edge, laid along face of stone.

Two-line Dressed Means Sparrow picked or Chisel dressed so that no portion of the dressed is more than 3 mm from edge of a straight face edge laid along face of stone.

Three-line Dressed Fine Chisel dressed means that the surface of the stone is dressed until a straight edge laid along the face is in contact at every point. This is also called '**Plain face'**.

1,	BLOCK IN COURSE	ASHLAR
Face	Two- line dressed	Three- line Dressed, laid in Flemish Bond
Bed & Joints	Not exc13 mm thick. Face beds to be squared back to the full depth and joints 25 mm bed and joints to be Two-line Dressed.	As for Block in Course, but beds and joints to be Three- line Dressed.
Height of Course	Not less than 175 mm. No course to be of greater in height than any course below.	Not less than 300 mm. No course to be of greater height than any course below.
TBS & LBS	1.5 M apart in every course.	As per Block in Course.
Quoins	Short bed to be at least equal to height and long bed at least equal to twice height. Beds and joints to be squared back as for walling.	As per Block in Course.

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Note:- Strength and Classification of stones in respective areas, to be obtained from Geological Survey of Pakistan.

CONSTRUCTION REQUIREMENTS

5.6. Stone Masonry:- All stones to be soaked in water for two hours and should not absorb water more than 5 - 10% by weight, before being laid in CM. All joints are well flushed up at every course. The walls shall be carried up regularly not leaving any part more than one metre (1M) lower than another unless, special circumstances render this impracticable. Any wall left at different levels to be raked back, courses to be properly leveled, quoins, jambs and other angles plumbed, as the work proceeds.

5.7. Stone masonry walls required to be plastered shall be raked, not less than 10mm deep, when the mortar is green, but not later than 24 hours after the work is done.

5.8. Joints of stonework, which are to be struck, will be cleaned and the same mortar pressed while the stonework proceeds using additional

mortar, if required, Raking out joints will NOT be done. When pointing is to be done in stonework, it will be a separate process, incl raking out joints and using different mortar from that of stonework mortar. Pointing will NOT be done with the same mortar.

5.9. The Pointing or striking out joints will normally be done as follows:-

5.9.1. Flush pointing will only be used on inside surfaces.

5.9.2. Weather struck joints / pointing will generally be adopted for external work, where the walls are not plastered.

5.9.3. Recessed joints / pointing will generally be adopted for pillars; fireplaces or other ornamental work / faces required both internally or externally, where so ordered.

5.9.4. Tuck-pointing will be done on surfaces specially ordered by the Engineer-in-Charge.

5.10. All new work in cement will be kept watered and damp for such period, as directed, not exc 14 days and where it is to be built on old work, the later will be kept watered for 2 days before hand.

5.11. Stone Masonry in Arches: The stone to be cut and dressed to template, as specified. The centering is approved by the Engineer-in-Charge and to be struck as directed by him.

METHOD OF MEASUREMENTS

5.12. Tolerances:- The thickness of wall shall be measured to the nearest cm.

5.13. Deductions:- No deduction shall be made in stonework for openings not exc 0.35 Sqm in area. No deductions shall be made for plates, strings, relieving arches, lintels, sills etc not exc 150 mm deep and fireplace flues.

CLARIFICATION OF RATES

5.14. The rates, inter alia, incl particularly:-

- 5.14.1. Rough relieving arches.
- 5.14.2. Beam filling (measured solid).
- 5.14.3. Striking joints as work proceeds / raking out joints if pointing is to be done in a mortar different to stone work mortar.
- 5.14.4. Raking out joints for plaster and pointing.
- 5.14.5. Forming chases, etc.
- 5.14.6. Leveling up and preparing walls for DPC.

- 5.14.7. Bedding wall plates in / on walls, bedding and pointing sash and door frames in mortar, bedding roof tiles and corrugated sheets in /on wall solidly in mortar and make good the same.
- 5.14.8. Building in or cutting and pinning in with mortar to ends of joints, beams, etc. and making good the same.
- 5.14.9. Holes (cut and form holes of fixing pipes, etc.)
- 5.14.10. Coring and pargeting flues with cow-dung mortar for flues, not exc 900 Sq. cm. sectional area.
- 5.14.11. Stone work to curve exc inner radius 6M.
- 5.14.12. Works in any position, in small or large quantities and in any thickness.
- 5.14.13. Stone work up to 12 M above or below grounds.
- 5.14.14. Connecting up new and old (stone work in toothing to be measured with new work).
- 5.14.15. Cost of 1.25 Cum of stone per Cum of stonewall brought to Courses or built to Regular Course is incl in the rates.

5.15. Wherever stone of Second quality is used, a deduction of 8% shall be made from "Material and Labour" rates

5.16 Pointing, when specified or ordered will be paid for extra.

ITEM RATES

SI No	Description	Unit	Rate(Rs)
	Stone Walling		
	Random Rubble - Stone Masonry Brought	Upto C	ourse
5-1	Random Rubble stone masonry brought upto Course, every 45cm to 105cm to 110cm, roughly hammer dressed stone, well bonded, faced with hammer dressed selected stone, with square quoins and jambs, any thickness in building work PLATE - I, laid dry.	Cum	2898.62
5-2	Same as item 05-1, but laid and jointed in CM 1:4	Cum	4881.87
5-3	Same as item 05-1, but laid and jointed in CM 1:6	Cum	4564.55
5-4	Same as item 05-1, but in retaining wall	Cum	3221.84
5-5	Same as item 05-4, but laid and jointed in CM 1:4	Cum	5319.48
5-6	Same as item 05-4, but laid and jointed in CM 1:6	Cum	5002.17
	Squared Rubble – Un-Coursed		
5-7	Squared Rubble, Un-Coursed, roughly hammer dressed, well bonded, faced with hammer dressed selected stone with square quoins and jambs, any thickness in building work, PLATE- II , laid dry.	Cum	3903.21
5-8	Same as item 05-7, but laid and jointed in CM 1:4	Cum	6241.20
5-9	Same as item 05-7, but laid and jointed in CM 1:6	Cum	5923.87
	Squared Rubble – Regular Coursed		
5-10	Add to item 05-7, 05-8 and 05-9, if laid to Regular Courses 150 mm to 230 mm thick , PLATE – III.	Cum	461.74
	Block and Ashlar Masonry		
5-11	Extra over Squared Rubble Regular Coursed, masonry for Block in Course, PLATE - IV (per face of wall).	Sqm	660.04
5-12	Same as item 05-11, but for Ashlar, PLATE - IV (per face of wall)	Sqm	850.36

SI No	Description	Unit	Rate(Rs)
	Pointing		
5-13	Pointing struck, flush or recessed to old or new stone masonry, any type, in CM 1:3	Sqm	407.47
5-14	Same as item 05-13, but Coloured, CM 1:3	Sqm	451.74
5-15	Same as item 05-13, but in CM 1:4.	Sqm	402.14
5-16	Same as item 05-15, but Coloured, CM 1:4.	Sqm	441.19
5-17	Tuck pointing to old or new stone masonry, any type, in CM 1:3	Sqm	372.95
5-18	Same as item 05-17, but Coloured, CM 1:3	Sqm	418.97
5-19	Same as item 05-17, but in CM 1:4	Sqm	364.41
5-20	Same as item 05-19, but Coloured, CM 1:4.	Sqm	403.47
5-21	Struck pointing to old or new stone masonry, any type, in CM 1:1	Sqm	406.12
5-22	Same as item 05-21, but Coloured, CM 1:1	Sqm	455.59
	Dressed Stonework		
5-23	Stone in blocks, with faces, beds and joints on One-Line Dressed as in bands, string and plinth courses, blocking courses pilaster, cornice, columns, caps, bases, copings, kneelers, lintels etc, (measured net), built in CM 1:4.	Cum	7157.03
5-24	Same as per item 05-23, but built in CM 1:6	Cum	6839.70
	Door and Window Sills, etc		
5-25	Providing and laying of door and window sills, steps etc, plain face on exposed surface and chisel dressed on all other faces, sunk and weathered if required, incl ends, set and jointed in CM 1:4	Cum	14499.40
	Boulders in Crates, Pitching, etc		
5-26	Boulder filling dry hand packed as filling behind retaining walls in pitching and bunds.	Cum	1366.29
5-27	Boulder filling in crates incl laying readymade wire mattress in position hand packing boulders folding wire mattress and lying its edges so as to form crates of the	Cum	1526.61

SI No	Description	Unit	Rate(Rs)
	required shape and size etc but excl wire mattress and anchorage of crates, which are to be paid separately.		
	Miscellaneous Repairs		
5-28	Racking out Only, joints of stone masonry, in any mortar, incl preparation of surface for re-pointing, in any mortar	Sqm	28.06
5-29	Refastening or re-securing, ends of balusters, newels, rag bolts let into stone, re-cutting of mortices and re-running with cement.	Each	63.60
5-30	Boulders laid, jointed and pointed in CM 1:4 in pitching.	Cum	4757.09

SECTION - 6

WOOD WORK

SPECIFICATIONS

6.0. This section covers Wood work.

MATERIAL REQUIREMENTS

6.1. Timber:-

6.1.1. It shall be of good quality, properly seasoned, at least three months air-drying for carpenter's work, preferably under cover in all cases. To be of mature growth, uniform in texture and straight in fiber. It shall be free from sapwood, loose or dead knots (*knots aggregating more than 75mm in a batten 180mm wide*), open shakes, bit holes, rot, decay, other defects and blemishes. Sawn square and holding the full sizes specified, whether wrought or unwrought, seasoned First Class Soft wood (*Deodar should weigh 565 Kg / Cum with moisture content upto 12%*). The timber shall be approved by the Engineer-in-Charge, before incorporation in the work.

6.1.2. Classified as follows:-

- 6.1.2.1. All faces sawn and angles squared:-
 - 6.1.2.1.1. When less than 150 mm wide & less than 25 mm thick "*Fillet*".
 - 6.1.2.1.2. When less than 75 mm wide and less than 50 mm thick i.e. under 40 sqcm sectional area, as "*Batten*".
 - 6.1.2.1.3. When 75mm wide or over and 50mm thick or over, as "Scantling" – no upper limit.
 - 6.1.2.1.4. When less than 50mm thick, except flooring, and the width is not less than 150 mm as "*Boarding*".

6.1.2.2. Un-sawn, but roughly squared; all section to be called "*Baulks*".

6.1.2.3. Logs and Ballies:-

- 6.1.2.3.1. Round un-sawn timber over 200mm mean dia (without bark) shall be called "Logs".
- 6.1.2.3.2. Round un-sawn timber not exc 200mm mean dia (without bark) shall be called "Ballies".

- 6.1.2.3.3. Specified as "*Hardwood*" first class; "*Soft wood*" first and second class.
- 6.1.3. Common Timber shall be sub divided into following:-.

Common Name	Botanical Name
Hardwood 1st Class	
Teak Burma	Tectona Granids
Shisham	Dalbargia Siboo
Softwood 1st Class	
Deodar	Cedrus Deodara
Softwood 2 nd Class	
Kail	Pinus Excelsa
Chir	Pinus Longifolia
Partal (Himalayan fir), Spruce	Abicis Pindrow
Garjan	Diptercarpus Species Loagerstoemia Floriegac

6.1.4. **Plywood:-** Plywood shall conform to BS, EN-636 "Plywood Specifications".

6.1.5. **Face-Veneering:** Face-veneering shall be free from knots, streaks, irregularities and sap, and shall have matching grains.

6.1.6. **Seasoning of Timber:-** Timber shall be properly seasoned. It shall be kiln or air-dried to reduce the moisture content up to 12% of its natural weight.

6.1.7. All other timber shall be classified according to the comparable grading given in the book, "*Commercial Timbers of Pakistan*". In case of disagreement, the case will be referred to next higher authority whose decision shall be final. The work will not be commenced till the dispute is resolved.

6.2. Wrought Timber means with surface, planed.

6.3. Joints:- "Framed" means Mortice and Tenon or Dovetailed joints. All joints should fit fully and truly without wedging or filling. Framed joints are coated with glue, before being fixed together.

6.4. Glue shall be:-

- 6.4.1. Of good make, prepared from skins or high-grade bones.
- 6.4.2. Used in proportion of 2 parts glue to 3 parts of water.
- 6.4.3. Used as far as on dry surface.
- 6.4.4. Readymade white glue can also be used.

6.5. Nails shall be cut brads, cut clasp, oval, square or round, wire of approved manufacture and lengths as required.

6.6. Screws shall be:-

- 6.6.1. Of First class manufacture.
- 6.6.2. Of the gauges required.
- 6.6.3. Of flat or round head patterns as required.
- 6.6.4. Of strong bright steel.
- 6.6.5. Galvanized etc, where ordered.

CONSTRUCTION REQUIREMENTS

6.07. Fixing etc: In addition to the item, detailed in definition of the General Rules, the term "fixed" shall incl all laps, notching, halving, scraping etc, wrought, splayed, rounded notched and pointed ends of timbers, scribing, circular, cutting and boring for bolts as well as wire, hoop iron, coir, hemp or either approved ropes, previously dipped in anti-termite or preservative solution, for ballies.

6.08. The term "**Re-secure**" provides for securing fitting, etc., which have become partially loosened, but which can be secured with holdfasts, plugs etc, without taking down.

6.09. The expression "**taking up**" or "**taking down**" incl clearing out nails, etc. the expression "taking down existing trusses and re-hoisting and re-fixing the same" incl tightening up wedges, cotters, bolts etc. Any work done on the trusses in addition to the foregoing shall be paid for separately, under the relevant rates.

6.10. Plugging to Walls:- Rawal plugs or Phill plugs will invariably be used. Plugging to walls shall be at intervals not exc 200 mm for Rawal plugs & Phill plugs.

6.11. Boarding:- Boarding shall be in width not exc 225 mm, except where in detached pieces as shelves etc, and in length not less than 2 M, unless circumstances make it impracticable.

6.12. Flooring: Boarding in flooring, ceiling etc, shall incl cramping or wedging up punching nail and "cleaning off" after fixing. All heading joints are made on the center of joint bearers and no two heading joints to be adjacent. The boards to be nailed with steel cut brads (or oval brads) or fixed with screw, two to each board, on every joist of following lengths:-

i.	For 25 mm or 30 mm flooring	65 mm long
ii.	For 40 mm flooring	75 mm long
iii.	For 50 mm flooring	100 mm long
METHOD OF MEASUREMENTS

6.13. Timbering:-

- 6.13.1. Measure the surface of excavation supported.
- 6.13.2. Timbering to excavation will Only be carried out, when specially ordered by the Engineer-in-Charge.
- 6.13.3 Timbering, where ordered, incl use and waste upto 6 months, fixing and removal.
- 6.13.4 Both sides of trenches will be taken as one side area, the Area will be equal to length x depth of timbering.

6.14. Timbering Left In:- Measure the cubic contents of timber, planks, struts etc, left in.

6.15. Tolerance:-

- 6.15.1. Lengths shall be measured net.
- 6.15.2. Scantling, swan or wrought, shall hold full dimension.
- 6.15.3. Boarding shall hold the full thickness specified whether sawn or wrought.
- 6.15.4. Widths of single boards shall be measured net.
- 6.15.5. Widths of surfaces of two or more boards be measured net.

6.16. Framed and Unframed Timbers shall be measured out to out.

6.17. Ballies:- The mean dia of ballies is the sum of the dia at either end divided by two.

CLARIFICATION OF RATES

- 6.18. The rates, inter alia, incl particularly:-
 - 6.18.1. Beveled heading joints to boarding.
 - 6.18.2. Boring for bolts, as required.
 - 6.18.3. Cleaning of wrought faces.
 - 6.18.4. Cramping or wedging up.
 - 6.18.5. Fixing with hardwood or male bamboo pins, nails, spikes hoop iron and wire in any position.
 - 6.18.6. Labour and material in halving, tabling, lapping, notching, framing and straight, splay, circular or birds mouth cutting,

splayed and beveled ends, miters, fair or turned ends, as required.

- 6.18.7. Punching and clenching nails.
- 6.18.8. Treating plugs with wood preservative.
- 6.18.9. Waste.
- 6.18.10. Boarding in any width.
- 6.18.11. Work in First Class Softwood (i.e. *Deodar, Chamblee or Tit Chamblee*) except where otherwise stated.
- 6.18.12. All notching, firing or squaring, to ballies necessary to obtain level bedding, bearing of fixings.
- 6.18.13. Rebates and chamfers to door and window frames, where required.
- 6.18.14. Chamfering mitering, edging etc, to fillets.

6.19. In Addition:- The rates for "framed" incl, for framing together with Mortice and Tenon or dovetailed joints, as in trimmer and trimming joists, roof trusses etc and hoisting into position as may be necessary.

6.20. Where a contractor supplies or is ordered to supply Second Class Softwood following adjustments will be made to the rates:-

For item of Materials and Labour - Deduct 24%.

6.21. Circular framed work shall be measured net and paid for at twice the rates for straight. All other irregular / circular work shall be measured to the smallest circumscribing rectangle and paid at normal rates.

ITEM RATES

SI No	Description	Unit	Rate (Rs)
	Timber to Excavation		
6-1	Use and waste of timbering to excavation of any description incl walls, struts, open or close polling board, etc., as may be necessary and fixing and removal (payment will be made for the area supported).	Sqm	479.62
6-2	Timbering to Excavation when timber is permanently left in.	Cum	45977.77
	Shoring Work		
6-3	Use and waste incl striking of shoring timber, framing and boarding to temporary partition etc, (stricking is incl in the rates and will not be paid as demolition).	Cum	22160.79
	Wood Work		
6-4	Supply and fix timber in scantling , lst Class softwood. Complete.	Cum	140681.98
6-5	Same as item 06-4, but hardwood (Shisham).	Cum	44427.98
6-6	Same as item 06-4, but Burma Teak.	Cum	348578.62
6-7	Supply and fix timber in scantling framed lst Class softwood Complete.	Cum	153265.44
6-8	Same as item 06-7, but hardwood (Shisham).	Cum	55650.73
6-9	Same as item 06-7, but Burma teak.	Cum	387009.26
6-10	Supply and fix, timber in scantling wrought and framed, Ist Class softwood complete.	Cum	159373.04
6-11	Same as item 06-10, but hardwood (Shisham).	Cum	62369.20
6-12	Same as item 06-10, but Burma Teak.	Cum	414153.03
	Fillets		
6-13	Supply and fix, fillets not exc 12.90sqcm sectional area of lst Class softwood	Metre	119.13

SI No	Description	Unit	Rate (Rs)
	wrought and fixed with screws.		
6-14	Same as item 06-13, but hardwood (Shisham).	Metre	54.60
6-15	Same as item 06-13, but Burma Teak.	Metre	286.47
6-16	Supply and fix fillets exc 12.90 sqcm but not exc 25.80 sqcm sectional area of 1st Class softwood, wrought and fixed with screws.	Metre	236.51
6-17	Same as item 06-16, but hardwood (Shisham).	Metre	99.53
6-18	Same as item 06-16, but Burma Teak.	Metre	606.67
6-19	Supply and fix fillets exc 25.80 sqcm but not exc 38.70 sqcm in sectional area of 1st Class softwood, wrought and fixed with screws	Metre	349.64
6-20	Same as item 06-19, but hardwood (Shisham).	Metre	134.54
6-21	Same as item 06-19, but Burma Teak.	Metre	904.87
	Boarding		
6-22	Supply and fix boarding , rebated, grooved and tongued, beaded or chamfered one or both sides, and fixed complete with screws in any position and any width required in walls, floors and ceiling etc of 1st class softwood wrought one side edges short, 13 mm thick.	Sqm	2343.61
6-23	Same as item 06-22, but 19 mm thick.	Sqm	3314.69
6-24	Same as item 06-22, but 25 mm thick.	Sqm	4168.39
6-25	Supply and fix boarding , rebated, grooved and tongued, beaded or chamfered one or both sides, and fixed complete with screws in any position and any width required in walls, floors and ceiling etc of Ist class hardwood Shisham wrought one side edges short, 13 mm thick.	Sqm	804.51

SI No	Description	Unit	Rate (Rs)
6-26	Same as item 06-25, but 19 mm thick	Sqm	1280.23
6-27	Same as item 06-25, but 25 mm thick	Sqm	1587.28
6-28	Supply and fix boarding, rebated, grooved and tongued, beaded or chamfered one or both sides, and fixed complete with screws in any position and any width required in walls floors ceiling etc of Ist Class hardwood Burma Teak wrought one side edges short, 13 mm thick.	Sqm	5811.52
6-29	Same as item 06-28, but 19 mm thick	Sqm	8469.97
6-30	Same as item 06-28, but 25 mm thick	Sqm	10844.06
6-31	Supply and fix boarding , rebated, grooved and tongued, beaded or chamfered one or both sides, and fixed complete with screws in any position and any width required in walls floors ceiling etc of 1st Class softwood wrought both side edges short 13 mm thick.	Sqm	2475.39
6-32	Same as item 06-31, but 19 mm thick	Sqm	3468.12
6-33	Same as item 06-31, but 25 mm thick	Sqm	4348.76
6-34	Supply and fix boarding, rebated, grooved and tongued, beaded or chamfered one or both sides, and fixed complete with screws in any position and any width required in walls sides, and fixed complete with screws in any position and any width required in walls floors ceiling etc of lst Class hardwood Shisham wrought both side edges short, 13 mm thick.	Sqm	1113.14
6-35	Same as item 06-34, but 19 mm thick	Sqm	1460.60
6-36	Same as item 06-34, but 25 mm thick	Sqm	1793.31
6-37	Supply and fix boarding, rebated, grooved and tongued, beaded or chamfered one or both sides, and fixed complete with screws in any position and any width required in wall, floors	Sqm	6017.55

SI No	Description	Unit	Rate (Rs)		
	ceiling etc of Ist Class hardwood Burma Teak wrought both side edges short 13 mm thick.				
6-38	Same as item 06-37, but 19 mm thick	Sqm	8675.99		
6-39	Same as item 06-37, but 25 mm thick	Sqm	11037.26		
6-40	Supply and fixing boarding with screw in any position, wrought both side edge short of Ist class softwood 13mm thick.	Sqm	2423.28		
6-41	Same as item 06-40, but 19 mm thick	Sqm	3416.01		
6-42	Same as item 06-40, but 25 mm thick	Sqm	4307.07		
6-43	Supply and fixing boarding with screw Sqm 1061 in any position wrought both side edge short of 1st Class hardwood Shisham 13mm thick.				
6-44	Same as item 06-43, but 19 mm thick	Sqm	1434.14		
6-45	Same as item 06-43, but 25 mm thick	Sqm	1725.97		
6-46	Supply and fixing boarding with screw Sqm 60 in any position wrought both side edge short of Ist class hardwood Burma Teak, 13mm thick				
6-47	Same as item 06-46, but 19 mm thick	Sqm	8623.88		
6-48	Same as item 06-46, but 25 mm thick 🔍	Sqm	10995.58		
6-49	Supply and fix, chipboard (600 density) 13 mm thick.	Sqm	469.34		
6-50	Same as item 06-49, but 19 mm thick	Sqm	626.18		
6-51	Same as item 06-49, but 25 mm thick	Sqm	820.03		
6-52	Supply and fix, Formica, 0.8 mm thick.	Sqm	397.03		
6-53	Same as item 06-52, but fixing only	Sqm	80.55		
6-54	Add to item 06-52 and 06-53, if fixed in Sqm 25 repair.				
6-55	Supply and fix, ply wood 3 mm thick in Sqm any position commercial ply.				
6-56	Same as item 06-55, but Shisham ply. Sqm 572				
6-57	Same as item 06-55, but Teak ply.	Sqm	580.86		
6-58	Same as item 06-55, but Malaysian ply.	Sqm	665.03		

SI No	Description	Unit	Rate (Rs)
6-59	Add to item 06-55, 06-56, 06-57 and 06-58, if fixed in repairs.	Sqm	25.65
6-60	Supply and fix 19 mm thick Chip board veneered both sides of specified pattern in any position Commercial.	Sqm	723.36
6-61	Same as item 06-60, but Shisham.	Sqm	904.49
6-62	Same as item 06-60, but Teak.	Sqm	1132.60
	Old Roof Trusses		
6-63	Taking down, old timber trusses upto 8M span.	Each	551.52
6-64	Same as item 06-63, but exc 8M, not exc 11 M span.	Each	1019.67
6-65	Hoisting and fixing old timber trusses upto 8 M span.	Each	1359.56
6-66	Same as item 06-65, but exc 8M and not exc 11 M span.	Each	2039.33
	Trellis Work		
6-67	Supply and fix 40 mm x 10 mm first class soft wood wrought trellis work two way, square or diagonal at 50 mm space and 75 mm x 25 mm Fillet framing all around fixed complete.	Sqm	3010.65
	Moulding and Turned work		
6-68	Supply and fix first class softwood moulding and turned work exc 75 mm but not exc 150 mm, 25 mm thick.	Metre	339.89
6-69	Same as item 06-68, but 40mm thick	Metre	723.00
6-70	Same as item 06-68, but 50 mm thick.	Metre	955.67
	Small Articles		
6-71	Supply and fix, first class softwood small fitting wrought, splayed, chamfered, shaped, rounded etc, such as brackets, small shelves, latch hinge, switch and bell push blocks door and windows stops etc, Articles n. exc 440 cucm (size measured as net rectangular timber from which article	C.No	14892.01

SI No	Description	Unit	Rate (Rs)
	can be cut or constructed).		
6-72	Same as item 06-71 but exc 440 cu cm and not exc 1050 cu cm.	C.No	20867.90
	Ballies		
6-73	Supply and fix, ballies complete having mean dia exc. 75 mm and not exc 100 mm	Metre	149.12
6-74	Same as item 06-73 but mean dia exc 100 mm and not exc 150 mm.	Metre	173.15
	Workmanship, Plugging etc.		
6-75	Labour only beads, chamfers, splay, rebate, rounded angles, tongues, grooves, rounded nosings, staff beads, flutes, each exc. 6mm and not exc 75 mm width or girth, mouldings and turned work not exc 75mm girth, where not otherwise provided. Rate per 25 mm turned girth or part thereof, soft wood.	Metre	76.96
6-76	Same as item 06-75, but hardwood Shisham.	Metre	89.78
6-77	Extra for work in rifle racks i.e., cutting and dishing for butts, notching for stocks and cutting for ends of barrel - softwood first class.	C Rifles	15391.20
6-78	Same as item 06-77, but hardwood Shisham.	C Rifles	19239.00
6-79	Supply and fix Rawal plug 25 mm long for boards etc not exc 200 mm c/c (in any wall, in any mortar or concrete)	Metre	49.70
6-80	Same as item 06-79, but 50mm long.	Metre	46.81
	Jobbing Work		
6-81	Resecuring of wire gauze (fly and mosquito netting with fillet and or framing) hard /soft wood.	Sqm	48.10
6-82	Taking up or down and refixing of wire gauze (fly and mosquito netting with fillet and / or framing) hard/soft wood.	Sqm	73.75

SI No	Description	Unit	Rate (Rs)
6-83	Taking up or down wire gauze (fly and mosquito netting with fillets and / or framing) and removing to store, hard/soft wood.	Sqm	25.65
6-84	Taking up or down and refixing of shelves incl brackets, fillets and window board with beads etc., hard/soft wood.	Sqm	86.58
6-85	Taking up or down shelves incl brackets, fillets and window boards with beads etc, and removing to store, hard/soft wood.	Sqm	38.48
6-86	Taking up or down and refixing of skirting wood, any width incl grounds if required, hard /soft wood.	Sqm	125.05
6-87	Taking up or down skirting wood, any width incl grounds and removing to store, hard/soft wood.	Sqm	41.68
6-88	Taking up or down and refixing boarding flooring in area not exc 4.65 sqm super, hard/soft wood.	Sqm	175.56
6-89	Same as item 06-88 but in patches, in repairs to existing floors, incl cutting to joints etc, hard/soft wood.	Sqm	288.59
6-90	Re-securing of casings (box) to pipes, any girth hard/soft wood.	Sqm	25.65
6-91	Taking up or down and refixing of casing (box) to pipes any girth hard/soft wood.	Metre	51.30
6-92	Taking up or down and removing to store of casing (box) to pipes any girth, hard / soft wood.	Metre	12.83
6-93	Re-securing of fillets, mouldings, quadrant skirting, hand rails, peg rails, etc, hard/ soft wood.	Metre	32.07
6-94	Taking up and down and refixing of fillets, mouldings, quadrant skirting, hand rails, peg rails, etc, hard/soft wood.	Metre	51.30

SI No	Description	Unit	Rate (Rs)
6-95	Taking up or down fillets, mouldings, quadrant skirting, hand rails, peg rails etc, and removing to store, hard/soft wood.	Metre	12.83
6-96	Taking up or down and refixing of scantling in any position, hard/soft wood.	Cum	6107.61
	THE ENCALES		
			<i>\</i> 0 .

SECTION - 7

DOORS AND WINDOWS

SPECIFICATIONS

7.0. This section covers all operations regarding fabrication and erection of wooden joinery, cabinets, vinyl, aluminium, steel doors and windows etc, incl hardware and preservatives.

MATERIAL REQUIREMENTS

7.1. Timber:- For specifications and classification of timber, see "Wood Work" (Section - 6).

7.2. Frames or Chowkats:- Door and window chowkats, transoms and mullion shall be rebated of the dimensions shown below without horns:-

7.2.1.	Openings under 1.11 Sqm	75 mm x 75 mm
7.2.2.	Openings 1.11 Sqm and over	
	but not exc 2.60 Sqm	75 mm x 100 mm
7.2.3.	Openings 2.60 Sqm and over	100 mm x 125 mm

7.3. Joints:- The joints in framed and halved joinery, to be pinned with hardwood pins and put together with glue. Framed means Mortice and Tenon or Dovetailed joints.

7.4. Sashes:-

7.4.1. The term "**sashes**" incl casements, single or double fixed, sliding or hung, and fanlights or clerestory windows (centre, top or bottom hung or fixed).

7.4.2. Sashes shall be wrought, framed, squared, chamfered or moulded, with or without bars and rebated for glass or wire gauze. Styles and rails shall not be less than 65 mm wide. When fixed, means with screws.

7.5. Glass:- Glass shall be clear, 3 mm or 5 mm thick, ordinary glazing quality, as specified. The glass shall be fixed in oil putty well bedded, back puttied and sprigged where necessary, or with hard wood /soft wood beads, as directed. Hard wood beads will be used for hard wood doors and windows, invariably.

7.6. MDF (Medium Density Fibre) **Board:-** BS EN 622 Density 600 to 800 Kg /Cum. Sealing as per architectural design.

7.7. Screws:- For specifications, see "Wood Work" (Section - 6).

7.8. Wire gauze:- Wire gauze shall be (iron tinned Fly wire 9×9 mesh x 22 or 24 gauge, iron or aluminium mosquito wire gauze 16 x 16 mesh x 26 gauge or 18 x 18 mesh x 28 gauge) fixed in rebate of wooden frames and secured with fillets, braded in or fixed with flat iron to steel frame, with screws.

CONSTRUCTION REQUIREMENTS

7.9. Wooden Doors:-

7.9.1. Panelled Doors:- To be wrought, squared, framed and flat or chamfered or moulded one or both sides. Bottom rails be 150mm wide and other rails and styles 100mm wide. Panels shall not be less than 15mm thick.

7.9.2. **Framed Panelled Partitions and Dados:-** To be as per Para 7.9.1 above. The through styles shall not be more than one metre apart.

7.9.3. **Half Glazed Doors:-** All as for panelled doors, except top rail, which should be as for sashes.

7.9.4. Flush Doors:-

- 7.9.4.1. Hollow Flush door shutter shall have frame and core of Deodar wood, treated with termite proofing agent and fixed on both sides with 3mm thick veneer of Teak / Shisham / Commercial ply. The shutter shall be either procured from a proprietary manufacturing firm, as approved by the Engineerin-Charge or manufactured at site according to the established techniques (incl machine pressing). The make up of the shutter shall be as specified in Figure 7-1. Inspection shall be carried out by the Engineer-in-Charge before pressing.
- 7.9.4.2. Solid Flush door shutter shall have Deodar frame and core internal made of 2nd Class Soft wood treated with Termite proofing agent, veneered on both sides with 3 mm thick Teak / Shisham / Commercial ply.

7.9.5. General

- 7.9.5.1 **Hinges:-** Doors exc 1.4 M height shall be fixed with three (3) Butt hinges to each leaf.
- 7.9.5.2. Holdfasts:- Doors, windows and CSW frames shall be fixed with 230mm long hold fasts, made of flat iron 25 mm x 3 mm thick with forked ends, tarred, sanded and fixed with two (2) screws 65mm long to frame respectively.
- 7.9.5.3. **Preservatives**:- Back of door and window frames or chowkats shall be treated with one coat of Tar before fixing.

Internal surface of steel chowkats be treated with anti-Creosote paint.

7.9.5.4. **Mongery:-** Shall be provided to doors and windows as shown in Table 7-1, except where, otherwise described.



FIGURE 7-1

TABLE 7-1

		Door		Opening Windows		
Description	Unit	Double Leaf	Single Leaf	Double Leaf	Single Leaf	Clerestory Pivot hung
125 mm, Steel, Butt Hinges	Nos	6	3			
100 mm, – do-				4	2	
57 mm WI Pivots & Sockets	Sets					2
200 mm WI Tower or Barrel Bolts	Nos	1	1			
150 mm WI Tower or Barrel Bolts	Nos	2	1	1	1	
100 mm, - do-				2	1	
Door and window stops Teak or Shisham with one 75 mm, Steel, Butt Hinge		2	1	2	1	
150 mm, iron , bow handle		3	2	1	1	
White cotton Sash cord 20 mm girth, 3.7 M long with WI eyes.				<u>р</u>		1
WI 100 mm Belaying Cleat				No.		
125 mm x 50 mm x75mm Softwood chocks		2	1	2		

- 7.9.5.5. **Fixing etc:-** In addition to the items, detailed in definition under General Rules, the term "fixed" shall incl all laps, notching, halving, scarifying etc and boring for bolts.
- 7.9.5.6. The term "**Re-secure**" provides for securing fitting etc, which has become partially loosened, but which can be secured without taking down and shall incl cost of any subsidiary materials, required for re-securing.
- 7.9.5.7. The expression "**taking up**" or "**taking down**" incl clearing out nails, etc.
- 7.9.5.8. The expression "in **other openings**" incl cutting to size and fixing in openings.

7.10. Aluminium Doors and Windows:- These shall be made of extruded sections of Aluminium alloy conforming to International standards for alloy, quality and extrusion. The styles shall be joined by standard self tapping or stainless steel screws. Special nylon rollers with steel galvanised housing and inner be incorporated with anti-friction bearing for sliding of leaves. One piece of standard latch shall be provided in the window enabling it to be locked from inside. Door leaf should be removable from inner side of the frame for easy glazing and cleaning. Vinyl bead shall be used for setting of glass and sealed with silicon, where necessary. All extruded sections shall be anodized to give natural aluminium / bronze or any colour finish as required and provide a non-wearing and weather proof oxide coating (powder coating). The windows, doors and hardware shall be procured from standard manufacturer as approved by Engineer-in-Charge.

7.10.1. Sliding / Swing Doors:-

7.10.1.1. **Deluxe Model** (Aluminium Natural / Coloured Anodized):-The wall thickness of frame and leaves shall not be less than 1.6 mm.

7.10.1.1.1. Sliding Doors

- i. Frame
- ii. Leaves (outer style)
- iii. Leaves (inner style)
- iv. Leaves (Top and bottom rail)

7.1.0.1.1.2. Swing Doors

- i. Frame
- ii. Leaves (styles and top rail)
- iii. Leaves (bottom rail)
- iv. Divider

75 mm x 32 mm 45 mm x 25 mm 45 mm x 35 mm 58 mm x 22 mm

100 mm x 35 mm 42 mm x 65 mm 42 mm x 100 mm 42 mm x 30 mm

7.10.1.2. **Premium Model** (Aluminium Natural/Coloured Anodized):-The wall thickness of frame and leaves having sections as in Para 7.10.1.1 shall not be less than 2 mm.

7.10.2. Sliding / Fixed Windows:-

7.10.2.1. **Economy Model** (Aluminium Natural / Coloured/Anodized):-These are suitable for 1350 mm height. Wall thickness of frames and leaves shall not be less than 1.2 mm.

7.10.2.1.1. Sliding windows with fan light

	-	
i.	Frame (for sliding)	100 mm x 30 mm
ii.	Frame (for fan light)	100 mm x 35 mm
iii.	Divider (for fan light)	100 mm x 64 mm
iv.	Leaves (outer style)	45 mm x 25 mm
ν.	Leaves (inner style)	45 mm x 35 mm
vi.	Leaves (top and bottom rail)	58 mm x 22 mm
	· · · ·	

7.10.2.1.2. Fixed windows

i.	Frame	75 mm x 35 mm
ii.	Divider	75 mm x 55 mm
iii.	Beading (for glass)	27 mm x 15 mm

- 7.10.2.2. **Deluxe Model** (Aluminium Natural / Coloured Anodized):- These are suitable up to 3100 mm height. The wall thickness of frame and leaves having sections as in Para 7.10.2.1 shall not be less than 1.6 mm.
- 7.10.2.3. **Premium Model** (Aluminium Natural /Coloured Anodized):- The wall thickness of frame and leaves having sections as per Para 7.10.2.1 shall not be less than 2 mm.

7.10.3. **Fly Screen:-** The Aluminium Fly / Insect screen shall be made from aluminium, having frame $42mm \times 13mm / 16 \times 16$ mesh and be rust-proof. The frames of the screen should match to the windows.

7.10.4. Standard Hardware:-

- 7.10.4.1. **Hinges:-** The swing door shall be provided with hinges made of Stainless steel.
- 7.10.4.2. **Handles:-** These shall be 100mm x 225mm, having good grip and made of Aluminium extruded sections with matching finish.
- 7.10.4.3. **Materials:-** Aluminium sections shall be extruded Aluminium Alloy billets of AA 6063 conforming to ASTM B-221 (equivalent to HE 9 of BSS 1474) metal grade, having the following composition:

i.	Aluminium not less than	95.50%
ii.	Iron, not more than	0.35%
iii.	Silicon	0.20 to 0.60%
iv.	Magnesium	0.45 to 0.90%

7.11. uPVC Doors and Windows:-

7.11.1. uPVC doors, panels, frames, windows, louvers, screens shall be complete in all respect incl sashes, glazing beads, mullions, panels, hardware, fasteners etc and procured from reputed manufacturers approved by the Engineer-in-Charge. Details are shown in Figure 7-2.

7.11.2. Allowable tolerances:- Size dimensions ± 2mm.

7.11.3. **Inspection** before Installation.

- 7.11.3.1. All doors and frame components will be inspected, before installation.
- 7.11.3.2. All components, which are abraded, dented, bent, bowed or show any other structural damage or distortion will be rejected, marked and shall be removed from the site. No component will be allowed to be straightened and then incorporated in the work.

- 7.11.3.3. **Delivery, Storage and Protection:-** Protect factory finished uPVC surfaces with wrapping strippable finish. Do not use adhesive papers or sprayed coatings that bond when exposed to sunlight or weather.
- 7.11.3.4. **Environmental Requirements:-** Do not install sealant, when Ambient temperature is less than 5°C during or 48 hours after installation

7.12. Z - Type Steel Windows

- 7.12.1. MS beam section for frame shall be 38 mm x 25 mm x 16 mm, "Z" section for leaves shall be 19 mm x 25 mm x 19 mm.
- 7.12.2. Sashes, when provided be of "T" section, 25 mm x 25 mm.
- 7.12.3. Thickness of all these sections be not less than 3 mm.
- 7.12.4. One coat of rust-proof paint will be applied to windows, before their installation.
- 7.12.5. Counter sunk steel screws will be used for fixing of wire gauze with flat iron 13mm x 3mm.

7.13. Steel Chowkats. Steel Chowkats shall conform to the specifications shown in Figure 7-3 (115mm Wall, Single Leaf), Figure 7-4a (230mm/242mm Single Leaf) and Figure 7-4b (230mm/242mm Double Leaf)

7.14. Kitchen Cabinets:- Refer to details in Figure 7-5, as per Information Sheet No. IS - ARCH 17 to 19, Volume - I (Revised 2001). The details are as under:-

- 7.14.1. Frame:- First Class Soft wood, Deodar, 25 mm x 38 mm.
- 7.14.2 **Shutter:-** Vin board, 19mm thick Teak, hanged with spring loaded hinges.
- 7.14.3. Shelves:- Vin board 19mm thick Teak.
- 7.14.4. **Floor:-** CC Type B finished smooth.
- 7.14.5. **Counter Slab:-** RCC Type B, with 25 mm thick marble slab on top.
- 7.14.6. **Drawer:-** First Class Soft wood, 19mm thick sides and back with 19mm thick Teak Vin board on front, and 5mm thick MDF board provided with sliding rails.
- 7.14.7. Wall and Skirting:- Glazed tiles.
- 7.14.8. Sink:- Stainless steel sink, supported on brick walls
- 7.14.9. Internal Wall finishes:- Plaster, 13 mm thick, on brick walls
- 7.14.10. **Exhaust Hood:-** Made of Teak Vin board with 22 gauge PGI sheet fixed on inner side.



SKETCH 7-2.4



FIGURE 7-2 uPVC DOORS AND WINDOWS PANEL CROSS SECTION



DOORS AND WINDOWS







METHOD OF MEASUREMENTS

7.15. Following shall be considered while taking measurements:-

7.15.1. **Tolerances:-** Thickness will be dead, as shown in each item. No tolerance, plus or minus will be admissible.

7.15.2. **Clench Nailing:-** No extra allowance shall be made, where clench nailing is specified, but screws are used.

7.15.3. **Doors & Windows:-** To be measured overall, incl frames or chowkats. Circular and curved portions shall be measured as square and paid for at twice the ordinary rates (segment only to be measured).

7.15.4. Mitered Pieces:- Each piece shall be measured over all.

7.15.5. **Door Partly Panelled Sashed**:- The glazed portion shall be measured separately as a sash. The dividing line shall be the middle of the rail below the glazing.

7.15.6. **Aluminium Doors and Windows**:- To be measured overall incl frames. Arched portions be measured as square by measuring, base & rise.

7.15.6.1. Fixed portion with sliding window be treated as sliding rates.

- 7.15.6.2. Fan light fixed portion up to 450mm high of Aluminium sliding windows doors / swing doors be treated as sliding/ swing and paid accordingly.
- 7.15.6.3. Exc 450 mm high (Fixed portion) of Aluminium sliding windows / doors / swing doors be treated as fixed and paid accordingly.

7.15.7. **uPVC Doors / Windows:-** To be measured overall incl frames. Arched portions shall be measured as square by measuring, base & rise.

7.15.8. "Z"-Type / Box Steel Windows:- Measured overall incl frames.

7.15.9. **Kitchen Cabinet:-** Length of floor cabinet, sink cabinet, wall cabinet and exhaust hood shall be measured.

CLARIFICATION OF RATES

7.16. The rates, inter alia, incl particularly:-

- 7.16.1. Work in First Class Soft wood, as defined, except where otherwise stated.
- 7.16.2. Fitting and fixing or hanging, as indicated.
- 7.16.3. Nails, screws, wedging and keys as required.
- 7.16.4. Hard wood or bamboo pins for framed joints.
- 7.16.5. Boring for bolts.
- 7.16.6. Arises or chamfers 6 mm wide as required.
- 7.16.7. Mitres, stops, fair or turned end, etc.
- 7.16.8. All cutting and wastes.
- 7.16.9. Fixing gauze with wooden beads and glass with bead and oil putty.
- 7.16.10. Fixing of springs, beads and brads.
- 7.16.11. Frames or chowkats to door and windows with holdfasts.
- 7.16.12. Mongery to doors and windows as listed in Table 7-1.

7.17. The rates for sashes also incl:-

- 7.17.1. Glazing with 3mm or 5mm thick glass or wire gauze (fly or mosquito wire) as specified.
- 7.17.2. Fixing with screws or nails, or preparing for hanging with hinges, pivots etc.

7.18. Where Second-Class softwood is used, the rates for "material and labour" shall be reduced by 24 %.

7.19. Mongery supplies in addition to that listed in specification will be paid extra at the "Supply and Fix " rates and vice versa.

7.20. Wood Preservatives, except as specified in Para 7.9.5.3 and 7.9.5.4, and painting will be paid extra.

7.21. Rates of Kitchen cabinet etc do not incl cost of sink, mixer, cooking range and glazed tiles etc.

- 7.22. Rates of uPVC doors and windows:-
 - 7.22.1. The rates incl items of joinery, mongery and fixing of doors and windows complete.
 - 7.22.2. Glazing will be paid separately.





DETAILS - KITCHEN CABINET

DOORS AND WINDOWS



FIGURE 7-5

As per Information Sheet # IS-ARCH 17 to 19, Volume-I (Revised 2001)

134

ITEM RATES

SI No	Description	Unit	(Rate Rs)
	Wood Work		
7-1	Supply and fix, 1st Class Soft wood , wrought, sashes, glazed with moulded or chamfered bars, panels filled in with glass incl chowkats, holdfasts and fixed with screws to frames, 32 mm thick.	Sqm	8138.16
7-2	Same as item 07-1, but gauzed, 9x9 mesh, 24 gauge.	Sqm	8036.26
7-3	Same as item 07-1, but 38mm thick, glazed	Sqm	8427.85
7-4	Same as item 07-3, but wire gauzed, 9x9 mesh, 24 gauge.	Sqm	8338.29
7-5	Deduct from item No.07-1 to 07-4, if chowkats not supplied and fixed.	Sqm	4389.10
7-6	Supply and fix, 1st Class Burma Teak wood, wrought, sashes, glazed with moulded or chamfered bars, panels filled in with glass incl chowkats, holdfasts and fixed with screws to frames, 32 mm thick.	Sqm	17898.94
7-7	Same as item 07-6, but gauzed, 9x9 mesh, 24 gauge.	Sqm	17809.38
7-8	Same as item 07-6, but glazed, 38 mm thick	Sqm	18704.66
7-9	Same as item 07-08, but gauzed, 9x9 mesh, 24 gauge.	Sqm	18615.11
7-10	Deduct from item 07-6 to 07-9, if chowkats not supplied and fixed.	Sqm	10817.06
7-11	Supply and fix, 1st Class Soft wood , sashes and doors, glazed with moulded or chamfered bars, panels filled in with glass incl chowkats, holdfasts and hung with hinges or pivots incl iron mongery as described, 32 mm thick.	Sqm	8678.33
7-12	Same as item 07-11, but gauzed, 9x9 mesh, 24 gauge.	Sqm	8545.53
7-13	Same as item 07-11, but 38 mm thick.	Sqm	8893.12
7-14	Same as item 07-13, but gauzed, 9x9 mesh, 24 BG.	Sqm	8803.57
7-15	Deduct from item No.07-11 to 07-14, if	Sqm	4390.05

SI No	Description	Unit	(Rate Rs)
	chowkats not supplied and fixed.		
7-16	Supply and fix 1st class Burma Teak wood sashes and doors, glazed with moulded or chamfered bars, angels filled in with glass incl chowkats, holdfasts hung with hinges or pivots incl iron mongery as described, 32mm thick.	Sqm	18485.47
7-17	Same as item 07-16, but gauzed, 9X9 mesh, 24 BG.	Sqm	18375.17
7-18	Same as item No 07-16, but 38 mm thick	Sqm	19341.50
7-19	Same as item 07-18, but gauzed, 9x9 mesh, 24 BG.	Sqm	19251.94
7-20	Deduct from item 07-2, 07-04, 07-7, 07-9, 07-12, 07-14, 07-17 and 07-19, if mosquito proof gauze, 16x16 mesh, 26 gauge is used.	Sqm	154.65
7-21	Deduct from item 07-16 to 07-19, if chowkats not supplied and fixed.	Sqm	10734.62
7-22	Supply and fix, 1st class Soft wood , glazed, CSWs, with moulded or chamfered bars, panels filled in with glass incl chowkats, holdfasts and hung with pivots incl mongery as described, 32mm thick.	Sqm	10701.58
7-23	Same as item 07-22, but gauzed, 9x9 mesh, 24 gauge.	Sqm	10633.65
7-24	Same as item 07-22, but 38 mm thick.	Sqm	10859.45
7-25	Same as item 07-24, but gauzed, 9x9 mesh, 24 gauge.	Sqm	10790.99
7-26	Deduct from item 07-22 to 07-25, if chowkats not supplied and fixed.	Sqm	6582.56
7-27	Supply and fix, 1st class Burma Teak wood, glazed CSWs with moulded or chamfered bars, panels filled in with glass incl chowkats, holdfasts and hung with pivots incl mongery as described, 32 mm thick.	Sqm	23703.48
7-28	Same as item 07-27, but gauzed, 9x9 mesh, 24 gauge.	Sqm	23635.35
7-29	Same as item 07-27, but 38 mm thick.	Sqm	24137.02
7-30	Same as item 07-29, but gauzed, 9x9 mesh, 24 gauge.	Sqm	24084.11

SI No	Description	Unit	(Rate Rs)
7-31	Deduct from item 07-23, 07-25, 07-28 and 07-30, if mosquito proof gauze is used.	Sqm	21.36
7-32	Deduct from item 07-27 to 07-30, if chowkats not supplied and fixed.	Sqm	16205.84
7-33	Supply and fix, Venetian shutter for windows made of 1st class Soft wood 100 mm, wide rail and styles and Hard wood (Shisham) Venetian, incl chowkats 75 mm x 125 mm, holdfasts and fixed with screws to frame, 32mm thick.	Sqm	9418.80
7-34	Same as item 07-33, but 38 mm thick.	Sqm	9799.53
7-35	Deduct from item 07-33 and 07-34, if chowkats not supplied and fixed.	Sqm	4521.32
	Alumium Windows		
7-36	Supply of Aluminium Sliding window (Economy Model) of Anodized Aluminium extruded section, upto height of 1524mm as specified, incl fixing on concrete, wood or steel frames complete with all necessary fittings, except glass.	Sqm	5541.06
7-37	Same as item 7-36, but Anodized Bronze.	Sqm	5748.90
7-38	Same as item 07-36, but Anodized Champagne	Sqm	6000.48
	Anodized Champagne	\diamond .	
7-39	Supply of Aluminium Sliding window (Deluxe Model), of Anodized Aluminium extruded section, upto height of 1524mm as specified, incl fixing on concrete, wood or steel frames, complete with all necessary fittings except glass.	Sqm	6241.11
7-40	Same as item 07-39, but Anodized Bronze.	Sqm	6405.18
7-41	Same as item 07-39, but Anodized Champagne	Sqm	6623.95
7-42	Supply of Aluminium Sliding window (Premium model) of Anodized Aluminium extruded section upto 1524mm height as specified, incl fixing on concrete, wood or steel frame, complete, with all necessary fittings, except glass.	Sqm	7159.94

SI No	Description	Unit	(Rate Rs)
7-43	Same as item 07-42, but Anodized Bronze.	Sqm	7356.82
7-44	Same as item 07-42, but Anodized	Sqm	7608.40
	Champagne.	-	
7-45	Supply of Aluminium Sliding window	Sqm	5048.83
	extruded section exc-1524mm but not exc		
	3048 mm height as specified, incl fixing on		
	concrete, wood or steel frames complete		
	with all necessary fittings except glass.	_	
7-46	Same as item 07-45, but Anodized Bronze .	Sqm	5267.60
7-47	Same as item 07-45, but Anodized	Sqm	5508.25
7 10	Champagne.	Sam	5701 71
7-40	(Deluxe Model), of Anodized Aluminium	Sqm	5761.71
	extruded sections exc 1524mm, but not exc		
	3048mm height as specified, incl fixing on		
	concrete, wood or steel frames, complete,		
7-40	Same as item 07-48, but Apodized Bronze	Sam	50/5 78
7-49	Same as item 07-48, but Anodized	Sam	6164 55
7-50	Champagne.	Gqm	0104.00
7-51	Supply of Aluminium sliding window	Sqm	6241.10
	(Premium Model), of Anodized Aluminium		
	extruded section exc 1524mm, but not exc		
	concrete wood or steel frames complete		
	with all necessary fittings except glass.		
7-52	Same as item 07-51, but Anodized Bronze	Sqm	6864.59
7-53	Same as item 07-51, but Anodized	Sqm	7159.94
	Champagne.		
7-54	Supply of Aluminium Fixed window	Sqm	2795.55
	(Economy Model), of Anodized Aluminium extruded section upto 1524mm beight as		
	specified, incl fixing on concrete, wood or		
	steel frames, complete with all necessary		
	fittings except glass.	-	
7-55	Same as item 7-54, but Anodized Bronze .	Sqm	2904.93
7-56	Same as item 07-54, but Anodized	Sqm	3025.18
7-57	Supply of Aluminium Fixed window	Sam	3200 26
1-51	Supply of Aluminum Fixed willdow	Sqm	3200.20

SI No	Description	Unit	(Rate Rs)
	(Deluxe Model), of Anodized Aluminium extruded section upto 1524mm height as specified, incl fixing on concrete, wood or steel frames, complete with all necessary fittings except glass.		
7-58	Same as item 07-57, but Anodized Bronze	Sqm	3265.89
7-59	Same as item 07-57, but Anodized Champagne .	Sqm	3419.03
7-60	Supply of Aluminium Fixed window (Premium Model) of Anodized Aluminium extruded section upto 1524mm height as specified, incl fixing on concrete, wood or steel frames, complete with all necessary fittings except glass.	Sqm	3506.53
7-61	Same as item 07-60, but Anodized Bronze	Sqm	3648.73
7-62	Same as item 07-60, but Anodized Champagne.	Sqm	3725.30
7-63	Supply of Aluminium Fixed window (Economy Model) of Anodized Aluminium extruded section exc-1524mm but not exc 3048mm height as specified, incl fixing on concrete, wood or steel frames, complete with all necessary fittings except glass.	Sqm	2631.47
7-64	Same as item 7-63, but Anodized Bronze.	Sqm	2729.92
7-65	Same as item 07-63, but Anodized Champagne	Sqm	2850.23
7-66	Supply of Aluminium Fixed window (Deluxe Model) of Anodized Aluminium extruded section exc 1524mm, but not exc 3048 mm height as specified, incl fixing on concrete, wood or steel frames, complete with all necessary fittings except glass.	Sqm	2894.81
7-67	Same as item 07-66, but Anodized Bronze	Sqm	2948.68
7-68	Same as item 07-66, but Anodized Champagne	Sqm	3036.19
7-69	Supply of Aluminium Fixed window (Premium Model) of Anodized Aluminium extruded section exc 1524mm, but not exc 3048mm height as specified, incl fixing on	Sqm	2992.43

SI No	Description	Unit	(Rate Rs)
	concrete, wood or steel frames, complete with all necessary fittings except glass.		
7-70	Same as item 7-69, but Anodized Bronze.	Sqm	3123.69
7-71	Same as item 07-69, but Anodized Champagne.	Sqm	3233.07
7-72	Supply of Aluminium Side Hung window (Economy Model) of Anodized Aluminium extruded section upto 2133mm height as specified incl fixing on concrete, wood or steel frames, complete with all necessary fittings except glass.	Sqm	4567.84
7-73	Same as item 07-72, but Anodized Bronze	Sqm	4709.75
7-74	Same as item 07-72, but Anodized Champagne	Sqm	4906.64
7-75	Supplying of Aluminium Side Hung window (Deluxe Model) of Anodized Aluminium extruded section upto 2133mm height as specified, incl fixing on concrete, wood or steel frames, complete with all necessary fittings except glass.	Sqm	5180.10
7-76	Same as item 07-75, but Anodized Bronze	Sqm	5333.23
7-77	Same as item 07-75, but Anodized Champagne	Sqm	7717.78
7-78	Supply of Aluminium Side Hung windows (Premium Model) of Anodized Aluminium extruded upto 2133 mm height as specified, incl fixing on concrete, wood or steel frames,	Sqm	5672.33
	glass.		
7-79	- Same as item 7-78, but Anodized Bronze .	Sqm	5912.96
7-80	Same as item 07-78, but Anodized Champagne.	Sqm	6077.05
7-81	Supply of Aluminium Fly / Insect screening with imported mesh (Economy Deluxe and Premium Model), of Anodized Aluminium extruded section	Sqm	1736.90

SI No	Description	Unit	(Rate Rs)
	as specified, incl fixing on concrete, wood or steel frames, complete with all necessary fittings.		
7-82	Same as item 07-81, but Anodized Bronze.	Sqm	1769.71
7-83	Same as item 07-81, but Anodized Champagne.	Sqm	1824.41
1.	Steel Windows		
7-84	Supply and fix, Z type steel window or CSW using "Z" and beam sections not exc 1.48 Sqm, super, each with openable / fixed panels with all necessary steel fitting / iron mongery, hold fasts etc, two coats of synthetic enamel paint in addition to one coat of primer/ rust proof paint, but except glass panes and wire gauze.	Sqm	3190.29
7-85	Same as item 07-84, but Brass mongery.	Sqm	3590.87
7-86	Supply and fix, Z type steel window or CSW using "Z" and beam sections not exc 1.48 Sqm, super, each with openable / fixed panels with " T " Section sashes all necessary steel fitting / iron mongery, hold fasts etc, two coats of synthetic enamel paint in addition to one coat of primer / rust proof paint, but except glass panes and wire gauze.	Sqm	3435.67
7-87	Same as item 07-86, but Brass mongery.	Sqm	3799.53
7-88	Supply and fix, Z type steel window or CSW using "Z" and beam sections exc 1.48 Sqm, super each with openable / fixed panels with all necessary steel fitting / iron mongery, hold fasts etc, two coat of synthetic enamel paint in addition to one coat of primer / rustproof paint, but except glass panes and wire gauze.	Sqm	2191.22
7-89	Same as item 07-88, but Brass mongery.	Sqm	2756.76
7-90	Supply and fix, Z type steel window or CSW using "Z" and beam sections exc 1.48 Sqm super each with openable / fixed panels with "T" sections , sashes	Sqm	2670.79

SI No	Description	Unit	(Rate Rs)
	with all necessary steel fitting / iron mongery, hold fasts etc, two coats of synthetic enamel paint in addition to one coat of primer / rust proof paint, but except glass panes and wire gauze.		
7-91	Same as item 07-90, but brass mongery.	Sqm	2983.72
7-92	Supply and fix, Box type steel sliding/fixed window or CSW using 16 gauge frame section 75mm x 30mm and panel section 25mm x 50mm and 10mm x 10mm square gola, with all necessary steel fitting / iron mongery hold fast etc and two coats of S/E paint in addition to one coat of primer/ rust proof paint, except glass panes, grill and wire gauze.	Sqm	3531.55
7-93	Supply and fix, Box Pipe type open-able and fixed side hung window or CSW using 16 gauge frame section 50mm x 25mm and panel Z shape 38mm x 31mm x 38mm and 10mm x 10mm square gola, not exc 1.48 Sqm, super, each with all necessary fitting/iron mongery, hold fast etc and two coats of S/E paint in addition to one coat of primer / rust proof paint, except wire gauze and glass panes, grill.	Sqm	3586.68
7-94	Supply and fix, Box Pipe type openable and fixed side-hung window or CSW using 16 gauge frame section 50mm x 25mm and panel Z shape 38mm x 31mm x 38mm and 10mm x 10mm square golas, exc 1.48 Sqm, super, each with all necessary fittings/iron mongery hold fast etc and two coats of S/E paint in addition to one coat of primer / rust proof paint, except wire gauze and glass panes, grill.	Sqm	3585.48
	Doors (Wooden)		
7-95	Supply and fix, 1st Class Soft wood framed and panelled doors , gates etc, incl hanging chowkats, hold fats, and iron mongery as described, 32 mm thick.	Sqm	9566.67

SI No	Description	Unit	(Rate Rs)
7-96	Same as item 07-95, but 38mm thick.	Sqm	9811.45
7-97	Supply and fix, 1st Class Soft wood framed and panelled doors , gate etc (panels filled with MDF 16mm sheet) incl chowkats, hold fast and iron mongery as described, 32mm thick.	Sqm	9955.44
7-98	Same as item 07-97, but 38mm thick	Sqm	10141.00
7-99	Deduct from item 07-95, 07-96, 07-97 and 07-98,if chowkats not supplied and fixed	Sqm	3103.82
7-100	Supply and fix, 1st Class Burma Teak wood Framed and Panelled doors, gates etc incl hanging chowkats, hold fasts, and iron mongery as described, 32 mm thick.	Sqm	20669.73
7-101	Same as item 07-100, but 38 mm thick.	Sqm	21473.87
7-102	Deduct from item 07-100 and 07-101, if chowkats not supplied and fixed.	Sqm	7890.49
7-103	Supply and fix, 1st Class Soft wood framed and panelled partitions and dados, 32 mm thick.	Sqm	4673.95
7-104	Same as item 07-103, but 38 mm thick.	Sqm	4976.47
7-105	Supply and fix, 1st Class Burma Teak wood Framed and Panelled partitions and dados, 32 mm thick.	Sqm	11421.57
7-106	Same as item 07-105, but 38 mm thick.	Sqm	12249.35
7-107	Supply and fix, Hollow Flush door, Teak Veneered , 38 mm thick incl iron mongery all as specified, except chowkats.	Sqm	6481.02
7-108	Same as item 07-107, but Shisham veneered.	Sqm	6445.94
7-109	Same as item 07-107, but Commercial veneered.	Sqm	6109.54
7-110	Supply and fix, Hollow Flush door , Teak veneered, 32 mm thick incl iron mongery except chowkats.	Sqm	5571.14
7-111	Same as item 07-110, but Shisham Veneered.	Sqm	5654.67
7-112	Same as item 07-110, but Commercial veneered.	Sqm	5175.68
7-113	Supply and fix, Solid Flush door, Teak	Sqm	7676.25

SI No	Description	Unit	(Rate Rs)
	veneered, 38 mm thick incl iron mongery, except chowkats.		
7-114	Same as item 07-113, but Shisham veneered.	Sqm	7816.96
7-115	Same as item 07-113, but Commercial veneered.	Sqm	7349.13
7-116	Supply and fix, Solid Flush door , Teak veneered, 32mm thick incl iron mongery, except chowkats.	Sqm	7060.02
7-117	Same as item 07-116 but Shisham veneered.	Sqm	7143.59
7-118	Same as item 07-116 but Commercial veneered.	Sqm	6675.73
7-119	Supply and fix, MDF (Medium Density Fibre board) Hollow Flush door 38mm thick with Malaysian ply (Pak made) 3mm skin panel on both sides internal wood, 2nd class soft wood frame , 75mm x32mm, hydraulically hot pressed with glue, in any design, shape and pattern, complete, incl iron mongery, except chowkat.	Sqm	2850.33
7-120	Add to item 07-107 to 07-119, if chowkats Ist Class Soft wood, supplied and fixed.	Sqm	3104.24
7-121	Supply and fix, Solid Flush door , Teak veneered, 25 mm thick for cupboard all as specified, except chowkats.	Sqm	5856.70
7-122	Same as item 07-121, but Shisham veneered.	Sqm	5940.23
7-123	Same as item 07-121, but Commercial veneered.	Sqm	5472.40
7-124	Same as item 07-121 or 07-122 and 07-123, but fixing only.	Sqm	292.86
7-125	Add to item 07-121 or 07-122 and 07-123, if fixed in repairs.	Sqm	19.77
7-126	Deduct from items 07-107 to 07-109, if 2nd Class Soft wood is used in frame and core.	Sqm	576.46

SI No	Description	Unit	(Rate Rs)
7-127	Deduct from items 07-110 to 07-112, if 2nd Class Soft wood is used in frame and core.	Sqm	358.23
7-128	Deduct from items 07-113 to 07-115,if 2nd Class Soft wood is used in frame.	Sqm	248.50
7-129	Deduct from items 07-116 to 07-118,if 2nd Class Soft wood is used in frame.	Sqm	211.02
7-130	Deduct from items 07-121 to 07-123,if 2nd Class Soft wood is used in frame.	Sqm	200.50
	Aluminium Doors		
7-131	Supply Aluminium Sliding door (Deluxe Model), of Anodized Aluminium extruded section, incl fixing on concrete, wood or steel frames, complete except glass, lock and handle.	Sqm	6413.89
7-132	Same as item 07-131, but Anodized Bronze.	Sqm	6505.34
7-133	Same as item 07-131, but Anodized Champagne.	Sqm	6927.05
7-134	Supply Aluminium Sliding door (Premium Model), of Anodized Aluminium extruded section, incl fixing on concrete, wood or steel frames complete, except glass, lock and handle.	Sqm	7072.51
7-135	Same as item 07-134, but Anodized Bronze .	Sqm	7282.71
7-136	Same as item 07-134, but Anodized Champagne.	Sqm	7586.61
7-137	Supply Aluminium Swing door , single shutter (Deluxe Model) of Anodized Aluminium extruded section as specified incl fixing on concrete, wooden or steel frames, complete with all necessary fitting, except glass, lock and handle.	Sqm	6656.85
7-138	Same as item 07-137, but Anodized Bronze .	Sqm	6788.11
7-139	Same as item 07-137, but Anodized Champagne .	Sqm	7006.88

SI No	Description	Unit	(Rate Rs)
7-140	Supply Aluminium Swing door , single shutter (Premium Model), of Anodized Aluminium extruded section as specified, incl fixing on concrete, wood or steel frames complete with all necessary fitting except glass, lock and handle.	Sqm	7466.30
7-141	Same as item 07-140, but Anodized Bronze .	Sqm	7641.30
7-142	Same as item 07-140, but Anodized Champagne .	Sqm	7903.82
7-143	Supply Aluminium Swing door, double shutter (Deluxe Model) of Anodized Aluminium extruded section as specified incl fixing on concrete, wood or steel frames, complete with all necessary fitting except glass, lock and handle.	Sqm	7411.61
7-144	Same as item 07-143, but Anodized Bronze.	Sqm	7520.99
7-145	Same as item 07-143, but Anodized Champagne	Sqm	7674.12
7-146	Supply Aluminium Swing door, double shutter (Premium Model), extruded section as specified, incl fixing on concrete, wood or steel frames complete with all necessary fitting except, glass, lock and handle.	Sqm	8056.96
7-147	Same as item 07-146, but Anodized Bronze.	Sqm	8275.72
7-148	Same as item 07-146, but Anodized Champagne.	Sqm	8406.99
7-149	Supply Iron tinned wire gauze fly proof 9x9 mesh, 24 gauge and fixed with cover fillets to window chowkats etc.	Sqm	699.22
7-150	Same as item 07-149, but 22 gauge.	Sqm	1183.37
7-151	Same as item 07-149 or 07-150, but except cost of wire gauze.	Sqm	453.11
7-152	Add to item 07-149 or 07-150 or 07-151, if fixed in repairs.	Sqm	41.19
7-153	Supply of Iron tinned wire gauze mosquito proof 18 x 18 mesh, 28	Sqm	660.57
SI No	Description	Unit	(Rate Rs)
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	gauge and fixed with cover fillets to window chowkats etc.		
7-154	Same as item 07-153, but except cost of wire gauze.	Sqm	453.11
7-155	Add to item 07-153 or 07-154, if fixed in repairs.	Sqm	41.19
7-156	Supply Plastic wire gauze , mosquito proof 18x18 mesh, and fixed with cover fillets to window chowkats etc.	Sqm	532.84
7-157	Same as item 07-156, but except cost of wire gauze.	Sqm	453.11
7-158	Add to item 07-156 or 07-157, if fixed in repairs.	Sqm	41.19
7-159	Supply Iron tinned wired gauze fly proof 9 x 9 mesh, 22 gauge and fixed with flat iron 13mm x 3mm to steel window frames with screws 75 mm c/c, complete.	Sqm	1125.11
7-160	Same as item 07-159, but 24 gauge.	Sqm	637.66
7-161	Same as item 07-159 or 07-160, but except cost of wire gauze.	Sqm	390.60
7-162	Add to item 07-159 or 07-160 or 07-161, if fixed in repairs.	Sqm	41.19
7-163	Supply of Iron tinned wire gauze , 16 x 16 mesh, 26 gauge and fixed with flat iron 13mm x 3mm to steel window frames with screws 75 mm c/c complete.	Sqm	507.23
7-164	Same as item 07-163, but except cost of wire gauze.	Sqm	390.60
7-165	Add to item 07-163 or 07-164, if fixed in repairs.	Sqm	41.19
7-166	Supply of Iron tinned wire gauze mosquito proof 18 x 18 mesh, 28 gauge and fixed with flat iron 13mm x 3mm to steel window frames with screws 75mm c/c, complete.	Sqm	599.27
7-167	Same as item 07-166, but except cost of wire gauze.	Sqm	390.60

SI No	Description	Unit	(Rate Rs)
7-168	Add to item 07-166 or 07-167, if fixed in repairs.	Sqm	41.19
7-169	Supply of Aluminium wire gauze 16x16 mesh, 26 gauge and fixed with flat iron 13mm x 3mm to steel window frames with screws 75mm c/c, complete.	Sqm	1050.80
7-170	Same as item 07-169, but except cost of wire gauze.	Sqm	390.60
7-171	Add to item 07-169 or 07-170, if fixed in repairs.	Sqm	41.19
	Jobbing Work		
7-172	Re-securing without taking down window chowkats incl window boards, if any, (Hard/Soft wood).	Each	129.30
7-173	Taking down window chowkats incl window boards, if any, (Hard/Soft wood) and refixing in same opening.	Each	240.27
7-174	Same as item 07-173, but refixing in other opening.	Each	296.89
7-175	Taking down window chowkats incl window boards, if any, (Hard/Soft wood).	Each	61.22
7-176	Removing to or from store window chowkats incl window boards, if any, (Hard/Soft wood).	Each	40.40
7-177	Re-securing without taking down window chowkats incl Sashes (Hard/Soft wood).	Each	86.47
7-178	Taking down window chowkats incl sashes (Hard/Soft wood) and re-fixing in same opening.	Each	228.03
7-179	Same as item 07-178, but re-fixing in other opening.	Each	339.74
7-180	Taking down window chowkats, incl sashes (Hard/Soft wood).	Each	37.24
7-181	Removing to or from store, window chowkats incl sashes (Hard/Soft wood).	Each	25.56
7-182	Re-securing without taking down casement window fanlights etc (sashes only) (Hard/Soft wood).	Each	63.59
7-183	Taking down casement, window, fanlights etc (sashes only) (Hard/Soft	Each	120.75

SI No	Description	Unit	(Rate Rs)
	wood) and re-fixing same opening.		
7-184	Same as item 07-183, but re-fixing in other openings.	Each	147.83
7-185	Taking down casement, windows, fanlights etc (sashes only), Hard /Soft wood.	Each	30.61
7-186	Removing to or from store, casement, window, fanlights etc (sashes only) Hard/ Soft wood.	Each	12.78
7-187	Re-securing without taking down door chowkats (not exc 2.60 m super each) incl architraves if any, (Hard/Soft wood).	Each	129.32
7-188	Taking down door chowkats (not exc 2.60m, super each) incl architraves if any, Hard/Soft wood and refixing in same opening.	Each	228.03
7-189	Same as item 07-188, but re-fixing in other opening.	Each	281.07
7-190	Taking down door chowkats (not exc 2.60m super each) incl architraves, if any, Hard/Soft wood.	Each	74.00
7-191	Removing to or from store door chowkats (not exc 2.60m super each) incl architraves, if any, Hard/Soft wood.	Each	32.14
7-192	Re-securing without taking down door chowkats (exc 260m super each) incl architraves if any, Hard/Soft wood.	Each	240.27
7-193	Taking down door chowkats (exc 2.60m super each) incl architraves if any, Hard / Soft wood and re-fixing in same opening.	Each	339.74
7-194	Same as item 07-193, but re-fixing in other opening	Each	359.64
7-195	Taking down door chowkats (exc 2.60 m super each) incl architraves if any, Hard /Soft wood.	Each	160.69
7-196	Removing to or from store, door chowkats (exc 2.60m super each) incl architraves if any, Hard /Soft wood.	Each	49.74
7-197	Re-securing without taking down door or gates, leaves only (single or folding) of any pattern or thickness not exc 2.60m	Each	33.83

SI No	Description	Unit	(Rate Rs)
	super each, Hard /Soft wood.		
7-198	Taking down door or gates, leaves only (single or folding) of any pattern or thickness not exc 2.60m super each, Hard / Soft wood and re-fixing in same opening.	Each	87.23
7-199	Same as item 07-198, but re-fixing in the other opening.	Each	120.29
7-200	Taking down door or gates, leaves only (single or folding) of any pattern or thickness not exc 2.60m super each.	Each	33.23
7-201	Removing to or from store door or gates, leaves only (single or folding) of any pattern or thickness exc 2.60m super each not.exc Hard / Soft wood.	Each	19.14
7-202	Re-securing without taking down Partitions, framing, cupboard front, wall panelling and similar woodwork, incl doors exc 2.60m super each, Hard /Soft wood.	Sqm	74.00
7-203	Taking down Partitions, framing, cupboard front, wall panelling and similar woodwork, incl doors exc 2.60 m super each Hard / Soft wood and re-fixing in same opening.	Sqm	260.16
7-204	Same as item 07-203, but re-fixing in other opening.	Sqm	642.76
7-205	Taking down partitions, framing, cupboard front, wall panelling and similar woodwork, incl doors exc 2.60m super each, Hard / Soft wood.	Sqm	162.22
7-206	Removing to or from store, partitions, framing, cupboard front, wall panelling and similar woodwork, incl doors exc 2.60m super each, Hard / Soft wood.	Sqm	153.04
7-207	Door or gates (any description) cramped up, reweighed with new wedges in glue (or white lead repined if in external work) not exc 2.60 m super each, incl taking down and re-hanging, taking off and re-fixing	Each	408.61

SI No	Description	Unit	(Rate Rs)
	hinges (any description) and removing to and from workshop.		
7-208	Same as item 07-207, but exc 2.60m super each.	Each	419.48
7-209	Door or gates (any description) cramped up, reweighed with new wedges in glue (or white lead repined if in external work) not exc 2.60 m super each, incl taking down and re-hanging, taking off and re- fixing hinges (any description) and renewal of defective parts and removing to and from workshop.	Each	441.67
7-210	Same as item 07-209, but exc 2.60 m super each.	Each	648.88
7-211	Supply and fix, roller type Brass or Aluminium curtain rails with suitable brackets but without rings.	Metre	117.29
7-212	Supply and fix, rubber linings to door with screw etc.	Metre	81.00
7-213	Supply and fix, door stopper on wall or floor any type.	Metre	120.47
	Kitchen Cabinets		
7-214	Supply and fix, Kitchen Floor / Sink Floor Cabinet , 600mm wide and 862mm high with First Class Soft wood frame, 19mm thick Teak Veneered board shutter, drawers incl all necessary Chromium plated (CP) mongery, RCC slab, 25mm thick white / coloured marble slab, PCC inside complete as per IS Arch 17,18 and 19.	Metre	8901.26
7-215	Supply and fix, Kitchen Wall Cabinet 381mm wide and 610mm high, 19mm thick Teak Veneered board shutter complete as per IS Arch 17,18 and 19, incl all necessary CP mongery fixture and deodar wood edging provided to door cabinets.	Metre	4831.55
7-216	Supply and fix, Kitchen Exhaust Hood made of Teak Veneered board with	Metre	4705.46

SI No	Description	Unit	(Rate Rs)
	22BG, PGI sheet fixed on inner side complete as per Information Sheet IS Arch No 17, 18 and 19, incl all fitting / fixture as specified.		
7-217	Fixing only chowkats, complete any type not exc 2.60 m, super each.	Sqm	636.64
7-218	Same as item 07-217, but exc 2.60 m super each.	Sqm	696.32
7-219	Fixing only, doors and windows leaves incl iron mongery, any type, not exc 2.60 m, super each.	Sqm	1810.43
7-220	Same as item 07-219, but exc 2.60 m super each.	Sqm	2337.65
7-221	Fixing only , Aluminium windows, any type/model on concrete, wood or steel frames incl fittings, except glass.	Sqm	198.95
	Venetian Blinds		
7-222	Supply and fix, Venetian blinds (Horizontal) having metallic, plastic strip, upto 25mm width, best quality, complete with all accessories.	Sqm	1057.38
7-223	Supply and fix, Venetian blind (Vertical) having fabric strip, upto 90mm width, of desired shades, best quality, complete with all accessories.	Sqm	886.12
7-224	Same as item 7-223, but strip width exc 90mm upto 127mm.	Sqm	834.74
7-225	Supply any fix, Venetian blinds (horizontal) having wooden strip best quality complete with all accessories.	Sqm	5169.89
7-226	Fixing only , Aluminium fly/insect screening for windows any type on concrete, wood or steel frames incl fittings.	Sqm	19.59
	Steel Chowkats		
7-227	Fixing only, Aluminium door any type on	Sqm	298.42

SI No	Description	Unit	(Rate Rs)
	concrete, wooden or steel frames incl fittings, except glass.		
7-228	Supply and fix, Steel Chowkat press- moulded 16 SWG, for 115mm walls, single leaf, complete, incl hold fast ties for lateral movement, PCC 1:2:4 cavity filling etc, incl one coat of anti-Creosote paint (internal surface and Red oxide paint (external surface).	Metre	807.45
7-229	Same as item 07-228, but 230mm wall, (Single/Double Leaf) 16 SWG.	Metre	1101.56
7-230	Same as item 07-228, but 342mm wall, (Single/Double Leaf)	Metre	1498.62
7-231	Same as item 07-228, but 18 SWG.	Metre	750.53
7-232	Same as item 07-229, but 18 SWG.	Metre	1036.90
7-233	Same as item 07-230, but 18 SWG.	Metre	1407.17

Dolly Frame Chowkats

7-234 Supply and fix lst class soft wood Dolly Sam 4274.10 frame chowkat using 57mm x 57mm fillets on edge sides of wall and @ 381mm c/c cross fillets, covered with 3mm commercial ply, incl architrave on both sides (inside/out sides) n.exc 12.90 sqcm in any design/shape, hold fasts, bitumen coating on wall side of frame and wood preservative on remaining sides of frame, gaps filled with CC Type B for 230mm wall, complete, all as specified. (Single/Double rebate). 7-235 Same as item 07-234 but shisham ply. 4409.86 Sqm 7-236 Same as item 07-234 but teak ply. Sqm 4410.74 7-237 Supply and fix lst class soft wood dolly Sqm 4755.56 frame chowkat using 57 mm x 57 mm fillets on the edge sides of wall and 381 mm c/c cross fillets . covered with 3 mm

> commercial ply, incl architrave on both sides (inside/our sides) n-exc 12.90 sqm cm in any design/shape, hold fasts,

SI No	Description	Unit	(Rate Rs)
	bitumen coating on wall side of frame and wood preserve on remaining sides of frame , gaps filled with C.C type for 345 mm wall complee all as spd. (Single/double rebate)		
7-238	Same as item 7-237 but shisham ply.	Sqm	4941.54
7-239	Same as item 7-237 but teak ply.	Sqm	4950.06
1,	uPVC Doors/Windows		
7-240	Supply and fix u-PVC sliding window in white colour 37 mm thick shutter with , frame 80 mm x 50mm complete exc 2.23 Sqm super each in white colour incl necessary fittings mongery fly proof netting, except glass complete as per sections shown in figuire T-2 skectch No 7-101 to 7-103.	Sqm	6380.93
7-241	Same as item 07-240, but coloured.	Sqm	7494.64
7-242	Supply and fix, uPVC open able window, 60mm thick shutter with frame complete, exc 2.23 sqm super each in white colour incl necessary fittings, mongery, except glass.(Figure 7-2, Sketch 7-2.1 to 7-2.3)	Sqm	7152.45
7-243	Same as item 07-242, but coloured.	Sqm	7922.78
7-244	Supplying of uPVC 37mm thick fixed window, with frame complete exc 2.23 sqm super each, in white colour incl necessary fittings, mongery except glass as per sections shown in Figure 7-2, Sketch No 7-1.1 to 7- 1.3.	Sqm	4496.08
7-245	Same as item 07-244, but coloured.	Sqm	4925.81
7-246	Supply and fix, uPVC Sliding door, 37mm thick shutter with frame 80mm x 50mm exc 3.5 sqm super each in white colour incl all necessary fittings, mongery fly proof netting except glass, complete as per sections shown in Figure 7-2, Sketch No 7-1.1 to 7-1.3.	Sqm	8121.72
7-247	Same as item 07-246, but in coloured.	Sqm	9150.96
7-248	Supply and fix, uPVC door, 60mm thick shutter for full glass with frame complete exc 1.9 sqm super each, in white colour	Sqm	10092.11

SI No	Description	Unit	(Rate Rs)
	incl necessary fittings, mongery except glass, as section shown in Figure 7-2, Sketch No 7-2.1 to 7- 2.3.		
7-249	Same as item 07-248, but groove panel 20mm thick, filled as per Figure 7-2, Sketch 7- 2.4 instead of glass, complete in white colour.	Sqm	12748.48
7-250	Same as item 07-248, but coloured	Sqm	11378.12
7-251	Same as item 07-249, but coloured	Sqm	16159.25
	Glass Partitions & Door		
7-252	Supply and fix, 12mm thick Plate Glass partition/door in any size incl all necessary accessories i.e. pivot machine, handle lock etc (partitions, where door will not be provided, be paid separately)	Sqm	7708.07

SECTION – 8

ANCILLARY ITEMS (MONGERY)

SPECIFICATIONS

8.0. This Section covers Iron, Chromium plated (CP) & Brass mongery.

MATERIAL REQUIREMENTS

8.1. Mongery:- All articles of mongery shall be sound, strong and well finished, according to the specified weight.

8.2. The weight of articles of Iron or Brass mongery (covering any type of finish) shall be within 10% or the weight given in Table 8-1 to 8-6:-

8.3. Engineer-in-Charge will approve sample of mongery for each contract before incorporation. Weight for size other than those given in the Table 8-1 to 8-6 shall be prorate to the size.

TABLE 8-1

WEIGHT OF TEN NUMBERS ARTICLES - (KG)

(Incl Weight of Necessary Screws etc)

Articles	100	mm	150 mm		
Articles	Iron	Brass	Iron	Brass	
Hooks and Eyes, cabin or casement	0.59	0.63	0.73	0.77	
Hooks and screw pattern (wire)	0.33	0.35	0.69	0.73	
Knobs cupboard 30 mm	-		-	0.14	
Hasp and Staple 100 mm	-	-	0.45	-	

TABLE 8-2

	SIZE (mm)									
Articles	100		150		200		300		450	
	Iron	Brass	Iron	Brass	Iron	Brass	Iron	Brass	Ironill	Brass
Bolts tower plate thickness (20 gauge)	1.84	1.17	2.24	1.42	2.48	2.14	2.95	3.97		
All drop plate thickness (16 to 18 gauge)					4.23	7.69	9.66	11.58	13.44	16.54

ANCILLARY ITEMS (MONGERY)

	SIZE (mm)							
Articles	5	50 75 100		75		00	1:	25
	Iron	Brass	Iron	Brass	Iron	Brass	Iron	Brass
Hinges Butt	0.34	0.39	0.70	0.85	1.42	1.42	2.13	2.27
Hinges Parliament			2.50		4.26		5.67	
TABLE 8-4								

TABLE 8-3

TABLE 8-4

	SIZE (mm)			
Articles	250	300	450	
Hinges straps, cross garnet etc, iron	3.00	4.08	8.35	
Hinges ,hook and ride, Iron		12.02	17.69	

TABLE 8-5

Articles	Iron	Brass
Thumb latches, 195 mm x 44 mm	2.54	
Thumb latches, 244 mm x 56 mm	3.40	
Cleats belaying, 100 mm	0.46	0.47
Catches, 50 mm	0.97	0.93
Catches, 63 mm	1.23	1.17
Fasteners Cockspur	2.00	2.13
Fasteners and Stays (casement) 300 mm	2.80	3.22
Fasteners and (casement) 380 mm	3.54	4.00
Pivot and sockets, 56 mm (per TEN sets)	0.79	0.82
Stays quadrant, for fanlights, 300 mm	2.72	2.90
Handles, Bow 150 mm	0.64	1.11
Handles, drawer pull 100 mm	0.39	0.71
Hooks, hat and coat, 175 mm single	1.38	1.54
Hooks, Wardrobe, 56 mm single	0.46	0.54

TABLE 8-6

Articles	SIZE IN MILLIMETRES			
	25 mm	38 mm		
Hooks screw (dresser or cup) Iron	0.08	0.10		
Hooks screw (dresser or cup) Brass	0.09	0.12		

METHOD OF MEASUREMENTS

8.4. General:- The under mentioned articles of mongery shall be measured as indicated in the Table 8-7:-

Articles	How Measured	
Bolts	-The length of plates in Flush and French , Casement bolts.	
	-The length of shoots in the case of level, tower or all other drop bolts.	
Hasps & staples	The overall length of the Hasp.	
Hinges	-The length of the joint of Butt and Back flap Hinges.	
	-Overall of Parliament hinges when open.	
	-The length of straps, cross garnet, hook and ride hinges from the joint or knuckle to the point.	
Latches	-The overall length of the plate for mounted latches or the handle for un-mounted latches.	
Locks	The length or width (whichever is greater).	

TABLE 8-7

CLARIFICATION OF RATES

- 8.5. The rates, inter alia, incl particularly:-
 - 8.5.1. Fixing to softwood or hardwood.
 - 8.5.2. Brass articles are to be fixed with brass screws. Black japanned articles to be fixed with black japanned screws. Screws be round or flat headed, as required.
 - 8.5.3. Keys to differ, if required two keys to each lock and stamping as required.
 - 8.5.4. Plugs and plugging to walls, building into walls or floors and making good.
 - 8.5.6. Black japanned finish to all Wrought Iron, Cast and Malleable Cast articles (except hinges).
 - 8.5.7. Burnishing and lacquering of exposed surfaces of Brass fittings.
 - 8.5.8. Easing, oiling and leaving all mongery in good condition.

8.6. If Brass mongery is ordered to be finished "**Copper Bronze**", 33% will be added to the "except fixing" rates.

8.7. "Fixing only" rates incl the supply of screws.

8.8 The rates for "**Fixed in repairs**" incl taking off the old articles and removing to store, also for plugging up old key holes, spindle holes, screw holes etc, where necessary.

ANCILLARY ITEMS (MONGERY)

8.9. The rates for "**Taking off and Re Fixing**" also incl adjustment, plugging up key holes etc, as required.

ITEM RATES

SI No	Description	Unit	Rate (Rs)
	Tower Bolts		
8-1	Supply and fix, 100mm long, W I tower bolts with bright shoots, and fixed with sockets or let into any material.	Each	103.89
8-2	Same as item 08-1, but C P.	Each	103.89
8-3	Same as item 08-1 or 08-2, but fixing only	Each	59.00
8-4	Same as item 08-1 to 08-3, if fixed in repairs.	Each	25.65
8-5	Supply and fix, 100mm long, Brass tower bolts with Brass shoots, and fixed with sockets or let into any material.	Each	187.26
8-6	Same as item 08-5, but fixing only.	Each	59.00
8-7	Same as item 08-5 or 08-6, if fixed in repairs.	Each	25.65
8-8	Supply and fix 150mm long, WI tower bolts with bright shoots, and fixed with sockets or let into any material.	Each	138.52
8-9	Same as item 08-8, but CP.	Each	146.22
8-10	Same as item 08-8 or 08-9, but fixing only.	Each	74.39
8-11	Same as 08-8 or 08-9 or 08-10, if fixed in repairs.	Each	32.07
8-12	Supply and fix, 150mm long, Brass tower bolts with Brass shoots, and fixed with sockets or let into any material.	Each	356.56
8-13	Same as item 08-12, but fixing only.	Each	74.39
8-14	Add to item 08-12 or 08-13, if fixed in repairs.	Each	32.07
8-15	Supply and fix, 200mm long, WI tower bolts with bright shoots, and fixed with sockets or let into any material.	Each	170.59
8-16	Same as item 08-15, but CP.	Each	175.72
8-17	Same as item 08-15 or 08-16, but fixing only.	Each	87.22
8-18	Add to item 08-15 or 08-16 or 08-17, if fixed in repairs.	Each	38.48
8-19	Supply and fix, 200 mm long, Brass tower bolts with Brass shoots, and fixed with sockets or let into any material.	Each	420.69
8-20	Same as item 08-19, but fixing only.	Each	87.22

ANCILLARY ITEMS (MONGERY)

SI No Description	Unit	Rate (Rs)
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SI No	Description	Unit	Rate (Rs)
8-21	Same as item 08-19 or 08-20, if fixed in repairs.	Each	38.48
	Bolts (All Drops)		
8-22	Supply and fix, 300mm long WI , sliding and locking bolts, with staple (Plate thickness 16- 18 gauze).	Each	448.91
8-23	Same as item 08-22, but CP.	Each	493.80
8-24	Same as item 08-22 or 08-23, but fixing only	Each	123.13
8-25	Add to item 08-22 or 08-23 or 08-24, if fixed in repairs.	Each	76.96
8-26	Supply and fix, 300mm long, Brass sliding and locking bolts with staple (Plate thickness 16 -18 gauge).	Each	867.04
8-27	Same as item 08-26, but fixing only.	Each	123.13
8-28	Same as item 08-26 or 08-27, if fixed in repairs.	Each	38.48
8-29	Supply and fixing, 450mm long, WI, sliding and locking bolts with staple (Plate thickness 16 - 18 gauge).	Each	692.60
8-30	Same as item 08-29, but C P	Each	763.15
8-31	Same as item 08-29 or 08-30, but fixing only.	Each	153.91
8-32	Add to item 08-29 to 08-31, if fixed in repairs.	Each	38.48
8-33	Supply and fix, 450mm long, Brass sliding and locking bolts with staple (plate thickness 16 -18 gauge).	Each	1693.03
8-34	Same as item 08-33, but fixing only.	Each	153.91
8-35	Add to item 08-33, or 08-34, if fixed in repairs.	Each	38.48
	Hinges		<i>N</i> C
8-36	Supply and fix, hinges, Butt, Steel , 50mm long.	Each	94.91
8-37	Same as item 08-36, but 75 mm long.	Each	133.39
8-38	Same as item 08-36, but 100 mm long.	Each	180.85
8-39	Same as item 08-36, but 125 mm long.	Each	251.39
8-40	Same as item 08-36 to 08-39,if fixing only	Each	39.76

ANCILLARY ITEMS (MONGERY)

SI No	Description	Unit	Rate (Rs)
8-41	Add to item 08-36 to 08-40, if fixed in repairs	Each	29.50
8-42	Supply and fix, hinges, Butt, Brass, 50 mm long.	Each	118.00
8-43	Same as item 08-42, but 75 mm long.	Each	210.35
8-44	Same as item 08-42, but 100 mm long.	Each	297.56
8-45	Same as item 08-42, but 125 mm long.	Each	448.91
8-46	Same as item 08-42 to 08-45, but fixing only.	Each	39.76
8-47	Add to item 08-42 to 08-46, if fixed in repairs.	Each	29.50
8-48	Supply and fix, hinges, Parliament, Steel , 75mm long.	Each	89.78
8-49	Same as item 08-48, but 100mm long.	Each	116.72
8-50	Same as item 08-48, but 125mm long.	Each	144.93
8-51	Same as item 08-48 to 08-50, but fixing only.	Each	33.35
8-52	Add to item 08-48 to 08-51, if fixed in repairs.	Each	25.65
8-53	Supply and fix, CP hinges, 16 mm wide and 1800 mm long (Piano Type).	Each	173.15
8-54	Same as item 08-53, but 19 mm wide and 1800 mm long (Piano Type).	Each	218.04
8-55	Same as item 08-53, but 25 mm wide and 1800 mm long (Piano Type).	Each	295.00
8-56	Same as item 08-53 or 08-54 or 08-55, but fixing only.	Each	102.61
8-57	Add to item 08-53 to 08-56, if fixing in repairs.	Each	25.65
8-58	Supply and fix CP hinges 25 mm wide and 2025 mm long (Piano Type).	Each	333.48
8-59	Same as item 08-58, but fixing only.	Each	115.43
8-60	Add to item 08-58 or 08-59, if fixed in repairs.	Each	25.65
8-61	Supply and fix, Brass hinges 13 mm wide and 1800 mm long (Piano type).	Each	474.56
8-62	Same as item 08-61, but 16 mm wide and 1800 mm long (Piano type).	Each	532.28
8-63	Same as item 08-61, but 19 mm wide and 1800 mm long (Piano type).	Each	590.00

SI No	Description	Unit	Rate (Rs)
8-64	Same as item 08-61, but 25 mm wide and 1800 mm long (Piano type).	Each	660.54
8-65	Same as item 08-61 to 08-64, but fixing only.	Each	102.61
8-66	Add to item 08-61 to 08-65, but fixed in repairs.	Each	25.65
8-67	Supply and fix, Brass hinges 25 mm wide and 2025 mm long (Piano type).	Each	872.17
8-68	Same as item 08-67, but fixing only.	Each	128.26
8-69	Add to item 08-67 or 08-68, if fixed in repairs.	Each	38.48
8-70	Supply and fix, 250mm hook and eye, WI (pintle) with riveted hooks on plates (or hooks prepared for leading), heavy pattern welded, handmade.	Each	64.13
8-71	Same as item 08-70, but 300mm.	Each	71.83
8-72	Same as item 08-70, but 450mm.	Each	93.63
8-73	Same as item 08-70, but 600 mm.	Each	118.00
8-74	Same as item 08-70 to 08-73, but fixing only.	Each	53.87
8-75	Add to item 08-70 to 08-74, but fixed in repairs.	Each	15.39
	Spring Hinges		
8-76	Supply and fix, 100mm long, Double action, Brass spring hinges.	Per set	307.82
8-77	Same as item 08-76, but 115 mm long.	Per set	346.30
8-78	Same as item 08-76, but 125 mm long.	Per set	365.54
8-79	Same as item 08-76, but 150 mm long.	Per set	410.43
8-80	Same as item 08-76 to 08-79, but fixing only.	Per set	74.39
8-81	Same as item 08-76 to 08-80, if fixed in repair.	Per set	64.13
8-82	Supply and fix, 100mm Brass spring hinges.	Each	260.37
8-83	Same as item 08-82, but 115 mm long.	Each	305.26
8-84	Same as item 08-82, but 125 mm long.	Each	429.67
8-85	Same as item 08-82 to 08-84, but fixing only.	Each	87.22
8-86	Add to item 08-82 to 08-85, if fixed in repairs.	Each	74.39
8-87	Supply and fix, Hydraulic door closer , Pak made .	Each	915.14

SI No	Description	Unit	Rate (Rs)
8-88	Same as item 08-87, but imported.	Each	1628.58
8-89	Same as item 08-87 or 08-88, but fixing only.	Each	145.90
8-90	Add to item 08-87 to 08-89, if fixed in repairs.	Each	89.78
	Latches Rim (Night)		
8-91	Supply and fix, Japanned , pressed, Steel latch , 100 mm long strong brass bolt and knob with 2 brass levers, 2 keys.	Each	487.39
8-92	Same as item 08-91, but fixing only.	Each	121.85
8-93	Add to item 08-91 or 08-92, if fixed in repairs.	Each	25.65
	Locks (Rim)		
8-94	Supply and fix, CP locks , rim or latch, 150 mm with two bolts and two levers, in any pattern/shape, best quality, 2 keys.	Each	572.04
8-95	Same as item 08-94, but fixing only.	Each	123.13
8-96	Add to item 08-94 or 08-95, if fixed in repairs.	Each	25.65
	Locks (Ordinary Cupboards)		
8-97	Supply and fix, CP locks for cupboard 50 mm, complete.	Each	107.74
8-98	Same as item 08-97, but fixing only.	Each	30.78
8-99	Add to item 08-97 or 08-98, if fixed in repairs.	Each	25.65
8-100	Supply and fix, Brass locks for cupboard 50 mm, complete.	Each	120.56
8-101	Same as item 08-100, but fixing only.	Each	30.78
8-102	Same as item 08-100, or 08-101, if fixed in repair.	Each	25.65
	Locks (Furniture)		
8-103	Supply and fix, 44 mm dia, cast brass Knobs, with solid necks, cast Brass Cover rose and escutcheon, WI spindle, (Wilkes Mace's or other equal and approved pattern).	Each	109.02
8-104	Same as item 08-103, but 50mm dia.	Each	123.13

SI No	Description	Unit	Rate (Rs)
8-105	Same as item 08-103, but 63mm dia.	Each	141.09
8-106	Same as item 08-103 or 08-104 or 08-105, but fixing only.	Each	32.07
8-107	Add to item 08-103 to 08-106, if fixed in repairs.	Each	19.24
	Cleats - Belaying		
8-108	Supply and fix, Cleat belaying WI 100mm, for cords etc fixed in and incl circular wooden disc.	Each	93.63
8-109	Same as item 08-108, but CP.	Each	110.30
8-110	Same as item 08-108, but Brass.	Each	130.83
8-111	Same as item 08-108 to 08-110, but fixing only.	Each	21.80
8-112	Add to item 08-108 to 08-111, if fixed in repairs.	Each	15.39
	Eyes, Screws		
8-113	Supply and fix, WI eyes, screws 10mm to 15mm internal dia for cords.	Each	11.54
8-114	Same as item 08-113, but CP.	Each	13.47
8-115	Same as item 08-113, but Brass.	Each	26.93
8-116	Same as item 08-113 or 08-114 or 08-115, but fixing only.	Each	7.70
8-117	Add to item 08-113 to 08-116, if fixed in repairs.	Each	3.85
	Catches Spring		
8-118	Supply and fix, WI catch spring 50mm with projecting ring, and staples or skirting plate (fan light, hung at bottom opening inwards or hung at top opening outwards).	Each	65.41
8-119	Same as item 08-118, but CP.	Each	84.65
8-120	Same as item 08-118, but Brass.	Each	97.48
8-121	Same as item 08-118 or 08-119 or 08-120, but fixing only.	Each	20.52
8-122	Add to item 08-118 to 08-121, if fixing in repairs.	Each	6.41
8-123	Supply and fix, WI catch spring, 63mm with projecting ring, and staples or striking plate (for fan light hung at bottom opening inwards or hung at top opening outwards).	Each	65.41
8-124	Same as item 08-123, but CP.	Each	71.83

SI No	Description	Unit	Rate (Rs)
8-125	Same as item 08-123, but Brass	Each	97.48
8-126	Same as item 08-123 or 08-124 or 08-125, but fixing only.	Each	20.52
8-127	Same as item 08-123 to 08-126, if fixing in repairs.	Each	12.83
	Fastener, Cockspur		
8-128	Supply and fix, WI / Steel fastener, cockspur medium size, with slot (or staples) for casements	Each	61.56
8-129	Same as item 08-128, but Brass.	Each	148.78
8-130	Same as item 08-128 or 08-129, but fixing only.	Each	20.52
8-131	Same as item 08-128 or 08-129 or 08-130, if fixed in repairs.	Each	7.70
8-132	Supply and fix, WI / Steel fastener and stays (casement) 300mm with hinged joint and two plates with studs complete.	Each	164.17
8-133	Same as item 08-132, but Brass	Each	351.43
8-134	Same as item 08-132 or 08-133, but fixing only.	Each	82.09
8-135	Add to item 08-132 or 08-133 or 08-134, if fixed in repairs.	Each	38.48
8-136	Supply and fix, WI / Steel fastener and stays (casement) 380mm with hinged joint and two plates with studs complete.	Each	171.87
8-137	Same as item 08-136, but Brass	Each	402.74
8-138	Same as item 08-136 or 08-137, but fixing only.	Each	82.09
8-139	Same as item 08-136 or 08-137 or 08-138, if fixed in repairs.	Each	38.48
8-140	Supply and fix, WI / Steel studs on plate (when ordered separately).	Each	43.61
8-141	Same as item 08-140, but Brass.	Each	76.96
8-142	Same as item 08-140 or 08-141, but fixing only.	Each	20.52
8-143	Add to item 08-140 or 08-141 or 08-142, if fixed in repairs.	Each	7.70
	Pivots and Sockets (or Sash Centre)		
8-144	Supply and fix, malleable CI pivots and sockets (or sash centre) 56mm plates as	Each	56.43

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SI No	Description	Unit	Rate (Rs)
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for swing sashes.

MILLIAR ENGINEER

SI No	Description	Unit	Rate (Rs)
8-145	Same as item 08-144, but CP.	Each	59.00
8-146	Same as item 08-144, but Brass.	Each	101.33
8-147	Same as item 08-144 or 08-145 or 08-146 but fixing only.	Each	30.78
8-148	Add to item 08-144 to 08-147, if fixed in repairs.	Each	12.83
	Casement Stays		
8-149	Supply and fix, WI casement stays quadrant for fan light 300mm.	Each	274.48
8-150	Same as item 08-149, but Brass.	Each	459.17
8-151	Same as item 08-149 or 08-150, but fixing only.	Each	56.43
8-152	Add to item 08-149 or 08-150 or 08-151, if fixed in repairs.	Each	15.39
	Cleat Hinges		
8-153	Supply and fix, Cleats, wooden not exc 442 cu cm, wrought and splayed to doors and windows, incl 75mm pressed steel butt hinges and fixing with screws.	Each	71.83
8-154	Same as item 08-153, but fixing only	Each	33.35
8-155	Same as item 08-153 or 08-154, if fixed in repairs.	Each	12.83
8-156	Supply and fix, WI handle bow, 150mm overall.	Each	114.15
8-157	Same as item 08-156, but Brass.	Each	229.59
8-158	Same as item 08-156, but C P.	Each	144.93
8-159	Same as item 08-156 or 08-157 or 08-158, but fixing only.	Each	69.26
8-160	Same as item 08-156 to 08-159, if fixed in repairs.	Each	25.65
8-161	Supply and fix, Steel handle complete as required for Z type Steel windows.	Each	137.24
8-162	Same as item 08-161, but Brass.	Each	169.30
8-163	Same as item 08-161, or 08-162, but fixing only.	Each	53.87
8-164	Add to item 08-161 or 08-162 or 08-163, if fixed in repairs.	Each	25.65
8-165	Supply and fix, WI bow with handle canted 250 mm overall for Swing door.	Each	237.28
8-166	Same as item 08-165, but Brass.	Each	427.11

SI No	Description	Unit	Rate (Rs)
8-167	Same as item 08-165, but CP	Each	356.56
8-168	Same as item 08-165 or 08-166 or 08-167, but fixing only.	Each	74.39
8-169	Same as item 08-165 to 08-168, if fixed in repair.	Each	25.65
8-170	Supply and fix, WI drawer handle (drop handle and 2 screws on plate), 75mm grip.	Each	67.98
8-171	Same as item 08-170, but Brass.	Each	124.41
8-172	Same as item 08-170, but CP	Each	85.93
8-173	Same as item 08-170 or 08-171 or 08-172, but fixing only.	Each	43.61
8-174	Same as item 08-170 to 08-173, if fixed in repairs.	Each	19.24
8-175	Supply and fix, WI drawer handles (drop handle and 2 screws on plates) 100mm over all.	Each	85.93
8-176	Same as item 08-175, but Brass .	Each	132.11
8-177	Same as item 08-175, but CP .	Each	102.61
8-178	Same as item 08-175 or 08-176 or 08-177, but fixing only.	Each	43.61
8-179	Same as item 08-175 to 08-178, if fixed in repairs.	Each	19.24
8-180	Supply and fix, WI Flush pattern handle with dished plated 75mm grip.	Each	118.00
8-181	Same as item 08-180, but Brass	Each	159.04
8-182	Same as item 08-180, but CP	Each	134.67
8-183	Same as item 08-180 or 08-181 or 08-182, but fixing only.	Each	43.61
8-184	Same as item 08-180 to 08-183, but fixed in repairs.	Each	19.24
	Hooks		
8-185	Supply and fix, WI hat pegs strong make 125 mm or over.	Each	51.30
8-186	Same as item 08-185, but Brass.	Each	89.78
8-187	Same as item 08-185, but CP.	Each	57.72
8-188	Same as item 08-185 or 08-186 or 08-187, but fixing only.	Each	17.96
8-189	Add to item 08-185 to 08-188, if fixed in repairs.	Each	15.39
8-190	Supply and fix, WI hat and coat hooks strong make 175 mm or over.	Each	105.17

SI No	Description	Unit	Rate (Rs)
8-191	Same as item 08-190, but Brass.	Each	374.52
8-192	Same as item 08-190, but CP.	Each	105.17
8-193	Same as item 08-190 or 08-191 or 08-192, but fixing only.	Each	21.80
8-194	Add to item 08-190 to 08-193, if fixed in repairs.	Each	8.98
8-195	Supply and fix, WI hook for wardrobe (Single) 56 mm long.	Each	41.04
8-196	Same as item 08-195 but Brass.	Each	121.85
8-197	Same as item 08-195 but CP.	Each	70.54
8-198	Same as item 08-195 or 08-196 or 08-197, but fixing only.	Each	21.80
8-199	Add as item 08-195 to 08-198, if fixed in repairs.	Each	8.98
	Hooks and Eyes		
8-200	Supply and fix, WI hooks and eyes 100mm long, 6mm dia.	Each	41.04
8-201	Same as item 08-200, but Brass .	Each	120.56
8-202	Same as item 08-200 or 08-201, but fixing only.	Each	24.37
8-203	Add to item 08-200 or 08-201 or 08-202, if fixed in repairs.	Each	8.98
8-204	Supply and fix, WI hooks and eyes 150 mm long 6 mm dia.	Each	62.85
8-205	Same as item 08-204, but Brass.	Each	171.87
8-206	Same as item 08-204 or 08-205, but fixing only.	Each	24.37
8-207	Add to item 08-204 or 08-205 or 08-206, if fixed in repairs.	Each	8.98
8-208	Supply and fix WI hooks and eyes 300mm long, 16mm dia.	Each	120.56
8-209	Same as item 08-208, but Brass.	Each	293.72
8-210	Same as item 08-208 or 08-209, but fixing only.	Each	24.37
8-211	Add to item 08-208 to 08-210, if fixed in repairs.	Each	8.98
	Screws – Wire Pattern		
8-212	Supply and fix, WI screw wire pattern, 50 mm.	Each	29.50
8-213	Same as item 08-212, but Brass.	Each	34.63
8-214	Same as item 08-212 or 08-213, but fixing only.	Each	25.65
8-215	Add to item 08-212, 08-213 and 08-214, if	Each	8.98

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SI No	Description	Unit	Rate (Rs)
fixed in repairs			

fixed in repairs.

MILLIAR ENGINEER

SI No	Description	Unit	Rate (Rs)
8-216	Supply and fix, WI screw pattern (wire) 100 mm	Each	25.65
8-217	Same as item 08-216, but Brass.	Each	30.78
8-218	Same as item 08-216 or 08-217, but fixing only.	Each	19.24
8-219	Add to item 08-216, 08-217 and 08-218, if fixed in repairs.	Each	8.98
8-220	Supply and fix, WI screws pattern (wire) 150mm.	Each	25.65
8-221	Same as item 08-220, but Brass .	Each	47.46
8-222	Same as item 08-220 or 08-221, but fixing only.	Each	19.24
8-223	Add to item 08-220 or 08-221 or 08-222, if fixed in repairs.	Each	8.98
	Knobs		
8-224	Supply and fix, knobs 30mm cupboard (iron) plain, with screwed end.	Each	56.43
8-225	Same as item 08-224, but fixing only.	Each	15.39
8-226	Add to item 08-224 or 08-225, if fixed in repairs.	Each	7.70
8-227	Supply and fix, knobs 30 mm cupboard (brass) with nut screw and rose.	Each	92.35
8-228	Same as item 08-227, but CP	Each	85.93
8-229	Same as item 08-227 or 08-228, but fixing only.	Each	15.39
8-230	Add to item 08-227 or 08-228 or 08-229, if fixed in repairs.	Each	7.70
8-231	Supply and fix, knob 70mm Iron Japanned with screws bolt and nut as for front doors.	Each	73.11
8-232	Same as item 08-231, but Brass.	Each	150.06
8-233	Same as item 08-231, but CP.	Each	105.17
8-234	Same as item 08-231 or 08-232 or 08-233, but fixing only.	Each	15.39
8-235	Add to item 08-231 to 08-234, if fixed in repairs.	Each	7.70
08-236	Supply and fix, knob 50 mm or 56 mm polished hard wood tapped end with wood screws completed.	Each	50.02
8-237	Same as item 08-236, but fixing only.	Each	15.39
8-238	Add to items 08-236 or 08-237, if fixed in repairs.	Each	7.70
	Hasp and Staple		
8-239	Supply and fix, CP Hasp and Staple, hinged to plate overall length 100mm.	Each	105.17

SI No	Description	Unit	Rate (Rs)
8-240	Same as item 08-239, but Brass.	Each	120.56
8-241	Same as item 08-239 or 08-240, but fixing only.	Each	39.76
8-242	Add to item 08-239 or 08-240 or 08-241, if fixed in repairs.	Each	32.07
	Spring For Doors		
8-243	Supply and fix, 150mm patent Helical Japanese make, steel spring for doors.	Each	309.11
8-244	Same as item 08-243, but Brass.	Each	472.00
8-245	Same as item 08-243, but CP.	Each	321.93
8-246	Same as item 08-243 or 08-244 or 08-245, but fixing only.	Each	59.00
8-247	Add to item 8-243 to 08-246, if fixed in repairs.	Each	25.65
	Turns - Cupboards		
8-248	Supply and fix, brass knob 40mm dia with rose spindle turns and screws completed.	Each	121.85
8-249	Same as item 08-248, but CP.	Each	115.43
8-250	Same as item 08-248 or 08-249, but fixing only.	Each	51.30
8-251	Add to item 08-248 to 08-250, if fixed in repairs.	Each	25.65
	Poles, Curtains etc		
8-252	Supply and fix, poles (soft wood) turned stained and varnished, 30mm to 50mm dia.	Metre	173.15
8-253	Supply and fix, Curtain rail 'C' type with fitting complete best quality as specified.	Metre	129.54
8-254	Same as item 08-253, but fixing only.	Metre	76.96
8-255	Add to item 08-253 or 08-254, in repairs.	Metre	25.65
8-256	Supply and fix, ends (soft wood) for curtain poles turned (incl double ended steel screws) stained and varnished for poles 30mm to 50mm dia.	Each	69.26
8-257	Same as item 08-256, but fixing only.	Each	28.22
8-258	Add to item 08-256 or 08-257, if fixed in repairs.	Each	12.83
8-259	Supply and fix, brackets strong cast Brass for curtain poles, any dia	Pair	677.21
8-260	Same as item 08-259, but fixing only.	Pair	56.43

1	72
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SI No	Description	Unit	Rate (Rs)
8-261	Add to item 08-259 or 08-260, if fixed in repairs.	Pair	25.65
8-262	Supply and fix, white cotton sash lines and CSW cords, 20mm girth, best quality.	Metre	27.10
8-263	Same as item 08-262 but nylons.	Metre	28.38
	Push and Kick Plates etc		
8-264	Supply and fix, Brass or Copper push /plate exc 160 sqcm in area (16-18 gauge)	Each	338.61
8-265	Same as item 08-264, but stainless steel.	Each	321.93
8-266	Same as item 08-264, but CP	Each	296.28
8-267	Same as item 08-264 or 08-266, but fixing only.	Each	39.76
8-268	Add to item 08-264 or 08-267, if fixed in repairs.	Each	15.39
8-269	Supply and fix, Brass or Copper kick plate (16-18 gauge).	Sqm	8687.05
8-270	Same as item 08-269, but Stainless Steel.	Sqm	7450.12
8-271	Same as item 08-269, but CP.	Sqm	4405.37
8-272	Same as item 08-269 to 08-271, but fixing only.	Sqm	1313.05
8-273	Add to item 08-269 to 08-272, if fixed in repairs	Sqm	1028.79
	Knob Lock	P	
8-274	Supply and fix, knob lock CP , 150 mm long	Each	600.26
8-275	Same as item 08-274, but fixing only.	Each	135.96
8-276	Add to item 08-274 or 08-275, if fixed in repairs.	Each	19.24
	Aluminium Door Lock and Closer		
8-277	Supply and fix, Aluminium door lock (Economy model) Anodized Bronze.	Each	356.56
8-278	Supply and fix, Aluminium door lock (Deluxe model) Anodized Bronze.	Each	382.21
8-279	Supply and fix, Aluminium door lock , (Premium model) Anodized Bronze.	Each	577.34

SI No	Description	Unit	Rate (Rs)
8-280	Supply and fix, Aluminium door closer (Deluxe Model) Anodized Bronze.	Each	2190.04
8-281	Supply and fix, Aluminium door closer , single action , (Premium model) Anodized Bronze.	Each	2382.43
8-282	Supply and fix, Floor Concealed Door Closer (swing machine, single/double action), Best quality (Imported) 900. location, applicable for door width upto1250mm with load bearing range upto 150 kg, all as specified.	Each	8795.43

SECTION – 9

STEEL AND IRONWORK

SPECIFICATION

9.0. The work covered under this section consists of steel / iron items like angle, tee, joist / girder, reinforcement bars, pre-stressed reinforcement, plain, black or galvanized sheets, bolts and nuts, wire fencing, G.I wires, woven wires, netting, CI and welding works etc.

MATERIAL REQUIREMENTS

9.1. Plain Corrugated Steel sheeting:- Shall be of the best quality specified for corrugated steel sheeting.

9.2. Galvanizing: Shall be a thorough even coat of zinc, free from stains, bare spots or defects, at the rate of 610 gm of zinc per Sqm of surface, measured on both sides.

9.3. C I Casting:- Shall be clean, sound and free from air holes.

9.4. Steel and Iron incl CI;-

- 9.4.1. Steel shall:-
 - 9.4.1.1. Comply with BS No 15.
 - 9.4.1.2. Be obtained from approved source.
 - 9.4.1.3. Be of tested quality, where required without extra charge.

9.4.2. MS or W I shall comply with relevant BS.

9.4.3. For Steel reinforcement, plain bars should comply with BS 4449 or ASTM 615 and deformed bars shall conform to ASTM A-615, Ribbed, and Tor steel bars shall comply with BS-4461.

9.4.4. Physical Properties:- As given in Table 9-1.

TABLE 9-1

Туре	Grade 40	Grade 60
Vield Strength	40,000 Psi	60,000 Psi
min	2,812 Kg / Sq. cm,	4,218 Kg / Sq. cm,
	276 N/mm ²	414 N/mm ²
Ultimate Tensile	70,000 Psi	90,000 Psi
Strength min.	4,921 Kg / Sq. cm,	6,330 Kg / Sq. cm,
	485 N/mm ²	624 N/mm ²

Tensile Requirements

9.5. The weight of Mild, Ribbed or Tor steel bars will be calculated at rates specified in Table 9-2, with a tolerance of upto 5% either way.

METRIC		IMPERIAL			
Dia in mm	Sectional area in Sq. cm	Weight in Kg per M	Dia in inches	Section Area in Sq. cm	Weight in Kg per M
6	0.283	0.222	1⁄4"	0.317	0.248
8	0.502	0.395	3/8"	0.713	0.559
10	0.785	0.617	1⁄2"	1.267	0.995
12	1.131	0.888	5/8"	1.979	1.554
16	2.011	1.578	3⁄4"	2.850	2.237
18	2.545	2.000	7/8"	3.879	3.045
22	3.801	2.980	1"	5.067	3.978
25	4.909	3.854	1 1/8"	6.413	5.034
28	6.157	4.830	1 ¼"	7.917	6.215
32	8.042	6.313	1 3/8"	9.580	7.520
35	10.179	7.990	1 ½"	11.401	8.950
40	12.566	9.864			
50	19.635	15.410			

TABLE 9-2 WEIGHT OF STEEL

9.6. Pre-stressing Reinforcement Steel:- Pre-stressing Steel shall be High-Tensile Wire grade 250-K, 270-K (Joint less quality) conforming to ASTM Specification A-421; Strand or Rope conforming to ASTM Specification A-416 or High Tensile Alloy bars. as per Table 9 - 3 :-

TABLE 9-3

S.No	Description	Strength Kg /Sq cm (Psi)	
a.	Min Ultimate tensile strength	16,570 (235,000)	
b.	Min Yield strength, measured by 0.7 % extension under Load method shall be not less than	9,100 (130,000)	
c.	Min Modulus of Elasticity	1.75 x 10 ⁶ (25,000,000)	
d.	Min Elongation in 20 bar dia length	4 %	
e.	Dia after rupture	- 0.75 mm	
f.	Dia tolerance	- 0.25 mm	

9.7. High-Tensile-Strength Alloy bars shall be stress relieved and cold stretched to a min of 9,100 Kg / Sq cm. After cold stretching the physical properties shall be as per Table 9 - 4:-

Nominal Dia (mm)	Nominal Cross Section (mm)	Nominal Tensile Strength (N/mm ²)	Min Breaking Load (kN)	Modulus of Elasticity (kN/mm ²)	Nominal Weight per 1000 M (Kg)			
3.0	7.07	1770	12.5	195±10	56			
		1860	13.1					
4.0	12.6	1670	21.0		99			
		1770	22.3					
5.0	19.6	1670	32.7		154			
		1770	34.7					
5.5	23.8	1670	39.7		187			
		1770	42.1					
6.0	28.3	1670	47.2		222			
		1770	50.1					
7.0	38.5	1670	64.3		302			
		1770	68.1					
7.5	44.2	1670	73.8		346			
8.0	50.3	1570	78.9		395			
9.4	69.4	1570	108.9		545			
12.2	116.9	1570	183.5		918			

TABLE 9-4 Weight of Wire with smooth / indented surface

Note:

- i. The steel shall be free from injurious defects and shall have a smooth surface. The Material that shows defect / damage / injury during or prior to installation in the work shall be rejected.
- ii. Wire and strand shall be supplied in coils of sufficient dia to ensure that they lie out straight, when opened.
- iii Engineer-in-Charge may call for a relaxation test on pre-stressing steel in case, he is not satisfied with the source of manufacture. Relaxation for pre-stressing steel shall be measured over a period of thousand (1000) hours stressed at seventy percent (70%) of its ultimate tensile strength giving less than six percent (6%) elongation.

9.8. Bolts and Nuts shall be:-

- 9.8.1. Wrought iron or steel Whit Worth standard pattern
- 9.8.2. Forged with heads in one piece
- 9.8.3. Threaded for required lengths

9.8.4. With full, true, deep threads

9.9. Rivets shall be:-

9.9.1. MS truly shaped and hammer tight fit.

9.9.2. Provided with cheese, countersunk, round head as required

9.10. Testing:-

9.10.1. All wires, strands, or bars to be shipped to the site shall be assigned a lot number and tagged for identification purposes. Anchorage assemblies to be shipped shall be likewise identified.

9.10.2. All samples submitted shall be representative of the lot to be furnished.

9.10.3. All of the materials specified for testing shall be furnished free of cost and shall be delivered in time for tests to be made well in advance of anticipated time of use.

9.10.4. The contractor shall furnish for testing the samples selected from each lot as ordered by the Engineer-in-Charge. The selection of samples shall be made at the manufacturer's plant by the Engineer-in-Charge or his representative.

CONSTRUCTION REQUIREMENTS

9.11. Wire Netting shall be of GI in any width, required from 300 mm to 1800 mm, fixed with galvd wire staples etc, complete. It shall be min 25 mm mesh, 14 SWG.

9.12. Wrought Iron or Mild Steel:- All forgings shall be neatly and soundly made to the dimensions given. Bolts and rivet holes may be punched unless ordered to be drilled.

9.13. XPM shall be 25mm x 25mm mesh or 38mm x 40mm mesh (16 or 18 gauge).

9.14. Generally:- Drilling, punching, forging, screwing, riveting, bolting etc., shall be done in a sound and workman like manners.

9.15. Painting:- Steel work, which will be exposed, shall be thoroughly cleaned and receive one coat of linseed oil or Oxide of Iron paint at work, before bolting or riveting. For additional painting refer to Section 15.

9.16. Steel work in contact with brickwork or block masonry to be grouted with cement.

9.17. Steel work to be buried in Concrete work shall be scraped free from oil, scale or loose rust, with a stiff wire brush, before it is placed in

STEEL AND IRONWORK

position and, except in the case of reinforcement bars, shall be given one coat of cement wash.

9.18. Reinforcement:-

9.18.1. All reinforcing bars shall be bent cold and tied with 16 SWG wire, to keep correct position in centering.

9.18.2. Lengthening of bars will not be done by welding. Bars connected longitudinally are to have the ends bent over the bars to overlap for a length equal to not less than 24 dia in compression e.g in columns and the like, and 45 dia in tension e.g. beams and the like, end to be securely wired. Ends of plain round bars in tension are to be bent over to an inner radius of 2 bar dia and the straight part of the hook to be 4 dia long.

9.19. Pre-stressing Reinforcement Steel

9.19.1. **Pre-tensioning Method:-** Samples at least 2.10 M long shall be furnished of each wire, or strand size. A sample shall be taken from each and every coil.

9.19.2. **Post-Tensioning Method:-** Samples of the following lengths shall be furnished:-

9.19.2.1. For Wires sufficient length to make up one parallel lay cable one and half (1.5) M long, consisting of the same number of wires as the cable to be furnished. For strands, one and half (1.5) M length shall be furnished.

9.19.2.2. For bars to be furnished with threaded ends and nuts, one and half (1.5) M between threads at ends.

9.19.3. Anchorage Assemblies:- Two anchorage assemblies of each size of anchorage to be used shall be furnished, complete with distribution plates.

9.19.4. **Pre-stressing Method:-** The method of pre-stressing to be used shall be optional with the Contractor, provided he introduces no change in the position of centroid of the total pre-stressing force over the length of the member and in the magnitude of the final effective pre-stressing force as prescribed in the Drawings. The pre-stressing system chosen by the Contractor shall have been indicated in the tender. This option shall be subject to all requirements hereinafter specified and with the approval of the Engineer-in-Charge.

9.19.5. Irrespective of the Pre-stressing system to be applied, following points must be ensured.

- i. The safety of the anchorage of the Pre-stressing tendons and their suitability for the transmission of forces, to the concrete under all loads, whatsoever.
- ii. That the actual losses due to friction coincide with the calculated ones for the Pre-stressing.
- iii. The suitability of the proposed steel for the chosen Prestressing system.
- iv. The length of transmission of the force to the concrete and the min strength of the later necessary for pre-stressing in systems, where the pre-stressing elements are fully or partially anchored to the concrete through bond and friction.
- v. The suitability of measures taken to protect Pre-stressing tendons from corrosion until the final tensioning is carried out.

9.19.6. The Contractor shall submit well in advance to the Engineerin-Charge for approval, complete details of the methods, materials, and equipment he proposes to use in the Pre-stressing operations. Such details shall outline the method and sequence of stressing, complete specifications and details of the Pre-stressing steel and anchoring devices proposed for use, anchoring stresses, type of enclosures, and all other data pertaining to the Pre-stressing operation, including the proposed arrangement of the Pre-stressing units in the members.

9.19.7. An agreement certificate for the Pre-stressing system shall be submitted and approved by the Engineer-in-Charge, before any structural member to be pre-stressed may be tensioned; this agreement certificate must be issued by an authorized testing laboratory, otherwise, the Engineer-in-Charge may order such an agreement certificate from a laboratory of his choice, at the cost of the Contractor. All rules referring to this agreement certificate here in after are subject to the approval of the Engineer-in-Charge.

9.20. Pre-stressing Equipment:- Hydraulic jacks shall be equipped with accurate pressure gauges. The contractor may elect to substitute screw jacks or other types for hydraulic jacks. In that case, proving rings or other approved devices shall be used in connection with the jacks. All devices, whether hydraulic jack gauges or other wise, shall be calibrated, so as to permit the stress in the pre-stressing steel to be computed at all times. A certified calibration curve shall accompany each device. Safety measures shall be taken by the contractor to prevent accidents due to possible breaking of the Pre-stressing steel or the slipping of the grips during the Pre-stressing process. All grouting equipments shall be thoroughly washed with clean water at least once every three (3) hours, during the grouting operations and at the end of use for each day.
9.21. Enclosures:- Enclosures for Pre-stressing steel shall be accurately placed at locations shown on the plans or approved by the Engineer-in-Charge. All enclosures shall be of ferrous metallic material and shall be completely mortar-tight with the exception that the contractor, at his option, with the approval of the Engineer-in-Charge, may form the enclosures by means of cores or ducts, composed of rubber or other suitable material, which can be removed prior to installing the pre-stressing reinforcement. Enclosures shall be strong enough to maintain their shape under such forces as will be imposed upon them. They shall be six (6) mm. larger in internal dia than the bar, cable, strand or group of wires, which they enclose. Where pressure grouting is specified, cores or ducts shall be provided with the pipes or other suitable connection for the injection of grout after the pre-stressing operations have been completed.

9.22. Placing Steel: All steel units shall be accurately placed in the position, shown on the drawings or required by the Engineer-in-Charge and firmly held during the placing and setting of the concrete.

9.22.1. Distance from the forms shall be maintained by stays, blocks, ties, or hangers approved by the Engineer-in-Charge. Blocks for holding units from contact with the forms shall be pre-cast mortar blocks of approved shape and dimension. Layers of units shall be separated by mortar blocks or other equally suitable devices. Wooden blocks shall not be left in the concrete.

9.22.2. Suitable horizontal and vertical spacers shall be provided, if required, to hold the wires in place in true position in the enclosure.

9.23. Tensioning

9.23.1. **Pre-tensioning:** The Pre-tensioning elements shall be accurately held in position and stressed by jacks. A record of the jacking force and the elongation produced thereby shall be kept. Several units may be cast in one continuous line and stressed at one time. Sufficient space shall be left between ends of units if necessary; to permit access for cutting after Concrete has attained the required strength. No bond stress shall be transferred to the concrete or end anchorages released, until Concrete has attained a Compressive strength of at least 28 MPa (4000 psi), as shown by cylinder tests, and as approved by Engineer-in-Charge. The elements be cut or released in such an order, that there is min lateral eccentricity of Pre-stress.

9.23.2. **Post-tensioning:-** Tensioning shall be carried out only in the presence of the Engineer-in-Charge or his representative unless permission has been obtained to contrary. Immediately before tensioning, the contractor shall prove that all tendons are free to move

between jacking points and that members are free to accommodate horizontal and vertical movement due to the application of pre-stress.

9.23.3. Tensioning of Pre-stressing reinforcement shall not be commenced until tests on Concrete cylinders, casted with the same Concrete and cured under the same conditions, indicate that the Concrete of the particular member to be pre-stressed has attained a Compressive strength of at least 280 Kg / Sq cm (4000 psi).

9.23.4. After the concrete has attained the required strength, the Pre-stressing reinforcement shall be stressed by means of jacks to the required tension and stress transferred to the end anchorage(s). Stressing shall be from both ends unless otherwise required in the Contract or agreed by the Engineer-in-Charge. The tensioning process shall be so conducted that the tension being applied and the elongation of the Pre-stressing elements are measured at all times. The friction loss in the elements, i.e, the difference between the tension at the jack and the min tension in the Pre-stressing steel shall be determined by the formula:

$$F_t = 2 \left(\mathsf{F}_1 - \frac{acE}{d} \right)$$

Where

- F_t = Total Friction loss
- F_1 = Observed tension at the jack
- a = Cross-sectional area of the pre-stressing element.
- c = Observed elongation of the element when the force at the jack is F_1
- E = Secant Modules of Elasticity of the element for the stress F_1 as determined from the stress-strain diagram of the element.
- d = Distance from the jack to the point of lowest tension in the element.
 Where jacking is done from both ends of the members, the point of min tension is the center of the member. Where jacking is done from one end only, d is the distance to the other end of the member.

9.23.5 Any surplus length of tendon shall be cut off by an approved method, which will not affect the strength of the stressed tendon. Particularly with care, if the use of spark erosion or Oxyacetylene burning methods of cutting is approved by the Engineer-in-Charge. A record shall be kept of gauge pressures and elongation at all times and submitted to the Engineer-in-Charge for his approval within twenty four (24) hours of each tensioning operation. The tendons shall be maintained in such a condition that they can be re-stressed until the Engineer-in-Charge has given final approval after inspecting the tensioning log.

9.24. Grouting of Bonded Steel:-

9.24.1. Post-tensioned pre-stressed bridge members, preferably, shall be of the bonded type in which the tensioned steel is installed in holes or flexible metal ducts cast in the concrete and bonded to the surrounding Concrete by filling the tubes or ducts with grout. The grout shall be a mixture of Cement and Fine sand (passing Sieve #.30) in the approximate proportion of one part cement to 0.75 part sand, the exact proportions to be adjusted to form a grout having proper consistency and under no circumstances, shall the water cement ratio exc 0.45. The Compressive strength of the hardened grout shall not be less than 170 Kg/Sq cm (2400 psi) after seven (7) days at a temperature of 18°C, when making preliminary trials for quality. The grout shall be mixed for two (2) mins and until a uniform consistency is obtained.

9.24.2. The grout shall be fluid (*consistency of thick paint*) but proportioned so that free water will not separate out of the mix. Unpolished Aluminum powder may be added in an amount per sack of Cement as approved by the Engineer-in-Charge. Commercial plasticizers may be used in accordance with the manufacturer's recommendation, provided they contain no ingredients that are corrosive to steel. Sufficient pressure shall be used in grouting to force the grout completely through the duct, taking care that rupturing of the ducts does not occur.

9.25. Sampling and Testing:-

9.25.1. Testing of Pre-tensioned Beams

9.25.1.1 Any beam, required by the Engineer-in-Charge to be subjected to a load test will be selected after transfer and wherever possible, before the beam has been removed from the casting yard to the storage area. The Contractor shall not proceed with a load test until he has obtained the approval of the Engineer-in-Charge to the detailed arrangements. Except where otherwise agreed by Engineer-in-Charge, the load test shall be carried out not less than twenty eight (28) days after casting. The cost of the load test shall be borne by the Contractor.

9.25.1.2. The beam shall be supported at its design points of bearing. The specified test loads shall be applied equally at the third points of the span in not less than ten (10) approx equal stages. The max load shall be sustained for five (5) mins and then removed in not less than five (5) approx equal stages. The mid-span deflection relative to a straight reference line joining the points of support shall be measured for each value of the load and five (5) mins after removal of the load.

9.25.1.3. Loads shall be measured with an accuracy of +2% (plus two percent) or 50Kg and deflections with an accuracy of plus half mm (+0.5mm).

9.25.1.4. The load-deflection graph shall be plotted from these values and shall show no appreciable variation from a straight line. If after five (5) mins of removal of the load the beam does not show a recovery of at least ninety per cent (90%) of the max deflection recorded during the test, the test loading shall be repeated. The beam shall be considered to have failed the test, if the recovery five (5) mins after removal of the test load for the second time is not at least ninety per cent (90%) of the max deflection recorded during the second test.

9.25.1.5. The result of the test shall be deemed to apply to the other beams cast in the same production line but in the event of failure any additional beam may be separately tested at the contractor's option.

9.25.1.6. The contractor shall supply to the Engineer-in-Charge record sheets of the test showing the age of the beam at the time of the test, loads, deflections, load-deflection curves and calculated value of Young's Modules of Elasticity (E).

9.25.1.7. In addition, the record sheets supplied by the contractor to the Engineer-in-Charge shall show the temperatures of the top and bottom surfaces of the beam measured at the time of the test.

9.25.1.8. **Testing of Pre-stressing Anchorages:-** Anchorages for post-tensioning shall be tested in accordance with the procedure described in BS 4447 or as approved by the Engineer-in-Charge. For each anchorage system, used in the Works, the characteristic value for anchorage efficiency shall be not less than ninety per cent (90%)

METHOD OF MEASUREMENTS

- 9.26. Tolerances:- Linear work shall be measured to nearest cm.
- 9.27. Superficial work:
 - i. Length as above.
 - ii. Width to the nearest cm.

9.28. Steel Bar Reinforcement:- Shall be measured gross. Lap shall be measured and hook girth, saddles (chairs) and weight added to the total weight. Patent reinforcement (expanded metal) shall be measured net with no allowance for laps.

9.29. Generally:-All work (except steel reinforcement) shall be measured net and flat (not grithed) as fixed.

9.30. Corrugated and Plain Sheets:- Shall be measured net and no allowance made for laps or welts, sheets cut to shape shall be measured overall the least dimension out of which can be cut.

9.31. **Bolts:-** shall be measured (net length) x fixed girth. MILIAS

CLARIFIICATION OF RATES

- 9.32. The rates, inter alia, incl particularly:-
 - 9.32.1. Reducing to size, shape, figure, etc, incl rolls, welts, seams and all straight cutting and waste.
 - All holes, screw bolts, nuts washers, rivets connection. 9.32.1. packing pieces, wedges, if and where required and grouting, as necessary.
 - 9.32.2. True and square ends neatly cut and fitted notches.
 - 9.32.3. All necessary templates, patterns, moulds, etc.
 - 9.32.4. Jointing etc, for pipe work.
 - Scraping reinforcement, as specified, and all bends, cranks, 9.32.5. hooks, spirals, loops and tying wire, supporting and maintaining in position.
 - 9.32.6. Painting all Iron and Steel work (except WI articles, which will be dipped in hot tar, if required and the items, mentioned below) with one coat of Red Oxide paint, before fixing and coat of paint after fixing. All Steel and Iron in contact with brickwork or concrete will be given a coat of cement slurry.

Exception:- Sheet steel work, sheet iron pipe, reinforcement and galvd work.

- 9.32.7. Mortises, holes, plugs etc, in concrete, brick or stone work and making good.
- Hoisting, erection etc, complete as required. 9.32.8.
- Fixing / Erection only will also incl two coats of paint as 9.32.9. specified above.
- 9.32.10. Welding in lieu of riveting / bolting etc.
- 9.32.11. For more or less cross sectional area of welding, the existing rate shall be increased or decreased proportionally.

STEEL AND IRONWORK

- 9.32.12. Concertina wire 12 gauge galvd, loop dia 0.991 M @ 10 Kg per 5.86 M in length.
- 9.32.13. Razor wire 12 gauge galvd, single coil/cross type, loop dia 0.700 M @ 10 Kg per 10.66 M in length.
- 9.32.14. Razor wire 12 gauge galvd, single coil/cross type, loop dia MILLIARS ENCINEERS SERVICES 0.450 M @ 10 Kg per 13.71 M in length.

180

ITEM RATES

SI No	Description	Unit	Rate (Rs)
	Structural Steel Works		
9-1	Supply and fix, joist, channel, angle or tee sections , fixed independently without connecting plates etc, cut to ordinary length.	Kg	121.64
9-2	Same as item 09-1, but erection only	Kg	7.82
9-3	Add to item 09-1 or 09-2, if fixed in repairs	Kg	4.69
9-4	Supply and fix purlins , hips and the like , main and cross beams or grids with angle cleats or other connecting plates, cut to dead length where required.	Kg	127.66
9-5	Same as item 09-4, but erection only	Kg	10.49
9-6	Add to item 09-4 or 09-5, if fixed in repairs	Kg	6.30
9-7	Supply and fix, built up girders , ordinary and compound stanchion for wheel runs, platforms, gate/door coverings incl screws bolts and nuts etc, or welding in lieu of riveting etc.	Kg	142.47
9-8	Same as item 09-7, but erection only	Kg	10.49
9-9	Add to item 09-7 or 09-8,if fixed in repairs	Kg	6.30
9-10	Supply and fix, roof trusses , framed structure , walls , pieces , purlins , cleats, etc and all connections incl welding in lieu of riveting etc.	Kg	151.14
9-11	Same as item 09-10, but erection only	Kg	19.16
9-12	Add to item 09-10 or 09-11, if fixed in repairs	Kg	11.49
9-13	Supply and fix, framed stair cases, framed doors and gates prepared for attachment of coverings incl hooks, hinges sliding or hanging door fittings, fastenings (except locks) and hanging and fixed complete. (coverings to be paid extra as supply and fix) incl welding in lieu of riveting / bolting etc.	Kg	151.50
9-14	Same as item 09-13, but erection only	Kg	24.69

STEEL AND IRONWORK 18				
SI No	Description	Unit	Rate (Rs)	
9-15	Same as item 09-13 or 09-14, if fixed in repairs	Kg	14.81	
	General Steel Works			
9-16	Supply and fix, holds fast, guard bars, straps tor wooden trusses, holding down bolts with washers, ladders, railing, brackets, pipe supports, tie rods and balusters, chimney bars, chains, rings shackles, hinges any type, gratings or gullies, etc, incl, forging, letting into stone or brick work etc. complete by welding in lieu of riveting/bolting etc.	Kg	171.00	
9-17	Same as item 09-16, but erection only	Kg	45.28	
9-18	Same as item 09-16 or 09-17, if fixed in repairs.	Kg	27.17	
9-19	Supply and fix Wind ties incl punching and fixing in any position complete.	Kg	131.84	
9-20	Same as item 09-19, but erection only.	Kg	27.18	
9-21	Same as item 09-19 or 09-20, if fixed in repairs	Kg	16.30	
9-22	Supply and fix, guard bars, grills, railing, ladders brackets, hooks hold fasts and frames etc, cut to dead length, reduced to size, shape, figure etc., incl punching/drilling holes if necessary and fixing, assembling by welding or with the use of bolts, nuts, rivets washers etc., and erection/fixing in position incl making good the disturbed surface.	Кg	156.13	
9-23	Same as item 09-22, but erection only	Kg	41.27	
9-24	Add to item 09-22 or 09-23, if fixed in repairs.	Kg	24.77	
9-25	Supply and fix, small articles, weighing under 1Kg , hammered from the anvil, heated if necessary, reduced to any size or figure required, incl drilling, punching, riveting and roughly filled if necessary (Articles which cannot be measured but can only be weighed).	Kg	222.99	
9-26	Same as item 09-25, but weighting 1 Kg and over, upto 3Kg	Kg	180.05	

SI No	Description	Unit	Rate (Rs)
9-27	Same as item 09-25 or 09-26, if fixed in repairs.	Kg	62.33
9-28	Add to item 09-25 or 09-26 or 09-27, if fixed in repairs.	Kg	37.40
	Welding		
9-29	Gas welding of MS or WI, 9 Sq mm	Metre	446.09
9-30	Electric welding of MS or WI, 9 Sq mm Screw Bolts	Metre	139.29
9-31	Supply and fix, bolts not exc 10mm dia and length not exc 75mm, with hexagon, incl square, cup or cheese heads, screwed one washer and one hexagon or square nut.	Each	13.08
9-32	Same as Item 09-31, but length exc. 75mm and not exc 150mm.	Each	18.88
9-33	Same as item 09-31 or 09-32, but length exc 150mm and not exc 300mm.	Each	61.21
9-34	Same as item 09-31 or 09-32 or 9-33, but fixing only	Each	3.49
9-35	Add to item 09-31 to 09-34, if fixed in repairs.	Each	1.86
9-36	Supply and fix, bolts exc 10mm, but not exc 18mm dia and length not exc 75mm, with hexagon, square, cup or cheese heads, screwed one or both ends, of one end enlarged or jagged or lewised, each with one washer and one hexagon or square nut.	Each	50.94
9-37	Same as item 09-36, but length exc 75mm and not exc 150mm.	Each	80.44
9-38	Same as item 09-36, but length exc 150mm and not exc 300mm.	Each	123.39
9-39	Same as item 09-36 or 09-37 and 09-38, but fixing only.	Each	4.10
9-40	Add to item 09-36 to 09-39, if fixed in repairs.	Each	2.46
9-41	Supply and fix, bolts exc 18mm but not exc 25 mm dia and length not exc 75mm with hexagon, square, cup or cheese heads, screwed one or lewised each with	Each	147.55

SI No	Description	Unit	Rate (Rs)
	one washer and one hexagon/square nut		
9-42	Same as item 09-41, but length exc 75mm and not exc 150mm	Each	219.38
9-43	Same as item 09-41, but length exc 150 mm and not exc 300mm	Each	305.31
9-44	Same as item 09-41or 09-42 and 09-43, but fixing only.	Each	6.46
9-45	Add to item 09-41 to 09-44, if fixed in repairs.	Each	3.87
	Galvanizing		
9-46	Galvanizing light articles (weight not exc 3 Kg each)	Kg	28.40
9-47	Galvanizing, iron steel work (not elsewhere provided) any description, area galvd measure flat (not girths)	Sqm	161.22
	Cast Iron (CI) work		
9-48	Supply and fix, CI work weight not exc 6 kg un-machined in brackets, gully tops gratings, frames, fire doors, stop cock boxes, manhole covers and the like.	Kg	294.74
9-49	Same as item 09-48, but weight exc 6Kg	Kg	228.83
9-50	Supply and fix, CI work weight not exc 6kg, machine turned, as in pulleys etc.	Kg	426.44
9-51	Same as item 09-50, but weight exc 6kg	Kg	262.75
	Steel Reinforcement		
9-52	Supply and fix, bars round, square or flat incl cutting, bending, binding and placing reinforcement in position	Kg	98.60
9-53	Same as item 09-52, except cost of bars	Kg	14.75
9-54	Supply and fix, bars round, using deformed bars Grade-40 incl cutting, bending, binding and placing reinforcement in position.	Kg	112.58
9-55	Same as item 09-54, except cost of bars.	Kg	14.75
9-56	Supply and fix, bars round , using deformed bars Grade-60 , incl cutting, bending, binding	Kg	118.42

and placing reinforcement in position.

SI No	Description	Unit	Rate (Rs)
9-57	Same as item 09-56, except cost of bars.	Kg	14.75
9-58	Supply and fix, bars round using ribbed , tor steel incl cutting, bending, binding and placing reinforcement in position.	Kg	129.22
9-59	Same as item 09-58, except cost of bars	Kg	14.75
9-60	Supply and fix, steel reinforcement for pre- stressed concrete as in beams, girders etc, incl post-tensioning, all as specified.	Kg	266.10
9-61	Same as item 09-60, except cost of bars.	Kg	65.05
9-62	Supply and fix, XPM (expended metal), 38mm x 44mm mesh (18 gauge) BRC fabric weld-mesh, max-weld etc, in reinforcement or in other positions like doors, partition and lathing for plaster, to shape and size as required, incl binding with 14 SWG wire, nails staples etc., and placing in position, measured net.	Sqm	327.06
9-63	Same as item 09-62, but 25 mm x 25 mm mesh.	Sqm	349.96
9-64	Supply and fit, XPM (expended metal), 38 mm x 44mm (16 gauge) BRC fabric weld-mesh, max-weld etc in reinforcement or in position like doors, partition and lathing for plaster, to shape and size as required incl binding with 14 SWG wire, nails, staples etc and placing in position, measured net.	Sqm	459.04
9-65	Same as item 09-64 but 25 mm x 25 mm mesh.	Sqm	495.40
9-66	Same as item 09-64 or 09-65, but except cost of fabric etc.	Sqm	61.76
	Plain Sheeting		0.
9-67	Supply and fix, black sheets 24 BG in walls, floors, ceiling etc.	Sqm	788.73
9-68	Same as item 09-67, but 22 BG	Sqm	951.45
9-69	Same as item 09-67, but 20 BG	Sqm	1123.53
9-70	Same as item 09-67, but 18 BG	Sqm	1295.61
9-71	Same as item 09-67 to 09-70, but fixing only.	Sqm	91.06
9-72	Supply and fix, GI sheets 24 BG in walls,	Sqm	932.77

SI No	Description	Unit	Rate (Rs)
	floors, ceiling etc.		
9-73	Same as item 09-72, but 22 BG	Sqm	1131.70
9-74	Same as item 09-72, but 20 BG	Sqm	1364.69
9-75	Same as item 09-72, but 18 BG	Sqm	1489.93
9-76	Same as item 09-72 to 09-75, but fixing only.	Sqm	91.06
9-77	Supply and fix, black sheets 24 BG in hearts, troughs, protection sheets behind stoves, coverings to frames and doors including edges sleeve pieces, curb to hearths, over wooden cores, edges mangers etc.	Sqm	910.71
9-78	Same as item 09-77, but 22 BG	Sqm	1068.08
9-79	Same as item 09-77, but 20 BG	Sqm	1256.08
9-80	Same as item 09-77, but 18 BG	Sqm	1436.33
9-81	Same as item 09-77 to 09-80, but fixing only.	Sqm	174.43
9-82	Supply and fix, GI sheets 24 BG in hearts, troughs, protection sheets behind stoves, coverings to frames and doors incl edges sleeve pieces, curb to hearths, over wooden cores, edges mangers etc.	Sqm	1066.10
9-83	Same as item 09-82, but 22 BG	Sqm	1266.05
9-84	Same as item 09-82, but 20 BG	Sqm	1510.13
9-85	Same as item 09-82, but 18 BG	Sqm	1669.56
9-86	Same as item 09-82 to 09-85, but fixing only.	Sqm	178.28
9-87	Supply and fix, pipes of black sheets 20 BG , any dia, welded or riveted side joints (fixed length to nearest 15mm)	Sqm	1378.97
9-88	Same as item 09-87, but pipes of galvd sheets.	Sqm	1448.06
9-89	Supply and fix, pipes of black sheets 18 BG, any dia, welded or riveted side joints (fixed length to nearest 15mm)	Sqm	1391.88
9-90	Same as item 09-89, but pipes of galvd sheet.	Sqm	1573.30
9-91	Same as item 09-89 to 09-90, but fixing	Sqm	174.43

SI No	Description	Unit	Rate (Rs)
	only.		
9-92	Supply and fix, cowl , elbows of black sheets 20 BG, (canister with soot door) bends, taped, oval short pieces for ranges.	Each	528.43
9-93	Same as item 09-92, but of galvd sheets.	Each	620.78
9-94	Supply and fix, cowels, elbows of black sheets 18 BG, (canister with soot door) bends, taped, oval short pieces for ranges.	Each	601.54
9-95	Same as item 09-94, but of galvd sheets.	Each	665.67
9-96	Same as item 09-94 to 09-95, but fixing only.	Each	51.30
	Hoop Iron		
9-97	Supply and fix, hoop iron , 25mm, 18 BG at 0.07 Kg/M in any position (not elsewhere stated) incl laps etc, as required.	Metre	45.01
9-98	Same as item 09-97, but of galvd sheets	Metre	57.13
9-99	Same as item 09-97, but 40mm, 16 BG at 0.15 Kg/ M.	Metre	71.94
	Wire for Fencing etc		
9-100	Supply and fix, barbed wire, galvd 12 gauge, 2 strands 4 points barbs at 75mm apart fixed with staples, nails etc., and connect up ends complete.	Metre	64.71
9-101	Same as item 09-100, but 14 gauge	Metre	51.24
9-102	Same as item 09-100 or 09-101, but fixing only.	Metre	31.04
9-103	Restraining and re-securing, barbed wire fixed with staples, nails etc, and connect up ends complete or taking down and removing to stores per strand.	Metre	19.37
9-104	Supply and fix, 16 SWG galvd plain wire in any position.	Metre	11.98
9-105	Same as item 09-104, but 14 SWG	Metre	14.69
9-106	Same as item 09-104, but 12 SWG	Metre	21.41
9-107	Same as item 09-104, but 8 SWG	Metre	26.79
9-108	Same as item 09-104 to 09-107, but fixing only.	Metre	3.90

100

SI No	Description	Unit	Rate (Rs)
9-109	Add to item 09-104 to 09-108, if fixed in repairs.	Metre	2.33
	Woven Wire Work etc		
9-110	Supply and fix, Wire Netting , Iron galvd 50mm x 50mm mesh,14 SWG and fixed with tinned tacks, G.I staples etc, as required.	Sqm	310.07
9-111	Same as item 09-110, but fixing only.	Sqm	24.37
9-112	Same as item 09-110 or 09-111, if fixed in repairs.	Sqm	14.62
9-113	Supply and fix, Wire Netting, Iron galvd 40mm x 40mm mesh, 14 SWG and fixed with tinned tacks, G.I staples etc, as required.	Sqm	512.83
9-114	Same as item 09-113, but fixing only	Sqm	24.37
9-115	Same as item 09-113 or 09-114, if fixed in repairs.	Sqm	14.62
9-116	Supply and fix, Wire Netting, Iron galvd 25mm x 25mm mesh, 14 SWG and fixed with tinned tacks, G.I staples etc, as required.	Sqm	564.41
9-117	Same as item 09-116, but fixing only	Sqm	24.37
9-118	Same as item 09-116 or 09-117, if fixed in repairs.	Sqm	14.62
9-119	Supply and fix, Wire Netting, Iron galvd 50mm x 50mm mesh, 12 SWG and fixed with tinned tacks, G.I staples etc, as required.	Sqm	390.68
9-120	Same as item 09-119, but fixing only.	Sqm	24.37
9-121	Same as item 09-119 or 09-120, if fixed in repairs.	Sqm	14.62
9-122	Supply and fix, Wire Netting, Iron galvd, 40mm x 40mm mesh, 12 SWG and fixed with tinned tacks, G.I staples etc, as required.	Sqm	564.41
9-123	Same as item 09-122, but fixing only.	Sqm	24.37
9-124	Same as item 09-122 or 09-123, if fixed in repairs.	Sqm	14.62
9-125	Supply and fix, Wire Netting, Iron galvd	Sqm	794.70

SI No	Description	Unit	Rate (Rs)
	25mm x 25mm mesh, 12 SWG and fixed with tinned tacks, G.I staples etc, as required.		
9-126	Same as item 09-125, but fixing only.	Sqm	24.37
9-127	Add to item 09-125 or 09-126, if fixed in repairs	Sqm	14.62
9-128	Supply and fix, Wire Netting, Iron galvd 50mm x 50mm mesh, 10 SWG and fixed with tinned tacks, G.I staples etc, as required.	Sqm	525.35
9-129	Same as item 09;128, but fixing only	Sqm	24.37
9-130	Add item 09-128 or 09¿129, if fixed in repair	Sqm	14.62
	Concertina / Razor Wire		
9-131	Supply and fix, Concertina Wire , coil, 12 gauge galve wire, loop dia 0.991M, complete, all as specified.	Metre	399.29
9-132	Supply and fix, Razor Wire , 12 gauge galvd wire, single coil / cross type, loop dia 0.700 M, with / without clips, all as specified.	Metre	381.33
9-133	Same as item 9-132, but loop dia 0.450M	Metre	271.05
9-134	Same as item 9-131 to 9-133, but fixing only.	Metre	4.25
9-135	Same as item 9-131 to 9-134, if fixed in repairs.	Metre	2.57

SECTION - 10

ROOF COVERINGS AND ROOF TREATMENTS

SPECIFICATIONS

10.0.0. This section consists of following sub sections.

- i. Roof Coverings
- ii. Water Proofing Treatment
- iii Roof Insulation

SUB SECTION 10-1

ROOF COVERINGS

10.1.0. This sub section consists of roof coverings of Corrugated Galvanized Iron (CGI), Mild Steel (MS), Asbestos Fibre Glass, corrugated and plain sheets, incl Ridge gutter and rain water pipes.

MATERIAL REQUIREMENTS

10.1.1. Corrugated Steel Sheeting:-

10.1.1.1. The Sheets to be made of tough mild steel, well annealed, even in temper and thickness, free from holes, cracks, blisters and other defects;

10.1.1.2. The sheets to be perfectly rectangular, the corrugations parallel with the sides and regular in curve, pitch and depth, and the average weight of any ten sheets to be within 7.5% margin of the weights given in Para 10.1.1.3 :-

10.1.1.3. The weight of steel sheet before galvanizing shall be as given below:-

10.1.1.3.1.No.24 BG, weight of girthed surface4.924 Kg per Sqm.10.1.1.3.2.No. 22 BG, weight of girthed surface6.247 Kg per Sqm.10.1.1.3.3.No. 20 BG, weight of girthed surface7.809 Kg per Sqm.10.1.1.3.4.No. 18 BG, weight of girthed surface9.760 Kg per Sqm.10.1.1.3.5.No. 16 BG, weight of girthed surface12.490 Kg per Sqm.10.1.1.3.6.No. 16 BG, weight of girthed surface12.490 Kg per Sqm.

The allowance for increase in weight by galvanizing shall be 610 gm/ Sqm of girthed surface.

10.1.1.4. Galvd steel sheets shall be thoroughly and evenly coated with Zinc, and be free of stains, bare spots and other defects.

10.1.1.5. When not galvd, all sheets are coated immediately after manufacture with one coat of oil paint, applied by dipping or brushing over the whole of the surface of each sheet.

10.1.1.6. The corrugations are to be of standard pattern.

10.1.2. Naini Tal Pattern Roofing:- The side edges of sheets shall be formed to a true curve. Rolls be 75 mm in dia and of the gauge, same as of sheeting.

10.1.3. Plain Steel Sheeting:- Shall be of the quality, specified for corrugated steel sheeting.

10.1.4. Asbestos Cement (AC) / Fibre Cement (FC) Roofing:- Shall be of approved pattern or manufacture.

CONSTRUCTION REQUIREMENTS

10.1.5. Corrugated Sheeting:- Sheet be fixed with galvd screws or bolts, fiber and galvanized curved or limpet washers at a spacing not exc 300 mm centres in case of 8/3 corrugation sheets and at not exc 380 mm centres for 10/3 corrugation sheets on every bearer.

10.1.6. Naini Tal Pattern Roofing:-

10.1.6.1. Sheets shall be fixed with one screw at top center, three iron clips 75 mm x19 mm x 6 mm at each edge joint fixed with two screws 40 mm long and one center clip to bottom of sheet at eaves. Rolls shall be fixed with one screw at top. The sheet shall have an end lap of 150 mm.

10.1.6.2. Batman and Le Mesurier or other types of plain sheet roofing with roll side joints shall be similar to Naini Tal except for such modification as each type necessitates.

10.1.7. Asbestos Cement (AC) / Fibre Cement (FC) Roofing:-Shall be laid in accordance with the manufacturer's instructions. Max spacing of Purlins shall not exc 1372 mm. End lap shall not be less than 150 mm, Side lap shall be 70 mm. Roof pitch / slope in all normal conditions shall not be less than 1 in 20 and shall not exc 1 in 40.

METHOD OF MEASUREMENTS

10.1.8. Measurements:- The net superficial area of sheeting, as fixed, is to be measured on the flat (not girthed corrugations) without any extra allowance for laps or welts.

10.1.9. Cutting:- Sheet cut to shape (as in stepped flashing) shall be measured overall, least dimension out of which the sheet can be cut.

10.1.10. Openings:- No deductions shall be made for opening of any shape not exc 0.4 Sqm.

CLARIFICATION OF RATES

- **10.1.11.** The rates, inter alia, incl particularly
 - 10.1.11.1. All screws, bolts and washers in any position.
 - 10.1.11.2. All cutting and waste
 - 10.1.11.3. Jointing to gutters and pipes.
 - 10.1.11.4. Labour in reducing to size, shape, figure, etc., and all straight, raking and circular cutting, waste, labour and materials in rolls, welts, seams, etc.

KINGANITE STERKICE

SUB SECTION 10-2

WATER PROOFING TREATMENT

10.2.0. This sub-section consists of water proofing treatment i.e felts, building paper, bitumen coating and membranes.

MATERIAL REQUIREMENTS

10.2.1. Bitumen Felt:- Shall be of specified thickness and type. Samples along with relevant literature will be submitted to the Engineer-in-Charge for obtaining approval, before the start of work at site.

10.2.1.1. **Primer**:- Shall conform to ASTM D-41.

10.2.1.2. Bitumen:- Shall conform to ASTM D-312 type-III. Bitumen Grade 10 / 20 PB 4.

10.2.2. Building Paper:- Water proof building or insulating paper shall be of best quality with specified weight, stout, strong and thoroughly impregnated with water proof composition.

10.2.3. Membranes:-Shall be of specified thickness and type. Samples along with relevant literature will be submitted to the Engineer-in-Charge for obtaining approval, before the start of work. Following types are generally available in the market with various brand names:-

- 10.2.3.1. **Bitumen Based Membrane.** Modified Bituminous Membrane is a torch bonding flexible waterproof sheet membrane that consists of a very strong non woven polyester reinforcement, coated on both sides with Modified Bitumen compound. The upper and lower surfaces are covered with Poly Ethylene film. It is also available in a variety of surface finishes for both covered and exposed applications. It is normally available in size of one metre (1M) wide sheet in 3mm and 4mm thickness. The jointing and bonding is done by using Propane gas torch. The material shall meet the requirements of ASTM D446, Heat resistant upto 130^oC and have Tensile strength of 800 N / sq cm.
- 10.2.3.2. Acrylic / Polymer / Synthetic Vinyl (PVC) Flexible Membrane. It is composed of Synthetic Polymer Resins, plasticizers and pigments. It is synthetic Vinyl, a highly flexible and stable material, useful for application as a water barrier, where required. It can be jointed with different types of materials thermally / chemically. It is available in the form of sheets in thickness varying from 0.25mm to 2mm. Application and jointing as per Manufacturer's instructions.
- 10.2.3.3. Elastomeric Cementitious Water Proof Coating: It is a cementitious mix of two components; a powder and a liquid.

It is available in various sizes of packing. Once mixed, it forms an Elastomeric paste which can be sprayed or applied with a brush, keeping the ratio of mix accordingly. Once hardened, it requires mechanical means for removal.

- 10.2.3.4. Admixtures / Construction Chemicals. Various brands of admixtures are available in the market. These may only be used in accordance with the requirements specified in Para 3.6. The exact type and nomenclature will be decided by the designer and approved by the Engineer in Charge. However, some of the locally available types are highlighted below for reference only.
 - 10.2.3.4.1. **Latex** is a Carboxylated Spyrene Butadiene Copolymer. Latex admixture is designed as an integral adhesive for cement bond coats, mortar and concrete to improve bond strength and chemical resistance.
 - 10.2.3.4.2. **Superplast Super Plasticizer** is an advance organic polymer dispersant, used to modify Portland cement grout or concrete.
 - 10.2.3.4.3. **Water Proofing powder** is a balanced blend of sterate water repellant and other chemicals, which once used as admixture which forms an internal barrier against water penetration.

CONSTRUCTION REQUIREMENTS

10.2.4. General:- The work shall comply with the requirements of BS 8218 "Code of practice for Mastic Asphalt roofing" as applicable to the work. Waterproofing shall not be carried out when Ambient temperature is below $5^{\circ}C$ ($40^{\circ}F$) or before any pipes, drains etc. have been installed. The surface to receive water-proofing shall be prepared by filling up all pit holes and crevices with 1:3 cement-sand mortar and high spots shall be chipped off and ground smooth. The surface shall be thoroughly cleaned and shall be perfectly dry.

10.2.5. Priming the Surface:- Over the prepared surface, specified primer shall be applied at the rate of 0.5 lit / sqm.

10.2.6. Sticking Coat of Bitumen / Felt Layers:- Over primed surface, indicated number of layers of roofing felt shall be installed.

- 10.2.6.1. Each layer of Felt shall be preceded by a sticking coat of bitumen @ 0.95Kg / Sqm. Bitumen shall be heated to flow freely but not above 162°C (325°F).
- 10.2.6.2. The Felt shall be laid with 101.6 mm end laps, free of wrinkles or air pockets underneath. While the sticking coat

of bitumen is still hot, Felt will be pressed against the bitumen.

10.2.6.3. Laying of Felt layers shall be started from lower side of the roof. Felts shall be laid in shingle fashion, width overlaps along the length of felts shall be:-

i.	Side over lap	=	50 mm
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ii. End over lap = 150 mm

10.2.7. Covering: Coverings, as specified by the manufacturer will be provided.

10.2.8. Storage: Material should be stored vertically in a clean covered area. Rolls should not be stocked on top of each other.

10.2.9. Health & Safety:- As with all Bitumen products, caution should always be exercised. Protective clothing such as gloves and goggles should be worn. Treat any splashes to the skin or eyes with fresh water immediately. Should any of the products be accidentally swollen, don't induce vomiting, but call medical assistance immediately.

10.2.10. Fixing Bitumen Based Membrane:- This torch bonding membrane will be fixed by applying heat with a Propane Gas torch. The manufacturer's Instructions will be followed to avoid defects and damage to the material.

10.2.11. Admixtures / Construction Chemicals:- Admixtures and other Chemicals which modify the properties of concrete shall be used on the advice of the designer and approval of the Engineer in Charge.

METHOD OF MEASUREMENTS

10.2.12. Measurement:-

- 10.2.12.1. The work shall be measured net as laid.
- 10.2.12.2. Turn ups or turn downs at eaves, verges, abutments, etc, shall not be added to measurements.

10.2.12.3. Lengths and widths shall be measured to nearest cm.

- 10.2.13. Deduction:- No deductions shall be made for:-
 - 10.2.13.1. Cut out in portions in stepped flashing.
 - 10.2.13.2. Opening not exc 0.4 Sqm.
- 10.2.14. Additions:- No additions shall be made for:-
 - 10.2.14.1. Portions turned into groves, joints of walls, etc;
 - 10.2.14.2. Laps, joints, waste;
 - 10.2.14.3. Linings to openings not exc 0.4 Sqm of openings.

MILLITARY ENGINEERS SERVICES

CLARIFICATIONS OF RATES

- 10.2.15. The rates inter alia, incl particularly:-
 - 10.2.15.1. Work complete in all respects, as fixed in any position, or shape etc.
 - 10.2.15.2. 50mm side laps, 150mm end laps, open nailing, cuts, MILLING AND SERVICES wastes, risk, etc.

Sub Section 10-3

ROOF INSULATION

10.3.0. Roof Insulation using brick tiles, PCC tiles, mud and Poly Extruded-Board / Sheet (like Jumbolon etc) are covered in this section.

MATERIAL REQUIREMENTS

10.3.1. Brick Tiles:-

10.3.1.1. Size of tile shall be

i.

- 300 mm x 150 mm x 50 mm.
- ii. 300 mm x 150 mm x 38 mm.
- 10.3.1.2. The plus or minus variation shall not exc by 3.18 mm on width and length. Thickness shall not exc (-) 2.38 mm.
- 10.3.1.3. The avg breaking load applied along the width of the midway between the supports shall not be less than 79.40 Kg when determined in standard manner.
- 10.3.1.4. Water absorption shall not exc 10.5%.
- 10.3.1.5. Tiles shall be square at angles and of uniform shape .It will ring clear and true, when struck, and be approved, before incorporation in the work. These shall be bedded, if required, jointed & pointed on either lower or upper face in appropriate mortar.

10.3.2. Cement Tiles:- These shall be pre-cast from the specified mix. The size shall be as specified. These shall be laid, jointed & pointed in the manner specified above.

10.3.3. Tiles on Mud:- Mud shall be of stiff clay.

- 10.3.3.1. **Mud Mortar:-** Clay for earth fill over, roofs, mud and tiles shall not contain more than 0.5% soluble salts, 0.2% sulphates or 4% organic contents. It shall not contain any gravel, coarse sand, kankar, roots of grass/ plants. Clay be obtained from good earth containing 20-30% Fine Sand.
- 10.3.3.2. **Laying:-** Apply to thickness ordered, and finish to levels, falls, dishings, etc, as required with 3 mm leaping.
- 10.3.3.3. Slope of Mud Roofs:- Min 1 in 40, max 1 in 30.

CONSTRUCTION REQUIREMENTS

10.3.4. The Construction requirements for Roof Insulation using brick tiles and PCC tiles are given in Figures 10-1 and 10-2 respectively:-



METHOD OF MEASUREMENTS

10.3.5. Measurements:- Shall be net.

10.3.6. Openings:- No deductions shall be made for opening of any shape not exc 0.4 Sqm each.

CLARIFICATION OF RATES

- **10.3.7.** The rates, inter alia incl particularly:-
 - 10.3.7.1. Laying complete.

10.3.7.2. Fillets on walls. REAL REAL CREEK

ITEM RATES

SI No.	Description	Unit	Rate (Rs)
	Sheets Roof (With End Laps)		
10-1	Supply and fix, corrugated galvd steel sheet 24 BG, fixed to timber framing or a purlins, with one and half corrugation side laps and 150mm end laps, fixed with screws, fibre and galvd, curved or limpet washers at centre not exc 380mm.	Sqm	1277.02
10-2	Same as item 10-1, but Black Steel sheet	Sqm	856.30
10-3	Supply and fix, corrugated galvd steel sheet 22 BG, fixed to timber framing or purlins with one and half corrugation, side laps and 150mm end laps fixed with screws fibre and galvd curved or limpet washers at centre not exc 380mm.	Sqm	1473.96
10-4	Same as item 10-3, but Black Steel sheet.	Sqm	1046.18
10-5	Same as item 10-1 to 10-4, but except cost of sheets.	Sqm	66.35
	Sheets Roof (Without End Laps)		
10-6	Supply and fix, corrugated galvd steel sheet 24 BG, fixed to timber framing or purlins with one and half corrugation side laps and without end laps fixed with screws fibre and galvd, curved or limpet washers at centre not exc 380mm.	Sqm	1078.27
10-7	Same as item 10-6, but Black Steel sheet	Sqm	725.09
10-8	Supply and fix, corrugated galvd steel sheet 22 BG, fixed to timber framing or purlins with one and half corrugation side laps and without end laps fixed with screws fiber and galvd, curved or limpet washers at centre not exc 380mm.	Sqm	1241.93
10-9	Same as item 10-8, but Black Steel sheet	Sqm	740.52
10-10	Same as item 10-6 to 10-9 but except cost of sheets.	Sqm	63.46

SI No.	Description	Unit	Rate (Rs)
	Sheets with 'U' Bolts incl End Laps		
10-11 	Supply and fix corrugated galvd steel sheet 24 BG, fixed to timber framing or purlins with one and half corrugation side laps and 150 mm end laps fixed with 'U' bolts 10mm dia fibre and galvd, curved or limpet washers at centres not exc 380 mm.	Sqm	1334.74
10-12	Same as item 10-11, but Black Steel sheet	Sqm	914.02
10-13	Supply and fix, corrugated galvd steel sheet 22 BG, fixed to timber framing or purlins with one and half corrugation side laps and 150 mm end laps fixed with 'U' bolts 10mm dia fibre and galvd, curved or limpet washers at centres not exc 380 mm.	Sqm	1531.68
10-14	Same as item 10-13, but Black Steel sheet	Sqm	1103.90
10-15	Same as item 10-11 to 10-14, but except cost of sheets.	Sqm	124.07
	Sheets with 'U' Bolts Without End Laps		
10-16	Supply and fix, corrugated galvd steel sheet 24 BG, fixed to timber/steel framing or purlins with one and half corrugation side laps and without end laps fixed with 'U' bolts 10mm dia fibre and galvd, curved or limpet washers at centres not exc 380 mm.	Sqm	1135.99
10-17	Same as item 10-16, but Black Steel sheet	Sqm	782.81
10-18	Supply and fix, corrugated galvd steel sheet 22 BG, fixed to timber/steel framing or purlins with one and half corrugation side laps and without end laps fixed with 'U' bolts 10mm dia fiber and galvd, curved or limpet washers at centre not exc 380 mm.	Sqm	1299.65
10-19	Same as item 10-18, but Black Steel sheet	Sqm	941.27
	Sheet with 'L' Hooks		
10-20	Same as item 10-16 to 10-19, but except	Sqm	121.18

SI No.	Description	Unit	Rate (Rs)
	cost of sheets.		
10-21	Supply and fix, corrugated galvd iron (CGI) sheet 20 BG, fixed with 'L'- hooks, limpet and bituminous washers end and side laps.	Sqm	1755.92
10-22	Same as item 10-21, but 22 BG.	Sqm	1503.82
10-23	Same as item 10-21, but 24 BG.	Sqm	1306.88
10-24	Same as item 10-21, 10-22 and 10-23,	Sqm	96.20
	Aluminum Sheets		
10-25	Supply and fix, Aluminum sheet, 20 BG, with nails and screws, End and Side laps.(Pak made)	Sqm	1262.69
10-26	Same as item 10-25, but imported sheet.	Sqm	3655.38
10-27	Same as item 10-25 and 10-26, but fixing only.	Sqm	54.83
10-28	Extra, for riveting or bolting, side laps, any gauge, at 225mm centres.	Sqm	52.91
10-29	Extra, for riveting or bolting, end laps, each corrugation.	Sqm	83.37
	Naini Tal Pattern Roofs		
10-30	Supply and fix, corrugated galvd steel sheet 24 BG, fixed complete in all respects with nails, screws, clips etc, in Naini Tal pattern roofs, with rolled side joints, plain, 150mm end laps etc, incl wooden battens, 40mm x 50mm for roll.	Sqm	1784.28
10-31	Same as item 10-30, but Black Steel sheets.	Sqm	1327.86
10-32	Supply and fix, corrugated galvd steel sheet 22 BG, fixed complete in all respects with nails, screws, clips etc, in Nani Tal pattern roofs with rolled side	Sqm	2000.59
	joints, plain, 150mm end laps etc, incl wooden battens 40mm x 50mm for rolls.		<i>(</i> 0 ,
10-33	Same as item 10-32, but Black Steel sheets.	Sqm	1591.83
10-34	Same as item 10-30 to 10-33, but except cost of sheets.	Sqm	517.76
10-35	Supply and fix, corrugated galvd steel sheet 24 BG, fixed complete in all respects with nails, screws, clips etc, in Naini Tal pattern roofs, with rolled side joints, plain, without end	Sqm	1748.89

SI No.	Description	Unit	Rate (Rs)
	laps, sheets, ridges, hips, valley, gutters etc.		
10-36	Same as item 10-35, but Black Steel sheets.	Sqm	1302.90
10-37	Supply and fix, corrugated galvd steel sheet 22 BG, fixed complete in all respects with nails screws clips etc, in Naini Tal pattern roofs, with rolled side joints, plain without end laps, sheets, ridges, hips, valleys, gutters etc.	Sqm	1959.97
10-38	Same as item 10-37, but Black Steel sheets.	Sqm	1560.83
10-39	Same as item 10-35 to 10-38, but except cost of sheets.	Sqm	512.95
	Plain Galvd Sheets		
10-40	Supply and fix, plain galvd steel sheet 24 BG in ridges, hips valleys and straight and stepped flashing roof plates and sleeve pieces etc, incl wooden battens as required.	Sqm	1759.23
10-41	Same as item 10-40, but Black Steel sheets.	Sqm	1332.70
10-42	Supply and fix, plain galvd steel sheet 22 BG in ridges hips, valleys and straight and stepped flashing, roof plates and sleeve pieces etc, incl wooden battens as required.	Sqm	1999.15
10-43	Same as item 10-42, but Black Steel sheets.	Sqm	1555.63
10-44	Same as item 10-40 to 10-43 but except cost of sheets.	Sqm	544.63
10-45	Supply and fix, plain galvd steel sheet 24 BG in ridges hips, valleys and straight and stepped flashing, roof plates and sleeve pieces etc, without wooden battens as required.	Sqm	1396.41
10-46	Same as item 10-45, but Black Steel sheets.	Sqm	969.88
10-47	Supply and fix, plain galvd steel sheet 22 BG in ridges hips, valleys and straight and stepped flashing, roof plates and sleeve pieces etc, without wooden battens as required.	Sqm	1636.33
10-48	Same as item 10-47, but Black Steel sheets.	Sqm	1192.81
10-49	Same as item 10-45 to 10-48, but except cost of sheets.	Sqm	181.81
10-50	Supply and fix, plain galvd steel sheet 20 BG, in Gutters etc with rounded edge any pattern, (fixed length girth not exc	Sqm	2243.04

SI No.	Description	Unit	Rate (Rs)
	450mm wide) with support of galvd WI, 19mm x 6mm strap, spaced not exc one meter apart, incl angles outlet, stop ends etc.		
10-51	Same as item 10-50, but 18 BG.	Sqm	2541.56
10-52	Dismantling corrugated sheets for repair and re-fixing the same with screws.	Sqm	71.95
10-53	Same as item 10-52, but hook bolts or 'U' Bolts.	Sqm	139.93
	Asbestos Cement (AC) Sheet Roofs		
10-54	Supply and fix, AC sheet corrugated or ribbed of any approved make, fixed with screws, hook bolts, 'U' bolts, 10mm dia nuts, GI Limpet washers and fibre washers, as required, in any position.	Sqm	833.96
10-55	Same as item 10-54, but except cost of sheets.	Sqm	136.13
10-56	Add to item 10-54 or 10-55, if fixed in repair.	Sqm	37.60
10-57	Supply and fix, AC sheets, corrugated or ribbed of any approved make and fix with screws, hook bolts, 'U' bolts, 10mm dia nuts, GI limpet washers as required in any position but without end laps.	Sqm	800.80
10-58	Same as item 10-57, but except cost of sheets.	Sqm	131.65
10-59	Add to item 10-57 or 10-58, if fixed in repair.	Sqm	33.03
10-60	Supply and fix AC sheets, corrugated or ribbed with 'L' hooks, 10mm dia limpet and bitumen washers.	Sqm	789.88
10-61	Same as item 10-60, but except cost of sheets.	Sqm	92.06
10-62	Add to item 10-60, 10-61 if fixed in repair.	Sqm	35.42
10-63	Supply and fix, AC two pieces ridging serrated or close fitting of any approved make.	Metre	1210.92
10-64	Same as item 10-63, but except cost of ridges.	Metre	51.73
10-65	Add to item 10-63 or 10-64, if fixed in repair.	Metre	31.04
10-66	Supply and fix, AC sheet two pieces ridging, un-serrated or ventilating of any approved make.	Metre	1054.43
10-67	Same as item 10-66, but except cost of ridge.	Metre	51.73

SI No.	Description	Unit	Rate (Rs)
10-68	Add to item 10-66 or 10-67, if fixed in repairs.	Metre	31.04
10-69	Supply and fix, AC sheet two pieces ridging apron of any approved make.	Metre	1042.49
10-70	Same as item 10-69, but except cost of ridges.	Metre	39.79
10-71	Add to item 10-69 and 10-70, if fixed in repair.	Metre	23.87
10-72	Supply and fix, AC sheet two pieces ridging, barge board or corner pieces of any approved make.	Metre	1064.38
10-73	Same as item 10-72, but except cost of ridges.	Metre	45.76
10-74	Add to item 10-72 or 10-73, if fixed in repairs.	Metre	27.46
10-75	Supply and fix, AC ridging, ridge final of any approved make.	Each	586.9
10-76	Same as item 10-75, but except cost for ridge.	Each	29.85
10-77	Add to item 10-75 or 10-76, if fixed in repair.	Each	17.91
	Gutering		
10-78	Supply and fix, AC eaves gutters, 150mm half round (with socket joints or plain rebated joints) and supports of 18mm x 6mm, GI straps not exc one metre apart, incl angles, drop end, stop end etc.	Metre	551.13
10-79	Same as item 10-78, but except cost of sheets.	Metre	153.23
10-80	Add to item 10-78 or 10-79, if fixed in repair.	Metre	91.93
	Rain Water Pipes		
10-81	Supply and fix, AC building pipe Class 'A', 80mm, with spigot and socket joints and Hexagonal head for rain water incl jointing and supports, MS flat 19mm x 6mm spaced not exc one metre apart.	Metre	337.17
10-82	Same as item 10-81, but 100 mm dia.	Metre	401.63
10-83	Extra, only for AC Bend 80mm dia, as required for AC building pipe.	Each	153.59
10-84	Same as item 10-83, but 100 mm dia.	Each	202.70
10-85	Extra, only for AC Tee junction, 80mm dia as required, for AC building pipe.	Each	177.33
10-86	Same as item 10-85, but 100mm dia.	Each	221.83

SI No.	Description	Unit	Rate (Rs)
	Single Tile Roofs		
10-87	Providing and laying, single layer of 300mmx 150mm x 50mm Flat brick tiles in roof, bedded, jointed and pointed in CM 1:3.	Sqm	613.68
10-88	Same as item 10-87, but size of Flat brick tiles 300mm x150mm x38mm.	Sqm	553.50
10-89	Supply and fix, single layer of 300mm x 150mm x 50mm, CC Type 'B', precast tiles on roof, bedded, jointed and pointed in CM 1:3.	Sqm	727.67
	Insulated Tile Roof		
10-90	Providing and laying, one layer of 300mm x 150mm x 50mm Flat brick tiles in roof, laid on half bricks on edge forming space in between, bedded, jointed and pointed in CM 1:3 incl 300mm x 75mm x 100mm CC perforated tiles, set in CM 1:3 all round, incl two coats of white washing on top. Complete as shown in Figure 10-1 (Coat of hot bitumen on the surface forming bed of half brick on the edge, to be paid separately, if ordered).	Sqm	846.14
10-91	Same as item 10-90, but size of flat brick tiles 300mm x 150mm x 38mm.	Sqm	780.07
10-92	Providing and laying, one layer of 300mm x 300 mm x 50mm, CC Type B Precast tiles on roof, laid on CC Type B precast blocks 75mm x 75mm x 100mm forming space in between, bedded, jointed and pointed in CM 1:3, and incl 300mm x	Sqm	882.54
	75mm x 100mm CC perforated tiles set in CM 1:3 all round, Two coats of white washing on top complete as shown in Figure 10-2 . (Coat of hot bitumen on the surface forming bed of CC. Precast block, to be paid separately, if ordered)		<i>×</i> 0,
40.00		0	400.00
10-93	25mm thick mud plaster and leaping over 50mm thick mud on roofs.	Sqm	186.02

SI No.	Description	Unit	Rate (Rs)
10-94	25mm thick mud plaster and leaping over 75mm thick mud on roofs.	Sqm	202.36
10-95	25mm thick mud plaster and leaping over 125mm thick mud on roofs.	Sqm	235.03
10-96	Mud plaster 25mm thick incl 3mm leaping on roof or floor.	Sqm	153.34
10-97	3mm leaping on roof or floor.	Sqm	65.55
	Felt Work		
10-98	Supply and fix, two ply Felt , bituminous, in flashing and concrete / brick work joint, joint wedged and tucked inside end joints, stuck with approved bituminous adhesive.	Sqm	274.04
	Building Paper		
10-99	Supply of water proofing building or insulating paper, weighing 3.92 Kg per 10 sqm, and fix in any position with 50 mm side and 150 mm end laps and nailing, as described for Felt	Sqm	89.76
	Bitumen Coating		
10-100	One coat of bitumen, applied hot on roof @ 0.75 Kg/sqm and blinded with sand, at 0.012 cum per sqm (incl cleaning surface)	Sqm	141.35
10-101	One coat of water proofing compound, using Bitumen 10/20, applied hot @ 4.90 Kg /10sqm	Sqm	106.73
10-102	Same as 10-101, but @ 14.68kg /10sqm.	Sqm	217.35
10-103	One coat of bitumen 10/20, @ 1.46 kg per sqm, blinded with sand @ 0.012 cum per sqm.	Sqm	247.13
10-104	Same as item 10-103, but @ 2.44 kg/sqm.	Sqm	327.29
10-105	One coat of water proofing primer, cold sticker, (Bituminous Emulsion) @ 0.75 Kg/sqm all as specified.	Sqm	97.16
	Water Proofing Treatments		
10-106	Supply and laying, one layer of Polyester Based Roofing Bitumen Felt,	Sqm	586.88

SI No.	Description	Unit	Rate (Rs)
1.	weighing 16 Kg to 18 Kg /Sqm with side lap, end laps incl, water proofing bitumen primer 0.50 lit /Sqm incl bitumen sticking coat 10/20 @ 0.95 Kg/Sqm, bitumen paint coat @ 0.95 Kg/Sqm over bitumen felt, blinded with 3mm aggregate @ 0.012 Cum /Sqm complete all as specified.		
10-107	Same as item 10-106, but in double layer.	Sqm	934.90
10-108	Two coat of Elastomeric Cementitious Water Proofing Coating, applied as per manufacturer's instructions as specified.	Sqm	313.37
10-109	Providing and laying, 3mm thick Torch Bonding Bituminous Membrane [Poly Propylene (PP) / Poly granular (PG)] with self adhesive side lap 75mm, end lap 100 mm, complete as specified.	Sqm	743.20
10-110	Same as item 10-109, but 4 mm thick.	Sqm	949.09
10-111	Supply and fix, Synthetic Vinyl (PVC) Flexible Membrane , 0.25 mm thick with 75-100 mm side laps / end laps, seamed/ welded thermally /chemically, all as per manufacturer's specification.	Sqm	131.78
10-112	Same as item 10-111, but 0.50 mm thick.)	Sqm	263.47
10-113	Same as item 10-111, but 1 mm thick.	Sqm	526.94
10-114	Same as item 10-111, but 2 mm thick.	Sqm	988.01
10-115	Supply and fix, Poly Extruded board (like Jumbolon etc or equivalent) 50 mm thick density 32-35 Kg /m3, fixed on as roof insulation with ship lap edges having size of sheet 600 x 1250 mm, all as specified.	Sqm	1214.09

SECTION - 11

TERMITE TREATMENT

SPECIFICATIONS

11.0. This section covers termite treatment of old and new buildings and joinery works.

MATERIAL REQUIREMENTS

11.1. Termite Treatment:- The chemicals approved by Pakistan Council of Scientific and Industrial Research (PCSIR) like *Fiprokil, Biflex, Agenda, Dursban* etc, shall be used with approval of Engineer-in-Charge.

CONSTRUCTION REQUIREMENTS

11.2. New Buildings (Pre-Construction Treatment)

- 11.2.1. Treatment of beds and sides of excavated foundation trenches.
- 11.2.2. Treatment of back fills.
- 11.2.3. Treatment of filled up earth.
- 11.2.4. Treatment of surrounding areas within 5M of the building.
- 11.2.5. Any other operation, which the specialized firm may consider necessary in context to their guarantee obligations.

11.3. Old buildings (Post-Construction Treatment

- 11.3.1. Provision of Exterior Chemical barrier around the plinth protection by drilling 13mm dia holes to a depth of 600-900 mm at intervals of 1200-1500 mm and by filling these holes with approved Termite Proofing chemical in required quantity, having dilution as recommended by the manufacturer of chemical and sealing with chemical paste.
- 11.3.2. Provision of Interior Chemical barrier as Para 11.3.1 above, but drilling 6-13 mm dia holes and sealing with cement /chemical paste.
- 11.3.3. Barrier on either side of interior walls of the building as Para 11.3.2 above.
- 11.3.4. Any other additional operation, which the specialized firm may consider necessary, in context to their guarantee obligations.
TERMITE TREATMENT

11.4. Wooden joinery:- (Doors, windows, CSWs, wooden partition, floors, ceilings etc.). Termite proofing to new and old joinery, wooden partition, ceilings and floor etc. is for unit area (length and breadth) covering following operations.

- 11.4.1. **New Joinery**:- Treatment of frames boarding and fillets etc with Termite chemicals suitable for wood preservation with brush coating or spraying, as approved by the Engineer-in-Charge.
- 11.4.2. **Old Joinery**:-Treatment of frames of joinery, cupboards, ends of trusses / framings in ceiling etc by drilling holes 6-13 mm dia at the side / back, at intervals of 300 - 450 mm around the same. These holes and any cracks found along the chowkats, frames, embedded ends of frames etc, are filled with approved Termite Chemical and plugged with cement / chemical paste as considered necessary by the specialized firm in context to their guarantee obligations.

METHOD OF MEASUREMENTS

11.5. For new or old building, area shall be measured along the outer side of walls at DPC level.

CLARIFICATION OF RATES

11.6. The rates are for one storey i.e basement or Ground Floor.

11.7. For wooden joinery, partition and ceilings etc, rates are applicable to all floors and shall be measured on one side only. Wooden trusses and beams etc, shall be measured (length x girth) of the item.

SI No.	Description	Unit	Rate (Rs)
11-1	Termite proofing of new buildings incl wood-work therein with approved chemicals.	Sqm	71.38
11-2	Termite proofing of old buildings with approved chemicals.	Sqm	61.73
11-3	Termite proofing of new and old wooden joinery, partition walls, trusses, ceilings and floors etc with approved chemical.	Sqm	60.13

ITEM RATES

SECTION-12

FLOORING AND TILING

SPECIFICATIONS

12.0. This section covers flooring of bricks, concrete, stonolithic, terrazzo, glazed tiles, marble, granite, aluminium composite panel (wall cladding), wooden floor and pavers.

MATERIAL REQUIREMENTS

12.1. Cement:- Shall be Ordinary, Normal Setting Cement of any brand, complying in all respects with BS No.12, unless, otherwise, specified to be of any particular quality.

12.2. Hardcore:- Shall be hard, free from dust and broken to gauge, not exc 63 mm. Any of the material, specified for aggregate may be used. It shall compose of one part of cement and three parts of aggregates.

12.3. Stonolithic Wearing Course:- The aggregate shall be of approved hard crushed stone, made up with equal parts of 3 mm and 6 mm screening. No Sand will be used.

12.4. Terrazzo:-

12.4.1. Marble Chips:- Shall be crushed marble of best quality, white or coloured, having an abrasive hardness of not less than 16 and the size shall vary from No. 4 to No 8 or as specified.

12.4.2. Dividing Strips:- Shall be marble / aluminum / brass having thickness and width as specified.

12.5. Terrazzo (Mosaic) Tiles:- The tiles shall adhere to the specifications given below and approved by the Engineer-in-Charge. These will be hydraulically compressed at 140 Kg / Sq cm. Normal size and thickness of the tiles shall be as follows:-

- 12.5.1. 200 mm x 200 mm x 20 mm of White or Ordinary cement, with coloured or white marble chips of ratio 2 parts of cement and 3 parts of marble chips (max size 10 mm) with 10mm thick topping on 10mm thick base of CM 1:2.
- 12.5.2 300 mm x 300 mm x 25 mm of White or Ordinary cement, with coloured or white marble chips of ratio 2 parts of cement and 3 parts of marble chips (max size 13 mm) with 13mm thick topping on 12mm thick base of CM 1:2.

12.6. Glazed / Ceramic / Porcelain Tiles:- The glazed / Ceramic/ Porcelain tiles shall be of first quality, type, size and approved by the Engineer-in-Charge:-

12.6.1. **Floor Tiles Full Body:-** Shall have hard and tough material of full thickness of the tile.

12.6.2. **Floor / Wall Glazed tile:-** Shall have 1mm thick glazing on top of the tile.

12.7. PVC Tiles:- Shall be of specified thickness and type, locally manufactured. Samples will be submitted to the Engineer-in-Charge for obtaining approval, before the start of work.

12.8. Artificial Stone Face Tiles:- These are artificial stone face tiles, prepared by incorporating cement, reclaimed stone and pigments etc. The face is treated with specially prepared hardener in order to produce a strong, durable and weather resisting product. It is moulded in vibrating compaction moulds for the desired density. The appearance is matt and of different sizes. The thickness of these tiles varies from 13-25 mm. The quality shall be approved by the Engineer-in-Charge, before incorporation.

12.9. Marble Tiles:- Marble shall be compact, dense, metamorphic rock of lime stone origin, from quarries in Pakistan. It shall have Specific Gravity of about 2.7 and density of 2723.14 Kg / Cum (170 lbs / Cuft). It must be evenly grained with sugar-like appearance, when broken. The type of marble, size and thickness shall be as specified.

12.10. Granite Tiles:- Granite shall be of approved quality, colour and grain. It may be imported or local, as approved by the Engineer-in-Charge. The type of granite tile, size and thickness shall be as specified.

12.11. Aluminium Composite Panel (Wall Cladding):- Used for interior and exterior building cladding and signage. It shall be of specified thickness and type, local or imported. Manufacturer's samples along with relevant brochure will be submitted to the Engineer-in-Charge for obtaining approval, before the start of work. It will consist of the following:-

- 12.11.1. Top layer:- Aluminium coated with choice of PVDF or Polyester
- 12.11.2. **Core:-** Non-toxic material of the choice of Polyethylene or fire retardant minerals.
- 12.11.3. Bottom layer:- Aluminium in mill finish or coated with primer paint.

12.12. Parquet Wooden Flooring:- Shall consist of wooden blocks of well-seasoned Shisham timber, laid closely and uniform in colour.

12.13. Paving Stones:-

12.13.1. **Strength:-** Min 28 days Cylinder Compressive strength for 50 mm thickness shall be 35 MPa (5000 psi) and for 60 / 80 mm thickness, it shall be 48 MPa (7000 psi).

12.13.2. **Thickness of Sub Base and pavers:-** Recommended thickness of sub base and pavers is shown in Table 12-1

Application	Thickness mn	of sub-base n (in.)	Thickness of paver	
	Dry Area	Low Wet Area	(mm)	
LIGHT DUTY Residential, drive way, walk ways, parking patios etc.	0 to 76 (0 to 3)	100 to 204 (4 to 8)	50	
MEDIUM DUTY Residential, Streets, Public Parking, service road, maintenance area, canal lining, storage area, City petrol pumps etc.	100 to 152 (4 to 6)	254 (10)	60	
HEAVY DUTY City Streets, Loading deck Industrial floors, Highway petrol pumps etc.	204 (8)	305 (12)	80	

TABLE 12-1

12.13.3. **Shapes** and details of different pavers are shown in sketches given in Figure 12-1:-

12.13.4. **Quantity and thickness** required per Sqm of different shape and size is shown in Table 12-2:-

TABLE 12-2

Specification for the Paving Stone

S.No	Туре	Thickness (mm)	Area per Tile Sq cm (Sq In.)	Nos. of Tiles/Sqm (Tiles/Sq Ft)
1.	Uni-Block	50/60/80	249.74 (38.71)	39.81 (3.70)
2.	I-Section	50/60	270.83 (41.98)	36.90 (3.43)
3.	Rectangle	60/80	196.90 (30.52)	50.67 (4.71)
4.	Half Rectangle	60	128.12 (19.86)	78.01 (7.25)
5.	Wavy	60	275.99 (42.78)	35.83 (3.33)
6.	Hexagon	60	346.64 (53.73)	28.83 (2.68)
7.	Delta	50	245.74 (38.09)	40.67 (3.78)

FLOORING AND TILING

FIGURE 12 – 1 SKETCHES OF VARIOUS COMMON PAVING STONES

SHOWING SHAPES AND DIMENSIONS

EN CANER SEE





CONSTRUCTION REQUIREMENTS

12.14. Concrete Floor Finishes:- The surface of concrete floors shall be finished fair, smooth with neat cement @ 0.06 bag / sqm and steel trowelled. The floors shall be laid in alternate bays with wrought wood parting slip (expansion joints), which shall be left in, if required. Pre-cast floor slabs shall have fair edges.

12.15. Stonolithic Wearing Surface:- The stonolithic wearing surface must be floated on the under layer of Ordinary concrete, immediately after the later has been laid and before it has commenced to set. Sufficient quantity of stonolithic being mixed at the same time as the concrete for the under layer is being mixed. Particular care is taken to remove any dust and to use min amount of water, for mixing. The surface shall be well rubbed with carborundum blocks #.80 (gittee), 3(three) days after laying.

12.16. Terrazzo (Mosaic) Floor Finish:-

12.16.1. The thickness of terrazzo finish shall be 10 mm. It shall consists of one part of Cement and two parts of marble chips, passing through 5 mm and retained on 2 mm screen. If both Coloured and White marble chips are ordered, they shall be mixed in the proportion of 1:3. This top layer of terrazzo finish shall be laid within 30 minutes after laying the base under layer. The colour of pigment, where used, shall be approved by the Engineer-in-Charge. The colouring pigments will **not** be added to the Grey cement.

12.16.2. Surface of terrazzo shall be rubbed with carborundum blocks, after 3 days of laying, beginning with coarser grade till smooth surface is obtained.

12.16.3. Finally, Oxalic acid powder shall be rubbed on the surface with pieces of felt and a few drops of water. Glossy finish shall be obtained by applying an approved floor polish.

12.16.4. In walls, dados, skirting and the like, the terrazzo finish shall be given a base by rendering of CM (1:3) of specified thickness.

12.16.5. The top of the base shall be crosshatched, so as to provide strong bond between the base and the terrazzo finish.

12.16.6. When 13 mm thick terrazzo is specified, marble chips passing through 10 mm and retained on 3 mm screen will be used.

12.17. Terrazzo (Mosaic) Floor Tiles (Laying / Jointing and Finishing):-A padding or cushioning layer 25 mm thick, consisting of 1 part of freshly cement and 3 parts of clean coarse sand shall be spread evenly and to the required slope/level, giving due consideration to thickness of tiles to ensure correct finished floor slope/level, as instructed by the Engineer-in-Charge. Tiles shall then be fixed on the CM by spreading a thin even layer of neat Cement slurry (using 4.10 Kg cement per Sqm area) and the tiles shall be worked into mortar with a wooden mallet to ensure correct slope/level and adhesion. All joints shall be approximately 1.5 mm wide and parallel to walls. After laying tiles in particular area, the surface shall be washed down at the end of the days work and any unevenness removed. No traffic shall be allowed on tiles laid, for 3 days. After 24 hours, the tiles shall be grouted with coloured cement, as in the matrix of the tiles, ensuring filling of all joints. The top surface of the joint shall be lightly sprinkled with water to ensure adequate curing of jointing cement. After a min 7 days, the floors shall be ground with portable machines, using carborundum stone of grit size 60-80. The floors shall then be washed down and grouted with cement as in matrix of tile, ensuring filling of all joints and cavities, which may appear. Grouting material shall be cured, as stated above. Just prior to polishing, the floors shall be ground down, using fine grit carborundum stone i.e 200 or finer, washed with a weak acid such as Tartaric or Oxalic Acid to remove all surface impurities. The tiles shall then be waxed with machine to a full gloss. No traffic shall be allowed on waxed floors until the wax has hardened.

12.18. Glazed / Ceramic / Porcelain Tiles:-

12.18.1. Glazed tiles shall be laid /fixed on CM 1:4 screed of 13 mm thickness. Old wall shall be well watered and the screeding left slightly rough (by being cross hatched). Tiles, first well soaked in water, are bedded in cement paste, the paste being "buttered" on the back of the tiles to give a bed of 6 mm, after which tile is pressed and tapped home. The joints between the tiles shall be grouted with White or Coloured cement, according to colour of tiles.

12.18.2. In case of split tiles, these should not be soaked or wetted, before use. Min thickness of mortar bed should be 10 mm and the joint between the tiles be 3 - 5 mm.

12.19. Marble / Granite Floor and Tiles (Laying / Jointing and Finishing):- The method for laying these tiles shall be the same as highlighted for Terrazzo (Mosaic) Floor tiles in Para 12.17.

12.20. Wall Cladding (Aluminum Composite Panel):- Shall be provided by aluminum crafts-man on wood or aluminum frame work according to manufacturer's instructions.

12.21. Parquet Wooden Flooring:- Wooden block shall be fixed with chemical compound approved by the Engineer in Charge, when laid on concrete. Long bottom edges of blocks shall have dovetailed grooves 3 mm x 6 mm, in order to key the blocks to the cement. Top surface shall be smoothed using sandpaper etc and wax polished. Fixing arrangement

of wooden moulded blocks is shown in sketches 1 to 4 given in Figure 12-2.







Sketch-2

12.22. Paving Stones

12.22.1. **Sub-Base:-** The sub-base for approach roads, driveways and parking lots used for low speed traffic, should comprise of min 150 mm thick compacted. For areas to be used for pedestrians only, well-compacted earth is sufficient. The sub-base may have been used by site traffic, before the paving is laid. It must, therefore, be inspected to make sure that it is structurally sound, free of debris or mud and that its surface level is correct. Any faults must be rectified, before Laying course is spread.

12.22.2. **Laying Course:** The Laying course, about 50 mm thick after vibration, consists of clean, washed, sharp sand, containing not more than 3% of Silt and Clay by weight. To achieve the best regularity in the finished surface, the sand should be uniform in type and moisture content, spread to a smooth level, without uneven compaction. To help maintain uniformity, the sand should be obtained

from a single source, allowed to dry before use and sheeted over to minimize changes in moisture content.

12.22.3. **Screeding to Level:-** Screeding is done by traditional methods. For roads upto 5 M wide, it can be done from the kerbs and for wider roads or over large areas, temporary screed rails set to level be used.

12.22.4. **Surcharge:** After final vibration, the Inter-lock pavers will be lower than their initial level, because, the laying course sand has been compacted and some moved up into the joints between the blocks. Thus, the sand has to be laid to a surcharge, the amount of which depends on the type and moisture content of the sand, but, is normally in the range 5-15 mm.

12.22.5. Surface Course

12.22.5.1. Placing the First Pavers

- i. The positioning of the first Inter-lock pavers demand extra care. To give the required laying pattern the pavers must be placed at the correct angle against a firm starting edge.
- ii. Each inter-lock paver has to be placed very carefully, so as not to disturb its neighbours, and it is not disturbed, until three or four rows have been placed so that normal rapid laying rates can be achieved.
- iii.. The order of laying must ensure that the pavers can be placed easily and in such a way that it is never necessary to force a paver between those already laid.

12.22.5.2 Laying

- i. Each inter-lock paver must be placed firmly against its neighbours, being held slightly above the Laying course, so as not to disturb sand until paver is in its correct place.
- ii. All inter-lock pavers must be laid, so that they fit closely together. If joints begin to open, the pavers should be knocked together with a wooden hammer. Care must be taken not to tilt pavers on the leading edge of the laying face, by standing or kneeling on them.
- Paver laying is continued until enough area has been laid, to make vibration worthwhile, say 15-20 Sqm. Men or light equipment can move over the pavers before, they have been vibrated. At this stage an

uneven surface may be faced, but, this will be ironed out by the plate vibrator.

12.22.5.3. Edging

- i. Where inter-lock pavers do not fit at the edges, the spaces are filled with cut pieces, but, very small pieces are best chipped off with a bolster and hammer.
- ii. Where the gaps are small, e.g less than 50 mm, they can be filled with 1:4 cement sand mortar.

12.22.5.4. Vibration

- The inter-lock pavers are vibrated to their final level with plate vibrator, having a plate 0.2-0.3 Sqm and a centrifugal force of approximately 1Ton is suitable. There is no advantage in using a heavy machine.
- ii The vibration should be guided over the whole area, avoiding any un-restrained edge by about a meter. Two or three passes are normally needed to vibrate finished level.
- 12.22.5.5. **Filling the joints:** After the initial vibration, sand is brushed over the surface of the pavers and is vibrated into the joints by further two or three passes of the plate vibrator. After all the joints are filled, surplus sand can be swept away. The paved area is now ready for use.

12.23. Screed Bed on Bond Breaking Layer (Refer to TI - 52-F)

12.23.1. Contents

- i. Port land Cement = 50 Kg (one bag)
- ii. Acetylene black (Calcium Carbide) = 0.80 Kg
- iii. Coarse sand = 0.06 Cum
- iv. Screening 13 mm = 0.09 Cum

12.23.2. The water contents are kept sufficiently low to affect a slump of less than 25 mm. The sand, Acetylene black (Calcium Carbide) and Cement are mixed together first and then water is added, before the Coarse aggregate. If a revolving drum type mixer is used, the order of mixing may have to be altered to prevent balling of mix. Mixing should be continued for 2-3 minutes.

12.24. Sodium Silicate Application:-

12.24.1. Three coats of Sodium Silicate will be provided as approved by the Engineer-in-Charge.

12.24.2. The first application shall consist of 1 part of Sodium Silicate to 5 parts of clean water and the second and third coat shall consist of 1 part of Sodium Silicate to 6 parts of clean water. The first application shall be given over the surface after 10 days of laying the concrete. The second and third application shall be given after first and second have dried. Uniform application shall be ensured by using broom and a can fitted with rose.

METHOD OF MEASUREMENTS

12.25. Measurements:- All work be measured net and flat (not girthed).

12.26. Openings:- No deduction or additions shall be made for opening not exc 0.4 Sqm.

CLARIFICATION OF RATES

- 12.27. The rates, inter alia, incl particularly:-
 - 12.27.1. Rendering, forming base of tiles is to be paid for separately at the relevant rates.
 - 12.27.2. Thickness of hard core will be of the finished work after ramming and not the thickness as spread.
 - 12.27.3. Channel formed in concrete floors:- When over 40 Sqcm in section, the curved water way shall be deducted as ³/₄ x width (max dimension).
 - 12.27.4. Cement shall not be issued under Schedule 'B' for pre-cast / manufactured items i.e mosaic tiles, paving stones etc.

ITEM RATES

SI No	Description	Unit	Rate(Rs)
	Sub Floors		
12-1	Providing and laying hard core of any description , any thickness, spread, level and ramming, filling under floors.	Cum	2250.05
12-2	Providing and laying CC 1:4:8, laid under floor using shingle or gravel.	Cum	4385.50
12-3	Same as in item 12-2, but using crushed or broken stone.	Cum	4753.73
12-4	Providing and laying CC 1:6:12, laid under floor, using shingle or gravel.	Cum	3530.29
12-5	Same as item 12-4, but using crushed or broken stone. Floors	Cum	4149.96
12-6	Providing and laying burnt bricks, laid flat in floors, roofs and channels etc, laid, jointed in sand or mud.	Sqm	507.27
12-7	Same as item 12-6, but laid on edge.	Sqm	741.48
12-8	Providing and laying burnt bricks, laid flat in floors, roofs and channels etc, laid, jointed and pointed in CM 1:4.	Sqm	678.02
12-9	Same as item 12-8, but laid on edge.	Sqm	972.83
12-10	Providing and laying burnt bricks, laid flat in floors, roofs and channels, etc laid, jointed and pointed in CM 1:6.	Sqm	657.74
12-11	Same as item 12-10 but laid on edge.	Sqm	942.08
12-12	Providing and laying, CC Type 'C' , as in floor, slabs, surface finished smooth with neat cement and steel trowel, using shingle or gravel.	Cum	4986.55
12-13	Same as item 12-12, but using crushed or broken stone.	Cum	5345.81
12-14	Providing and laying CC Type 'B' as in floor, slabs, surface finished smooth with neat cement and steel trowel, using shingle or gravel.	Cum	6072.41
12-15	Same as item 12-14, but using crushed or broken stone.	Cum	6415.20
12-16	Providing and laying, CC Type 'C,' using shingle or gravel, laid in floor, slabs as under layer for Terrazzo / Stonolithic/tiles	Cum	4389.93

SI No	Description	Unit	Rate(Rs)
	top finished.		
12-17	Same as item 12-16, but using crushed or broken stone.	Cum	4748.31
12-18	Providing and laying, CC Type 'B,' using shingle or gravel, laid in floor, slabs as under layer for Terrazzo / Stonolithic/tiles top finished.	Cum	5437.90
12-19	Same as item 12-18, but using crushed or broken stone.	Cum	5818.28
	Paving Stones		
12-20	Providing and laying, CC Paving stone, 50 mm thick in natural colour, as in floors, drive-way, walk-way etc, any pattern and any shape, (Hydraulically compressed), laid and jointed in sand, incl 50mm thick sand bed as laying course, all as specified.	Sqm	765.79
12-21	Same as 12-20, but in any colour (except natural colour).	Sqm	807.84
12-22	Providing and laying, CC Paving stone, 60 mm thick in natural colour, as in floors, streets, public parking etc, any pattern and shape, (Hydraulically compressed), laid and jointed in sand, incl 50 mm thick sand bed as laying course, all as specified.	Sqm	839.35
12-23	Same as 12-22, but in any colour (except natural colour).	Sqm	881.38
12-24	Providing and laying, CC Paving stone 80 mm thick, in natural colour, as in floors loading decks, highway petrol pumps etc, any pattern and shape, (Hydraulically compressed), laid and jointed in sand, incl 50mm thick sand bed as laying course, all as specified.	Sqm	970.46
12-25	Same as item 12-24, but in any colour	Sqm	1012.49
	(except natural colour).		
12-26	Supply and fix 2 mm thick and 40 mm	Motro	57 20
12-20	wide aluminium dividing strips, in floors.	weue	57.28
12-27	Same as item 12-26, but 25 mm wide.	Metre	53.38

SI No	Description	Unit	Rate(Rs)
12-28	Supply and fix, 8-10 mm thick and 40 mm wide marble patty, as dividing strip in floors.	Metre	53.93
	Hard Wearing Surfaces		
12-29	Providing and laying, 13 mm thick Stonolithic layer, spread over ordinary concrete floor etc, incl cutting and rubbing as specified.	Sqm	370.75
12-30	Same as item 12-29, but 20 mm thick.	Sqm	465.12
12-31	Providing and laying, 13 mm thick Stonolithic, as finishing surfaces of concrete stair treads, incl round rises, cutting and rubbing.	Sqm	395.16
12-32	Providing and laying, 13 mm thick Stonolithic skirting, 75 mm high and tucking in top edge or fair upper edge, where walls are plastered incl cutting and rubbing.	Metre	23.86
12-33	Same as item 12-32, but 150 mm high.	Metre	59.18
12-34	Providing and laying, 13 mm thick Stonolithic dado, incl 10 mm thick Cement plaster in CM (1:4) and touching in top edge or fair upper edge, where walls are plastered incl cutting and rubbing.	Sqm	546.86
	Terrazzo Floors		
12-35	Providing and laying, 10 mm thick Terrazzo Floor marble chips (1:2) with White/ Coloured cement, incl cutting and rubbing (except polishing).	Sqm	376.99
12-36	Same as item 12-35 but in dados, skirting etc incl 10mm thick Cement plaster 1:3, rendering.	Sqm	735.42
12-37	Providing and laying, 10 mm Terrazzo floor using marble chips (1:2) with ordinary Cement incl cutting and rubbing (except polishing)	Sqm	467.73
12-38	Same as item 12-37, but in dados, skirting etc incl 10 mm thick Cement plaster (1:3), rendering.	Sqm	633.51
12-39	Providing and laying, 13 mm Terrazzo floor using marble chips (1:2) with White / Coloured Cement, incl cutting and rubbing (except polishing).	Sqm	635.58

SI No	Description	Unit	Rate(Rs)
12-40	Same as item 12-39, but dados, skirting etc, incl 10 mm thick Cement plaster (1:3), rendering.	Sqm	969.26
12-41	Providing and laying, 13 mm thick terrazzo floor, using marble chips (1:2) with ordinary Cement incl cutting and rubbing, (except polishing).	Sqm	550.76
12-42	Same as item 12-41, but dados, skirting incl 10mm thick Cement plaster (1:3), rendering.	Sqm	620.73
12-43	Grinding / rubbing of Stonolithic floor/ dado	Sqm	91.13
12-44	Grinding / rubbing of Terrazzo floor /dado.	Sqm	95.69
12-45	Cleaning and wax polishing of Terrazo floor /dado.	Sqm	45.56
12-46	Cleaning and chemical polishing to terrazzo floor / dado.	Sqm	100.24
12-47	Providing and laying of sand cushion under floor.	Cum	1067.34
	Tiling (Pak Made)		
12-48	Providing and laying, white / light colour/glazed / non skid tiles, not exc 225 sq cm area each, on walls and floors, set in neat cement and joints grouted with White/ Coloured cement, complete, all as specified, Pak made.	Sqm	1598.99
12-49	Same as item 12-48, but dark colour/ printed / textured.	Sqm	1683.60
12-50	Providing and laying, white / light colour/	Sqm	1565.14
	glazed / non skid tiles exc 225 sq cm, but not exc 400 sq cm area each, on walls and floors, set in neat cement and joints grouted with white/coloured cement, complete, all as specified, Pak made.		Ś
12-51	Same as item 12-50, but dark colour/ printed / textured.	Sqm	1615.91
12-52	Providing and laying white / light colour/ glazed / non skid tiles exc 400 sq cm, but not exc 900 sq cm area each, on walls and floors, set in neat cement and	Sqm	1527.13

SI No	Description	Unit	Rate(Rs)
	joints grouted with white /coloured cement, complete, all as specified, Pak made.		
12-53	Same as item 12-52, but dark colour / printed / textured.	Sqm	1602.64
12-54	Providing and laying, white / light colour/ glazed / non skid tiles exc 900 sq cm each, on walls and floors, set in neat cement and joints grouted with white/ coloured cement, all as specified, Pak made.	Sqm	1651.86
12-55	Same as item 12-54, but dark colour/ printed / textured	Sqm	1736.47
	Tiling Imported		
12-56	Providing and laying, white / light colour/ glazed / non skid tiles upto 600 sq cm each, on walls and floors, set in neat cement and joints grouted with white / coloured cement, complete, all as specified, Imported Asian origin (China, Malaysia, Thailand or equivalent).	Sqm	2029.89
12-57	Same as item 12-56, but dark colour / printed / textured.	Sqm	2199.13
12-58	Providing and laying, in any colour/ printed / textured / glazed / non skid tiles exc 600 sq cm but not exc 1000 sq cm each, in walls and floors, set in neat cement and joints grouted with white/ coloured cement, complete, all as specified, Imported, Asian origin (China, Malaysia, Thailand or equivalent).	Sqm	1860.65
12-59	Same as item 12-58, but European origin (Spain or equivalent)	Sqm	3383.80
12-60	Providing and laying, in any colour/ printed / textured / glazed / non skid tiles exc 1000sq cm but not exc 1600 sq cm each, on walls and floors, set in neat cement and joints grouted with white/ coloured cement, complete, all as specified, Imported, Asian origin (China, Malaysia, Thailand or equivalent).	Sqm	2283.76
12-61	Same as item 12-60, but European origin (Spain or equivalent)	Sqm	3722.27
12-62	Providing and laying in any colour / printed/	Sqm	2791.47

SI No	Description	Unit	Rate(Rs)
	textured / glazed /non skid tiles exc 1600 cm each, on walls and floors, set in neat cement and joints grouted with white / coloured cement, complete, all as specified Imported, Asian origin (China, Malaysia, Thailand or equivalent).		
12-63	Same as item 12-62, but European origin (Spain or equivalent).	Sqm	4060.75
12-64	Providing and laying, Border tiles , 100 mm wide , in any colour / size set in neat cement and joints grouted with white/ coloured cement, complete, all as specified, Pak made .	Metre	789.08
12-65	Same as item 12-64, but 75mm wide imported, European origin (Spain or equivalent)	Metre	2776.18
12-66	Providing and laying, un-glazed split tiles , facing strip, chequered tile, rough, glossy, glazed, double matt glazed 10 mm thick light / dark coloured / printed / textured, laid in floors, set in neat cement and joints grouted with white / coloured cement, complete, Pak made.	Sqm	1691.41
12-67	Providing and laying, rough / glossy double matt glazed, skirting tiles, split tiles facing strip, chequered, light / dark coloured /printed / textured, laid on walls, set in neat cement and joints grouted with white/coloured cement, complete, Pak made Mosaic Tiles	Sqm	1864.16
12-68	Providing and laying, Mosaic tiles , 200mm x 200mm x 20mm of white cement, on walls and floors laid, set in CM (1:2) and joints grouted with white / coloured cement, chemical polished, complete.	Sqm	1136.98
12-69	Same as item 12-68, but 300 mm x 300 mm x 25 mm.	Sqm	1061.71

SI No	Description	Unit	Rate(Rs)
12-70	Providing and laying, Mosaic tiles, 200mmx200mmx200mm of ordinary cement, in walls and floors, laid, set in CM (1:2) and joints grouted with white / coloured cement, chemical polish, complete.	Sqm	1074.09
12-71	Same as item 12-70, but 300 mm x 300 mm x 25 mm. Marble Tiles/Slabs	Sqm	954.95
12-72	Providing and laying, 20/22 mm thick White / Coloured Marble tiles (except Green and Yellow) not exc 900 sq cm each, in walls and floors, laid and jointed in white / coloured cement (1:2) incl rubbing, chemical polishing, complete.	Sqm	1312.94
12-73	Same as item 12-72, but Brilliant White marble, thickness 20 / 22mm.	Sqm	3733.76
12-74	Same as item 12-72, but Yellow (Lasbela) marble tiles, thickness 20/22 mm.	Sqm	1943.72
12-75	Same as item 12-72, but Green (Onyx).	Sqm	4993.94
12-76	Providing and laying, 20 / 22 mm thick white / coloured marble slabs (Except green and yellow) exc 900 Sqcm each, but not exc 1.00 sqm each, on walls and floors, laid jointed and grouted with white/ coloured cement (1:2), incl rubbing, chemical polishing, complete.	Sqm	2030.78
12-77	Same as 12-76, but Brilliant White.	Sqm	4640.29
12-78	Same as item 12-76, but Yellow (Lasbela)	Sqm	2909.36
12-79	Same as item 12-76, but Green (Onyx)	Sqm	5972.07
12-80	Providing and laying, 10 / 12 mm thick white / coloured marble tiles (except Green and Yellow) on walls and floor, laid, jointed and grouted in white / coloured cement (1:2) incl rubbing and chemical polishing, complete.	Sqm	949.12
12-81	Same as item 12-80, but Brilliant White 10 /12mm thick.	Sqm	2088.23
12-82	Same as item 12-80, but Yellow	Sqm	1247.24

SI No	Description	Unit	Rate(Rs)
	(Lasbela) 10/12 mm thick.		
12-83	Same as item 12-80, but Green (Onyx).	Sqm	3663.46
	Pointing		
12-84	Racking out joints of old floors, roofs etc with brick laid on edges, built in any mortar, incl preparing surface for re-pointing.	Sqm	88.85
12-85	Same as item 12-84 but with bricks or tiles laid flat.	Sqm	67.70
12-86	Pointing Flush in CM 1:3, to old or new brick floors laid on edge.	Sqm	201.32
12-87	Same as item 12-86, but bricks laid flat.	Sqm	131.39
12-88	Three applications of Sodium Silicate on concrete surface.	Sqm	119.12
	Floor Toping		
12-89	Providing and laying, 50 mm thick Floor Toping with CC Type " A ," using 19 mm graded broken stone of specially hard quality, over normal thickness of concrete floor. (Steel reinforcement to be paid under Section-9).	Sqm	549.13
12-90	Providing and laying, Bond Breaking materials , using 0.102 mm thick Polythene film, over normal thickness of concrete floor.	Sqm	54.85
12-91	Providing and laying, Screed bed 50 mm thick on bond breaking material as specified.	Sqm	1002.98
12-92	Providing and laying, a layer of Marble powder @ 0.25 kg per sqm on surface of floor (Trowel into finished green surface of concrete floor).	Sqm	35.80
	PVC Floor Tiles		
12-93	Supply and fix, PVC Floor Plain tiles, 2 mm thick, best quality.	Sqm	781.99
12-94	Same as item 12-93, but Textured.	Sqm	815.61
12-95	Supply and fix, PVC Floor Plain tiles, 3 mm thick, best quality.	Sqm	950.13

SI No	Description	Unit	Rate(Rs)
12-96	Same as item 12-95, but Textured.	Sqm	969.22
12-97	Supply and fix, PVC Floor Plain tiles, 5 mm thick, best quality.	Sqm	1449.24
12-98	Supply and fix, PVC Floor Plain sheet, 2 mm thick, best quality.	Sqm	749.29
12 -9 9	Same as item 12-98, but Textured.	Sqm	766.25
12-100	Supply and fix, PVC Floor Plain sheet , 3 mm thick.	Sqm	942.29
12-101	Same as item 12-100, but Textured.	Sqm	958.85
12-102	Supply and fix, Anti-Static tile, 3mm thick best quality (Copper strips measured and paid separately).	Sqm	2430.01
	Parquet Wooden Flooring		
12-103	Supply and fix, Parquet Wooden floor , 22 mm thick of 1st Class Hard wood, (Shisham) blocks, wrought all faces, fixed complete, incl wax polishing, all as specified.	Sqm	3281.52
	Artificial Stone Face Tiles		
12-104	Providing and laying, Artificial Stone face tiles, of sizes for facing in any colour, as specified.	Sqm	968.12
	Plinth Protection		
12-105	Providing and laying, 75mm thick CC Type 'C,' as in plinth protection, surface finished and smoothed with new cement and steel trowel, incl form work, using shingle or gravel.	Sqm	392.26
12-106	Same as item 12-105, but using crushed stone.	Sqm	419.19
	Cladding/Panelling (Aluminium, PE, PVDF)		
12-107	Providing and fixing, Aluminium Cladding upto any height with sheets of any size and shape using 0.5mm thick Aluminium sheet, 3mm thick PE (polyethylene) or 0.5mm thick Aluminium sheet PVDF (Poly Vinyl Deni Flouride) coated, in any colour / texture with	Sqm	9870.89

SI No	Description	Unit	Rate(Rs)
	framing, as required, complete, as specified.		
12-108	Same as item 12-107, but as in Panelling, with thickness of sheet using 0.4mm Aluminium sheet, 3.20mm PE or 0.4mm Aluminium sheet (PVDF coated), as specified.	Sqm	8076.53
	Granite Marble / Tiles		
12-109	Providing and laying, 20 mm thick, Granite marble in Black colour (China) polished complete as in floors, steps, walls and kitchen tops etc, laid and jointed in white/coloured cement (1:2), complete.	Sqm	7394.53
12-110	Same as item 12-109, but Coloured (except black)	Sqm	9146.81
12-111	Same as item 12-109, but Coloured/ Pattern, Imported, European-origin (Italy or equivalent).	Sqm	11773.91
12-112	Providing and laying Granite tiles glazed/unglazed in any colour/print/texture exc 400 sqcm but not.exc 900 sqcm on walls and floor set in neat cement and joints grouted with white/coloured cement, complete all as specified.	Sqm	1734.37
12-113	Providing and laying Granite tiles glazed/unglazed in any colour/print/texture exc 900 sqcm but not exc 1600 sqcm on walls and floor set in neat cement and joints grouted with white/coloured cement complete all as specified.	Sqm	2180.91
12-114	Providing and laying Granite tiles glazed/unglazed in any colour/print/texture exc 1600 sqcm but not.exc 3700 sqcm on walls and floor set in neat cement and joints grouted with white/coloured cement, complete all as specified.	Sqm	2873.48
12-115	Providing and laying Granite tiles glazed/ unglazed in any colour/print/texture exc 3700 Sq cm on walls and floor set in neat cement and joints grouted with white/ coloured cement, complete, as specified.	Sqm	3605.11

SI No	Description	Unit	Rate(Rs)
	Porcelain Tiles		
12-116	Providing and laying, Porcelain tiles glazed/unglazed in any colour/print/texture exc 1600 sqcm each on walls and floor , set in neat cement and joints grouted with white/coloured cement, complete all as specified, imported (China).	Sqm	2498.55
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SECTION - 13

PLASTERING

SPECIFICATIONS

13.0. This section covers all operations in connection with mud, cement, and gypsum plastering.

MATERIAL REQUIREMENTS

13.1. Clay:- Mud shall be composed of stiff Clay.

13.2. Chopped straw / Fibre:- Chopped straw, (not less than 25mm long), fibre or other similar and approved long binding material.

13.3. Water:-

- 13.3.1. The quality of mixing water shall be determined by AASHTO methods of sampling and testing designation T-26. Water used in plaster shall be clean and free from injurious amount of acids, alkalis, salts, organic material or substances deleterious to plaster. The other required characteristics for curing, mixing shall be as given in Para 13.3.2.
- 13. 3.2. It shall be free from oil and shall neither contain more than 1,000 ppm of Chlorides nor more than 1,300 ppm of Sulphates (SO₄).

13.4. Cement:- The cement shall be Ordinary Portland, Normal Setting of any brand, complying in all respects with BS No. 12, unless, otherwise, specified to be of any particular quality.

13.5. Sand:- Sand shall be from approved source and free from dust and salt. For additional explanation, refer to Para 4.3, Section-4

13.6. Gypsum:- Gypsum is fine ground powder.

CONSTRUCTION REQUIREMENTS

13.7. Mud Plaster:- Mud plaster shall be composed of stiff clay to which shall be added equal bulk of chopped straw. The Clay, which may if required, contain a small quantity of sand not exc 5%, shall be laid out in stacks not exc 300 mm high and saturated with water. The water is allowed to stand for not less than three days. During this period, water is added as required, to ensure complete saturation. The binding material shall then be added and the mixture well puddled and left for two days to soak. It will then be thoroughly mixed (water is added, if required) to the consistency of

stiff mortar. The mud plaster shall be floated smooth and level, and when dry, will be given a coat of leeping 3 mm thick as given below.

- 13.7.1. Leeping shall be made with a mixture of clay and cow dung in equal parts and trowelled or floated smooth. A small quantity of Sand may be added to the mixture, if so ordered.
- 13.7.2. Leeping must be free from seeds, grass, straw and other impurities.

13.8. Cement Plaster:- Shall be composed of cement and washed sand, mixed in the proportions specified .The plaster shall be applied in one or two coats work, as may be ordered.

13.9. Gypsum Plaster:-

- 13.9.1. Gypsum powder shall be gradually added to water @ approx one bag (40 Kg) to 24 lit of water. It should be left undisturbed for about 3 mins and then mixed by hand or by using suitable drill. For hand mixing, one bag should be mixed at a time whereas upto 3 bags may be mixed simultaneously for drill mixing. The mixing shall be done for about 3 min to obtain a mortar of good consistency i.e, which does not flow when applied on walls. Immediately before applying plaster, the area being plastered shall be wetted.
- 13.9.2. After the initial spreading on wall, the surface must be leveled using straight edge, before the start of initial set, which is about 65 mins. The final setting is about 90 mins, when the final trowel is to be completed.
- 13.9.3. Gypsum plaster is usually a One Coat plaster, which combines the function of both backing and finishing plaster. The coverage will vary greatly depending on the nature of the wall and thickness of application, but, on an avg 3 bags of Gypsum powder will give 9.29 Sqm of 13mm thick plaster.
- 13.9.4. Any instructions of workmanship, issued by the manufacturer, shall take precedence and will be followed.

13.10. Dubbing Out:- All irregularities in wall shall be dubbed out with mortar of the same specification and consistency as the plaster coat.

METHOD OF MEASUREMENTS

13.11. Measurement:- All work be measured net and flat (not girthed).

13.12. Openings:- No deduction or addition shall be made for opening not exc 0.4 Sqm. Openings in mud plaster shall not be deducted, when the jambs are plastered and no addition will be made for the jambs.

13.13. Ends:- No deduction shall be made for ends of joints, beams, posts, steps etc not exc 900 Sq cm.

13.14. Thickness:- Thickness of plaster, specified, is the thickness when dry, and excl any key or dubbing out and is taken from face of lathing or walls.

CLARIFICATION OF RATES

13.15. The rates, inter alia, incl particularly:-

- 13.15.1. Fair and even surfaces where exposed, finished with steel trowel, or wooden float.
- 13.15.2. Work on ceilings, walls or other positions and in patches (roof / floor excl).
- 13.15.3. Work of any widths, incl coving.
- 13.15.4. Straight or curved work.
- 13.15.5. Small labour (chamfers, rounds, coves) not exc 75 mm, mitres, turns, etc.
- 13.15.6. Dubbing out of irregular surfaces.
- 13.15.7. Blocking out pieces to beams etc, as required.
- 13.15.8. All labour in rounding off internal and external angles in plaster.
- 13.15.9. Skirting plaster.

ITEM RATES

SI No	Description	Unit	Pate (Pc)
51 NO.		Unit	Nate (NS)
	Mud Plaster		
13-1	19mm thick Mud Plaster incl 3mm thick leeping	Sqm	212.23
13-2	Same as item 13-1 but 25 mm thick.	Sqm	264.78
4	Cement Plaster		
13-3	13mm thick Cement Plaster 1:3 finished as specified.	Sqm	235.42
13-4	Add to item 13-3, for Pudlo or other similar approved material mixed with cement @ 3% by weight.	Sqm	33.20
13-5	13mm thick Cement Plaster 1:4, finished as specified.	Sqm	219.01
13-6	Add to item 13-5, for Pudlo or other similar approved material mixed with cement @ 3% by weight.	Sqm	23.43
13-7	13mm thick Cement Plaster 1:6, finished as specified.	Sqm	200.27
13-8	Add to item 13-7, for Pudlo or other similar approved material mixed with cement @ 3% by weight.	Sqm	16.66
13-9	19mm thick Cement Plaster 1:3, finished as specified.	Sqm	313.16
13-10	Add to item 13-9 for Pudlo or other similar approved material mixed with cement of the rate at of 3% by weight.	Sqm	39.06
13-11	19mm thick Cement Plaster 1:4, finished as specified.	Sqm	291.29
13-12	Add to item 13-11 for Pudlo or other similar approved material mixed with cement @ 3% by weight.	Sqm	31.24
13-13	19mm thick Cement Plaster 1:6, finished as specified.	Sqm	267.29
13-14	Add to item 13-13 for Pudlo , or other similar approved material mixed with cement @ 3% by weight.	Sqm	22.65
13-15	6mm thick Rough Cast Plaster 1:2	Sqm	242.47

SI No.	Description	Unit	Rate (Rs)
	using 3mm aggregate, all as specified.		
13-16	Same as item 13-15, but 13 mm thick.	Sqm	354.97
13-17	6mm thick Gypsum Plaster , finished all as specified.	Sqm	129.29
13-18	12mm thick Gypsum Plaster , finished all as specified.	Sqm	217.11
	Scraping Plaster		
13-19	Hacking Cement Plaster of walls or lathing, racking out joints when required, or racking out cement jointing to walls, roofs or floors of any description, or hacking out concrete to form key, or dismantling, lathing with or without plaster.	Sqm	100.04
13-20	Same as item 13-19, but Gypsum Plaster.	Sqm	66.70
13-21	Scraping, Leaping or Mud Plaster, any thickness.	Sqm	25.65
13-22	Filleting exc 40 mm but not exc 75 mm wide and upto 50 mm deep, in any position, in CM 1:3.	Metre	63.56
13-23	Same as item 13-22, but exc 75 mm and not exc 150 mm wide.	Metre	83.52
13-24	Forming V-grooves 13mm wide and 10mm deep in new plaster.	Metre	27.34

SECTION - 14

CEILING AND PANELING

SPECIFICATIONS

14.0. This Section covers all operations pertaining to ceiling and paneling works using Asbestos Cement (AC) / Fibre Cement (FC) Sheets, Patent boards and sheets, Thermo-pore sheet, Fibre Glass, Gypsum board, Mineral (Acoustic), Dampa, Medium Density Fibre (MDF) / Soft Board, Plaster of Paris (Gypsum) and PVC / uPVC etc.

MATERIAL REQUIREMENTS

14.1. Asbestos Cement / FC Sheets:- The sheets are made of Asbestos Cement (AC) / Fibre Cement (FC). FC is a *Chrysotile fibre*, bound in cement matrix. Chrysotile is a natural Hydrous Magnesium Silicate fibre having high tensile strength.

14.2. Patent / Hard Board Sheet:- Patent / Hard board sheets be of approved quality.

14.3. Medium Density Fibre Board (MDF) /Soft Board:- MDF board, 20mm thick, shall be approved by the Engineer-in-Charge before incorporation in the work.

14.4. Thermopore Sheet:- Thermopore sheet ceiling shall be of density not less than 35 Kg/Sqm and thickness 20mm. Shape and design approved by the Engineer-in-Charge.

14.5. Dampa Sheet:- Shall be of best quality as approved by the Engineer-in-Charge. All fittings/fixtures and system of hanging shall be followed strictly in accordance with manufacturer's instructions.

14.6. Fibre Glass, Gypsum Board, and Mineral (Acoustic) Sheet:-These shall be of high grade and best quality as approved by the Engineer-in-Charge.

14.7. Plaster of Paris (POP) / (Gypsum):- POP tiles 600x600mm and 20 mm thick of pattern approved by the Engineer-in-Charge.

14.8. PVC/ uPVC Ceiling / Paneling:- PVC / uPVC Ceiling and Paneling of pattern and quality approved by the Engineer-in-Charge.

CONSTRUCTION REQUIREMENTS

14.9. Asbestos Cement (AC) / FC Sheet Ceiling:- Shall be provided in accordance with the manufacturer's instructions.

14.10. Patent / Hard Board Sheet - Ceiling / Paneling:- The sheets shall be fixed Butt jointed, joints stopped and sheet drilled for and fixed with 30mm galvd or sherardized steel nails at 150mm center and rows not exc one meter apart where practicable, or fixed according to manufacturer's instructions. The joints shall be covered with beveled edged Soft wood fillets, fixed with screws at not exc 300mm centers.

14.11. MDF Board /Soft Board - Ceiling / Paneling:- The false ceiling shall be suspended from the roof with Rawal plug or nut and bolt *(for steel structure)* arrangement. The vertical members shall be galvd wire / strip of approved dimension. The MDF board shall be properly installed in "L" and "T" shape horizontal strips, as approved by Engineer-in-Charge.

14.12. Thermo-pore Sheets - Ceiling / Paneling:- The sheets shall be fixed Butt jointed, joints stopped, sheet drilled and fixed with 30mm galvd or sherardized steel nails at 150mm center and rows not exc one meter apart, where practicable, or fixed according to manufacturer's instructions.

14.13. Fibre Glass, Gypsum Board, Mineral (Acoustic) - Ceiling / Paneling:- All fittings/fixtures and system of hanging shall be followed strictly in accordance with manufacturer's instructions.

14.14. Plaster of Paris (Gypsum) Ceiling / Paneling:- The sheet shall be drilled and fixed with counter sunk screws and making good with POP to hide the screw heads.

14.15. Dampa Ceiling / Paneling:- All fittings/fixtures and system of hanging shall be followed in accordance with manufacturer's instructions.

14.16. PVC / uPVC - Ceiling / Paneling:- Shall be provided as per manufacturer's instruction to the shape and pattern as approved by the Engineer-in-Charge.

METHOD OF MEASUREMENTS

14.17. Measurements:- All work shall be measured net as fixed with no allowance for cutting and waste, laps, seams turning, etc.

CLARIFICATION OF RATE

14.18. The rates, inter alia, incl particularly:-

- 14.18.1. Fixing complete as specified in any position.
- 14.18.2. All cutting and waste.

- 14.18.3. Cutting holes for pipes, etc.
- 14.18.4. Wooden frames, where provided, shall be paid separately.

MILLITARY ENCINE SERVICES

ITEM RATES

SI No	Description	Unit	Rate (Rs)
	Asbestos Cement (AC) Sheets Ceiling		
14-1	Supply and fix, AC sheet exc 4mm but not exc 6mm thick, fixed in ceiling and partitions, with 1st Class Soft wood, beveled edge, cover fillets, 50 mm x 13 mm, screwed on	Sqm	1038.18
14-2	Same as item 14-01, but except cost of AC sheet.	Sqm	274.22
14-3	Add to item 14-01 or 14;02, if fixed in repairs.	Sqm	51.33
	Hard Board Ceiling, etc		
14-4	Supplying and fix, Hard board sheets not exc 4mm thick, fixed in ceiling and partitions with 1st Class Soft wood, beveled edge, cover fillets, 50mm x 13mm, screwed on.	Sqm	395.57
14-5	Same as item 14-4, but exc 4mm and not exc 6 mm thick sheet.	Sqm	415.77
14-6	Same as item 14-4 or 14-5, but except cost of Hard board sheets.	Sqm	260.29
14-7	Add to item 14-4, 14-5 and 14-6, if fixed in repair.	Sqm	42.97
	Soft Board Ceiling,etc		
14-8	Supply and fix, 13mm thick Soft board sheet , fixed in ceiling and partitions, with 1st Class Soft wood, beveled edge, cover fillet, 50mm x 13mm, screwed on.	Sqm	716.03
14-9	Same as item 14-8, but except cost of Soft board sheet.	Sqm	262.43
14-10	Same as item 14-8 or 14-9, if fixed in repair.	Sqm	42.97
14-11	Supply and fix, 13mm thick, Chip board sheets , fixed in ceilings and partitions, with 1st Class Soft wood, beveled edge, cover fillets, 50mm x13mm, screwed on.	Sqm	580.75
14-12	Same as item 14-11, but 20 mm thick.	Sqm	699.45
14-13	Same as item 14-11 or 14-12, but except	Sqm	267.28

SI No	Description	Unit	Rate (Rs)
	cost of Chip board sheets.		
14-14	Add to item 14-11 to 14-13, if fixed in repairs.	Sqm	42.97
	Thermopore Ceiling, etc		
14-15	Supply and fix, Thermopore Tiles, fixed in ceiling, partitions and dados etc, all as specified.	Sqm	368.94
14-16	Add to item 14-15, if fixed in repair.	Sqm	42.97
14-17	Supply and fix, Thermopore Ceiling , 600mm x 600mm x 20mm tiles, along with Aluminium Tee and Aluminium angle, 25mm x 25mm x 1mm, incl hanger clips, jointing clips and GI wire 14 SWG etc, complete all as specified	Sqm	1310.38
14-18	Add to item 14-17, if fixed in repairs.	Sqm	175.48
14-19	Replacement of Thermo-pore Ceiling tiles only, 600mm x 600mm x 20mm.	Sqm	393.73
	Dampa Ceiling		
14-20	Supply and fix, Dampa Ceiling , along with necessary components for fixing direct or suspending from the soffit complete, incl provision of opening for light.	Sqm	1225.52
14-21	Add to item 14-20, if fixed in repairs.	Sqm	439.28
	Fibre Glass Ceiling		
14-22	Supply and fix, Fibre Glass Ceiling (1200 mm x 600mm) panels, single ply (not less than 1mm thick), in any colour / texture, incl Aluminium Tee and angle, 25mm x 25mm x 1mm, hanger clips, jointing clips and GI 14 SWG wire etc complete, incl provision of openings for lights.	Sqm	1647.05
14-23	Same as item 14-22, but 2mm thick sheet.	Sqm	2305.77
14-24	Same as item 14-22, but 3mm thick sheet.	Sqm	2964.45
14-25	Add to item 14-22 to 14¿24, if fixed in repairs.	Sqm	175.48
14-26	Replacement of Fibre Glass, single ply,	Sqm	775.66

SI No	Description	Unit	Rate (Rs)
	(not less than 1mm thick) ceiling panels only , 1200 mm x 600 mm.		
14-27	Same as item no. 14-26, but 2mm thick, Fibre sheet.	Sqm	1500.44
14-28	Same as item 14-26, but 3mm thick, Fibre sheet.	Sqm	1894.67
1	Plaster of Paris (POP) Ceiling		
14-29	Supply and fix, POP Tiles (600 mm x 600 mm x 20 mm), fixed in ceiling. partitions and dados etc	Sqm	488.84
14-30	Add to item No.14-29, if fixed in repairs.	Sqm	175.48
14-31	Supply and fix, POP border , in any shape and design, girth not exc 150 mm, complete.	Metre	94.90
14-32	Same as item 14-31, but girth exc 150mm but not exc 300 mm, complete.	Metre	121.93
14-33	Add to item 14-31 and 14-32, if fixed in repairs.	Metre	17.91
	Gypsum Ceiling		
14-34	Supply and fix, Gypsum Ceiling 600mm x 600mm x 7.5mm thick, incl Aluminium Tee and Aluminium angle, 25mm x 25mm x 1mm, incl hanger clips, jointing clips and 14 SWG, GI wire etc, complete.	Sqm	991.44
14-35	Add to item 14-34, if fixed in repairs.	Sqm	175.48
14-36	Replacement of Gypsum Tiles only, 600 mm x 600 mm x 7.5 mm.	Sqm	387.61
	Mineral Acoustics Ceiling		<u>`</u> ()'
14-37	Supply and fix, Mineral Acoustics Sheet Ceiling , 600 mm x 600 mm x12 mm thick incl Aluminium Tee and Aluminium angle, framing 25 mm x 25 mm x 1 mm, incl hanger clips, jointing clips and 14 SWG GI wire etc, complete.	Sqm	1049.08
14-38	Add to item 14-37, if fixed in repairs.	Sqm	175.48
14-39	Replacement of Mineral Acoustic	Sqm	916.76
SI No	Description	Unit	Rate (Rs)
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	Ceiling 600 mm x 600 mm x 12 mm,. tiles only.		
	PVC/uPVC Sheet - Ceiling/Paneling		
14-40	Supply and fix, PVC/uPVC Sheet - Ceiling/ Paneling, 1.5mm thick, as in wall paneling/ceiling (soffit of slab) incl fittings in any size, pattern, shape, colour/ texture, complete.	Sqm	1677.54
	MDF (Like Lasani Sheet) Ceiling		
14-41	Supply and fix, 13mm thick MDF sheets (like Lasani etc) ceiling, along with hanging arrangements, Aluminium 'Tee' and angle 25 mm x 25 mm x 1 mm, incl hanger, clips, jointing clips etc, complete.	Sqm	1657.29
14-42	Add to item 14-41, if fixed in repairs	Sqm	175.48
14-43	Replacement of 13mm thick MDF sheets (like Lasani etc) only.	Sqm	740.64
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SECTION - 15

FINISHES

(DISTEMPERING AND PAINTING)

SPECIFICATIONS

15.0.0. This section covers White / Coloured washing, distempering, oiling, painting (internal and external) all types, wallpapers, wood preservatives, tarring, epoxy paints, coating of Acrylic based marble chips, roll on, Special spray paints, Textured paints like Graffito, Venetian grains and Road Marking paints etc.

SUB SECTION 15-1

WHITE / COLOUR WASHING, DISTEMPERING

MATERIAL REQUIREMENTS

15.1.1. Cement Slurry: Cement Slurry shall be of creamy consistency.

15.1.2. Cement Oil Paint:- Shall be composed of 1.20 Kg Cement to 1 lit, double boiled Linseed oil.

15.1.3. Distemper:- Will be obtained from the list approved by the Engineer-in-Chief. The distemper shall be of required shade. Vinyl based emulsions / distempers are marketed under different trade names. For this Schedule, such products are equivalent of Oil Bound Distemper.

15.1.4. Whitening: Plaster of Paris (POP) is applied as below

- 15.1.4.1. Required quantity of POP is soaked in such a way that a thin layer of water comes on top of material, once properly mixed from jelly.
- 15.1.4.2. 2.5 Lit of Water is added to 1.0 Kg of jelly to form a mixture.

15.1.5. Lime:- The lime for white/colour washing shall be ordinary Fat Lime of good quality.

CONSTRUCTION REQUIREMENTS

15.1.6. Preparatory Work:- For White washing, color washing, distempering, etc, shall consist of brushing with stiff broom to remove all loose lime, scales of distemper etc, removing nails, screws, plugs, etc, as required and stopping holes not exc 100 sq cm.

15.17. Distempering:- The distemper shall be applied strictly in accordance with manufacturer's instructions.

15.1.8. Whitening: Give any number of coats required to produce a well covered, smooth bodied, opaque surface.

15.1.9. White / Colour Washing:-

- 15.1. 9.1. The lime is to be slaked at site with an excess of water to the consistency of a cream and allowed to remain under water for 2 days.
- 15.1.9.2. The mixture shall then be strained through coarse cloth and gum water (mix of 100 gm gum to one lit of water) added as directed.
- 15.1.9.3. The White wash shall be applied with proper fiber brushes.
- 15.1.9.4. For Colour washing, colouring material is to be boiled in water, and gum water added to form a uniform texture and finally mixed with strained white wash.

15.1.10. Cleaning:- Protect all surfaces liable to splashing and clean all splashes off neighbouring work and leave whole of the premises clean.

METHOD OF MEASUREMENTS

15.1.11. Measurements:- All surfaces flat (not girths) whether plain or corrugated.

15.1.12. No addition shall be made for attachments to surfaces, as casings, pipes, timber etc, which are distempered or lime washed and no deduction shall be made for such attachments, if, not distempered or lime-washed etc.

15.1.13. Openings:- No deduction or addition shall be made for openings, not exc 0.4 Sqm. Openings shall not be deducted, when the jambs are distempered or lime washed and no addition will be made for the jambs. No deduction to be made for ends of joists, beams, etc.

CLARIFICATION OF RATES

15.1.14. The rates, inter alia, incl particularly.

- 15.1.14.1. Preparatory works.
- 15.1.14.2. Protective works against splashes and cleaning of splashes.
- 15.1.14.3. Distemper of any tint (variety / colour).
- 15.1.14.4. Preparation of lime / whitening use.
- 15.1.14.5. Work on surfaces of any materials in any position.

15.1.14.6. The use of cradles etc, where required, particularly for convenience of inspection etc.

MILLIAR ENGLAND

SUB SECTION 15-2

OILING, PAINTING AND LETTERING

MATERIAL REQUIREMENTS

15.2.1. Painting Generally:- Paints shall be of the best quality. Paint will be obtained from manufacturers approved by Engineer-in-Chief.

15.2.2. Oiling Woodwork:- The Oil shall be a mixture of 450 gm beeswax, 0.20 lit of Turpentine and 2.25 lit boiled Linseed oil. It is enough for oiling 75 Sqm surface of wood work.

15.2.3. Camouflaging Paint:- Shall be from manufacturer's list, approved by the Engineer-in-Chief.

15.2.4. Wallpaper:- Wallpaper plain or decorative shall be of high grade and best quality, approved by the Engineer-in-Charge.

15.2.5. Epoxy Paints: Epoxy paints/products shall be procured from manufacturer's list approved by the Engineer-in-Chief.

15.2.6. Wall Coating:-

15.2.6.1. Acrylic Based Marble Chips Coating:- It is used for internal and external surfaces as a permanent protective covering, that can be applied on any surface like wood, CC and cement plaster etc. It is composed of Acrylic resins, specially graded natural marble chips in different colour, viscosity setting agents, additives against bacteria, fungi and other harmful insects. Water is used as solvent.

15.2.6.2. Textured Coatings:-

- 15.2.6.2.1. **Roll on Wall Coating:-** It is a textured wall coating composed of Acrylic Copolymer Emulsion in organic pigments, silica, powder of quartz and various other additives like antibacterial and anti fungal agents etc.
- 15.2.6.2.2. **Spray Wall Coating (e.g Zola etc):-** It is a textured wall coating composed of Acrylic Copolymer emulsion in organic pigments, silica, powder of quartz, marble grains and various other additives like antibacterial and anti fungal agents etc.
- 15.2.6.2.3. **Granular Wall Coating (e.g Graffito etc):-** It is wall coating of variable granular material and is composed of Acrylic Copolymer emulsion, spheroid quartz, various additives, metallic oxides, inerts of different granulemetries, colouring agent, antibacterial and anti fungal agents etc.

- 15.2.6.2.4. Venetian Grain Wall Coating:- It is composed of Acrylic Copolymer emulsion, marble chips, grains, metallic oxides inerts, colouring agents, antibacterial and antifungal agents.
- 15.2.6.2.5. Weather Resistant Coatings:- It is used as permanent protective covering for external surface and can be applied on any type of surface based on wood, CC and cement plaster. It is composed of Acrylic resins of different colour, viscosity setting agents, additives against bacteria, fungi and other harmful insects. Water is used as a solvent.

15.2.7. Epoxy Coating for POL Tanks:- Material shall be as per Technical Instruction M-25 Volume V of Engineer-in-Chief's Branch.

15.2.8. Road Marking Paint:- Shall be of the Approved quality.

15.2.9. Wood Preservative:- It shall be from the manufacturers approved by the Engineer in Chief. Creosote shall comply with BS No.144.

CONSTRUCTION REQUIREMENTS

15.2.10. Painting Generally:-

- 15.2.10.1. Painting, as far as possible is carried out in dry weather.
- 15.2.10.2. Paint to be applied with proper paint brushes of good quality, carefully maintained throughout the work, so as to be always pliable and free from loose bristles and well worked over the surface.
- 15.2.10.3. Where more than one coat is specified, each coat is to be of a different shade and be passed by the Engineer-in-Charge, before next coat is started.
- 15.2.10.4. The faces of all new priming and undercoats to be properly rubbed with pumice stone or sand paper and well dusted.
- 15.2.10.5. If old paint is unsound, it shall be entirely removed by burning off or using suitable paint remover. Burning off or stripping of old paint will not be done, unless, specifically, ordered in writing by the Engineer-in-Charge.

15.2.11. Oiling Woodwork:- The oil and wax are to be mixed by heating the wax slowly till it melts and then Turpentine is added. Boiled Linseed oil and not raw linseed oil be used to facilitate drying.

15.2.12. Oiling with Crude or Creosote:- Shall be applied, as thickly as practicable in one coat, so as to cover completely, all surface to be treated. The material shall be worked in with a brush.

15.2.13. Tarring:- Tar shall be heated near boiling point and 200 g of unslaked lime added to each lit of tar. The mixture shall be thinned with 1 part of kerosene to 4 parts of tar by volume and applied hot.

15.2.14. Painting New or Old Wood surfaces, from where paint has been burnt or removed:- Painting shall be done in following order:-

- 15.2.14.1. Knotting:- Knots and resinous portions shall be coated with two thin coats of "Paint" knotting well brushed in.
- 15.2.14.2. Stopping:- All crevices, cracks or holes shall be thoroughly cleaned out and filled up with thick coat of white lead paint and /or putty.
- 15.2.14.3. Touching up:- All the knots, crevices, cracks and holes treated as above (not the whole surface to be painted) shall be touched up with an even coat of primer and restored, where damaged or defaced and the entire work left free from blemishes.
- 15.2.14.4. Priming Coat or Under Coat:- The entire surface will be painted with pink primer, manufactured by any of the manufacturer's specified for paints for first coat or pink paint obtained by a mixture of white and red lead paint.
- 15.2.14.5. First coat: Apply thick coat of paint of required shades.
- 15.2.14.6. Second and Subsequent Coats:- Apply a thin coat of paint as specified for the First coat.

15.2.15. Painting Old Wood :- Painting on old surface shall be done in the following order:-

- 15.2.15.1. Washing down:- Surfaces are to be well rubbed down with pumice or soapstone, to remove all blisters scales of old paint etc, and greasy spots rubbed and removed with turpentine. The surface is to be then well washed with soap and water.
- 15.2.15.2. Filling cracks:- All holes and cracks shall be filled up with putty to an even smooth surface.
- 15.2.15.3. Touching up in patches:- All patches rendered naked by "washing down" shall be touched up with primer to the tint of the required paint.
- 15.2.15.4. First Coat:- Apply thick coat of paint obtained from the manufacturer's list approved by the Engineer-in-Chief, specified for new surface.

15.2.15.5. Second and subsequent Coats:- Apply a thin coat of paint obtained from the manufacturer's list approved by the Engineer-in-Chief, specified for new surface.

15.2.16. Painting Steel and Iron work:-

- 15.2.16.1. New Surfaces or Old Surfaces from where paint has been burnt or removed:-
 - 15.2.16.1.1. All mill scale, rust scales, etc, be removed by means of heavy steel scraps or steel wire brush and well dusted.
 - 15.2.16.1.2. Priming Coats:- To be Oxide of Iron paint or Red Lead or obtained from manufacturer's list approved by the Engineer-in-Chief, specified for First coat of paint on new steel / iron surface.
 - 15.2.16.1.3. Second and Subsequent Coats:- To be Oxide of Iron or Lead based paint as ordered or paints obtained from manufacturer's list approved by the Engineer-in-Chief.
- 15.2.16.2. Painting Old Surface:-
 - 15.2.16.2.1. If the existing paint is not ordered to be removed, remove all blisters, scales of old paint, rust etc, and dust the surface.
 - 15.2.16.2.2. Surfaces, which become naked by the above process, will be treated with primer coat.
 - 15.2.16.2.3. When thoroughly dry, one or two coats shall be applied as ordered.

15.2.17. Enamel Paint to Plastered Surface / Wood / Steel Work:-The surface shall be applied with one primer and two subsequent coats of paint as per manufacturer's instructions. The painted surface shall finally produce a glossy /.matt finish as approved by the Engineer-in-Charge.

15.2.18. Camouflage Paint:- Shall be applied strictly in accordance with manufacturer's instructions.

15.2.19. Wallpaper:-

- 15.2.19.1. The wall surface to be absolutely dry and smooth. Any dampness shall be dried by one of the improvised methods and roughness removed by sand-paper, before the paper placed on the wall.
- 15.2.19.2. The adhesive used for paper hanging is ordinary stiff floor paste. The adhesive manufactured and marketed for this

purpose by a proprietary firm shall be used. No other material shall be allowed.

- 15.2.19.3. The paper hanging is done by experienced skilled men.
- 15.2.19.4. Any particular instructions by the manufacturer of wallpaper regarding the type of adhesive and system of hanging shall be followed in full.

15.2.20. Epoxy Paints:- Epoxy paints / products shall be applied strictly in accordance with manufacturer's instructions.

15.2.21. Wall Coating:-

15.2.21.1. Acrylic Based Marble Chips Coating:- It shall be applied .with a stainless steel trowel and after the application has been worked over, smoothen out the application and compact until uniform surface is achieved. Keep steel trowel clean with wet clean cloth during every operation.

15.2.21.2. Textured Coatings:-

- 15.2.21.2.1. **Roll on Wall Coating:** Shall be applied with wood roller and Finishing coat is applied with sponge roller.
- 15.2.21.2.2. Spray Wall Coating (like Zola etc):- First Base coat shall be applied with wood roller and finishing coat is applied with compressor spray gun.
- 15.2.21.2.3. **Granular Wall Coating (e.g Graffito etc):-** Shall be applied with stainless steel trowel and will be finished with plastic trowel. To get straight texture plastic trowel is moved vertically and the trowel is rotated to obtain swirl texture.
- 15.2.21.2.4. Venetian Grain Wall Coating:- Shall be applied as Granular Wall coating.
- 15.2.21.2.5. Weather Resistant Coatings:- Shall be applied strictly in accordance with the manufacturer's instructions. Drying period of the coating is three hours. Care be taken not to touch it by hands, during the drying period.

(Contact with eyes or skin be avoided.)

15.2.22. Epoxy Coating for POL Tanks:- Apply as per Technical Instruction M-25 Volume V, E-in-C's Branch, which will be strictly followed.

15.2.23. Road Marking Paints:- Shall be used as per manufacturer's instructions and approval by the Engineer-in-Charge.

15.2.24. Wood Preservative:- Shall be applied as per manufacturer's instructions and as approved by the Engineer-in-Charge.

METHOD OF MEASUREMENTS

15.2.25. Generally Oiling:- Will be paid per cum as per quantity of timber measured.

15.2.26. Attachment:- No extra shall be paid for oiling or painting of attachment (block, wooden handles, etc.) in a similar manner to the main work.

15.2.27. Measurements:- Matched boarding, boarding with cover fillets, corrugated sheeting, etc, shall be measured net and flat (not girthed). Boarding with faces and edges exposed shall be measured over the faces only.

15.2.28. Door and Windows:- Shall be measured on both sides. Portion of doors sashed or with panels left out shall not be measured separately from doors with panels and no deductions shall be made for glass or panels left out.

15.2.29. Trellis (Jali/ Grill) Work, Iron guard bars, iron bar gates, grating and railing, etc shall be measured on one side only, but shall be coated on all exposed faces.

15.2.30. Oiling or Tarring:- Second coat will only be paid, if, specially ordered by the Engineer-in-Charge.

CLARIFICATION OF RATES

- 15.2.31. The rates, inter alia, incl particularly:-
 - 15.2.31.1. Cleaning and preparing all surfaces for the application of wood preservatives, tar, paint etc.
 - 15.2.31.2. Work on surfaces of any material in any position.
 - 15.2.31.3. The rates apply to paint of any base and/or colour or tint.
 - 15.2.31.4. The use of cradles etc, where required particularly for convenience of inspection etc, by the Engineer-in-Charge.
 - 15.2.31.5. Rates for priming coat, which is for new work will incl knotting, stopping and under coat on crevices, cracks or holes.
 - 15.2.31.6. Rates for washing down, which are for old work, will incl rubbing, filling cracks with putty and under coat on naked patches.
 - 15.2.31.7. Protective works against splashes and cleaning of splashes.

15.2.32. The rates in Section-9 (Iron and Steel Work) with the exception of sheets, steel work, sheet iron pipes, reinforcement and galvd work, incl painting with one coat of paint before fixing and one coat after fixing.

MILLITARY ENCINE SERVICES

SI No	Description	Unit	Rate (Rs)
15-1	Cement Slurry wash , on new /old surface per coat.	Sqm	11.32
15-2	Cement Oil paint , on new /old surface 1st Coat.	Sqm	50.72
15-3	Same as item 15-2, but 2nd and subsequent coats	Sqm	58.07
15-4	White or Colour washing on new /old surface 1st Coat.	Sqm	12.17
15-5	Same as item 15-4, but 2nd and subsequent coats.	Sqm	9.27
15-6	Distempering with Poly Vinyl Distemper or equivalent, on new or old surface, 1st Coat.	Sqm	43.12
15-7	Same as item 15-6, but 2nd and subsequent coats.	Sqm	32.91
15-8	Whitening surface of soft board ceiling etc with POP on new or old surface, 1st Coat.	Sqm	14.64
15-9	Same as item 15-8, but 2nd and subsequent coats.	Sqm	11.32
15-10	Removing white or colour wash and distemper from plastered / un-plastered surface. Oiling	Sqm	31.83
15-11	Oiling to timber in scantling with Crude Oil , HCF 50/50 one coat.	Cum	794.78
15-12	Same as item 15-11, but two coats	Cum	1354.38
15-13	Oiling to timber in scantling with Creosote oil , one coat.	Cum	824.20
15-14	Same as item 15-13, but two coats.	Cum	1628.32
15-15	Oiling to wooden planks boarding, doors windows, trellis work etc with Crude Oil HCF 50/50, one coat.	Sqm	12.06
15-16	Same as item 15-15, but two coats.	Sqm	20.51
15-17	Oiling to wooden planks boarding, doors windows, trellis work etc with Creosote Oil , one coat.	Sqm	15.57

ITEM RATES

15-18	Same as item 15-17, but two coats.	Sqm	22.10
SI No	Description	Unit	Rate (Rs)
15-19	Oiling to fillets, framings and similar work not exc 150mm girth with Crude Oil HCF 50/50 one coat.	Metre	1.80
15-20	Same as 15-19 but two coats	Metre	3.02
15-21	Oiling to fillets, framings and similar work not exc 150mm girth with Creosote Oil one coat.	Metre	2.25
15-22	Same as 15-21, but two coats	Metre	3.11
15-23	Oiling to ballies not exc 140 mm mean dia with Crude Oil HCF 50/50 one coat.	Metre	5.25
15-24	Same as 15-23, but two coats.	Metre	8.26
15-25	Oiling to ballies not exc 140 mm mean dia with Creosote Oil , one coat.	Metre	6.66
15-26	Same as item 15-25, but two coats.	Metre	4.90
15-27	Oiling to ballies exc 140mm but not exc 200 mm mean dia with Crude Oil HCF 50/50 one coat.	Metre	6.28
15-28	Same as item 15-27, but two coats.	Metre	10.70
15-29	Oiling to ballies exc 140mm but not exc 200mm means Creosote Oil , one coat.	Metre	6.32
15-30	Same as item 15-29, but two coats.	Metre	10.46
	Tarring		
15-31	Tarring on any plain surface, one coat.	Sqm	115.08
15-32	Same as item 15-31, but two coats. Painting Wood Work	Sqm	197.01
15-33	Prime Coat on new wood work such as timber work in ceiling timber boarding etc., of any description, as specified.	Sqm	119.53
15-34	Ist Coat of painting on new or old work such as timber work ceiling and timber boarding etc of any description with synthetic enamel paint.	Sqm	99.41
15-35	Same as item 15-34, but second and subsequent coat.	Sqm	75.91
15-36	Same as item 15-34, but using Lead Oxide paint .	Sqm	108.69
15-37	Same as item 15-35, but using Lead Oxide paint.	Sqm	66.72

15-38	Prime coat on new work such as glazed or gauzed window and fanlight, as specified.	Sqm	92.20
SI No	Description	Unit	Rate (Rs)
15-39	Ist Coat of painting on new or old work such as glazed or gauzed window and fanlight, with Synthetic Enamel paint.	Sqm	100.64
15-40	Same as item 15-39, but second and subsequent coat.	Sqm	83.60
15-41	Same as item 15-39, but using Lead Oxide paint.	Sqm	80.31
15-42	Same as item 15-40, but using Lead Oxide paint.	Sqm	71.01
15-43	Primer Coat on new work such as doors of any type and description as specified.	Sqm	127.49
15-44	Ist Coat of painting to new or old work such as doors of any type and description with synthetic enamel paint.	Sqm	107.37
15-45	Same as item 15-44, but 2nd and subsequent coat.	Sqm	83.86
15-46	Same as item 15-44, but using Lead Oxide paint.	Sqm	93.29
15-47	Same as item 15-45, but using Lead Oxide paint.	Sqm	74.68
15-48	Primer coat on new work such as fillets framings skirting and similar work not exc 150 mm in girth as specified.	Metre	16.19
15-49	Ist coat of painting on new or old work such as fillets, framings, skirting and similar work not exc 150 mm girth with Synthetic Enamel Paint .	Metre	10.52
15-50	Same as item 15-49, but second and subsequent coat.	Metre	6.99
15-51	Same as item 15-49, but using Lead oxide paint.	Metre	8.45
15-52	Same as item 15-50, but using Lead oxide paint.	Metre	5.66
15-53	Primer coat on new work such as detached articles not exc 900 Sqcm, as specified.	C.No	832.70

FINISHES (D	ISTEMPERING AND PAINTING)		258
15-54	Ist coat of painting on new or old work such as detached articles not exc 900 Sqcm with Synthetic Enamel Paint	C.No	665.53
15-55	Same as item 15-54, but 2nd and subsequent coat.	C.No	453.97
SI No	Description	Unit	Rate (Rs)
15-56	Same as item 15-54, but using Lead Oxide paint.	C.No	538.81
15-57	Same as item 15-55, but using Lead Oxide paint.	C.No	369.00
	Painting Steel and Iron Work		
15-58	1st Coat of painting on new or old work such as steel doors, windows and CSWs of any type and description with Synthetic Enamel paint .	Sqm	84.72
15-59	Same as item 15-58, but 2nd and subsequent coat.	Sqm	60.09
15-60	1st Coat of painting on new or old work such as iron guard bars, iron bars gates, railing and similar open work with Synthetic Enamel paint.	Sqm	52.99
15-61	Same as item 15-60, but 2nd and subsequent coat.	Sqm	37.17
15-62	1st Coat of painting on new or old work such as plain and corrugated sheets in roofs, partitions etc with Synthetic Enamel paint . (measured flat not girthed).	Sqm	96.47
15-63	Same as item 15-62, but 2nd and subsequent coat.	Sqm	65.97
15-64	1st Coat of painting on new or old work such as pipes, gutters and similar work not exc 150mm in girth with Synthetic Enamel paint.	Metre	14.47
15-65	Same as item 15-64, but 2nd and subsequent coat.	Metre	9.65
15-66	1st Coat of painting on new or old work such as detached articles not exc. 900 Sqcm with Synthetic Enamel paint	C.No	868.27

15-67 Same as item 15-66, but 2nd and C.No 593.64 subsequent coat.

15-68	1st Coat of painting on new or old Sqm surfaces of any description of steel with Red Oxide paint except items 15-58 and	73.70
	15-59.	
15 60	Same as itom 15.69 but and and Sam	62.07

15-69	Same	as	item	15-68,	but	2nd	and	Sqm	62.07
	subsec	quen	t coat.						

SI No	Description	Unit	Rate (Rs)
15-70	1st Coat of painting on new or old work such as iron guard bars, iron bar gates, gratings, railings and similar open work, with Red Oxide paint.	Sqm	48.58
15-71	Same as item 15-70, but 2nd and subsequent coat.	Sqm	43.93
15-72	1st Coat of painting on new or old work such as pipes, gutters and similar work not exc 150 mm in girth with Red Oxide paint.	Metre	11.06
15-73	Same as item 15-72, but 2nd and subsequent coat.	Metre	9.32
15-74	1st Coat of painting of new or old work such as detached articles not exc 900 Sq cm with Red Oxide paint.	C.No	663.33
15-75	Same as item 15-74, but 2nd and subsequent coat.	C.No	558.65
	Aluminium Painting		
15-76	1st Coat of painting on new or old work such as steel doors and window with Aluminium paint.	Sqm	84.81
15-77	Same as item 15-76, but 2nd and subsequent coat.	Sqm	60.14
15-78	1st Coat of painting on new or old such as corrugated sheets in roofs, partitions, etc, (measured flat and not girthed) with Aluminium paint.	Sqm	86.63
15-79	Same as item 15-78, but 2nd and subsequent coat.	Sqm	66.03
15-80	1st Coat of painting on new or old work such as pipes, gutters, and similar work not exc 150 mm internal dia with Aluminium paint.	Metre	12.72
15-81	Same as item 15-80, but 2nd and subsequent coat.	Metre	9.02

FINISHES (DI	STEMPERING AND PAINTING)		260
15-82	1st Coat of painting on new or old work such as detached articles not exc. 900 Sq cm with Aluminium paint.	C.No	763.25
15-83	Same as item 15-82, but 2nd and subsequent coat. Painting on Plastered Walls	C.No	541.29
15-84	Surface preparation (for dampness) by provision of a film with Alkali Resisting primer on plastered wall or ceiling.	Sqm	57.75
SI No	Description	Unit	Rate (Rs)
15-85	1st Coat of painting on new or old work such as walls incl all detached attachment with Plastic Emulsion paint.	Sqm	99.58
15-86	Same as item 15-85, but 2nd and subsequent coat.	Sqm	68.06
15-87	1st Coat of painting on new or old pipes, picture rails, dados etc. 150mm in girth with Plastic emulsion paint.	Metre	14.94
15-88	Same as item 15-87, but 2nd and subsequent coat.	Metre	10.65
15-89	1st Coat of Weather Resistant paint on exterior wall after removing /scraping the white/ colour wash and distemper from plastered / un-plastered surface.	Sqm	119.50
15-90	1st Coat of Weather Resistant paint on exterior wall on new surface.	Sqm	107.26
15-91	Subsequent Coat of Weather Resistant paint on exterior wall surface to item 15-89 and 15-90.	Sqm	73.07
15-92	One Coat of painting with Black Japan or ordinary varnish on surface of any description.	Sqm	108.02
15-93	One Coat of painting with Black Japan or ordinary varnish on linear work not exc 150 mm girth.	Metre	16.20
15-94	One coat of painting with Black Japan or ordinary varnish to small detached articles as locks, latches, soot doors and frames, casement fasteners, etc. Burning Old Paint	C.No	972.16

FINISHES (D	ISTEMPERING AND PAINTING)		261
15-95	Burning off old paint (or removing by chemicals where burning is not allowed).	Sqm	55.71
15-96	Washing down old wood work.	Sqm	39.79
15-97	Wax polishing to wood work (complete rate)	Sqm	194.32
15-98	Spirit polishing to new wood work (complete rate).	Sqm	129.97
15-99	Same as item 15-98, but old wood work.	Sqm	119.75
15-100	Spirit polishing to sashes glazed or gauzed, new work (complete rate).	Sqm	97.48
15-101	Same as item 15-100, but old work.	Sqm	89.80
SI No	Description	Unit	Rate (Rs)
	Road Marking		
15-102	1st Coat of Road Marking paint on any new or old surface.	Sqm	73.15
15-103	Same as item 15-102, but 2nd and subsequent coat.	Sqm	59.38
	Camouflaging Paint		
15-104	1st Coat of Camouflaging paint on new or old work.	Sqm	99.47
15-105	Same as item 15-104, but 2nd and subsequent coat.	Sqm	87.54
	Wallpaper		
15-106	Supply and fix Wallpaper , plain or decorative, best quality, imported, all as specified.	Sqm	710.03
45 407	Epoxy Paint		404.00
15-107	Chromate primer on steel surface, new or old work, as specified.	Sqm	121.02
15-108	Same as item 15-107, but 2nd and subsequent coat.	Sqm	107.92
15-109	1st Coat of Epoxy finish on steel surface, new or old work, as specified.	Sqm	124.27
15-110	Same as item 15-109, but 2nd and subsequent coat.	Sqm	107.92
15-111	One Coat of Epoxy protective primer on blast cleaned surface of new / old work.	Sqm	98.07
15-112	1st Coat of Epoxy Coal tar to concrete or steel work new or old work.	Sqm	114.47

FINISHES	(DISTEMPERING AND PAINTING)		262
15-113	Same as item 15-112, but 2nd and subsequent coat.	Sqm	92.74
15-114	1st Coat of Epoxy Concrete Finish, to concrete or plastered surface, new / old work.	Sqm	192.09
15-115	Same as item 15-114, but 2nd Coat.	Sqm	158.06
15-116	1st Coat of Epoxy, imported (USA or Europe) finish on steel surface, new or old work, as specified.	Sqm	297.50
15-117	Same as item 15-116, but 2nd and subsequent coat.	Sqm	263.84
15-118	Filling / Sealing of cracks in concrete or plastered surface, with Epoxy sand mortar.	Metre	90.59
SI No	Description	Unit	Rate (Rs)
	Wall Coatings		
15-119	Wall finish, coat of Acrylic based Marble chips coating (Mesh-16 large) 1.00 mm to 2.00 mm thick, in any colour. (No extra	Sqm	390.55
15-120	Wall finish, coat of Roll-on Wall Coating 1.00 mm thick, incl a base coat in any colour	Sqm	795.80
15-121	Wall finish, coat of Graffito Wall coating 1.5 mm to 3.00 mm thick, in any colour, (straight and swirl),.	Sqm	430.81
15-122	Wall finish, coat of Venetian grain, Wall coating 1.5 mm to 3.00 mm thick (straight and girth) in any colour.	Sqm	465.07
15-123	Wall Finish, Spray coat (like Zola etc) single colour complete all as specified.	Sqm	318.32
15-124	Wall Finish, Spray coat (like Zola etc) multi-colour complete all as specified.	Sqm	355.05
15-125	Surface preparation by using putty on plastered wall or ceiling to form smooth base for distemper, plastic emulsion paint etc, all as specified. EPOXY PAINTING (POL TANKS)	Sqm	44.63
15-126	Cleaning of fuel tank including removal of settled material/fuel particles from inner surface all as specified.	Lit	0.55

(DISTEMPERING AND PAINTING)		263
Abbrasive/Sand Blasting Of Fuel Tank for new un-painted (un-corroded) steel surface all as specified.	Sqm	506.63
Same as item 15-127 but corroded un painted steel surface.	Sqm	769.56
Same as item 15-127 but previously painted (old work) steel surface.	Sqm	630.51
Primer coat imported (USA or Europe) to steel surface buff or ivory colour, minimum 125 micron dry film thickness complete as specified.	Sqm	483.60
Finish coat imported (USA or Europe) to steel surface white colour, minimum 125 micron film thickness complete as specified.	Sqm	440.75
CALL SC		Ĩ,
	(DISTEMPERING AND PAINTING) Abbrasive/Sand Blasting Of Fuel Tank for new un-painted (un-corroded) steel surface all as specified. Same as item 15-127 but corroded un painted steel surface. Same as item 15-127 but previously painted (old work) steel surface. Primer coat imported (USA or Europe) to steel surface buff or ivory colour, minimum 125 micron dry film thickness complete as specified. Finish coat imported (USA or Europe) to steel surface white colour, minimum 125 micron film thickness complete as specified.	(DISTEMPERING AND PAINTING) Abbrasive/Sand Blasting Of Fuel Tank for new un-painted (un-corroded) steel surface all as specified. Same as item 15-127 but corroded un painted steel surface. Same as item 15-127 but previously painted (old work) steel surface. Primer coat imported (USA or Europe) to steel surface buff or ivory colour, minimum 125 micron dry film thickness complete as specified. Finish coat imported (USA or Europe) to steel surface white colour, minimum 125 micron film thickness complete as specified. Sqm

SECTION - 16

GLAZING

SPECIFICATIONS

16.0. The work covered under this section consists of glazing plate / sheet, tempered glass and glass blocks, etc.

MATERIAL REQUIREMENTS

16.1. Glazing:-

- 16.1.1. **Generally:-** All glass to be of the best quality of its respective kind, free from specks, bubbles and defects.
- 16.1.2. **Sheet glass** is upto 6.34 mm thickness and plate glass is above 6.34 mm thickness.
- 16.1.3. **Plate glass:** To be plain, tempered, tinted, milky rough, wired cast, rolled wire or ornamental rolled, as ordered.
- 16.1.4. **Glass Blocks:-** To be plain or of different shapes and colour, generally used for ornamental and low lighting.

CONSTRUCTION REQUIREMENTS

16.2. Glazing:- Rebates of frames of doors and windows etc, shall be provided with paint of same type as of doors and windows.

16.3 Putty:-

- 16.3.1. It shall be prepared by taking 930 gm, finely powdered whiting, 58 gm white lead (dry), 350 gm raw Linseed oil, 30 gm litharge, mixing well together and beating with a wooden mallet until thoroughly incorporated. If the putty becomes hard, it can be restored by heating it and working it up while hot.
- 16. 3.2. Ready made putty can also be used, if approved by the Engineer-in-Charge.
- **Note:-** For glazing in metal sashes, 5% Red Lead to be added.

16.4. Fixing of Sheet Glass:- Where not otherwise specified, to be fixed in oil putty (Red lead putty for steel sashes) well bedded and back puttied, and the glass well springed, where necessary. All broken or damaged glass will be hacked out and replaced and on completion, the whole of the glazing is left perfect. Rebates, whether in new or old work to be painted one coat, before glazing, or moistened with raw linseed oil, if joinery is to be oiled. Each pan of glass to be in one whole piece, pieces of pans of glass will not be allowed.

16.5. Fixing of Plate Glass:- To be fixed as per the recommendations of the Manufacturer, its purpose and requirements related to the site. It shall be approved by the Engineer in Charge before executing the work.

16.6. Glass Blocks / Tiles:- To be fixed as per the recommendations of the Manufacturer, and as approved by the Engineer in Charge before executing the work.

METHOD OF MEASUREMENTS

16.7. Tolerance:-

- 16.7.1. Take dimensions to nearest cm.
- 16.7.2. Measure irregular panes as the smallest circumscribing rectangle.

CLARIFICATION OF RATES

- 16.8. The rates, inter alia, incl particularly:-
 - 16.8.1. Glazing with springs and oil putty, well bedded and back puttied or beads, screws, as required in wood or metal sashes, skylights, etc.
 - 16.08.2. All cutting and waste.
 - 16.08.3. Fixing in any position.

ITEM RATES

SI N	o. Description	Unit	Rate (Rs)
	Glazing:-		
16-1	Supply and fix, 3mm thick, Plain Sheet glass fixed to timber or steel sashes with putty as specified.	Sqm	750.29
16-2	Same as item 16-1, but 5mm thick.	Sqm	981.93
16-3	Supply and fix, 3mm thick Frosted Sheet glass fixed to timber or steel sashes with putty as specified.	Sqm	862.07
16-4	Same as item 16-3, but 5mm thick.	Sqm	1010.21
16-5	Supply and fix, 5mm thick, Tinted Sheet glass fixed to timber or steel sashes with putty as specified.	Sqm	1314.57
16-6	Supply and fix, 3mm thick, Milky glass fixed to timber or steel sashes with putty as specified.	Sqm	750.29
16-7	Same as item 16-6, but 5mm thick.	Sqm	965.76
16-8	Supply and fix 3mm thick, Plain Sheet glass fixed to timber or steel sashes with hard /soft wood beads and screws as specified.	Sqm	782.61
16-9	Same as Item 16-08, but 5mm thick	Sqm	1014.25
16-10	Supply and fix, 8mm thick, Plate glass fixed to timber or steel sashes with Hard /Soft wood beads and screws as specified.	Sqm	1789.38
16-1 ⁻	1 Same as Item 16-10, but 10 mm thick	Sqm	2224.37
16-12	2 Same as Item 16-10, but 12 mm thick	Sqm	2804.81
16-13	3 Same as Item 16-10, but 12 mm thick (imported)	Sqm	3744.83
16-14	4 Same as Item 16-10, but 15mm thick (imported)	Sqm	4969.01
16-1	5 Supply and fix, 3mm thick, Frosted glass fixed to timber or steel sashes with hard /soft wood beads and screws as specified.	Sqm	894.39

SI No.	Description	Unit	Rate (Rs)
16-16	Same as Item 16-15, but 5mm thick.	Sqm	1042.53
16-17	Supply and fix 5mm thick Tinted glass fixed to timber or steel sashes with hard/softwood beads and screws or by the use of rubber lining.	Sqm	1346.89
<u> 16-18</u>	Same as item 16-17, but 8 mm thick.	Sqm	1789.38
16-19	Supply and fix 3mm thick Milky glass fixed to timber or steel sashes with hard /soft wood beads and screws as specified.	Sqm	782.61
16-20	Same as item 16-19, but 5mm thick.	Sqm	998.09
	Hacking Out		
16-21	Hacking out old broken glass from sashes, remove any serviceable portions to store and dispose off rubbish.	Sqm	314.95
	Tempering		
16-22	Tempering to any thickness of glass sheet all as specified.	Sqm	3622.70
	Glass Blocks		
16-23	Supply and fix, Plain Glass blocks , size 190 mm x190 mm x 80 mm, as specified.	Each	489.72
16-24	Supply and fix, Coloured Glass blocks , size 190 mm x 190 mm x 80 mm,as specified.	Each	575.42
16-25	Same as item 16-23 and 16-24, but fixing only.	Each	102.03
16-26	Add to item 16-23 to 16-25, if fixed in repairs.	Each	61.22

SECTION - 17

SANITARY FITTINGS

SPECIFICATIONS

17.0. The work covered under this section consists of all operations for Sanitary ware and fittings like Water Closets (WC), urinals, Wash-Hand Basins (WHB), bath sets and accessories, incl their specified jointing etc.

MATERIAL REQUIREMENTS

17.1. Workmanship and Materials:- The material and fittings shall be of the quality, as approved by the Engineer-in-Charge. Fittings shall be neat and conforming to approved quality. The materials shall be of the specified grade and best quality.

17.2. Jointing and Packing Materials:- Lead shall be sound, free from inclusions and shall be of the best quality available in the market. The packing material shall be of pure jute, hemp or hempen yarn. The mortar used for caulking joints shall be 1:2 Cement-Sand mortar with min water added to just wet all particles of cement and sand, dry mix.

17.3. Rubber Cone Joint Cover:- Rubber cones to be 100-150mm long with end dia as required, edges beaded. Rubber shall be 6mm thick.

17.4. Rag Joint Cover:- To consist of clean Linen, 50mm wide.

17.5. Sanitary Fittings:- All bib cocks, stop cocks etc are to be of the pattern required to conform to the Regulation and be the product of manufacturers incl in the approved list of Engineer-in-Chief. These are elaborated in Section–18.

17.6. Sanitary Ware:- Shall be of best quality, as approved by the Engineer-in-Charge It should be made of Vitreous China clay and glazed with Zirconium Silicate (Glaze, preferably **European Standard**). The Finished product shall have Water Absorption not more than 0.05%. Pigments used may be verified according to European Standard and should not fade with time. It shall be ensured that no particle, bubble or deposit is visible on the surface of the sanitary ware. If found unsatisfactory, the item be rejected. Min size of WC (Asiatic) shall not be less than 550 mm, where as the min size for European pattern WC shall be 380 mm. The other components shall have compatible dimensions as per manufacturer's brochure and approved by the Engineer in Charge.

17.7. Traps (For Sinks, Baths etc):- To be of approved make.

CONSTRUCTION REQUIREMENTS

17.8. Workmanship and Materials:- The workmanship / labour used in preparatory work and fittings shall be neat and approved by the Engineer-in-Charge.

17.9. Joints Generally:- These shall be made with special care, particularly joints between different materials. No joint to be embedded in a wall, if avoidable.

17.10. Cement Caulked Joints:- The spigots to be packed and caulked to 13mm depth of tarred yarn or yarn impregnated in cement slurry. Pipe to be truly fitted concentric, to be solidly bedded, packed, caulked with wooden caulking tool, shaped to fit the angular ring, joined in CM (1:1) and finished with a bold collar of CM on the outside of each joint. The bore of the pipes to be care-fully wiped clean, as work proceeds.

17.11. Run Lead Caulked Joints:- The spigot and socket are to be cleaned, truly fitted and concentrically aligned, the joint to be packed and caulked for half the depth of the socket with picked gaskit and then filled with molten lead, caulked and trimmed.

17.12. Lead Wool Caulked Joint:- To be Run Lead using Lead wool in lieu of molten lead.

17.13. Lead Caulked Joint:- The pipes to be clean, fitted, aligned, concentric, the joint packed and caulked with picked gasket, mixed with red lead putty. The joint be neatly finished with a bold collar of similar materials.

17.14. Joint to Similar Materials:-

- 17.14.1. Lead to Lead, wiped Lead Joint.
- 17.14.2. Stoneware / Porcelain to stoneware-caulked cement joint.
- 17.14.3 Iron to Iron:-
 - 17.14.3.1 Run Lead caulked Joint.
 - 17.14.3.2 Lead Wool caulked Joint.

17.15. Joint to Dissimilar Materials:-

17.15.1 **Lead to Stoneware etc:-** Use 150 mm long, 5 mm thick brass ferrule one end plain, other flanged. Plain end to be wiped to lead and flanged end caulked with stoneware, by any one of the following:-

- 17.15.1.1. Cement caulked into Stoneware socket OR
- 17.15.1.2. Red Lead caulked into Stoneware socket.
- 17.15.1.3. Finish (17.15.1.1) or (17.15.1.2) with a rag cover.

17.15.2. **Stoneware to Lead:-** Use a spigot and socket piece 150 mm long and 5 mm thick Brass.

- 17.15.2.1. Put Brass socket into Stoneware spigot and cement in the joint.
- 17.15.2.2. Put Lead pipe into Brass socket and caulk the joint with cement.
- 17.15.2.3. Provide (17.15.2.1) or (17.15.2.2) rag cover.

17.15.3. Lead to Iron:- Use a 5mm thick, 150mm long Brass ferrule, with one flanged end and the other plain. Wipe the plain end of ferrule to the plain end of the Lead and put the flanged end of ferrule to socketed end of CI pipe and caulk the Run Lead upto the flange of ferrule in the socket.

17.15.4. **Iron to Lead:-** Use a Brass spigot and socket piece of 5mm Brass, 150 mm long.

- 17.15.4.1. Run lead, caulk the Iron spigot into the Brass socket OR.
- 17.15.4.2. Lead wool, caulk the Iron spigot into the Brass socket.
- 17.15.4.3. The spigot end of the Brass to be wiped to the Lead.

17.15.5. Stoneware, etc to Iron:-

- 17.15.5.1. Cement caulk the stoneware spigot into a special large socket of the Iron pipe OR.
- 17.15.5.2 All as (17.17.5.1), but Red Lead caulk and.
- 17.15.5.3 Use a rag. Cover where directed in addition.
- 17.15.6. Iron to Stoneware:-
 - 17.15.6.1. Cement caulk OR.
 - 17.15.6.2. All as (17.17.6.1.), but Red Lead caulk, and.
 - 17.15.6.3. Cover with rag, where directed.

17.16. Rubber Cone Joint Cover:- Rubber cones to be 100mm to 150mm long with end dia as required and edges beaded. Rubber be 6mm thick and cone be bound with Copper wire.

17.17. Rag Joint Cover:- Shall be thickly coated with thick Red Lead paint and bandaged (six laps) round the joint. To be secured with Copper wire and finished with 2 coats of Lead paint.

17.18. Testing of Work:- Whole of the work shall be tested at the contractor's expense, to entire satisfaction of the Engineer-in-Charge. All defective items incl leakages be rectified / replaced.

METHOD OF MEASUREMENTS

17.19. Measurements will be carried out as under:-

17.19.1. Fitting shall be enumerated, except where otherwise described.

17.19.2. The items shall be measured in units of Each as enumerated for respective items.

17.19.3. The dimensions shall be measured to the nearest mm.

CLARIFICATION OF RATES

17.20. The rates, inter alia, incl particularly:-

17.20.1. Fixing Only Rates:-

- 17.20.1.1 The rates for "Fixing only" Water Closets (WC) and urinals complete incl for pedestal, pattern with loose trap, and basin or stall urinals, the rates incl for securing to floors or wall, in CM 1:3 and bedding traps of Asian WC. in CC Type B, also for securing seats, flushing cisterns to walls, fixing and jointing flush pipes incl joints to fittings and for fixing stoppers, if anti syphonage pipes are not required.
- 17.20.1.2. The rates for "**Fixing only**" for bath tubs etc incl placing the bath tubs in position and securing to floor, if required, fixing overflow and waste grating and trap, stopper and chain.
- 17.20.1.3. The rates for "**Fixing only**" sinks, basins in range incl for properly securing to brackets or bedding in cement to dwarf piers, and fixing waste or overflow gratings and trap, stopper and chain. These rates also incl for fixing only a porcelain stopper in lieu of a pillar cock, if only one pillar cock is required and supplied.

17.20.2. The rates for "**Add if Fixed in Repairs**" incl carriage to MES store or for safe custody until required to reuse, and making good on completion.

17.20.3. All **"Fixing Only Rates"** incl all jointing and fixing materials, i.e. Lead wool, Red lead, CM, screws, nails and other subsidiary articles required for proper fixing of the fittings, but do not incl for Red Lead joints to Iron or soldered joint to Lead, service waste or over flow pipes, where required.

ITEM RATES

SI No	Description	Unit	Rate (Rs)
	Water Closet (WC) and Urinals		
17-1	Supply and fix, Water Closet (WC) apparatus European pattern complete comprising closet, 13 lit flushing cistern, plastic, low down, flush pipe seat cover etc (non coupled) in white colour (IFO pattern or equivalent width not less than 380 mm), fixed to concrete, brick, stone or wood work, best quality, Pak made .	Each	6430.82
17-2	Same as item 17-1, but light colour	Each	6920.54
17-3	Same as item 17-1, but special colours.	Each	7165.40
17-4	Supply and fix, WC apparatus European pattern, complete, comprising closet, 13 lit flushing cistern, glazed, low down, flush pipe, seat cover etc (non coupled) in white colour (IFO pattern or equivalent, width not less than 380 mm), fixed to concrete, brick, stone or wood work, best quality, Pak made .	Each	7471.47
17-5	Same as item 17-4, but light colour.	Each	7716.33
17-6	Same as item 17-4, but special colour.	Each	8512.13
17-7	Same as item 17-1 to 17-6, but fixing only	Each	597.03
17-8	Add to item 17-1 to 17-07, if fixed in repair.	Each	381.98
17-9	Supply and fix, WC apparatus, European Pattern, complete (coupled set), comprising closet 13 lit flushing cistern glazed, in white colour, seat cover, complete set (IFO pattern or equivalent, width not less than 380 mm) fixed to concrete, brick, stone or wood work, best quality, Pak made.	Each	9205.08
17-10	Same as item 17-9, but light colour.	Each	9511.16
17-11	Same as item 17-9, but special colour.	Each	9694.80

SANITARY FITTINGS

SI No	Description	Unit	Rate (Rs)
17-12	Supply and fixing, WC apparatus, European pattern, (like Porta design or equivalent) complete, (coupled set), comprising closet 13 lit flushing cistern, glazed, seat cover, in white/lvory colour, complete, Imported (China), fixed to concrete, brick, stone or wood work, best quality.	Each	10306.95
17-13	Same as item 17-12, but Coloured.	Each	7322.72
17-14	Same as item 17-9 to 17-13, but fixing only	Each	390.12
17-15	Add to item 17-09 to 17-14, for fixed in repairs.	Each	233.96
17-16	Supply and fix, Ceramic Sanitary ware , five pieces i.e WC apparatus, European pattern (width not less than 380mm), complete, comprising closet 13 lit, glazed flushing cistern, (coupled set), seat cover, wash hand basin (WHB) size 660x 560mm with pedestal etc, complete, (IFO pattern or equivalent), white colour, fixed to concrete, brick, stone or wood work, best quality, Pak made .	Set	12756.34
17-17	Same as item 17-16, but light colour.	Set	15651.81
17-18	Same as item 17-16, but special colour.	Set	18315.53
17-19	Supply and fix Ceramic Sanitary ware , five pieces, complete ser, i.e WC apparatus European pattern (like Porta design or equivalent) comprising closet, 13 lit flushing glazed cistern, coupled set, seat cover, WHB, size 660mm x 560mm with pedestal etc,complete. Imported (China).	Each	12303.35
17-20	Same as item 17-19 but Coloured.	Each	5000.40
17-21	Same as item 17-16 to 17-20, but fixing only.	Set	1241.80
17-22	Add to item 17-16 to 17-21, if fixed in repairs.	Set	791.02
17-23	Supply and fix, WC Asiatic pattern (white colour incl foot rest, full Orrisa pattern or equivalent) 13 lit flushing cistern, low down (plastic), flush pipe etc,	Each	5479.97

270

SI No	Description	Unit	Rate (Rs)
	fixed to concrete, brick, stone, or wood work, best quality, Pak made.		
17-24	Same as item 17-23, but light colour.	Each	4727.02
17-25	Same as item 17-23, but special colour.	Each	5014.73
17-26	Same as item 17-23 to 17-25, but fixing only.	Each	570.52
17-27	Add to item 17-23 to 17-26, if fixed in repair.	Each	381.98
17-28	Supply and fix, Urinal apparatus, basin/stall pattern, white colour, complete comprising basin, flushing cistern, flush pipe etc, flat back, fixed to concrete, brick, stone or wood work, best quality, Pak made.	Each	7531.47
17-29	Same as item 17-28, but light colour.	Each	7513.10
17-30	Same as item 17-28, but special colour.	Each	8382.35
17-31	Same as item 17-28 to 17-30, but fixing only.	Each	601.93
17-32	Add to item 17-28 to 17-31, if fixed in repair.	Each	381.98
17-33	Supply and fix, WC pan and trap, European pattern, white colour, incl connection to drain or out-going pipe and to flushing pipe, anti-siphon pipe etc, complete, (IFO pattern or equivalent width not less than 380 mm), best quality, Pak made .	Each	2825.26
17-34	Same as item 17-33, but light colour.	Each	3009.33
17-35	Same as item 17-33, but special colour.	Each	3039.51
17-36	Same as item 17-33, 17-34 and 17-35, but fixing only in repair.	Each	437.87
17-37	Supply and fix, Closet Pan only , Asiatic pattern, white colour, full Orrisa pattern or equivalent, incl connection to trap and flushing pipe, incl making good to floor, best quality.	Each	3111.01
17-38	Same as item 17-37, but light colour.	Each	2119.32

SANITARY FITTINGS

SI No	Description	Unit	Rate (Rs)
17-39	Same as item 17-37, but special colour.	Each	3790.49
17-40	Same as item 17-37, 17-38, 17-39, but fixing only in repair.	Each	691.35
17-41	Supply and fix, Low down cistern , glazed, white colour, 13 lit capacity (incl brackets if required) and connection to flush pipe, best quality, Pak made .	Each	3530.88
17-42	Same as item 17-41, but light colour.	Each	3714.53
17-43	Same as item 17-41, but special colour.	Each	3971.63
17-44	Same as item 17-41 to 17-43, but fixing only in repair.	Each	188.54
17-45	Supply and fix, Low down plastic flushing cistern , white colour, 13 lit capacity, with connection to flushing pipe etc, complete.	Each	2343.31
17-46	Same as item 17-45, but light colour.	Each	2582.05
17-47	Same as item 17-45, but special colour.	Each	2765.69
17-48	Same as item 17-45, 17-46, 17-47, but fixing only.	Each	268.12
17-49	Supply and fix, urinal , basin/stall pattern, white colour, incl connection to out-going pipe and to flushing pipe complete.	Each	2815.89
17-50	Same as item 17-49, but light colour.	Each	2797.53
17-51	Same as item 17-49, but special colour.	Each	3666.78
17-52	Add to item 17-49, 17-50, 17-51, if flushing cistern in any colour, supplied and fixed only.	Each	4730.70
17-53	Same as item 17-49, 17-50, 17-51 and 17-52, but fixing only.	Each	307.30
17-54	Add to item 17-49 to 17-53, for fixing only in repair.	Each	195.89
17 55	Cupply and fix Fibre Class both tub	Fach	10701 00
17-55	with acrylic finishing, 1473 x 736 mm, incl waste coupling, chain with plug, except tub mixer, any colour, complete, Pak made .	Each	13704.39

17-56 Fixing only, bath tub of any size make or Each 965.54

SI No	Description	Unit	Rate (Rs)
	colour incl waste coupling and chain with plug washer and trap etc, complete, Pak made.		
17-57	Add to item No 17-55 and 17-56, if fixed in repair.	Each	238.74
	Sink Scullery		
17-58	Supply and fix, Sink Scullery of Stainless Steel , with single drainage board , complete, shallow or deep pattern upto 6000 sqcm, super, fixed to concrete, brick, stone or wood work, Pak Made , incl S/F fittings, accessories etc as required.	Each	11110.52
17-59	Supply and fix, Sink Scullery Stainless Steel with double drainage board with single bowl up to 6000 sqcm, super, fixed to concrete, brick, stone or wood work, Pak made, incl S/F fittings, accessories etc as required.	Each	15089.50
17-60	Supply and fix, Sink Scullery Stainless Steel with single drainage board, with double bowl exc 6000 sqcm upto 7500 sqcm, super, fixed to concrete, brick, stone or wood work, Pak made, incl S/F fittings, accessories etc as required.	Each	20739.64
17-61	Supply and fix, Sink Scullery of Stainless Steel with double drainage board and double bowl , complete, shallow or deep pattern exc 6000 sqcm upto 9300 sqcm, super, fixed to concrete, brick, stone or wood work, Pak made , incl S/F fittings, accessories etc as required.	Each	22588.34
17-62	Fixing only, of Sink Scullery, single drainage board and single bowl , incl S/F fittings, accessories etc as required.	Each	1057.80
17-63	Add to item 17-62, for fix in repair.	Each	318.32
17-64	Fixing only, of Sink Scullery with double drainage board and single bowl , incl S/F fittings, accessories etc as required.	Each	1220.63
17-65	Same as item 17-64, but if fixed in repairs	Each	318.32

SI No	Description	Unit	Rate (Rs)
17-66	Fixing only, of Sink Scullery with double drainage board and double bowl , incl S/F fittings, accessories etc as required.	Each	1220.63
17-67	Add to item 17-66, if fixed in repairs.	Each	397.90
17-68	S/F, Sink Scullery, Glazed ware , 615 mm x 440 mm x 240mm (over-all) without drainage board , fixed to concrete, brick, stone or wood work, complete, Pak made	Each	5778.70
17-69	Same as Item 17-68, but fixing only incl S/F, fittings, accessories etc as required.	Each	1057.80
17-70	Add to item, 17-68 and 17-69, if fixed in repair.	Each	318.32
	Shower Tray		
17-71	Supply and fix, Shower Tray of Fibre Glass acrylic, incl coupling etc 940 mm x 940 mm in any colour, Best quality, Pak made .	Each	8392.58
17-72	Add to item 17-71, but fixing only.	Each	318.32
17-73	Add to item 17-71 to 17-72, if fixed in repair.	Each	159.16
17-74	Supply and fix, Chromium Plated (CP) shower rose, fixed or adjustable, any dia.	Each	1076.16
17-75	Fixing only, of Shower rose, any make and pattern.	Each	66.11
17-76	Add to item 17-74 and 17-75, if fixed in repairs.	Each	47.75
	Wash Hand Basin (WHB)		
17-77	Supply and fix, WHB in White colour, glazed ware, 660 mm x 560 mm (IFO pattern or equivalent), one hole ,complete with waste pipe, coupling, chain and plug etc (except mixer), best quality, fixed to concrete, brick, stone, or wood work, Pak made .	Each	7613.92
17-78	Same as item 17-77, but light colour.	Each	4240.98
17-79	Same as item 17-77, but special colour.	Each	4914.34
17-80	Supply and fix, WHB with pedestal, glazed ware , size 660 mm x 560 mm in white colour, one hole, complete with	Each	8852.48

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SI No	Description	Unit	Rate (Rs)
	waste pipe, coupling, CP chain and plug and pedestal etc (except mixer) best quality, (IFO pattern or equivalent), fixed to concrete, brick, stone or wood work, Pak made .		
17-81	Same as item 17-80, but light colour.	Each	5786.04
17-82	Same as item 17-80, but special colour.	Each	6612.02
17-83	Supply and fix, WHB with pedestal, glazed ware, Imported (China) (like Porta design or equivalent) in white / Ivory colour, one hole, complete with waste pipe coupling, CP chain and plug and pedestal etc (except mixer) best quality, fixed to concrete, brick, stone or wood work.	Each	7077.25
17-84	Same as item 17-83, but Coloured.	Each	1990.28
17-85	Same as item 17-77 to 17-84, but fixing only.	Each	795.80
17-86	Fixing only, of WHB, incl all necessary fitting, except mixer and pedestal.	Each	1377.34
17-87	Fixing only, of WHB with pedestal, incl all necessary fittings except Mixer.	Each	1384.25
17-88	Add to item 17-77 to 17-84, if fixed in repair.	Each	318.32
	Bidet		
17-89	Supply and fix, Bidet in white colour, Pak made , best quality, incl CP bidet mixer, complete, fixed to concrete, brick, stone or wood work.	Each	14964.19
17-90	Same as item 17-89, but light colour.	Each	14689.15
17-91	Same as item 17-89, but special colour.	Each	15607.38
17-92	Same as item 17-89, 17-90 and 17-91, but fixing only.	Each	597.46
17-93	Add to item 17-89, 17-90, 17-91, and 17-92, if fixed in repairs.	Each	238.74
	Mirrors		
17-94	Supply and fix, Mirror , any shape and pattern, circular, rectangular, oval etc upto 2700 sqcm, 5 mm thick, Imported	Each	1441.00

SI No	Description	Unit	Rate (Rs)
	(mirror foreign made, but frame Pak made) with plastic frame, any colour, edges ground, complete, fixed to concrete, brick, stone or wood work.		
17-95	Same as tem 17-94, but fixing only.	Each	155.49
17-96	Add to Item 17-94 and 17-95, if fixed in repair.	Each	79.58
17-97	Supply and fix, Mirror , any shape and pattern, 5 mm thick, Imported , edges ground, complete, fixed to concrete, brick, stione or wood work.	Sqm	1625.87
17-98	Same as item 17-97, but fixing only.	Sqm	254.65
17-99	Same as item 17-97 and 17-98, if fixed in repair.	Sqm	79.58
	Bath Accessories etc		
17-100	Supply and fix, Glass shelf complete , in any size and shape, Imported , with plugs and screw, fixed to concrete, bricks, stone or wood work.	Each	1907.21
17-101	Supply and fix, Plastic shelf complete , in any size and shape, Pak made , with plugs and screws, fixed to concrete, brick, stone or wood work.	Each	1055.35
17-102	Same as item 17-100 and 17-101, but fixing only.	Each	88.15
17-103	Same as item 17-100, 17-101 and 17-102, if fixed in repair.	Each	47.75
17-104	Supply and fix, Toilet paper holder , any shape pattern and size, Imported , with plugs, screws etc complete, fixed to concrete, brick, stone or wood work.	Each	2556.34
17-105	Supply and fix, Soap / sponge tray any shape pattern and size, Imported , complete with plugs, screws etc, fixed to concrete, brick, stone or wood work	Each	1393.25
17-106	Same as item 17-105, but Brush / Tumbler holder.	Each	426.06
SI No	Description	Unit	Rate (Rs)
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17-107	Same as item 17-104, but Pak made.	Each	505.64
17-108	Same as item 17-105, but Pak made.	Each	407.69
17-109	Same as item 17-106, but Pak made.	Each	340.36
17-110	Same as item 17-104 to 17-109, but fixing only.	Each	107.74
17-111	Add to item 17-104 to 17-110, if fixed in repairs.	Each	63.66
17-112	Supply and fix, Towel rail , CP , single rod, any pattern, shape and size, Pak made , with plugs, screws etc, fixed to concrete, brick, stone or wood work.	Each	1041.88
17-113	Same as item 17-112, but double rod.	Each	1415.29
17-114	Same as item 17-112, but Imported.	Each	1133.70
17-115	Same as item 17-113, but Imported.	Each	2572.25
17-116	Same as item 17-112 to 17-115, but fixing only.	Each	123.65
17-117	Same as item 17-112 to 17-116, if fixed in repairs.	Each	79.58
17-118	Supply and fix, Plastic Bath cabinet , 450 mm x 450 mm x 100 mm, deep with double shutters, complete, best quality, fixed to concrete, brick, stone or wood work, Pak made .	Each	2694.68
17-119	Same as item 17-118, but fixing only.	Each	123.65
17-120	Supply and fix, Bath curtain (1.78 m x1.78 m) with plastic rings best quality, Imported .	Each	550.94
17-121	Supply and fix, 100 mm dia Cl floor trap , incl reducer etc, complete.	Each	1365.09
17-122	Supply and fix, Casted Grating CP , 100 mm x 100 mm.	Each	484.82
17-123	Same as item 17-122, but 150 mm x150 mm.	Each	970.87
17-124	Supply and fix, Bottle trap, complete.	Each	1631.99
17-125	Supply and fix, Plastic float valve , fixed complete, for 15 mm dia pipe.	Each	139.57

SI No	Description	Unit	Rate (Rs)
17-126	Supply and fix, Copper float valve , fixed complete, for 20 mm dia pipe.	Each	157.93
17-127	Supply and fix Chain and plug , best quality.	Each	243.64
17-128	Supply and fix, Brass connection , with brass union on both ends, 15mm dia, 300 mm to 450 mm long.	Each	249.76
17-129	Same as item 17-128, but 20mm dia.	Each	271.79
17-130	Supply and fix, Plastic connection with brass, C.P or Aluminium union at both ends, 15mm dia from 300mm to 450mm.	Each	198.33
17-131	Same as item 17-130, but with plastic union , at both end.	Each	179.97
17-132	Same as item 17-130, but 20 mm dia.	Each	222.82
17-133	Supply and fix, CP Copper connection , with brass union on both ends, 20 mm dia upto 450 mm long.	Each	161.61
17-134	Fixing only, Bath set (Plastic) consisting of shelf, towel rail, towel ring, brush holder, toilet paper holder, soap dish and mirror.	Set	700.30
17-135	Supply and fix, Vanity bowl , glazed ware, one hole, complete with bottle trap, waste coupling, chain and plug etc (except mixer) best quality, fixed to concrete, brick, stone and marble slab in any size, shape, white colour.	Each	6010.09
17-136	Same as item 17-135, but special colour.	Each	6805.88
17-137	Same as item 17-135, but light colour.	Each	6377.38
17-138	Same as item 17-135 to 17-137, but fixing only.	Each	334.23
17-139	S/F, 25mm thick, white / coloured marble slab around vanity bowel, with brackets etc incl cutting in shape with machine, rubbing, polishing and making the joints water tight, fixed to concrete, brick or stone work.	Sqm	4181.72

SANITARY FITTINGS

SI No	Description	Unit	Rate (Rs)
17-140	Fixing only, Toilet shower for WC, best quality, 15 mm dia, Pak made .	Each	79.58
17-141	S/F, Toilet shower , best quality, Pak made , 15 mm dia.	Each	814.16
17-142	Fixing only, Wall shower , any type and colour, Pak made .	Each	190.99
17-143	Supply and fix, Seat cover plastic , in any colour shape, best quality, Pak made.	Each	967.20

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SECTION - 18

WATER SUPPLY

PIPING, PLUMBING AND ALLIED WORKS

SPECIFICATIONS

18.0.0. This section covers all operations for water supply work in two sub-sections as under:-

18.0.1. Sub-Section (18-1). Piping Works and Fixtures:- It covers GI and MS pipes / fixtures (light, medium and steam quality), uPVC pressure pipes/fixtures, PPR pipes / fixtures and PE pipes / fixtures

18.0.2. Sub-Section (18-2). Plumbing and Allied Works:- It incl all fittings for Water Supply, Plumber's Brass Work, provision and installation of allied works like water tanks, water cooler and filters etc. It also covers testing and disinfection of water.

SUB-SECTION (18-1)

PIPING WORKS AND FIXTURES

(GI, MS, uPVC, PPR, PE etc)

MATERIAL REQUIREMENTS

18.1.1. Water Quality (Light/Medium) and Steam Quality (Medium) **Tubing:-** To be screwed and socketed in accordance with the latest addition of BS No.1387, as per Table 18-1-1 & 18-1-2:-

TABLE 18-1-1

DIMENSIONS OF BLACK STEEL TUBES (LIGHT QUALITY)

Nominal	Gauge	Wall	Weight of black tube		
Bore (mm)		thickness (mm)	Plain end (Kg / M)	Threaded and Socketed (Kg / M)	
15	14	2.0	0.952	0.961	
20	13	2.35	1.41	1.42	
25	12	2.65	2.01	2.03	
32	12	2.65	2.58	2.61	
40	11	2.90	3.25	3.29	
50	11	2.90	4.11	4.18	
65	10	3.25	5.80	5.92	
80	10	3.25	6.81	6.98	
100	9	3.65	9.89	10.20	

TABLE 18-1-2

DIMENSIONS OF STEEL TUBES - (MEDIUM QUALITY)

Nominal Bore	_	Wall thickness	Wall thickness	
mm	Gauge	mm	Plain End	Screwed & Socketed
			Kg / M	Kg / M
15	12	2.65	1.22	1.23
20	12	2.65	1.58	1.59
25	10	3.25	2.44	2.46
32	10	3.25	3.14	3.17
40	10	3.25	3.61	3.65
50	9	3.65	5.10	5.17
65	9	3.65	6.51	6.63
80	8	4.05	8.47	8.64
100	7	4.50	12.10	12.40
150	6	4.85	19.20	19.80

FOR WATER SUPPLY / STEAM / SUI-GAS

Note: - Tolerance in Thickness and Weight ±5%.

18.1.2. Steel Tubing for External Water Supply (Heavy):- To be Flanged/Socketed in accordance with API-5L (Grade-B) as in Table 18-1-3:-

DIMENSIONS OF STEEL TUBES - (HEAVY)							
Nominal Bore mm	Wall thickness mm	Weight Plain end Kg / M	Test Pressure Kg / Sq. cm.				
200	4.80	25.37	63				
-do-	6.40	33.57	84				
250	4.80	31.76	50				
-do-	6.40	42.09	68				
300	6.40	50.11	56				
-do-	7.10	55.47	64				

18.1.3. Fittings:- All fittings used for Water Supply shall be of the pattern and standards conforming to the regulations. The specifications are given in Section 18-2 (Refer to Para.18.2.1).

18.1.4. Sluice valves.

18.1.4.1. Non Rising Stem Gate Valve as per BSS-3464

TABLE 18-1-4

Materials used for Main Parts of Slice Valve

Name of Parts	Material
Body, Gate, Bonnet	Gray Cast Iron
Gland, Hand wheel	Gray Cast Iron
Body Seats	Stainless Steel
Gate Seats	Stainless Steel
Stem (Spindle)	Stainless Steel
Stem Nut	Bronze
Bonet Gasket	Synthetic Rubber / Compressed Asbestos Fibre Jointing
Gland Packing	Lubricated Asbestos







TABLE 18-1-5

Dimension - Inch (mm)

(as per BSS-3464)

Si	ze		A		В		C		D	Weight
mm	In	mm	In	mm	In	mm	In	mm	In	in Kg
50	2"	145	5 ¾"	270	10 ¾"	150	6"	150	6"	17
65	2 ½"	160	6 ¼"	290	11 1⁄2"	150	6"	165	6 ½"	18
80	3"	165	6 1⁄2"	330	13"	225	9"	180	7 ¼"	23
100	4"	170	6 ¾"	390	15¼"	250	10"	215	8 1⁄2"	28
150	6"	210	8 ¼"	460	18 ¹ / ₈ "	280	11 ½"	275	11"	46
200	8"	240	9 ½"	585	23 ¹ / ₈ "	375	15"	335	13 ¼"	90
250	10"	270	10 ¾"	710	28"	375	15"	400	16"	123
300	12"	300	12"	805	31 ¾"	525	21"	450	18"	174

Note:-

a. Safe working pressure 200 psi.

b. Tolerance on weights is plus / minus 12 ½ %.

TABLE 18-1-6

Service Rating

	Seat	200 Lbs. Psi
Testing Pressure	Body	250 Lbs. Psi
Working Pres	150 Lbs. Psi	

18.1.4.2. Non Rising Stem Gate Valve as per BSS--5163 / BSS-5150







TABLE 18-1-7 Dimension - Inch (mm) (as per BSS-5163 / BSS-5150)

Si	ze	A	В	С	D (PN-10)	D (PN-16)	Weight
mm	In	mm	mm	mm	mm	mm	ming
80	3"	203	411	200	200	200	27
100	4"	229	432	250	220	220	37
150	6"	267	518	250	285	285	59
200	8"	292	615	300	340	340	107
250	10"	330	710	400	395	405	165
300	12"	456	789	400	445	460	215

Note:-

a. Safe working pressure 200 psi.

b. Tolerance on weights is plus / minus 12 1/2"%.

TABLE 18-1-8

Service Rating

Nominal Pressu	10	16	
Testing Pressure	Testing Pressure Strength		24
	Sealing	15	24

18.1.5. Water Meters:- Water meters upto 65mm dia will be completed with union joints to suit GI / MS pipes. Those exc 65 mm dia will be of flanged ends & drilled to BS, as per Table 18-1-9.

TABLE 18-1-9

Overall Size and Drilling Dimensions								
Overall dia of flange (mm)	Pitch circle dia(mm)	Number of bolts	Dia of holes mm					
115	90	4	14					
140	100	4	14					
150	115	4	17					
165	127	4	17					
190	146	4	17					
215	178	4	17					
280	235	8	17					
340	292	8	17					
406	356	8	22					
460	406	12	22					
	Overall Size a Overall dia of flange (mm) 115 140 150 165 190 215 280 340 406 460	Overall Size and Drilling Dir Overall dia of flange (mm) Pitch circle dia(mm) 115 90 140 100 150 115 165 127 190 146 215 178 280 235 340 292 406 356 460 406	Overall Size and Drilling Dimensions Overall dia of flange (mm) Pitch circle dia(mm) Number of bolts 115 90 4 140 100 4 150 115 4 165 127 4 190 146 4 215 178 4 280 235 8 340 292 8 406 356 8 460 406 12					

STANDARD PIPE FLANGES

Note:-

a. All tubing over 150 mm (6") dia shall conform to API-5L Grade-"B" standards.

b. In case of galvd pipes, the weight shall increase @ 0.61 Kg / Sqm of girthed area.

c. Steam tubing to be capable of withstanding 35 Kg / Sq cm and water tubing 28 Kg / Sqcm hydraulic pressure.

CONSTRUCTION REQUIREMENTS

18.1.6. Sluice valves and Hydrants etc:-

- 18.1.6.1. Sluice valves and hydrants shall be flanged and drilled to BS given in Table 18-1-9
- 18.1.6.2. All sluice valves and hydrants shall be housed in suitable brick masonry or PCC pits with pre-cast removable RCC / hinged steel covers with locking arrangement.

18.1.7. **Tubing:** All tubing (unless galvanized) will be coated with rust preventive coating before incorporation in work. Water quality tubing shall be painted 'Blue' and steam quality 'Red'.

- 18.1.7.1. All screwed connection to be taper threaded and put together with White lead and fine spun yarn.
- 18.1.7.2. The whole of the pipes and fittings to be fully tested and left drop dry on completion and put to commission.
- 18.1.7.3. MS Tubes 40mm dia (and over) may be Butt welded.

- 18.1.7.4. The contractor while quoting rates shall incl work both below and above ground, as specified or ordered.
- 18.1.7.5. In areas with high corrosive effect of moisture and minerals, coating and wrapping the exterior surface of MS pipe shall be carried out. Pipes shall first be thoroughly cleaned of all oil, grease, dirt, rust, moisture, or any other foreign substance. As far as practicable, immediately after cleaning, pipe surface shall be covered with bituminous primer leaving about 75mm from either end. Primer should be applied after ascertaining that pipe surface to be covered is thoroughly dry and clean, as primer will not stick to wet and dirty surfaces. Primer shall be applied in thin layer and the pipe then wrapped all around with bitumen paper duly dipped in bitumen solution with an over-lap of single layer for pipes up to 100mm dia. For pipes exc 100mm dia double layer of bitumen paper shall be wrapped.

METHOD OF MEASUREMENTS

18.1.8. Pipe work generally shall be measured Net overall length of pipes incl fittings as fixed, except where otherwise described.

CLARIFICATION OF RATES

18.1.9. The rates inter alias, incl particularly:-

18.1.9.1. Fixing complete in long or short lengths, (surface / concealed), incl running joints in length and use of white lead, yarn or rubber ring and bolts etc

- 18.1.9.2. Fixing of water tubing:
 - i Fixing to wall complete with clips, wall hooks, clamps wooden / Rawal plugs.
 - ii Making good surface disturbed.
 - iii Forming all necessary holes and making good.
 - iv The supply and fixing of all beddings, jointing pointing materials and reinforcement as required.
- 18.1.9.3. Cuts in new water mains.
- 18.1.9.4 For plumbing generally:
 - i Jointing and fixing with and incl supporting materials specified or necessary. Rates except pipes incl for plugging walls, where required. Making good, provision and fixing of wall hooks, holder bats, clips, etc.
 - ii Turning water On or Off as necessary.

- iii Taps, valves and other plumber's brass work with suitable washer complete.
- iv Jointing as specified or required.
- v Taking off and re-fixing (stop cock, tank, manhole) etc. covers for inspection, measuring, etc.

18.1.10. uPVC Pressure Pipes / Fixtures

MATERIAL REQUIREMENTS

18.1.10.1. uPVC Pressure Pipes

18.1.10.1.1. uPVC (Un-plasticized Polyvinyl Chloride) pipes manufactured in accordance with PS 3051:1991 & BS 3505, shall be used for potable cold water supply system.

18.1.10.1.2. uPVC pipes are manufactured in B, C, D & E classes with dimensions as per (Table 18-1-10 and 18-1-13) , designed and manufactured for different working pressures. Pipes tested for short-term Hydrostatic pressure resistance (Table 18-1-12) from 75-600 mm dia, are manufactured in B, C, D & E classes, whereas pipes of 50mm & 65mm dia are manufactured in C,D & E classes. Pipes of 32mm & 40mm dia are manufactured in D & E classes, whereas, pipes of 10mm & 25mm dia are manufactured in E Class only.

18.1.10.2. Pressure Fittings:-

18.1.10.2.1. A wide range of fabricated and injection moulded fittings available with approved manufacturers are designed to make service pipe connections economical, durable, leak proof, easy and quick.

18.1.10.2.2. These fittings incl couplers / sockets, elbows (90°) , tees, threaded adapters (male/female), end caps, flanges, saddles, bends $(45^{\circ},90^{\circ})$ and reducer, available in various sizes for different classes of pipes.

18.1.10.2.3. uPVC fittings used with pipes, long radius bends and sockets shall be fabricated fittings, whereas all remaining fittings shall be injection moulded i.e equal tees, elbows $45^{\circ}/90^{\circ}$, male/female sockets, end plugs etc.

18.1.10.3. **Jointing Systems:-** For 75mm to 610 mm dia, Z-joint with rubber rings shall be used and for 20mm to 65mm dia, Cement Solvent joint shall be used.

TABLE 18-1-10 PIPE DIMENSION FOR CLASSES B, C, D & E (BS-3505)

		Mean						Wall Thickness (mm)							
		Outsid	le dia		Class B		C	lass C			Class D		C	lass E	
S.	Nominal Sizo (mm)	(mi	m)	Avg	Indi v	/alue	Avg value	Indi	value	Avg value	Ind	l value	Avg value	Indi	value
	0120 (1111)	min	max	max	min	max	max	Min	max	max	min	max	max	min	max
1	*9.52	17.0	17.3	-		2 -	-	-	-	-	-	-	1.9	1.5	1.9
2	12.7	21.2	21.5	-	- 1	-	-	-	-	-	-	-	2.1	1.7	2.1
3	19.05	26.6	26.9	-	-	-	-	-	-	-	-	-	2.5	1.9	2.5
4	25.4	33.4	33.7	-	-	-	-	-	-	-	-	-	2.7	2.2	2.7
5	31.75	42.1	42.4	-	-	-	7 -,	-	-	2.7	2.2	2.7	3.2	2.7	3.2
6	38.1	48.1	48.4	-	-	-		-	-	3.0	2.5	3.0	3.7	3.1	3.7
7	50.8	60.2	60.5	-	-	-	3.0	2.5	3.0	3.7	3.1	3.7	4.5	3.9	4.5
8	*63.5	75.0	75.3	-	-	-	3.5	3.0	3.5	4.5	3.9	4.5	5.5	4.8	5.5
9	76.2	88.7	89.1	3.4	2.9	3.4	4.1	3.5	4.1	5.3	4.6	5.3	6.5	5.7	6.6
10	101.6	114.1	114.5	4.0	3.4	4.0	5.2	4.5	5.2	6.8	6.0	6.9	8.3	7.3	8.4
11	*127	140.0	140.4	4.4	3.8	4.4	6.3	5.5	6.4	8.3	7.3	8.4	10.1	9.0	10.4
12	152.4	168.0	168.5	5.2	4.5	5.2	7.5	6.6	7.6	9.9	8.8	10.2	12.1	10.8	12.5
13	*177.8	193.5	194.0	6.0	5.2	6.0	8.7	7.7	8.9	11.4	10.1	11.7	13.9	12.4	14.3
14	203.2	218.8	219.4	6.1	5.3	6.1	8.8	7.8	9.0	11.6	10.3	11.9	14.1	12.6	14.5
15	228.6	244.1	244.8	6.7	5.9	6.8	9.8	8.7	10.0	1 2.9	11.5	13.3	15.8	14.1	16.3
16	254	272.6	273.4	7.5	6.6	7.6	10.9	9.7	11.2	14.3	12.8	14.8	17.5	15.7	18.1
17	304.8	223.4	324.3	8.8	7.8	9.0	12.9	11.5	13.3	17.0	15.2	17.5	20.8	18.7	21.6
18	355.6	355.0	356.0	9.6	8.5	9.8	14.1	12.6	14.5	18.6	16.7	19.2	22.8	20.5	23.6
19	406.4	405.9	406.9	10.9	9.7	11.2	16.2	14.5	16.7	21.1	19.0	21.9	26.0	23.4	27.0
20	457.2	456.7	457.7	12.3	11.0	12.7	18.2	16.3	18.8	23.8	21.4	24.6	-	-	-
21	508	507.5	508.5	13.7	12.2	14.1	20.2	18.1	20.9	-		-	-	-	-
22	558.8	558.3	559.3	15.0	13.4	15.5	22.1	19.9	22.9	-			-	-	-
23	609.6	609.1	801.1	16.3	14.5	16.8	24.1	21.7	25.0	-	-		-	-	-

TABLE 18-1-11

MAX SUSTAINED WORKING & FIELD TEST PRESSURES

Class	w	ORKING PRESS	URE	TEST PRESSURE			
Class	Bar	Kg / Sq. cm.	lb f /sq in	Bar	Kg / Sq.cm	lb f /sq in	
В	6	6.12	87	9	9.18	130	
С	9	9.18	130	14	13.77	195	
D	12	12.25	173	18	18.38	259	
E	15	15.30	217	23	22.95	325	

Note:- The max admissible service pressures are calculated from known data on the basis of life of at least 50 years of continuous operation and a Factor of safety greater than 2.

TABLE 18-1-12

SHORT-TERM HYDROSTATIC PRESSURE RESISTANCE AT 20° C

Class of Pipe	Max 1 hr failure pressure
6 barg, Class – B	21.6 barg
9 barg, Class – C	32.4 barg
12 barg, Class – D	43.2 barg
15 barg, Class – E	54.0 barg

18.1.10.4. **Weights:-** BS 3505 gives no weights. The pipe weight depends on its formulation, density and tolerance. Approx weight of uPVC pipes for transportation and estimation is given in Table 18-1-13:-

TABLE 18-1-13

C No	Normal Size		CLASS-B	CLASS-C	CLASS-D	CLASS-E	
3.110	mm	In	Kg/M	Kg/M	Kg/M	Kg/M	
1	9.52	3/8	-	-	-	0.11	
2	12.7	1/2	-	-	-	0.15	
3	19.05	3/4	-	-	-	0.22	
4	25.4	1	-	-	-	0.32	
5	31.75	1-1/4	-	-	0.41	0.50	
6	38.1	1-1/2	-	-	0.54	0.65	
7	50.8	2	-	0.68	0.82	1.03	
8	63.5	2-1/2	-	1.01	1.20	1.58	
9	76.2	3	1.17	1.41	1.82	2.22	
10	101.6	4	1.78	2.32	3.03	3.65	
11	127	5	2.44	3.49	4.55	5.51	
12	152.4	6	3.46	5.01	6.57	7.95	
13	203.2	8	5.30	7.72	10.05	12.17	
14	254	10	8.26	11.97	15.59	18.89	
15	304.8	12	11.55	16.85	21.91	26.68	
16	355.6	14	13.87	20.27	26.49	32.16	

APPROX WEIGHT OF uPVC PIPE PER METRE

CONSTRUCTION REQUIREMENTS

18.1.10.5. Transportation and Storage:-

- uPVC pipes and fittings should be loaded on to the truck in such a manner that they are not damaged during transportation. Pipes should be supported along their length, leaving the sockets open. Impact stresses on uPVC pipes and fittings should be avoided, especially at temperature near freezing point and below. They should be protected from contact with substances like solvents, tar, paint, fuels etc for being injurious to uPVC.
- ii. Pipes should be loaded on the vehicle in such a way that the overhang is not more than 1M. Thick walled pipes should always be loaded before the thin walled pipes.
- iii. In no case pipes should be dragged along the ground.
- iv. In storage, it is important that no unacceptable deformation or damage is caused. Stack height should not exc 1.0M for bundle pack and 1.5M for loose pipes.
- v. Protect pipes and fittings from sunlight. Where ever, sheds are not available, use air permeable tarpaulins.
- vi. Rubber sealing rings should be kept cool under cover. Solvent cement and cleaner should also be stored in a cool dry place.

18.1.10.6. Installation Procedure - Pipe Trench:-

- i. The depth of trench should be such that the pipe and fitting can be conveniently laid with a cover of 1.0-1.8m according to the design, climate and soil conditions.
- ii. If the ground is rocky, then the depth of trench should be increased by at least 0.15 M and the excavated earth replaced by a stone free layer.
- iii. In case of descending gradients, the stone free layer must be prevented from being washed away by concrete or clay stopper. Drainage might also be advisable.
- iv. In case of changing layer and consequently changing bearing capacity of the trench bottom soil, provide adequate fine gravel or sand filling (approx 10xdia) at the points of transition. Should there be a parallel running or crossing of other pipes conveying warm fluids, care must be taken that the uPVC pipe surface temperature does not rise above 20°C.

18.1.10.7. Pipe Laying / Installation:-

- 18.1.10.7.1. Small dia pipes can easily be handled without auxiliary tools.
- 18.1.10.7.2. When connecting bigger dia pipes, use of a bar to push them into position is recommended.

Note:- When applying force to pipe ends protect with a wooden block.

18.2.10.7.3. After installation, backfill the pipeline between the joints in order to stabilize the pipes before pressure testing. Endplugs should be anchored before pressure testing. In addition, anchored or barring should be carried out at bends and tees, if necessary.

18.1.10.8. **Marking:-** Pipes are typically marked in *Dark Blue* colour at one meter intervals as shown below.

uPVC BS 3505 4 inch dia 6 Bar Class "B" 1-1990-6-7".

18.1.10.9. Solvent Jointing System:-

- i.. Chamfer the pipe end at an angle of 15° to 20° to an extent of 0.75 mm length.
- ii.. Remove the dust and burr from the pipe ends and fittings using dry rag and thoroughly clean with the cleaner.
- iii. Spread solvent cement thinly and evenly over spigot end and inside of socket.
- iv. Assemble within 40 seconds.
- v. Hold together for 3-5 mins.
- vi. Wipe all excessive adhesive.
- vii. Leave for 24 hours before pressure testing.

Important Notes: -

- i. Excessive use of Solvent cement can lead to weakening the pipe wall by solvent action.
- ii. The tools required for solvent cement jointing comprise of cutting tool, rags, knife or half round coarse file, natural bristle, primer, application can, lubricant, solvent cement and tool tray.

18.1.10.10. **Guide** – Consumption of lubricant, cleaner and solvent cement per 100 joints for a range of pipe and fitting dia (mm) is given in Table 18-1-14 and the Setting Time is given in Table 18-1-15.

TABLE 18-1-14

CONSUMPTION OF LUBRICANT, CLEANER AND SOLVENT CEMENT

(per 100 joints)										
Dia (mm)	32 ~ 40	50 ~ 63	75 ~ 90	110 ~ 125	140 ~ 160					
Lubricant (kg)	-	2.00	3.50	4.00	5.0					
Cleaner	0.35 ~ 0.50	0.65 ~ 0.90	1 ~ 2	3 ~ 5	6.5 ~ 9.0					
Solvent Cement	0.78 ~ 1.00	1.30 ~ 1.800	2 ~ 4	6 ~ 10	13 ~ 18					

(per 100 joints)

Note:-- In semi-tropical areas, the use of special Solvent cement is recommended and 30% increase in consumption of cleaner shall be allowed for Solvent Cement joint.

Ambient Temperature	Pipe Dia de (mm)	Time during which the joint should not be moved (min)	Wearing Time before installation (min)					
05	<63	1/2	10					
>25	>75	1	15					
10.05	<63	3	20					
10 25	>75	5	30					
-10	<63	8	60					
210	>75	15	90					

TABLE 18-1-15

Ambient Temperature	Pipe Dia de (mm)	joint should not be moved (min)	before installation (min)	
05	<63	1/2	10	
>25	>75	1	15	
10, 05	<63	3	20	
10 25	>75	5	30	
-10	<63	8	60	
210	>75	15	90	

SETTING TIME

18.1.10.11. ZJointing System:- Z-joint was developed by waving and since its inception has become one of the well-known integral joint for uPVC pressure pipes in the world. The Z-joint possesses following sealing mechanism: -

- Due to cavity between the lip and the body of the sealing element, i the internal water pressure pushes the body of the ring into the groove and the lip to the inside dia of the pipe, thus giving an excellent sealing.
- ii. The gap between the groove and the body of the rubber rings is small, because their profiles match.
- iii. The contact surface between the ring and the inside pipe dia is relatively large because of the lip's length. (Z-joints and other lip sealing rings are normally loose components of the joint).

18.1.10.12. Procedure for Z-joint Installation:-

- Carefully clean the socket, groove, rubber ring and bevelled spigot end i. until they are completely dry and free of dirt. This is extremely important for the correct positioning of the rubber ring during assembly.
- ii. Press the rubber ring into a heart shape and fit carefully into the groove, pushing it firmly in as far as it goes all the way around. The opening in the rubber ring must face backwards.
- iii. Apply lubricant generously to the bevelled spigot end and a little to front edge of the rubber ring. Ensure that no lubricant penetrates behind the rubber rina.
- iv. Press the spigot end into the socket, rotating gently to align the chamfer with rubber ring. Do not insert spigot at an angle.
- Stop at the entry (13-25mm) from the end of the socket to cater for V. potential expansion and contraction.
- vi. Make sure that the pipes to be jointed are aligned correctly against each other.

ii.

18.1.10.13. **Pressure Testing:** It is recommended to test the pipe line in accordance with the prescribed code of practice. Normally, the leakage may occur at the rubber ring joints. As such, the back filling of joints should only be done after testing the pipeline.

18.1.10.14. **Preparation for Testing:-**(After pipeline is installed according to the applicable norms).

- The pipeline is buried / anchored at specified places prior to pressure testing.
 - Air-relief valves should be provided at higher points.
- iii.. Start filling the pipeline from the lowest point.
- iv. Open the air-relief valves during filling of water.
- v. Water filling speed should be 7 hours for 1 Km line irrespective of the pipe dia.
- vi. Pressure testing be carried out after 48 hours of back filling.
- vii. Prior to testing, pipe line should be filled with water for 2 hours.
- viii. The temperature of water used for testing should be 20°C.
- ix. If the pipe system is lengthy, then it should be tested in sections of max 500 M.

18.1.10.15. Testing Procedure:-

- i. The testing pressure is raised to the Nominal or working pressure either by manually operated pump or a power driven pump. This pressure is maintained for 2 hours during which any loss of water is supplemented.
- ii. Within 6 min thereafter, the pressure is increased to 1.5 times of the Working pressure. This pressure is maintained for 2 hours once again by supplementing any loss of water.
- iii. Thereafter within 6 min, the pressure is reduced back to Normal Working pressure and retained for one hour.
- iv. In case, the quantity of water added during this period is below the approx limits, as shown in Table 18-1-16, the pipeline is **acceptable**.
- v. If the quantity of water lost exc values given in Table 18-1-16, or the amount calculated by following formula, it means Leakage.

4.5 litres / 1.6 Km of pipe / 25 M of nominal bore / 30 M head of test pressure / 24 hrs (1 gallon per mile or pipe inch of nominal bore, per 100 ft head of test pressure for 24 hours).

vi. If there is leakage in line, it must be investigated and rectified.

TABLE 18-1-16

MAX ACCEPTABLE LIMIT OF LEAKAGE

Dia (approx) mm	89	114	140	168	219	244	273	324	406	508	610
Lit/Km (approx)	1	1.2	1.9	2.2	3.6	4.1	4.8	5.1	7.2	9.2	11.6

METHOD OF MEARSUREMENTS

- 18.1.10.16. Pipe work generally shall be measured:-
 - 18.1.10.16.1. Net overall length of pipes and fitting as fixed, except, where otherwise indicated.
 - 18.1.10.16.2. Fitting shall be enumerated and described as extra over "Pipes and fitting" except where otherwise indicated.

CLARIFICATION OF RATES

18.1.10.17. Rates (material and labour) calculated per metre of uPVC pipes incl the following:-

18.1.10.17.1. For dia 20 mm to 65 mm (Cement Solvent joint).

- i. Cost of one pipe of 4 M length.
- ii. Cost of one socket.
- iii. Cost of Cement Solvent.
- iv. Fixing charges of 18.1.10.17.1. (i, ii and iii) above.

18.1.10.17.2. For dia 75 mm to 600 mm (Z-joint)

- i. Cost of one pipe of 6 M length.
- ii. Cost of one rubber ring.
- iii. Fixing charges of 18.1.10.17.2. (i and ii) above.

18.1.11. Poly Propylene Random (PPR) Pipe and Fixtures MATERIAL REQUIREMENTS

18.1.11.1. The Pipes and fixtures are both manufactured with same material, i.e Poly Propylene Random (PPR). It is a food grade material with high chemical and heat / temperature (both hot and cold) resistance, due to which it is used as a popular means of supply for hot and cold water as well as other fluids.

18.1.11.2. PPR products are available in the market with various brand names, but the product must fulfill following specifications:-

18.1.11.2.1.	Pipes:-	DIN 8	077, 8078
18.1.11.2.2.	Fittings:-	DIN	16962

18.1.11.3. **Sizes of Pipes and Fittings**:- The product is available in various sizes according to the purpose of use. However, the sizes given in Table 18-1-17 are being commonly used and marketed:-

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TABLE 18 -1-17
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SIZES OF PPR PIPES

Outer Dia d (mm)	Wall Thickness t (mm)	Internal Dia d ₁ (mm)
20	3.4	13.2
25	4.2	16.6
32	5.4	21.2
40	6.7	26.6
50	8.4	33.2
63	10.5	42.0
75	12.5	50.0
90	15.0	60.0
110	18.4	73.2

CONSTRUCTION REQUIREMENTS

18.1.11.4. **Jointing Technique:-** The jointing of PPR Pipes is carried out by a method called "Heat Fusion". It is done with a Electro fusion machine. The male and female ends/ parts are joined together through heat to form a joint. Both the ends (Male & Female) are heated simultaneously till the Welding Temperature is reached. The two parts to be joined (now in molten state) are pressed together and held till recommended cooling time (given in Table 18-1-18). On cooling, a leak-proof permanent joint is formed which is irreversible. In case of

bad jointing, the fitting is lost / not reusable. The jointing shall be done strictly in accordance with manufacturer's instructions.

OUTER DIA	AVERAGE HEATING TIME	AVERAGE WORKING TIME (max)	AVERAGE COOLING TIME (min)
mm	sec	sec	sec
20	5	4	2
25	7	4	2
32	8	6	4
40	12	6	4
50	18	6	4
63	24	8	6
75	30	8	6
90	40	8	6
110	50	10	8

TABLE 18-1-18

JOINTING BY FUSION METHOD - DATA

18.1.11.5. The product be installed / fixed and used strictly in accordance with the instructions of the manufacturer duly approved by the Engineer in Charge.

METHOD OF MEARSUREMENTS

- 18.1.11.6. Pipe work generally shall be measured:-
 - 18.1.11.6.1. Net overall length of pipes and fitting as fixed, except, where otherwise indicated.
 - 18.1.11.6.2. Fitting shall be enumerated and described as extra over "pipes and fitting" except where otherwise indicated.

CLARIFICATION OF RATES

18.1.11.7. Rates (material and labour) calculated per metre of PPR pipes incl the following:-

- i. Cost of one pipe of 4 M length (Class PN-20).
- ii. Cost of fittings, "socket, bend, elbow etc" at the basis of avg.
- iii. Fixing charges for (i and ii) above, with walls, open or concealed.
- iv. Making good surfaces disturbed

18.1.12. Poly Ethylene (PE) Pipes / Fixtures MATERIAL REQUIREMENTS

18.1.12.1. The pipes and fixtures are both made with Poly Ethylene Compound. It is food grade material and being used for supply and distribution of water, compressed air and various chemicals due to its flexibility and other properties.

18.1.12.2. The PE pipes and fittings for water supply must conform to DIN 8074 / 8075 and PS – 3580.

18.1.12.3. The product is generally available in coils upto 50M and 100 M length for sizes upto 90mm, and for sizes upto 250mm in lengths of 6 M and 12 M. The commonly available sizes and dimensions are given in Table 18-1-19:-

Nominal Outside dia	Nominal wall thickness (mm)								
(mm)	SDR 21 (PN 8)	SDR 17 (PN 10)	SDR13.6(PN 12.5)	SDR11 (PN 16)					
20	-	1.9	1.9	2.0					
25	1.8	1.9	2.0	2.3					
32	1.9	2.0	2.4	3.0					
40	2.0	2.4	3.0	3.7					
50	2.4	3.0	3.7	4.6					
63	3.0	3.8	4.7	5.8					
75	3.6	4.5	5.6	6.8					
90	4.3	5.4	6.7	8.2					
110	5.3	6.0	8.1	10.0					
125	6.0	7.4	9.2	4.0					
160	7.7	9.5	11.8	14.6					
180	8.6	10.7	13.3	16.4					
200	9.6	11.9	14.7	18.3					
250	11.9	14.8	18.4	22.7					

Table 18-1-19

POLYETHYLENE PIPE (PE 100) DIMENSIONS (ISO 4427, 2007)

The nominal pressure PN corresponds to the max allowable pressure in bars for pipe at 20° C

18.1.12.4. The operating pressure ranges between 6 to 16 bar at 20° C, for various sizes and jointing types.

CONSTRUCTION REQUIREMENTS

18.1.12.5. The PE pipes and fittings shall be used and fixed in accordance with the manufacturer's instructions and approval of Engineer in Charge.

18.1.12.6. Jointing Technique:- The PE pipes and fittings can be joined together by employing any of following techniques:-

i. **Compression Fitting**:- It is a mechanical technique. In this type of jointing a standard fitting is provided which is

assembled with the help of clinching rings, 'O' rings and a Locking Nut. Necessary details are available with the fitting, which shall be strictly followed.

 Butt Fusion: - It is a technique in which the two pipe ends or a pipe and fitting ends are heated to a molten state and brought together to form a homogeneous bond. It must be ensured that the material and size of both jointing ends are same (dia, SDR, polymer etc). The process is done with the help of Butt Fusion equipment. The elaboration of Jointing Technique shall be provided by the manufacturer / supplier.

METHOD OF MEARSUREMENTS

- 18.1.12.7. Pipe work generally shall be measured:-
 - 18.1.12.7.1. Net overall length of pipes and fitting as fixed, except, where otherwise indicated.
 - 18.1.12.7.2. Fitting shall be enumerated and described as extra over "Pipes and fittings", except where otherwise indicated.
 - 18.1.12.7.3. For PE pipes with size 100 to 250mm, the fitting shall be enumerated and described as extra over "Pipes and fittings" and "Fusion joint", except where otherwise indicated.

18.1.12-8. Back-Filling

18.1.12.8.1. After pressure testing, filling of the trench is to be done in layer of 0.30 M over the pipe, utilizing stone free soil. The soil layer immediately over the pipe is to be compacted by tamping bars.

18.1.12.8.2. The material used for upper layers can be coarser than used for the initial back fill. These layers should be carefully rammed down one on top of the other until the back fill is completed.

CLARIFICATION OF RATES

18.1.12.9. Rates (material and labour) calculated per metre of PE pipes incl the following:-

- 18.1.12.9.1. For dia 20 mm to 90 mm (Suckered joint).
 - i. Cost of 50 M length (Class PN-10).
 - ii. Cost of one socket for each 50M.
 - iii. Fixing charges of i and ii above.
- 18.1.12.9.2. For dia 110 mm to 250 mm (butt Fusion / Electro fusion joint)
 - i. Cost of one pipe of 12 M length.
 - ii. Cost of Fusion joint.
 - iii. Fixing charges of (i and ii) above.

SUB-SECTION (18-2)

PLUMBING AND ALLIED WORKS

MATERIAL REQUIREMENTS

18.2.1. Fittings for Water Supply:- All bib cocks, stop cocks, etc. shall be of the pattern required to conform to the regulations and product be of manufacturer incl in the approved list of Engineer-in-Chief.

18.2.2. Washers:- For ball / float valves, washers shall be manufactured of best quality rubber, and washers of water bib cocks and stop cocks shall be of leather, and that of hot water cocks shall be of vulcanized fiber.

18.2.3. Plumber's Brass Work:-

- 18.2.3.1. The whole of the plumber's brass work, copper or gunmetal fittings to be heavy quality and of approved manufactures to be fixed complete incl any necessary subsidiary materials.
- 18.2.3.2. Bib and stop cocks (brass or gun-metal as ordered) to be for working pressures up to 14 Kg / Sqcm and will conform to BS 1010, or equivalent specifications.
- 18.2.3.3. Jumpers / washers are interchangeable i.e., to British Standard Dimensions. Sanitary fittings are screwed to BSP (British Standard Pipe and threads). Cocks to have stuffing boxes, loose valves and strong crutch handles lettered "Hot" or "Cold" for use with sanitary fittings, valves to be faced with specially prepared leather for cold water, and with good quality vulcanized fibre for hot water.
- 18.2.3.4. Pillar cocks as described in 18.2.3.2, but fitted with fancy head handles lettered "**Hot**" or "**Cold**" have long screwed shanks, with fly nuts.
- 18.2.3.5. Ball valves shall be of strong brass of approved pattern with copper ball having screwed sockets. The valves to be faced with vulcanized rubber. Ball valve with plastic balls may also be used up to 25 mm dia.
- 18.2.3.6. Ferrules, unions, etc. shall be of heavy brass of approved quality, and when connected to lead pipes, shall have tinned ends.
- 18.2.3.7. Gunmetal may be used in lieu of brass at no extra price.

18.2.4. Hard Brass:- Hard brass shall be a composition of Copper and Zinc with or without Lead or Tin, not less than 62% by weight of the composition being Copper and having tensile strength not less than 2 Ton per Sqcm.

18.2.5. Gunmetal: As per BS EN 1982, the Gunmetal shall be an alloy containing not less than 88% by weight of Copper, and not less than 10% by weight of Tin and the balance of 2% made up of by Zinc, Lead or Spelter and having a tensile strength of not less than 2.20 Ton per Sqcm. of sectional area. Elongation on 50 mm (2") shall be 15 - 25% and Brinell Hardness 70 - 95%.

18.2.6.	Water Tanks:-	Quality standardized by E-in-	C Branch.
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18.2.7. Water Coolers:- Quality approved by E-in-C Branch.

18.2.8. Water Filters:- Quality standardized by E-in-C Branch.

18.2.9. Disinfection for Water Supply: After the completion of test (working pressure/leakage) of water mains satisfactorily and approved by the Engineer-in-Charge, the contractor shall disinfect the entire pipe net work by means of dispensed solution of chlorine and water at min chlorine content 50mg/ltr, for a period of 30 min. The procedure and equipment used to introduce, disperse and test Chlorine in pipes shall be subject to the approval of the Engineer-in-Charge.

18.2.10. Testing:-

- 18.2.10.1. All water mains and connections will be fully tested to 1¹/₂ times working pressure and left drop dry before hunching and/ or trenches are filled in, and put into commission.
- 18.2.10.2. The whole of the work is to be tested at the contractor's expense, to the entire satisfaction of Engineer-in-Charge.

18.2.10.3. Plumber's Brass work:-

- i The rates for articles described as "Supplied and Fixed" incl making all necessary joints.
- ii If stopcocks are ordered to be fitted with strong squareended spindles to suit turn cock's key, the same rate as for crutch handles is to be allowed.

ITEM RATES

SI No.	Description	Unit	Rate(Rs)
	Water Tubing – GI / MS		
18-1	Tube, Water Quality (GI) with all fittings (i.e sockets, bends, tees, elbows where required) and laid complete in trenches, (excl excavation) or fixed to wall, floor (surface or concealed) and ceiling etc, incl caps and plugs as required 15mm dia (light), supply and fixing.	Metre	304.35
18-2	Same as item 18-1 but 20 mm dia.	Metre	404.07
18-3	Same as item 18-1 but 25 mm dia.	Metre	415.77
18-4	Same as item 18-1 but 40 mm dia.	Metre	666.37
18-5	Same as item 18-1 but 50 mm dia.	Metre	832.43
18-6	Same as item 18-1 but 65 mm dia.	Metre	1132.40
18-7	Same as item 18-1 but 80 mm dia.	Metre	1350.92
18-8	Same as item 18-1 but 100 mm dia.	Metre	1900.31
18-9	(i.e sockets, bends, tees, elbows where required) and laid complete in trenches (excl excavation) or fixed to wall, floor (surface or concealed) and ceiling etc, incl caps and plugs as required 15mm dia (medium), supply and fixing.	Metre	334.12
18-10	Same as item 18-9, but 20 mm dia.	Metre	423.51
18-11	Same as item 18-9, but 25 mm dia.	Metre	470.79
18-12	Same as item 18-9, but 40 mm dia.	Metre	686.40
18-13	Same as item 18-9, but 50 mm dia.	Metre	944.02
18-14	Same as item 18-9, but 65 mm dia.	Metre	1197.99
18-15	Same as item 18-9, but 80 mm dia.	Metre	1559.27
18-16	Same as item 18-9, but 100 mm dia.	Metre	2232.89
18-17	Same as item 18-9, but 150 mm dia.	Metre	3899.13
18-18	Same as item 18-1 or 18-9, but fixing only	Metre	93.41
18-19	Same as item 18-2 or 18-10, but fixing only	Metre	103.75
18-20	Same as item 18-3 or 18-11, but fixing only	Metre	78.15
18-21	Same as item 18-4 or 18-12, but fixing only	Metre	92.36

SI No.	Description	Unit	Rate(Rs)
18-22	Same as item 18-5 or 18-13, but fixing only	Metre	106.26
18-23	Same as item 18-6 or 18-14, but fixing only	Metre	111.64
18-24	Same as item 18-7 or 18-15, but fixing only	Metre	111.64
18-25	Same as item 18-8 or 18-16, but fixing only	Metre	139.19
18-26	Same as item 18-17, but fixing only	Metre	166.77
18-27	Add to item 18-1 or 18-9 or 18-18, if removal only.	Metre	61.99
18-28	Add to item 18-2 or 18-10 or 18-19, if removal only.	Metre	69.72
18-29	Add to item 18-3 or 18-11 or 18-20, if removal only.	Metre	46.49
18-30	Add to item 18-4 or 18-12 or 18-21, if removal only.	Metre	55.78
18-31	Add to item 18-5 or 18-13 or 18-22, if removal only.	Metre	63.53
18-32	Add to item 18-6 or 18-14 or 18-23, if removal only.	Metre	63.53
18-33	Add to item 18-7 or 18-15 or 18-24, if removal only	Metre	63.53
18-34	Add to item 18-8 or 18-16 or 18-25, if removal only.	Metre	77.47
18-35	Add to item 18-17 or 18-26, if removal only.	Metre	91.42
18-36	(i.e sockets, bends, tees, elbows, where required) and laid complete in trenches (excl excavation) or fixed to walls, ceilings and floors etc, incl caps and plugs as required, 200mm dia (4.8mm thickness), supply and fixing.	Metre	5839.40
18-37	Same as item 18-36, but 6.40 mm thickness, supply and fixing.	Metre	6821.89
18-38	Same as item 18-36 or 18-37, but fixing only.	Metre	197.42
18-39	Add to item 18-36 to 18-38, if removal only.	Metre	108.46
18-40	Same as item 18-36, but 250 mm dia. (thickness 4.8mm)	Metre	7426.25
18-41	Same as item 18-40, but 6.40 mm thickness.	Metre	8473.78
18-42	Same as item 18-40 or 18-41, but fixing only.	Metre	237.47
18-43	Add to item 18-40 or 18-41 or 18-42,if removal only	Metre	123.96
18-44	Same as item 18-36, but 300 mm dia (6.4 mm thickness).	Metre	10089.80
18-45	Same as item 18-44, but 7.10 mm thickness.	Metre	12324.53

SI No.	Description	Unit	Rate(Rs)
18-46	Same as item 18-44 or 18-45, but fixing only.	Metre	275.79
18-47	Add to item 18-44 or 18-45 or 18-46, if	Metre	139.46
	removal only.		
18-48	Tubes, Steam Quality, without socket	Metre	458.39
	weld-less, BS Specifications, 15mm dia, supply and fixing		
18-49	Same as item 18-48 but 20 mm dia	Metre	578 05
18-50	Same as item 18-48, but 25 mm dia.	Metre	800.2
18-51	Same as item 18-48, but 40 mm dia.	Metre	1215.71
18-52	Same as item 18-48, but 50 mm dia.	Metre	1585.38
18-53	Same as item 18-48, but 65 mm dia.	Metre	2473.43
18-54	Same as item 18-48, but 80 mm dia.	Metre	3072.06
18-55	Same as item 18-48, but fixing only.	Metre	133.95
18-56	Same as item 18-49, but fixing only.	Metre	173.85
18-57	Same as item 18-50, but fixing only.	Metre	213.76
18-58	Same as item 18-51, but fixing only.	Metre	307.27
18-59	Same as item 18-52, but fixing only.	Metre	379.45
18-60	Same as item 18-53, but fixing only.	Metre	485.17
18-61	Same as item 18-54, but fixing only.	Metre	580.61
18-62	Add to item 18-48 or 18-55, if removal only.	Metre	15.50
18-63	Add to item 18-49 or 18-56, if removal only.	Metre	18.60
18-64	Add to item 18-50 or 18-57, if removal only.	Metre	21.69
18-65	Add to item 18-51 or 18-58, if removal only.	Metre	24.79
18-66	Add to item 18-52 or 18-59, if removal only.	Metre	34.08
18-67	Add to item 18-53 or 18-60, if removal only.	Metre	46.49
18-68	Add to item 18-54 or 18-61, if removal only.	Metre	46.49
18-69	Prepare surface clean of all dust, dirt etc,	Metre	35.57
	of MS pipe 15mm dia and applying two		
	coats of bitumen solution and then wrap all around with bitumen paper duly dipped in		
	bitumen solution with overlap of 100mm		
	(excl cost of pipe).		
18-70	Same as item 18-69, but 20 mm dia pipe.	Metre	43.94
18-71	Same as item 18-69, but 25 mm dia pipe.	Metre	53.37

SI No.	Description	Unit	Rate(Rs)
18-72	Same as item 18-69, but 40 mm dia pipe.	Metre	74.44
18-73	Same as item 18-69, but 50 mm dia pipe.	Metre	90.57
18-74	Same as item 18-69, but 65 mm dia pipe.	Metre	118.66
18-75	Same as item 18-69, but 80 mm dia pipe.	Metre	130.39
18-76	Same as item 18-69, but 100 mm dia pipe.	Metre	165.10
18-77	Same as item 18-69, but 150 mm dia pipe.	Metre	215.39
	Socket - GI		
18-78	Socket GI, 15 mm dia, supply and fixing.	Each	34.78
18-79	Same as item 18-78, but 20 mm dia.	Each	46.17
18-80	Same as item 18-78, but 25 mm dia.	Each	69.99
18-81	Same as item 18-78, but 40 mm dia.	Each	117.07
18-82	Same as item 18-78, but 50 mm dia.	Each	188.47
18-83	Same as item 18-78, but 65 mm dia.	Each	344.52
18-84	Same as item 18-78, but 80 mm dia.	Each	597.87
18-85	Same as item 18-78, but 100 mm dia.	Each	857.81
18-86	Same as item 18-78 but 150 mm dia.	Each	2902.12
	Socket Reducing - GI		
18-87	Socket reducing GI, 20 mm x 15 mm dia, supply and fixing.	Each	60.10
18-88	Same as item 18-87, but 25 x 20 mm dia.	Each	74.95
18-89	Same as item 18-87, but 40 x 25 mm dia.	Each	134.23
18-90	Same as item 18-87, but 50 x 40 mm dia.	Each	200.86
18-91	Same as item 18-87, but 65 x 50 mm dia.	Each	407.43
18-92	Same as item 18-87, but 80 x 65 mm dia.	Each	624.55
18-93	Same as item 18-87, but 100 x 80 mm dia.	Each	1068.26
18-94	Same as item 18-87, but 150 x 100 mm dia	Each	3227.78
	Bend GI 45% 90%		
18-95	Bend GI 45% 90%, 15mm dia, supply and fixing.	Each	80.91
18-96	Same as item 18-95, but 20 mm dia.	Each	107.44
18-97	Same as item 18-95, but 25 mm dia.	Each	148.41
18-98	Same as item 18-95, but 40 mm dia.	Each	322.77
18-99	Same as item 18-95 ,but 50 mm dia.	Each	574.27
18-100	Same as item 18-95, but 65 mm dia.	Each	1089.37

SI No.	Description	Unit	Rate(Rs)
18-101	Same as item 18-95, but 80 mm dia.	Each	1512.17
18-102	Same as item 18-95, but 100 mm dia.	Each	2965.03
18-103	Same as item 18-95, but 150 mm dia.	Each	12887.51
	Elbow - Gl		
18-104	Elbow GI, 15 mm dia, supply and fixing.	Each	38.06
18-105	Same as item 18-104, but 20 mm dia.	Each	54.47
18-106	Same as item 18-104, but 25 mm dia.	Each	85.97
18-107	Same as item 18-104, but 40 mm dia.	Each	151.37
18-108	Same as item 18-104, but 50 mm dia.	Each	262.07
18-109	Same as item 18-104, but 65 mm dia.	Each	480.89
18-110	Same as item 18-104, but 80 mm dia.	Each	887.78
18-111	Same as item 18-104, but 100 mm dia.	Each	1429.43
18-112	Same as item 18-104, but 150 mm dia.	Each	5480.49
18-113	Same as item 18-78, 18-87, 18-95 or 18-104, but fixing only.	Each	8.68
18-114	Same as item 18-79, 18-88, 18-96 or 18-105, but fixing only.	Each	10.39
18-115	Same as item 18-80, 18-89, 18-97 or 18-106, but fixing only.	Each	11.29
18-116	Same as item 18-81, 18-90, 18-98 or 18-107 but fixing only.	Each	14.25
18-117	Same as item 18-82, 18-91, 18-99 or 18-108, but fixing only.	Each	17.42
18-118	Same as item 18-83, 18-92, 18-100 or 18-109, but fixing only.	Each	18.32
18-119	Same as item 18-84, 18-93, 18-101 or 18-110, but fixing only.	Each	26.71
18-120	Same as item 18-85, 18-94, 18-102 or 18-111, but fixing only.	Each	26.71
18-121	Same as item 18-86, 18-103 or 18-112, but fixing only.	Each	32.36
18-122	Add to item 18-78, 18-87, 18-95, 18-104 or 18-113, if removal only.	Each	2.49
18-123	Add to item 18-79, 18-88, 18-96, 18-105 or 18-114, if removal only.	Each	3.10

SI No.	Description	Unit	Rate(Rs)
18-124	Add to item 18-80, 18-89, 18-97, 18-106 or 18-115, if removal only.	Each	4.65
18-125	Add to item 18-81, 18- 90, 18-98, 18-107 or 18-116, if removal only.	Each	4.65
18-126	Add to item 18-82, 18-91, 18-99, 18-108 or 18-117, if removal only.	Each	6.35
18-127	Add to item 18-83, 18-92, 18-100, 18-109 or 18-118 if removal only.	Each	6.35
18-128	Add to item 18-84, 18-93, 18-101, 18-110 or 18-119, if removal only.	Each	9.29
18-129	Add to item 18-85, 18-94, 18-102, 18-111 or 18-120, if removal only.	Each	10.85
18-130	Add to item 18-86, 18-103, 18-112 or 18-121, if removal only.	Each	10.85
	Tee Equal - GI		
18-131	Tee equal GI 15 mm dia, supply and fixing	Each	47.06
18-132	Same as item 18-131,but 20 mm dia.	Each	77.12
18-133	Same as item 18-131, but 25 mm dia.	Each	112.86
18-134	Same as item 18-131, but 40 mm dia.	Each	203.98
18-135	Same as item 18-131, but 50 mm dia.	Each	309.06
18-136	Same as item 18-131, but 65 mm dia.	Each	717.65
18-137	Same as item 18-131, but 80 mm dia.	Each	1027.62
18-138	Same as item 18-131, but 100 mm dia.	Each	1698.85
18-139	Same as item 18-131, but 150 mm dia.	Each	8364.83
	Tee Reducing - GI).
18-140	Tee reducing GI, 20x15mm dia, supply and fixing.	Each	90.82
18-141	Same as item 18-140, but 25 x 20 mm dia	Each	139.88
18-142	Same as item 18-140, but 40 x 25 mm dia	Each	256.09
18-143	Same as item 18-140, but 50 x 40 mm dia	Each	373.95
18-144	Same as item 18-140, but 65 x 50 mm dia	Each	824.16
18-145	Same as item 18-140, but 80 x 65 mm dia.	Each	1290.84
18-146	Same as item 18-140, but 100 x 80 mm dia	Each	1962.08
18-147	Same as item 18-140, but 150 x100 mm dia	Each	10642.03

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SI No.	Description	Unit	Rate(Rs)
	Union Socket – GI / MS		
18-148	Union socket GI/ MS, screwed BSP, 15 mm dia, supply and fixing.	Each	109.50
18-149	Same as item 18-148, but 20 mm dia.	Each	143.46
18-150	Same as item 18-148, but 25 mm dia.	Each	174.07
18-151	Same as item 18-148, but 40 mm dia.	Each	341.79
18-152	Same as item 18-148, but 50 mm dia.	Each	476.79
18-153	Same as item 18-148, but 65 mm dia.	Each	1007.81
18-154	Same as item 18-148, but 80 mm dia.	Each	1327.57
18-155	Same as item 18-148, but 100 mm dia.	Each	2515.46
18-156	Same as item 18-131 or 18-148, but fixing only.	Each	10.33
18-157	Same as item 18-132 , 18-140 or 18-149, but fixing only.	Each	12.46
18-158	Same as item 18-133, 18-141 or 18-150, but fixing only.	Each	14.91
18-159	Same as item 18-134, 18-142 or 18-151, but fixing only.	Each	17.35
18-160	Same as item 18-135 , 18-143 or 18-152, but fixing only.	Each	21.35
18-161	Same as item 18-136 , 18-144 or 18-153, but fixing only.	Each	22.25
18-162	Same as item 18-137, 18-145 or 18-154, but fixing only.	Each	29.81
18-163	Same as item 18-138, 18-146 or 18-155, but fixing only.	Each	33.8
18-164	Same as item 18-139 or 18-147, but fixing only.	Each	39.59
18-165	Add to item 18-131, 18-148 or 18-156, if removal only.	Each	3.72
18-166	Add to item 18-132, 18-140, 18-149 or 18-157, if removal only.	Each	4.65
18-167	Add to item 18-133, 18-141, 18-150 or 18-158, if removal only.	Each	5.82
18-168	Add to item 18-134, 18-142, 18-151 or 18-159, if removal only.	Each	6.98
18-169	Add to item 18-135, 18-143, 18-152 or 18-160, if removal only.	Each	9.29

SI No.	Description	Unit	Rate(Rs)
18-170	Add to item 18-136, 18-144, 18-153 or 18-161, if removal only.	Each	9.29
18-171	Add to item 18-137, 18-145, 18-154 or 18-162, if removal only.	Each	11.62
18-172	Add to item 18-138, 18-146, 18-155 or 18-163, if removal only.	Each	13.94
18-173	Add to item 18-139, 18-147 or 18-164, if removal only.	Each	16.26
18-174	Check nut GI, 15 mm dia, supply and fixing.	Each	32.16
18-175	Same as item 18-174, but 20 mm dia.	Each	45.72
18-176	Same as item 18-174, but 25 mm dia.	Each	49.39
18-177	Same as item 18-174, but 40 mm dia.	Each	69.69
18-178	Same as item 18-174, but 50 mm dia.	Each	97.65
18-179	Same as item 18-174, but 65 mm dia.	Each	165.88
18-180	Same as item 18-174, but 80 mm dia.	Each	230.25
18-181	Same as item 18-174, but 100 mm dia.	Each	425.29
18-182	Same as item 18-174, but 150 mm dia.	Each	874.98
	Plugs – GI / MS		
18-183	GI/MS plug screwed BSP, 15 mm dia, supply and fixing.	Each	27.27
18-184	Same as item 18-183, but 20 mm dia.	Each	37.15
18-185	Same as item 18-183, but 25 mm dia.	Each	51.84
18-186	Same as item 18-183, but 40 mm dia.	Each	81.93
18-187	Same as item 18-183, but 50 mm dia.	Each	119.69
18-188	Same as item 18-183, but 65 mm dia.	Each	218.53
18-189	Same as item 18-183, but 80 mm dia.	Each	367.38
18-190	Same as item 18-183, but 100 mm dia.	Each	535.47
18-191	Same as item 18-174 or 18-183, but fixing only.	Each	5.23
18-192	Same as item 18-175 or 18-184, but fixing only.	Each	6.54
18-193	Same as item 18-176 or 18-185, but fixing only.	Each	6.54
18-194	Same as item 18-177 or 18-186, but fixing only.	Each	8.47
18-195	Same as item 18-178 or 18-187, but fixing only	Each	9.51
18-196	Same as item 18-179 or 18-188, but fixing only.	Each	9.51

SI No.	Description	Unit	Rate(Rs)
18-197	Same as item 18-180 or 18-189, but fixing only.	Each	12.33
18-198	Same as item 18-181 or 18-190, but fixing only.	Each	15.14
18-199	Same as item 18-182, but fixing only.	Each	17.97
18-200	Add to item 18-174, 18-183 or 18-191, if removal only.	Each	1.24
18-201	Add to item 18-175, 18-184 or 18-192, if removal only.	Each	1.55
18-202	Add to item 18-176, 18-185 or 18-193, if removal only.	Each	1.55
18-203	Add to item 18-177, 18-186 or 18-194, if removal only.	Each	2.33
18-204	Add to item 18-178, 18-187 or 18-195, if removal only.	Each	3.11
18-205	Add to item 18-179, 18-188 or 18-196, if removal only.	Each	3.11
18-206	Add to item 18-180, 18-189 or 18-197, if removal only.	Each	3.87
18-207	Add to item 18-181, 18-190 or 18-198, if removal only.	Each	4.65
18-208	Add to item 18-182 or 18-199, if removal only.	Each	5.42
	Bib Cocks – (Brass, Bright)		
18-209	Bib cock (Brass, bright) plug, round way (low pressure) with GI or brass handle and shouldered tail, Screwed for iron pipe, 15 mm dia, supply and fixing.	Each	330.32
18-210	Same as item 18-209, but 20 mm dia.	Each	416.91
18-211	Same as item 18-209, but 25 mm dia.	Each	601.45
18-212	Bib cock (Brass, bright), screw down, high pressure, screwed for iron pipe or for brass ferrule, 15mm dia, supply and fixing.	Each	576.96
18-213	Same as item 18-212, but 20 mm dia.	Each	722.99
18-214	Same as item 18-212, but 25 mm dia.	Each	883.04
18-215	Bib cock, Brass, CP, fancy type, screwed down, BSP, 15 mm dia, supply and fixing.	Each	819.49
18-216	Same as item 18-215, but with long head.	Each	1003.68
18-217	Same as item 18-215, but toilet bib cock (Double).	Each	1493.40
18-218	Same as item 18-215, but Ordinary type.	Each	269.10

SI No.	Description	Unit	Rate(Rs)
18-219	Same as item 18-209 to 18-218, but fixing only.	Each	24.24
18-220	Add to item 18-209 to 18-219, if removal only.	Each	15.50
18-221	CP Nipple 15x150 mm for CP bib cock and shower, supply and fixing.	Each	109.94
18-222	Same as item 18-221, but 15 x 125 mm.	Each	94.03
18-223	Same as item 18-221, but 15 x 80 mm.	Each	87.90
18-224	Same as item 18-221 to 18-223, but fixing only.	Each	24.24
18-225	Add to item 18-221 to 18-223 or 18-224, if removal only.	Each	15.50
	Bath and Lavatory Cocks – (CP)		
18-226	CP Pillar cock , high neck fancy head, screw down, high pressure, lettered Hot or Cold, with long screw, shank and fly nuts, fixed on iron pipe 15mm dia, supply and fixing.	Each	994.12
18-227	CP Mixer, 15mm dia, fancy head, any pattern and shape, screw down, high pressure, lettered Hot and cold with long screw channels and fly nuts complete, supply and fixing.	Each	1106.33
18-228	Same as 18-226 to 18-227, but fixing only.	Each	96.28
18-229	Add to item 18-226, 18-227 or 18-228, if removal only.	Each	68.18
	Stop Cock		
18-230	Stop cock, brass dull or polished body, screw down, high pressure, screwed both ends, for iron pipes (or to suit brass unions), 15 mm dia, supply and fixing.	Each	345.24
18-231	Same as item 18-230, but 20 mm dia.	Each	516.64
18-232	Same as item 18-230, but 25 mm dia.	Each	896.18
18-233	Stop cock brass, CP, screw down, high pressure, fancy type, 15mm dia, supply and fixing.	Each	822.72
18-234	Same as item 18- 233 but concealed type.	Each	1006.36
18-235	Same as item 18-233, but tee stop cock.	Each	822.72
18-236	Same as item 18-230 to 18-235, but fixing only.	Each	26.92
18-237	Add to item 18-230 to 18-235 or 18-236, if removal only.	Each	15.50

SI No.	Description	Unit	Rate(Rs)
	Water Meters		
18-238	Water meters, screwed BSP, 15mm dia, supply and fixing.	Each	883.93
18-239	Same as item 18-238, but 20 mm dia.	Each	1255.36
18-2 4 0	Same as item 18-238, but 25 mm dia.	Each	2485.57
18-241	Same as item 18-238, but 40 mm dia.	Each	4945.13
18-242	Same as item 18-238, but 50 mm dia.	Each	8629.87
18-243	Same as item 18-238, but 65 mm dia.	Each	12666.69
18-244	Water meter, flanged and drilled to BS Table 18-1-9, complete with rubber packing, 80 mm dia, supply and fixing.	Each	13996.66
18-245	Same as item 18-244, but 100 mm dia.	Each	18641.81
18-246	Same as item 18-244, but 150 mm dia.	Each	28043.06
18-247	Same as item 18-244, but 200 mm dia.	Each	49551.40
	Valves		
18-248	Valves, " Peet " pattern, strong gunmetal, high pressure, "Full-way" valves with iron wheel head, screwed both ends for iron pipe, 15 mm dia, supply and fixing.	Each	516.64
18-249	Same as item 18-248, but 20 mm dia.	Each	761.01
18-250	Same as item 18-248, but 25 mm dia.	Each	1014.63
18-251	Same as item 18-248, but 40 mm dia.	Each	1576.52
18-252	Same as item 18-248, but 50 mm dia.	Each	2380.58
18-253	Same as item 18-248, but 65 mm dia.	Each	3729.10
18-254	Globe valves , gunmetal, screwed both ends, complete with steel handle Class-150, 15 mm dia, supply and fixing.	Each	394.21
18-255	Same as item 18-254, but 20 mm dia.	Each	643.21
18-256	Same as item 18-254, but 25 mm dia.	Each	904.44
18-257	Same as item 18-254, but 40 mm dia.	Each	1943.81
18-258	Same as item 18-254, but 50 mm dia.	Each	2503.01
18-259	Same as item 18-254, but 65 mm dia.	Each	4280.03
18-260	Globe valves , gunmetal, flanged and drilled to BS Table 18-1-9, complete with steel handle Class-150, 80 mm dia, supply and fixing.	Each	12221.43

SI No.	Description	Unit	Rate(Rs)
18-261	Same as item 18-260, but 100mm dia, with CI body.	Each	19056.23
18-262	Same as item 18-260 but 150mm dia, with CI body.	Each	24737.45
	Sluice Valves		
18-263	Sluice Valve, according to BSS-3464 class 150,(Table 18-1-5) flanged and drilled to BS Table 18-1-9, complete with rubber packing, 80 mm dia, supply and fixing.	Each	13732.67
18-263.1	Same as item 18-263, but 80mm dia BSS-5150/5163 , PN-16 (Table18-1-7).	Each	15201.83
18-264	Same as item 18-263, but 100 mm dia.	Each	18566.51
18-264.1	Same as item 18-263.1, but 100 mm dia.	Each	19545.95
18-265	Same as item 18-263, but 150 mm dia.	Each	28106.56
18-265.1	Same as item 18-263.1, but 150 mm dia.	Each	30491.66
18-266	Same as item 18-263, but 200 mm dia.	Each	40452.71
18-266.1	Same as item 18-263.1, but 200 mm dia.	Each	45472.34
18-267	Same as item 18-263, but 250 mm dia.	Each	61392.22
18-267.1	Same as item 18-263.1, but 250 mm dia.	Each	67636.15
18-268	Same as item 18-263, but 300 mm dia.	Each	78752.26
18-268.1	Same as item 18-263a, but 300 mm dia.	Each	84996.19
	Non Return Valves	L,	
18-269	Non return valve or reflux valve, screwed 15mm dia, supply and fixing.	Each	332.10
18-270	Same as item 18-269, but 20 mm dia.	Each	484.05
18-271	Same as item 18-269, but 25 mm dia.	Each	586.12
18-272	Same as item 18-269, but 40 mm dia.	Each	780.72
18-273	Same as item 18-269, but 50 mm dia.	Each	1401.14
18-274	Same as item 18-269, but 65 mm dia.	Each	2749.66
18-275	Same as item 18-269, flanged and drilled to BS Table 18-1-9, 80 mm dia.	Each	5652.29

SI No.	Description	Unit	Rate(Rs)
18-276	Same as item 18-275, but 100 mm dia.	Each	7670.24
18-277	Same as item 18-275, but 150 mm dia.	Each	12127.16
18-278	Same as item 18-275, but 200 mm dia.	Each	19556.05
18-279	Same as item 18-238, 18-248, 18-254 or 18-269, but fixing only.	Each	23.35
18-280	Same as item 18-239, 18-249, 18-255 or 18-270, but fixing only.	Each	31.06
18-281	Same as item 18-240, 18-250, 18-256 or 18-271, but fixing only.	Each	35.19
18-282	Same as item 18-241, 18-251,18-257 or 18-272, but fixing only.	Each	46.14
18-283	Same as item 18-242, 18-252, 18-258 or 18-273, but fixing only.	Each	54.41
18-284	Same as item 18-243, 18-253, 18-259 or 18-274, but fixing only.	Each	56.20
18-285	Same as item 18-244,18-260, 18-263, 18-263.1 or 18-275, but fixing only.	Each	265.37
18-286	Same as item 18-245, 18-261, 18-264, 18-264.1 or 18-276 but fixing only.	Each	324.44
18-287	Same as item 18-246, 18-262,18-265, 18-265.1 or 18-277, but fixing only.	Each	496.31
18-288	Same as item 18-247, 18-266, 18-266.1 or 18-278, but fixing only.	Each	579.40
18-289	Same as item 18-267, 18-267.1, but fixing only.	Each	699.85
18-290	Same as item 18-268, 18-268.1, but fixing only.	Each	1129.72
18-291	Add to item 18-238, 18-248, 18-254, 18-269 or 18-279, if removal only.	Each	15.50
18-292	Add to item 18-239, 18-249, 18-255, 18-270 or 18-280 if removal only.	Each	18.60
18-293	Add to item 18-240, 18-250, 18-256, 18-271 or 18-281 if removal only.	Each	21.69
18-294	Add to item 18-241, 18-251, 18-257, 18-272 or 18-282, if removal only.	Each	27.89
18-295	Add to item 18-242, 18-252, 18-258, 18-273 or 18-283 if removal only.	Each	34.08
18-296	Add to item 18-243, 18-253, 18-259, 18-274 or 18-284, if removal only.	Each	34.08
PLUMBING AND ALLIED WORKS

SI No.	Description	Unit	Rate(Rs)
18-297	Add to item 18-244, 18-260, 18-263, 18-263.1, 18-275 or 18-285, if removal only.	Each	77.47
18-298	Add to item 18-245, 18-261, 18-264, 18-264.1, 18-276 or 18-286, if removal only.	Each	122.12
18-299	Add to item 18-246, 18-262, 18-265, 18-265.1, 18-277 or 18-287, if removal only.	Each	196.84
18-300	Add to item 18-247, 18-266, 18-266.1, 18-278 or 18-288, if removal only.	Each	236.22
18-301	Add to item 18-267, 18-267.1 or 18-289, if removal only.	Each	253.09
18-302	Add to item 18-268, 18-268.1 or 18-290, if removal only.	Each	430.41
	Ball / Float Valves		
18-303	Ball valves, brass (Corydon) or other approved pattern, with plastic ball screwed for iron (brass ferrule), 15mm dia, supply. and fixing.	Each	575.18
18-304	Same as item 18-303, but 20mm dia.	Each	763.85
18-305	Same as item 18-303, but 25mm dia.	Each	1111.68
18-306	Same as item 18-303, with copper ball, but 40mm dia.	Each	3474.18
18-307	Same as item 18-306, but 50 mm dia. Foot Valve	Each	6175.91
18-308	Foot valve complete with strainer screwed 25mm dia, supply and fixing.	Each	894.89
18-309	Same as item 18-308, but 40 mm dia.	Each	1883.49
18-310	Same as item 18-308, but 50 mm dia.	Each	3116.95
18-311	Same as item 18-308, but 65 mm dia.	Each	3970.59
18-312	Same as item 18-308, but flanged and drilled to BS Table 18-1-9, 80 mm dia.	Each	5469.87
18-313	Same as item 18-312, but 100 mm dia	Each	6610.00
18-314	Same as item 18-312, but 150 mm dia	Each	8949.49
18-315	Same as item 18-312, but 200 mm dia	Each	17587.38
18-316	Same as item 18-303 to 18-305 or 18-308, but fixing only.	Each	37.88
18-317	Same as item 18-306 or 18-309, but fixing only.	Each	47.04

SI No.	Description	Unit	Rate(Rs)
18-318	Same as item 18-307 or 18-310, but fixing only.	Each	56.20
18-319	Same as item 18-311, but fixing only.	Each	114.04
18-320	Same as item 18-312, but fixing only.	Each	205.38
18-321	Same as item 18-313, but fixing only.	Each	243.64
18-322	Same as item 18-314, but fixing only.	Each	379.39
18-323	Same as item 18-315, but fixing only.	Each	447.18
18-324	Add to item 18-303 to 18-305, 18-308 or 18-316, if removal only.	Each	21.69
18-325	Add to item 18-306, 18-309 or 18-317, if removal only.	Each	27.89
18-326	Add to item 18-307, 18-310 or 18-318, if removal only.	Each	34.08
18-327	Add to item 18-311 or 18-319, if removal only.	Each	77.47
18-328	Add to item 18-312 or 18-320, if removal only.	Each	109.04
18-329	Add to item 18-313 or 18-321, if removal only.	Each	122.12
18-330	Add to item 18-314 or 18-322, if removal only.	Each	196.84
18-331	Add to item 18-315 or 18-323, if removal only.	Each	236.22
	Air Valves		
18-332	Air valve automatic, 50 mm size, single acting, supply and fixing.	Each	1890.86
18-333	Same as item 18-332, but double acting.	Each	2992.73
18-334	Same as item 18-332 or 18-333, but fixing only.	Each	54.41
18-335	Add to item 18-332, 18-333 or 18-334, if removal only.	Each	34.08
	Fire Hydrant		
18-336	Fire Hydrant flanged and drilled to BS Table 18-1-9, complete with rubber packing, 65 mm dia, supply and fixing.	Each	12936.87
18-337	Same as 18-336, but 80 mm dia.	Each	17956.50
18-338	Same as item 18-336 or 18-337, but fixing only.	Each	326.58
18-339	Add to item 18-336, 18-337 or 18-338, if removal only.	Each	154.95
	Flange – MS / Gl		
18-340	Flanges MS/GI, drilled to B.S Table 18-1-9, for screwed pipe, 25mm dia, supply and fixing.	Each	239.50

SI No.	Description	Unit	Rate(Rs)
18-341	Same as item 18-340, but 40mm dia.	Each	316.33
18-342	Same as item 18-340, but 50mm dia.	Each	400.05
18-343	Same as item 18-340, but 65mm dia.	Each	466.61
18-344	Same as item 18-340, but 80mm dia.	Each	542.36
18-345	Same as item 18-340, but 100mm dia.	Each	587.81
18-346	Same as item 18-340, but 150mm dia.	Each	820.97
18-347	Same as item 18-340, but 200mm dia.	Each	1488.59
18-348	Same as item 18-340, but 250mm dia.	Each	2108.69
18-349	Same as item 18-340, but 300mm dia.	Each	2517.76
18-350	Same as item 18-340, but fixing only.	Each	68.10
18-351	Same as item 18-341, but fixing only.	Each	77.60
18-352	Same as item 18-342, but fixing only.	Each	81.73
18-353	Same as item 18-343, but fixing only.	Each	123.81
18-354	Same as item 18-344, but fixing only.	Each	150.59
18-355	Same as item 18-345, but fixing only.	Each	159.31
18-356	Same as item 18-346, but fixing only.	Each	245.55
18-357	Same as item 18-347, but fixing only.	Each	325.50
18-358	Same as item 18-348, but fixing only.	Each	394.67
18-359	Same as item 18-349, but fixing only.	Each	558.88
18-360	Add to item 18-340 or 18-350, if removal only.	Each	10.85
18-361	Add to item 18-341 or 18-351, if removal only.	Each	13.94
18-362	Add to item 18-342 or 18-352, if removal only.	Each	17.04
18-363	Add to item 18-343 or 18-353, if removal only.	Each	43.62
18-364	Add to item 18-344 or 18-354, if removal only.	Each	54.52
18-365	Add to item 18-345 or 18-355, if removal only.	Each	61.07
18-366	Add to item 18-346 or 18-356 if removal only.	Each	76.32
18-367	Add to item 18-347 or 18-357, if removal only.	Each	118.11
18-368	Add to item 18-348 or 18-358, if removal only.	Each	126.54
18-369	Add to item 18-349 or 18-359, if removal only.	Each	177.16
	Brass Spindles		
18-370	Brass Spindle with nuts, for 80mm dia, Sluice valves , supply and fixing.	Each	2622.68
18-371	Same as item 18-370, but 100 mm dia.	Each	2867.54
18-372	Same as item 18-370, but 150 mm dia.	Each	6173.15

SI No.	Description	Unit	Rate(Rs)
18-373	Same as item 18-370, but 200 mm dia.	Each	8673.41
18-374	Same as item 18-370, but 250 mm dia.	Each	10509.86
18-375	Same as item 18-370, but 300 mm dia.	Each	11734.16
18-376	Same to item 18-370 to 18-372, but fixing only.	Each	51.65
18-377	Same as item 18-373 to 18-375, but fixing only.	Each	103.31
18-378	Add to item 18-370 to 18-372 or 18-376, if removal only.	Each	38.74
18-379	Add to item 18-373 to 18-375 or 18-377, if removal only.	Each	77.47
	Water Tanks – Fibre Glass		
18-380	Water tank, made of Fibre Glass, capacity 900 lits, supply and fixing	Each	16991.14
18-381	Same as item 18-380, but 1400 lits.	Each	25486.72
18-382	Same as item 18-380, but 1800 lits.	Each	33982.28
18-383	Same as item 18-380, but fixing only.	Each	374.94
18-384	Same as item 18-381, but fixing only.	Each	562.42
18-385	Same as item 18-382, but fixing only.	Each	749.88
18-386	Add to item 18-380 or 18-383, if removal only.	Each	281.21
18-387	Add to item 18-381 or 18-384, if removal only.	Each	421.81
18-388	Add to item 18-382 or 18-385, if removal only.	Each	562.42
	Water Tanks – Polyethylene (PE)		
18-389	Water tank Polyethylene (PE) vertical, 227 lits (50 gallons) capacity, supply and fixing.	Each	5861.34
18-390	Same as item 18-389 but 680 lits (150 gallons) capacity.	Each	12778.63
18-391	Same as item 18-389 but 900 lits (200 gallons) capacity.	Each	16818.82
18-392	Same as item 18-389 but 1136 lits (250 gallons) capacity.	Each	21348.73
18-393	Same as item 18-389 but 1360 lits (300 gallons) capacity.	Each	23824.12
18-394	Same as item 18-389 but 1810 lits (400 gallons) capacity.	Each	29700.76
18-395	Same as item 18-389 but 2270 lits (500 gallons) capacity.	Each	34353.10

SI No.	Description	Unit	Rate(Rs)
18-396	Same as item 18-389, but 4540 lits (1000 gallons) capacity.	Each	68101.69
18-397	Water tank Polyethylene (PE) horizontal , 680 lits (150 gallons) capacity, supply and fixing.	Each	16084.24
18-398	Same as item 18-397 but 900 lits (200 gallons) capacity.	Each	22083.31
18-399	Same as item 18-397 but 1136 lits (250 gallons) capacity.	Each	28572.10
18-400	Same as item 18-397 but 1360 lits (300 gallons) capacity.	Each	33312.44
18-401	Same as 18-389 to 18-392 or 18-397 to 18-399, but fixing only.	Each	290.77
18-402	Same as 18-393 to 18-395 or 18-400, but fixing only.	Each	562.42
18-403	Same as 18-396, but fixing only.	Each	1377.34
18-404	Add to item 18-389 to 18-392, 18-397 to 18-399 or 18-401, if removal only.	Each	218.08
18-405	Add to item 18-393 to 18-395, 18-400 or 18-402 if removal only.	Each	421.81
18-406	Add to item 18-396 or 18-403, if removal only.	Each	1033.00
	Water Coolers		
18-407	Deleted being shifted section 27-77.	Pr-	-
18-408	Deleted being shifted section 27-78.	-	-
18-409	Deleted being shifted section 27-79.	-	
18-410	Deleted being shifted section 27-80.	-	<i>¹</i> 0,
18-411	Deleted being shifted section 27-81.	-	-
18-412	Deleted being shifted section 27-82.	-	-
18-413	Deleted being shifted section 27-83.	-	-
18-414	Deleted being shifted section 27-84.	-	-
18-415	Deleted being shifted section 27-85.	-	-

SI No.	Description	Unit	Rate(Rs)
18-416	Deleted being shifted section 27-86.	-	-
18-417	Deleted being shifted section 27-87.	-	-
	Water Filters		
18-418	Water filter, 3 stage, consisting polypropylene fiber cartridge 5 micron, granular activated carbon cartridge 1 micron, and size of cartridge 10" with ultra violet lamp, water flow rate 2 gpm complete, supply and fixing.	Each	18559.54
18-419	Same as item 18-418, but 3 gpm	Each	28029.50
18-420	Same as item 18-418, but 8 gpm	Each	42947.60
18-421	Same as item 18-418 to 18-420, but fixing only.	Each	97.10
18-422	Add to item 18-418 to 18-421, if removal only.	Each	72.93
	MS – Pipes / Fittings		
18-423	MS pipe , Water Quality (heavy), 20 mm dia, with all fittings i.e. sockets, bends, tees, elbows etc where required, laid complete in trenches, as specified in para 18-1-2 (excl cost of excavation), supply and fixing.	Metre	386.51
18-424	Same as item 18-423, but 25 mm dia	Metre	478.90
18-425	Same as item 18-423, but 40 mm dia	Metre	731.02
18-426	Same as item 18-423, but 50 mm dia	Metre	1004.67
18-427	Same as item 18-423, but 65 mm dia	Metre	1531.37
18-428	Same as item 18-423, but 80 mm dia	Metre	1977.4
18-429	Same as item 18-423, but 100 mm dia	Metre	2793.77
18-430	Same as item 18-423, but 150 mm dia	Metre	4619.69
18-431	Same as item 18-423, but fixing only	Metre	51.65
18-432	Same as item 18-424, but fixing only	Metre	61.99
18-433	Same as item 18-425, but fixing only	Metre	74.38
18-434	Same as item 18-426, but fixing only	Metre	84.71
18-435	Same as item 18-427, but fixing only	Metre	92.97
18-436	Same as item 18-428 or 18-429, but fixing only.	Metre	103.31

SI No.	Description	Unit	Rate(Rs)
18-437	Same as item 18-430, but fixing only.	Metre	121.89
18-438	Add to item 18-423 or 18-431, if removal only.	Metre	38.74
18-439	Add to item 18-424 or 18-432, if removal only.	Metre	46.49
18-440	Add to item 18-425 or 18-433, if removal only.	Metre	55.78
18-441	Add to item 18-426 or 18-434, if removal only.	Metre	63.53
18-442	Add to item 18-427 or 18-435, if removal only.	Metre	69.72
18-443	Add to item 18-428, 18-429 or 18-436, if removal only.	Metre	77.47
18-444	Add to item 18-430 or 18-437, if removal only.	Metre	91.42
18-445	Canvas pipe of 40mm dia, supply and fixing.	Metre	147.15
18-446	Same as item 18-445, but 50 mm dia.	Metre	158.17
18-447	Same as item 18-445, but 65 mm dia.	Metre	176.53
18-448	Same as item 18- 445, but 75 / 80mm dia.	Metre	201.02
18-449	Same as 18-445 to 18-448 but fixing only.	Metre	51.65
18-450	Add to item 18-445 to 18-448 or 18-449, if removal only.	Metre	38.74
	uPVC Pipes		
18-451	uPVC Pressure pipe, 75mm dia, Class B , complete, Z-joint with rubber ring, (excl excavation), supply and fixing.	Metre	542.54
18-452	Same as item 18-451, but 100 mm dia.	Metre	811.66
18-453	Same as item 18-451, but 150 mm dia.	Metre	1528.94
18-454	uPVC pressure pipe, 50mm dia, Class C , complete, with solvent cement joint, (excl excavation), supply and fixing.	Metre	324.01
18-455	Same as item 18-454, but 75 mm dia, complete, using 'Z'- joint with rubber ring.	Metre	476.91
18-456	Same as item 18-455, but 100 mm dia.	Metre	659.85
18-457	Same as item 18-455, but 150 mm dia.	Metre	1541.25
18-458	uPVC Pressure pipe, 32 mm dia, Class D , complete with solvent, socket, (excl excavation), Supply and Fixing.	Metre	203.23
18-459	Same as item 18-458, but 40 mm dia.	Metre	260.09
18-460	Same as item 18-458, but 50 mm dia	Metre	379.75
18-461	Same as item 18-458, but 75 mm dia, complete, but 'Z'- joint with rubber ring.	Metre	809.13

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SI No.	Description	Unit	Rate(Rs)
18-462	Same as item 18-461, but 100 mm dia.	Metre	1324.70
18-463	Same as item 18-461, but 150 mm dia.	Metre	2812.02
18-464	uPVC pressure pipe, 20mm dia, Class E, complete, with solvent, socket, (excl excavation), supply and fixing.	Metre	117.92
18-465	Same as item 18-464, but 25 mm dia.	Metre	164.63
18-466	Same as item 18-464, but 32 mm dia.	Metre	241.57
18-467	Same as item 18-464, but 40 mm dia.	Metre	311.66
18-468	Same as item 18-464, but 50 mm dia.	Metre	472.81
18-469	Same as item 18-464, but 75 mm dia, complete, 'Z' joint with rubber ring.	Metre	973.18
18-470	Same as item 18-469, but 100 mm dia.	Metre	1578.99
18-471	Same as item 18-469, but 150 mm dia.	Metre	3370.47
18-472	Same as item 18-451, 18-455, 18-461 or 18-469, but fixing only.	Metre	39.41
18-473	Same as item 18-452, 18-456, 18-462 or 18-470, but fixing only.	Metre	47.29
18-474	Same as item 18-453, 18-457, 18-463 or 18-471, but fixing only.	Metre	58.84
18-475	Same as item 18-454, 18-460 or 18-468, but fixing only.	Metre	31.07
18-476	Same as item 18-459 or 18-467, but fixing only.	Metre	27.31
18-477	Same as item 18-458 or 18-466, but fixing only.	Metre	27.31
18-478	Same as item 18-465, but fixing only.	Metre	23.19
18-479	Same as item 18-464, but fixing only.	Metre	23.19
18-480	Add to item 18-451, 18-455, 18-461, 18-469 or 18-472, if removal only.	Metre	29.55
18-481	Add to item 18-452, 18-456, 18-462, 18-470 or 18-473, if removal only.	Metre	35.47
18-482	Add to item 18-453, 18-457, 18-463, 18-471 or 18-474, if removal only.	Metre	44.09
18-483	Add to item 18-454, 18-460, 18-468 or 18-475, if removal only.	Metre	23.36
18-484	Add to item 18-459, 18-467 or 18-476, if removal only.	Metre	20.45

SI No.	Description	Unit	Rate(Rs)
18-485	Add to item 18-458, 18-466 or 18-477, if removal only.	Metre	20.45
18-486	Add to item 18-465 or 18-478, if removal only.	Metre	17.35
18-487	Add to item 18-464 or 18-479, if removal only.	Metre	17.35
	uPVC – Coupler / Socket		
18-488	uPVC Coupler / socket, 75 mm dia, for uPVC pipe, Class B , supply and fixing.	Each	195.13
18-489	Same as item 18-488, but 100 mm dia.	Each	316.03
18-490	Same as item 18-488, but 150 mm dia.	Each	516.04
18-491	uPVC, Coupler / socket, 50 mm dia, for uPVC pipe, Class C , supply and fixing.	Each	109.73
18-492	Same as item 18-491, but 75 mm dia.	Each	286.95
18-493	Same as item 18-491, but 100 mm dia.	Each	432.34
18-494	Same as item 18-491, but 150 mm dia.	Each	1156.05
18-495	uPVC, Coupler / socket, 32 mm dia, for uPVC pipe, Class D , supply and fixing.	Each	81.58
18-496	Same as item 18-495, but 40 mm dia.	Each	99.41
18-497	Same as item 18-495, but 50 mm dia.	Each	136.02
18-498	Same as item 18-495, but 75 mm dia.	Each	293.07
18-499	Same as item 18-495, but 100 mm dia.	Each	548.65
18-500	Same as item 18-495, but 150 mm dia.	Each	1609.04
18-501	uPVC, Coupler / socket, 20 mm dia, for uPVC pipe, Class E , supply and fixing.	Each	47.63
18-502	Same as item 18-501, but 25 mm dia.	Each	54.97
18-503	Same as item 18-501, but 32 mm dia.	Each	90.15
18-504	Same as item 18-501, but 40 mm dia.	Each	105.52
18-505	Same as item 18-501, but 50 mm dia.	Each	172.75
18-506	Same as item 18-501, but 75 mm dia.	Each	360.41
18-507	Same as item 18-501, but 100 mm dia.	Each	909.81
18-508	Same as item 18-501, but 150 mm dia.	Each	2449.98
18-509	Same as item 18-488, 18-492, 18-498 or18-506, but fixing only.	Each	84.94

SI No.	Description	Unit	Rate(Rs)
18-510	Same as item 18-489, 18-493, 18-499 or 18-507, but fixing only.	Each	107.90
18-511	Same as item 18-490, 18-494, 18-500 or18-508 but fixing only.	Each	112.02
18-512	Same as item 18-491, 18-497 or 18-505, but fixing only.	Each	61.99
18-513	Same as item 18-496 or 18-504, but fixing only.	Each	47.29
18-514	Same as item 18-495 or 18-503, but fixing only.	Each	47.29
18-515	Same as item 18-502, but fixing only.	Each	29.85
18-516	Same as item 18-501, but fixing only.	Each	29.85
18-517	Add to item 18-488, 18-492, 18-498, 18-506 or 18-509, if removal only.	Each	63.70
18-518	Add to item 18-489, 18-493, 18-499, 18-507 or 18-510, if removal only.	Each	80.91
18-519	Add to item 18-490, 18-494, 18-500, 18-508 or 18-511 if removal only.	Each	84.02
18-520	Add to item 18-491, 18-497, 18-505, or 18-512, if removal only.	Each	46.49
18-521	Add to item 18-496, 18-504 or 18-513, if removal only.	Each	35.47
18-522	Add to item 18-495, 18-503 or 18-514, if removal only.	Each	35.47
18-523	Add to item 18-502 or 18-515, if removal only.	Each	22.38
18-524	Add to item 18-501 or 18-516, if removal only.	Each	22.38
	uPVC – Long Radius Bend		
18-525	uPVC, Long Radius Bend, 90°-45°-135°, 75 mm dia, for uPVC pipe Class B , supply and fixing.	Each	305.32
18-526	Same as item 18-525, but 100 mm dia.	Each	548.65
18-527	Same as item 18-525, but 150 mm dia.	Each	1774.32
18-528	uPVC, Long Radius Bend,90°-45°-135° 50mm dia, for uPVC pipe, Class C , supply and fixing.	Each	186.38
18-529	Same as item 18-528, but 75 mm dia.	Each	342.04
18-530	Same as item 18-528, but 100 mm dia.	Each	891.45
18-531	Same as item 18-528, but 150 mm dia.	Each	3114.93

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SI No.	Description	Unit	Rate(Rs)
18-532	uPVC, Long Radius Bend, 90°-45°-135° 32mm dia, for uPVC pipe Class D ,supply and fixing.	Each	104.84
18-533	Same as item 18-532, but 40 mm dia.	Each	130.01
18-534	Same as item 18-532, but 50 mm dia.	Each	210.86
18-535	Same as item 18-532, but 75 mm dia.	Each	525.69
18-536	Same as item 18-532, but 100 mm dia.	Each	1050.61
18-537	Same as item 18-532, but 150 mm dia.	Each	3763.80
18-538	uPVC, Long Radius Bend, 90°-45°-135°, 20mm dia, for uPVC pipe, Class E , supply and fixing.	Each	58.64
18-539	Same as item 18-538, but 25 mm dia.	Each	75.78
18-540	Same as item 18-538, but 32 mm dia.	Each	93.82
18-541	Same as item 18-538, but 40 mm dia.	Each	156.94
18-542	Same as item 18- <mark>5</mark> 38, but 50 mm dia.	Each	273.30
18-543	Same as item 18-538, but 75 mm dia.	Each	452.23
18-544	Same as item 18-538, but 100 mm dia.	Each	720.05
18-545	Same as item 18-538, but 150 mm dia.	Each	4951.38
18-546	Same as item 18-525, 18-529, 18-535 or 18-543, but fixing only.	Each	84.94
18-547	Same as item 18-526, 18-530, 18-536 or 18-544, but fixing only.	Each	107.90
18-548	Same as item 18-527, 18-531, 18-537 or 18-545, but fixing only.	Each	274.55
18-549	Same as item 18-528, 18-534 or 18-542, but fixing only.	Each	61.99
18-550	Same as item 18-533 or 18-541, but fixing only.	Each	47.29
18-551	Same as item 18-532 or 18-540, but fixing only.	Each	47.29
18-552	Same as item 18-539, but fixing only.	Each	31.07
18-553	Same as item 18-538, but fixing only.	Each	31.07
18-554	Add to item 18-525, 18-529, 18-535, 18-543 or 18-546, if removal only.	Each	63.70
18-555	Add to item 18-526, 18-530, 18-536, 18-544 or 18-547, if removal only.	Each	80.91
18-556	Add to item 18-527, 18-531, 18-537, 18-545 or 18-548, if removal only.	Each	205.92

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SI No.	Description	Unit	Rate(Rs)
18-557	Add to item 18-528, 18-534, 18-542 or 18-549, if removal only.	Each	46.49
18-558	Add to item 18-533, 18-541 or 18-550, if removal only.	Each	35.47
18-559	Add to item 18-532, 18-540 or 18-551, if removal only.	Each	35.47
18-560	Add to item 18-539 or 18-552, if removal only.	Each	23.30
18-561	Add to item 18-538 or 18-553, if removal only.	Each	23.30
	uPVC – Moulded Equal Tee		
18-562	uPVC, Moulded Equal Tee, 20 mm dia, for uPVC pipe Class (B,C,D,E), supply and fixing.	Each	130.46
18-563	Same as item 18-562, but 25 mm dia.	Each	154.95
18-564	Same as item 18-562, but 32 mm dia.	Each	271.56
18-565	Same as item 18-562, but 40 mm dia.	Each	326.66
18-566	Same as item 18- <mark>562, but</mark> 50 mm dia.	Each	512.44
18-567	Same as item 18-562, but 75 mm dia.	Each	1150.84
18-568	Same as item 18-562, but 100 mm dia.	Each	1879.68
18-569	Same as item 18-562, but 150 mm dia.	Each	5928.98
18-570	Same as item 18-562, but fixing only.	Each	44.76
18-571	Same as item 18-563, but fixing only.	Each	44.76
18-572	Same as item 18-564, but fixing only.	Each	69.55
18-573	Same as item 18-565, but fixing only.	Each	69.55
18-574	Same as item 18-566, but fixing only.	Each	96.18
18-575	Same as item 18-567, but fixing only.	Each	128.55
18-576	Same as item 18-568, but fixing only.	Each	159.54
18-577	Same as item 18-569, but fixing only.	Each	419.63
18-578	Add to item 18-562 or 18-570, if removal only.	Each	44.76
18-579	Add to item 18-563 or 18-571, if removal only.	Each	33.62
18-580	Add to item 18-564 or 18-572, if removal only.	Each	52.21
18-581	Add to item 18-565 or 18-573, if removal only.	Each	52.21
18-582	Add to item 18-566 or 18-576, if removal only.	Each	72.18
18-583	Add to item 18-567 or 18-575, if removal only.	Each	96.41
18-584	Add to item 18-568 or 18-576, if removal only.	Each	119.76
18-585	Add to item 18-569 or 18-577, if removal only.	Each	314.78

SI No.	Description	Unit	Rate(Rs)
	uPVC Elbow		
18-586	uPVC, Elbow, 90°/45°, 20 mm dia, for	Each	97.18
	uPVC pipe, Class (B,C,DandE), supply and fixing		
18-587	Same as item 18-586, but 25 mm dia	Each	127 70
18-588	Same as item 18-586, but 32 mm dia	Each	218 70
19,590	Same as item 18 596, but 40 mm dia	Each	210.70
18-509	Same as item 18 596, but 50 mm dia.	Each	237.00
18-590	Same as item 18 596, but 30 mm dia.	Each	370.31
18-591	Same as item 18-586, but 75 mm dia.	Each	972.50
18-592	Same as item 18-586, but 100 mm dia.	Each	1601.54
18-593	Same as item 18-586, but 150 mm dia.	Each	4688.15
18-594	Same as item 18-586, but fixing only.	Each	29.85
18-595	Same as item 18-587, but fixing only.	Each	29.85
18-596	Same as item 18-588, but fixing only.	Each	47.29
18-597	Same as item 18-589, but fixing only.	Each	47.29
18-598	Same as item 18-590, but fixing only.	Each	61.99
18-599	Same as item 18-591, but fixing only.	Each	84.94
18-600	Same as item 18-592, but fixing only.	Each	107.90
18-601	Same as item 18-593, but fixing only.	Each	274.55
18-602	Add to item 18-586 or 18-594, if removal only.	Each	22.38
18-603	Add to item 18-587 or 18-595, if removal only.	Each	22.38
18-604	Add to item 18-588 or 18-596, if removal only.	Each	35.47
18-605	Add to item 18-589 or 18-597, if removal only.	Each	35.47
18-606	Add to item 18-590 or 18-598, if removal only.	Each	46.49
18-607	Add to item 18-591 or 18-599, if removal only.	Each	63.70
18-608	Add to item 18-592 or 18-600, if removal only.	Each	80.91
18-609	Add to item 18-593 or 18-601, if removal only.	Each	205.92
	uPVC – Moulded – Male / Female Socket		
18-610	uPVC, Moulded Male / Female socket, 20	Each	84.94
	E, supply and fixing.		
18-611	Same as item 18-610, but 25 mm dia.	Each	103.31
18-612	Same as item 18-610, but 32 mm dia.	Each	168.50
18-613	Same as item 18-610, but 40 mm dia.	Each	181.97

SI No.	Description	Unit	Rate(Rs)
18-614	Same as item 18-610, but 50 mm dia.	Each	239.51
18-615	Same as item 18-610, but 75 mm dia.	Each	727.70
18-616	Same as item 18-610, but 100 mm dia.	Each	1059.18
18-617	Same as item 18-610, but 150 mm dia.	Each	2717.03
18-618	Same as item 18-610, but fixing only.	Each	29.85
18-619	Same as item 18-611, but fixing only.	Each	29.85
18-620	Same as item 18-612, but fixing only.	Each	47.29
18-621	Same as item 18-613, but fixing only.	Each	47.29
18-622	Same as item 18-614, but fixing only.	Each	61.99
18-623	Same as item 18-615, but fixing only.	Each	84.94
18-624	Same as item 18-616, but fixing only.	Each	107.90
18-625	Same as item 18-617, but fixing only.	Each	274.55
18-626	Add to item 18-610 or 18-618, if removal only.	Each	22.38
18-627	Add to item 18-611 or 18-619, if removal only.	Each	22.38
18-628	Add to item 18-612 or 18-620, if removal only.	Each	35.47
18-629	Add to item 18-613 or 18-621, if removal only.	Each	35.47
18-630	Add to item 18-614 or 18-622, if removal only.	Each	46.49
18-631	Add to item 18-615 or 18-623, if removal only.	Each	63.64
18-632	Add to item 18-616 or 18-624, if removal only.	Each	63.64
18-633	Add to item 18-617 or 18-625, if removal only.	Each	205.92
	uPVC – Moulded End Plug		
18-634	uPVC, Moulded end plug, 20 mm dia, for uPVC pipe Class B,C,D and E , supply and fixing.	Each	59.76
18-635	Same as item 18-634, but 25 mm dia.	Each	111.18
18-636	Same as item 18-634, but 32 mm dia.	Each	125.56
18-637	Same as item 18-634, but 40 mm dia.	Each	175.76
18-638	Same as item 18-634, but 50 mm dia.	Each	275.85
18-639	Same as item 18-634, but 75 mm dia.	Each	659.59
18-640	Same as item 18-634, but 100 mm dia.	Each	847.45
18-641	Same as item 18-634, but 150 mm dia.	Each	2633.93
18-642	Same as item 18-634, but fixing only.	Each	14.46
18-643	Same as item 18-635, but fixing only.	Each	14.46
18-644	Same as item 18-636, but fixing only.	Each	22.72

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SI No.	Description	Unit	Rate(Rs)
18-645	Same as item 18-637, but fixing only.	Each	22.72
18-646	Same as item 18-638, but fixing only.	Each	30.99
18-647	Same as item 18-639, but fixing only.	Each	41.32
18-648	Same as item 18-640, but fixing only.	Each	51.65
18-649	Same as item 18-641, but fixing only.	Each	136.36
18-650	Add to item 18-634 or 18-642, if removal only.	Each	10.85
18-651	Add to item 18-635 or 18-643, if removal only.	Each	10.85
18-652	Add to item 18-636 or 18-644, if removal only.	Each	17.04
18-653	Add to item 18-637 or 18-645, if removal only.	Each	17.04
18-654	Add to item 18-638 or 18-646, if removal only.	Each	23.24
18-655	Add to item 18-639 or 18-647, if removal only.	Each	30.99
18-656	Add to item 18-640 or 18-648, if removal only.	Each	38.74
18-657	Add to item 18-641 or 18-649, if removal only.	Each	102.27
	uPVC – Moulded Tee Unequal		
18-658	uPVC Moulded Tee unequal, 75 mm x 50 mm dia, for uPVC pipe Class B,C,D and E , supply and fixing.	Each	1398.76
18-659	Same as item 18-658, but 100 x 50mm dia.	Each	2000.97
18-660	Same as item 18-658, but 100 x 75mm dia.	Each	2000.97
18-661	Same as item 18-658, but 150 x 75mm dia.	Each	6526.44
18-662	Same as item 18-658, but 150 x 100mm dia.	Each	6526.44
18-663	Same as item 18-658, but fixing only.	Each	82.64
18-664	Same as item 18-659, but fixing only.	Each	103.31
18-665	Same as item 18-660, but fixing only.	Each	103.31
18-666	Same as item 18-661 but fixing only.	Each	272.71
18-667	Same as item 18-662, but fixing only.	Each	272.71
18-668	Add to item 18-658 or 18-663, if removal only.	Each	61.99
18-669	Add to item 18-659 or 18-664, if removal only.	Each	77.47
18-670	Add to item 18-660 or 18-665, if removal only.	Each	77.47
18-671	Add to item 18-661 or 18-666, if removal only.	Each	204.53
18-672	Add to item 18-662 or 18-667 if removal only.	Each	204.53

SI No.	Description	Unit	Rate(Rs)
	uPVC – Fabricated Socket - Reducing		
18-673	uPVC Fabricated socket reducing, 75 mm x 50 mm dia, for uPVC pipe, Class B, C, D and E , supply and fixing.	Each	707.03
18-674	Same as item 18-673, but 100 x 75 mm dia.	Each	1048.47
18-675	Same as item 18-673, but 150 x 100 mm dia.	Each	2780.08
18-676	Same as item 18-673, but fixing only.	Each	82.64
18-677	Same as item 18-674, but fixing only.	Each	103.31
18-678	Same as item 18-675, but fixing only.	Each	272.71
18-679	Add to item 18-673 or 18-676, if removal only.	Each	61.99
18-680	Add to item 18-674 or 18-677, if removal only.	Each	77.47
18-681	Add to item 18-675 or 18-678, if removal only.	Each	204.53
	PE - Pipes		
18-682	Polyethylene Pipe (PE-100), 20 mm dia Class PN-10 / SDR-17 (excl cost of excavation), supply and fixing.	Metre	106.87
18-683	Same as item 18-682, but 25 mm dia.	Metre	120.92
18-684	Same as item 18-682, but 32 mm dia.	Metre	145.92
18-685	Same as item 18-682, but 40 mm dia.	Metre	222.39
18-686	Same as item 18-682, but 50 mm dia.	Metre	303.70
18-687	Same as item 18-682, but 63 mm dia.	Metre	434.70
18-688	Same as item 18-682, but 75 mm dia.	Metre	615.31
18-689	Same as item 18-682, but 90 mm dia.	Metre	841.56
18-690	Same as item 18-682, but 110 mm dia complete with fusion joint.	Metre	1350.24
18-691	Same as item 18-690, but 125 mm dia.	Metre	1651.42
18-692	Same as item 18-690, but 160 mm dia.	Metre	2 <mark>5</mark> 34.88
18-693	Same as item 18-690, but 180 mm dia.	Metre	3275.33
18-694	Same as item 18-690, but 200 mm dia.	Metre	3963.27
18-695	Same as item 18-690, but 250 mm dia.	Metre	5987.29
18-696	Same as item 18-682 to 18-684, but fixing only.	Metre	51.65
18-697	Same as item 18-685 to 18-687, but fixing only.	Metre	72.31
18-698	Same as item 18-688 to 18-689, but fixing only.	Metre	103.31
18-699	Same as item 18-690 to 18-692, but fixing only.	Metre	255.96

SI No.	Description	Unit	Rate(Rs)
18-700	Same as item 18-693 to 18-694, but fixing only.	Metre	409.12
18-701	Same as item 18-695, but fixing only.	Metre	470.60
18-702	Add to item 18-682 to 18-684 or 18-696, if removal only.	Metre	38.74
18-703	Add to item 18-685 to 18-687 or 18-697, if removal only.	Metre	54.24
18-704	Add to item 18-688 to 18-689 or 18-698, if removal only.	Metre	77.47
18-705	Add to item 18-690 to 18-692 or 18-699, if removal only.	Metre	54.24
18-706	Add to item 18-693 to 18-694 or 18-700, if removal only.	Metre	61.99
18-707	Add to item 18-695 or 18-701, if removal only. Coupler / Socket	Metre	77.47
18-708	Coupler/Socket, 20 mm dia, for PE pipe supply and fixing.	Each	155.34
18-709	Same as item 18-708, but 25 mm dia.	Each	185.95
18-710	Same as item 18-708, but 32 mm dia.	Each	263.08
18-711	Same as item 18-708, but 40 mm dia.	Each	512.68
18-712	Same as item 18-708, but 50 mm dia.	Each	690.20
18-713	Same as item 18-708, but 63 mm dia.	Each	1051.37
18-714	Same as item 18-708, but 75 mm dia.	Each	1564.89
18-715	Same as item 18-708, but 90 mm dia.	Each	2292.12
18-716	Same as item 18-708 but 110 mm dia.	Each	5961.35
	Reducing Coupler / Socket		->>
18-717	Reducing Coupler/Socket 25 x 20 mm dia, for PE pipe , supply and fixing.	Each	190.84
18-718	Same as item 18-717, but 32 x 20 mm dia.	Each	254.51
18-719	Same as item 18-717, but 32 x 25 mm dia.	Each	271.65
18-720	Same as item 18-717, but 40 x 25 mm dia.	Each	360.86
18-721	Same as item 18-717, but 40 x 32 mm dia.	Each	428.20
18-722	Same as item 18-717, but 50 x 25 mm dia.	Each	469.83
18-723	Same as item 18-717, but 50 x 32 mm dia.	Each	533.49
18-724	Same as item 18-717 but 50 x 40 mm dia.	Each	616.74

SI No.	Description	Unit	Rate(Rs)
18-725	Same as item 18-717, but 63 x 32 mm dia.	Each	744.07
18-726	Same as item 18-717, but 63 x 50 mm dia.	Each	756.85
18-727	Same as item 18-717, but 75 x 50 mm dia.	Each	1277.18
18-728	Same as item 18-717, but 75 x 63 mm dia.	Each	1313.91
18-729	Same as item 18-717, but 90 x 63 mm dia.	Each	1839.13
18-730	Same as item 18-717, but 90 x 75 mm dia.	Each	2169.69
18-731	Same as item 18-717, but 110 x 63 mm or 110 x 90mm dia, Butt Fusion fitting .	Each	2263.80
18-732	Same as item 18-731, but 110 x 75 mm dia.	Each	1863.46
18-733	Same as item 18-731, but 125 x90 mm or 125mm x 110mm dia.	Each	2077.71
18-734	Same as item 18-731, but 160 x 90 mm dia.	Each	4083.11
18-735	Same as item 18-731, but 160 x110 mm dia.	Each	4083.11
18-736	Same as item 18-731, but 160 x 125 mm or 180 x 90 mm dia.	Each	4083.11
18-737	Same as item 18-731, but 180 x 110mm, 180 x 125 mm or 180 x 160 mm dia.	Each	6088.52
18-738	Same as item 18-731, but 200 x 160 mm or 200 x 180 mm dia.	Each	6088.52
18-739	Same as item 18-731, but 250 x180 mm dia.	Each	14396.62
18-740	Same as item 18-708 to 18-710, 18-717 to 18-719, but fixing only.	Each	20.67
18-741	Same as item 18-711 to 18-713, 18-720 to 18-725 but fixing only.	Each	41.32
18-742	Same as item 18-714 to 18-716, 18-726 to 18-730, but fixing only.	Each	51.65
18-743	Same as item 18-731 to 18-739, but fixing only.	Each	72.31
18-744	Add to item 18-708 to 18-710, 18-717 to 18-719 or 18-740, if removal only.	Each	15.50
18-745	Add to item 18-711 to 18-713, 18-720 to 18-725 or 18-741, if removal only.	Each	30.99
18-746	Add to item 18-714 to 18-716, 18-726 to 18-730 or 18-742, if removal only.	Each	38.74
18-747	Add to item 18-731 to 18-739 or 18-743, if removal only.	Each	54.24

SI No.	Description	Unit	Rate(Rs)
	Tee Equal		
18-748	Tee Equal , 20 mm dia, for PE pipe, supply and fixing.	Each	226.88
18-749	Same as item 18-748, but 25 mm dia.	Each	273.41
18-750	Same as item 18-748, but 32 mm dia.	Each	409.30
18-751	Same as item 18-748, but 40 mm dia.	Each	864.59
18-752	Same as item 18-748, but 50 mm dia.	Each	1169.44
18-753	Same as item 18-748, but 63 mm dia.	Each	1743.64
18-754	Same as item 18-748, but 75 mm dia.	Each	2700.35
18-755	Same as item 18-748, but 90 mm dia.	Each	3802.22
18-756	Same as item 18-748, but 110 mm dia, Butt Fusion fitting.	Each	4019.84
18-757	Same as item 18-756, but 125 mm dia.	Each	5064.17
18-758	Same as item 18-756, but 160 mm dia.	Each	7063.45
18-759	Same as item 18-756, but 180 mm dia.	Each	12992.74
18-760	Same as item 18-756, but 200 mm dia	Each	20157.34
18-761	Same as item 18-756, but 250 mm dia.	Each	34195.16
	Reducing Tee		
18-762	Reducing Tee 25 x 20 mm dia for PE pipe , supply and fixing.	Each	288.09
18-763	Same as item 18-762, but 32 x 20 mm dia.	Each	379.91
18-764	Same as item 18-762, but 32 x 25 mm dia.	Each	395.83
18-765	Same as item 18-762, but 40 x 32 mm dia.	Each	711.71
18-766	Same as item 18-762, but 50 x 25 mm dia.	Each	816.84
18-767	Same as item 18-762, but 50 x 32 mm dia.	Each	1004.16
18-768	Same as item 18-762, but 50 x 40 mm dia.	Each	1053.13
18-769	Same as item 18-762, but 63 x 32 mm dia.	Each	1551.42
18-770	Same as item 18-762, but 63 x 50 mm dia.	Each	1616.85
18-771	Same as item 18-762, but 75 x 63 mm dia.	Each	2931.75
18-772	Same as item 18-762, but 90 x 63 mm dia.	Each	3635.72
18-773	Same as item 18-762, but 90 x 75 mm dia.	Each	3932
18-774	Same as item 18-762 but 125 x 90 mm dia, Butt Fusion fitting.	Each	6119.52
18-775	Same as item 18-774, but 160 x 90 mm dia.	Each	10846.54

SI No.	Description	Unit	Rate(Rs)
18-776	Same as item 18-774, but 160x110 mm dia.	Each	10846.54
18-777	Same as item 18-774, but 180 x 125 mm dia.	Each	14488.83
18-778	Same as item 18-748 to 18-750 or 18-762 to 18-765, but fixing only	Each	30.99
18-779	Same as item 18-751 to 18-753 or 18-766 to 18-769, but fixing only.	Each	51.65
18-780	Same as item 18-754 to 18-755 or 18-770 to 18-773, but fixing only.	Each	61.99
18-781	Same as item 18-756 to 18-761 or 18-774 to 18-777, but fixing only.	Each	103.31
18-782	Add to item 18-748 to 18-750, 18-762 to 18-765 or 18-778, if removal only.	Each	23.24
18-783	Add to item 18-751 to 18-753, 18-766 to 18-769 or 18-779 if removal only.	Each	38.74
18-784	Add to item 18-754 to 18-755, 18-770 to 18-773 or 18-780, if removal only.	Each	46.49
18-785	Add to item 18-756 to 18-761 or 18-774 to 18-777 or 18-781, if removal only.	Each	77.47
	Male / Female Tee		
18-786	Male /Female Tee 20 mm x 15mm dia, for PE pipe, Supply and Fixing.	Each	196.27
18-787	Same as item 18-786, but 20 x 20 mm dia.	Each	202.39
18-788	Same as item 18-786, but 25 x 25 mm dia.	Each	248.91
18-789	Same as item 18-786, but 25 x 20 mm dia.	Each	245.24
18-790	Same as item 18-786, but 32 x 25 mm dia	Each	355.28
18-791	Same as item 18-786, but 32 x 20 mm dia	Each	352.83
18-792	Same as item 18-786, but 50 x 32 mm dia.	Each	688.29
18-793	Same as item 18-786, but 50 x 40 mm dia.	Each	881.73
18-794	Same as item 18-786, but 63 x 50 mm dia.	Each	1296.08
18-795	Same as item 18-786, but 90 x 75 mm dia.	Each	3193.75
18-796	Same as item 18-786 to 18-789, but fixing only	Each	30.99
18-797	Same as item 18-790 to 18-793, but fixing only.	Each	51.65
18-798	Same as item 18-794 to 18-795, but fixing only.	Each	61.99
18-799	Add to item 18-786 to18-789 or 18-796, if removal only.	Each	23.24

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SI No.	Description	Unit	Rate(Rs)
18-800	Add to item 18-790 to18-793 or 18-797, if removal only.	Each	38.74
18-801	Add to item 18-794 to18-795 or 18-798, if removal only. Bend	Each	46.49
18-802	Bend 20 mm dia for PE pipe, supply and fixing.	Each	161.46
18-803	Same as item 18-802, but 25 mm dia.	Each	201.86
18-804	Same as item 18-802, but 32 mm dia.	Each	292.46
18-805	Same as item 18-802, but 40 mm dia.	Each	570.22
18-806	Same as item 18-802, but 50 mm dia.	Each	843.24
18-807	Same as item 18-802, but 63 mm dia.	Each	1189.71
18-808	Same as item 18-802, but 75 mm dia.	Each	1787.71
18-809	Same as item 18-802, but 90 mm dia.	Each	2292.12
	Elbow		
18-810	Elbow, 110 mm dia, for PE pipe, Butt Fusion joint, supply and fixing.	Each	3489.49
18-811	Same as item 18-810, but 125 mm dia.	Each	3336.29
18-812	Same as item 18-810, but 160 mm dia.	Each	5396.79
18-813	Same as item 18-810, but 180 mm dia.	Each	6837.79
18-814	Same as item 18-810, but 200 mm dia.	Each	10099.32
18-815	Same as item 18-810, but 250 mm dia.	Each	22991.20
	Male / Female Bend	Υ/	
18-816	Male / Female Bend, 20 x 15 mm dia, for PE pipe, supply and fixing	Each	125.96
18-817	Same as item 18-816, but 20 x 20 mm dia	Each	130.85
18-818	Same as item 18-816, but 25 x 25 mm dia	Each	161.46
18-819	Same as item 18-816, but 25 x 20 mm dia	Each	159.01
18-820	Same as item 18-816, but 25 x 15 mm dia	Each	155.34
18-821	Same as item 18-816, but 32 x 20 mm dia	Each	251.90
18-822	Same as item 18-816, but 32 x 25 mm dia	Each	255.57
18-823	Same as item 18-816, but 40 x 32 mm dia	Each	457.58
18-824	Same as item 18-816, but 50 x 32 mm dia	Each	545.73
18-825	Same as item 18-816, but 50 x 40 mm dia	Each	691.96
18-826	Same as item 18-816, but 63 x 50 mm dia	Each	1006.61

SI No.	Description	Unit	Rate(Rs)
18-827	Same as item 18-816, but 90 x 75 mm dia	Each	2074.2
18-828	Same as item 18-802 to 18-804, 18-816 to 18-820, but fixing only.	Each	20.67
18-829	Same as item 18-805 to 18-807, 18-821 to 18-824, but fixing only.	Each	41.32
18-830	Same as item 18-808 to 18-810, 18-825 to 18-827, but fixing only.	Each	51.65
18-831	Same as item 18-811 to 18-815, but fixing only.	Each	72.31
18-832	Add to item 18-802 to 18-804, 18-816 to 18-820 or 18-828, if removal only.	Each	15.50
18-833	Add to item 18-805 to 18-807, 18-821 to 18-824 or 18-829, if removal only.	Each	30.99
18-834	Add to item 18-808 to 18-810, 18-825 to 18-827 or 18-830, if removal only.	Each	38.74
18-835	Add to item 18-811 to 18-815, or 18-831, if removal only.	Each	54.24
	Male Threaded Adapter		
18-836	Male Threaded adapter, 20 x 15 mm dia, for PE pipe, supply and fixing.	Each	106.89
18-837	Same as item 18-836, but 20 x 20 mm dia.	Each	109.34
18-838	Same as item 18-836, but 25 x 25 mm dia	Each	141.17
18-839	Same as item 18-836, but 25 x 20 mm dia.	Each	138.73
18-840	Same as item 18-836, but 25 x 15 mm dia	Each	155.72
18-841	Same as item 18-836, but 32 x 15 mm dia	Each	155.72
18-842	Same as item 18-836, but 32 x 20 mm dia	Each	186.33
18-843	Same as item 18-836, but 32 x 25 mm dia	Each	188.77
18-844	Same as item 18-836, but 40 x 25 mm dia	Each	343.04
18-845	Same as item 18-836, but 40 x 32 mm dia	Each	355.82
18-846	Same as item 18-836, but 40 x 40 mm dia	Each	331.33
18-847	Same as item 18-836, but 50 x 32 mm dia	Each	429.28
18-848	Same as item 18-836, but 50 x 40 mm dia	Each	453.76
18-849	Same as item 18-836, but 63 x 50 mm dia.	Each	639.86
18-850	Same as item 18-836, but 75 x 63 mm dia.	Each	931.24
18-851	Same as item 18-836, but 90 x 75 mm dia.	Each	1374.44
18-852	Same as item 18-836, but 110 x100 mm dia.	Each	3543.9

SI No.	Description	Unit	Rate(Rs)
	Female Threaded Adapter		
18-853	Female Threaded adapter, 20 x 15 mm dia, for PE pipe, supply and fixing.	Each	121.59
18-854	Same as item 18-853, but 20 x 20 mm dia.	Each	135.05
18-855	Same as item 18-853, but 25 x 25 mm dia	Each	159.54
18-856	Same as item 18-853, but 25 x 20 mm dia	Each	154.64
18-857	Same as item 18-853, but 25 x 15 mm dia	Each	171.63
18-858	Same as item 18-853, but 32 x 20 mm dia	Each	216.93
18-859	Same as item 18-853, but 32 x 25 mm dia	Each	220.61
18-860	Same as item 18-853, but 40 x 25 mm dia	Each	345.49
18-861	Same as item 18-853, but 40 x 32 mm dia	Each	358.27
18-862	Same as item 18-853, but 50 x 32 mm dia	Each	600.68
18-863	Same as item 18-853, but 50 x 40 mm dia	Each	604.35
18-864	Same as item 18-853, but 63 x 50 mm dia	Each	821.05
18-865	Same as item 18-853, but 75 x 63 mm dia	Each	1239.76
18-866	Same as item 18-853, but 90 x 75 mm dia	Each	1555.63
18-867	Same as item 18-836 to 18-839, 18-853 to 18-856, but fixing only	Each	30.99
18-868	Same as item 18-840 to 18-844, 18-857 to 18-860, but fixing only	Each	51.65
18-869	Same as item 18-845 to 18-852, 18-861 to 18-866, but fixing only	Each	61.99
18-870	Add to item 18-836 to 18-839, 18-853 to 18-856 or 18-867, if removal only.	Each	23.24
18-871	Add to item 18-840 to 18-844, 18-857 to 18-860 or 18-868 if removal only.	Each	38.74
18-872	Add to item 18-845 to 18-852, 18-861 to 18-866 or 18-869, if removal only.	Each	46,49
	End Cap		
18-873	End Cap 20 mm dia, for PE pipe , supply and fixing.	Each	97.80
18-874	Same as item 18-873, but 25 mm dia	Each	112.49
18-875	Same as item 18-873, but 32 mm dia	Each	157.79
18-876	Same as item 18-873, but 40 mm dia	Each	288.09
18-877	Same as item 18-873, but 50 mm dia	Each	483.98

SI No.	Description	Unit	Rate(Rs)
18-878	Same as item 18-873, but 63 mm dia	Each	640.69
18-879	Same as item 18-873, but 75 mm dia	Each	957.10
18-880	Same as item 18-873, but 90 mm dia	Each	1582.71
18-881	Same as item 18-873, but 110 mm dia	Each	2476.45
18-882	Same as item 18-873, but 125 mm dia Butt Fusion fitting	Each	2559.02
18-883	Same as item 18-882, but 160 mm dia	Each	3133.22
18-884	Same as item 18-882, but 180 mm dia	Each	3715.98
18-885	Same as item 18-873 to 18-875, but fixing only	Each	20.67
18-886	Same as item 18-876 to 18-878, but fixing only	Each	30.99
18-887	Same as item 18-879 to 18-881, but fixing only	Each	41.32
18-888	Same as item 18-882 to 18-884, but fixing only	Each	51.65
18-889	Add to item 18-873 to 18-875 or 18-885 if removal only.	Each	15.50
18-890	Add to item 18-876 to 18-878 or 18-886, if removal only.	Each	23.24
18-891	Add to item 18-879 to 18-881 or 18-887, if removal only.	Each	30.99
18-892	Add to item 18-882 to 18-884 or 18-888, if removal only.	Each	38.74
	PPR (Poly Propylene Random) - Pipes		
18-893	PPR pipe , with all fittings i.e. socket, bend, tee, elbow, where required, 20 mm dia, Class PN-20 (excl excavation), supply and fixing.	Metre	184.49
18-894	Same as item 18-893, but 25 mm dia	Metre	219.99
18-895	Same as item 18-893, but 32 mm dia	Metre	333.17
18-896	Same as item 18-893, but 40 mm dia	Metre	498.98
18-897	Same as item 18-893, but 50 mm dia	Metre	855.48
18-898	Same as item 18-893 but 63 mm dia	Metre	1253.23
18-899	Same as item 18-893, but 75 mm dia	Metre	2131.05
18-900	Same as item 18-893, but 90 mm dia	Metre	3281.90
18-901	Same as item 18-893, but 110 mm dia	Metre	4965.31
18-902	Same as item 18-893 to 18-895, but fixing only	Metre	51.65
18-903	Same as item 18-896 to 18-898, but fixing only	Metre	72.31

SI No.	Description	Unit	Rate(Rs)
18-904	Same as item 18-899 to 18-901, but fixing only	Metre	103.31
18-905	Add to item 18-893 to 18-895 or 18-902, if removal only.	Metre	38.74
18-906	Add to item 18-896 to 18-898 or 18-903, if removal only.	Metre	54.24
18-907	Add to item 18-899 to 18-901 or 18-904, if removal only.	Metre	77.47
	Coupler / Socket		
18-908	PPR Coupler / Socket, 20 mm dia, supply and fixing.	Each	51.27
18-909	Same as item 18-908, but 25 mm dia	Each	51.27
18-910	Same as item 18-908, but 32 mm dia	Each	63.52
18-911	Same as item 18-908, but 40 mm dia	Each	112.33
18-912	Same as item 18-908, but 50 mm dia	Each	195.58
18-913	Same as item 18-908, but 63 mm dia	Each	311.28
18-914	Same as item 18-908, but 75 mm dia	Each	786.23
18-915	Same as item 18-908, but 90 mm dia	Each	1274.73
18-916	Same as item 18-908, but 110 mm dia	Each	2194.18
	Reducing Coupler / Socket		
18-917	Reducing Coupler / Socket 25 x 20 mm dia, supply and fixing.	Each	52.81
18-918	Same as item 18-917, but 32 x 20 mm dia	Each	59.23
18-919	Same as item 18-917, but 32 x 25 mm dia.	Each	57.40
18-920	Same as item 18-917, but 40 x 20 mm, 40 x 25 mm or 40 x 32 mm dia.	Each	113.55
18-921	Same as item 18-917, but 50 x 25 mm, 50 x 32 mm or 50 x 40 mm dia.	Each	137.73
18-922	Same as item 18-917, but 63 x 25 mm dia	Each	245.78
18-923	Same as item 18-917, but 63 x 35 mm, 63 x 40 mm or 63 x 50 mm dia.	Each	270.19
18-924	Same as item 18-917, but 75 x 63 mm dia	Each	1031.09
18-925	Same as item 18-917, but 90 x 63 mm or 90 x 75mm dia	Each	1144.34
18-926	Same as item 18-917, but 110 x 90 mm dia	Each	1725.34

SI No.	Description	Unit	Rate(Rs)
18-927	Same as item 18-908 to 18-910, 18-917 to 18-919, but fixing only	Each	20.67
18-928	Same as item 18-911 to 18-913, 18-920 to 18-922, but fixing only	Each	41.32
18-929	Same as item 18-914 to 18-916, 18-923 to 18-926, but fixing only	Each	51.65
18-930	Add to item 18-908 to 18-910, 18-917 to 18-919 or 18-927, if removal only.	Each	15.50
18-931	Add to item 18-911 to 18-913, 18-920 to 18-922 or 18-928, if removal only.	Each	30.99
18-932	Add to item 18-914 to 18-916, 18-923 to 18-926 or 18-929, if removal only.	Each	38.74
	Tee Equal		
18-933	Tee Equal, 20 mm dia, for PPR pipe , supply and fixing.	Each	78.73
18-934	Same as item 18-933, but 25 mm dia	Each	86.08
18-935	Same as item 18-933, but 32 mm dia	Each	104.45
18-936	Same as item 18-933, but 40 mm dia	Each	186.33
18-937	Same as item 18-933, but 50 mm dia	Each	357.73
18-938	Same as item 18-933, but 63 mm dia	Each	731.14
18-939	Same as item 18-933, but 75 mm dia	Each	2326.94
18-940	Same as item 18-933, but 90 mm dia	Each	3918.53
18-941	Same as item 18-933, but 110 mm dia	Each	5326.48
	Reducing Tee		
18-942	Reducing Tee, 25mm x 20mm x 25mm dia, for PPR pipe , supply and fixing.	Each	101.69
18-943	Same as item 18-942, but 32x20x 32mm dia.	Each	120.97
18-944	Same as item 18-942, but 32x25x 32mm dia.	Each	159.54
18-945	Same as item 18-942, but 40 x 20 x 40 mm, 40 x 25 x 40 mm or 40 x 32 x 40 mm dia	Each	231.63
18-946	Same as item 18-942, but 50 x 25 x 50 mm, 50 x 32 x 50 mm or 50 x 40 x 50 mm dia.	Each	437.31
18-947	Same as item 18-942, but 63 x 25 x 63 mm dia	Each	499.06
18-948	Same as item 18-942, but 63 x 32 x 63 mm dia	Each	537.01

SI No.	Description	Unit	Rate(Rs)
18-949	Same as item 18-942, but 63 x 40 x 63 mm or 63 x 50 x 63 mm dia.	Each	679.03
18-950	Same as item 18-942 but 75 x 63 x 75 mm dia	Each	1898.44
18-951	Same as item 18-933 to 18-935, 18-942 to 18-944, but fixing only.	Each	30.99
18-952	Same as item 18-936 to 18-938, 18-945 to 18-946, but fixing only.	Each	51.65
18-953	Same as item 18-939 to 18-941, 18-947 to 18-950, but fixing only.	Each	61.99
18-954	Add to item 18-933 to 18-935, 18-942 to 18-944 or 18-951, if removal only.	Each	23.24
18-955	Add to item 18-936 to 18-938, 18-945 to 18-946 or 18-952 if removal only.	Each	38.74
18-956	Add to item 18-939 to 18-941, 18-947 to 18-950 or 18-953, if removal only.	Each	46.49
	Male Threaded - Tee		
18-957	Male Threaded Tee, 20 mm x 15 mm dia, for PPR pipe , supply and fixing	Each	352.37
18-958	Same as item 18-957, but 20 x 20 mm dia	Each	645.59
18-959	Same as item 18-957, but 25 x 15 mm dia	Each	398.28
18-960	Same as item 18-957, but 25 x 20 mm dia	Each	398.28
18-961	Same as item 18-957, but 32 x 20 mm dia	Each	480.16
18-962	Same as item 18-957, but 32 x 25 mm dia	Each	541.37
	Female Threaded - Tee		
18-963	Female Threaded Tee, 20 mm x 15 mm dia, for PPR pipe , supply and fixing.	Each	352.37
18-964	Same as item 18-963, but 20 x 20 mm dia	Each	496.22
18-965	Same as item 18-963, but 25 x 15 mm dia	Each	217.08
18-966	Same as item 18-963, but 25 x 20 mm dia	Each	281.97
18-967	Same as item 18-963, but 32 x 20 mm dia	Each	345.49
18-968	Same as item 18-963 but 32 x 25 mm dia	Each	541.37
18-969	Same as item 18-957 to18-960, 18-963 to 18-966, but fixing only.	Each	30.99

SI No.	Description	Unit	Rate(Rs)
18-970	Same as item 18-961 to18-962, 18-967 to 18-968, but fixing only	Each	51.65
18-971	Add to item 18-957 to18-960, 18-963 to 18-966 or 18-969, if removal only.	Each	23.24
18-972	Add to item 18-961 to18-962, 18-967 to 18-968 or 18-970, if removal only.	Each	38.74
	Elbow		
18-973	Elbow 20mm dia 90° for PPR pipe , supply and fixing.	Each	63.52
18-974	Same as item 18-973, but 25 mm dia	Each	53.72
18-975	Same as item 18-973, but 32 mm dia	Each	84.94
18-976	Same as item 18-973, but 40 mm dia	Each	151.51
18-977	Same as item 18-973, but 50 mm dia	Each	285.57
18-978	Same as item 18-973, but 63 mm dia	Each	413.51
18-979	Same as item 18-973, but 75 mm dia	Each	1337.17
18-980	Same as item 18-973, but 90 mm dia	Each	2866.32
18-981	Same as item 18-973, but 110 mm dia	Each	4973.34
18-982	Elbow, 20mm dia, 45°, for PPR pipe , supply and fixing	Each	65.66
18-983	Same as item 18-982, but 25 mm dia	Each	72.09
18-984	Same as item 18-982, but 32 mm dia	Each	104.22
18-985	Same as item 18-982, but 40 mm dia	Each	157.02
18-986	Same as item 18-982, but 50 mm dia	Each	506.55
18-987	Same as item 18-982, but 63 mm dia	Each	906.90
18-988	Same as item 18-982, but 75 mm dia	Each	1398.38
18-989	Same as item 18-982, but 90 mm dia	Each	2223.56
	Male Threaded - 90° Elbow		
18-990	Male Threaded 90° Elbow, 20 x 15 mm dia, for PPR pipe , supply and fixing	Each	241.04
18-991	Same as item 18-990, but 20 x 20 mm dia	Each	498.14
18-992	Same as item 18-990, but 25 x 15 mm dia	Each	230.02
18-993	Same as item 18-990, but 25 x 20 mm dia	Each	273.94
18-994	Same as item 18-990, but 32 x 20 mm dia	Each	390.25

SI No.	Description	Unit	Rate(Rs)
18-995	Same as item 18-990, but 32 x 25 mm dia	Each	453.91
	Female Threaded - 90° Elbow		
18-996	Female Threaded 90° Elbow, 20 x 15 mm dia, for PPR pipe, supply and fixing	Each	259.40
18-997	Same as item 18-996, but 20 x 20 mm dia	Each	396.53
18-998	Same as item 18-996, but 25 x 15 mm dia	Each	179.83
18-999	Same as item 18-996, but 25 x 20 mm dia	Each	243.33
18-1000	Same as item 18-996 but 32 x 20 mm dia	Each	341.27
18-1001	Same as item 18-996 but 32 x 25 mm dia	Each	445.34
18-1002	Same as item 18-973 to 18-975, 18-982 to 18-984, 18-990 to 18-992, or 18-996 to 18-998, but fixing only.	Each	20.67
18-1003	Same as item 18-976 to 18-978, 18-985 to 18-987, 18-993 to 18-995 or 18-999 to 18-1001, but fixing only.	Each	41.32
18-1004	Same as item 18-979 to 18-981 or 18-988 to 18-989, but fixing only	Each	51.65
18-1005	Add to item 18-973 to 18-975, 18-982 to 18-984, 18-990 to 18-992, 18-996 to 18-998 or 18-1002, if removal only.	Each	15.50
18-1006	Add to item 18-976 to 18-978, 18-985 to 18-987, 18-993 to 18-995,18-999 to 18-1001 or 18-1003, if removal only.	Each	30.99
18-1007	Add to item 18-979 to 18-981, 18-988 to 18-989 or 18-1004, if removal only.	Each	38.74
	Ball Tap With Handle		? ;/
18-1008	Ball Tap with handle, 20 mm dia, for PPR pipe , supply and fixing.	Each	938.89
18-1009	Same as item 18-1008, but 25 mm dia	Each	1214.36
18-1010	Same as item 18-1008, but 32 mm dia	Each	1948.94
18-1011	Same as item 18-1008, but 40 mm dia	Each	4326.37
18-1012	Same as item 18-1008, but 50 or 63 mm dia.	Each	4938.52

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SI No.	Description	Unit	Rate(Rs)
	Screw Tap With Handle		
18-1013	Screw tap with handle, 20 mm dia, for PPR pipe , supply and fixing.	Each	1816.71
18-1014	Same as item 18-1013, but 25 mm dia	Each	2772.89
18-1015	Same as item 18-1013, but 32 mm dia	Each	3770.70
18-1016	Same as item 18-1013, but 40 mm dia	Each	5463.74
18-1017	Same as item 18-1013, but 50 or 63 mm dia.	Each	6968.41
18-1018	Same as item 18-1008 to 18-1110 or 18-1013 to 18-1015, but fixing only	Each	20.67
18-1019	Same as item 18-1011 to 18-1012 or 18-1016 to 18-1017, but fixing only	Each	41.32
18-1020	Add to item 18-1008 to 18-1010, 18-1013 to 18-1015 or 18-1018, if removal only.	Each	15.50
18-1021	Add to item 18-1011 to 18-1012, 18-1016 to 18-1017 or 18-1019, if removal only.	Each	30.99
	Male Threaded - Adapter		
18-1022	Male Threaded adapter, 20 x 15 mm dia, for PPR pipe , supply and fixing	Each	275.23
18-1023	Same as item 18-1022, but 20 x 20 mm dia	Each	349.31
18-1024	Same as item 18-1022, but 25 x 15 mm dia	Each	251.36
18-1025	Same as item 18-1022, but 25 x 20 mm dia	Each	281.97
18-1026	Same as item 18-1022, but 32 x 20 mm dia	Each	803.68
18-1027	Same as item 18-1022, but 32 x 25 mm dia	Each	565.86
18-1028	Same as item 18-1022, but 40 x 32 mm dia	Each	1459.60
18-1029	Same as item 18-1022, but 50 x 40 mm dia	Each	1722.82
18-1030	Same as item 18-1022, but 63 x 50 mm dia	Each	2761.57
	Female Threaded - Adapter		
18-1031	Female Threaded adapter, 20 x 15 mm dia, for PPR pipe , supply and fixing	Each	284.23
18-1032	Same as item 18-1031, but 20 x 20 mm dia	Each	545.19
18-1033	Same as item 18-1031, but 25 x 15 mm dia	Each	184.02
18-1034	Same as item 18-1031, but 25 x 20 mm dia	Each	226.88

SI No.	Description	Unit	Rate(Rs)
18-1035	Same as item 18-1031, but 32 x 25 mm dia	Each	418.94
18-1036	Same as item 18-1031, but 40 x 32 mm dia	Each	1398.38
18-1037	Same as item 18-1031, but 50 x 40 mm dia	Each	1735.68
18-1038	Same as item 18-1031, but 63 x 50 mm dia	Each	2633.02
18-1039	Same as item 18-1031, but 75 x 63 mm dia	Each	8019.94
18-1040	Same as item 18-1022 to 18-1025, 18-1031 to 18-1034, but fixing only.	Each	30.99
18-1041	Same as item 18-1026 to 18-1029, 18-1035 to 18-1037, but fixing only.	Each	51.65
18-1042	Same as item 18-1030 or 18-1038 to 18-1039, but fixing only.	Each	61.99
18-1043	Add to item 18-1022 to 18-1025, 18-1031 to 18-1034 or 18-1040, if removal only.	Each	23.24
18-1044	Add to item 18-1026 to 18-1029, 18-1035 to 18-1037 or 18-1041, if removal only.	Each	38.74
18-1045	Add to item 18-1030, 18-1038 to 18-1039 or 18-1042, if removal only.	Each	46.49
18-1046	Cross piece , 20 mm dia, for PPR pipe , supply and fixing.	Each	223.20
18-1047	Same as item 18-1046, but 25 mm dia.	Each	185.25
	Shut Off Valve with Handle		
18-1048	Shut off valve with handle, 20 mm dia, for PPR pipe , supply and fixing.	Each	4879.22
18-1049	Same as item 18-1048, but 25 mm dia.	Each	5173.05
18-1050	Same as item 18-1046 to 18-1049, but fixing only.	Each	30.99
18-1051	Add to item 18-1046 to18-1049 or 18-1050, if removal only.	Each	23.24
	FRP – Fuel Pipe and Fittings		
18-1052	FRP pipe for fuel, laid in trench (excl cost of excavation) complete with jointing material as required, 100 mm dia (5 mm thickness), supply and fixing.	Metre	6113.54

SI No.	Description	Unit	Rate(Rs)
18-1053	Same as item 18-1052 but 150mm dia, (6mm thickness).	Metre	9344.47
18-1054	Same as item 18-1052 or 18-1053, but fixing only.	Metre	642.15
18-1055	Add to item 18-1052, 18-1053 or 18-1054, if removal only.	Metre	145.39
18-1056	Flange for FRP pipe 100 mm dia, (5mm thickness) with jointing material as required, supply and fixing.	Each	17754.19
18-1057	Same as item 18-1056, but for 150 mm dia pipe (6mm thickness).	Each	28017.49
18-1058	Same as item 18-1056 or 18-1057, but fixing only.	Each	4575.82
18-1059	Add to item18-1056, 18-1057 or 18-1058, if removal only.	Each	145.39
18-1060	Bend 900 for FRP pipe 100 mm dia (5mm thickness) with jointing material as required, supply and fixing.	Each	20282.06
18-1061	Same as item 18-1060, but for 150 mm dia (6mm thickness)	Each	29207.21
18-1062	Same as item 18-1060, but 450.	Each	15372.62
18-1063	Same as item 18-1061, but 450.	Each	20359.19
18-1064	Socket reducing for FRP pipe, 150 X 100 mm dia (7.5 mm thickness), with jointing material as required, supply and fixing.	Each	20651.80
18-1065	Same as item 18-1064, but 100 x 80 mm dia (7.5mm thickness).	Each	17844.48
18-1066	Same as item 18-1060 to 18-1065, but fixing only.	Each	9006.26
18-1067	Add to item 18-1060 to 18-1065 or 18-1066, if removal only.	Each	218.08
18-1068	Tee equal for FRP pipe, 100 mm dia (5mm thickness) with jointing material as required supply and fixing.	Each	25724.07
18-1069	Same as item 18-1068, but for 150 mm dia (6mm thickness).	Each	33611.01

Description	Unit	Rate(Rs)
Tee reducing, for FRP pipe, 100 x 100 x 80 mm dia, (5 mm thickness), with jointing material as required, supply and fixing.	Each	24616.08
Same as item 18-1070, but 150 x 150 x 100 mm dia, (6 mm thickness).	Each	28107.79
Same as item 18-1068 to 18-1071, but fixing only.	Each	13291.31
Add to item 18-1068 to 18-1071 or 18-1072, if removal only.	Each	218.08
	Description Tee reducing, for FRP pipe, 100 x 100 x 80 mm dia, (5 mm thickness), with jointing material as required, supply and fixing. Same as item 18-1070, but 150 x 150 x 100 mm dia, (6 mm thickness). Same as item 18-1068 to 18-1071, but fixing only. Add to item 18-1068 to 18-1071 or 18-1072, if removal only.	DescriptionUnitTee reducing, for FRP pipe, 100 x 100 x 80 mm dia, (5 mm thickness), with jointing material as required, supply and fixing.EachSame as item 18-1070, but 150 x 150 xEach100 mm dia, (6 mm thickness).Same as item 18-1068 to 18-1071, butEachSame as item 18-1068 to 18-1071 or Each18-1072, if removal only.

344

SECTION – 19

WATER SUPPLY INSTALLATION

SPECIFICATIONS

19.0. This section covers all operations for pumps, centrifugal, reciprocating, submersible, deep well turbines, tube well boring, development and sterilization. It also incl use of casing, blind pipes, strainer, and chlorinators with accessories. Engineer-in-Chief's Branch, Technical Instructions (Tube Well Installations) Volume–IV (Revised) 2001, shall be followed for guidance

MATERIAL REQUIREMENTS

19.1. Blind / Casing Pipes:- Shall be of MS / uPVC / Fibre Glass, as specified, approved by the Engineer-in-Chief Branch.

19.2. Strainers, Filter or screens:-Shall be of Brass / uPVC / Stainless steel / Fibre Glass as approved by the Engineer-in-Charge. Selection of filter may be based on structural strength, open area and well hydraulics.

19.3. Water Supply Pumping Sets:- Centrifugal pumping sets, Centrifugal deep well turbine and submersible pumps shall be standardized by the Engineer-in-Chief Branch.

19.4. Chlorinators (Foreign / Pak Make):-

19.4.1. Standard Chlorinators

19.4.1.1. Chlorinators shall be direct cylinder mounted with ejector, safety / check valves and other standard accessories / spare parts as per manufacturer's specification and as standardized by Engineer-in-Chief Branch.

19.4.1.2. All the standard accessories of the unit will be supplied as a part of equipment for installation and operation according to manufacturer's manual / specifications and to meet the site requirements.

19.4.1.3. The spares will be supplied according to the manufacturer's recommendations, if any. The rates of spares as well as accessories required for installation purpose will be considered free of cost to be supplied by the manufacturer.

19.4.2. **Hypo Chlorinator.** It is more efficient equipment with improved processes which is now in use. Limited brands of Hypo chlorinators are in the market. Hypo chlorinator Model - Series M-1200, Type M-1222, Solenoid Type, has been considered for this

Schedule. It operates on 220 / 240V, 50 cycles and is fitted with a diaphragm type of non corrosive material with standard suction and discharge tubing and injectors. The work shall also include the electric wiring with main control and fluid control valve on the feeding / suction line. Initially, 60Kg of Sodium Hypochlorite (NaOCI) and spare parts for maintenance period will be supplied as per the manufacturer's recommendations.

19.5. Chlorine Gas Cylinders:- Chlorine gas cylinder, bottle type, Manganese steel body, neck ring and valve cap fitted with chlorine gas valve, having fusible plug made according to the International / Pakistan Standard Specifications and as approved by the Engineer-in-Chief, with first filling of liquid Chlorine after hydraulic testing and obtaining NOC from the Department of Explosives.

CONSTRUCTION REQUIREMENTS

19.6. Tube Well boring is a highly specialized job. It must therefore be given to experts, equipped with specific technical skill and suitable equipment. Any of the following methods can be adopted for well-boring with the permission of the Engineer-in-Charge:-

19.6.1. **Hydraulic Drilling** may be under taken by employing the Straight / Reverse Rotary methods.

19.6.1.1. **Straight Rotary Drilling** shall be carried out in consolidated rocky formations, consisting fractured rocks, lime stone or hard clay and shale using special Bentonite Higel optimum mud solution and cognis powder (**imported**) mud / foam.

19.06.1.2. **Reverse Rotary Drilling**, shall be carried out in unconsolidated rock where formations mainly consist of sand & clay, using drilling mud / foam.

19.6.2. **Percussion Drilling** (in rare cases):- This type of drilling is limited upto certain depth in boulder formation.

19.7. Corresponding dia of blind pipes for different dia of bore holes shall be as given in Table 19-1.

TABLE 19-1 DIA OF BLIND PIPES

CORRESPONDING TO DIFFERENT DIA OF BORE HOLES

Dia of bore hole (mm)	Dia of blind pipe (mm)
375	200
450	250
600	300

19.8. Thickness of gravel pack and Sanitary seal may vary from 80-125mm. Two gravel feed pipes shall be placed diagonally opposite outside the housing pipe and should protrude Sanitary seal by 1.524 M.

19.9. Yield of a **Trial bore** hole, in limited ground water areas is estimated using electrical logging, compressed air or suitable pumping system. Enlarging of trial bore may be allowed after satisfactory results.

19.10. Well Development:- Method of Well Development should correspond to characteristics of water bearing strata and well hydraulics.

19.11. Well Sterilization:- Sterilization of the bore is very important. It is recommended to use 50 Kg Bleaching powder from fresh stock. A solution is made in water and after 24 hrs; the same is poured into the well up to gravel pack. After 2 hrs, approx 500 gallon of fresh water shall be added. The entire bore is pumped out to waste after another 2 hrs.

METHOD OF MEASUREMENTS

19.12. Tube Well Measurement:-

19.12.1. Per linear metre length of work done in drilling, lowering pump housing casing, tube well casing and slotted casing, shrouding and provision of sanitary seal.

19.12.2. Unit rate per tube well for developing, testing and sterilization, installation of pump, and completing other "one job works" at each well site.

CLARIFICATION OF RATES

19.13. The rates inter alia, including particularly:-

19.13.1. The capacity and head of pumping sets shall be in accordance with the design requirements and paid under the Schedule item having the same range i.e for 0.021 cum (0.75 cusec) shall be paid under Schedule item, having range above 0.014 - 0.028 cum (0.5 - 1 cusec) without extra cost.

19.13.2. The pump setting shall also be in accordance with design requirement and be adjusted, if varies from relevant Schedule item.

19.13.3. The rates of centrifugal / reciprocating pumps, including the supply and installation of pump and motor mounted on common bed plate, (except PCC foundation).

19.13.4. The rate of turbine / submersible pumping set, including the supply and installation of pump and motor with shafts (less shafts with submersible) and column pipes.

19.13.5. The cost of motor starter/ motor control unit with turbine/ submersible pumping set only and the cost of wiring from starter to motor (less cable for submersible pump) will be paid separately.
19.13.6. Trial bore hole may be paid in both the conditions whether unsuccessful or converted into main bore hole depending upon the condition of trial bore.

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ITEM RATES

SI No.	Description	Unit	Rate (Rs)
	Centrifugal Pumping Set		
19-1	Centrifugal Pumping set, AC, electric motor driven, 400 volts, 3 phase, 50 cycles, 1 hp, mounted on a common channel base, total head 20/25 M , supply and fixing.	Each	27542.01
19-2	Same as item 19-1, but 2 hp motor, for 25/30 M head.	Each	36239.13
19-3	Centrifugal Pumping set, AC, electric motor driven, 220 /230 V, SP, 1 hp, 50 cycles, mounted on a common channel base, total head 20/25 M, supply and fixing.	Each	31061.87
19-4	Same as item 19-3, but with 1/2 hp motor for 10/15 M head.	Each	23869.11
19-5	Same as item 19-1, but fixing only.	Each	309.91
19-6	Same as item 19-2, but fixing only.	Each	516.51
19-7	Same as item 19-3, but fixing only.	Each	309.91
19-8	Same as item 19-4, but fixing only.	Each	309.91
19-9	Add to item 19-1 or 19-5, if removal only.	Each	232.42
19-10	Add to item 19-2 or 19-6, if removal only.	Each	387.38
19-11	Add to item 19-3 or 19-7, if removal only.	Each	232.42
19-12	Add to item 19-4 or 19-8, if removal only.	Each	232.42
19-13	Centrifugal Pumping set with A.C electric motor, 400V, 3 phase 5 HP, 50 cycles, motor and pump directly coupled and mounted on common bed plate/ channel base, duly aligned, head 10-13 M, Capacity 100 - 200 gpm, 1450 rpm, Complete, with anchoring bolts/nuts, supply and fixing.	Each	356669.20
19-14	Same as item 19-13, but capacity above 200 upto 300 gpm, head 11-15 M 10 HP.	Each	429698.69
19-15	Same as item 19-13, but capacity above 300 upto 550 gpm, head 12-17 M , 15 HP.	Each	505636.06
19-16	Same as item 19-13, but capacity 100 to 210 gpm, head 27-33M , 2850/2900 rpm, 15 HP.	Each	410751.89

SI No.	Description	Unit	Rate (Rs)
19-17	Same as item 19-16, but capacity 150 to 250 gpm, head 38 - 41 M , 15 HP.	Each	429698.85
19-18	Same as item 19-16, but capacity 300 gpm, head 35 M ,15 HP.	Each	486046.95
19-19	Same as item 19-13, but fixing only.	Each	826.40
19-20	Same as item 19-14, but fixing only.	Each	826.40
19-21	Same as item 19-15, but fixing only.	Each	1136.31
19-22	Same as item 19-16, but fixing only.	Each	929.71
19-23	Same as item 19-17, but fixing only.	Each	1136.31
19-24	Same as item 19-18, but fixing only.	Each	1342.91
19-25	Add to item 19-13 or 19-19, if removal only.	Each	619.80
19-26	Add to item 19-14 or 19-20, if removal only.	Each	619.80
19-27	Add to item 19-15 or 19-21, if removal only.	Each	852.22
19-28	Add to item 19-16 or 19-22, if removal only.	Each	697.28
19-29	Add to item 19-17 or 19-23, if removal only.	Each	852.22
19-30	Add to item 19-18 or 19-24, if removal only.	Each	1007.18
	Tube Well Boring		
19-31	In any soil, drilling bore hole, 375 mm dia, employing Reverse Rotary , Hydraulic method/Percussion method , bore upto 50 M depth, complete.	Metre	2448.60
19-32	Same as item 19-31, but 450 mm dia bore hole.	Metre	3060.75
19-33	Same as item 19-31, but 600 mm dia bore hole.	Metre	3672.90
19-34	In any soil, drilling bore hole, 375 mm dia, employing Reverse Rotary, Hydraulic method / Percussion method , bore more than 50M but upto 100 M depth, complete.	Metre	3495.38
19-35	Same as item 19-34, but 450 mm dia bore hole.	Metre	4285.05
19-36	Same as item 19-34, but 600 mm dia bore hole.	Metre	4897.20

SI No.	Description	Unit	Rate (Rs)
19-37	In any soil, drilling a bore hole 375 mm dia, employing Reverse Rotary , Hydraulic method/ Percussion method , bore more than 100 M but upto 150M depth complete.	Metre	3679.02
19-38	Same as item 19-37, but 450 mm dia bore hole.	Metre	4955.97
19-39	Same as item 19-37, but 600 mm dia bore hole.	Metre	6121.50
19-40	In any soil, drilling bore hole 375 mm dia, employing Reverse Rotary Hydraulic method / Percussion method , bore beyond 150 M depth, complete.	Metre	3856.55
19-41	Same as item 19-40, but 450 mm dia bore hole.	Metre	5242.45
19-42	Same as item 19-40, but 600 mm dia bore hole.	Metre	7049.52
19-43	In any soil, drilling Trial bore hole 150 mm dia, bore up to 50 M depth.	Metre	1836.45
19-44	Same as item 19-43, but bore above 50M and upto 100 M depth	Metre	2258.83
19-45	Same as item 19-43, but bore above 100 M and upto 150 M depth	Metre	2422.89
19-46	Same as item 19-43, but bore beyond 150 M depth.	Metre	2558.79
19-47	Supply and installation, MS Blind pipe 5.0 mm thick, 200mm dia with welding joints, complete.	Metre	4652.25
19-48	Same as item 19-47, but 250 mm dia and 5.5 mm thick.	Metre	6213.97
19-49	Same as item 19-47, but 300 mm dia and 6.35 mm thick.	Metre	7449.35
19-50	Supply and installation, Brass Slotted Strainer , 4.75 mm thick, 200 mm dia, with welding joints, complete.	Metre	21826.92
19-51	Same as item 19-50, but 250 mm dia	Metre	26619.75
19-52	Same as item 19-50, but 300 mm dia	Metre	37166.79

SI No.	Description	Unit	Rate (Rs)
19-53	Supply and installation, Stainless Steel strainer , 4.75 mm thick, 200 mm dia with welding joints, complete.	Metre	33815.08
19-54	Same as item 19-53, but 250 mm dia.	Metre	47252.51
19-55	Same as item 19-53, but 300 mm dia.	Metre	59524.95
19-56	Supply and installation of Bail Plug , 200 mm dia of approved specifications.	Each	8361.97
19-57	Same as item 19-56, but 250 mm dia	Each	11422.72
19-58	Same as item 19-56, but 300 mm dia	Each	14361.04
19-59	Supply and Pouring of Shrouding Gravel of requisite grade, in annular space between blind pipe/strainer and bore hole according to specifications for 200 mm dia blind pipe/strainer.	Metre	115.64
19-60	Same as item 19-59, but for 250 mm dia blind pipe/strainer.	Metre	156.22
19-61	Same as item 19-59, but for 300 mm dia blind pipe/strainer.	Metre	270.57
19-62	Provision of Sanitary Seal of approved design and specification for 200 mm dia blind pipe.	Metre	876.04
19-63	Same as item 19-62, but for 250 mm dia blind pipe.	Metre	1198.45
19-64	Same as item 19-62, but for 300 mm dia blind pipe.	Metre	2256.10
19-65	Develop, Test and Sterilize tube well in accordance with approved procedure, 200 mm dia	Each	88149.60
19-66	Same as item 19-65, but 250 mm dia.	Each	102841.20
19-67	Same as item 19-65, but 300 mm dia.	Each	117532.80
	Deep Well – Turbine / Pump		

SI No.	Description	Unit	Rate (Rs)
19-68	Pumping set Deep Well Turbine , hollow shaft, AC electric motor driven, 400 volts 3 phase, 50 cycles, complete with shafts, column pipes, motor and auto star delta starter, pump capacity 0.50-0.70 cusec , upto 46 M head, pump setting upto 18 M with electric motor, 15 hp, supply and fixing.	Each	1232870.10
19-69	Same as item 19-68, but pump capacity above 0.7 and upto 1.0 cusec at 46 M head, pump setting upto 18M, with 20 hp motor.	Each	1433655.30
19-70	Same as item 19-68, but pump capacity 1.0-1.25 cusec at 35-47 M head, pump setting upto 18 M with 30 hp motor.	Each	1603833.00
19-71	Same as item 19-68, but pump capacity above 1.0 cusec upto 1.5 cusec at 46 M head, pump setting upto 18 M with 30 hp motor.	Each	1754421.90
19-72	Same as item 19-68, but pump capacity above 0.5 cusec upto 0.75 cusec at 47-61 M head, pump setting upto 46 M , with motor 30 hp.	Each	1414678.65
19-73	Same as item 19- 68, but pump capacity upto 0.5-0.8 cusec at 60-78 M head, pump setting upto 46 M with 30 hp motor.	Each	1584856.35
19-74	Same as item 19-68, but pump capacity above 1.0 and upto 1.5 cusec, 63-92 M head, pump setting upto 46 M with motor 60 hp.	Each	2518385.10
19-75	Same as item 19-68, but pump capacity above 1.5 and upto 2.0 cusec, 40-62 M head, pump setting upto 46 M, with motor 50 hp	Each	2348819.55
19-76	Same as item 19-68, but pump capacity above 1.0 and upto 1.5 cusec, 47-70 M head, pump setting upto 46 M with motor 40 hp.	Each	2239856.85

SI No.	Description	Unit	Rate (Rs)
19-77	Same as item 19-68, but pump capacity above 0.80 and upto 1.0 cusec, 68-85 M head, pump setting upto 46 M with motor 30 hp.	Each	2018258.55
19-78	Same as item 19-68, but pump capacity above 2.0 and upto 2.25 cusec, 40-50 M head, pump setting upto 46 M with motor 60 hp.	Each	2358001.80
19-79	Same as item 19-68, but pump capacity above 2.0 and upto 2.25 cusec, 58-78 M head, pump setting up to 46 M with motor 100 hp.	Each	2853843.30
19-80	Same as item 19-68, but pump capacity above 0.75 and upto 1.0 cusec, 66-88 M head, pump setting upto 46 M with motor 40 hp.	Each	2169459.60
19-81	Same as item 19-68, but fixing only.	Each	2448.60
19-82	Same as item 19-69, but fixing only.	Each	3030.14
19-83	Same as item 19-70, but fixing only.	Each	3030.14
19-84	Same as item 19-71, but fixing only.	Each	3611.69
19-85	Same as item 19-72, but fixing only.	Each	3611.69
19-86	Same as item 19-73, but fixing only.	Each	3611.69
19-87	Same as item 19-74, but fixing only.	Each	3611.69
19-88	Same as item 19-75, but fixing only.	Each	4774.77
19-89	Same as item 18-76, but fixing only.	Each	3611.69
19-90	Same as item 19-77, but fixing only.	Each	3030.14
19-91	Same as item 19-78, but fixing only.	Each	4774.77
19-92	Same as item 19-79, but fixing only.	Each	3611.69
19-93	Same as item 19-80, but fixing only.	Each	3611.69
19-94	Add to item 19-68 or 19-81, if removal only.	Each	1836.45
19-95	Add to item 19-69 or 19-82, if removal only.	Each	2272.61
19-96	Add to item 19-70 or 19-83, if removal only.	Each	2272.61
19-97	Add to item 19-71 or 19-84, if removal only.	Each	2708.76
19-98	Add to item 19-72 or 19-85, if removal only.	Each	2272.61
19-99	Add to item 19-73 or 19-86, if removal only.	Each	2708.76
19-100	Add to item 19-74 or 19-87, if removal only.	Each	2708.76
19-101	Add to item 19-75 or 19-88, if removal only.	Each	3581.08

SI No.	Description	Unit	Rate (Rs)
19-102	Add to item 19-76 or 19-89, if removal only.	Each	2708.76
19-103	Add to item 19-77 or 19-90, if removal only.	Each	2272.61
19-104	Add to item 19-78 or 19-91, if removal only.	Each	3581.08
19-105	Add to item 19-79 or 19-92, if removal only.	Each	2708.76
19-106	Add to item 19-80 or 19-93, if removal only.	Each	2708.76
	Extra Column Pipe		
19-107	Extra column pipe, with motor shaft (3 M length each), complete with bearing sockets, threaded coupling shaft, sleeve and rubber bearing, complete set (125mm x 3mm x 25mm), supply and fixing.	Each	106694.07
19-108	Same as item 19-107, but size (150mm x 3mm x 30mm).	Each	126805.65
19-109	Same as item 19-107, but size (150mm x 3mm x 35mm).	Each	143191.68
19-110	Same as item 19-107, but size (175mm x 3mm x 35mm).	Each	169621.26
19-111	Same as item 19-107, but size (175mm x 3mm x 45mm).	Each	177367.40
19-112	Same as item 19-107, but fixing only.	Each	581.54
19-113	Same as item 19-108, but fixing only.	Each	581.54
19-114	Same as item 19-109, but fixing only.	Each	581.54
19-115	Same as item 19-110, but fixing only.	Each	872.31
19-116	Same as item 19-111, but fixing only.	Each	872.31
19-117	Add to item 19-107 or 19-112, if removal only.	Each	436.16
19-118	Add to item 19-108 or 19-113, if removal only.	Each	436.16
19-119	Add to item 19-109 or 19-114, if removal only.	Each	436.16
19-120	Add to item 19-110 or 19-115, if removal only.	Each	654.24
19-121	Add to item 19-111 or 19-116, if removal only.	Each	654.24
	Submersible Pump		
19-122	Pumping set submersible, with AC electric motor driven, 400 V, 3 phase, 50 cycles, complete with pump, motor, cable, column pipes, motor control unit, pump capacity 0.5 cusec upto 97 M head, pump setting 60M with 25 hp motor, 2900 rpm, supply and fixing.	Each	1729709.40

SI No.	Description	Unit	Rate (Rs)
19-123	Same as item 19-122, but pump capacity 0.5 cusec at 97-106 M head, pump setting 60M, with 30hp motor, 2900 rpm.	Each	1765610.78
19-124	Same as item 19-122, but pump capacity 1.0 cusec at 88-97 M head, pump setting 50M, with 50 hp motor, 2900 rpm.	Each	2192838.53
19-125	Same as item 19-122, but pump capacity 1.0 cusec at 97-105 M head, pump setting 60M with 60 hp motor, 2900 rpm.	Each	3117189.92
19-126	Same as item 19-122, but pump capacity 1.0 to 1.25 cusec, 96-110 M head, pump setting 60M, with 60hp motor, 2900 rpm.	Each	3420112.35
19-127	Same as item 19-122, but pump capacity 1.50 cusec and upto 88 M head, pump setting 60M with 75 hp motor, 2900 rpm.	Each	3048306.83
19-128	Same as item 19-122, but pump capacity 1.25-1.50 cusec at 95-105 M head, pump setting 60M with 75hp motor 2900 rpm.	Each	3133418.94
19-129	Same as item 19-122, but pump capacity 1.50 to 1.75 cusec at 88-102 M head, pump setting 60M with 75hp motor, 2900 rpm.	Each	3145657.65
19-130	Same as item 19-122, but pump capacity 1.75 cusec at 82-91 M head, pump setting 60M with 85hp motor 2900 rpm.	Each	2882403.77
19-131	Same as item 19-122, but fixing only.	Each	1867.06
19-132	Same as item 19-123, but fixing only.	Each	1867.06
19-133	Same as item 19-124, but fixing only.	Each	2012.44
19-134	Same as item 19-125, but fixing only.	Each	2012.44
19-135	Same as item 19-126, but fixing only.	Each	2012.44
19-136	Same as item 19-127, but fixing only.	Each	2157.83
19-137	Same as item 19-128, but fixing only.	Each	2157.83
19-138	Same as item 19-129, but fixing only.	Each	2448.60
19-139	Same as item 19-130, but fixing only.	Each	2448.60
19-140	Add to item 19-122 or 19-131, if removal only.	Each	1400.29
19-141	Add to item 19-123 or 19-132, if removal only.	Each	1400.29
19-142	Add to item 19-124 or 19-133, if removal only	Each	1509.33
19-143	Add to item 19-125 or 19-134, if removal only	Each	1509.33

SI No.	Description	Unit	Rate (Rs)
19-144	Add to item 19-126 or 19-135, if removal only	Each	1509.33
19-145	Add to item 19-127 or 19-136, if removal only	Each	1618.38
19-146	Add to item 19-128 or 19-137, if removal only	Each	1618.38
19-147	Add to item 19-129 or 19-138, if removal only	Each	1836.45
19-148	Add to item 19-130 or 19-139, if removal only	Each	1836.45
	Chlorinators		
19-149	Gas Chlorinator "Imported" direct cylinder mounted, all vacuum operated, max capacity 25-50 pounds per day (ppd), feed gas chlorination ratio 20:1, with all operational standard accessories, make Pennsylvania USA, Model 201-CI, supply and fixing.	Each	275674.10
19-150	Same as item 19-149, but Model 481-CI	Each	159365.60
19-151	Same as item 19-149, but fixing only.	Each	206.60
19-152	Same as item 19-150, but fixing only.	Each	206.60
19-153	Add to item 19-149 or 19-151, if removal only.	Each	154.95
19-154	Add to item 19-150 or 19-152, if removal only.	Each	154.95
19-155	Multistage Centrifugal mono-block chlorinator, booster pumping set, size 40 mm x 32 mm dia suction /delivery (Pak made) having gunmetal impellers, stainless steel shaft, stuffing box, fitted to 3hp 380/400 V, 50 cycles, 3 phase, AC electric motor on common shaft, capacity 15 gpm at 41 M total discharge head, supply and fixing.	Each	58774.05
19-156	Same as item 19-155, but motor capacity 5 hp	Each	74445.09
19-157	Same as item 19-155, but fixing only.	Each	619.80
19-158	Same as item 19-156, but fixing only.	Each	619.80
19-159	Add to item 19-155, 19-156, 19-157 or 19-158, if removal only.	Each	4 <mark>6</mark> 4.85
19-160	Gas Chlorinator direct cylinder mounted, Model F-500 (Pak made) , all vacuum operated, capacity upto 100 ppd, feed ratio 20:1, with all operational standard accessories complete, supply and fixing.	Each	86642.18
19-161	Same as item 19-160, but Model F-230	Each	64604.78

SI No.	Description	Unit	Rate (Rs)
19-162	Gas Chlorinator cylinder mounted, Series, M-900 (Pak made) all vacuum operated, feed ratio 20:1, capacity and measuring range 4, 10, 25, 50 and 100 ppd, consisting of vacuum regulator with chlorine gas flow meter, rate valve, chlorine supply indicator and vent, manually adjustable flow rate, vent and vacuum tubing, vacuum ejector with diffuser and water back-flow check valve, complete all as specified, supply and fixing. Hypo-Chlorinator, Pak made, Series M-1200, The M 1000 Colemaid tax back-flow	Each	69991.70 95097.50
	Type IV-1222, Solenoid type naving reeding capacity 20 gpd at 150 psi fitted with flow rate control knob manually adjustable 0-100%, operated at 220 / 240V, 50 Hz, diaphragm type of non corrosive material with standard suction/discharge tubing, injector, pressure auto relief valve, anti siphon valve, solution storage tank of 50 gal capacity PE/PVC with stand duly painted as specified, supply and fixing.		
19-164	Same as item 19-160 or 19-161, but fixing only.	Each	206.60
19-165	Same as item 19-162, but fixing only.	Each	206.60
19-166	Same as item 19-163, but fixing only	Each	826.40
19-167	Add to item 19-160, 19-161, 19-162, 19-164 or 19-165 if removal only.	Each	154.95
19-168	Add to item 19-163 or 19-166, if removal only.	Each	413.20
	Chlorine Gas Cylinder		1
19-169	Chlorine Gas cylinder, Imported Approved Type 68 kg capacity, bottle type, with first filling of liquid chlorine after Hydraulic testing, supply and fixing.	Each	81446.56
19-170	Same as item 19 - 169 but fixing only.	Each	30.61
19-171	Add to item 19-169 or 19-170, if removal only.	Each	22.96
	Reciprocating Pump		
19-172	Reciprocating pump (donkey pump) 1450 rpm, driven with single phase electric motor 1/2 hp, mounted on frame and fixed complete (except electric motor) head 15-40 M, discharge 34-29 lit/min , supply and fixing.	Each	6840.78

SI No.	Description	Unit	Rate (Rs)
19-173	Same as item 19-172, but heavy duty driven by electric motor 2 hp, SP (except electric motor) head 30-70 M, discharge 50-39 lit/min .	Each	20308.08
19-174	Same items as 19-172 or 19-173, but fixing only.	Each	474.42
19-175	Add to item 19-172, 19-173 or 19-174, if removal only. Motor Electric	Each	355.82
19-176	Motor electric, single phase, 220V, 1/2 hp. 1425 /1450 rpm, supply and fixing.	Each	8918.27
19-177	Same as item 19-176, but 2 hp, SP.	Each	19202.39
19-178	Same as item 19-176 or 19-177, but fixing only.	Each	103.31
19-179	Add to item 19-176, 19-177 or 19-178, if removal only. Sluice Valve – Oil Quality	Each	77.47
19-180	Cast Steel Gate/Sluice valve, flanged and drilled to BS, Table 18-1-9, rising stem, oil quality, Class-150 lbs complete with packing sheet, 25 mm dia, supply and fixing.	Each	14685.17
19-181	Same as item 19-180, but 40 mm dia.	Each	16762.81
19-182	Same as item 19-180, but 50 mm dia.	Each	17908.75
19-183	Same as item 19-180, but 62 mm dia.	Each	23777.29
19-184	Same as item 19-180, but 75/80 mm dia.	Each	29164.21
19-185	Same as item 19-180, but 100 mm dia.	Each	36220.92
19-186	Same as item 19-180, but 150 mm dia.	Each	49964.91
19-187	Same as item 19-180 to 19-182, but fixing only	Each	289.85
19-188	Same as item 19-183 to 19-184, but fixing only	Each	393.16
19-189	Same as item 19-185 to 19-186, but fixing only	Each	975.77
19-190	Add to item 19-180 to 19-182 or 19-187, if removal only.	Each	154.95
19-191	Add to items 19-183 to 19-184 or 19-188, if removal only.	Each	232.42
19-192	Add to items 19-185 to 19-186 or 19-189, if removal only.	Each	436.16
	Disinfection of Water Pipe Line		

SI No.	Description	Unit	Rate (Rs)
19-193	Disinfection of water pipe line, 25 mm dia with mixture of clear water and liquid Chlorine, as specified in Para 18.2.9.	Metre	6.05
19-194	Same as item 19-193, but 40 mm dia.	Metre	6.91
19-195	Same as item 19-193, but 50 mm dia.	Metre	7.69
19-196	Same as item 19-193, but 65 mm dia.	Metre	9.19
19-197	Same as item 19-193, but 80 mm dia.	Metre	11.09
19-198	Same as item 19-193, but 100 mm dia.	Metre	14.23
19-199	Same as item 19-193, but 150 mm dia.	Metre	25.12
19-200	Same as item 19-193, but 200 mm dia.	Metre	40.39
19-201	Same as item 19-193, but 250 mm dia.	Metre	60.00
19-202	Same as item 19-193, but 300 mm dia.	Metre	83.99
	Mono Block Pumping Set		
19-203	Mono Block Pumping Set (cast iron body) single Phase, electric motor with copper winding, 1/2 HP, max suction 6M, head 8-20 Meter, discharge 55-20 Lit/Min, supply and fixing.	Each	9044.52
19-204	Same as item 19-203, but 1 HP, Max section 6 M, Head 10-24 and discharge 70-25 Ltr/Min.	Each	10758.54
19-205	Same as item 19-203, 19-204 but fixing only.	Each	474.42
19-206	Add to Item 19-203, 19-204 or 19-205, if removal only.	Each	355.82

SECTION – 20 SOIL WASTE AND VENTILATION (SWV) PIPES / FIXTURES

SPECIFICATIONS

20.0. This section consists of all operations for Soil, Waste, and Ventilation (SWV). CI Spun and uPVC (non pressure type, like Nikasi etc) pipes have been discussed.

MATERIAL REQUIREMENTS

20.1. CI – (Soil, Waste and Ventilation) Pipes:- Pipes to be spun (Centrifugally casted) conforming to BS No. 416

20.1.1. Weights of CI Spun Pipes and fittings are given in Table 20-1 and 20-2:-

Dia Nominal mm	Wall Thickness mm	Weight in Kg	Pipe's Length (M)	
50 mm	5 mm	10.5 Kg	1.83	
75 mm	5 mm	🕨 15 Kg	1.83	
100 mm	5 mm	20 Kg	1.83	
150 mm	5 mm	34 Kg	1.83	

TABLE 20-1 CL Pipes - Spun

Note: - Tolerance in weight \pm 5%.

TABLE 20-2 CI FITTINGS (SPUN)

		Weight (Kg)			
S.No	Description of Fittings	50 mm Dia	75 mm Dia	100 mm Dia	150 mm Dia
1	Plain Bend 90°	2.3	4.0	6.75	14.8
2	Plug Bend 90°	2.7	4.8	7.80	16.5
3	Plain Tee 90°	3.2	5.7	9.40	18.5
4	Plug Tee 90°	3.7	6.6	10.80	22.0
5	Off-set Bend	2.5	6.0	8.00	
6	Plain Yee Tee Single 90°	4.8	7.0	10.30	28.5
7	Plug Yee Tee Single 90°	5.8	7.5	11.50	-
8	Double Branch (Yee Tee Double)	-	11.5	16.00	33.0
9	Collar (Single Socket)	1.5	2.2	2.80	8.0
10	Collar (Double Socket)	2.5	2.9	4.70	9.0
11	Plain Cross Tee	5.0	7.5	10.00	20
12	Cowel (Over Vent Pipe)	1.0	1.5	2.00	4.0
13	Gully Trap (6" x 6" x 4")	-	-	9.00	-
14	Gully Trap (9" x 9" x 4")	-	-	20.00	-
15	P-Trap	4.1	5.9	8.60	-

Note:- Tolerance in weight ± 5%

20.2. Inlet Ventilators:-

20.2.1. Inlet ventilators for drain ventilation will be valve inlet type of Galvanized Iron (GI) with Mica valve, to be fixed to vertical or horizontal pipes with run lead or lead wool joints.

20.2.2. In minor repairs, if a length of piping to be renewed is necessarily cut to lengths other than standard lengths, an allowance will be made for each cut. In such case, if piping is supplied by the Contractor, 600mm run "supplied and fixed" will be added to the net measured length to allow for cutting and waste.

20.2.3. If CI pipes and fittings are ordered to be supplied "uncoated" a deduction of 5 % from "Supplied only rates, Section-28" is to be made. If pipes and fittings are ordered to be supplied galvanized in lieu of being coated with Dr. Angus Smith's composition, an additional 33 ¹/₃ percent of the "Supply only" rate will be made.

20.3. uPVC Pipes (Non Pressure types like Nikasi etc):- uPVC Soil, Waste and Ventilation (SWV) system is made of un-Plasticized Polyvinyl Chloride compound (uPVC). These pipes and fittings conform to ISO 3633 and EN 1329 and available in 50, 75, 110 and 160mm outside dia in standard length of 3 and 4M. The dimensions and thickness of the pipes are given in Table 20 - 3.

	•		
Nominal Size	Nominal Outside	Wall Thick	ness (mm)
mm	mm Dia (d _n)	min	max
50	50	3.0	3.5
75	75	3.0	3.5
110	110	3.2	3.8
160	160	3.2	3.8

TABLE 20 - 3

uPVC Pipe Dimensions

CONSTRUCTION REQUIREMENTS

20.4. Provision and laying CI - SWV Pipes:-

20.4.1. Pipes without ears will be secured with holder-bats let into walls and pinned and those with ears will be secured to walls with strong galvanised wrought iron pipe nails, passing 75mm into wall through distance place, all as described below:

20.4.2. Pipes to be socket jointed, with or without ears for fixing as ordered and coated, inside and outside with Dr. Angus Smith's composition before leaving the manufacturer's works.

20.4.3. Pipes to be blocked-out from walls at least 25mm and securely fixed by means of clamps or by standard pattern malleable CI Lewis ended holder-bats let into walls, the two portions of the holder-bats to be secured with gunmetal bolts and nuts, pipe needs to be of stout WI and after allowing for thickness, of distance pieces to run not less than 75mm into the wall.

20.4.4. All pipes and connections to be jointed with molten lead well caulked. Joints in inverted and difficult positions, however, may be made with Lead wool, well caulked. Access doors to be jointed with oil dressed leather and secured with gunmetal set screws

20.5. Jointing Techniques uPVC - SWV System (Non Pressure):-

20.5.1. **Solvent Cement Jointing:** For jointing pipe to pipe or pipe to fitting with the Solvent Cement, both parts that are to be jointed must be dry and clean. Chamfer the pipe end and remove any dust or grease from both sides. Apply Solvent Cement using a paint brush on both the outside of spigot end and the inside of the socket, then insert the spigot end fully into the socket edge with a panel or felt tip pen on the pipe. Remove excess Solvent Cement with dry cloth. The joint may be tested / commissioned after 24 hours.

20.5.2. **Rubber Ring Push fit Jointing:-** Clean pipe's spigot end from the outside and the sealing groove of the fitting from inside. Insert rubber ring into the socket end of the pipe / fitting. To avoid dislocation during / after jointing (pipe to fitting or pipe to pipe), always ensure that the rubber ring is fixed in the right direction. Apply the lubricant (soap solution) uniformly to the spigot end and sealing ring. Push the spigot end into the socket containing sealing ring, until fully home. Prior to insertion, mark the position of the socket edge on the pipe with a pencil or felt-tip pen and withdraw the pipe from socket by approx 10mm to allow for thermal expansion.

METHOD OF MEASUREMENTS

20.6. Pipe Works generally shall be Measured:-

- 20.6.1 Net overall length of pipes and fittings as fixed, except, where otherwise indicated.
- 20.6.2. Fittings shall be enumerated as described.
- 20.6.3. Fitting of unequal bores shall be classified according to the larger bore.

CLARIFICATION OF RATES

- 20.7. The rates, inter alia, incl particularly:-
 - 20.7.1. Fixing complete in long or short lengths, incl running joints in the length.
 - 20.7.2. Fittings like bends, double sockets and tee shall be paid separately.
 - 20.7.3. Fixing Soil Waste and Ventilation pipes.
 - 20.7.4. Distance pieces; supported or unsupported.
 - 20. 7.5. Making good surfaces disturbed.
 - 20.7.6. Cutting holes in walls, and roofs and making good.
- 20.8. The contractor shall provide Lead and gasket.

SI No Rates(Rs) Description Unit Soil, Waste and Ventilation (SWV) Pipes (CI – Sand Cast) 20-1 Supply and fix, 75mm dia bore CI, soil, 1530.46 Metre waste and vent (SWV) pipes as specified Same as item 20-1, but 100 mm bore. 20-2 Metre 1731.54 20-3 Same as item 20-1, but 150 mm bore. Metre 3594.81 20-4 Add to item 20-1, 20-2 and 20-3, if fixed Metre 79.58 in repairs. Supply and fix 75mm bore, CI, SWV 20-5 Metre 433.26 pipes, but except cost of pipes 20-6 Same as item 20-5, but 100 mm bore. Metre 508.46 Metre 20-7 Same as item 20-5, but 150 mm bore. 714.79 20-8 Add to item 20-5 or 20-6 or 20-7, if fixed Metre 79.58 in repairs. Fittings – (Sand Cast) Bends Supply and fix, 75 mm bore, CI, plain 20-9Each 1243.36 bends, joint filled with lead, as specified. 20-10 Same 20-9, but 100 mm bore. Each 1352.21 20-11 Same 20-9, but 150 mm bore. Each 3408.89 20-12 Supply and fix, 75mm bore, Cl, plain Each 672.02 bends, joints filled with lead, but except cost of bend, as specified. 20-13 Same as item 20-12, but 100 mm bore. Each 807.98 20-14 Same as item 20-12, but 150 mm bore. Each 1176.00 Supply and fix, 75 mm bore Cl, plug 20-15 Each 1389.11 **bends**, joint filled with lead, as specified. Same 20-15, but 100 mm bore. 20-16 Each 1641.67 Same 20-15, but 150 mm bore. 20-17 Fach 3863.63 Supply and fix, 75mm bore CI, Plug 20-18 672.02 Each bends, joints filled with lead, but except cost of bend as specified. 20-19 Same as item 20-18 but 100 mm bore. Each 807.98 20-20 Same as item 20-18 but 150 mm bore. Each 1176.01 Tees (Sand Cast) 20-21 Supply and fix, 75 mm bore, Cl. plain Each 2143.63 tee, joints filled with lead, as specified

Same as item 20-21, but 100 mm bore.

Each

2559.25

20-22

ITEM RATES

SI No	Description	Unit	Rates(Rs)
20-23	Same as item 20-21, but 150 mm bore.	Each	5430.24
20-24	Supply and fix, 75 mm bore, CI, plug tee , joints filled with lead, as specified.	Each	2295.21
20-25	Same as item 20-24, but 100 mm bore.	Each	2710.83
20-26	Same as item 20-24, but 150 mm bore.	Each	5785.87
20-27	Supply and fix, 75mm bore, CI, Yee tee , joints filled with lead as specified.	Each	2371.01
20-28	Same as item 20-27, but 100 mm bore.	Each	2899.73
20-29	Same as item 20-27, but 150 mm bore.	Each	6013.24
20-30	Supply and fix 75mm bore CI , plain , plug and Yee tee , joints filled with lead but expect cost of plain, plug and Yee tee as specified.	Each	1309.94
20-31	Same as item 20-30, but 100 mm bore.	Each	1573.98
20-32	Same as item 20-30, but 150 mm bore.	Each	2299.53
	Reduced Fittings (Sand Cast)		
20-33	Supply and fix, 100 mm x 50 mm bore CI reducer socket, joints filled with lead, as specified.	Each	1527.40
20-34	Supply and fix, 100 mm x 75 mm bore CI reducer socket, joints filled with lead, as specified.	Each	1604.36
20-35	Supply and fix, 100mm x 50mm/75mm bore, CI reducer socket, joints filled with lead, but except cost of reducer socket to item 20-33 and 20-34, as specified.	Each	807.98
20-36	Supply and fix, 100mm x 50mm/ 75mm bore, CI reducer plain tee, joints filled with lead, as specified.	Each	2295.21
20-37	Supply and fix, 100mm x 50mm/75mm bore, CI reducer plug tee, joints filled with lead, as specified.	Each	2446.79
20-38	Supply and fix, 100 mm x 50mm/75mm bore, CI reducer plug tee, single tee, joints filled with lead, as specified.	Each	2749.95
20-39	Supply and fix, 100mm x 50mm/ 75mm bore, CI reducer tee, joints filled with	Each	1309.94

SI No	Description	Unit	Rates(Rs)
	lead, but except cost of reducer tee to item 20-36, 20-37 and 20-38, as specified.		
	Cowls (Sand Cast)		
20-40	Supply and fix, Vent Cowls , over out lets of down pipes, top of ventilating pipe etc, fixed complete, dome or balloon pattern, 75 mm bore.	Each	521.65
20-41	Same as item 20-40, but 100 mm bore.	Each	634.75
20-42	Same as item 20-40, but 150 mm bore.	Each	1961.66
20-43	Same as item 20-40 or 20-41 or 20-42, but fixing only.	Each	28.43
20-44	Same as item 20-40 to 20-43, if fixed in repairs.	Each	17.06
	Soil Waste and Ventilation, Pipes (CI – Spun)		
20-45	Supply and fix, 75mm bore, CI, SWV pipe, as specified.	Metre	1621.07
20-46	Same as item 20-45, but 100 mm bore.	Metre	1957.67
20-47	Same as item 20-45, but 150 mm bore.	Metre	3469.33
20-48	Add to item 20-45, 20-46 or 20-47, if fixed in repairs.	Metre	79.58
20-49	Supply and fixing 75mm bore, CI, SWV, pipe but except cost of pipes.	Metre	433.26
20-50	Same as item 20-49, but 100 mm bore.	Metre	508.46
20-51	Same as item 20-49, but 150 mm bore.	Metre	715.00
20-52	Same as item 20-49, 20-50 or 20-51, if fixed in repair.	Metre	79.58
	Fittings – (CI-Spun) Bends		
20-53	Supply and fix, 75mm bore, CI , plain bend , joints filled with lead, as specified.	Each	1293.50
20-54	Same as item 20-53, but 100 mm bore.	Each	1690.64
20-55	Same as item 20-53, but 150 mm bore.	Each	3802.36
20-56	Supply and fix, 75mm bore, CI, plug bend , joints filled with lead, as specified.	Each	1460.24
20-57	Same as item 20-56 but 100mm bore.	Each	1810.74
20-58	Same as item 20-56 but 150mm bore.	Each	4278.73
20-59	Supply and fix, 75mm bore, CI plain	Each	672.02

SI No	Description	Unit	Rates(Rs)
	and plug bends , joints filled with lead, but except cost of plain and plug bends, as specified.		
20-60	Same as item 20-59, but 100mm bore.	Each	807.98
20-61	Same as item 20-59, but 150mm bore.	Each	1055.58
20-62	Supply and fix, 75mm bore, CI, plain tee , joints filled with lead, as specified.	Each	2192.60
20-63	Same as item 20-62, but 100 mm bore.	Each	2862.41
20-64	Same as item 20-62, but 150 mm bore.	Each	5402.25
20-65	Supply and fix, 75mm bore, CI, plug tee , joint, filled with lead, as specified.	Each	2312.70
20-66	Same as item 20-65, but 100mm bore.	Each	3005.83
20-67	Same as item 20-65, but 150mm bore.	Each	5880.31
20-68	Supply and fix, 75mm bore, CI, Yee tee , joint, filled with lead, as specified.	Each	2977.32
20-69	Same as item 20-68, but 100mm bore.	Each	3847.68
20-70	Same as item 20-68, but 150mm bore.	Each	7225.88
20-71	Supply and fix, 75mm bore, CI , plain tee , plug tee and Yee tee , joints filled with lead, but except cost of plain tee, plug tee and Yee tee.	Each	1309.94
20-72	Same as item 20-71, but 100 mm bore.	Each	1573.98
20-73	Same as item 20-71, but 150 mm bore.	Each	2299.53
	Reduced Fittings (CI – Spun)		
20-74	Supply and fix, 100mm x 50mm bore , CI reducer socket, joints filled with lead, as specified.	Each	1690.64
20-75	Supply and fix, 100mm x 75mm bore , CI reducer socket, joints filled with lead, as specified.	Each	1929.67
20-76	Supply and fix, 100mm x 50mm /75mm bore, CI reducer socket, joints filled with lead, but except cost of reducer socket to item 20-74 and 20-75, as specified.	Each	807.98
20-77	Supply and fix, 100mm x 50mm/ 75mm bore, CI reducer plain tee, joints filled with lead, as specified.	Each	2598.37

SI No	Description	Unit	Rates(Rs)
20-78	Supply and fix, 100mm x 50mm/75mm bore, CI reducer plug tee, joints filled with lead, as specified.	Each	2741.79
20-79	Supply and fix, 100mm x 50mm/ 75mm bore, CI reducer plain, Yee tee, joints filled with lead, as specified.	Each	2884.04
20-80	Supply and fix, 100mm x 50mm / 75mm bore, CI reducer tee, joints filled with lead, but except cost of reducer tee to item 20-77, 20-78 and 20-79, as specified.	Each	1309.94
	Cowls – (Cl – Spun)		
20-81	Supply and fix, Vent guard / Cowl over out let of down pipes or top of ventilating pipes etc, fixed complete, dome or balloon pattern, 75 mm bore.	Each	576.45
20-82	Same as item 20-81, but 100 mm bore	Each	672.06
20-83	Same as item 20-81 or 20-82, but fixing only.	Each	28.43
20-84	Same as item 20-81 to 20-83, if fixed in repair.	Each	17.06
	uPVS – Soil and Waste Pipes		
20-85	Supply and fix, u-PVC Soil and waste pipe 50mm dia complete with Z joint and rubber ring, all as specified.	Metre	392.39
20-86	Same as item 20-85 but 75 mm dia.	Metre	593.33
20-87	Same as item 20-85 but 110 mm dia	Metre	845.93
20-88	Same as item 20-85 but 160 mm dia	Metre	1440.95
20-89	Supply and fix, u-PVC, Soil and waste pipe 50mm dia complete, with plain end and solvent cement joint as specified.	Metre	453.31
20-90	Same as item 20-89, but 75 mm dia	Metre	720.83
20-91	Same as item 20-89, but 110 mm dia	Metre	1045.30
20-92	Same as item 20-89, but 160 mm dia	Metre	2285.11
	uPVC – Vent Pipes		

SOIL WASTE AND VENTILATION (SWV) - PIPES / FIXTURES

SI No	Description	Unit	Rates(Rs)
20-93	Supply and fix, u-PVC, Vent pipe 50mm dia complete, with Z joint and rubber ring, all as specified.	Metre	220.99
20-94	Same as item 20-93 but 75 mm dia	Metre	320.31
20-95	Same as item 20-93, but 110 mm dia	Metre	545.73
20-96	Supply and fix, u-PVC, Vent pipe 50mm dia complete, with plain end and solvent cement joint, all as specified.	Metre	281.91
20-97	Same as item 20-96, but 75 mm dia	Metre	447.81
20-98	Same as item 20-96, but 110 mm dia	Metre	922.87
20-99	Same as item 20-85,20-89,20-93 and 20-96, but fixing only 50 mm dia	Metre	31.22
20-100	Same as item 20-86,20-90,20-94 and 20-97, but fixing only 75 mm dia	Metre	37.50
20-101	Same as item 20-87, 20-91, 20-95 and 20-98, but fixing only, 110 mm dia	Metre	44.99
20-102	Same as item 20-88 and 20-92, but fixing only, 160mm dia	Metre	56.17
20-103	Add to item 20-85, 20-89, 20-93 and 20- 96, if fixed in repair, 50 mm dia	Metre	18.74
20-104	Add to item 20-86, 20-90, 20-94 and 20- 97 if fixed in repair, 75 mm dia	Metre	22.50
20-105	Add to item 20-87, 20-91, 20-95 and 20-98, if fixed in repair, 110 mm dia	Metre	27.01
20-106	Add to item 20-88 and 20-92, if fixed in repair, 160 mm dia	Metre	33.72
	Fittings (uPVC)		
20-107	Supply and fix, 50mm dia, uPVC Elbow/bend, 90°, complete with Z joint and rubber ring, all as specified.	Each	175.69
20-108	Same as item 20-107, but 75 mm dia.	Each	393.77
20-109	Same as item 20-107, but 110 mm dia.	Each	1034.23
20-110	Same as item 20-107, but 160 mm dia.	Each	2240.32

SOIL WASTE AND VENTILATION (SWV) - PIPES / FIXTURES

SI No	Description	Unit	Rates(Rs)
20-111	Supply and fix, 50mm, uPVC Elbow/bend, 45° , complete with Z joint and rubber ring, all as specified.	Each	163.44
20-112	Same as item 20-111, but 75 mm dia.	Each	326.44
20-113	Same as item 20-111, but 110 mm dia.	Each	884.86
20-114	Same as item 20-111, but 160 mm dia.	Each	2090.96
20-115	Supply and fix, 50mm dia, uPVC Elbow/bend, 90°, complete, with solvent cement joint, all as specified.	Each	174.17
20-116	Same as item 115, but 75 mm dia.	Each	382.92
20-117	Same as item 115, but 110 mm dia.	Each	707.39
20-118	Same as item 115, but 160 mm dia.	Each	2086.77
20-119	Supply and fix, 50mm, uPVC, Elbow/bend, 45° , complete with solvent cement joint, all as specified.	Each	143.56
20-120	Same as item 20-119, but 75mm dia.	Each	384.15
20-121	Same as item 20-119, but 110mm dia.	Each	638.83
20-122	Same as item 20-119, but 160mm dia.	Each	1304.44
20-123	Supply and fix, 50mm dia, Socket complete with Z joint and rubber ring, all as specified.	Each	167.12
20-124	Same as item 20-123, but 75 mm dia.	Each	219.92
20-125	Same as item 20-123, but 110 mm dia.	Each	480.84
20-126	Same as item 20-123, but 160 mm dia.	Each	1673.47
20-127	Supply and fix, 50mm dia, Socket complete with solvent cement joint, as specified.	Each	104.38
20-128	Same as item 20-127, but 75 mm dia.	Each	184.59
20-129	Same as item 20-127, but 110 mm dia.	Each	447.84
20-130	Same as item 20-127, but 160 mm dia.	Each	897.98
20-131	Supply and fix, Eccentric Reducer 50mm x 75mm dia, complete with solvent cement joint, all as specified.	Each	240.91
20-132	Supply and fix, Eccentric Reducer 50mm x 110mm dia, complete with solvent cement joint, all as specified.	Each	367.03

SI No	Description	Unit	Rates(Rs)
20-133	Supply and fix, Eccentric Reducer 75mm x 110mm dia, complete with	Each	403.76
20-134	Supply and fix, Eccentric Reducer 110mm x 160mm dia, complete with solvent cement joint, all as specified.	Each	1076.72
20-135	Supply and fix, uPVC, Equal Tee , 50mm dia, complete with Z joint and rubber ring, all as specified.	Each	319.54
20-136	Same as item 20-135, but 75mm dia	Each	678.57
20-137	Same as item 20-135, but 110mm dia.	Each	1369.38
20-138	Supply and fix uPVC Yee Tee , 50mm dia, complete with Z joint and rubber ring all as specified.	Each	299.95
20-139	Same as item 20-138, but 75 mm dia	Each	630.82
20-140	Same as item 20-138, but 110 mm dia	Each	1089.01
20-141	Same as item 20-138, but 160 mm dia	Each	3410.59
20-142	Supply and fix, uPVC, Equal Tee , 50mm dia, complete with solvent cement joint, all as specified.	Each	200.20
20-143	Same as item 20-142, but 75 mm dia.	Each	436.50
20-144	Same as item 20-142, but 110 mm dia.	Each	1043.80
20-145	Same as item 20-142, but 160 mm dia.	Each	2285.66
20-146	Supply and fix, uPVC, Access /door tee 75mm dia, complete with solvent cement joint, all as specified.	Each	628.71
20-147	Same as item 20-146, but 110 mm dia.	Each	3062.67
20-148	Supply and fix, uPVC, Yee tee, 50mm dia, complete with solvent cement joint, all as specified.	Each	292.02
20-149	Same as item 20-148, but 75 mm dia.	Each	503.84
20-150	Same as item 20-148, but 110 mm dia.	Each	641.01
20-151	Same as item 20-148, but 160 mm dia.	Each	2741.10
20-152	Supply and fix, uPVC, Reducer tee , 75 mm to 110mm dia, complete with Z joint and rubber ring, all as specified.	Each	1188.18
20-153	Supply and fix, uPVC, Reducer Yee tee,	Each	1035.15

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SI No	Description	Unit	Rates(Rs)
	75 mm x 110 mm dia, complete with Z joint and rubber ring, all as specified.		
20-154	Supply and fix, uPVC, Reducer, Yee tee, 110 mm x 160 mm dia, complete with Z joint and rubber ring, all as specified	Each	4652.95
20-155	Supply and fix, uPVC, Reducer tee , 75mm x 110mm dia, complete with solvent cement, all as specified.	Each	1185.82
20-156	Supply and fix, uPVC, Reducer tee , 110 mm x 160 mm dia, complete with solvent cement joint, all as specified.	Each	1999.17
20-157	Supply and fix, uPVC, Reducer Yee tee , 110 mm x 160 mm dia, complete with solvent cement joint, all as specified.	Each	2204.85
20-158	Supply and fix, uPVC, Reducer Yee tee , 75 mm x 110 mm dia, complete with solvent cement joint, all as specified.	Each	1173.58
20-159	Supply and fix, uPVC, Reducer Yee tee , 75 mm x 160 mm dia, complete with solvent cement joint, all as specified.	Each	3102.27
20-160	Fixing only 50mm dia, uPVC, bend elbow, socket, eccentric reducer etc.	Each	31.22
20-161	Same as item 20-160, but 75mm dia	Each	37.50
20-162	Same as item 20-160, but 110mm dia	Each	44.99
20-163	Same as item 20-160, but 160mm dia	Each	56.17
20-164	Same as item 20-160, but if fixed in repair.	Each	18.73
20-165	Same as item 20-161, but if fixed in repair.	Each	22.50
20-166	Same as item 20-162, but if fixed in repair.	Each	27.00
20-167	Same as item 20-163, but if fixed in repair.	Each	33.70
20-168	Fixing only, 50mm dia, uPVC, Equal tee, Yee tee, Reducer tee and tee etc.	Each	62.44
20-169	Same as item 20-168, but 75 mm dia.	Each	74.99
20-170	Same as item 20-168, but 110 mm dia.	Each	89.99
20-171	Same as item 20-168, but 160 mm dia.	Each	112.33
20-172	Same as item 20-168, but if fixed in repair.	Each	37.46
20-173	Same as item 20-169, but if fixed in repair.	Each	44.99
20-174	Same as item 20-170, but if fixed in repair.	Each	53,99

SI No	Description	Unit	Rates(Rs)
20-175	Same as item 20-171, but if fixed in repair.	Each	67.64
20-176	Supply and fix, uPVC, Vent Cowl 50mm dia on top of ventilating pipes.	Each	97.18
20-177	Supply and fix, uPVC, Vent Cowl 75mm dia, on top of ventilating pipes.	Each	120.45
20-178	Supply and fix, uPVC, Vent Cowl 110mm dia, on top of ventilating pipes.	Each	135.14
20-179	Same as item 20-176, 20-177 and 20-178, but fixing only.	Each	25.84
20-180	Same as item 20-176 to 20-179, if fixed in repair.	Each	15.51

SECTION - 21

DRAINAGE / SEWAGE

SPECIFICATIONS

21.0. This section consists of all operations related to drainage and sewage using RCC pipes (ASTM Specifications / BS), Manholes and Sludge pumps.

MATERIAL REQUIREMENTS

21.1. Reinforced Cement Concrete (RCC) Pipes:- The pipes shall be RCC obtained from approved manufacturers and shall conform to following Specifications-

21.1.1. **R.C.C. Pipes (BSS – 785 &1144):-** These shall conform to specifications given in Table 21-1 and details shown in Figure 21-1.

S.No	Internal Dia		Wall Thickness		Circ Reinfor	ular cement	Longitudinal Reinforcement on Respective Cage			
	mm	in	mm	in	Size of	No of	Size of	No of		
					Bars	Rings	mm	in	Bars	
1	100	4	25	1	10 SWG	11	5	3/16	6	
2	150	6	25	1	10 SWG	11	5	3/16	6	
3	230	9	25	1	3/16"	7	5	3/16	6	

TABLE 21-1 RCC Pipe Based on BSS – 785 &1144

Note:-

- i. One extra ring at both edges of the pipe for minimizing damage during handling.
- ii. Concrete strength must not be less than 3000 psi.
- iii. Standard length of pipe is 1.82 M (6'- 0").
- iv. Standard width of Collar for pipe internal dia 100-230mm is 150mm.
- v. Either Ring of specified gauge / size is provided or Spiral of specified gauge / size is used.



FIGURE 21-1

21.1.2. **R.C.C. Pipes (Based on ASTM C-76).** These shall conform to specifications given in Table 21-2 and details shown in Figure 21–2.

Table 21-2 Table 21-2 R.C.C Pipe Class II Wall "B" (4000 Psi) Based on ASTM C-76

	Internal Dia (D)		Wall Thickness (D)		Circular Reinforcement					Longitudinal Reinforcement on respective cage			
SNo					Size of Bars		No of Rings				No of Bars		
3 110							Inner Cage + Bell	Elliptical Cage	Outer Cage	Size of Bars	Inner Cage	Elliptical cage	Outer cage
	mm	Inch	mm	Inch	mm	Inch				mm			
1	300	12	51	2	5	3/16	21+3	-	-	5	5	-	-
2	375	15	57	2 1/4"	5	3/16	21+3	-	-	5	5	-	-
3	450	18	63	2 ½"	5	3/16	21+3	21	-	5	5	5	-
4	525	21	70	2 3⁄4"	5	3/16	21+3	21	-	5	6	5	-
5	600	24	76	3	5	3/16	21+3	21	-	5	6	6	-
6	675	27	82	3 ¼"	6	1/4	22	19	-	6	7	7	-
7	750	30	89	3 ½"	6	1/4	24	19	-	6	7	7	-
8	825	33	95	3 ¾"	6	1/4	27	21	-	6	7	7	-
9	900	36	101	4"	6	1/4	19	21	15	6	8	8	8
10	1050	42	115	4 1⁄2"	6	1/4	27	27	21	6	8	8	8
11	1200	48	127	5	6	1/4	32	32	26	6	8	8	8
12	1350	54	140	5 ½"	6	1/4	38	38	27	10	9	9	9
13	1500	60	152	6	6	1/4	48	48	32	10	9	9	9
14	1650	66	165	6 ½"	10	3/8	24	24	17	10	10	10	10
15	1800	72	178	7	10	3/8	27	27	19	10	10	10	10
16	1950	78	190	7 ½"	10	3/8	32	32	22	10	11	11	11
17	2100	84	203	8	10	3/8	38	38	25	10	11	11	11
18	2250	90	216	8 1⁄2"	10	3/8	38	43	27	10	12	12	12

Notes for TABLE 21-2:-

Bell and spigot joints will be used from 12" (300mm) dia to 24"(600mm) dia size with Rubber gaskets.

Tongue and Groove joint will be used from 27" (675 mm) Internal dia and above. li

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Grade 40 steel conforming to specifications A-615 be used. Refer Drg #. E-in-C Branch (DD&C) MISC /A/19-2004 Sheet No. Svcs / SEW – 1/3 Ιv



FIGURE 21-2

21.3. Galvanizing:- Galvanizing shall be a thorough even coat of zinc, free from stains bare spots or defects.

21.4. Wire Guards:- To be of stout wire, galvanized after manufacture, dome or balloon pattern as ordered, to be fixed over outlets of down pipes or tops of ventilating pipes.

21.5. Sludge Pumps:- These shall be of capacity and size as specified by the manufacturer's and will be approved by the Engineer-in-Charge, from the Engineer-in-Chief approved list:-

21.5.1. Horizontal Non Clogging Pumps.

- i. Capacity
 - (a) 250 to 275 gpm
 - (b) 0.5 Cusecs to 2.00 Cusecs
- ii. Head 6 M to 15 M
- iii. Trolley mounted (Mobile) and permanently installed.
- iv. The pumps are driven by diesel engine or electric motor
- v. The Pumps are useful for:-
 - (a) Activated sludge pumping stations.
 - (b) Storm water pumping stations.
 - (c) They are also useful for similar activity like disposal of industrial and chemical effluents and other industrial wastes.

21.5.2. Submersible Pumps for Fountains / Dewatering / Drainage, Non-clogging submersible pumps for Sludge / Sewage.

- i. For Sludge / Sewage
 - (a) Size upto 10"
 - (b) Capacity upto 1000 cum / hr (3750 gpm)
 - (c) Head 60 Ft. and above.
- ii. For Fountains / Dewatering / Drainage.
 - (a) Size upto 4"
 (b) Capacity upto 111 cum / hr (400 gpm)
 (c) Head upto 200 ft.
- iii. Pumps are of short, compact design as a result of the effective seal between the motor and the hydraulic section.
- iv. Built-in cooling system on all pumps. The back vanes of the impeller circulate cooling water around stator housing.
- Double Mechanical face seals provide necessary isolation between electric motor and the pumped liquid. The seal surfaces are made of extremely wear resistant materials.
- vi. The impeller in case of non-clogging pumps has a large through let allowing passage of large particles and thus reducing the risk of clogging.
- vii. Pumps are mainly used for pumping sewage, waste water and storm water in Municipal pumping stations.

- viii. Pump has a multi-vane open or semi-open impeller available in different materials i.e CI, Bronze and Stainless Steel etc. It is specially designed to handle media containing highly abrasive material such as clay, sand, drilling dust etc.
- ix. For installation of pumps piping and other work shall be paid under respective section.

CONSTRUCTION REQUIREMENTS

21.6. Laying of RCC Pipes:-

21.6.1. The pipes shall be laid according to the gradients required, in straight line manhole to manhole. The pipes shall rest on CC Type-B saddles, pre-cast/cast in situ at distances as directed. Any change in direction shall take place inside the manhole by the use of curved main half round channels; similar changes in internal dia of sewage pipes shall be made in manhole by the use of taper half round channels, straight or curved as necessary, and NOT by the use of tapers or bend in the sewage line outside the manhole.

21.6.2 Lay not more than 6 lengths of pipes to the required gradient, fill in the groove and end of each pipe jointed with rubber ring, spun or hemp yarn soaked in molten bitumen, jute chopped composition of soap. The hemp will be of a size sufficient to fill the groove while pressed. These six lengths of joints of pipes should be pressed tight by means of jack and the loose collars slide over the joints of two pipes and kept concentric by means of few wooden wedges. CM 1:1 is then pressed into the joints and edges finished off with a beveled joint. Laying and jointing will be carried out in sets of not more than 6 pipes each time.

21.6.3. When a flexible water tight joint with the use of rubber gasket is specified, the laying of pipes shall correspond to the respective ASTM Specification.

21.7. Concrete for Cover, Benching etc:- The concrete for benching and pre-cast covers, to manholes etc, is to be composed of one part of cement, two parts of sand and four parts of 19mm graded aggregate. The concrete in main and branch benching be trowelled upto a smooth hard face with steel trowel, adding additional cement as required. Benching to be brought upto an avg height of 250mm above main invert level, so as to ensure quick fall towards various channels.

21.8. Foundation Concrete:- Concrete in foundations under drains, manholes traps gullies etc, to be CC Type C or D (1:3:6 or 1:4:8) as may be ordered or shown on the drawings. The composition, mixing and laying to conform to conditions laid down in Section–3 (Concrete).

21.9. Foundation Beds to Drains:- The concrete beds to be 100mm thick under collars of pipes and 300mm wider than internal dia of the pipes. After the pipes are laid and tested, they are to be hunched with similar concrete. The hunching to extend from the edges of the foundation concrete to at least half way up the sides of the pipes and incl packing solid under the pipes.

21.10. Gullies:-

21.10.1. To be glazed-ware and set truly in level and jointed to drain pipes in CM (1:1). Gullies to be encased in CC Type C.

21.10.2. Cleaning eyes are to be provided to gullies, when the distance between the gully and the manhole exc 6M.

21.11. Interception Chambers:- To be as described for manholes, but to incl an intercepting trap of approved pattern, with cleaning arm, having an approved stopper fitted with a GI lever and chain complete. This strap be carefully bedded in concrete on the discharge side of the manhole and set, so as to ensure that the normal "drop" from inlet to outlet is preserved.

21.12. Laying Drains:- Every line of drain shall be accurately laid and be perfectly true to line and gradient from point to point. Every main drain shall be true in line from manhole to manhole and any change in direction shall take place inside the manhole by the use of taper channels, straight or curved as necessary and not by the use of tapers or bend in the line drain, outside the manhole.

21.13. Manholes:- Manholes will be designed according to the required depth and the number of sewage lines meeting at the point. These shall be constructed in the manner described below:-

- 21.13.1. Excavate in any soil, make good and dispose off surplus spoil.
- 21.13.2. Foundations shall be 150mm thick, projection of 150mm beyond outside of the walls and to be CC Type C.
- 21.13.3. Bolsters around manhole covers shall be 150mm x150 mm of CC Type B.
- 21.13.4. Benching shall be CC Type C with main and branch channels formed there-in rising 45 degrees from channel edges and all surfaces shall be trowelled smooth.
- 21.13.5. Cover slabs shall be of stone or concrete, bedded in CM.
 - i. Stone covers shall be 75mm thick of approved strong slab of self faced stone.
 - ii. CC Type B reinforced with 6mm round or square bars at 150mm centers both ways and surfaces and edges finished fair.
 - iii. CC of size and reinforced as shown in the drawings for special areas expected to take live loads.

21.13.6. Cover and frame will be bedded in mortar bolstered round with 150 mm x 150 mm, CC Type B.

21.13.7. Mortar shall be CM 1:3.

21.13.8. Walls shall be either of the following, as ordered or shown on the drawings:-

- i. Burnt brick work 230 mm thick, in CM 1:3.
- ii. Approved Rubble stone, 300 mm thick, in CM 1:3.
- iii. Solid Concrete blocks, 200 mm thick in CM 1:3.
- iv. Poured CC Type C, 230 mm thick.
- v. R.C.C Type B, 150 mm thick reinforced with 6 mm round bars, 150 mm center to center both ways.

21.13.9. Internal faces of walls shall be hacked for plaster key, cleaned dubbed out with mortar and rendered not less than 13 mm thick with CM 1:3.

21.13.10. If rock is encountered in excavation of the manholes, prior order of the Engineer-in-charge will be obtained before starting excavation. Extra payment for rock will be made under Section-1 "Excavation and Earth work" and the cost of excavation will be deducted at the avg rate of ordinary and hard soil rates.

21.14. Manhole Covers:- Internal dia of RCC/CI covers shall be as specified-

21.15. Testing:-

21.15.1. All new drains, manhole etc, will be tested before hunching with concrete and before the trenches are filled in, at the contractor's expense.

21.15.2. All drains are to be tested by filling with water having a head of not less than 0.6 M and not more than 1.8 M, above the top of the lowest pipe, in the length to be tested.

21.15.3. Manhole and branch drains discharging into manholes will be tested independently. All Vent pipes and Soil pipes will be tested by a Smoke Test.

21.15.4. The contractor will be responsible for any disturbance of the drains etc after they pass the test satisfactorily. After the drains are laid, give an interval of at least 48 hrs before testing, to allow sufficient time for joints to set,

21.15.5. For Smoke Testing, the smoke machine and necessary chemicals or smoke rockets shall be provided by the contractor. The Test will be carried out at the contractor's expense in a manner as directed by Engineer in Charge.

21.16. Damages etc:- The contractor will be responsible for any disturbance / damage to the sewage lines, even after the test, within the maintenance period.

METHOD OF MEASUREMENTS

21.17. Pipe work shall be measured:- Net overall length of pipes and fittings as fixed, except where otherwise indicated.

21.18. Manholes:- Internal plan area x height (as defined below).

21.18.1. Uniform area on plan:-

Height = From invert to top of manhole cover.

- 21.18.2. With shaft of reduced area:-
 - **Chamber height** = From invert to junction of shaft with chamber. Internal plan area of chamber
 - ii. **Shaft height** = From junction of shaft with chamber or top of manhole cover. Internal plan area of shaft.

21.18.3. The internal area of circular manhole shall be internal dia squared. In calculating internal area of shaft, ignore any corbelling out.

CLARIFICATION OF RATES

- 21.19. The rates, inter alia, incl particularly:-
 - 21.19.1. Fixing complete in long or short lengths, incl running joints in the length.
 - 21.19.2. Making good surface disturbed.
 - 21.19.3. Cutting hole in wall / roof and making good.
 - 21.19.4. Supply and installation of sludge pumps in any position.
ITEM RATES

SI No.	Description	Unit	Rate(Rs)
	RCC - Pipes (BS Specifications)		
21-1	Supply and fix, RCC pipes 100mm bore, laid and jointed with spigot socket or collars, as specified.	Metre	253.11
21-2	Same as item 21-1, but except cost of pipe, collars fittings.	Metre	75.58
21-3	Supply and fix, RCC pipes, 150mm bore, laid and jointed with spigot socket or collars, as specified.	Metre	682.73
21-4	Same as Item 21-3, but except cost of pipes, collars fittings.	Metre	113.72
21-5	Supply and fix, RCC pipes 230mm bore, laid and jointed with spigot socket or collars, as specified.	Metre	794.65
21-6	Same as Item 21-5, but except cost of pipes, collars fitting.	Metre	141.94
	R C C – Pipes (ASTM Specifications)		
21-7	Supply and fix, RCC pipes 300mm bore, laid and jointed with spigot socket or tongue and groove joint, incl rubber ring, as specified.	Metre	1594.46
21-8	Same as Item 21-7, but 375mm bore.	Metre	1902.12
21-9	Same as item 21-7, but 450mm bore.	Metre	2419.71
21-10	Same as item 21-7, but 525 mm bore	Metre	2869.54
21-11	Same as item 21-7, but 600 mm bore	Metre	3351.85
21-12	Same as item 21-7, but 675 mm bore	Metre	4542.78
21-13	Same as item 21-7, but 750 mm bore	Metre	5725.23
21-14	Same as item 21-7, but 825 mm bore	Metre	6238.10
21-15	Same as item 21-7, but 900 mm bore	Metre	7648.64
21-16	Same as item 21-7, but 1050 mm bore	Metre	8278.42
21-17	Same as item 21-7, but 1200 mm bore	Metre	9926.87

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SI No.	Description	Unit	Rate(Rs)
	Cleaning Eyes		
21-18	Extra over drains and fittings for surrounding, up turned junction in 450 x 450 x 600mm of CC Type 'C,' provide 450mm x 450mm x 75 mm CC Type 'C' or 65mm self face of cover stone, set and jointed in CM 1:3.	Each	699.62
	Surface Gullies		
21-19	Excavate, to dispose off surplus spoil on site, make good the surface disturbed, supply (230mm x 230mm x 100mm out let), surface gullies and bed, and surround in 100mm of CC Type 'C', provide 100mm x 125mm rounded CC Type 'C,' curb or 900mm x 900mm x100mm dished CC Type 'C', top and 250 x 250mm galvd Cl, loose grating, complete.	Each	1570.84
	Testing Drains		
21-20	Provide water and temporary apparatus, test drains till perfect testing using (600mm to 1800mm head).	Each	357.15
21-21	Provide water and temporary apparatus, test manholes, full depth of manholes, but not exc 1800mm.	Each	823.14
21-22	Provide apparatus, material, labour etc; and Smoke test till perfect testing of Soil Waste, Ventilating pipes and connecting drain to nearest manhole.	Each	511.02
21-23	Clearing drains by rodding and well flushing between manholes not.exc 30M	Each	1028.41
21-24	Same as item 21-23, but manholes exc 30 M and not exc 92 M	Each	1444.67
	Manholes		
21-25	Manholes, complete, rectangular or circular as described, not exc 600mm deep from invert to surface of cover, incl main channel, set in CM 1:1, 230 mm thick brick walls (except manhole cover).	Cum	26180.20

SI No.	Description	Unit	Rate(Rs)
21-26	Same as item 21-25, but 300 mm thick stone walls.	Cum	28288.58
21-27	Same as item 21-25, but 230 mm thick poured Concrete walls.	Cum	24783.18
21-28	Same as item 21-25, but 150 mm thick RCC walls.	Cum	22524.62
21-29	Manholes, complete, rectangular or circular as described, exc 600mm deep but not exc 1800mm deep, with iron steps (in angles 380mm centres), 230mm thick brick walls (Except manhole cover).	Cum	20528.47
21-30	Same as item 21-29, but 300 mm thick stone walls.	Cum	20514.93
21-31	Same as item 21-29, but 230 mm thick poured Concrete walls.	Cum	17713.17
21-32	Same as item 21-29, but 150 mm thick RCC walls.	Cum	16286.30
	Manhole Covers		
21-33	Supply and fix, Manhole CI cover with frame , 450mm, circular or rectangular exc 7.50kg each, but not exc 10kg/each, set in CM and haunching in Concrete, as specified.	Each	2235.93
21-34	Taking up or down, manhole cover and frame, and removing to store.	Each	153.04
21-35	Providing and laying, RCC Type 'B' manhole cover (precast) complete with angle iron frame, embedded in concrete, all as per Information Sheet # Svcs-341	Each	4454.27
21-36	Supply and fix, siphon traps, glazed ware in CC Type 'D' (1:4:8), P or S traps, 100 mm dia	Each	507.21
	Sinking of Well		
21-37	Sinking of Well , 2.15 M dia, upto 3M depth, below sub soil water level.	Metre	18851.88

SI No.	Description	Unit	Rate(Rs)
	Addition, Alterations etc to Drainage, I	Manhole	S
21-38	Cutting into existing Manholes, for connecting new drains, making good to pipe and rendering, cutting out existing benching and reforming of benching as required for new drain, making good to existing wall etc, complete, 100 mm bore of pipes.	Each	361.61
21-39	Same as item 21-38, but 150 mm bore of pipes.	Each	413.43
21-40	Same as item 21-38, but 230 mm bore pipes.	Each	464.63
21-41	Cutting into existing manholes for removing branch drains, making good to walls and rendering, cutting out branch channel, and making good benching complete, 100 mm bore of pipes.	Each	302.55
21-42	Same as item 21-41, but 150 mm bore of pipes.	Each	328.94
21-43	Same as item 21-41, but 230 mm bore of pipes.	Each	399.60
	Taking Up – CC or Salt Glazed Ware Pi	pes	
21-44	Taking up CC or Salt Glazed ware pipes with or without collars, incl fittings, removing to store or cleaning, and stacking for relaying, 100 mm bore pipes.	Metre	39.42
21-45	Same as item 21-44, but 150 mm bore pipes.	Metre	61.50
21-46	Same as item 21-44, but 230 mm bore pipes.	Metre	75.21
21-47	Breaking up Salt Glazed ware or RCC drain pipes set in CM and removing off the Mindef premises, if required, 100 mm bore of pipes.	Metre	28.16
21-48	Same as item 21-47, but 150 mm bore of pipes.	Metre	43.93
21-49	Same as item 21-47, but 230 mm bore of pipes.	Metre	53.72

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SI No.	Description	Unit	Rate(Rs)
21-50	Taking up carefully, drain pipes fit for subsequent reuse, cleaning and stacking within 30M, 100 mm bore of pipes.	Metre	28.16
21-51	Same as item 21-50, but 150 mm bore of pipes.	Metre	52.71
21-52	Same as item 21-50, but 230 mm bore of pipes.	Metre	64.46
21-53	Breaking up gully traps, disconnecting traps etc, set in Concrete and removing off the Mindef premises, if required, 100 mm bore of pipes.	Each	49.74
21-54	Same as item 21-53, but 150 mm bore of pipes.	Each	74.61
21-55	Same as item 21-53, but 230 mm bore of pipes.	Each	111.85
21-56	Taking up carefully, cleaning gulley traps, disconnecting traps etc, jointed in CM and stacking within 30M (only traps etc) fit for subsequent reuse, 100mm bore of pipes.	Each	74.61
21-57	Same as item 21-56, but 150 mm bore of pipes.	Each	111.82
21-58	Same as item 21-56, but 230 mm bore of pipes.	Each	167.84
	Sludge Pumps		
21-59	Pumping set , submersible, Sewerage type, with AC electric motor 400V, 3phase, 50 cycles, capacity 14 cum/hr , head 30M, supply and fixing.	Each	271598.71
21-60	Same as item 21-59, but discharge 15 cum / hr, head 60 M.	Each	533705.43
21-61	Same as item 21-59, but discharge 16 cum / hr , head 100 M.	Each	730362.29
21-62	Same as item 21-59 to 21-61, but fixing only.	Each	703.97
21-63	Same as item 21-59 to 21-61 or 21-62, if removal only.	Each	527.98

SECTION - 22

PRE ENGINEERED CONSTRUCTION

SPECIFICATIONS

22.0. This section covers all operations for Pre-cast RCC slabs, Pre-stressed RCC girder, Pre-cast RCC planks and columns for boundary walls, Single or Double Tee, RCC roof panels and other pre-cast / prefabricated / pre-engineered structures.

MATERIAL REQUIREMENTS

22.1. A number of pre-casting companies manufacture and market different kinds of pre-cast concrete products, which incl the following:-

22.1.1. **Pre-cast Concrete Conventional Roofing system** consisting of I-section girder and slabs.

22.1.2. **Pre-cast Concrete Boundary Wall system** consisting of concrete H-Section column with in-fill planks, and I Section column with beam and in-fill masonry.

22.1.3 Single / Double Tee Slab Roofing system with following spans.

i.	Double Tee	3.048 M x 0.686 M	upto	21.336M
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ii. Double Tee 1.524 M x 0.406M oupto 12.192M

iii Double Tee 0.610M x 0.133M Upto 6.096M

22.1.4. **Pre cast Inverted and "L" Beam** for supporting Double Tee are commonly available in following sections:-

- i. Inverted Tee Beam 305 x 686 mm / 699 x 254 mm for 3.048 M wide Double Tee.
- ii. **Inverted Tee Beam** 305 x 406 mm / 699 x 254 mm for 1.524 M wide Double Tee.
- iii. **L Beam** 305 x 686 mm / 502 x 254 mm for 3.048 M wide Double Tee.
- iv. **L Beam** 305 x 406 mm / 502 x 254 mm for 1.524 M wide Double Tee.

22.2. Items mentioned in Para 22.1 above must be manufactured by employing fully equipped plant using concrete design mix for strength of **41.38 MPa (**6000 psi) for girders, Double Tee, Inverted beams and "L" beams etc, whereas **34.48 MPa** (5000 psi) for slabs and planks etc.

22.3. Reinforcement:- Reinforcement of High Tensile Carbon Steel must conform to ASTM A-421.

22.4. Conventional Roofing system:-

22.4.1. The Girder & Slab system comprises of pre-stressed Concrete, I-section girder or batten combining with RCC slab having ribs running in either direction. With the availability of a wide range of different standard girder & slab sizes, this system can be assembled with scores of assorted combinations of different girders & slab sizes fulfilling the individual geometry and loading requirements of each work. This system is easy to handle without heavy hoisting equipment.

22.4.2. This Roofing system is used upto 21.336 M spans. Girders/Slabs can be placed on masonry bearing wall or on RCC beams. It can also be used in multi-storeyed buildings.

22. 4.3. RCC pre-stressed main and secondary girders must be produced on a long line extrusion process by pouring on a long bed at a stretch and then cut to pieces of required length with the help of special cutting equipment.

22. 4.4. **Common Sizes of Pre-Cast Girders**:- A large variety of Pre-Cast girders and beams is available in the market. However, for the purpose of this Schedule, commonly used sizes of girders have been elaborated in Table 22-1:-

	-	
S.No	Size	Weight (Kg / M)
i	102 mm x 260 mm	37.215
ii	114 mm x 304 mm	47.635
iii	127 mm x 337 mm	55.078
iv	127 mm x 356 mm	61.032
v	140 mm x 368 mm	64.000
vi	178 mm x 457 mm	89.315
vii	203 mm x 483 mm	110.155
viii	203 mm x 533 mm	138.438
ix	203 mm x 610 mm	163.749
x	203 mm x 711 mm	178.630
xi	203 mm x 813 mm	196.493

TABLE 22 - 1

Commonly Available Sizes of Girders

22.4.5. **Pre-cast Slabs:-** These should be casted on a plant to achieve proper compaction by vibration system to give a uniform structure, of specified size with accurate dimensions and quality. The commonly available sizes considered for the purpose of this Schedule are highlighted in Table 22-2:-

ТΑ	BL	E	22	_	2
		_			_

	Commonly Available Sizes of Fre-Cast Sidbs	
S.No	Size	Weight (Kg)
1	Length 0.914M to 1.397 M and Width 0.457 M	
	1.397 M x 0.457 M	48.50
2	Length exc 1.397 M but not exc 1.981 M ,and Width 0.457 M	
	1.981M x 0.457 M	79.10
3	Length 0.914M to 1.397 M and Width 0.3048 M	
	1.397 M x 0.3048 M	33.30
4	Length 1.524M to 1.981 M and Width 0.3048 M	
	1.981M x 0.3048 M	55.80

Commonly Available Sizes of Pre-cast Slabs

22.5. Pre-cast Boundary Wall System:- The details of the components of the system is as shown in Figure 22-1 to 22-4.

22.5.1. This system consists of following components:-

22.5.1.1. RCC pre-cast pre-stressed Columns.

22. 5.1.2. RCC pre-cast pre-stressed plinth Beams.

22. 5.1.3. RCC pre-cast in-fill planks (Plain and Coloured).

22.5.2. Item will be casted as per Para 22.2 above.

22.5.3. Panels formed by erection of section columns at suitable distance & inter-linked with plinth beams may be filled with normal masonry work, instead of in-fill planks.

22.6. Single / Double Tee Slab Roofing System:-

22.6.1. This system is used as structural roofing from 3.353 M to 21.336 M span. It is made with High strength Concrete produced on a plant in controlled conditions and using High Tensile Carbon Steel. Double Tee Slab Roofing System offers strength, economy in cost, speed of erection and aesthetically pleasant appearance.

22.6.2. The system is used as a deck member in floor and roof of offices, workshops, storage godowns and parking structures.

22.6.3. The details about safe loads for various spans are shown in Figure 22-5 to 22-11.

22.7. Steel K-Span System: It comprises of an Arch Type Roof using Pre-Painted Galvd Iron (PPGI) sheets (thickness from 0.5 mm to 1.3 mm). It can span 6.096 M to 32.004 M. The work shall be undertaken as per the manufacturer's instructions. The commonly available Steel K Span pre-engineered structures for different widths (spans) considered for this Schedule are given in Table 22 - 3.

CONSTRUCTION REQUIREMENTS

22.8. Pre-Engineered Construction System is highly specialized job. Therefore, it must be executed through experts equipped with suitable equipment and labour.

22.9. Pre-cast / Pre-Engineered Structures:-

22.9.1. Other types of pre-cast / prefabricated concrete and steel structures are of different design and shapes for residential, storage, commercial, parking of vehicles and aircrafts etc. The design and execution is based on requirements and parameters, given by the user.

22.9.2. The work may be under taken as a complete job through recognized and approved firms. The design produced by the Firm be got vetted from DD &C or an approved Consultant, before execution.

METHOD OF MEASUREMENTS

- 22.10. All linear dimensions to be measured net.
- **22.11. Roofs**:- Measure all projections and pay at the same rates.
- 22.12. No deduction or addition shall be made on any account for:-
 - 22.12.1. Opening not exc 0.2 Sqm area.
 - 22.12.2. Joints (locking, rebated, tongued and grooved etc.).
 - 22.12.3. Linear labour (small) and incidental labour.

CLARIFICATION OF RATES

- 22.13. The rates inter alia, incl particularly:
 - i. All matters specified which apply.
 - ii. Aggregates of any grade.
 - iii. Work in any position and of any thickness.
 - iv. Linear and incidental labour produced by form work, cores, etc, except where a separate item exits.
 - v. Curing and protection.
 - vi. Hoisting up to 6 M above or below ground level for girder, slab, inverted / L beam and Double Tee etc.
 - vii. Hoisting upto 10 M above GL for Steel "K" Span.

- viii. Transportation upto 250 km for girder, slab, Inverted / L- Beam and Double Tee etc.
- ix. Transportation upto 200 km for Steel "K" Span.
- x. All reinforcement forming part of pre-stressed pre-cast items are incl in the concrete supply and fixing rates.
- xi. Prestressed / pre-cast concrete items conforming to BSS-4482 and the requisite strength are only payable under this section.
- xii.

Any addition / allied items of work are payable under relevant Schedule items.

xiii. Cement and Steel for pre-stressed / pre-cast work shall not be issued under Schedule "B".











FIGURE 22-5 DOUBLE TEE

3.048x 0.686M, Self Weight = 259 Kg/ sqm Safe Super imposed Service Load incl 97Kg/sqm L.L

						(r.g / ;	sqm)						
270 K STRAND	FEET	26	28	30	32	34	36	38	40	42	44	46	48
PATTERN	м	7.925	8.534	9.144	9.754	10.363	10.973	11.582	12.192	12.802	13.411	14.021	14.630
½" Ø, 2	+2	741	601	487	394	317	253						
1⁄2 "Ø, 3-	+ 3			840	705	592	498	418	350	292	241		
1⁄2 "Ø, 4-	+ 4					851	729	626	537	461	396	338	288
1⁄2 "Ø, 5-	+ 5							832	724	631	550	480	418
½ "Ø, 6-	+ 6									791	695	612	540
½ "Ø, 7-	+ 7								Q.		840	746	662
1⁄2" Ø,7+ 7+Ts+3	¼"Ø (1+1)											811	723
1⁄2" Ø,7+ 7+Ts+3	4ӯ (2+2)												784
½" Ø, 7+ 7+Ts+	¾"Ø (3+3)												

(Continued on Page - 397)

(Continued from Page - 396)

FIGURE 22-5 DOUBLE TEE

3.048x 0.686M, Self Weight = 259 Kg/ sqm

Safe Super imposed Service Load incl 97Kg/sqm L.L

(Kg / Sqm)

270 K STRAND	FEET	50	52	54	56	58	60	62	64	66	68	70
PATTERN	М	15.240	15.850	16.459	17.069	17.678	18.288	18.898	19.507	20.117	20.726	21.336
1⁄2" Ø,	2+2				\mathbf{N}							
1⁄2 "Ø,	3+ 3											
1⁄2 "Ø,	4+ 4	243										
1⁄2 "Ø,	5+5	363	314	271	233							
1⁄2 "Ø,	6+6	475	418	368	322	281	245					
1⁄2 "Ø,	7+7	588	523	464	412	365	323	285	250			
½" Ø,7+ 7+Ts	s+¾"Ø (1+1)	644	574	512	457	407	362	321	284	250		
½" Ø,7+ 7+Ts	;+¾"Ø (2+2)	701	627	561	502	449	401	358	329	283	250	
1⁄2" Ø, 7+ 7+Ts	s+¾"Ø (3+3)	740	663	595	534	478	429	384	343	306	272	241



FIGURE 22-6 DOUBLE TEE

1.524 x 0.406 M, Self Weight = 190 Kg/ sqm Safe Super imposed Service Load incl 97Kg/sqm L.L

(Kg / Sqm)

270 K	FEET	22	24	26	28	30	32	34	36	38	40
STRAND PATTERN	м	6.706	7.315	7.925	8.534	9.144	9.754	10.363	10.973	11.582	12.192
³∕₃" Ø, 2+2		716	568	452	361	287					
³∕₀ "Ø, 3+ 3				730	607	502	415	344	284		
³‰" Ø, 3+3+Ts+½"Ø, 1	+1.06 L				717	597	499	418	350	293	
³∕₅" Ø, 3+3+Ts+½"Ø, 2	2+2.06 L					693	583	492	416	352	297



0.610 x 0.133 M, Self Weight = 147 Kg/ sqm Safe Super imposed Service Load incl 97Kg/sqm L.L (Kg / Sqm)

270 K	FEET	11	12	13	14	15	16	17	18	19	20
STRAND PATTERN	м	3.353	3.658	3.962	4.267	4.572	4.877	5.182	5.486	5.701	6.096
5 mm Ø, 3+3		780	693	517	425	351	283				
¾" Ø, 1+1, 3.5 mm Ø	1+1		712	581	478	395	327	273			
¾" Ø, 1+1, 4 mm Ø ′	1+1		752	615	508	420	356	293	244		
¾" Ø, 1+1, 5 mm Ø ′	1+1			683	566	468	395	332	278		
³‰" Ø, 1+1, 5 mm Ø 1+1+ 1+1, 0.5 L	Ts ¾Ø,				702	591	503	425	361	308	261



FIGURE 22-8 INVERTED TEE BEAM 305 X 406 / 699 X 254 FOR 1.524 DOUBLE TEE 0.406 Self Weight = 480 lbs/Rft , 218 Kg/ Rft Safe Super imposed Service Load (Kg / Sqm)

270 K	FEET	12	14	16	18	20	22	24	26	28
STRAND PATTERN	м	3.658	4.267	4.877	5.486	6.096	6.706	7.315	7.925	8.534
½ "Ø 4 №	S	9960	7126	5287	4026		$\langle \cdot \rangle$			
1⁄2"Ø 6 Nos	6		11050	8291	6399	5046	4045	2,		
1⁄2"Ø 8 Nos	6			11295	8773	6969	5634	4619		
½"Ø 10 №	os				11147	8892	7223	5954	4967	
½"Ø 12 №	os					10815	8812	7290	6104	5886
1⁄2"Ø 14 No	DS						10402	8625	7442	6145
1⁄2"Ø 16 No	DS							9960	8380	7126
1⁄2"Ø 18 No	DS							11295	9518	8107
1⁄2"Ø 20 No	DS								10655	9088



305 X 686 / 699 X 254 FOR 3.048 DOUBLE TEE 0.686 Self Weight = 617 Ibs/Rft , 280 Kg/ Rft Safe Super imposed Service Load (Kg / Sqm)

270 K	FEET	12	14	16	18	20	22	24	26	28
STRAND PATTERN	м	3.658	4.267	4.877	5.486	6.096	6.706	7.315	7.925	8.534
½ "Ø 4 No	S	15139	10879	8114	6218			2,		
1⁄2"Ø 6 Nos	6		16651	12533	9710	7690	6196	1		
1⁄2"Ø 8 Nos	6			16952	13202	10519	8534	7024	D	
½"Ø 10 №	os				16952	13347	10871	8988	7523	
½"Ø 12 №	DS					16176	13209	10952	9196	7803
½"Ø 14 №	os						15546	12917	10870	9246
½"Ø 16 No	DS							14881	12543	10689
1⁄2"Ø 18 No	DS								14217	12132
1⁄2"Ø 20 No	DS									13575

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FIGURE 22-10 L - BEAM 305 X 406 / 502 X 254 FOR 1.524 DOUBLE TEE 0.406 Self Weight = 402 lbs/Rft , 182 Kg/ Rft Safe Super imposed Service Load (Kg / Sqm)

270 K	FEET	12	14	16	18	20	22	24	26	28
STRAND PATTERN	м	3.658	4.267	4.877	5.486	6.096	6.706	7.315	7.925	8.534
½ "Ø 4 №	S	9739	6996	5216	3996	3123				
1⁄2"Ø 6 Nos	6			8124	6293	4984	4015	3278		
1⁄2"Ø 8 Nos	6				8590	6845	5553	4570	3806	3100
1⁄2"Ø 10 No)S					8705	7091	5863	4907	4148
1⁄2"Ø 12 No	os						8628	7154	6008	5098
1⁄2"Ø 14 No)S							8447	7109	6047
½"Ø 16 №	os								8210	6996

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FIGURE 22-11 L - BEAM 305 X 686 / 502 X 254 FOR 3.048 DOUBLE TEE 0.686 Self Weight = 518 lbs/Rft , 235 Kg/ Rft Safe Super imposed Service Load (Kg / Sqm)

FEET	12	14	16	18	20	22	24	26	28
М	3.658	4.267	4.877	5.486	6.096	6.706	7.315	7.925	8.534
S	14703	10588	7189	6088	5582				
;		16284	12280	9534	7570	6116	5011		
;			16640	12979	10361	8423	6949	5802	4903
s				16425	13152	10730	8888	7454	6316
S					15943	13036	10826	9105	7740
S						15343	12746	10757	9164
S							15047	12702	10842
	FEET M S S S S S S	FEET 12 M 3.658 5 14703 5 - S - S - S - S - S - S - S - S - S - S -	FEET 12 14 M 3.658 4.267 5 14703 10588 6 14703 10588 5 16284 16284 5 - - 5 - - 5 - - 5 - - 5 - - 5 - - 5 - - 5 - - 5 - - 5 - -	FEET 12 14 16 M 3.658 4.267 4.877 5 14703 10588 7189 5 16284 12280 6 16284 16640 5 5 5 16640 5 6 1 1 6 7 1 1 7 1 1 1 8 1 1 1 8 1 1 1 9 1 1 1 1 9 1 1 1 1 9 1 1 1 1 9 1 1 1 1 9 1 1 1 1 9 1 1 1 1 9 1 1 1 1 9 1 1 1 1 9 1 1 <t< td=""><td>FEET 12 14 16 18 M 3.658 4.267 4.877 5.486 s 14703 10588 7189 6088 s 14703 10588 7189 6088 s 16284 12280 9534 s 16640 12979 s 5 16640 12979 s 5 1 1 1 s 1 1 1 1 1 s 1 1 1 1 1 1 s 1 1 1 1 1 1 1</td><td>FEET 12 14 16 18 20 M 3.658 4.267 4.877 5.486 6.096 s 14703 10588 7189 6088 5582 s 14703 10588 7189 6088 5582 s 14284 12280 9534 7570 s 16284 12280 9534 7570 s 16284 12280 9534 7570 s 16640 12979 10361 s 1 14642 13152 s 1 14 16 1 15943 s 1 1 1 1 1 s 1 1 1 1 1</td><td>FEET 12 14 16 18 20 22 M 3.658 4.267 4.877 5.486 6.096 6.706 s 14703 10588 7189 6088 5582 - s 14703 10588 7189 6088 5582 - s 16284 12280 9534 7570 6116 s 16284 12280 9534 7570 6116 s 16640 12979 10361 8423 s 1 140 1428 13152 10730 s 1 1 1 13036 1333 s 1 1 1 1543 13336</td><td>FEET 12 14 16 18 20 22 24 M 3.658 4.267 4.877 5.486 6.096 6.706 7.315 s 14703 10588 7189 6088 5582 - - s 14703 10588 7189 6088 5582 - - s 16284 12280 9534 7570 6116 5011 s 1 16400 12979 10361 8423 6949 s 1 1 1 1 1 1 1 s 1 1 1 1 1 1 1 1 s 1 1</td><td>FEET 12 14 16 18 20 22 24 26 M 3.658 4.267 4.877 5.486 6.096 6.706 7.315 7.925 s 14703 10588 7189 6088 5582 . . . s 14703 10588 7189 6088 5582 . . . s 14703 10588 7189 6088 5582 . . . s 14703 10588 7189 6088 5582 . . . s 16284 12280 9534 7570 6116 5011 . s . 16640 12979 10361 8423 6949 5802 s . . 16425 13152 10730 8888 7454 s . . . 15943 13036 10826 91057 s</td></t<>	FEET 12 14 16 18 M 3.658 4.267 4.877 5.486 s 14703 10588 7189 6088 s 14703 10588 7189 6088 s 16284 12280 9534 s 16640 12979 s 5 16640 12979 s 5 1 1 1 s 1 1 1 1 1 s 1 1 1 1 1 1 s 1 1 1 1 1 1 1	FEET 12 14 16 18 20 M 3.658 4.267 4.877 5.486 6.096 s 14703 10588 7189 6088 5582 s 14703 10588 7189 6088 5582 s 14284 12280 9534 7570 s 16284 12280 9534 7570 s 16284 12280 9534 7570 s 16640 12979 10361 s 1 14642 13152 s 1 14 16 1 15943 s 1 1 1 1 1 s 1 1 1 1 1	FEET 12 14 16 18 20 22 M 3.658 4.267 4.877 5.486 6.096 6.706 s 14703 10588 7189 6088 5582 - s 14703 10588 7189 6088 5582 - s 16284 12280 9534 7570 6116 s 16284 12280 9534 7570 6116 s 16640 12979 10361 8423 s 1 140 1428 13152 10730 s 1 1 1 13036 1333 s 1 1 1 1543 13336	FEET 12 14 16 18 20 22 24 M 3.658 4.267 4.877 5.486 6.096 6.706 7.315 s 14703 10588 7189 6088 5582 - - s 14703 10588 7189 6088 5582 - - s 16284 12280 9534 7570 6116 5011 s 1 16400 12979 10361 8423 6949 s 1 1 1 1 1 1 1 s 1 1 1 1 1 1 1 1 s 1 1	FEET 12 14 16 18 20 22 24 26 M 3.658 4.267 4.877 5.486 6.096 6.706 7.315 7.925 s 14703 10588 7189 6088 5582 . . . s 14703 10588 7189 6088 5582 . . . s 14703 10588 7189 6088 5582 . . . s 14703 10588 7189 6088 5582 . . . s 16284 12280 9534 7570 6116 5011 . s . 16640 12979 10361 8423 6949 5802 s . . 16425 13152 10730 8888 7454 s . . . 15943 13036 10826 91057 s

TABLE 22-3

STEEL K SPAN - (6.096 M to 32.004 M Spans)



S No	THICNESS OF SHEET	SPAN RA	NGE	TAKE	SPAN	HEIGHT			
	(PPGI) mm	М	FEET	M	FEET	%	М	FEET	
1	0.5	6.096 - 7.620	20 - 25	7.620	25	8	0.610	2	



S No	THICNESS OF SHEET	SPAN RAI	NGE	TAKE	SPAN	HEIGHT			
	(PPGI) mm	м	FEET	М	FEET	%	М	FEET	
2	0.6	7.925 – 9.144	26 - 30	9.144	30	10	0.914	3	



S No	S No THICNESS OF SHEET (PPGI) mm	SPAN RAI	SPAN RANGE			HEIGHT			
		M	FEET	м	FEET	%	М	FEET	
3	0.7	9.449 – 10.668	31-35	10.668	35	12	1.280	4.20	



S No	THICNESS OF SHEET	SPAN RA	SPAN RANGE			HEIGHT			
	(PPGI) mm	М	FEET	м	FEET	%	м	FEET	
4	0.8	10.973–12.192	36 - 40	12.192	40	14	1.707	5.60	



S No	3 No THICNESS OF SHEET (PPGI)	SPAN RAI	NGE	TAKE	SPAN	HEIGHT			
	(PPGI) mm	SI) M n	FEET	м	FEET	%	М	FEET	
5	0.9	12.497–19.812	41-65	19.812	65	16	3.170	10.40	



S No	THICNESS OF SHEET	SPAN RAI	NGE	TAKE	SPAN	HEIGHT			
	(PPGI) mm	м	FEET	м	FEET	%	м	FEET	
6	1.00	20.117 – 22.860	66-75	22.860	75	18	4.115	13.50	



S No	THICNESS OF SHEET	SPAN RAI	NGE	TAKE	SPAN		HEIGH	Г
	(PPGI) mm	М	FEET	м	FEET	%	м	FEET
7	1.20	22.860-25.908	75 - 85	25.908	85	20	5.182	17.00



S No	THICNESS OF SHEET	SPAN RAI	NGE	TAKE	SPAN		HEIGHT	Г
	(PPGI) mm	М	FEET	м	FEET	%	М	FEET
8	1.30	26.213 - 32.004	86 - 105	32.004	105	22	7.041	23.10

ITEM RATES

SI No	Description	Unit	Rates (Rs)
	Precast Slabs		
22-1	Providing and laying, pre-cast, RCC slab, length 0.914 M to 1.397 M and width 0.457 M, incl hoisting, setting and jointing in CM (1:4), all as specified.	Sqm	700.33
22-2	Same as item 22-1, but length exc 1.397 M and not.exc 1.981 M, width 0.457 M.	Sqm	1014.11
22-3	Same as item 22-1, but length 0.914 M to 1.397 M, width 0.3048 M.	Sqm	958.56
22-4	Same as item 22-1, but length 1.524 M to 1.981 M, width 0.3048 M	Sqm	1266.39
	Precast Girders		
2-5	Providing and laying, pre-cast pre- stressed, R.C.C girders size 102mm x 260mm, incl setting and hoisting, all as specified for span 2.438 M to 4.877 M.	Metre	559.96
22-6	Same as item 22-5, but size 114 x 304mm (for span 5.182 M to 6.172M)	Metre	811.89
22-7	Same as item 22-5, but size 127 x 337 mm (for span 5.182 M to 6.782M)	Metre	923.40
22-8	Same as item 22-5, but size 127 x 356 mm (for span 5.486M to7.391M)	Metre	1039.70
22-9	Same as item 22-5, but size 140 x 368 mm (for span 6.096M to 8.306 M)	Metre	1165.68
22-10	Same as item 22-5, but size 178 x 457mm (for span 7.315M to 10.058M)	Metre	1520.65
22-11	Same as item 22-5, but size 203 x 483 mm (for span 8.534M to11.278M)	Metre	1934.53
22-12	Same as item 22-5, but size 203 x 533 mm (for span 9.754M to 12.69M)	Metre	2389.48
22-13	Same as item 22-5, but size 203 x 610 mm (for span 5.182M to 9.449M)	Metre	2666.56

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SI No	Description	Unit	Rates (Rs)
22-14	Same as item 22-5 but size 203 x 711mm e (for span 5.486M to 10.973M)	Metre	2878.02
22-15	Same as item 22-5 but size 203 x 813mm (for span 5.791M to 11.582M)	Metre	3041.33
	Precast Double Tees		
22-16	Providing and laying, precast pre-stressed, RCC, Double Tee, size 3.048 M x 0.686 M, RCC roof panel (having web size 101mm x 171mm and slab thickness 51mm), for span from 9.754M to 12.802 M incl hoisting, complete, all as specified.	Sqm	2593.97
22-17	Same as item 22-16, but for span from	Sqm	2776.76
22-18	13.411 M to 15.240 M. Same as item 22-16, but for span from 15.850 M to 17.678 M	Sqm	3006.57
22-19	Same as item 22-16, but for span from 18 288 M to 18 898 M	Sqm	3304.79
22-20	Same as item 22-16 but for span from 19.507 M to 21.336 M	Sqm	3522.87
22-21	Providing and laying, pre-cast pre- stressed, RCC, Double Tee, size 1.524 M x 0.406 M, RCC roof panel (having web size 64mm x114mm and slab thickness 35 mm) span from 6.096 M to 7.925 M, incl hoisting complete all as specified	Sqm	2102.50
22-22	Same as item 22-21, but for span from 8.534 M to 9.754 M	Sqm	2210.00
22-23	Same as item 22-21 but for span from 10.363 M to 10.973 M	Sqm	2333.30
22-24	Same as item 22-21 but for span from 11.582 M to 12.192 M	Sqm	2429.17
22-25	Providing and laying, pre-cast pre- stressed, RCC Double Tee, size 0.610 M x 0.133 M, RCC roof panel (having web size 64mm x 89mm and slab thickness 35mm) for span from 3.658 M to 4.267 M, incl hoisting, complete, all as specified.	Sqm	1734.93
22-26	Same as item 22-25 but for span from 4.877 M to 6.096 M. Precast Inverted Tee Beams	Sqm	1909.22

SI No	Description	Unit	Rates (Rs)
22-27	Providing and laying, pre-cast pre- stressed, RCC, Inverted Tee beam, size $0.305 \text{ M} \times 0.686 \text{ M} / 0.699 \text{ M} \times 0.254 \text{ M}$ for Double Tee, size $3.048 \text{ M} \times 0.686 \text{ M}$, for span from 3.658 M to 6.096 M , incl hoisting, complete, all as specified.	Metre	14276.66
22-28	Same as item 22-27, but for span from 6.401M to 8.534M.	Metre	15830.37
22-29	Providing and laying, pre-cast pre- stressed, RCC, Inverted Tee beam, size $0.305 \text{ M} \times 0.406 \text{ M} / 0.699 \text{ M} \times 0.254 \text{ M}$ for Double Tee, size, $1.524 \text{ M} \times 0.406 \text{ M}$, for span from 3.658 M to 6.096 M , incl hoisting, complete, all as specified.	Metre	12329.75
22-30	Same as item 22-29, but for span from 6.401M to 8.534M. Precast 'L' Beams	Metre	12659.16
22-31	Providing and laying, pre-cast pre- stressed, RCC, L beam, size 0.305 M x 0.686 M / 0.502M x 0.254M for Double Tee, size 3.048 M x 0.686M, for span from 3.658 M to 6.096 M, incl hoisting, complete, all as specified.	Metre	12558.58
22-32	Same as item 22-31, but for span from 6.401 M to 8.534 M.	Metre	12465.06
22-33	Providing and laying, pre-cast, pre-stressed, RCC, 'L' beam size 0.305 M x 0.406 M / 0.502M x 0.254M for Double Tee, size 1.524M x 0.406M, for span from 3.658M to 6.096M, incl hoisting, complete, all as specified.	Metre	10807.92
22-34	Same as item 22-33, but for span from 6.401 M to 8.534 M. Boundary Wall	Metre	13831.76
22-35	Providing and laying, pre-cast pre-stressed, RCC, "I" Section boundary wall, column size 102 mm x 229 mm, length 2.438 M to 3.658 M, complete, all as specified.	Metre	398.47
22-36	Providing and laying, pre-cast pre-stressed, RCC boundary wall beam, size 102mm x 760mm length 2.438 M, complete, all as specified.	Metre	414.65

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SI No	Description	Unit	Rates (Rs)
22-37	Providing and laying, pre-cast pre-stressed, RCC, "H" section, boundary wall, column size 140mm x 203 mm, length 2.438 M to 3.658 M, complete, all as specified.	Metre	586.06
22-38	Providing and laying, RCC, pre-cast RCC boundary wall, coloured strip, 76 mm wide and 64 mm thick, all as specified.	Metre	156.1
22-39	Providing and laying, pre-cast RCC planks for in-fill, "H" type boundary wall, column size 64 mm thick and 305 mm wide, all as specified.	Metre	358.11
22-40	Providing and laying, RCC pre-cast boundary wall column caps, all as specified. Steel 'K'-Span	Each	250.09
22-41	Supply and fix, Pre-Painted Galvd Iron (PPGI) steel sheets for Steel 'K - Span from 6.096 M to 7.620M using 0.5mm, thick sheet @ 4.166 kg/sqm, complete, all as specified.	Sqm	1423.08
22-42	Same as item 22-41, but for span from 7.925 M to 9.144 M, using 0.6 mm thick sheet @ 4.941 kg/sgm	Sqm	1672.57
22-43	Same as item 22-41, but for span from 9.449M to 10.668M, using 0.7 mm thick sheet @ 5.705 kg/sgm.	Sqm	1911.28
22-44	Same as item 22-41, but for span from 10.973M to 12.192M using 0.8 mm thick sheet @ 6.480 kg/sgm.	Sqm	2149.97
22-45	Same as item 22-41 but for span from 12.497M to 19.812M, using 0.9 mm thick sheet @ 7.244kg/sgm.	Sqm	2381.99
22-46	Same as item 22-41, but for span from 20.117M to 22.860M, using 1.00 mm thick sheet @ 8.019kg/sgm	Sqm	2611.49
22-47	Same as item 22-41, but for span from 22.860M to 25.908M, using 1.2 mm thick sheet @ 9.548kg/sqm	Sqm	3074.36
22-48	Same as item no. 22-41, but for span from 26.213M to 32.004M using 1.3 mm thick sheet @ 10.323kg /sqm	Sqm	3298.63

SI No	Description	Unit	Rates (Rs)
22-49	Add to item 22-01 to 22-34, for hoisting for each subsequent 4M or part thereof.	Kg	0.49
22-50	Add to item 22-41 to 22-48, for hoisting for each subsequent 4M or part thereof	Kg	3.98
22-51	Add to item 22-41 to 24-48, for transportation, for each subsequent 100 km or part thereof.	Kg	3.98
	(P)		
	No.		
			6

SECTION – 23

DEMOLITION AND DISMANTLING

SPECIFICATIONS

23.0. The work covered under this section consists of providing all materials, labour, equipment and performing all operations for demolition/ dismantling, concrete, asphalt, walls, foundation, roof, floor and iron / steel work etc.

23.1. When there are rates, else-where in the Schedule for "**add if in repairs**" the demolition or dismantling rates in this section will NOT be applicable either in addition to or in substitution of "**add if in repair**" items.

23.2. Demolition:- Implies taking down or breaking up, removing as ordered, spreading and leaving as required will normally be applied to:-

- 23.2.1. Ordinary concrete cast in situ, RCC, brickwork and stone masonry (except ashlars and dressings).
- 23.2.2. Asphalt work.

23.3. Dismantling:- Implies carefully taking up or down without damage (either large or small quantities), in patches or for work in repairs or replacements of parts where not otherwise provided for in the schedule and carting to store (if directed by Engineer-in-Charge) any useful materials, sorting, stacking, cleaning and the removal of all nails, screws and bolts from timber and disposal of rubbish off the site and will normally be applied to all other classes of work.

23.4. Damage:- To any part of the work which is to be left intact, will be made good by the Contractor at his expense.

23.5. Cutting Opening through Walls:-

23.5.1. For doors, windows and other purpose not covered below incl forming reveals and rough face work, except provision of arches, lintels and new finishing around opening which will be paid for separately under the relevant items.

23.5.2. For small holes for pipes etc, where surface area does not exc 900 Sq Cm, incl all work like filling, finishing and making good.

23.6. New Works in Making Good:- After dismantling etc will be paid for under the respective items in other sections of the Schedule. No additional payment for connecting up to existing work etc be made.

DEMOLITION AND DISMANTLING

23.7. Cutting Through Or excavating and grubbing up concrete, brickwork etc, in floors, road, paving and foundations will be paid under the items for "Excavation and Earth works" in Section-1, as applicable.

METHOD OF MEASUREMENTS

23.8. Measurements of all Work shall be made before dismantling and as described for new work in respect of deductions for voids, opening etc; and no allowance be made for any increase in bulk.

23.9. Measurements for Brickwork:- Plaster on one or both sides are to be exclusive of plaster thickness, but the rates for demolition incl taking down the plaster.

23.10. In cutting for Openings:- Measurements will be net finished size of the new opening or enlarged portion of opening.

23.11. No Additional Allowance:- Will be made for cutting and pinning in bolts, holdfasts, ends of steps, timbers, etc.

CLARIFICATION OF RATES

23.12. The rates, inter alia, incl particularly:-

23.12.1. Use and waste of all temporary strutting and shoring required, and clearing away after use, together with any scaffolding, tools, plants, watching etc;

23.12.2. Removal of all serviceable materials to store, or fresh site within the contract area, if so required.

23.12.3. Removal of all unserviceable materials on Mindef premises with in a distance of 4 Km and spreading, leveling, stacking, etc as directed;

23.12.4. As an alternative to Para 23.12.3 above, removal of all unserviceable materials from Mindef premises, in which case the materials shall become the property of the Contractor and no deduction shall be made for their value.

ITEM RATES

SI No	Description	Unit	Rate (Rs)
	Concrete		
23-1	Demolition of un-reinforced lime or CC and Premix carpet etc.	Cum	1374.88
23-2	Add to item 23-1, if dismantled in portions.	Cum	137.51
23-3	Demolition of RCC floor or beams/roof slabs etc; separating reinforcement from concrete, and cleaning and straightening the same.	Cum	1480.88
23-4	Demolition of RCC floor or beams/roof slabs etc; when reinforcement is not required to be separated from concrete.	Cum	1374.88
	Walls, Foundations, etc		
23-5	Demolition of Sundried brick work , Burnt brick work or Stone masonry , laid dry or in mud mortar, incl coping, quoins etc.	Cum	164.70
23-6	Add to item 23-5, if dismantled in portions.	Cum	16.48
23-7	Demolition of walls, built in brick work, or Concrete blocks, or in stone masonry, built in lime or CM, incl pillars, lintels, struts etc.	Cum	587.34
23-8	Add to item 23-7, if dismantled in portion	Cum	137.52
	Mud on Roofs		
23-9	Removing mud from roofs, incl plastering and leeping, if any.	Cum	137.49
23-10	Take up, Stone or Pre-cast concrete slab floors, of any thickness, laid in any mortar.	Cum	541.71
23-11	Add to item 23-10, if dismantled in portions.	Cum	22.69
	Cutting Openings		
23-12	Cutting through walls etc, for doors, windows or other opening, or enlarging existing openings and form reveals, as specified, in sundried brick work.	Cum	2062.05
23-13	Same as item 23-12, but burnt brick work, stone masonry or concrete block, in CM.	Cum	2205.10

SI No	Description	Unit	Rate (Rs)
23-14	Same as item 23-12, but Burnt brick work, Stone masonry or Concrete block, in lime or CM.	Cum	2957.33
23-15	Same as item 23-12, but lime or CC.	Cum	3116.33
23-16	Same as item 23-12, but RCC , incl cutting reinforcement.	Cum	3979.46
23-17	Cutting small openings, for pipes etc, where surface area does not exc 900 sq cm, and make good around the same, in sun dried brick work.	Cum	293.32
23-18	Same as item 23-17, but Burnt brick work, Stone masonry or Concrete blocks in mud mortar.	Cum	428.00
23-19	Same as item 23-17, but Burnt brick work, Stone masonry or Concrete blocks, in lime or CM.	Cum	1412.43
23-20	Same as item 23-17, but lime or CC.	Cum	1611.19
23-21	Same as item 23-17, but RCC incl cutting reinforcement.	Cum	2690.14
	Wood Work		
23-22	Cut out and demolish timber in scanting , in any position, not elsewhere provided for, clear out nails etc, remove and stack at site.	Cum	1515.80
23-23	Cut out and demolish timber boarding , (incl flooring) or Pharas position, not elsewhere provided, and stack on site	Sqm	45.47
23-24	Cut out and demolish ballies, any dia.	Metre	15.16
	Iron and Steel Work		9://
23-25	Take down Cl, Iron or AC flue (or smoke) pipes, eaves, gutters, rain water pipes, valley gutters or flashing ridges and hips incl bends, swan necks, shoes etc, and any supports or brackets, there to, (gutters, flashing ridges and hips to be measured in this item only when not taken down as part of roofing).	Metre	47.37
23-26	Dismantle Steel or Iron work of any description, and in any position, not	Kg	7.87

SI No	Description	Unit	Rate (Rs)
	elsewhere provided for.		
23-27	Any position, not elsewhere provided for, dismantle to remove, iron or steel sheeting in hearths covering to doors, frames, curbs, mangers and similar fittings any description or gauge.	Sqm	28.43
1	Roof etc		
23-28	Dismantle, AC corrugated sheets or corrugated iron plain sheeting to walls, ceilings etc, incl any ridges, hips, valleys, wind ties, barge and eaves boarding (net area of roof and or walls measured).	Sqm	31.48
	Miscellaneous		
23-29	Dismantling single tiling of brick or PCC in roof or floor, laid in CM, incl half bricks or blocks on edge, in any portion.	Sqm	72.88
23-30	Same as item 23-29, but of any other description incl ridges, hips or valleys (net area of roof surface measured, no additional allowance for ridges, hips and valleys).	Sqm	109.31
23-31	Dismantle double tiling of brick or PCC in roof laid in CM, incl half bricks or blocks on edge, in any position.	Sqm	131.18
23-32	Same as item 23-31, but of any other description, incl ridges, hips and valleys (net surface of roof area measured).	Sqm	196.76
23-33	Dismantling of shingles to roof (net surface of roof area measured).	Sqm	36.44
23-34	Demolish thatching (net surface of roof area measured).	Sqm	29.15
23-35	Take down bamboo framing, matting (incl matting, doors and windows) or trellis work or tile, battens of any number of layers, size, gauge, spacing or description.	Sqm	18.95
23-36	Dismantling cloth in ceiling, partitions etc; incl removing fillets and nails.	Sqm	15.16

SI No	Description	Unit	Rate (Rs)
23-37	Taking down single hole bamboo, any girth.	Metre	4.37
	Finishing		
23-38	Carefully taking up or down, glazed or encaustic tiling to floors, hearths or walls incl borders, skirting, moldings, capping, etc and CM setting, but not backing.	Sqm	104.94
	Plumbing and Drains		
23-39	Take down sheet lead in flats, gutters, dormers, flashing, ridges, hips cisterns, etc and similar work (not to be paid when gutters, ridges and hips are taken down as part of roofing).	Кg	2.33
SECTION - 24 INTERNAL ELECTRIFICATION

SPECIFICATIONS

24.1. Electrical Standard Requirement etc:- All electrical works shall be carried out in accordance with the Electricity Regulations, Govt of Pakistan and Pakistan Standard Specifications for Electrical equipment of buildings, here-in after referred to as "Rules", except where these rules are modified by these specifications.

24.2. Materials:-

24.2.1. Except where otherwise specified, all materials shall be supplied, fixed, connected and completed by the contractor.

24.2.2. All materials shall comply with the relevant and latest BS or equivalent Pakistan Standard Specifications.

24.2.3. **Fittings and Accessories:-** All fittings / accessories shall conform to current BS or its equivalent Pakistan Standard Specifications. No inferior quality material is allowed for use in works.

24.2.4. **Cables and Cords:** All cables and cords shall be of CMA grade or equivalent Pakistan grade, approved by the Engineer-in-Chief from time to time.

24.2.5. Size of Conductor:- The min size of conductor shall be:-

- 24.2.5.1. Lighting cables with conductor of $1 \text{ mm}^2/1.5 \text{ mm}^2$ sectional area.
- 24.2.5.2. Lighting flexible cord, conductor of 0.75 mm² sectional area.
- 24.2.5.3. Power cable with conductor of 2.5 mm² sectional area.
- 24.2.5.4. Sub-main cables with conductors of 4 mm² sectional area.
- 24.2.5.5. Any other size of conductor when required, shall comply with Electricity Regulations, Govt. of Pakistan.

24.2.6. Socket Outlet Points (3 Pin, 5 Amps and 15 Amps):-

- 24.2.6.1. The 3rd conductor, i.e Earth shall be 14 SWG solid bare copper conductors (soft), or 1 mm² or 1.5 mm² PVC insulated copper cable and shall be electrically continuous throughout the installation.
- 24.2.6.2. Socket outlets shall be of shutter pattern.

24.3. Building Work:- The position of all holes or cutting away will be agreed with Engineer-in-Charge before the work is under taken. All making good shall match the existing surroundings.

24.4. Siting of Electrical Equipment:-

24.4.1. The siting of cable/conduit runs, controls, fittings/accessories etc, must be in accordance with plans and settled on site in conjunction with the Engineer-in-Charge before commencement of work

24.4.2. The height from the floor level to bottom of fittings shall be as follows:-

i	Main Control	 1.75 M
ji .	Distribution Board	 1.75 M
iii	Pendant and interior bracket	 2.50 M
iv	Wooden board for lighting switches and fan regulators	 1.25 M
v	Socket outlets (generally)	 230 mm

24.4.3. The siting of main switches, meter and distribution board for officer's bungalow and important buildings shall be done in the rear/side veranda or in any suitable place in rear of the building.

24.5. Mounting of Fittings and Accessories:-

24.5.1. Ordinary pendant, batten and similar lighting fittings and accessories shall be mounted direct in / on conduit box / wooden blocks, etc.

24.5.2. Switch fuse, distribution board and the like shall be secured by means of wood screws, coach screws, rag bolts or other suitable method as approved by the Engineer-in-Charge.

24.5.3. Spacer bar saddle shall be secured by 25 mm long screws.

24.6. Conduit Wiring:-

24.6.1. The system shall consist of single core PVC un-sheathed cables in screwed steel / PVC conduits installed for surface or concealed wiring as specified.

24.6.2. The loop-in system shall be employed, where necessary or advisable, Teeing off by means of taped porcelain connectors in conduit boxes, may be utilized as approved by Engineer-in-Charge.

24.7. Conduit and Conduit fittings:-

24.7.1. All other conduits shall be of Heavy gauge Class "B" welded seam as per BSS 31, given in Table 24-1.

		•		
Outside dia	20 mm	25 mm	40 mm	50 mm
Threads per 25mm	16	16	14	14
Max length of threads on ends	14 mm	17 mm	20 mm	23 mm
Nominal thickness	1.83 mm	1.83 mm	2.03 mm	2.34 mm
Min thickness	1.68 mm	1.68 mm	2.00 mm	2.20 mm
Weight per metre before enamelling/ galvanizing	0.79 Kg	1.08 Kg	1.85 Kg	2.86 Kg

TABLE 24 - 1

Standard Dimensions & Weights of Steel Conduits

Note:- Conduit for magazines, explosive stores and POL installations shall be solid drawn.

24.7.2. The conduit boxes and covers shall be of malleable CI and shall conform to latest specifications. Solid fittings will not be permitted. Inspection elbows, tees or bends will be used for surface wiring at the ends of conduit immediately behind fittings or accessories, where specifically approved.

24.7.3. Fixing screws for conduit and inspection covers shall be of brass or rust proof material.

24.7.4. Erection:-

24.7.4.1. All conduit fittings shall be erected before any cables are drawn in. The number of cables allowed, in the conduit shall be in accordance with Electricity Regulations, Govt. of Pakistan. All screwed connections shall be metal to metal and exposed screw thread and parts. Where the galvanizing or enamelling has been damaged, it shall be thoroughly cleaned and painted with two coats of anti-corrosive paint, done as the work proceeds.

24.7.4.2. All points shall be such as to ensure perfect electrical continuity and where running joints are necessary, Lock nuts shall be utilized.

24.7.4.3. Where conduit passes through principals, rafters, purlins or joists, whether of wood, iron or steel, these must be drilled in approved position to take the conduits, the holes being of the smallest possible dia, consistent with requirements.

24.7.4.4. Where the conduit passes through a floor, wall partition or ceiling, the hole shall be made good with cement or similar incombustible materials to the full thickness of the floor,

wall, partition or ceiling and space through which **Fire** might spread shall not be left. Junction between conduit and adoptable boxes, back outlet boxes and the like, not provided with entry spouts, also between conduit and Iron Clad (IC) distribution boards and control gear, shall be effected by means of lock nuts and conduit couplers into which will be screwed a brass hexagonal smooth bore bush, from the inside of box or case. In addition to ensure perfect continuity, where boxes or cases have clearance holes, a brass compression washer shall be fitted between the bush and box or case. Conduit system shall be erected as far as possible to avoid traps where water may accumulate from condensation. Where this is unavoidable, suitable provision for drainage shall be made. Conduit shall be kept at least 150mm clear and preferably below steam or water pipes.

24.7.5. **Bonding and Earthing:-** All conduit systems shall be electrically continuous throughout the installation. The max conductivity resistance of the conduit and earthing lead shall not exc one ohm (1Ω) . All conduit systems shall be efficiently earthed.

24.8. Surface Conduit Wiring:-

24.8.1. No conduit shall be less than 20mm dia

24.8.2. Normally the conduit shall be carried on the surface of walls and ceilings, but where conditions permit, the conduit may be run within hollow spaces of wall, floor, partition and ceiling or in roof spaces. Diagonal run will not be permitted for surface wiring and particular attention shall be paid to "sets", which must fit as close to the walls etc, as possible. The conduit shall be secured by means of spacer bar saddles made of CI pressure steel fixed at intervals of max 900 mm with a saddle plate 3mm thick for conduits upto 40mm dia and 5mm for larger size of conduit. Wooden screws shall secure the saddle plates. Where conduit is attached to iron or steel joist / pillar, suitable clips, spaced at 900mm interval shall be utilized.

24.9. Concealed Conduit Wiring:-

24.9.1. No conduit shall be less than 20mm dia. Normally the conduit shall be sunk in wall and ceiling to such depth that there is not less than 20mm cover but where the construction of the building is such that it is found impossible or inadvisable to sink the conduit, then it shall be installed as surface wiring, with the approval of the Engineer-in-Charge. The conduit shall be secured by means of hooks or other means fixed at intervals of 1.25M or within 100mm of each fitting or accessory. Not more than four bends shall be provided in a single run of conduit.

24.9.2. Where a concealed conduit is to traverse on RCC roofs, it shall be embedded in concrete and not run on surface of the slabs.

24.9.3. Where junction boxes are fixed in walls etc, for drawing-in, the cover must fit flush with the plaster at all points.

24.9.4. Where junction boxes are laid under or in concrete or floors, traps of approved design having a flanged outer frame for keying into the concrete etc, and fitted with a recessed cover suitable for filling in with the floor material shall be utilized.

24.9.5. Where junction boxes are laid under wooden floors, properly constructed traps shall be put in the flooring and secured with suitable counter sunk brass screws.

24.9.6. Number of traps in the floors must be kept to a min.

24.9.7. Where flush type switches or socket outlets are specified, the plate must over-lap the cavity and fit flush with plaster at all points. No 'filling'' or packing will be permitted.

24.9.8. Conduit buried in plaster is, in ordinary circumstances, deemed not to be in a damp situation.

24.10. Flame Proof Conduit Wiring:-

24.10.1. The system shall consist of single PVC unsheathed cable in screwed steel conduit installed for surface wiring as specified.

24.10.2. The loop-in system shall be employed, where necessary or advisable, Teeing off by means of taped porcelain in sheathed connectors in conduit boxes may be utilized as approved by the Engineer-in-Charge.

24.10.3. Capacities of different sizes of steel / PVC conduits, in terms of cables are given in Table - 24-2.

Sizes of	Size of conduit								
Cable mm (in)	20 mm dia		25 m	25 mm dia		40 mm dia		50 mm dia	
	PVC	Steel	PVC	Steel	PVC	Steel	PVC	Steel	
1mm ²	12	12	20	19	41	39	-	-	
1.5mm ²	11	10	18	17	32	30	-	-	
2.5 mm ² (1/1.78)	8	8	14	13	23	21	42	40	
2.5mm ² (7/0.67)	7	7	12	11	20	19	38	36	
4mm ²	5	5	9	9	17	16	30	28	
6mm ²	4	4	7	7	11	10	19	18	

TABLE 24-2

Max Capacity of Conduit

10mm ²	2	2	4	4	9	8	17	16
16mm ²	2	2	3	3	7	6	13	12
25mm ²	-	-	2	2	4	3	7	6
35mm ²	-	-	-	-	3	3	6	5
70mm ²	-	-	-	-	2	2	4	3

24.10.4. All conduits shall be Class "B", screwed, solid drawn and heavy gauge in accordance with BS 31.

24.10.4.1. For Storage of Explosive Group-15. The fittings shall be flame proof duly tested / approved by Govt of Pakistan, Central Testing Laboratories Lahore, in accordance with BSS-31 & 229.

24.10.4.2. For Storage of Explosive Groups-1, 2 & 4. The fittings shall be dust proof in accordance with BSS-5490.

24.10.4.3. **For Storage of Remaining Explosive etc:-**The fittings shall be totally enclosed in accordance with BBS-2817.

24.10.5. Fixing screws for conduit boxes and inspection covers shall be 8 mm x 14 mm. Tri head steel screws may be used or as specified by the Engineer-in-Charge.

24.11. PVC Sheathed Wiring:-

24.11.1. The system shall consist of single core PVC sheathed cable run and fixed on hard wood battens.

24.11.2. The standard system of wiring, i.e loop-in shall be employed in all works as specified.

24.11.3. In the loop-in system, where necessary or advisable and approved by the Engineer-in-Charge, joint boxes with fixed terminals may be utilized.

24.11.4. PVC cable shall not be installed in any situation exposed to direct rays of the sun.

24.11.5. **Fixing:-** The fixing shall be by means of clips.

24.11.6. Battens:-

24.11.6.1. The battens shall be of well-seasoned hard wood; smooth finished, free from knots, sap, other defects, and shall be of standard commercial size, not less than 13mm thickness.

24.11.6.2. It shall be given two coats of first quality varnish on all faces and ends, before erection. The second coat shall not be applied less than 24 hours after the first.

24.11.7. Erection:-

24.11.7.1. The clips shall be secured to battens with brass tacks of suitable sizes, spaced not more than 75mm for horizontal wiring and 100mm for vertical wiring.

24.11.7.2. The battens shall be secured to walls etc. by means of counter-sunk brass screws spaced not more than 900mm apart. Where there is a change of direction, the cable shall be brought over a rounded support of adequate radius to avoid sharp bends. Cable passing through walls etc shall be protected by solid drawn conduit suitably bushed or porcelain tube.

24.11.8. **Plugs:-** Only Rawal plugs of appropriate size shall be used to secure batten and conduit spacer etc to the walls. In places where the use of rawal plugs is not possible, well seasoned hard wood plugs of appropriate sizes and shape shall be used with prior approval of Engineer-in-Charge. These shall be embedded in cement plaster and repair shall be carried out with cement mortar in ratio 1:1.

24.11.9. **Screws and Fastenings:-** All screws used shall be of brass and of suitable shape. Clips shall be of brass or iron brass tinned buckle/ link type with counter sunk holes.

24.11.10. **Wooden Board and Blocks:-** All boards and blocks shall be recessed/ closed and of well seasoned hard wood and smooth finish, free from knots, sap, and any other defect and shall be of standard sizes.

24.12. Point Wiring:-

24.12.1. The wiring for a point shall be necessary for every room, passage, staircase, veranda, out building irrespective of the circuit.

24.12.2. The wiring shall be connected to any point on the existing wiring or to distribution board as ordered by the Engineer-in-Charge.

24.13. External Wiring:- Where it is essential to take wiring under the ground it will be done by means of PVC cables of proper size laid underground and carried through appropriate size of GI pipe or conduit, laid in a cement lined duct, having sufficient gradient to draw off the water which may accumulate due to rains or other causes. The depth of the duct shall be decided by the Engineer-in-Charge. In cases where the wiring has to be taken to a building situated over 1.8M from the main building, the cable shall be weather proof and attached to a galvanized steel suspension wire of suitable gauge able to carry the weight of the cable and in any case shall not be less than No.8 SWG. The attachment of the suspension wire shall be done by means of brass/ iron brass tinned clips of appropriate size as approved by the Engineer-in-Charge.

24.14. Main Control:- When the voltage of a supply exceeds 250 volts and supply is given to different pairs of terminals, the terminals shall be arranged in such a manner that there shall be no danger of shock and the wiring from those terminals shall be kept distinct and apart. The siting of all controls shall be decided by Engineer-in-Charge.



24.15. Earthed (Neutral) Conductor:-

24.15.1. In all cases, where the supply conductors include an earth neutral, an indication of a permanent nature shall be provided to enable such neutral conductor to be distinguished from any live conductor, at the point.

24.15.2. The contractor shall similarly indicate the outgoing conductors. No fuse should be fixed, in an earthed neutral.

24.16. Precautions Vis-a-vis Gas, Water Supply etc, Fittings:-In bath rooms, lavatories, sculleries, kitchens or any place where gas, water taps/ fittings or masses of metal connected to earth are handled, special precautions shall be taken so that it is impossible to touch the electrical apparatus/fittings or the accessories and the gas or water system, etc, simultaneously.

24.17. Portable Appliances:- All portable fittings or appliances where the metal case may become alive, shall have the body earthed by means of a third conductor in the flexible cord. The armouring of any flexible cord shall also be efficiently connected to earth.

24.18. Earthing:- (These specifications will not apply to lightning conductors, which is covered in Para 24.22.)

24.18.1. All metal parts other than conductors of electrical apparatus shall be efficiently earthed.

24.18.2. Where switches with earthed dollies are used, contractor shall ensure that the Earthing links are in sound condition after fixing. The path to earth from any portion of a conduit system or other metal intended to be earthed shall be as direct as possible. The number of earthing connections for all equipments/ appliances/ fittings of medium and high voltage shall be as decided by Engineer-in Charge, but generally not less than two. Earthing conductors shall be of hard drawn bare copper or phosphor bronze as specified by Engineer-in-Charge of not less than No 8 SWG or its equivalent for cable upto 20 mm² and the connections shall be clearly visible and where necessary shall be protected from mechanical injury. Size of earthing conductor for cable

higher than 20 mm², shall be in accordance with Table 24-3. No earth connection shall be made to hot water, steam or gas pipes. All connections to cold water pipe shall only be made, if they have metal-to-metal joints throughout and the water supply is in continuous use and in direct contact with the general mass of earth.

Load Cable size	Earthing lead (copper conductor)
25 mm ² to 35 mm ²	6 SWG
50 mm ² to 95 mm ²	2 SWG
120 mm ² and above	3 / 0 SWG

24.18.3. Earth continuity conductors shall be taken to a common Earthing point outside the building. In case, where earth continuity conductors are connected together, they shall be connected through lugs and tinned and the outgoing conductors to the common earth point shall be at least twice the nominal area of the largest single earth continuity conductor installed.

24.18.4. The max continuity resistance from any point in the installation incl the earth continuity conductor and earth lead to the earth pipe shall not exc one ohm (1W).

24.18.5. The earth shall be laid as below.

- i The excavation for the earth pipe shall be sunk to a depth of not less than 1.8M for ordinary earth and 2.5M for lightning conductors and shall not be less than 1.8M from the nearest foundation.
- ii The pipe shall be perforated having 18 holes of 3 mm dia. and shall not be less than 25mm dia. and 1.8M in length in any case. The perforated holes shall be equally spaced as far as practicable.
- iii The pipe shall be erected vertically and shall be surrounded with 50 Kg coke breeze at the bottom and 50 Kg of Rock salt over the Coke breeze to cover all sides. Resistance of the Earth pipe with respect to the mass of earth shall not exc 4 W and upto 10 Wfor **lightning conductors** is recommended.
- iv The earth wire from main earthing point to earth pipe shall be of hard drawn bare copper or phosphor bronze wire of not less than No 8 SWG, or its equivalent and shall be buried not less than 50 mm below floor level of verandas when crossing the same. All channelling necessary shall be made good in all respects with appropriate materials.
- v The shortest route to earth pipe shall be adopted but sharp bends and joints shall in all cases be avoided.

- vi The wire shall be connected through thimble placed in between two brass nuts and two brass washers on the top of 25 mm pipe.
- vii A cap shall also be provided on top of the pipe.

24.19. Electric Meter:- Where meters are erected they shall be mounted on meter boards or as otherwise directed, in such manner that the spindles of the revolving elements are vertical, and the planes through the armatures and disc horizontal. They shall be connected in the positive wire in DC and in the phase wire in AC in all "earthed" system. Normally the height of the dial of meter shall be 1.7M from floor.

24.20. Switch Connections:- All single pole switches shall be installed in the unearthed conductor that is the phase wire on AC and the positive wire on DC system.

24.21. Bus-bar Trunking and Components:-

24.21.1. **Bus-bar Trunking:**- The trunking shall be supplied in 3.60 M sections of 230mm x 70mm heavy gauge zinc coated mild steel casing with outlets at 60cm intervals to take "plug in" "tap off" units. The unused outlets shall be protected by removable steel cover plates. Each length shall be finished in a glossy battleship grey and shall be supplied complete with standard fixing brackets, fishplates, insulating panels and covers. The length shall contain four hard drawn high conductivity copper conductor strips having rounded lower edges and coupling so designed as to allow for expansion or contraction due to temperature variations. The conductor strip shall be supported by means of high grade insulating panels spaced at frequent intervals to withstand the stresses set up under short circuit condition. A substantial copper earth link shall be fitted on the side of trunking to provide efficient earth continuity throughout the entire installation. Spring plates shall be provided at all outlet points to ensure that all tap off units are efficiently earthed before contacts approach the live bars.

24.21.2. **Stop End Unit:-** Stop end unit for terminating a trunking run shall be complete with coupling plates, copper earth link, sherardized (zinc coated) steel fixing screws and finished to match trunking.

24.21.3. Main Cable Connection Unit:-

24.21.3.1. The unit shall be universal in type and should enable main cable to be fed into Bus bar system:-

24.21.3.2. Above or below of the Bus bar trunking in line with or at right angle to the Bus bar trunking.

24.21.3.3. The unit shall consist of a 46cm long section of 220 mm x 70 mm trunking with removable cover plates, fish plates or earth links etc. On this section of trunking, is mounted a 300 mm x 300 mm x 150 mm deep connection box, on which any two-part sealing chamber may be fitted.

24.21.4. Tap off Unit:-

24.21.4.1. The tap off unit shall be built into a zinc coated sheet steel case with hinged door and spring catch.

24.21.4.2. The contact fingers have universal configured copper contacts reinforced by heavy steel springs to maintain high-pressure contact with the Bus bars. Each tap off unit shall contain porcelain fuse box and grips and a solid natural connector.

24.22. Lightning Conductors:- The entire work shall be carried out in accordance with the specifications given in the British Standard Code of Practice CP 326-101 with amendments there to, read in conjunction with TI No.47, as amended from time to time. All materials shall conform to the latest and relevant British Standard Specifications and as described in TI No.47. All metallic finials on or above the surface of the roof of the structure should be bonded to form part of the Air Termination net work

24.22.1. **Air Termination:-** An air termination should be of copper and hard or medium hard drawn 15mm dia, 1.5M long fixed with copper/gun metal base by means of brass bolts, nut and washer etc, and screwed properly. An air termination shall be interconnected by means of roof conductors/ ring conductors. Subsequently, the entire air termination network shall be finally connected to earth termination through down conductors.

24.22.2. **Roof Conductors:-** All roof conductors shall be of copper strip, soft annealed 25mm x 3mm and shall be secured to roof by means of copper holdfasts and brass screws etc, and should be interconnected to air termination

24.22.3. **Down Conductors:-** Down conductors should follow the nearest possible direct route between the air termination and the earth termination. There should be no upturn in any down conductor and radius of any bend should be as large as possible. Each down conductor shall have to be provided with test joint at 0.3M height from the GL in such a position that the testing is carried out conveniently.

24.22.4. **Ring Conductors:-** Copper strip soft annealed 25mm x 3mm shall be used and secured properly with copper holdfasts and brass screws etc. The ring conductors shall be fixed 0.3 M above GL and bonded to magazine doors, window frame and electric conduits.

24.22.5. **Earth Termination:-** The Earth termination of copper strip soft annealed 25mm x 3mm shall be fixed to Earth electrode either of:-

24.22.5.1. GI pipe 25mm dia perforated by means of bolts, nuts and washers etc, and soldering properly ensuring that no leakage to earth resistance is possible. **Or**

24.22.5.2. 15mm dia. copper rod by means of brass nuts and washers as shown in the drawing. The other end of the copper strip shall be connected to test joint.

24.22.6. Earth Electrodes shall be of:-

24.22.6.1. 15mm dia copper rod not less than 2.5M length and shall be driven in the ground vertically.

24.22.6.2. GI pipe 25mm dia. light quality as per BSS 1387 having 24 holes of 3mm dia and not less than 2.5M length shall be erected vertically and shall be surrounded with 50Kg Coke Breeze at the bottom and 50Kg of Rock Salt over the Coke Breeze to cover all sides. Resistance of the earth pipe with respect to the mass of Earth shall not exc 10 ohms (incl air termination, down conductor, earth termination etc). Length of Earth electrode shall be increased to suit soil conditions, where it is necessary to bring the resistance within the limits.

24.22.7. **Joint and Bonds:-** The joints and bonds should be kept to min as far as possible and all joints or joints for strips, shall be tinned soldered.

24.22.8. **Test Joints:-** Testing joints shall be provided on down conductors in such a position that the testing is carried out without any inconvenience.

24.22.9. **Testing:-** On completion of the work, testing shall be carried out in dry season as far as possible. The testing instruments shall be arranged by the contractor at site and testing should be carried out by the contractor in the presence of Engineer-in-Charge, without any extra payment

24.22.10. Details shown in the drawings shall be followed as guidance.

24.23. Electrical Tests:- Tests for insulation resistance and earth continuity resistance, as required by Electricity Regulations, Govt of Pakistan, shall be carried out by the Licensed supervisor of the contractor in the presence of the Engineer-in-Charge and reports prepared and handed over to the later.

24.24. Samples:- Two sets of samples of all normal fittings and accessories, conduit or conduit fittings, cables and wires which are to be

supplied and fixed by the contractor shall be produced by the contractor for inspection/ approval of the Engineer-in-Charge. These samples shall be approved by the Engineer-in-Charge according to specifications. One set of approved samples shall be retained by the Engineer-in-Charge. No installation work shall proceed until such samples have been approved.

METHOD OF MEASUREMENTS

24.25. Electric light work shall be measured "per point" and shall incl any length of circuit for one room, passage or staircase etc as required with all accessories and fittings as described in clarification of rates, connections to distribution boards and those specifically mentioned below.

24.25.1. Wiring for wall sockets will be paid as for lighting points.

24.25.2. Extensions to existing circuits when ordered separately from lighting point will measure linear under appropriate item.

CLARIFICATION OF RATES

- 24.26. The rates inter alia incl particularly:
 - i. "Per point" incl all accessories except socket outlets, pendants, brackets, lamp fittings, shades, lamps, switches, bells and fans.
 - ii. All subsidiary materials such as nails, screws, wall hooks and plugs etc;
 - iii. Cutting holes in or through walls, taking up and re-fixing flooring board, notching or drilling holes through joints and making good all disturbed surfaces to match existing works;
 - iv. Earthing of third pin point of socket, outlet as described upto Main Control common Earthing point;
 - v. For fittings supplied by Mindef, removal from store together with all subsidiary materials incl those of other trades necessary for fixing such fittings.
 - vi. In repairs, taking down any existing fittings and removal to store together with the making good of wall and ceiling surface etc;
 - vii. Testing the complete installation as may be required.
 - viii. *Only schedule items deleted being obsolete.

NOTE :- For Lightning Conductor

- i Major metal work inside the building should be bonded to the lightning protection system.
- ii If rails are to be provided these should be properly earthed.

- iii If copper rod is to be used as earth electrode the process will be adopted as under:-
 - (a) Excavate a pit 30cm x 30cm x 30cm
 - (b) Drive copper rod 15mm dia. direct into the ground.
 - (c) Clean the surface of copper strip to be jointed with driven copper rod.
 - (d) Clean the rod to be soldered with copper strip
 - (e) Solder copper strip rod.
 - (f) Screw up the strip with bolts and nuts.
- iv It is the discretion of the Engineer in Charge to select the type of Earth according to resistivity of soil.



LIGHTNING CONDUCTOR



ARRANGEMENT FOR FIXING LIGHTNING CONDUCTOR

(COPPER ROD EARTH ELECTRODE)



ARRANGEMENT FOR FIXING LIGHTNING CONDUCTOR



LIGHTNING CONDUCTOR

ITEM RATES

SI No.	Description	Unit	Rate (Rs)
	Wiring		
24-1	*(Deleted being obsolete) One fan point, one light point, one bell point, controlled by one switch, wiring complete with PVC sheathed single/ core cable 3/0.029 with clips on hard wood batten, supply and fixing.	Point	-
24-2	*(Deleted being obsolete) Same as item 24-1, but fixing only.	Point	-
24-3	*(Deleted being obsolete) Add to item 24-1 or 24-2, if removal only.	Point	-
24-4	*(Deleted being obsolete) One fan point; one light point, one bell point, controlled by one switch, wiring complete, with PVC single core cable 1mm ² , in Concealed conduit, stove enamelled, supply and fixing.	Point	-
24-5	Same as item 24-4, but in Surface conduit, stove enamelled.	Point	2202.03
24-6	Same as item 24-4, but in Surface Flame proof conduit.	Point	3875.40
24-7	Same as item 24-4, but in Concealed PVC conduit.	Point	1578.92
24-8	Same as item 24-4, but in Surface PVC conduit.	Point	1040.96
24-9	*(Deleted being obsolete) One fan point; one light point, one bell point, controlled by one switch, wiring complete, with PVC single core cable 1.5mm ² , in Concealed conduit , stove enamelled, supply and fixing.	Point	Cris
24-10	Same as item 24-9 but in Surface conduit, stove enamelled.	Point	2330.58
24-11	Same as item 24-9, but in Surface flame proof conduit.	Point	4003.95
24-12	Same as item 24-9, but in Concealed PVC conduit.	Point	1707.47
24-13	Same as item 24-9, but in Surface	Point	1169.51

SI No.	Description	Unit	Rate (Rs)
	PVC conduit.		
24-14	Same as item 24-4 or 24-9, but fixing only.	Point	994.74
24-15	Same as item 24-5 or 24-10, but fixing only.	Point	619.80
24-16	Same as item 24-6 or 24-11, but fixing only.	Point	619.80
24-17	Same as item 24-7 or 24-12, but fixing only.	Point	994.74
24-18	Same as item 24-8 or 24-13, but fixing only.	Point	413.20
24-19	Add to item 24-4, 24-9 or 24-14, if removal only.	Point	413.20
24-20	Add to item 24-5, 24-10 or 24-15, if removal only.	Point	206.60
24-21	Add to item 24-6, 24-11 or 24-16, if removal only.	Point	206.60
24-22	Add to item 24-7, 24-12 or 24-17, if removal only.	Point	413.20
24-23	Add to item 24-8, 24-13 or 24-18, if removal only.	Point	206.60
24-24	*(Deleted being obsolete) One fan point, one light point, one bell point controlled by one switch, wiring complete with PVC sheathed single core cable 3/0.29 with clips on hard wood batten, but without batten, supply and fixing.	Point	-
24-25	*(Deleted being obsolete) Same as item 24-24, but fixing only.	Point	-
24-26	*(Deleted being obsolete) Add to item 24-24 or 24-25, if removal only	Point	-
24-27	One fan point, one light point, one bell point controlled by one switch, wiring complete with PVC single core cable 1mm ² , in surface or concealed conduit, but without conduit, supply and fixing.	Point	501.35
24-28	Same as item 24-27, but fixing only.	Point	206.60
24-29	Add to item 24-27 or 24-28, if removal only.	Point	91.06
24-30	*(Deleted being obsolete) One fan point, one light point, one bell point controlled by one switch, wiring complete with PVC single core cable 1.5 mm, ² in Concealed or surfaced conduit, stove enamelled, but	Point	-

without conduit, supply and fixing.

SI No.	Description	Unit	Rate (Rs)
24-31	*(Deleted being obsolete) Same as item 24-30, but fixing only.	Point	-
24-32	*(Deleted being obsolete) Add to item 24-30 to 24-31, if removal only	Point	-
24-33	*(Deleted being obsolete) Add for each additional light point on same switch circuit/ additional circuit, controlled by more than one switch, wiring, complete with PVC sheathed single core cable 3/0.029, with clips on hard wood batten, supply and fixing.	Point	-
24-34	*(Deleted being obsolete) Same as item 24-33, but fixing only.	Point	-
24-35	*(Deleted being obsolete) Add to item 24-33 or 24-34, if removal only	Point	-
24-36	*(Deleted being obsolete) Add for each additional light point on same switch circuit/additional circuit, for one bell point, controlled by more than one push switch, wiring complete with PVC single core cable 1mm, ² in Concealed conduit, stove enamelled, supply and fixing.	Point	-
24-37	Same as item 24-36, but in Surface conduit, stove enamelled.	Point	891.79
24-38	Same as item 24-36, but in Surface	Point	1501.24
24-39	Same as item 24-36, but in concealed PVC conduit	Point	601.50
24-40	Same as item 24-36, but in surface PVC conduit	Point	615.09
24-41	Add for each additional light point on same switch circuit/additional circuit, for one bell point controlled by more than one push switch, wiring complete with PVC single core cable 1.5 mm, ² in Concealed conduit, stove enamelled, supply and fixing.	Point	966.58
24-42	Same as item 24-41, but in Surface conduit, stove enamelled.	Point	1020.34
24-43	Same as item 24-41, but in Surface Flame proof conduit, or stove enamelled.	Point	1629.79
24-44	Same as item 24-41, but in Concealed	Point	730.05

SI No.	Description	Unit	Rate (Rs)
	PVC conduit.		
24-45	Same as item 24-41, but in Surface PVC conduit.	Point	743.64
24-46	Same as item 24-36 or 24-41, but fixing only	Point	206.60
24-47	Same as item 24-37 or 24-42, but fixing only	Point	154.95
24-48	Same as item 24-38 or 24-43, but fixing only	Point	206.60
24-49	Same as item 24-39 or 24-44, but fixing only	Point	206.60
24-50	Same as item 24-40 or 24-45, but fixing only	Point	206.60
24-51	Add to item 24-36, 24-41 or 24-46, if removal only.	Point	103.31
24-52	Add to item 24-37, 24-42 or 24-47, if removal only.	Point	77.47
24-53	Add to item 24-38, 24-43 or 24-48, if removal only.	Point	103.31
24-54	Add to item 24-39, 24-44 or 24-49, if removal only.	Point	103.31
24-55	Add to item 24-40, 24-45 or 24-50, if removal only.	Point	103.31
24-56	*(Deleted being obsolete) Add for each additional light point on same switch circuit/additional circuit for one bell point, controlled by more than one push switch, wiring complete with PVC sheathed single core cable 3/0.029, with clips on hard wood batten but without batten, supply and fixing.	Point	-
24-57	*(Deleted being obsolete)Same as item 24-56, but fixing only	Point	
24-58	(Deleted being obsolete) Add to item 24-56 or 24-57, if removal only	Point	<i>℃</i>
24-59	*(Deleted being obsolete) Add for each additional light point on same switch circuit/additional circuit, for one bell point controlled by more than one push switch, wiring complete with PVC single core cable 1mm, ² in Concealed conduit , stove enamelled but without conduit, supply and fixing.	Point	-

SI No.	Description	Unit	Rate (Rs)
24-60	Same as item 24-59, but in Surface conduit, stove enamelled.	Point	449.70
24-61	Same as item 24-59, but in Surface Flame proof conduit, stove enamelled.	Point	449.70
24-62	Same as item 24-59, but in concealed PVC conduit.	Point	449.70
24-63	Same as item 24-59, but in surface PVC conduit	Point	449.70
24-64	*(Deleted being obsolete) Add for each additional light point on same switch circuit/additional circuit, for one bell point controlled by more than one push switch, wiring complete with PVC single core cable 1.5 mm, ² in Concealed conduit, stove enamelled, but without conduit, supply and fixing.	Point	-
24-65	Same as item 24-64, but in Surface conduit, stove enamelled.	Point	578.25
24-66	Same as item 24-64, but in Surface , Flame proof conduit , stove enamelled.	Point	578.25
24-67	Same as item 24-64, but in Concealed PVC conduit.	Point	578.25
24-68	Same as item 24-64, but in Surface PVC conduit.	Point	578.25
24-69	Same as item 24-59 to 24-68, but fixing only.	Point	154.95
24-70	Add to item 24-59 to 24-69 if removal only.	Point	51.65
24-71	*(Deleted being obsolete) One light point, controlled by two ways switch, wiring complete with PVC sheathed single core cable 3/ 0.029, on hard wood batten, supply and fixing.	Point	City I
24-72	*(Deleted being obsolete) Same as item 24-71, but fixing only.	Point	-
24-73	*(Deleted being obsolete)Add to item 24-71 or 24-72, if removal only.	Point	-
24-74	*(Deleted being obsolete) One light point controlled by two way switch, wiring complete with PVC single core cable 1mm2 in Concealed conduit	Point	-

SI No.	Description	Unit	Rate (Rs)
L	stove enamelled, supply and fixing.		
24-75	Same as item 24-74, but in Surface conduit stove enamelled.	Point	2788.28
24-76	Same as item 24-74, but in Surface Flame proof conduit.	Point	5298.34
24-77	Same as item 24-74, but in Concealed	Point	1660.15
24-78	Same as item 24-74, but in Surface PVC conduit.	Point	1448.41
24-79	*(Deleted being obsolete) One light point controlled by two way switch, wiring complete with PVC single core cable 1.5mm ² Concealed conduits, stove enamelled, supply and fixing.	Point	-
24-80	Same as item 24-79, but in Surface conduit , stove enamelled.	Point	2942.54
24-81	Same as item 24-79, but in Surface Flame proof conduit.	Point	5452.60
24-82	Same as item 24-79, but in Concealed PVC conduit.	Point	1814.41
24-83	Same as item 24-79, but in Surface PVC conduit.	Point	1602.67
24-84	Same as item 24-74, or 24-79, but fixing only.	Point	994.74
24-85	Same as item 24-75, or 24-80, but fixing only.	Point	619.80
24-86	Same as item 24-76, or 24-81, but fixing only.	Point	619.80
24-87	Same as item 24-77, or 24-82, but fixing only.	Point	872.31
24-88	Same as item 24-78 or 24-83, but fixing only.	Point	619.80
24-89	Add to item 24-74, 24-79 or 24-84, if removal only.	Point	374.94
24-90	Add to item 24-75, 24-80 or 24-85, if removal only.	Point	206.60
24-91	Add to item 24-76, 24-81 or 24-86, if removal only.	Point	206.60
24-92	Add to item 24-77, 24-82 or 24-87, if removal only.	Point	374.94
24-93	Add to item 24-78, 24-83 or 24-88, if removal only.	Point	206.60

SI No.	Description	Unit	Rate (Rs)
24-94	*(Deleted being obsolete) One light point, controlled by two way switch, wiring, complete, with PVC sheathed, single core cable 3 / 0.029, with clip on hard wood batten, but without hard wood batten, supply and fixing.	Point	-
24-95	*(Deleted being obsolete) Same as item 24-94 but fixing only.	Point	-
24-96	*(Deleted being obsolete)Add to item 24-94 or 24-95 if removal only	Point	-
24-97	One light point controlled by two-way switch, wiring complete with PVC single core cable 1mm, ² in Concealed or surface conduit but without conduit, supply and fixing.	Point	560.30
24-98	One light point controlled by two way switch, wiring complete with PVC single core cable 1.5mm ² in Concealed or surface conduit , but without conduit, supply and fixing.	Point	629.90
24-99	Same as item 24-97 or 24-98, but fixing only.	Point	206.60
24-100	Add to item 24-97, 24-98 or 24-99, if removal only.	Point	103.31
24-101	*(Deleted being obsolete) Add for each additional light point on Same switch circuit, wiring complete with PVC sheathed single core cable 3/ 0.029, with clips on hard wood batten, supply and fixing.	Point	
24-102	*(Deleted being obsolete) Same as item 24-101, but fixing only.	Point	Kie
24-103	(Deleted being obsolete) Add to item 24-101 or 24-102, if removal only	Point	-0
24-104	*(Deleted being obsolete) Add for each additional light point on same switch two way circuit, wiring complete with PVC single core cable 1mm ² in Concealed conduit, stove enamelled, supply and fixing.	Point	-
24-105	Same as item 24-104, but in Surface conduit , stove enamelled.	Point	1145.09

SI No.	Description	Unit	Rate (Rs)
24-106	Same as item 24-104, but in Surface flame proof conduit, stove enamelled.	Point	1981.77
24-107	Same as item 24-104, but in Concealed PVC conduit.	Point	852.66
24-108	Same as item 24-104, but in Surface , PVC conduit .	Point	659.65
24-109	*(Deleted being obsolete) Add for each additional light point on Same switch 2 way circuit, wiring complete with PVC single core cable 1.5 mm ² in Concealed conduit, stove enamelled, supply and fixing.	Point	-
24-110	Same as item 24-109, but in Surface conduit , stove enamelled.	Point	1273.64
24-111	Same as item 24-109, but in Flame proof conduit.	Point	2110.33
24-112	Same as item 24-109, but in Concealed PVC conduit.	Point	981.22
24-113	Same as item 24-109, but in Surface PVC conduit.	Point	788.20
24-114	Same as item 24-104 or 24-109, but fixing only.	Point	413.20
24-115	Same as item 24-105 or 24-110, but fixing only.	Point	206.60
24-116	Same as item 24-106 or 24-111, but fixing only.	Point	206.60
24-117	Same as item 24-107 or 24-112, but fixing only.	Point	413.20
24-118	Same as item 24-108 or 24-113, but fixing only.	Point	206.60
24-119	Add to item 24-104, 24-109 or 24-114, if removal only.	Point	206.60
24-120	Add to item 24-105, 24-110 or 24-115, if removal only.	Point	103.31
24-121	Add to item 24-106, 24-111 or 24-116, if removal only.	Point	103.31
24-122	Add to item 24-107, 24-112 or 24-117, if removal only.	Point	103.31

SI No.	Description	Unit	Rate (Rs)
24-123	Add to item 24-108, 24-113 or 24-118, if removal only.	Point	103.31
24-124	*(Deleted being obsolete) Add for each additional light point on same switch 2 way circuit, wiring complete with PVC sheathed single core cable 3/0.029, on hard wood batten, but without hard wood batten, supply and fixing.	Point	-
24-125	*(Deleted being obsolete)Same as item 24-124, but fixing only.	Point	-
24-126	*(Deleted being obsolete)Add to item 24-124 or 24-125,if removal only	Point	-
24-127	*(Deleted being obsolete)Add for each additional light point on same switch 2-way circuit, wiring complete with PVC single core cable 1mm ² , in Concealed conduit stove enamelled, but without conduit, supply and fixing.	Point	-
24-128	Same as item 24-127, but in Surface conduit, stove enamelled.	Point	501.35
24-129	Same as item 24-127, but in Surface Flame proof conduit.	Point	501.35
24-130	Same as item 24-127, but in Concealed PVC conduit.	Point	501.35
24-131	Same as item 24-127, but in Surface PVC conduit.	Point	501.35
24-132	Add for each additional light point on Same switch 2-way circuit, wiring complete with PVC single core cable 1.5 mm ² in Concealed conduit , stove	Point	629.90

and fixing. Same as item 24-132, but in Surface 24-133 Point 629.90 conduit, stove enamelled. 24-134 Same as item 24-132, but in Surface Point 629.90 Flame proof conduit. 24-135 Same as item 24-132, but Point 629.90 in **Concealed PVC conduit.**

enamelled but without conduit, supply

24-136 Same as item 24-132, but in **Surface** Point 629.90 **PVC conduit.**

SI No.	Description	Unit	Rate (Rs)
24-137	Same as item 24-127 to 24-136, but fixing only.	Point	206.60
24-138	Add to item 24-127 to 24-137, if removal only.	Point	103.31
24-139	*(Deleted being obsolete)One three pin socket outlet, 5 A, point controlled by one switch, wiring complete with PVC sheathed single core Cable 3 / 0.029, with clips on hard wood batten, incl earth wire, supply and fixing.	Point	-
24-140	*(Deleted being obsolete)Same as item 24-139, but fixing only.	Point	-
24-141	(Deleted being obsolete) Add to item 24-139 or 24-140, if removal only	Point	-
24-142	*(Deleted being obsolete)One three pin socket outlet, 5A, point controlled by one switch, wiring complete with PVC single core cable 1mm ² , in Concealed conduit, stove enamelled incl earth wire, supply and fixing.	Point	-
24-143	Same as item 24-142, but in Surface conduit, enamelled.	Point	2702.31
24-144	Same as item 24-142, but in Surface flame proof conduit, stove enamelled.	Point	4398.64
24-145	Same as item 24-142, but in Concealed PVC conduit.	Point	1894.21
24-146	Same as item 24-142, but in Surface PVC conduit.	Point	1516.76
24-147	*(Deleted being obsolete)One three pin socket outlet, 5A, point controlled by one switch, wiring complete PVC with single core cable 1.5 mm ² in Concealed conduit, stove enamelled, including earth wire, supply and fixing.	Point	C.C.S
24-148	Same as item 24-147, but in Surface conduit , stove enamelled.	Point	2830.86
24-149	Same as item 24-147, but in Surface Flame proof conduit.	Point	4527.19
24-150	Same as item 24-147, but in	Point	2022.76

SI No.	Description	Unit	Rate (Rs)
	Concealed PVC conduit.		
24-151	Same as item 24-147, but in Surface PVC conduit.	Point	1645.31
24-152	*(Deleted being obsolete)One three pin socket outlet, 5A, point controlled by one switch, wiring complete with PVC sheathed single core cable, 3 / 0.029, and copper conductor for earth, on hard wood batten, but without hard wood batten, supply and fixing.	Point	-
24-153	*(Deleted being obsolete)Same as item 24-152, but fixing only.	Point	-
24-154	*(Deleted being obsolete)Add to item 24-152 or 24-153, if removal only	Point	-
24-155	One three pin socket outlet, 5A, point controlled by one switch, wiring complete with PVC single core cable 1mm ² , in Concealed or Surface conduit incl copper conductor, but without conduit, supply and fixing.	Point	720.99
24-156	Same as item 24-155, but fixing only.	Point	206.60
24-157	Add to item 24-155 or 24-156, if removal only.	Point	103.31
24-158	One three pin socket outlet, 5A, point controlled by one switch, wiring complete with PVC single core cable 1.5mm ² , in Concealed or Surface conduit but without conduit and copper conductor, supply and fixing.	Point	629.90
24-159	Same as item 24-158 but fixing only.	Point	206.60
24-160	Add to item 24-158 or 24-159, if removal only	Point	103.31
24-161	*(Deleted being obsolete) One three pin socket outlet, 15 A, point controlled by one switch, wiring complete with PVC single core cable 7 / 0.029, on hard wood batten,incl earth wire, supply and fixing.	Point	-
24-162	*(Deleted being obsolete) Same as item 24-161, but fixing only.	Point	-

SI No.	Description	Unit	Rate (Rs)
24-163	(Deleted being obsolete) Add to item 24-161 or 24-162, if removal only.	Point	-
24-164	*(Deleted being obsolete) One three pin socket outlet, 15 A, point controlled by one switch, wiring complete with PVC single core cable 2.5mm ² , in Concealed conduit stove enamelled, incl earth wire, supply and fixing.	Point	-
24-165	Same as item 24-164, but in Surface conduit stove enamelled.	Point	3107.98
24-166	Same as item 24-164, but in Surface Flame proof conduit.	Point	4854.81
24-167	Same as 24-164, but in Concealed PVC conduit.	Point	2289.17
24-168	Same as item 24-164, but in Surface PVC conduit .	Point	1936.21
24-169	*(Deleted being obsolete) Same as item 24-142, 24 -147 or 24-164, but fixing only.	Point	-
24-170	Same as item 24-143, 24-148 or 24-165, but fixing only.	Point	619.80
24-171	Same as item 24-144, 24-149 or 24-166, but fixing only.	Point	910.57
24-172	Same as item 24-145, 24-150 or 24-167 but fixing only.	Point	1033.00
24-173	Same as item 24-146, 24-151 or 24-168, but fixing only.	Point	619.80
24-174	Add to item 24-142, 24-147, 24-164, or 24-169, if removal only.	Point	413.20
24-175	Add to item 24-143, 24-148, 24-165 or 24-170, if removal only.	Point	413.20
24-176	Add to item 24-144, 24-149, 24-166 or 24-171, if removal only.	Point	413.20
24-177	Add to item 24-145, 24-150, 24-167 or 24-172, if removal only.	Point	413.20
24-178	Add to item 24-146, 24-151, 24-168 or 24-173, if removal only.	Point	413.20
24-179	*(Deleted being obsolete) One three pin socket outlet, 15 A, point controlled by one switch, wiring complete with	Point	-

SI No.	Description	Unit	Rate (Rs)
	PVC sheathed single core cable 7/ 0.029, on hardwood batten but without hardwood batten and copper conductor, supply and fixing.		
24-180	*(Deleted being obsolete)Same as item 24-179, but fixing only.	Point	-
24-181	*(Deleted being obsolete)Add to item /24-179 or 24-180, if removal only.	Point	-
24-182	One three pin socket outlet, 15A, point controlled by one switch, wiring complete with PVC single core cable 2.5mm ² copper conductor in Concealed or Surface conduit but without conduit, and copper conductor, supply and fixing.	Point	1060.83
24-183	Same as item 24-182, but fixing only.	Point	413.20
24-184	Add to item 24-182 or 24-183, if removal only	Point	206.60
24-185	Copper conductor 14 SWG for 3 pin 5 A, or 3 pin, 15 A, socket outlet points, in Concealed or Surface conduit, but without conduit, supply and fixing.	Point	267.47
24-186	Same as item 24-185, but fixing only.	Point	51.65
24-187	Add to item 24-185 or 24-186, if removal only.	Point	25.82
24-188	Cable unsheathed for earth continuity conductor, 1 mm ² used for light/ fan/bell 5 A socket outlet points, where metallic boards / housings are used, in Concealed or Surface conduit, but without conduit, supply and fixing.	Point	191.22
24-189	Same as item 24-188, but fixing only.	Point	51.65
24-190	Add to item 24-188 or 24-189, if removal only.	Point	25.82
24-191	Cable unsheathed for earth continuity conductor 1.5 mm ² used for 15 A socket outlet points, where metallic boards/housings are used, in Concealed or Surface conduit, but without conduit, supply and fixing.	Point	220.97
24-192	Same as item 24-191, but fixing only.	Point	51.65

448

SI No.	Description	Unit	Rate (Rs)
24-193	Add to item 24-191 or 24-192, if removal only	Point	25.82
	Fittings and Accessories For Pendants		
24-194	Pendant, ordinary, comprising ceiling rose, lamp holder Bakelite, BC, CG, with shade carrier ring and twin core 0.75 mm2 flexible cord upto 3M in length, supply and fixing.	Each	337.04
24-195	Same as item 24-194, but without lamp holder	Each	263.51
24-196	Pendant, stiff, comprising galvd back plate 20 mm, ET, galvd welded heavy gauge screwed steel conduit upto one metre in length, 20 mm brass adopter BC Bakelite lamp holder, wired complete, supply and fixing.	Each	464.02
24-197	Same as item 24-196, but with CP steel tube, 0.61 M long.	Each	402.82
24-198	Same as item 24-194 to 24-197, but fixing only	Each	60.02
24-199	Add to item 24-194 to 24-198, if removal only.	Each	30.00
	Brackets		
24-200	Bracket Exterior , swan neck upto 300 mm projection incl 20 mm steel conduit, and round back plate double cone reflector, BC, brass holder and adopter, supply and fixing.	Each	440.01
24-201	Bracket Bath room, with globe white glass opal, 150 mm dia, complete with lamp holder BC with shade carrier ring, supply and fixing.	Each	580.81
24-202	Bracket Wall , with globe white glass opal, 150mm dia, complete with gallery and lamp holder BC, with shade carrier ring, supply and fixing	Each	623.66
24-203	Same as item 24-200 to 24-202, but fixing only	Each	72.72
24-204	Add to item 24-200 to 24-203, if removal only.	Each	36.36
	Lamp Holder		
24-205	Lamp holder, batten BC with shade, carrier ring 20 mm, all insulated	Each	97.06

SI No.	Description	Unit	Rate (Rs)
L	reinforced linear, supply and fixing.		
24-206	Same as item 24-205, but 45° angle	Each	97.06
24-207	Lamp holder ES, CG, supply and fixing	Each	94.61
24-208	Lamp holder ES, threaded 20 mm dia, ET, supply and fixing.	Each	107.37
24-209	Lamp holder brass screw type for 500 / 300W Lamp, supply and fixing	Each	140.43
24-210	Same as item 24-205 to 24-209, but fixing only.	Each	36.36
24-211	Add to item 24-205 to 24-210, if removal only.	Each	18.18
24-212	Shade enamelled, conical, 28 mm hole, 250 mm or 300 mm dia, by 88-100mm deep, supply and fixing.	Each	90.06
24-213	Reflector enamelled, dispersive, 400mm dia, 250-260 mm high, ES, complete with lamp holder for ES 200W lamp, supply and fixing.	Each	580.66
24-214	Same as item 24-212 or 24-213, but fixing only.	Each	27.28
24-215	Add to item 24-212 to 24-214, if removal only.	Each	13.64
	Fluorescent Light Fitting		
24-216	Reflector, trough type, stove enamelled white in side, green/grey outside complete with choke, starter, holder and capacitor, without fluorescent tube suitable for 1.20 M, 40W tube, supply and fixing.	Each	1945.90
24-217	Same as item 24-216, but 2 x 1.20M, 40W tube.	Each	3072.26
24-218	Fluorescent tube light fitting, rectangular box type, housing made of white stove enamelled 22 BG steel sheet, having spring loaded inner frame attachment with acrylic, sheet or cover or plastic louver, earthing terminals, complete, with 2 x1.20M, 40W fluorescent tubes, blast, starters, holders, two stiff pendants and canopies, supply and fixing.	Each	5802.45
24-219	Fluorescent tube, recessed light fitting 650 mm x 650 mm, square type,	Each	5838.07

SI No.	Description	Unit	Rate (Rs)
ħ	suitable for fixing in recessed or direct on the ceiling, complete with 4 x 600 mm, 20W fluorescent tubes, chokes, starters, tube holders, encased in steel body, durable stove enamelled finish with acrylic sheet cover, supply and fixing.		
24-220	Same as item 24-219, but fixing only.	Each	181.81
24-221	Add to item 24-219 or 24-220, if removal only	Each	90.90
24-222	Bath room light fitting complete with fluorescent tube, 0.3M, 10 W, choke, starter, and plastic cover, supply and fixing.	Each	470.62
24-223	Fluorescent light fitting, complete with 1x 600 mm, 20 W fluorescent tube, choke, starter, tube holder, encased in steel sheet body painted white inside and green/gray outside, complete with plastic cover, supply and fixing.	Each	1970.39
24-224	Patty fitting, complete with 1.20 M, 40W fluorescent tube, choke, starter and holder, supply and fixing.	Each	819.55
24-225	Same as item 24 -216 to 24-218 or 24-222 to 24-224, but fixing only	Each	72.72
24-226	Add to item 24-216 to 24-218 or 24-222 to 24- 225, if removal only.	Each	36.36
24-227	Fluorescent tube 1.20M, 40W, supply and fixing	Each	128.37
24-228	Same as item 24-227, but 0.6 M, 20 W	Each	113.68
24-229	Same as item 24-227, but 0.3 M, 10 W	Each	97.76
24-230	Same as item 24-227 to 24-229, but fixing only	Each	18.18
24-231	Add to item 24-227 to 24-230, if removal only.	Each	9.10
24-232	Globe white glass opal, 150 mm dia, complete with gallery, supply and fixing.	Each	213.89
24-233	Same as item 24-232, but 250/300 mm dia	Each	477.11
24-234	Same as item 24-232 or 24-233, but fixing only.	Each	36.36
24-235	Add to item 24-232 to 24-234, if removal only.	Each	18.18

SI No.	Description	Unit	Rate (Rs)
24-236	Aluminium alloy anodized chain, for hanging lights, supply and fixing.	Metre	291.35
24-237	Same as item 24-236, but fixing only.	Metre	3.64
24-238	Add to item 24-236 or 24-237, if removal only.	Metre	1.82
	Switches and Socket Outlets		
24-239	Switch, SP, Bakelite, surface type, 5A, all insulated one way, supply and fixing.	Each	76.25
24-240	Same as item 24-239, but two ways	Each	88.49
24-241	Same as item 24-239 or 24-240, but fixing only.	Each	27.28
24-242	Add to item 24-239, 24-240 or 24-241, if removal only.	Each	13.64
24-243	Switch, SP, Bakelite, suspension type , push action, all insulated, one or two way switch, supply and fixing.	Each	76.91
24-244	Same as item 24-243, but fixing only	Each	21.82
24-245	Add to item 24-243 or 24-244, if removal only	Each	10.91
24-246	Switch SP, 5A, Piano type single or two way mounted in cast or malleable iron galvd conduit box, with solid metal or Bakelite plate, supply and fixing.	Each	82.19
24-247	Same as item 24-246, but fixing only	Each	45.46
24-248	Add to item 24-246 or 24-247, if removal only.	Each	22.72
24-249	Switch water tight, SP, 5A, galvd, front side operated, screwed, 20mm, conduit terminal or through pattern one way, supply and fixing.	Each	250.25
24-250	Same as item 24-249, but fixing only	Each	72.72
24-251	Add to item 24-249 or 24-250, if removal only	Each	36.36
24-252	Switch, SP, socket outlet 3 pin, 5A, Bakelite, shuttered pattern, complete, supply and fixing.	Each	183.09
24-253	Same as item 24-252, but in galvd, cast or malleable iron, in lieu of Bakelite box	Each	262.49

SI No.	Description	Unit	Rate (Rs)
24-254	Same as item 24-252 or 24-253, but fixing only.	Each	72.72
24-255	Add to item 24-252, 24-253 or 24-254, if removal only.	Each	36.36
24-256	Plug 3 pin, 5A, supply and fixing.	Each	73.27
24-257	Same as item 24-256, but 15A	Each	122.25
24-258	Same as item 24-256 or 24-257, but fixing only.	Each	18.18
24-259	Add to item 24-256, 24-257 or 24-258, if removal only.	Each	9.10
24-260	Switch, SP, socket out let 3 pin, 15A, shuttered pattern, mounted in Bakelite box complete, supply and fixing.	Each	268.80
24-261	Switch, SP socket outlet 3 pin, 15A, shuttered pattern, mounted in a weather proof C I case, drilled and tapped 20 mm, ET with screw on type, metal cap attached by chain, complete, supply and fixing.	Each	684.87
24-262	Same as item 24-260 or 24-261, but fixing only	Each	72.72
24-263	Add to item 24-260 to 24-261 or 24-262, if removal only.	Each	36.36
24-264	Socket Outlet, Industrial 380/400V, 3 phase, neutral and earth, water protected 16 A, supply and fixing.	Each	1159.41
24-265	Same as item 24-264, but 32 A	Each	1453.24
24-266	Same as item 24-264, but 63 A	Each	4340.76
24-267	Same as item 24-264, 24-265 or 24-266, but fixing only.	Each	363.62
24-268	Add to item 24-264 to 24-266 or 24-267, if removal only.	Each	181.81
24-269	Plug for Socket Outlet, Industrial 380 / 400V, 3 phase, neutral and earth, water protected, 16A, supply and fixing.	Each	617.17
24-270	Same as item 24-269, but 32A	Each	874.27
24-271	Same as item 24-269, but 63A	Each	2843.74
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SI No.	Description	Unit	Rate (Rs)
24-272	Same as item 24-269 to 24-270, but fixing only.	Each	109.09
24-273	Same as item 24-271, but fixing only	Each	272.71
24-274	Add to item 24-269 to 24-270 or 24-272, if removal only.	Each	54.54
24-275	Add to item 24-271 or 24-273, if removal only.	Each	136.36
24-276	Bulk head fittings CI, without guard, tapped, 20mm ET, according to BSS No 229 of 1957, supply and fixing	Each	684.69
24-277	Same as item 24-276, but with guard	Each	703.05
24-278	Same as item 24-276 to 24-277, but fixing only	Each	90.90
24-279	Add to item 24-276 to 24-277 or 24-278, if removal only.	Each	45.46
	Earthing		
24-280	Earth, complete as described in Para 24.18.5 of the Specifications, with 8 SWG copper conductor, supply and fixing.	Each	4190.58
24-281	Same as item 24-280, but with 6 SWG	Each	4275.12
24-282	Same as item 24-280, but with 2 SWG	Each	4745.47
24-283	Same as item 24-280, but with 3/0 SWG	Each	8732.78
24-284	Same as item 24-280 to 24-283, but fixing only	Each	1372.75
24-285	Add to item 24-280 to 24-283 or 24-284, if removal only.	Each	227.27
	Lightning Conductor		
24-286	Air termination for Lightning Conductor, with 15 mm dia copper rod, 150 cm long, with gunmetal copper base, 75 mm x 40 mm x 30 mm, fixed complete, with brass bolts, supply and fixing.	Each	4834.15
24-287	Same as item 24-286, but fixing only	Each	181.81
24-288	Add to item 24-286 or 24-287, if removal only.	Each	90.90
24-289	Down conductor, roof conductor and	Metre	862.40

SI No.	Description	Unit	Rate (Rs)
	conductor required for bonding exposed metal work to earthing conductor with copper strips, 25 mm x 3 mm, supply and fixing.		
24-290	Same as item 24-289, but fixing only	Metre	72.72
24-291	Add to item 24-289 or 24-290, if removal only.	Metre	36.36
24-292	Inspection joints cross, tee, straight as per site requirement, supply and fixing.	Each	404.79
24-293	Same as item 24-292, but fixing only	Each	45.46
24-294	Add to item 24-292 or 24-293, if removal only.	Each	22.72
24-295	Earth for Lightning conductor, complete as described in Para 24.22.6.2 of the Specifications, inclusive of copper strip upto test joint, supply and fixing.	Each	5719.01
24-296	Same as item 24-295, but as described in Para 24.22.6.1 of the Specifications.	Each	5624.43
24-297	Same as item 24-295 or 24-296, but fixing only.	Each	1463.65
24-298	Add to item 24-295, 24-296 or 24-297 if removal only.	Each	363.62
	Energy Meter		
24-299	Meter Electric AC 220/250V, single phase, 50 cycle upto 30A, supply and fixing	Each	2884.00
24-299.1	Digital Electric Meter (TOU) AC 220/250V, single phase, 50 cycle upto 30A, supply and fixing	Each	4145.03
24-300	Same as item 24-299,24-299.1, but fixing only	Each	227.27
24-301	Add to item 24-299, 24-299.1 or 24-300, if removal only.	Each	113.63
24-302	Meter electric AC 400 volts, 3 phase, 50 cycle, 4 wire, 15-90A, supply and fixing.	Each	7227.20
24-302.1	Digital Electric Meter (TOU) AC 400 W, 3 Phase, 50 Cycle, 4 wire, 15-90A,	Each	23571.61

SI No.	Description	Unit	Rate (Rs)
L	supply and fixing.		
24-303	Same as item 24-302, but 100A	Each	17756.18
24-303.1	Same as item 24-302.1 , but 100A.	Each	38263.21
24-304	Same as item 24-302, but 200 A, complete with CTs.	Each	19216.00
24-304.1	Same as item 24-302.1 but 200 A, complete with CTs.	Each	39723.03
24-305	Same as item 24-302,24-302.1,24-303, 24-303.1, 24-303, but fixing only	Each	454.52
24-306	Same as item 24-304,24-304.1 but fixing only	Each	545.43
24-307	Add to item 24-302 to 24-306, if removal only.	Each	227.27
	Flame Proof Fittings		
24-308	Switch Flame proof, SP, 5 A, drilled and tapped on both sides, solid brass threaded plug for fitting the hole not required. The switch and cover be completely inter-locked, supply and fixing. (The complete unit should comply with BSS No.229, 542 and 889)	Each	1253.99
24-309	Switch socket flame proof, 3 pin 5A, complete as specified, supply and fixing.	Each	5600.25
24-310	Same as item 24-309, but 15A	Each	8048.85
24-311	Same as item 24308 to 24-310, but fixing only.	Each	90.90
24-312	Add to item 24-308 to 24-310 or 24-311, if removal only	Each	45.46
24-313	Switch fuse Flame proof, SP, 250V, 15A, terminal chamber drilled and tapped, 25mm ET on both sides, solid brass threaded plug for sealing hole not required, supply and fixing (The complete unit should comply with BSS No 229, 542 and 889).	Each	5622.98
24-314	Same as item 24-313, but 250/500 V, 30 A	Each	10397.75
24-315	Same as item 24-313, but TPNL, 500V, 15 A	Each	9147.97

SI No.	Description	Unit	Rate (Rs)
24-316	Same as item 24-313, but TPNL, 500 V, 30 A	Each	15055.22
24-317	Same as item 24-313, but TPNL, 500 V, 60 A	Each	27815.79
24-318	Same as item 24-313, but TPNL, 500 V, 100 A	Each	28183.08
24-319	Same as item 24-313, but TPNL, 500 V, 200 A	Each	49881.04
24-320	Same as item 24-313, but TPNL, 500 V, 300 A	Each	66531.52
24-321	Same as item 24-313, but fixing only	Each	113.63
24-322	Same as item 24-314, but fixing only	Each	113.63
24-323	Same as item 24-315, but fixing only	Each	363.62
24-324	Same as item 24-316, but fixing only	Each	363.62
24-325	Same as item 24-317 or 24-318, but fixing only	Each	636.33
24-326	Same as item 24-319 or 24-320, but fixing only	Each	909.04
24-327	Add to item 24-313, 24-314, 24-321 or 24-322, if removal only	Each	56.82
24-328	Add to item 24-315, 24-316, 24-323 or 24-324, if removal only	Each	181.81
24-329	Add to item 24-317 to 24-318 or 24-325, if removal only	Each	318.17
24-330	Add to item 24-319, 24-320 or 24-326, if removal only.	Each	454.52
24-331	Flame proof fitting, 20 mm ET tapped entry, CI body, grey painted, with heavy glass cemented to fixed ring, strong wire guard and lamp holder with terminal chamber, internal connections of solid metal passing through insulating sleeves dispersive or angle type, vitreous enamelled reflector, over all height 300 mm and overall dia 175 mm, suitable for 60/100 W lamp, supply and fixing.	Each	3212.87
24-332	Same as item 24-331, but suitable to take upto 150W lamp.	Each	4437.17
24-333	Same as item 24-331 or 24-332, but	Each	90.90

SI No.	Description	Unit	Rate (Rs)
L	fixing only.		
24-334	Add to item 24-331 to 24-333, if removal only.	Each	45.46
24-335	Spare glass and ring for item 24-331 or 24-332, supply and fixing.	Each	1147.33
24-336	Same as item 24-335, but fixing only.	Each	45.46
24-337	Add to item 24-335 or 24-336, if removal only.	Each	22.72
	Switch Fuses		
24-338	Switch fuse, IC, 250V, SP, fused and NL-15 A, supply and fixing.	Each	517.65
24-339	Same as item 24-338, but 30A	Each	560.50
24-340	Same as item 24-338, but 60A	Each	2073.72
24-341	Same as item 24-338, but 100A	Each	3438.81
24-342	Same as item 24-338 or 24-339, but fixing only.	Each	113.63
24-343	Same as item 24-340 or 24-341, but fixing only.	Each	145.45
24-344	Add to item 24-338, 24-339 or 24-342, if removal only.	Each	56.82
24-345	Add to item 24-340, 24-341 or 24-343, if removal only.	Each	72.72
24-346	Switch fuse IC, 500 V, TP, fused, 15 A, supply and fixing.	Each	1424.30
24-347	Same as item 24-346, but 30A	Each	1962.99
24-348	Same as item 24-346, but 60A	Each	3073.67
24-349	Same as item 24-346, but 100A	Each	6171.39
24-350	Same as item 24-346 or 24-347, but fixing only	Each	154.95
24-351	Same as item 24-348 to 24-349, but fixing only	Each	206.60
24-352	Add to item 24-346, 24-347 or 24-350, if removal only	Each	68.18
24-353	Add to item 24-348, 24-349 or 24-351, if removal only	Each	123.96
24-354	Switch fuse, IC, 500 volts, TP, fused	Each	2709.82

SI No.	Description	Unit	Rate (Rs)
	with NL-15A, supply and fixing.		
24-355	Same as item 24-354, but 30A	Each	3260.75
24-356	Same as item 24-354, but 60A	Each	5020.30
24-357	Same as item 24-354, but 100A	Each	9746.35
24-3 <mark>5</mark> 8	Same as item 24-354, but 200A	Each	13968.65
24-359	Same as item 24-354, but 300A	Each	15682.67
24-360	Same as item 24-354, but 400A	Each	26211.65
24-361	Same as item 24-354 to 24-355, but fixing only	Each	154.95
24-362	Same as item 24-356 to 24-357, but fixing only.	Each	206.60
24-363	Same as item 24-358 to 24-360, but fixing only	Each	413.20
24-364	Add to item 24- 354 to 24-355 or 24-361, if removal only.	Each	68.18
24-365	Add to item 24-356 to 24-357 or 24-362, if removal only.	Each	123.96
24-366	Add to item 24-358 to 24-360 or 24-363, if removal only.	Each	272.71
24-367	Change over switch , 15 A, SP, 250V, 50 cycles, DP, wall mounted type, supply and fixing.	Each	795.32
24-368	Same as item 24-367but 30 A	Each	819.80
24-369	Change over switch , 30 A, TP with NL, wall mounted type, supply and fixing.	Each	3214.46
24-370	Same as item 24-369, but 60A.	Each	4683.62
24-371	Same as item 24-369, but 100 A.	Each	7217.41
24-372	Same as item 24-369, but 200 A.	Each	11735.07
24-373	Same as item 24-369, but 300 A.	Each	14899.89
24-374	Same as item 24-369, but 400 A.	Each	53146.25
24-375	Same as item 24-369, but 500 A.	Each	72735.05
24-376	Same as item 24-367 to 24-370, but fixing only.	Each	206.60
24-377	Same as item 24-371 to 24-373, but fixing only.	Each	309.91
24-378	Same as item 24-374 to 24-375, but	Each	413.20

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SI No.	Description	Unit	Rate (Rs)
	fixing only.		I
24-379	Add to item 24-367 to 24-370 or 24-376, if removal only.	Each	154.95
24-380	Add to item 24-371 to 24-375 or 24-377, 24-378, if removal only.	Each	272.71
	HRC Fuses		
24-381	HRC fuse, 2 to 30 A, supply and fixing.	Each	498.76
24-382	Same as item 24-381, but 35 to 60A.	Each	556.30
24-383	Same as item 24-381, but 100 to 200A.	Each	1186.04
24-384	Same as item 24-381, but 300A.	Each	1326.84
24-385	Same as item 24-381, but 400A.	Each	1430.90
24-386	Same as item 24-381 to 24-382, but fixing only.	Each	103.31
24-387	Same as item 24-383, to 24-385, but fixing only.	Each	206.60
24-388	Add to item 24-381 to 24-382 or 24-386, if removal only	Each	61.99
24-389	Add to item 24-383 to 24-385 or 24-387, if removal only.	Each	136.36
	MCCBs	0	
24-390	MCCB, TP 500/600V, 50/60 cycles, complete with thermal and magnetic trips, 3 to 30A, (breaking capacity 2.5 KA), Supply and fixing.	Each	4388.36
24-391	Same as item 24-390, but 40 to 50A.	Each	4510.79
24-392	Same as item 24-390, but 15 to 60A (breaking capacity 5 KA).	Each	6959.39
24-393	Same as item 24-390, but 75 to 100A (breaking capacity 5 KA).	Each	8896.45
24-394	Same as item 24-390, but 125 to 225A (breaking capacity 18 KA).	Each	20968.05
24-395	Same as item 24-390, but 250 to 400A (breaking capacity 25 KA).	Each	31529.56
24-396	Same as item 24-390, but 500 to 600A (breaking capacity 25 KA)	Each	73155.76

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SI No.	Description	Unit	Rate (Rs)
24-397	Same as item 24-390, but 800A with external handle (breaking capacity 45 KA).	Each	110600.20
24-398	Same as item 24-390, but 1000A with external handle (breaking capacity 85 KA)	Each	196301.20
24-399	Same as item 24-390, but 1250A with external handle (breaking capacity 85 KA)	Each	220787.20
24-400	Same as item 24-390, 24-391 or 24-392, but fixing only.	Each	103.31
24-401	Same as item 24-393 or 24-394, but fixing only.	Each	154.95
24-402	Same as item 24-395 or 24-396, but fixing only.	Each	309.91
24-403	Same as item 24-397 to 24-399, but fixing only	Each	413.20
24-404	Add to item 24-390 to 24-392 or 24-400, if removal only.	Each	68.18
24-405	Add to item 24-393 to 24-394, or 24-401, if removal only.	Each	102.27
24-406	Add to item 24-395 to 24-396 or 24-402, if removal only.	Each	204.53
24-407	Add to item 24-397 to 24-399 or 24-403, if removal only.	Each	204.53
24-408	MCCB, SP, 6 to 63A. (Breaking capacity 6 KA), supply and fixing	Each	786.23
24-409	Same as item 24-408 but double pole .	Each	2071.75
24-410	Circuit breaker, built in plug type, 3 pin (Breaking capacity 6 KA) 6 to 20A, supply and fixing.	Each	938.89
24-411	Same as item 24-408 to 24-410, but fixing only.	Each	51.65
24-412	Add to item 24-408 to 24-411, if removal only.	Each	34.08
24-413	Earth leakage circuit breakers, four poles, 500/660V, 50/60 cycle, complete with earth leakage, over load and short circuit protection, 15 to 100A (breaking capacity 14 KA, at 415V), supply and fixing.	Each	62645.90

SI No.	Description	Unit	Rate (Rs)
24-414	Same as item 24-413, but 200A (breaking capacity 35 KA).	Each	122636.60
24-415	Same as item 24-413, but fixing only.	Each	206.60
24-416	Same as item 24-414, but fixing only.	Each	206.60
24-417	Add to item 24-413 or 24-415, if removal only.	Each	68.18
24-418	Add to item 24-414 or 24-416, if removal only.	Each	68.18
24-419	Board Distribution, IC, 240 V, SP, fused with neutral bus bar, 2 way, 15A, supply and fixing.	Each	904.45
24-420	Same as item 24-419, but 30A	Each	990.15
24-421	Same as item 24-419 or 24-420, but fixing only.	Each	206.60
24-422	Add to item 24-419 to 24-420, or 24-421, if removal only.	Each	136.36
24-423	Add to item 24-419, for each additional way	Each	42.85
24-424	Add to item 24-420, for each additional way	Each	106.51
24-425	Board Distribution, IC, 500V, SP, fused 2 way, 15 A, supply and fixing.	Each	1210.53
24-426	Same as item 24-425, but 30A.	Each	2128.75
24-427	Same as item 24-425, but 60A.	Each	1932.86
24-428	Same as item 24-425, but 100A.	Each	2691.93
24-429	Same as item 24-425 to 24-428, but fixing only.	Each	206.60
24-430	Add to item 24-425 to 24-428 or 24-429, if removal only.	Each	136.36
24-431	Add to item 24-425, for each additional way.	Each	42.85
24-432	Add to item 24-426, for each additional way.	Each	106.51
24-433	Add to item 24-427 for each additional way.	Each	128.55
24-434	Add to item 24-428, for each additional way.	Each	195.89
24-435	Board distribution, IC, 500V, TP, fused with neutral bus bar, 2 way, 15A, supply and fixing.	Each	1639.03

SI No.	Description	Unit	Rate (Rs)
24-436	Same as item 24-435, but 30A.	Each	1332.96
24-437	Same as item 24-435, but 60A.	Each	2553.82
24-438	Same as item 24-435, but 100A.	Each	5026.90
24-439	Same as item 24-435 or 24-436, but fixing only.	Each	206.60
24-440	Same as item 24-437 or 24-438, but fixing only.	Each	258.25
24-441	Add to item 24-435, 24-436 or 24-439, if removal only.	Each	136.36
24-442	Add to item 24-437, 24-438 or 24-440, if removal only.	Each	170.45
24-443	Add to item 24-435, for each additional way.	Each	128.55
24-444	Add to item 24-436, for each additional way.	Each	319.54
24-445	Add to item 24-437, for each additional way.	Each	385.65
24-446	Add to item 24-438, for each additional way.	Each	587.66
	Cut out Iron Clad (IC)		
24-447	Cut out, IC, SP, fused 15A, supply and fixing.	Each	130.65
24-448	Same as item 24-447, but 30A.	Each	169.82
24-449	Same as item 24-447, but 60A.	Each	359.64
24-450	Same as item 24-447, but 100A.	Each	743.38
24-451	Same as item 24-447 or 24-448, but fixing only.	Each	30.99
24-452	Same as item 24-449 or 24-450, but fixing only.	Each	51.65
24-453	Add to item 24-447, 24-448 or 24-451, if removal only.	Each	20.46
24-454	Add to item 24-449, 24-450 or 24-452, if removal only.	Each	34.08
24-455	Porcelain fuse, 250 or 500V, with grip / base, 15A, supply and fixing.	Each	91.63
24-456	Same as item 24-455, but 30A.	Each	155.29
24-457	Same as item 24-455, but 60A.	Each	184.56
24-458	Same as item 24-455, but 100A.	Each	266.59
24-459	Same as item 24-455 or 24-456, but fixing only.	Each	34.08

SI No.	Description	Unit	Rate (Rs)
24-460	Same as item 24-457 or 24-458, but fixing only.	Each	41.32
24-461	Add to item 24-455 to 24-456 or 24-459, if removal only.	Each	20.67
24-462	Add to item 24-457 to 24-458 or 24-460, if removal only.	Each	26.86
	Bus Bar Chamber		
24-463	Bus bar chamber, 600/610 mm long, steel sheet / CI with hinged cover, hard drawn copper bus bars mounted on well insulated with micanite or other approved insulating material frames, complete with main and branch cables, socket and terminals, enamel paint inside and black outside, 500V, 60/100A, 4 bars, 400mm height, 175-225 mm depth, supply and fixing.	Each	12641.06
24-464	Same as item 24-463, but 500V, 200A.	Each	14477.51
24-465	Same as item 24-463, but 500V, 300A.	Each	16069.10
24-466	Same as item 24-463, but 500V, 500A.	Each	18517.70
	Bus Bar Trunking		
24-467	Bus bar trunking with bends, tees and stop end unit, where required complete with all fittings (excl tap off and entry unit), 4 bars, TPN conductor size 25 x 6mm, supply and fixing.	Each	12234.59
24-468	Same as item 24-463 to 24-467, but fixing only	Each	309.91
24-469	Add to item 24-463 to 24-467 or 24-468, if removal only.	Each	204.53
	Blocks Hard Wood		
24-470	Blocks, round, hard wood, recessed, 75 mm dia x 40 mm, supply and fixing.	Each	56.24
24-471	Same as item 24-470, but rectangular, size 175 mm x 100 mm x 50 mm deep.	Each	112.49
24-472	Same as item 24-470, but rectangular size 250 mm x 200 mm x 50 mm deep	Each	185.31

SI No.	Description	Unit	Rate (Rs)
	(Double).		
24-473	Same as item 24-472, but rectangular, size 300 mm x 250 mm x 50 mm deep.	Each	217.13
24-474	Same as item 24-472, but rectangular, size 350 mm x 300 mm x 50 mm deep.	Each	245.78
24-475	Same as item 24-470 to 24-474, but fixing only.	Each	41.32
24-476	Add to item 24-470 to 24-474 or 24-475, if removal only.	Each	20.46
	Conduit		
24-477	Conduit 20mm dia, heavy gauge Class-"B", screwed, complete with bends, tees, boxes, saddles etc, stove enamelled for Surface wiring , supply and fixing.	Metre	214.49
24-478	Same as item 24-477, but 25 mm dia.	Metre	286.72
24-479	Same as item 24-477, but 40 mm dia.	Metre	392.55
24-480	Same as item 24-477, but 50 mm dia.	Metre	527.22
24-481	Same as item 24-477, or 24-478, but fixing only	Metre	51.65
24-482	Same as item 24-479 or 24-480, but fixing only.	Metre	61.99
24-483	Add to item 24-477, 24-478 or 24-481, if removal only.	Metre	34.08
24-484	Add to item 24-479, 24-480 or 24-482, if removal only.	Metre	40.90
24-485	Conduit 20 mm dia, heavy gauge Class "B" screwed complete with all bends, tees, boxes, saddles etc, stove enamelled for Concealed wiring , supply and fixing.	Metre	403.15
24-486	Same as item 24-485, but 25 mm dia.	Metre	475.56
24-487	Same as item 24-485, but 40 mm dia.	Metre	579.56
24-488	Same as item 24-485 but 50 mm dia.	Metre	714.23
24-489	Same as item 24-485 or 24-486, but fixing only.	Metre	217.31
24-490	Same as item 24-487 or 24-488, but	Metre	217.31

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SI No.	Description	Unit	Rate (Rs)
	fixing only.		
24-491	Add to item 24-485, 24- 486 or 24-489, if removal only.	Metre	119.37
24-492	Add to item 24-487 to 24-488 or 24-490, if removal only.	Metre	131.31
24-493	PVC conduit , 20 mm dia, complete with all bends, tees, boxes, saddles etc for Surface wiring , supply and fixing.	Metre	97.10
24-494	Same as item 24-493, but 25 mm dia.	Metre	120.28
24-495	Same as item 24-493, but 40 mm dia.	Metre	202.01
24-496	Same as item 24-493, but 50 mm dia.	Metre	268.86
24-497	Same as item 24-493 or 24-494, but fixing only	Metre	43.39
24-498	Same as item 24-495 or 24-496, but fixing only.	Metre	51.65
24-499	Add to item 24-493, 24-494 or 24-497, if removal only.	Metre	26.86
24-500	Add to item 24-495, 24-496 or 24-498, if removal only.	Metre	33.06
24-501	PVC conduit 20 mm dia, complete with all bends tees, boxes, saddles etc, for concealed wiring, supply and fixing.	Metre	292.16
24-502	Same as item 24-501, but 25 mm dia.	Metre	311.10
24-503	Same as item 24-501 or 24-502, but fixing only.	Metre	217.31
24-504	Add to item 24-501, 24-502, or 24-503, if removal only.	Metre	129.02
24-505	Conduit, 20mm dia, heavy gauge Class-	Metre	530.11
	"B", screwed, solid drawn, complete with all bends, tees, boxes saddles etc., stove enamelled for surface wiring, supply and fixing (Fittings shall be Flame proof and conform to BS No. 229 and 889).		<i>.</i>
24-506	Same as item 24-505, but 25 mm dia.	Metre	670.84
24-507	Same as item 24-505 or 24-506, but fixing only.	Metre	51.65
24-508	Add to item 24-505, 24-506 or 24-507, if removal only.	Metre	33.06

465

SI No.	Description	Unit	Rate (Rs)
24-509	(Deleted being obsolete)Battening , 15 mm hard wood for surface wiring, complete with clips, tacks and screws etc, supply and fixing.	Metre	101.94
24-510	(Deleted being obsolete) Same as item 24-509, but 20 mm.	Metre	105.00
24-511	(Deleted being obsolete) Same as item 24-509 but 25 mm.	Metre	108.67
24-512	(Deleted being obsolete) Same as item 24-509 to 24-511, but fixing only.	Metre	30.99
24-513	(Deleted being obsolete) Add to item 24-509 to 24-511 or 24-512, if removal only	Metre	20.46
24-514	Bell Push , 3 A, 250 V, supply and fixing.	Each	114.33
24-515	Same as item 24-514, but fixing only.	Each	20.67
24-516	Add to item 24-514 or 24-515, if removal only.	Each	12.40
24-517	Electric bell , AC/DC, Bakelite case, pressed iron frame, steel contact spring and nickel plated brass contact pillars both having silver contact points round and nickel / CP steel gong, supply and fixing.	Each	274.62
24-518	Same as item 24-517, but fixing only.	Each	30.99
24-519	Add to item 24-517 or 24-518, if removal only.	Each	20.46
24-520	Buzzer , Bakelite case, suitable for operation on AC/DC, main supply 100/110V and 200/250V, supply and fixing.	Each	188.92
24-521	Same as item 24-520, but fixing only.	Each	30.99
24-522	Add to item 24-520 or 24-521, if removal only.	Each	20.46
24-523	Mechanical Replacement Indicator , highly polished hard wood case, combed together, with hinged iron strip, movement of the figures, mechanical	Each	1082.75

SI No.	Description	Unit	Rate (Rs)
	replacement device, 2 ways, supply and fixing.		
24-524	Same as item 24-523, but fixing only.	Each	103.31
24-525	Add to item 24-523 or 24-524, if removal only.	Each	68.18
24-526	Add to item 24-523, for each additional way	Each	347.40
	Fan Works		
24-527	Take down fan, clean externally, bearings, dust field coils, armature, commutator, provide fresh clean lubricant (oil or grease as required), adjust for sweep running, fix blades and re-fix complete in position	Each	367.82
24-528	Same as item 24-527, but fixing only.	Each	309.91
24-529	Clamp hook for fan, ordinary type, supply and fixing.	Each	216.93
24-530	Same as item 24-529, but box concealed or for girder.	Each	284.27
24-531	Same as item 24-529 or 24-530, but fixing only.	Each	51.65
24-532	Add to item 24-529, 24-530 or 24-531, if removal only.	Each	33.06
24-533	Fan electric with blades, canopy and rod incl connection, provision of cable and ceiling rose, for fan 140 cm sweep, without regulator (Deluxe Model), supply and fixing.	Each	4107.48
24-534	Same as item 24-533, but 120 cm sweep.	Each	4082.99
24-535	Same as item 24-533, but 90 cm sweep.	Each	3538.18
24-536	Fan electric, Water proof with blades, canopy and rod incl connection, provision of cable and ceiling rose for fan, 140 cm sweep, (without regulator) of approved type, supply and fixing.	Each	4180.94
24-537	Same as item 24-536, but 120 cm.	Each	4156.45
24-538	Same as item 24-533 to 24-537, but fixing only.	Each	154.95

SI No.	Description	Unit	Rate (Rs)
24-539	Same as item 24-533 to 24-537 or 24-538, if removal only.	Each	101.24
24-540	Regulator for ceiling fan, any sweep, supply and fixing.	Each	509.54
24-541	Same as item 24-540, but fixing only.	Each	51.65
24-542	Add to item 24-540 or 24-541, if removal only	Each	33.06
	Switch/Socket		
24-543	Switch , SP, Bakelite, Piano type , 5A, all insulated, one way, supply and fixing.	Each	86.08
24-544	Switch , SP, Bakelite, Piano type , 5A, all insulated two ways, supply and fixing.	Each	92.20
24-545	Socket outlet , 5A, Bakelite, 2-pin, concealed type , supply and fixing.	Each	73.84
24-546	Dimmer , for ceiling fan, any sweep supply and fixing.	Each	153.42
24-547	Same as item 24-543 to 24-546, but fixing only.	Each	30.99
24-548	Add to item 24-543 to 24-546 or 24-547, if removal only.	Each	15.50
	Electric Motors		
24-549	Motor electric AC, 400V, 3 phase, 50 cycles, 1450 / 2900 rpm, 1 hp, solid shaft horizontal motor supply and fixing.	Each	16119.20
24-550	Same as item 24-549 but 2 hp.	Each	21161.26
24-551	Same as item 24-549, but 3 hp.	Each	36342.59
24-552	Same as item 24-549, but 5 hp.	Each	51156.62
24-553	Same as item 24-549, but 7.5 hp.	Each	68051.96
24-554	Same as item 24-549, but 10 hp.	Each	77987.91
24-555	Same as item 24-549, but 15 hp.	Each	111008.51
24-556	Same as item 24-549, but 20 hp.	Each	142406.90
24-557	Same as item 24-549, but 25 hp.	Each	168188.21
24-558	Same as item 24-549, but 30 hp.	Each	194994.26
24-559	Same as item 24-549, but 40 hp.	Each	255277.57
24-560	Same as item 24-549, but 60 hp.	Each	377761.44

SI No.	Description	Unit	Rate (Rs)
24-561	Same as item 24-549, but 75 hp.	Each	490086.07
24-562	Same as item 24-549, but 100 hp.	Each	636228.31
24-563	Same as item 24-549, but 125 hp.	Each	1032972.52
24-564	Same as item 24-549 but 150 hp.	Each	1086047.15
24-5 <mark>6</mark> 5	Same as item 24-549, but 180 hp.	Each	1445971.76
24-566	Same as item 24-549 to 24-553, but fixing only.	Each	225.74
24-567	Same as item 24-554 to 24-556, but fixing only.	Each	612.15
24-568	Same as item 24-557 to 24-559, but fixing only.	Each	1438.55
24-569	Same as item 24-560 or 24-561, but fixing only.	Each	1438.55
24-570	Same as item 24-562 or 24-563, but fixing only.	Each	1622.2
24-571	Same as item 24-564 or 24-565, but fixing only.	Each	2081.31
24-572	Add to item 24-549 to 24-553 or 24-566, if removal only.	Each	148.99
24-573	Add to item 24-554 to 24-556 or 24-567, if removal only.	Each	405.86
24-574	Add to item 24-557 to 24-559 or 24-568, if removal only.	Each	956.18
24-575	Add to item 24-560 to 24-561 or 24-569, if removal only.	Each	956.18
24-576	Add to item 24-562 to 24-563 or 24-570, if removal only	Each	1078.61
24-577	Add to item 24-564 to 24-565 or 24-571, if removal only.	Each	1373.66
	Heater Electric		
24-578	Heater , electric , tubular, AC 220/230V, 50 cycles, complete with suitable flexible cord and plug, 2000 W, supply and fixing.	Each	8531.84
24-579	Same as item 24-578 but 3000 W.	Each	11225.30
24-580	Same as item 24-578 or 24-579, but fixing only.	Each	206.60

SI No.	Description	Unit	Rate (Rs)
24-581	Add to item 24-578 to 24-579 or 24-580, if removal only.	Each	103.31
	Rewinding		
24-582	Rewinding of electric motor , SP, 50 cycle, 220/230V, with copper insulated conductor complete, upto 1/2 hp.	Each	2203.74
24-583	Same as item 24-582, but over 1/2 hp and upto 1 hp.	Each	3305.61
24-584	Same as item 24-582, but over 1 hp and upto 2 hp.	Each	4285.05
24-585	Rewinding of electric motor , AC, 400 V, 3 phase, 50 cycles, 1450/2900 rpm, complete as per original winding with copper insulated conductor upto 1 hp.	Each	3672.90
24-586	Same as item 24-585, but over 1 hp and upto 3 hp.	Each	5509.35
24-587	Same as item 24-585, but over 3 hp and upto 5 hp.	Each	7345.80
24-588	Same as item 24-585, but over 5 hp and upto 7.5 hp.	Each	13467.30
24-589	Same as item 24-585, but over 7.5 hp and upto 10 hp.	Each	15915.90
24-590	Same as item 24-585, but over 10 hp and upto 15 hp.	Each	20323.38
24-591	Same as item 24-585, but over 15 hp and upto 20 hp.	Each	23016.84
24-592	Same as item 24-585, but over 20 hp and upto 25 hp.	Each	30607.50
24-593	Same as item 24-585, but over 25 hp upto 30 hp.	Each	39177.60
24-594	Same as item 24-585, but over 30 hp upto 40 hp.	Each	50869.67
24-595	Same as item 24-585, but over 40 hp upto 50 hp.	Each	64520.61
24-596	Same as item 24-736, but over 50 hp upto 60 hp.	Each	71988.84
24-597	Same as item 24-585 but over 60 hp	Each	84109.41

SI No.	Description	Unit	Rate (Rs)
L	upto 70 hp.		
24-598	Same as item 24-585, but over 70 hp upto 80 hp.	Each	97454.28
24-599	Rewinding of Ceiling fan , AC 220/ 230V, 50 cycles, 140 cm sweep, complete as per original winding.	Each	1346.73
24-600	Same as item 24-599, but 120 cm sweep.	Each	1224.30
24-601	Same as item 24-599, but 90 cm sweep.	Each	1224.30
	Starters		
24-602	Direct Online starter , for motor, AC 400V, 3 phase, 50 cycles, upto 5hp incl connecting up with incoming and outgoing cables, supply and fixing.	Each	6144.46
24-603	Same as item 24-602, but fixing only.	Each	206.6
24-604	Add to item 24-602or 24-603, if removal only.	Each	103.31
24-605	Auto Star Delta starter, for electric motor, AC 400V, 3 phase, 50 cycles, 7.5 to 10 hp, including connecting up with incoming and outgoing cables, supply and fixing.	Each	31529.56
24-606	Same as item 24-605 but for 15 hp.	Each	34651.52
24-607	Same as item 24-605, but for 20 hp.	Each	37773.49
24-608	Same as item 24-605 but for 25 hp .	Each	41936.11
24-609	Same as item 24-605 but for 30 hp .	Each	48180.04
24-610	Same as item 24-605, but for 40 hp	Each	57855.83
24-611	Same as item 26-605, but for 50 hp .	Each	68262.38
24-612	Same as item 24-605, but for 60 hp	Each	83872.2
24-613	Same as item 24-605, but for 80 hp	Each	94278.75
24-614	Same as item 24-605 but for 100 /125 hp	Each	120601.20
24-615	Same as item 24-605 to 24-609, but fixing only.	Each	309.91
24-616	Same as item 24-610 to 24-614, but fixing only.	Each	619.80
24-617	Add to item 24-605 to 24-614 or	Each	258.25

SI No.	Description	Unit	Rate (Rs)
	24-615, 24-616, if removal only.		L]
	Conduit System		
24-618	Bend / elbow , 20mm dia, any type, cast or malleable iron, stove enamelled	Each	135.05
	or galvd, supply and fixing.		
24-619	Same as item 24-618, but 25mm dia.	Each	165.66
24-620	Same as item 24-618, but 40mm dia.	Each	300.33
24-621	Same as item 24-618 but 50mm dia.	Each	465.61
24-622	Box Junction circular , cast or malleable iron, stove enamelled or galvd, complete with cover, any number of outlets, 20 mm dia, supply and fixing.	Each	128.93
24-623	Same as item 24-622, but 25 mm dia.	Each	171.78
24-624	Same as item 24-622, but 40 mm dia.	Each	327.27
24-625	Same as item 24-622, but 50 mm dia.	Each	483.98
24-626	Board / Boxes Junction , rectangular 75x75 mm, cast or melleable iron, stove enamelled or galvd, complete with cover, supply and fixing.	Each	128.93
24-627	Same as item 24-626 but 75x100 mm.	Each	153.42
24-628	Same as item 24-626 but 75 x150 mm.	Each	177.90
24-629	Same as item 24-626, but 100 x175 mm.	Each	202.39
24-630	Same as item 24-626, but 200 x250 mm.	Each	347.40
24-631	Same as item 24-626, but 250 x300 mm.	Each	420.85
24-632	Same as item 24-618 to 24-621, but fixing only.	Each	30.99
24-633	Same as item 24-622 to 24-629, but fixing only.	Each	30.99
24-634	Same as item 24-630 or 24-631, but fixing only.	Each	41.32
24-635	Add to item 24-618 to 24-621 or 24-632, if removal only.	Each	18.60
24-636	Add to item 24-622 to 24-629 or 24 -633, if removal only.	Each	18.60

SI No.	Description	Unit	Rate (Rs)
24-637	Add to item 24-630 to 24-631 or 24-634, if removal only.	Each	24.79
24-638	Lock nut, 12 mm dia, supply and fixing.	Each	49.35
24-639	Same as item 24-638, but 20 mm dia.	Each	61.59
24 - 640	Same as item 24-638, but 25 mm dia.	Each	86.08
24-641	Same as item 24-638, but 30 mm dia.	Each	92.20
24-642	Tee inspection, 20mm dia, supply and fixing	Each	104.45
24-643	Same as item 24-642, but 25 mm dia.	Each	131.38
24-644	Same as item 24-642,but 40 mm dia.	Each	269.73
24-645	Same as item 24-642, but 50 mm dia.	Each	355.43
24-646	Saddles , 20mm pressed steel system, supply and fixing.	Each	61.59
24-647	Same as item 24-646, but 25 mm dia.	Each	67.72
24-648	Same as item 24-646 but 40 mm dia.	Each	83.63
24-649	Same as item 24-646, but 50 mm dia.	Each	104.45
24-650	Same as item 24-638 to 24-649, but fixing only.	Each	30.99
24-651	Add to item 24-638 to 24-649 or 24-650, if removal only.	Each	20.67
24-652	Thimble cable socket, for single core cable, 185 mm ² to 300 mm ² , supply and fixing.	Each	561.65
24-653	Same as item 24-652, but for 95 mm ² to 150 mm ² .	Each	349.48
24-654	Same as item 24-652, but for 16 mm ² to 70 mm ² .	Each	98.47
24-655	Same as item 24-652 or 24-653, but fixing only.	Each	206.6
24-656	Same as 24-654, but fixing only.	Each	61.99
24-657	Add to item 24-652 to 24-656, if removal only.	Each	30.99
	Wiring		
24-658	*(Deleted being obsolete) Wiring, on hard wood batten, with single core PVC insulated cable, installed and connected, complete (excl batten), one single core cable 3 / 0.029, supply and fixing.	Metre	-

SI No.	Description	Unit	Rate (Rs)
24-659	*(Deleted being obsolete) Same as 24-658, but 3 / 0.036 cable.	Metre	-
24-660	*(Deleted being obsolete)Same as 24-658, but 7 / 0.029 cable.	Metre	-
24-661	Wiring in conduit surface, concealed, flame proof, with single core PVC insulated cable, installed and connected complete (excl conduit) one single core cable, 1 mm ² , supply and fixing.	Metre	36.18
24-662	Same as item 24-661, but 1.5 mm ² cables.	Metre	44.75
24-663	Same as item 24-661 but 2.5 mm ² cable.	Metre	66.59
24-664	Same as item 24-661, but 4 mm ² cable.	Metre	89.30
24-665	Same as item 24-661, but 6 mm² cable.	Metre	124.73
24-666	Same as item 24-661, but 10 mm ² cable.	Metre	196.15
24-667	Same as item 24-661, but 16 mm ² cable.	Metre	296.66
24-668	Same as item 24-661 but 25 mm ² cable.	Metre	458.27
24-669	Same as item 24-661, but 35 mm ² cable.	Metre	631.30
24-670	Same as item 24-661, but 50 mm ² cable.	Metre	840.02
24-671	Same as item 24-661, but 70 mm ² cable.	Metre	1184.13
24-672	Same as item 24-658 to 24-666, but fixing only.	Metre	16.53
24-673	Same as item 24-667 to 24-671, but fixing only.	Metre	51.65
24-674	Add to item 24-658 to 24-666 or 24-672, if removal only.	Metre	8.26
24-675	Add to item 24-667 to 24-671 or 24-673, if removal only.	Metre	24.79
24-676	Wiring with PVC sheathed single core cable, 1 mm ² , on hard wood batten, fixed and connected complete (excl batten), supply and fixing.	Metre	35.25
24-677	Same as item 24-676,but 1.5 mm ² cable.	Metre	45.52
24-678	Same as item 24-676, but 2.5 mm ² cable.	Metre	63.14
24-679	Same as item 24-676, but 4mm ² cable.	Metre	103.81
24-680	Same as item 24-676, but 6 mm ² cable.	Metre	134.44

SI No.	Description	Unit	Rate (Rs)
24-681	Same as item 24-676, but 10 mm ² cable.	Metre	231.29
24-682	Same as item 24-676, but 16 mm ² cable.	Metre	318.01
24-683	Same as item 24-676, but 25 mm ² cable.	Metre	485.07
24-684	Same as item 24-676, but 35 mm ² cable.	Metre	648.44
24- <mark>68</mark> 5	Same as item 24-676, but 50 mm ² cable.	Metre	840.02
24-686	Same as item 24-676 but 70 mm ² cable.	Metre	1219.5
24-687	Same as item 24-676 to 24-681, but fixing only.	Metre	20.67
24-688	Same as item 24-682 to 24-686, but fixing only.	Metre	41.32
24-689	Add to item 24-676 to 24-681 or 24-687, if removal only.	Metre	10.33
24-690	Add to item 24-682 to 24-686 or 24-688 if removal only.	Metre	24.79
	Exhaust Fan AC		
24-691	Fan electric, AC, Exhaust, metal body 30 cm 220/230 V with shutter, Metal, duly enamel painted , supply and fixing.	Each	3131.92
24-692	Same as item 24-691, but 45 cm.	Each	4662.29
24-693	Same as item 24-691, but 60 cm.	Each	5617.25
24-694	Same as item 24-691 to 24-693, but fixing only.	Each	309.91
24-695	Add to item 24-691 to 24-693 or 24-694, if removal only.	Each	144.63
24-696	Shutter Metal for Exhaust fan off size duly enamel printed, supply and fixing.	Each	357.35
24-697	Same as item 24-696, but fixing only.	Each	20.67
24-698	Add to item 24-696, if removal only.	Each	14.46
24-699	Fan electric, AC, Exhaust , 220/230V, single phase, 50 cycles, plastic frame , body and blades, complete with cord operated switch, shutter and fixing screws, imported (National, Toshiba, Sanyo, Fisher etc), 15 cm, supply and fixing.	Each	2838.85
24-700	Same as item 24-699, but 20 cm.	Each	3132.68
24-701	Same as item 24-699, but 30 cm.	Each	3781.56

SI No.	Description	Unit	Rate (Rs)
24-702	Fan electric, AC, Exhaust , fresh air circulation (double way) 220/230 V single phase, 50 cycles, plastic frame , body and blades, complete with cord operated switch, shutter and fixing screws, imported (National, Toshiba, Sanyo, Fisher etc), switch, 25 cm, supply and fixing.	Each	3353.05
24-703	Fan electric, AC, Exhaust , 220/230V, SP, single way, 50 cycle, having plastic frame body and blades, complete with cord operated switch shutter and fixing screws 20 cm, Pak Made , supply and fixing.	Each	2618.47
24-704	Same as item 24-703, but 25 cm.	Each	2716.42
24-705	Same as item 24-703, but 30 cm.	Each	2998.00
24-706	Fan electric, AC. Exhaust fresh air circulation (double way), 220/230 V, SP, 50 cycle, having plastic frame, body and blades, complete with cord operated switch shutter and fixing screw 20 cm Pak made , supply and fixing.	Each	2710.29
24-707	Same as item 24-706, but 25 cm	Each	2814.36
24-708	Same as item 24-706, but 30 cm.	Each	3132.68
24-709	Same as item 24-699 to 24-708, but fixing only.	Each	267.82
24-710	Add to item 24-699 to 24-708 or 24-709, if removal only.	Each	68.18
24-711	Fan electric, AC, Exhaust, 30 cm, Flame proof, 220/230V, SP, complete, supply and fixing.	Each	7196.59
24-712	Same as item 24-711, but 45 cm	Each	11175.57
24-713	Same as item 24-711, but 60 cm	Each	18766.23
24-714	Same as item 24-711 to 24-713, but fixing only.	Each	401.73
24-715	Add to item 24-711 to 24-713 or 24-714, if removal only.	Each	113.63
	Air Compressors		
24-716	Air compressor, single stage air cooled, mounted with horizontal receiving tank 300 lit capacity, max pressure	Each	183505.43

SI No.	Description	Unit	Rate (Rs)
Λ	10 Kg/Cm2 (142 PSI), 3 cylinders, piston displacement 54.30 cfm, fitted with auto pressure switch, pressure gauge and AC electric motor 10HP, 400V, 3 phase , 50 cycles, (Asian/ European Origin), supply and fixing.		
24-717	Same as item 24-716 but tank capacity 250 lit, 2 cylinders, displacement 39.50 cfm, with 7.5 hp electric motor.	Each	139801.59
24-718	Same as item 24-716, but tank capacity 160 lit, 3 cylinders, displacement 26.50 cfm, with 5 hp electric motor.	Each	110664.48
24-719	Same as item 24-716, but tank capacity 120 lit, 2 cylinders, displacement 16.40 cfm, with 3 hp electric motor.	Each	93585.49
24-720	Same as item 24-716, but tank capacity 100 lit, 2 cylinders, displacement 10.60 cfm, with 2 hp electric motor.	Each	76824.83
24-721	Same as item 24-716, but tank capacity 90 lit, 2 cylinders, displacement 8.50 cfm, with 1 hp electric motor single phase .	Each	51556.50
24-722	Same as item 24-721, but tank capacity 60 lit, 2 cylinders, displacement 3.7 cfm, with 0.5 hp electric motor.	Each	41136.48
24-723	Same as item 24-716, but tank capacity 300 lit, pressure 16 Kg/Cm2 (228 Psi) 3 cylinders, piston displacement 38.50 cfm with 10 hp electric motor.	Each	252389.45
24-724	Same as item 24-723, but tank capacity 300 it, 2 cylinders, displacement 26.30 cfm, 7.5 hp. Electric motor.	Each	202682.87
24-725	Same as item 24-723, but tank capacity 160 lit, 2 cylinders, displacement 20 40 cfm 5 bp Electric motor	Each	116737.01
24-726	Same as item 24-716 to 24-725, but fixing only.	Each	1407.95
	Pumping Set For Fuels	_ .	
24-727	Add to item 24-716 to 24-725 or 24-726, if removal only.	Each	558.59
24-728	Pumping set, Centrifugal, multistage,	Each	1283633.25

SI No.	Description	Unit	Rate (Rs)
1	for fuel CI body and impeller, stainless steel shaft and mechanical seal, capacity 300 gpm, 48.75 M head, directly coupled with explosion proof AC electric motor, 400V, 3 phase, 50 cycles, 20 hp, mounted on common base steel frame, with foundation bolts/puts supply and fixing		
24-729	Same as item 24-728, but capacity 300 gpm, 42.75M head, with electric motor, 3 Phase, 20 hp.	Each	1283633.25
24-730	Same as item 24-728, but capacity 200 gpm, 56.5M head, with electric motor, 3 Phase, 20 hp.	Each	1236059.40
24-731	Same as item 24-728, but capacity 200 gpm, 48.75M head, with electric motor, 3 Phase, 15 hp.	Each	991365.91
24-732	Same as item 24-728, but capacity 200 gpm, 36.50M head, with motor electric motor, 3 Phase, 10 hp.	Each	871273.10
24-733	Same as item 24-728 to 24-730, but fixing only.	Each	1989.49
24-734	Same as item 24-731, to 24-732, but fixing only.	Each	1407.95
24-735	Add to item 24-728 to 24-730 or 24-733, if removal only.	Each	994.74
24-736	Add to item 24-731 to 24-732 or 24-734, if removal only. Flood Lights	Each	703.97
24-737	Flood light, luminaries, complete with 1 x 250W, Mercury vapour lamp, choke, capacitor, mounting bracket, supply and fixing.	Each	15679.61
24-738	Same as item 24-737, but 400W.	Each	18333.89
24-739	Flood light, luminaries, complete with 1x 250W, Sodium lamp, igniters, capacitor and choke. supply and fixing.	Each	13872.54
24-740	Same as item 24-739, but 400W.	Each	16313.8
24-741	Same as item 24-739, but with 400W Sodium lamp, "T" tubular igniters, choke capacitor, and mounting bracket,	Each	11383.54

SI No.	Description	Unit	Rate (Rs)
24-742	supply and fixing. Same as item 24-737 to 24-741, but	Each	581.54
24-743	Add to item 24-737 to 24-741 or 24-742, if removal only.	Each	290.77
24-744	Basic batten , complete with 1 x 40W tube, starter and capacitor, supply and fixing.	Each	1702.27
24-745	Same as item 24-744, but complete with 2 x 40W tube lamp, starter and capacitor	Each	2588.66
24-746	Same as item 24-744 to 24-745, but fixing only.	Each	72.31
24-747	Add to item 24-744 to 24-745 or 24-746, if removal only.	Each	36.15
	Electric Geyser		
24-748	Electric Geyser, 27 lit capacity, complete with thermostat, safety valve, supply and fixing.	Each	9934.58
24-749	Same as item 24-748, but 36 lit capacity.	Each	9885.61
24-750	Same as item 24-748, but 45 lit capacity.	Each	11367.01
24-751	Same as item 24-748 to 24-750, but fixing only.	Each	623.78
24-752	Add to item 24-748 to 24-750 or 24-751, if removal only.	Each	401.73
24-753	Distribution Board, steel sheet (16 BG) with hinged over, having locking arrangement, duly enamelled painted, suitable for housing of different capacities of MCCBs etc (as required), supply and fixing.	Sqm	20510.86
24-754	Same as item 24-753, but fixing only.	Sqm	309.91
24-755	Add to item 24-753 or 24-754, if removal only.	Sqm	206.60
	Wiring in PVC Channels		
24-756	One fan point, one light point, one bell point, controlled by one switch, wiring complete with PVC single core cable 1mm ² , in PVC rectangular channel, supply and fixing.	Point	1194.98
24-757	Sam as item 24-756, but 1.5 mm ² .	Point	1323.53
24-758	One 3 pin socket outlet, 5A, point	Point	1617.40

SI No.	Description	Unit	Rate (Rs)
	controlled by one switch, wiring, complete with PVC single core cable 1mm ² , in PVC rectangular channel, with earth wire, supply and fixing.		
24-759	Same as item 24-758 but 1.5 mm ²	Point	1745.95
24-760	One 3 pin socket outlet, 15A, point controlled by one switch, wiring, complete with PVC single core cable 2.5mm ² , in PVC rectangular channel with earth wire, supply and fixing.	Point	2073.57
24-761	PVC channel rectangular, 20mm complete for (surface wiring), supply and fixing.	Metre	132.82
24-762	Same as item 24-761, but 25mm.	Metre	168.84
	Gang Switch Series		
24-763	One gang switch, 10A, 250V, supply and fixing.	Each	259.78
24-764	Same as item 24-763, but 2 gang, 10A.	Each	321.00
24-765	Same as item 24-763, but 3 gang, 10A.	Each	382.21
24-766	Same as item 24-763, but 4 gang, 10 A.	Each	478.25
24-767	Same as item 24-763, but 6 gang, 10 A.	Each	674.14
24-768	Same as item 24-763, but 8 gang, 10 A.	Each	772.08
24-769	One gang switch, 2 way 10A, 250V, supply and fixing.	Each	265.53
24-770	Gang fan dimmer10A, 250V, supply and fixing.	Each	467.54
24-771	Gang TV/ Telephone socket, shuttered, supply and fixing.	Each	436.93
24-772	Twin TV/ Telephone socket, shuttered, supply and fixing.	Each	449.17
24-773	Single switch, one way, 10A, 250V gang type, supply and fixing.	Each	100.25
24-774	Same as item 24-773, but 2 ways, 10A.	Each	130.85
24-775	Bell, push, single 10 A, 250 V, gang type, supply and fixing.	Each	253.28
24-776	One socket 2 pin 10 A, single, 250V, gang type, supply and fixing.	Each	116.16
24-777	Single dimmer for fan 250V, supply and fixing	Each	296.13

SI No.	Description	Unit	Rate (Rs)
24-778	TV / Telephone socket (single gang type), supply and fixing.	Each	198.19
24-779	Telephone cable, 2 pairs copper conductor 0.6mm dia, PE insulated, PVC sheathed, supply and fixing.	Metre	49.58
24-780	Same as item 24-779, but 3 pairs.	Metre	67.95
24-781	Same as item 24-779, but 5 pairs.	Metre	97.8
	Energy Savers		
24-782	Energy Saver, (Plain), 14W, supply and fixing.	Each	210.43
24-783	Same as item 24-782, but 18 W.	Each	230.02
24-784	Same as item 24-782, but 23 W.	Each	260.63
24-785	Energy Saver, (Spiral) 5, 8, 11W, supply and fixing.	Each	256.96
24-786	Energy saver, (Full Spiral) , 11W, supply and fixing.	Each	256.96
24-787	Same as item 24-786, but 15 W.	Each	253.28
24-788	Same as item 24-786, but 20 W.	Each	265.53
24-789	Same as item 24-786, but 23 W.	Each	277.77
24-789.1	Same as item 24-786, but 45 W.	Each	1159.27
24-789.2	Same as item 24-786, but 85W.	Each	1673.47
24-790	Same as item 24-782 to 24-789, 24-789.1, 24-789.2 but fixing only.	Each	20.67
24-791	Add to item 24-782 to 24-790,24-789.1, 24-789.2 if removal only.	Each	14.46
	Miscellaneous		Vir I
24-792	Choke for Fluorescent tube 20/40W, supply and fixing.	Each	373.72
24-793	Same as item 24-792 but fixing only.	Each	24.79
24-794	Add to item 24-792 or 24-793, if removal only.	Each	12.40
24-795	Flood light, 1000W, complete with CP reflector, hardened glass and mounting bracket (without lamp), supply and fixing.	Each	9388.85
24-796	Same as item 24-695, but 500W.	Each	4614.08
24-797	Same as item 24-795 or 24-796, but	Each	206.60

SI No.	Description	Unit	Rate (Rs)
L	fixing only.		
24-798	Add to item 24-795 to 24-796 or 24-797, if removal only.	Each	103.31
24-799	Lawn / Garden light, complete with 125 W, mercury vapour lamp, suitable choke, plastic cover and mounting bracket (without pipe post), supply and fixing.	Each	4614.08
24-800	Same as item 24-799, but fixing only	Each	206.60
24-801	Add to item 24-799 or 24-800, if removal only.	Each	103.31
24-802	Wall Bracket , fancy, single, complete with holder and lamp, supply and fixing.	Each	837.12
24-803	Same as item 24-802, but Double.	Each	1779.83
24-804	Porch light , fancy, complete with holder and lamp, supply and fixing.	Each	806.51
24-805	Gate light , fancy, complete with holder and lamp of approved type, supply and fixing.	Each	1155.43
24-806	Same as item 24-802 to 24-805, but fixing only.	Each	41.32
24-807	Add to item 24-802 to 24-805 or 24-806, if removal only.	Each	30.99
24-808	Obstruction light , with Red glass , holder, bracket, lamp and rod etc complete, supply and fixing.	Each	4057.02
24-809	Same as item 24-808, but fixing only.	Each	206.60
24-810	Add to item 24-808 or 24-809, if removal only.	Each	154.95
24-811	Coaxial cable, 0.8 mm ² SC, 2V, 75 ohm, supply and fixing.	Metre	83.86
24-812	Deleted being shifted as 27-70	-	-
24-813	Deleted being shifted as 27-71	-	-
24-814	Deleted being shifted as 27-72	-	-
24-815	Deleted being shifted as 27-73	-	-
24-816	Deleted being shifted as 27-74	-	-
24-817	Deleted being shifted as 27-75	-	-

482

SI No.	Description	Unit	Rate (Rs)
24-818	Deleted being shifted as 27-76	-	-
24-819	Switch, SP, Socket outlet, 3 pins, 20A, shuttered pattern, mounted in Bakelite box, complete, supply and fixing.	Each	315.17
24-820	Phase Sequence Relay for electric motor, 3 Phase, 50 Cycles supply and fixing.	Each	11014.33
24-821	Same as item 24-820 but fixing only.	Each	413.20
24-822	Add to item 24-820 or 24-821 if removal only.	Each	206.60
24-822	Same as item 24-820 but fixing only. Add to item 24-820 or 24-821 if removal only. Patty fitting, complete with 0.60 M, 20 W fluorescent tube, choke, starter and holder, supply and fixing.		868.52
			C.A.S

SECTION – 25

EXTERNAL ELECTRIFICATION

SPECIFICATIONS

25.0. This Section covers Electrical distribution and transmission system; Low, Medium, High and Extra High Pressures.

25.1. Standard Requirement: All external works shall be executed in accordance with the Electricity Regulations, Govt of Pakistan and Pakistan Standard Specifications, here-in after referred to as "Rules" except where such "Rules" are modified by these specifications.

25.2. Equipment:- All the equipments i.e. Transformers, VCBs, OCBs, ACBs, Generating sets, AVRs and Frequency Convertor shall be of approved manufacturers and booking orders placed through the Department. The delivery shall be ensured in the presence of authorised representative of the Department.

25.2.1. **Power Transformers:-** All transformers indoor/ outdoor and pad mounted, shall be of approved manufacturers according to latest standard specifications as under:-

i.	Primary voltage-	11000 V with the taping: -	± 2.5%
			± 5.0%

±7.5%

- ii. No of phases; 3 phase, 4 wire, with star delta connection
- iii. Over loading: As per manufacturer's standards
- iv. Secondary Voltage 400 / 230 V, 3 phase 4 wires, 0.8 PF

25.2.2. Standard Fittings

- i Filling arrangement
- ii Drain plug (Drain valve for capacities above 200 KVA).
- lii Oil level indicator
- Iv Lifting lugs
- v Rollers
- vi HV Porcelain bushings
- vii LV Porcelain bushings

viii Five position off circuit tap changer

ix Earthing terminal

x Rating plate and name plate

xi Conservator and silica gel breather (with conservator type)

25.2.3. **Windings**:- Paper insulated high conductivity copper be used for all LV windings and for HV winding of transformers above 300 KVA capacity. HV windings of smaller transformers be made from Double Enamelled High Conductivity copper wire. In distribution transformers, packet windings are used on HV side, which increases the short circuit withstand capacity.

25.2.4. **Core:-** Transformer cores be manufactured with high quality cold rolled silicon steel sheets.

25.2.5. Tank:- Tanks be made of deeply corrugated sidewalls. Alternatively these can be of the tubular type. All tanks are pressure tested before assembly.

25.2.6. **HV Bushings:-** The transformers are generally equipped with three HV insulator bushings. Where Primary Windings connections are connected on the high-tension side, three bushings are provided.

25.2.7. **LV Bushings:**- The LV side is provided with four porcelain bushings and the neutral is brought out on one of these bushings.

25.2.8. **Tap Changer:-** The off circuit tap changer is built in with a vertical shaft and has five operating positions. Deviations from this design can be supplied on special order.

25.2.9. **Oil Level Gauge:-** The Oil Level Gauge is fitted on the oil conservator and permits direct observation of its contents through a transparent plastic tube. On sealed type transformer, this is fitted on the side well above the corrugations or tubes.

25.2.10. **Roller Wheels:-** The transformers are carried on flat-rimmed roller wheels. The axes are easily set over for either broadside or length wise travel of the wheels (centre distance remaining the same).

25.2.11. **Earthing Terminal:-** Each Transformer is provided with an Earthing Terminal.

25.2.12. **Oil Draining Point:** There is an oil-draining point at the bottom of transformer tank from where oil can be drained out. The vent is plugged by a screw cap, which makes it possible to take out even very small quantities for sample testing.

25.2.13. **Transformer Oil:-** The Transformer is supplied with a first filling with mineral oil and has an impedance of 4% upto 500 KVA and 5% for 630-1500 KVA at 75° C at high di-electric strength duly tested and treated.

25.2.14. HT Switchgear:-

25.2.14.1. **11 KV Switchgear** shall be **OCB operated**, having following specifications and accessories: -

	i.	Max voltage	12000 V
	ii.	Service voltage	11000 V
1	iii.	Current	400 A
	iv.	Breaking capacity	350 mva
	٧.	Sym KA	13.1/18.4
	vi.	Asym. KA	16.4/23
	vii.	Making capacity KA	33.4/46.9
	viii.	Short time current KA	13.1/18.4

- ix. **Supply system:** 3 phase, 3 wire with solidly earthed neutral
- x. **Operation** Hand charged spring close mechanism (standard) quick make/ break, trip free type.

25.2.14.2. The switch panel shall be of steel sheet (3mm thick), totally enclosed indoor floor mounting, cubicle type and shall consist of:-

- i A set of 3 Phase, 400A rating, HD, HC, Insulation covered copper bus bar.
- ii OCB suitable for vertical drop down and horizontal withdrawal lowering mechanism, with removable operating handle.
- iii Two direct acting release coils, one direct acting earth fault release coil to work in conjunction with triple pole inverse time projection pattern, over current and earth fault relay.
- iv One 3 phase oil immersed potential transformer with 11000 /110 volt ratio, one flush pattern, voltmeter scaled 0-15KV with selector switches. One AM metre scaled with suitable CTs ratio.
- v Cable boxes for incoming / outgoing cables.

25.2.15. HT Switchgear with VCB:-

25.2.15.1. 11 KV Switchgear with VCB shall have the following specification and accessories: -

i.	Max Voltage	12000 V
ii.	Service voltage	11000 V
iii	Current	400 / 630 A
iv.	Breaking capacity	350 mva
v.	Short circuit current rating 3 Sec	20 KV

vi. Supply system:-- 3 Phase, 3 Wires, with solidly earthed neutral

25.2.15.2. The HT switchgear panel shall be of steel sheets totally enclosed indoor floor mounting cubicle type and shall have the accessories, such as with suitable CTs, PTs, and all other standard accessories with VCB. The VCB should be withdrawable type with full complement of interlocks to prevent incorrect operation and should be motor operated with an over ride of manual operation, in case the motor operation fails and cable boxes for incoming/outgoing cables.

25.2.15.3. Two direct acting release coils, one direct acting earth fault release coil to work in conjunction with triple pole inverse time projecting pattern, over current and Earth fault relay.

25.2.16. **LT Switch Panels:-** These shall be of steel sheet (3 mm thick), totally enclosed, floor mounting, indoor type, suitable for operation on 3 Phases, 4 wires, 50 cycles, 400-600 V system and shall comprise of:-

25.2.16.1. Incoming

- 25.2.16.1.1. Triple Pole, 25 mva breaking capacity at 500V fixed type moulded case circuit breaker with manually operated quick breaking operation mechanism.
- 25.2.16.1.2. Three adjustable thermal over-current releases, three adjustable magnetic short circuit releases, arc chambers and one shunt trip coil.
- 25.2.16.1.3. Three CTs with required ratio for the operation of instruments one flush pattern voltmeter of instruments, one flush pattern voltmeter (0–600V) with selector switch, one flush pattern ammeter of required capacity, one earth fault relay single pole type, complete with indoor/outdoor cable termination or cable boxes as required.
- 25.2.16.2. **Outgoing:** Load break, load make 500V, Triple Pole solid neutral MCB of required capacity.

25.3. Materials:-

25.3.1. **Line Conductor**. Conductor shall be of copper, either solid hard drawn or stranded or of aluminium stranded and shall comply to Latest BSS.

25.3.2. **Poles or Supports.** Poles and supports shall be of iron/steel as per WAPDA's design.

25.3.3. Stays and Stay Wires:-

25.3.3.1 Stay assembly shall be of GI complying with BS-16

25.3.3.2. Stay wires shall be of GI/Steel stranded wire complying with BS-183.

25.3.4. Cross Arms and Clamps:-

- 25.3.4.1. Cross arms shall be galvd channel iron or creosoted wood for distribution and transmission line.
- 25.3.4.2. Clamps shall be of GI flats bars of approved size. MS black channel or flats may be used in lieu of GI with prior approval of the Engineer-in-Charge.

25.3.5. **Bolts, Nuts and Washers:** All bolts, nuts and washers shall be of GI with prior approved size, shape and strength. MS black bolts, nuts and washers may be used in lieu of GI with prior approval of the Engineer-in-Charge.

25.3.6. **Insulators:** Insulators shall be of glazed porcelain with mechanical strength to carry the loads and shall comply to the latest BS Specification.

25.3.7. Cables HT/LT:-

25.3.7.1. HT Cables shall be of the following types:-

- i. PVC insulated, PVC sheathed, armoured with stranded aluminium/copper conductor according to latest standard specifications.
- ii. Three cores, Cross-Linked Polyethylene Insulated, (XLPE) compacted stranded copper / aluminium conductors, extruded semi conducting screened cable. The cable shall be of 11 KV grade. The cores being screened by semi conducting material, semi conducting taped and copper taped cores, laid up with filler to make circular shape and wrapped with binder Melinex taped extruded PVC bedded, armoured and over all PVC sheathed all as per I.E.C 502

25.3.7.2. LT Cables:-

25.3.7.2.1. PVC insulated PVC sheathed SWA and PVC overall, 600/1000 V grade multi core cable according to latest standard specifications with:-

- i. Stranded Copper conductors.
- ii. Stranded Aluminium conductors.

25.3.7.2.2. PVC insulted PVC sheathed unarmoured, 600/1000 V, grade with stranded copper conductors, multi core cables according to latest standard specifications.
25.3.8. **Cable Boxes:-** All other accessories shall be of approved type and design conforming to the latest BS and shall be approved by the Engineer-in- Charge before erection/installation.

25.4. Earth for Transformer, HT/LT Switchgear:-

25.4.1. Excavation for the earth pipe shall be done to a depth of 4.60 M in any type of soil and shall not be less than 2M from the nearest foundation of the building.

25.4.2. 4 M long and 50mm dia. perforated GI pipe having 3 mm dia holes 25mm apart horizontally and vertically, in a staggered manner up to 2.75 M shall be vertically placed in trench. Upper end of the pipe shall be plugged, which shall be visible and 100mm above GL.

25.4.3. Pipe shall be surrounded with charcoal and lime to a packed thickness of 0.6M all around the pipe, 0.6M below and 0.6M above the bottom end of the pipe. **Resistance of the earth shall not exc 1 ohm**. The number of earths be increased to obtain this value.

25.4.4. Earth conductor from main Earthing point of the HT/LT switch board/transformer to the Earth shall be of hard drawn copper conductor 3/0 SWG or copper strip 25mm x 3mm which shall be bolted to GI pipe at two places, with brass bolts / nuts 25 mm x 10mm.

25.4.5. Copper conductor / copper strip shall be buried not less than 75mm below floor level of the veranda, passage etc, while crossing the same. All necessary channelling shall be made good in all respects with appropriate materials as per original.

25.4.6. Electrode Copper plate, size $300 \times 300 \times 5$ mm will be provided and fixed to copper strip at the bottom with brass nut / bolt atleast at three points with the help of additional anchoring pieces.

25.4.7. After backfilling the trenches, surface shall be rammed and brought to level with the ground over which a 75mm thick, CC Type B pit, measuring 300 x 300mm internally, shall be constructed. The walls shall be 150 mm high above the GL. The base of the pit shall be of $300 \times 300 \times 150$ mm thick CC Type B.

25.4.8. The pit shall be covered with a CC Type B precast slab $450 \times 450 \times 75$ mm thick.

25.4.9. Transformer neutral terminal shall be earthed separately and in no case it shall be linked with body earths. Each transformer shall be earthed at two places separately as per specifications.

25.5. Aerial Line:-

25.5.1. **Strength of Conductor:** Strength of line conductors and service line should be in accordance with the latest BS.

25.5.2. Max interval between supports for LT and medium pressure lines shall not exc 55 M.

25.5.3. **Height from GL:-** The min computed height from the ground of any line conductors at a temperature of 50° C shall be 6.1M, the conductor must not be accessible without the aid of ladder or other special appliances.

25.5.4. Height and distance of building or structure where the aerial line is on the building or structure to which persons have access, the min height shall be 4.90M and in-accessible without the aid of ladder or other special appliances.

25.5.5. **Earthing of Metal Supports**:- Stay wires and other metallic accessories: -

25.5.6. All metal supports and metals not live, shall be permanently and efficiently earthed. For this purpose, continuous earth wire shall be secured by fastening to each support and connected with earth, the spacing between the points being as nearly equidistant as possible

25.5.7. Each stay wire shall be similarly earthed unless an insulator has been placed in it, at a height of not less than 3M from the ground.

25.5.8. **Danger plate** of the following description shall be displayed on HT/ EHT pole. It shall be of sheet iron, vitreous enamelled 25cm x 14cm, 16 BG, with red lettering on white background. The lettering shall be in English as well as in Urdu stating "Danger," "Caution" and the pressure.

25.5.9. Phase indication of the following description shall be displayed on each HT/ EHT pole. It shall be of enamelled iron of appropriate colour, 80 mm in dia with 1.75 cm fixing hole.

25.5.10. **Non-Climbable Device** as shown in Figure 25-8 shall be provided on each pole carrying HT / EHT line. It shall be of flat iron clamp with round iron spikes welded to the clamp.

25.5.11. Factor of Safety:-

25.	5.11.1.	The Factor of Safety shall have following	ng values:	-
	25.5.11.1.1	For Iron or Steel support	4.0	
	25.5.11.1.2.	For Wood and Concrete supports.	3.5	
	25.5.11.1.3.	For guard wire and Earth wire.	5.0	
	25.5.11.1.4.	For Conductors	2.0	

- 25.5.11.2. Calculation of the Factor of Safety:-
 - 25.5.11.2.1. The max wind pressure shall be taken 39 Kg / sqm or 80.50 Kmph.
 - 25.5.11.2.2 For cylindrical bodies, the effective area shall be taken as 2/3rd of the sectional area exposed to wind pressure.
 - 25.5.11.2.3. The temperature shall be taken as 0°C or such other temperature as the Engineer-in-Charge specifies.
 - 25.5.11.2.4. For Lattice steel or other compounded structure, the wind pressure on the leeside members shall be taken as 1/2 of the wind pressure on the windward side. In localities, where aerial lines are liable to accumulation of ice or snow, it shall be assumed that wires are covered with ice to radial thickness of 6.5 mm.

25.5.12. **Line Crossing or Approaching Each other:-** Any telecommunication or other aerial line shall be protected and guarded with approved and efficient means against the possibility of coming into contact with each other.

25.5.13. **Protection from Lightning:** Every aerial line or portion thereof, which is so exposed as to be liable to injury from lightning shall be protected by approved and efficient means.

25.5.14. **Guard Wires:-** Safety devices, cradle guards or other approved means shall be provided for rendering a fallen wire dead.

- 25.5.14.1. Every guard wire shall have an actual breaking load of not less than 682 Kg and shall, if made of iron or steel, be galvd.
- 25.5.14.2. Every guard wire or cross connected system of guard wires shall be of sufficient current carrying capacity to ensure the fallen wire rendering dead, without the risk of fusing the guard wire or wires.
- 25.5.14.3. Every guard wire or system of guard wires and its supports shall be of sufficient strength to carry without breaking, the extra load put of them by the fall of any or all the wires guarded.

25.5.15. Conductors of Different Pressure on Same Supports:-

25.5.15.1. Where conductors forming part of systems at different pressure are erected on the same support, the clearance shall be at least 90 cm between line conductors of different system. Adequate provisions shall be made to guard against the possibility of danger to lineman and lower pressure being charged

above its normal working pressure by leakage from or contact with higher pressure systems.

- 25.5.15.2. The higher pressure system shall always be placed above the lower pressure.
- 25.5.15.3. Not more than two different pressure systems shall be erected on the same support.
- 25.5.15.4. Higher pressure more than 11 KV shall not be erected on supports carrying low/medium pressure systems.

25.5.16. Dip and Stress of wires:-

- 25.5.16.1. The dip or sag shall be based on the assumption that wires are subject to 1/5th of Breaking stress under worst conditions.
- 25.5.16.2. Sag will be within the limit according to Table 25-1.

TABLE 25-1

HV OVERHEAD LINES

EXTRACT OF MAX SAGS OF HARD DRAWN COPPER LINES COMPLYING WITH THE ELECTRICITY COMMISSIONER'S REGULATIONS E1 C- 53 (97 CM RADIAL ICE, 58 KG/SQM, WIND SAFETY FACTOR 2).

Area	Strand	Max	Sag in meters at 50°C for spans of							
mm²	Stranu	Kg	50 m	60 m	70 m	80 m				
16.44	3/0.104	0.35	0.60	0.98	1.42	1.92				
25.55	7/0.086	0.56	0.37	0.59	0.86	1.19				
32.85	3/0.147	0.66	0.37	0.57	0.82	1.12				
38.70	3/0.161	0.79	0.34	0.52	0.74	1.01				
47.43	3/0.180	0.97	0.32	0.49	0.68	1.21				
65.60	7/0.136	1.33	0.28	0.41	0.56	0.74				
75.33	7/0.152	1.64	0.28	0.40	0.55	0.72				
97.74	7/0.166	1.94	0.28	0.40	0.54	0.70				
132.10	7/0.193	2.56	0.29	0.41	0.54	0.70				
163.90	7/0.215	3.14	0.29	0.41	0.54	0.70				

SAGS AT 50⁰C IN STILL AIR

25.5.17. **Spacing of Conductor:-** This shall be regulated by two factors i.e. pressure and sag. It shall not be less than 30cm in case of Low/ Medium pressure and 90cm in case of High pressure upto 11KV.

25.5.18. Steel Tubular Poles:-

1/

25.5.18.1. **Material:-** The poles shall be fabricated from steel structural tubes complying with BS-1387. Steel used for tubes should meet the following requirements:

i.	Tensile strength	Min	34.72 Kg / mm ²
		Max	47.35 Kg / mm ²
ii.	Yield point	Min	$24.70~\textrm{Kg}/\textrm{mm}^2$
iii.	Elongation in 200 mm sample	Min	20%

25.5.18.2. Construction:-

25.5.18.2.1. **Base plate:-** Specification of base plate shall be as per Table 25-2:-

TABLE 25-2

Specifications - Base Plate

Length & Width "a" (mm)	Thickness "t" (mm)	Weight (Kg)
300	15	11

25.5.18.2.2. The poles shall be constructed according to the details as indicated on the drawings and shall conform to the dimensions depicted in Table 25-3 & 25-4.

25.5.18.2.3. Each section of the steel tube as cut to the specified length shall be tapered at one end in pneumatic press, after the ends are made red hot in a furnace.

25.5.18.2.4. The joint shall be single V-Groove joint, welded with complete penetration and backing. The welds shall be grinded off to give smooth finish to the pole.

25.5.18.2.5. For giving additional weld strength, a sleeve will be provided at each joint, as indicated in the drawings.

25.5.18.3 **Galvanizing:-** Galvd poles shall be fabricated from galvd steel pipe sections. For galvanizing, MS pipes shall be pickled in acid solution and to pass through the heating chamber after fluxing. The pipes shall then be dipped in molten zinc kettle. The excess zinc adhering on the external and internal surface of the pipe shall be wiped off by passing the hot zinc coated pipe through a system of compressed air ring and an internal steam

shooting device. The galvanizing shall be free from lumps blisters uncoated or porous spots black spots, flux or any other imperfection. The joints of such poles shall then be painted with two coats of zinc-enriched paint.

25.5.18.4. **Painting:-** Pole fabricated from un galvd steel pipe sections shall be painted with two coats of Red Lead primer from top to ground line after exterior surface is thoroughly cleaned, the remaining exterior surface i.e below ground line and interior surface throughout be painted with two coats of bituminous paint.

TABLE 25-3

Overall Length	Height above Ground	Buried Length	Point of load application	Outsid	Outside dia of sections		Thickr	ness of s	section	Length of sections			
Н	В	A	С	D1	D2	D3	T1	T2	Т3	L1	L2	L3	
9000	7475	1552	300	165	140	114	4.85	4.85	3.65	3000	3000	3000	
12000	10170	1830	450	168	140	114	4.78	4.85	3.65	6000	3000	3000	

Transmission Poles. (i)

Note: All dimensions are in mm

TABLE 25-4

Street Light poles: - Single Arm & Double Arm (ii)

Overall Length	Height above Ground	Buried Length	Point of load application	An dimer	m nsion	Oi	ıtside dia	a of sect	ion	5	Thick	kness			Length o	f sections	i
н	В	A	С	A	В	D1	D2	D3	D4	T1	T2	Т3	T4	L1	L2	L3	L4
10792	91301	1662	300	1500	140	114	88	48	48	4.85	3.65	3.25	2.90	3292	3000	3000	2540
						Note: /	All dime	ensions	are in	mm				Ś			

MI 1;

25.5.18.5. Tests:-

25.5.18.5.1. Steel tubular poles shall be subjected to the following tests:-

- i. Visual inspection for freedom from finishes defects.
- ii. Verification of dimensions for length, outer dia. and thickness etc.
- iii. Transverse Load Test:- Three poles selected at random from a lot shall be tested to failure and to a load equal to twice the full test load (the safe working load). For poles tested to failure, the value of the failure load, in no case shall be less than 2.5 times the full test load (safe working load).

25.5.18.5.2. Details of different test loads are given in Table 25-5 & 25-6:-

TABLE 25 - 5

(a) Transmission Poles

Overall length (mm)	Safe working Load (Kg)	Load for temporary deflection of 150 mm (Kg)	Load for permanent set of 15 mm (Kg)
9000	166	125	199
12000	168	65	202

TABLE 25-6

(b) Street light poles--- Single Arm & double Arm.

Overall length (mm)	Safe working Load (Kg)	Load for temporary deflection of 150 mm (Kg)	Load for permanent set of 15 mm (Kg)
10792	80	55	95

25.5.18.5.3. **Tolerances**:- following tolerances shall apply to all steel tubular poles:

i	Length of each section	±25 mm
ii	Outside dia	±10%
iii	Thickness	± 10% - 8%
iv	Temporary deflection	5% over

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25.5.18.5.4. Method of Testing:-

25.5.18.5.4.1. The pole shall be erected in true vertical position, in such a manner that it is held rigidly and that there is absolutely no possibility of any movement at the base or at the ground line. The free height of the pole above ground shall be the same as indicated in Tables 25-1, 25-2 and 25-3.

25.5.18.5.4.2. Test loads shall be applied to the structure at 300 or 450mm (as read) from top in a horizontal direction with the help of steel wire rope (SWR) attached to the pole, in such a manner that the pole is stressed in same way as in actual working conditions. The loading rope shall have in it a spring balance or any other loading arrangement of suitable capacity and accuracy. The loading rope shall pass over a pulley and shall on the other end be loaded with weights.

25.5.18.5.4.3. The load shall be increased gradually in increments of 25 Kg until the specified test load is reached. The test load shall be held for 5min and gradually removed. During the application of load, deflection shall be recorded at each increment of load. After the removal of load the permanent deflection shall be recorded after a test period of 5 min. The load shall then be re-applied in the manner stated above until the applied load equals 1.5 times the test load. Measurements of temporary and permanent deflections and corresponding loads as indicated above shall be recorded during all the tests. After the test at 2.5 times the test load, the load shall again be applied and gradually increased until failure occurs.

25.5.18.5.4.4. All test equipment incl rig fixture arrangement for pole erection, loading aids, deflection-recording instrument, steel rope, clamps etc as approved by the Engineer-in-Charge shall be arranged by the contractor free of cost.

25.5.18.5.4.5. If the contractor fails to arrange the test equipment, the tests shall be carried out at a suitable test bench, at risk and cost of contractor as directed by the Controlling Officer.

25.5.18.6. Erection of Poles:-

25.5.18.6.1. Digging holes and concrete beds for steel tubular poles, R.C.C and pre stressed concrete poles.

25.5.18.6.2. The excavation for poles shall be according to the buried lengths given in the dimension tables for transmission and street light poles. The holes shall be diagonal of base plate 100mm wide or other dimension as specified in drawing. CC Type D, 150mm, shall be laid in bed.

25.5.18.6.3. Pole shall be erected straight in the hole and 80mm CC Type D muffler shall be provided all around the pole to the entire depth up to 150mm above GL. After setting of muffler, the remaining portion of the hole shall be filled with pebbles or brick bats (over or properly burnt) up to 900mm. The remaining portion shall be filled with earth, well-watered, rammed in layers not exc 150mm. All surplus spoil shall be removed and the site shall be made good.

25. 5.18.7. Lattice Steel Poles

25. 5.18.7.1. Materials: -

25.5.18.7.1.1 The poles shall be fabricated from structural steel complying with ASTM A-36, It shall meet the following requirements: -

- i Min tensile strength, V A0.0 Kg/mm²
- ii Max Tensile strength, 56.0 Kg/mm²
- iii Min yield point,

25.0 Kg/mm²

- iv Elongation in 200 mm gauge length for Angle Iron of 5mm (3/16") thickness, min 15%
- v Elongations in 200 mm gauge length for Angle Iron of 3mm (1/8) thickness, min 12.5%.

25.5.18.7.1.2. The zinc used for galvanizing shall comply with BS 3436 and shall be of 99.5 % purity.

25.5.18.7.1.3. Bolts and nuts shall be made of Mild Steel and comply with ASTM A-394.

25.5.18.7.2. Construction:-

25.5.18.7.2.1. The welded lattice steel poles shall be made from rolled shapes generally in accordance with WAPDA Drawing No PDW/DF–10 and PDW/DF–11. These shall be hot dip galvd.

25.5.18.7.2.2. The poles shall be entirely welded. There shall be no joints in the main legs upto a height of 3 M from the GL point.

25.5.18.7.2.3. The poles shall be similar on all four faces. The holes shown on the drawings shall be provided on all four faces.

25.5.18.7.3. Tolerance: -

25.5.18.7.3.1. The dimensions shall be in accordance with and within the tolerances stated on drawings. Where no tolerance is stated, it shall be ± 5 % subject to a min of 3mm.

25.5.18.7.3.2. The structures shall be straight within 1/300 of their length. This applies to two-piece structures when assembled.

25.5.18.7.3.3. The weight of any structure shall not deviate from the calculated weight of structures or approval, which shall incl the nominal weight of steel incl weld metal, the weight of the zinc galvanizing and the nuts and bolts.

25.5.18.7.4. Galvanizing:-

25.5.18.7.4.1. Shall be hot dip galvd to conform to ASTM A-123. Prior to galvanizing the poles shall be fabricated and welded as required, free from burrs, cleaned and thoroughly prepared, so that the zinc coating shall be adherent, dense, smooth, continuous and uniform. Care shall be taken to completely remove all welding scale. The galvanizing shall be completely free from lumps, blisters, uncoated or porous spots, black spots, dross, flux or any other imperfections. All structural steel wrapped by the galvanizing process shall be straightened by re-rolling or pressing. The material shall not be hammered or otherwise straightened in a manner, which may injure the galvd coating.

25.5.18.7.4.2. All bolts and nuts shall be hot dip galvd, incl threaded portions in accordance with ASTM A-153, nuts shall have a finger tight fit on the bolts and develop the full strength of the bolts.

25.5.18.7.5. Testing:-

25.5.18.7.5.1. The loads for transverse loading tests shall be as follows: -

i. Type 'L' Pole 163 Kg

ii. Type 'H' Pole 313 Kg

25.5.18.7.5.2. Any permanent deflection after the application and removal of the full test load shall mean non-compliance with this specification. Failure at or before 2.5 times the test load shall also mean non-compliance with this specification. All poles tested shall comply with these requirements.

25.5.18.7.6. **Sample Tests:-** Following sample tests shall be carried out on the lots offered for acceptance: -

25.5.18.7.6.1. On Complete Poles:-

- i. Visual inspection.
- ii. Verification of dimensions and weights.
- iii. Transverse load test.

25.5.18.7.6.2. On Members:-

- i. Tensile strength and elongation test, in accordance with ASTM E 3-61.
- ii. Embitterment test, in accordance with ASTM A-143.
- iii. Galvanizing test, in accordance with ASTM A-123.

25.5.18.7.7. Method of Testing: -

25.5.18.7.7.1. The contractor shall provide a rig or fixture duly approved by Engineer-in Charge for erecting the pole in true vertical position, in such a manner that it is held rigidly and that there is absolutely no possibility of any movement at the base or at the ground line. The height of pole above ground line shall be the same as in actual working conditions, which normally are: -

- i. 7772 mm for 'L' Type pole.
- ii. 8640 mm for 'H' Type pole.

25.5.18.7.7.2. Before erecting the pole in the manner described above the jointing bolts, if any, shall be fully tightened.

25.5.18.7.7.3. The test load shall be applied to the structure at one foot below the top on a horizontal direction with the help of a SWR attached to the pole, in such a manner that the pole is stressed in the same way as in actual working conditions. This may be achieved by attaching two strips of steel on opposite faces and tightening them in position, with the help of a double arming bolt, to which the rope is attached. The loading rope shall have incorporated in it a spring balance or any other loading attachment of suitable capacity and

accuracy. The loading rope shall pass over pulley and shall on the other end be loaded with weights.

25.5.18.7.7.4. The load shall be increased gradually in increments of about 23 Kg until the specified test load is reached. The test load shall be held for 5 min and gradually removed. During the application of load the deflection shall be recorded at each increment of load. After the removal of load the permanent deflection shall be recorded, after a test period of 5 min. The load shall then be re-applied in the manner stated above until the applied load equals 1.5 times the test load. The pole shall be unloaded and this procedure repeated for loads equal to 2.0 and 2.5 times the test load. Measurements of temporary and permanent deflections and load as indicated above shall be recorded during all these tests. After the test at 2.5 times the test load, the load shall again be applied and gradually increased until failure occurs. The failure load shall be recorded. Failure is reached when the pole will not support any further load or a sudden buckling of some member occurs.

25.5.18.7.7.5. The measurement of deflection at the top shall be made with the help of a level or theodolite. This shall be achieved by fixing instrument at a certain distance from the testing position and sighting pre marked point on top of the structure. The precision of measurement shall be \pm 1 mm for deflection and \pm 9 Kg load.

25.5.18.7.8. **Erection**. This type of pole shall be erected as indicated in the drawings (Figure 25-6 and 25-7).

25.5.18.7.9. Stringing of Conductors:-

25.5.18.7.9.1. All conductors shall be placed on the groove of the pin type insulators in straight length, except in small curves or bends, where these shall be placed on side grooves with the prior approval of the Engineer-in-Charge. The conductors shall be fixed to the shackle/ strain insulators at the terminal or intermediate pole, the max length between intermediate or terminal poles shall not exc 365 M or 8 spans whichever is less, on straight runs and at bends. At points of terminations the conductors shall be fixed to the shackle/strain insulators.

25.5.18.7.9.2. All conductors shall be secured efficiently in approved manner to insulators with soft tinned copper binding wire of approved size.

25.5.18.7.9.3. Particular attention shall be paid to see dip or sag, so that all conductors on the same cross arms shall be of equal height from ground throughout the span. Attention shall also be paid to avoid kinks, sharp bends or any other injuries to the conductors during straining.

25.5.18.7.10. **Jointing and Binding:-** Britannia or any other suitable method shall be employed in jointing solid conductors. Twisting of solid conductor is not allowed. Any suitable method shall be employed for jointing stranded conductors. The method shall be approved by the Engineer-in-Charge before jointing of stranded conductors commences.

25.5.18.7.11. **Stay and Stay Wire:-** Stay assemblies and stay wire shall be of sufficient strength to withstand the load on them. These shall be provided either to straight the line at terminal poles or to bring up construction on the straight length to the required straight. They shall be fixed to post, if possible above the line wires or at the resultant point between them, not below. They shall be fixed at an angle in each alignment rather than in the resultant direction, if sufficient space is available. Stay wire shall not be directly fixed on poles by twisting them round the pole, but shall be fixed through suitable clamps of sufficient strength. An insulator shall be fixed to stay wire not less than 3M from ground. If no insulator is provided, then the stay wire shall be properly and efficiently earthed. However, this does not apply to High-pressure system.

25.5.18.7.12. **Setting of Stay Rod.** Sufficient excavation of earth be carried out to a depth of 1.37 M, so as to give correct angle to the stay wire. Stay rod and plate be erected in proper position and embedded in CC Type C upto 0.5 M from the bed level and the rest of the pit be properly refilled and rammed after the initial setting of concrete. Fixing of stay be completed one week thereafter. Stay of service bracket shall be 3/10 or 7/16 SWG-GI and shall be fixed on one side with a proper hook of MS bar or flat suitably anchored in wall and with a suitable clamp on service bracket on the other side.

25.6. Under Ground System.

25.6.1. Excavation for Trenches.

25.6.1.1. The excavation shall be 1 M deep. The width of the trench shall have max outer dia of cable +23 cm. The surface of the bed shall be levelled and made free of any pointed and sharp edged material.

25.6.1.2. All places where cables are to be jointed, the depth shall be increased by 46 cm, the width and breadth shall also be

increased by 30cm and 90cm respectively on both sides of the trench, to provide space for workmen for jointing.

25.6.2. **Laying of cables**, burnt bricks shall be laid dry flat to obtain width equivalent of length of brick on bed of the trench, over which a 7.5 cm layer of sand free from any edged material, (pebbles, stones or other inorganic materials), shall be spread and then cable is laid. Another 7.5 cm similar layer of sand shall be spread on top of the cable and then covered with bricks. The bricks will be laid flat as before. The remaining portion of the trench will then be filled in, with earth and well rammed.

25.6.3. **Crossing Roads, Streets and Pavements, etc:-** The trenches shall be covered with pre-cast slabs of sufficient strength to withstand the load over them and prevent injury to cable.

25.6.4. **Crossing Culverts and Bridges:-** The cables shall be drawn in suitable size of steel, GI or CI tubing which shall be properly secured by suitable hooks or clamps etc, to the culverts and bridges.

25.6.5. Jointing of Cables:-

25.6.5.1. While laying the cables, it shall be so arranged that cables to be jointed have an overlap of about 31cm to provide ample length for jointing. The serving and armouring shall be removed from both cables to conform to the dimensions of the box. The lead sheath is then to be cut off from both cables, to box dimensions. The belt paper shall be removed to within 25mm of the lead sheathing at each end exposing the insulated core. The insulation shall be removed to the required length. All joints shall be sweated, wiped clean and properly insulated as per latest BSS.

25.6.5.2. At least 25mm clearance shall be allowed between the centres of each pair of joints. The armouring shall be properly bound and the box shall be replaced in the filling holes. Necessary tapping shall be carried out after the compound has cooled.

25.6.6. Jointing and Termination of XLPE/ PVC Cables.

25.6.6.1. Hot poured compound has an adverse effect on the insulation of XLPE/ PVC cables. As this type of compound causes swelling thus creating a weak point in the joint and also because of chemical reaction, semi-conducting tape is punctured after some time. This results in earth fault. As such, hot poured jointing compound shall be used in the jointing of XLPE/ PVC.

25.6.6.2. The jointing of XLPE/PVC. Cable only PVC premoulded cable joints/terminations both outdoor and indoor, with cold filled material called 'Resin' shall be used. The selected resin shall be of low viscosity, flame retardant and have good track

resistance, together with resistance against chemical and climatic influences. After the resin has been cured, it must conform to min levels laid down in *"Properties of cured Resin Type G"*, according to DIN 57291, Part II.

MILLITARY ENGINEERS SERVICES

25.6.7. Straight Joint – 11KV

- 25.6.7.1. Straight joint kit should consist of:
 - i Moulds of high mechanical strength PVC instead of CI boxes.
 - li Required amount of Resin and padding tapes.
 - iii Semi conducting tapes.
 - iv HV Self Amalgamating tape.
 - Connectors of sizes v
 - vi Jubilee clips
 - vii Earth wire.

25.6.7.2.

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Method of making XLPE/PVC Cable Joint:-

Remove outer PVC of the cable and expose armour.

- ii. Bind armour on both ends by means of jubilee clips.
- iii. Remove filter and expose PVC sheath, remove PVC sheath and expose cores.
- Remove copper screen and level about 50mm at ends. iv.
- Remove semi conducting tape. v.
- vi. Clean very carefully the cores. Cleaning must not be done with kerosene oil but with BENZIN or TRI-CHLORETHANE. Cleaning cores is very important process and there must not be any trace of semiconducting particles on the core.
- vii. Punch connectors of sizes either copper or aluminium.
- viii. Apply two layers of semi-conducting tape on the core leaving exposed copper screen.
- Provide two layers of HV self amalgamating tape from ix. one end to other covering earth wire binding on all the three cores.
- Build earth wire continuity with copper braid by jointing х. the exposed screen.
- Build main cable earth by providing earth strip or xi. insulated wire through jubilee clips (two).
- xii. Place mould, when it is fixed, then apply padding on both the ends. Fix the funnels, and pour the resin.

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25.6.7.3. Method for making LT Straight Joint (Resin filled):-

- i The cable length reaching the mould should be double the dia of cable used, with cables over 25 mm dia., 50 mm should be taken in the mould.
- ii Cut the steps with saw. The opening should be slightly larger than the cable dia.
- iii Distance between connectors should be min 5mm for voltage upto 1 KV, increase the same by 1mm per KV voltage upto 11 KV.
 - Cable overall sheath or metal jacket, especially lead, sheath, should be thoroughly cleaned.
 - Plastic cable sheath inside the mould should be wrapped with the tape incl in the kit. The tape should be stretched and overlapped approx 50% and applied in two layers.
- vi Halves of the mould should be fitted round the splice and snapped together.
- vii The mould ends with tape and fit the stopper.
- viii The resin in the bag, according to printed instructions.
- ix Put resin into the funnel, until it is completely filled,
- x Upto 1 KV, as soon as the mould is completely filled, the cable can be put under voltage. For over 1 KV, wait until the resin has cured. After curing, cut off the funnels.
- 25.6.7.4. Method of Making LT Straight Joint (Heat Shrink):
 - i Clean both ends of cable and slide external HS tube on one end.
 - ii Remove the cable sheath and expose the cores.
 - iii Keep the cores of one end little longer than the inner sleeves, so that crimping of connectors is done without obstruction. Remove insulation from the conductor according to size of the connector and crimp
 - iv Slide the inner HS tubes over the connectors and shrink them, starting from centre with soft flame until the adhesive protrudes gently at the end.
 - v Slide external HS tube over the cable ends and shrink starting at the centre, then right or to left with soft flame.

- vi For armoured cable, armour can be connected by means of PVC insulated cables and jubilee clips at both ends.
- vii Study working instructions for measurement of cable core.

25.6.7.5. **Terminations:**- Termination kit should be pre-moulded dry type for indoor and outdoor use suitable for rapid installation and disconnection. It should be suitable for 11 KV distribution system with a min short circuit rating of 25 KV and for use in adverse climatic conditions and ambient temperatures. Relative humidity may range to 100%

25.6.7.6. Components - Dry type Pre-moulded Termination

25.06.7.6.1. Outdoor Terminations: -

- i. Cable lugs, (Copper, Aluminium or Bi-metal).
- ii. Sealing End caps, EPDM Semi Conductor.
- iii. Skirts EPDM Grey (Insulator).
- iv. Stress Release cone EPDM.
- v. Earthing devices.
- vi. Jubilee clips and main earth wire
- vii. Three core HS boot
- viii. Semi conducting tape.
- ix. PVC Tape.
- x. Silicone Grease.
- xi. Self Amalgamating tape or HS tube of black colour to protect cable core against ultra violet sun rays.

25.6.7.6.2. Indoor Terminations: -

- i. Lugs (copper, Aluminium or Bi-metal).
- ii. Introducing cap.
- iii. Stress relief cone made from semi conducting EPDM rubber.
- iv. Semi Conducting tape.
- v. Self Amalgamating tape.
- vi. Silicone Grease.
- vii. Earthing device.
- viii. PVC Tape.
- ix. Jubilee clip and main Earth wire.

25.6.7.7. Terminations - LT (Resin Filled):-

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- i. Keep the cable in position, and measure to length required for termination.
- ii. Remove cable sheath and expose cable cores.
- iii. Clean the cable sheath and metal jackets with wire brush.
- iv. Remove PVC insulation over the conductors from the cores that remain in the box.
- v. Cut the steps of the moulds, the opening should be slightly larger than the cable dia.
- vi. Both halves of the mould be filled and snapped together over the splice. Fit the lid and check the centering of cores.
- vii. Seal the mould end with tape and fit the funnels.
- viii. Mix the resin according to printed instructions, and pour the resin until the resin rises in both the funnels.
- ix. After the resin is cured, cut off the funnels.

25.6.7.8. Method of Making LT Termination (HS): -

- i. Remove cable sheath to the length required.
- ii. Secure armour by means of jubilee clips before cutting.
- iii. Connect main earth to armour.
- iv. Clean cable sheath and armour with wire brush.
- v. Spread cores and H.S boot over the cores and shrink.
- vi. Remove insulation of core according to the size of lug and crimp the lug.

25.6.7.9. Route and Joint Signs: -

- i. Casted embossed signs stating pressure and owner's name shall be provided at every 91 M along the route.
- ii. At the joints a similar sign stating the above particulars and the word "JOINT" shall be provided.
- iii. All signs will be approved by the Engineer-in-Charge.

25.7. Siting of External Service to Important Buildings.

25.7.1. Electric service connection to officer's bungalows and buildings, where appearance is important, shall be brought to the rear of the building or failing that on the side.

25.7.2. In case of buildings which are especially important, the service shall be brought in, by underground cable.

25.8. No work will be entrusted to a Contractor who has not employed a licensed supervisor as required under the Electricity Regulations, Govt. of Pakistan

25.9. Tests.

- 25.9.1. The completed lines shall comply with following tests:
 - i. Earth continuity resistance test.
 - ii. Cables insulation and continuity test.

iii. Over head conductor's continuity test.

25.9.2. The time at which these tests are carried out shall be arranged between the Contractor and the Engineer-in-Charge. The contractor shall supply the necessary apparatus, labour and instruments but the Engineer-in-Charge is at liberty, to use for this purpose any instruments he may wish to employ, the results of the tests shall be recorded in triplicate by the contractor and signed both by the contractor and the Engineer-in-Charge.

25.10. The Complete System:- Shall be put in commission by the Contractor. The completion drawings with tests results prepared by a licensed supervisor employed by the Contractor shall be handed over to the Engineer-in-Charge, before final payment.

METHOD OF MEASUREMENTS

25.11. All overhead conductors and cable of different sizes shall be measured per linear dimension nearest to cm. The sag shall be added in accordance with manufacturer's manual.

CLARIFICATION OF RATES

25.12. Payment for steel / PCC platform for transformers to be made separately under appropriate Schedule items. Pad mounted transformer consist.

- a. HT compart includes HT linking arrangement, barrel fuses alongwith 6 spares and suitable HT operating rod.
- b. LT compart includes one main, four sub mains control breaker, insulated bus bars of suitable current carrying capacity and thimbles all as per manufacturers specifications.

25.13. Mounting and dismounting of Pole mounted transformers to be paid separately.

25.14. The rates incl pole caps for transmission steel tubular poles and opening and locking system for street light tubular poles.

25.15. The rates incl the cost of binding wire for binding, jointing, tee off etc, of conductors and cables.

25.16. The rates incl the cost of compound, insulation tapes, soldering, preparation of extension leads and fixing at required place with all clamps, nuts and bolts etc for cable boxes.

25.17. The turned end of different sizes of conductors/cables for binding at ends overlap, looping & tee off etc shall be measured per linear dimension nearest to cm.

STEEL TUBLAR POLE – 9M and 12 M LENGTH

(TRANSMISSION)



STEEL TUBLAR POLE SINGLE ARM

(STREET LIGHTING)



OVERALL LENGTH	OUTSIDE	DIA & TI	HICKNE	ESS OF	SEC	L	ENGTH.	OF SE	C
Н		D1	D2	D3	D4	L1	L2	L3	L4
10702	OD mm	140	114	88	48	3292	3000	3000	2540

Wall Thickness	4.85	3.65	3.25	2.90	-	-	-	-	
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FIGURE 25-2

STEEL TUBLAR POLE DOUBLE ARM

(STREET LIGHTING)



10792	OD mm	140	114	88	48	3292	3000	3000	2540
10792	Wall Thickness	4.85	3.65	3.25	2.90	-	-	-	Both Arms

FIGURE 25-3

509





FIXING OF STEEL TUBLAR POLE 9M and 12M LENGTH

(WAPDA Drg # PWD/ DF -10)



FOUNDATION PLAN

TYPE H, 35 FT 600 Ibs LATTICED STEEL STRUCTURE

(WAPDA Drg # PWD/ DF -11)





BOX TYPE A

FOR MAIN SWITCH AND DISTRIBUTION BOARD OF OFFICERS QTRS



FIGURE 25-9

TYPES OF CROSS ARMS

MILLIAR CANERS





ITEM RATES

SI No.	Description	Unit	Rate (Rs)
	Steel Tubular Pole		
25-1	Digging holes, in ordinary soil, provision and erection in position and setting in 150 mm thick, CC Type 'D' (1:4:8) foundation and 80mm thick CC Type 'D' (1:4:8), muffler all round for Steel tubular un-galvd pole 9M long , complete with base plate, as specified	Each	26633.95
25-2	Same as item 25-1 but galvd	Each	30919.00
25-3	Same as item 25-1, but 12M long, un-galvd .	Each	36226.78
25-4	Same as item 25-3, but 12M long, galvd .	Each	41736.13
25-5	Same as item 25-1 or 25-2, but fixing only.	Each	5820.85
25-6	Same as item 25-3 or 25-4, but fixing only.	Each	6537.50
25-7	Add to item 25-1, 25-2 or 25-5, if removal only.	Each	752.58
25-8	Add to item 25-3, 25-4 or 25-6, if removal only.	Each	1191.86
25-9	Digging holes, in ordinary soil, provision and erection in position and setting in 150 mm thick Type 'D' (1:4:8) foundation and 80 mm thick Type 'D' (1:4:8) mufflers all round for steel tubular, un-galvd, single arm Steel pole, 10.792 M long , complete with base plate, as specified (Figure 25-2).	Each	29944.32
25-10	Same as item 25-09, but galvd .	Each	34841.52
25-11	Same as item 25-09, but double arm 10.792 M long, un-galvd (Figure 25-3).	Each	32056.85
25-12	Same as item 25-09, but double arm 10.792 M long, galvd .	Each	36954.05
25-13	Same as item 25-9 or 25-10, but fixing only.	Each	6070.47
25-14	Same as item 25-11 or 25-12, but fixing only	Each	6346.55
25-15	Add item 25-9, 25-10 or 25-13, if removal only	Each	1380.40
25-16	Add to item 25-11 or 25-12 or 25-14,	Each	1656.48

SI No.	Description	Unit	Rate (Rs)
	if removal only.		
25-17	Add to item 25-1 to 25-16, if fixed in hard soil.	Each	145.65
25-18	Add to item 25-1 to 25-16, if fixed in rock	Each	1064.64
	"L" Type Lattice Steel Pole		
25-19	Digging hole, in ordinary soil, provision and erection of "L"- Type Lattice Steel pole, un-galvd, incl provision of CC Type B, all as per WAPDA Drg No. PDW/DF-10.(Figure 25-6)	Each	33340.48
25-20	Same as item 25-19, but galvd	Each	34257.48
25-21	Same as item 25-19 or 25-20, but fixing only	Each	4462.92
25-22	Add to item 25-19, 25-20 or 25-21, if removal only.	Each	1380.40
25-23	Add to item 25-19 to 25-22, if fixed in hard soil.	Each	145.65
25-24	Add to item 25-19 to 25-22, if fixed in rock "H" Type Lattice Steel Pole	Each	1064.64
25-25	Digging hole in ordinary soil, provision and erection of " H " Type Lattice Steel pole , un-galvd, incl provision of CC Type B, all as per WAPDA Drg no. PDW/DF 11. (Figure 25-7)	Each	50559.26
25-26	Same as item 25-25, but galvd	Each	52163.10
25-27	Same as item 25-25 or 25-26, but fixing only	Each	6325.30
25-28	Add to item 25-25 to 25-27, if removal only	Each	1380.40
25-29	Add to item 25-25 to 25-28, if fixed in hard soil	Each	145.65
25-30	Add to item 25-25 to 25-28, if fixed in rock	Each	1064.64
	Cross Arm		
25-31	Cross arms galvd channels iron with clamp, washers, bolts and nuts etc Type " A " (Fig 25-10), supply and fixing.	Each	4051.21
25-32	Same as item 25-31, but Type 'B'	Each	3938.82
SI No.	Description	Unit	Rate (Rs)
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25-33	Same as item 25-31, but Type 'C'	Each	3632.74
25-34	Same as item 25-31, but Type 'D'	Each	3336.71
25-35	Same as item 25-31, but Type 'E'	Each	3153.06
25-36	Same as item 25-31, but 610 mm (for service bracket)	Each	1046.16
25-37	Same as item 25-31, but fixing only.	Each	255.88
25-38	Same as item 25-32 or 25-33, but fixing only.	Each	204.70
25-39	Same as item 25-34, 25-35 or 25-36, but fixing only.	Each	127.94
25-40	Add to item 25-31, to 25-33 or 25-37 to 25-38, if removal only.	Each	204.70
25-41	Add to item 25-34, to, 25-36 or 25-39, if removal only.	Each	127.94
25-42	Wooden Cross Arm , 2.44 M x 125 mm x 100 mm, complete with bracket and bolt/nuts, oil dipped, as specified for HT, supply and fixing	Each	3135.74
25-43	Same as item 25- 42, but fixing only.	Each	319.85
25-44	Add to item 25-42 or 25-43, if removal only.	Each	319.85
	Painting		
25-45	Painting of steel pole, tubular and other type, excl cross arms up to 12 M long, incl anti corrosive paint, first coat, (new or old work)	Each	878.44
25-46	Same as item 25-45, but without anti corrosive paint.	Each	538.69
25-47	Same as item 25-45, for second and subsequent coat, new or old work	Each	400.40
25-48	Same as item 25-46, for second and subsequent coat, new or old work	Each	416.26
25-49	Painting of service pole, first coat, (new or old work)	Each	321.65
25-50	Same as item 25-49, for second and subsequent coat, (new or old work)	Each	266.41
	Aerial Lines / Overhead Lines Insulato	ors	
25-51	Insulators, pin type LT, complete with	Each	444.05

SI No.	Description	Unit	Rate (Rs)
	pin, nuts and washers, supply and fixing.		
25-52	Same as item 25-51, but for HT upto 11KV.	Each	604.31
25-53	Insulator shackle, complete, with "D" iron or suitable arrangements /strap, LT, supply and fixing	Each	470.74
25-54	Disc insulator, HT, complete with pin, nuts washers etc, 11 KV, supply and fixing	Each	1245.36
25-55	Double Disc insulator, HT, complete with pin etc, 11 KV, supply and fixing.	Each	2337.19
25-56	Same as item 25-51, but fixing only	Each	76.76
25-57	Same as item 25-52, but fixing only	Each	102.35
25-58	Same as item 25-53, but fixing only	Each	127.94
25-59	Same as item 25-54, but fixing only	Each	204.70
25-60	Same as item 25-55, but fixing only	Each	255.88
25-61	Add to item 25-51 or 25-56, if removal only	Each	58.15
25-62	Add to item 25-52, 25-53, 25-57 or 25-58, if removal only.	Each	101.78
25-63	Add to item 25-54, 25-55, 25-59 or 25-60, if removal only	Each	204.70
	Stays		
25-64	Provision and fixing of stay assembly, stay wire (7/10 SWG), stay clamps incl setting in earth, with CC Type 'C', complete, upto 13.75 M length.	Each	6559.85
25-65	Provision and fixing of stay flying, complete with stay wire (7/10 SWG), stay assembly, stay clamps, upto 15 M length.	Each	4345.39
25-66	Same as item 25-64, but fixing only.	Each	1789.97
25-67	Same as item 25-65, but fixing only.	Each	1789.97
25-68	Add to item 25-64 to 25-67, if removal only.	Each	639.70
25-69	Stringing, straining, tensioning and binding Copper conductor , bare solid or stranded 10 SWG, supply and fixing	Metre	163.06
25-70	Same as item 25-69, but 8 SWG	Metre	189.99
25-71	Same as item 25-69, but 6 SWG	Metre	226.18
25-72	Same as item 25-69, but 4 SWG	Metre	268.02

SI No.	Description	Unit	Rate (Rs)
25-73	Same as item 25-69, but 2 SWG	Metre	336.80
25-74	Same as item 25-69, but 1 SWG	Metre	400.69
25-75	Same as item 25-69, but 1/0 SWG	Metre	830.42
25-76	Same as item 25-69, but 2/0 SWG	Metre	959.04
25-77	Same as item 25-69, but 3/0 SWG	Metre	1096.92
25-78	Same as item 25-69, but 4/0 SWG	Metre	1258.38
25-79	Same as item 25-69, but 70 mm2	Metre	940.48
25-80	Same as item 25-69, but 95 mm2	Metre	1349.62
25-81	Same as item 25-69, but 120 mm2	Metre	1533.26
25-82	Same as item 25-69, but 150 mm2	Metre	2251.89
25-83	Same as item 25-69, but MS , medium drawn galvd wire, 10 SWG	Metre	38.16
25-84	Same as item 25-83, but 8 SWG	Metre	50.86
25-85	Same as item 25-83, but 6 SWG	Metre	66.66
	Aluminium Conductor		
25-86	Stringing, straining, tensioning and binding, Aluminium Conductor Steel Reinforced (ACSR) 6/0.083 aluminium and 1/0.083 steel (Squirrel), supply and fixing.	Metre	139.59
25-87	Same as item 25-86 but size 6/.132 aluminium and 1/.132 steel (Rabbit)	Metre	163.82
25-88	Same as item 25-86, but size 6/.183 aluminium and 1/.183 steel (Dog)	Metre	290.87
25-89	Same as item 25-69 to 25-73, but fixing only	Metre	46.06
25-90	Same as item 25-74 to 25-76, but fixing only.	Metre	63.97
25-91	Same as item 25-77 to 25-82, but fixing only.	Metre	92.12
25-92	Same as item 25-83 to 25-85, but fixing only.	Metre	35.82
25-93	Same as item 25-86 to 25-88, but fixing only.	Metre	76.76
25-94	Add to item 25-69 to 25-73 or 25-89, if removal only.	Metre	45.95
25-95	Add to item 25-74 to 25-76 or 25-90, if removal only.	Metre	63.74
25-96	Add to item 25-77 to 25-82 or 25-91, if removal only.	Metre	92.12
25-97	Add to item 25-83 to 25-85 or 25-92,	Metre	35.82

SI No.	Description	Unit	Rate (Rs)
	if removal only.		
25-98	Add to item 25-86 to 25-88 or 25-93, if removal only.	Metre	76.76
	Cable Electric - HT		
25-99	Cable electric HT 11KV stranded aluminium conductor, XLPE insulated, extruded, PVC bedded, steel wire armoured and PVC sheathed overall 3 core, 16 mm ² laid in trenches complete with bricks, sand (excl cost of excavation), supply and fixing.	Metre	1649.55
25-100	Same as item 25-99, but 25 mm ²	Metre	1840.12
25-101	Same as item 25-99, but 35 mm ²	Metre	2171.50
25-102	Same as item 25-99, but 50 mm ²	Metre	2314.74
25-103	Same as item 25-99, but 70 mm ²	Metre	2620.81
25-104	Same as item 25-99, but 95 mm²	Metre	2957.49
25-105	Same as item 25-99, but 120 mm ²	Metre	3263.57
25-106	Cable electric HT 11 KV stranded aluminium conductor XLPE insulated extruded, PVC bedded, steel wire armoured and PVC sheathed over all, 3core 16 mm ² laid in GI / RCC Pipe/duct (excl cost of pipe/duct), supply and fixing.	Metre	1435.64
25-107	Same as item 25-106, but 25 mm ²	Metre	1619.28
25-108	Same as item 25-106, but 35 mm ²	Metre	1943.72
25-109	Same as item 25-106, but 50 mm ²	Metre	2066.15
25-110	Same as item 25-106, but 70 mm ²	Metre	2372.23
25-111	Same as item 25-106, but 95 mm ²	Metre	270 <mark>8.9</mark> 1
25-112	Same as item 25-106, but 120 mm ²	Metre	3014.99
25-113	Same as item 25-99 to 25-105, but fixing only.	Metre	294.64
25-114	Same as item 25-106 to 25-112, but fixing only.	Metre	46.06
25-115	Add to item 25-99 to 25-105 or 25-113, if removal only.	Metre	52.77
25-116	Add to item 25-106 to 25-112 or 25-114, if removal only.	Metre	46.06

SI No.	Description	Unit	Rate (Rs)
25-117	Cable electric HT 11 KV stranded copper conductor , XLPE insulated, extruded, PVC bedded steel wire armoured and PVC sheathed overall 3core 16mm ² laid in trenches complete with bricks, sand , (excl cost of excavation), supply and fixing.	Metre	2450.24
25-118	Same as item 25-117, but 3 core, 25 mm ²	Metre	3011.78
25-119	Same as item 25-117, but 3 core, 35 mm ²	Metre	3625.97
25-120	Same as item 25-117, but 3 core, 50 mm ²	Metre	4291.58
25-121	Same as item 25-117, but 3 core, 70 mm ²	Metre	5497.51
25-122	Same as item 25-117, but 3 core, 95 mm ²	Metre	6860.16
25-123	Same as item 25-117, but 3 core, 120 mm ²	Metre	8209.74
25-124	Cable electric HT 11 KV stranded copper conductor XLPE insulated, extruded, PVC bedded, steel wire armoured and PVC sheathed overall 3 core, 16mm ² laid in GI / RCC pipe/duct (excl cost of pipe/duct), supply and fixing.	Metre	2210.74
25-125	Same as item 25-124, but 3 core, 25mm ²	Metre	2770.47
25-126	Same as item 25-124, but 3 core, 35 mm ²	Metre	3382.84
25-127	Same as item 25-124, but 3 core, 50 mm ²	Metre	4046.63
25-128	Same as item 25-124, but 3 core, 70 mm ²	Metre	5252.57
25-129	Same as item 25-124, but 3 core, 95 mm ²	Metre	6620.33
25-130	Same as item 25-124, but 3 core, 120 mm ²	Metre	7961.16
25-131	Same as item 25-117 to 25-123, but fixing only	Metre	294.64
25-132	Same as item 25-124 to 25-130, but fixing only	Metre	46.06
25-133	Add to item 25-117 to 25-123 or 25-131, if removal only.	Metre	52.73
25-134	Add to item 25-124 to 25-130 or 25-132, if removal only.	Metre	46.06
	Cable Electric - LT		
25-135	Cable electricLTPVCinsulated,PVCsheathed,armouredoverallPVC600/1000Vwithstrandedcopperconductor,16mm²,4core,laidin	Metre	1479.37

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SI No.	Description	Unit	Rate (Rs)
	trenches, complete with bricks, sand (excl cost of excavation), supply and fixing.		
25-136	Same as item 25-135, but 3½ core, 25 mm²	Metre	1892.77
25-137	Same as item 25-135, but 3½ core, 35 mm²	Metre	2377.19
25-138	Same as item 25-135, but 3½ core, 50 mm²	Metre	3087.28
25-139	Same as item 25-135, but 3½ core, 70 mm²	Metre	4366.26
25-140	Same as item 25-135, but 3½ core, 95 mm²	Metre	5825.62
25-141	Same as item 25-135, but 3½ core, 120 mm ²	Metre	7082.58
25-142	Same as item 25-135, but 3½ core, 150 mm ²	Metre	8606.83
25-143	Same as item 25-135, but 3½ core, 185 mm ²	Metre	10757.51
25-144	Same as item 25-135, but 3½ core, 240 mm ²	Metre	13715.42
25-145	Same as item 25-135, but 3½ core, 300 mm ²	Metre	17528.71
25-146	Cable electric LT PVC insulated, PVC sheathed, armoured, overall PVC 600/1000V with stranded Copper conductor, 16mm ² , 4 core, laid in GI/RCC pipe/duct (excl cost of pipe/duct), supply and fixing.	Metre	1265.46
25-147	Same as item 25-146, but 3½ core, 25 mm ²	Metre	1671.93
25-148	Same as item 25-146, but 3½ core, 35 mm ²	Metre	2149.41
25-149	Same as item 25-146, but 31/2 core, 50 mm ²	Metre	2859.50
25-150	Same as item 25-146, but 3½ core, 70 mm ²	Metre	4131.55
25-151	Same as item 25-146, but 3½ core, 95 mm ²	Metre	5590.91
25-152	Same as item 25-146, but 3½ core, 120 mm²	Metre	6840.92
25-153	Same as item 25-146, but 3½ core, 150 mm²	Metre	8365.18
25-154	Same as item 25-146, but 3½ core, 185 mm²	Metre	10508.93
25-155	Same as item 25-146, but 3½ core, 240 mm²	Metre	13466.83
25-156	Same as item 25-146, but 3½ core, 300 mm²	Metre	17273.18
25-157	Same as item 25-135 to 25-145, but fixing only	Metre	294.64
25-158	Same as item 25-146 to 25-156, but fixing only	Metre	46.06
25-159	Add to item 25-135 to 25-145 or 25-157, if removal only.	Metre	46.06
25-160	Add to item 25-146 to 25-156 or 25-158, if removal only.	Metre	46.06

SI No.	Description	Unit	Rate (Rs)
25-161	C able electric LT PVC insulated, PVC sheathed, un-armoured, overall PVC 600/1000V with stranded copper conductor 16mm ² , 4 core laid in trenches complete with bricks, sand (excl cost of excavation), supply and fixing.	Metre	1304.69
25-162	Same as item 25-161, but 3½ core, 25 mm ²	Metre	1696.46
25-163	Same as item 25-161, but 3½ core, 35 mm ²	Metre	2131.09
25-164	Same as item 25-161, but 3½ core, 50 mm ²	Metre	2816.70
25-165	Same as item 25-161, but 3½ core, 70 mm ²	Metre	3867.15
25-166	Same as item 25-161, but 3½ core, 95 mm ²	Metre	5270.20
25-167	Same as item 25-161, but 3½ core, 120 mm ²	Metre	6610.80
25-168	Same as item 25-161, but 3½ core, 150 mm ²	Metre	7884.08
25-169	Same as item 25-161, but 3½ core, 185 mm ²	Metre	9939.68
25-170	Same as item 25-161, but 3½ core, 240 mm ²	Metre	12755.57
25-171	Same as item 25-161, but 3½ core, 300mm ²	Metre	16426.02
25-172	Cable electric LT 600/1000 volts PVC insulated, overall stranded copper conductor 16 mm ² , 4 core un-armoured, laid in GI / RCC pipe/duct (excl cost of pipe/duct), supply and fixing.	Metre	1056.11
25-173	Same as item 25-172, but 31/2 core, 25 mm ²	Metre	1447.88
25-174	Same as item 25-172, but 31/2 core, 35mm ²	Metre	1882.51
25-175	Same as item 25-172, but 31/2 core, 50 mm ²	Metre	2568.12
25-176	Same as item 25-172, but $3\frac{1}{2}$ core, 70 mm ²	Metre	3618.57
25-177	Same as item 25-172, but $3^{1\!/_2}$ core, 95 mm^2	Metre	5021.61
25-178	Same as item 25-172, but $3^{1\!/_{\! 2}}$ core, 120 mm^2	Metre	6362.22
25-179	Same as item 25-172, but $3^{1\!/_{\! 2}}$ core, 150 mm^2	Metre	7635.49
25-180	Same as item 25-172, but $3\frac{1}{2}$ core, 185 mm ²	Metre	9691.09
25-181	Same as item 25-172, but $3\frac{1}{2}$ core, 240 mm ²	Metre	12506.98
25-182	Same as item 25-172, but $3\frac{1}{2}$ core, 300 mm ²	Metre	16177.43
25-183	Same as item 25-161 to 25-171, but fixing only	Metre	294.64
25-184	Same as item 25-172 to 25-182, but fixing only	Metre	46.06
25-185	Add to item 25-161 to 25-171 or 25-183, if removal only.	Metre	52.73
25-186	Add to item 25-172 to 25-182 or 25-184, if removal only.	Metre	46.06

SI No.	Description	Unit	Rate (Rs)
25-187	Cable electric LT PVC insulated, PVC sheathed, armoured , overall PVC, $600/1000V$ with stranded aluminium	Metre	808.64
	tranches complete with bricks sand (excl		
	cost of excavation), supply and fixing		
25-188	Same as item 25-187, but 35 mm ²	Metre	911.91
25-189	Same as item 25-187, but 50 mm ²	Metre	1147.28
25-190	Same as item 25-187, but 70 mm ²	Metre	1355.47
25-191	Same as item 25-187, but 95 mm ²	Metre	1637.81
25-192	Same as item 25-187, but 120 mm ²	Metre	2006.60
25-193	Same as item 25-187, but 150 mm ²	Metre	2305.93
25-194	Same as item 25-187, but 185 mm ²	Metre	2703.78
25-195	Same as item 25-187, but 240 mm ²	Metre	3253.47
25-196	Same as item 25-187, but 300 mm ²	Metre	3780.09
25-197	Cable electric LT PVC insulated, PVC	Metre	560.06
	sheathed, armoured, overall PVC 600/ 1000V, with stranded aluminium conductor 25mm ² , 4 core laid in GI / RCC pipe / duct (excl cost of pipe/duct), supply and fixing.		
25-198	Same as item 25-197, but 35 mm ²	Metre	663.33
25-199	Same as item 25-197, but 50 mm ²	Metre	898.70
25-200	Same as item 25-197, but 70 mm ²	Metre	1106.89
25-201	Same as item 25-197, but 95 mm ²	Metre	1389.23
25-202	Same as item 25-197, but 120 mm ²	Metre	1758.02
25-203	Same as item 25-197, but 150 mm ²	Metre	2057.35
25-204	Same as item 25-197, but 185 mm ²	Metre	2455.20
25-205	Same as item 25-197, but 240 mm ²	Metre	3004.89
25-206	Same as item 25-197, but 300 mm ²	Metre	3531.51
25-207	Same as item 25-187 to 25-196, but fixing only	Metre	294.64
25-208	Same as item 25-197 to 25-206, but fixing only	Metre	46.06
25-209	Add to item 25-187 to 25-196 or 25-207, if removal only	Metre	46.06
25-210	Add to item 25-197 to 25-206 or 25-208, if removal only	Metre	46.06
25-211	Cable electric LT PVC insulated, PVC	Metre	575.59

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SI No.	Description	Unit	Rate (Rs)
	sheathed, un-armoured , overall PVC 600/1000V with stranded aluminium conductor 25 mm ² , 4 core laid in trenches complete with bricks , sand (excl cost of excavation), supply and fixing.		
25-212	Same as item 25-211, but 35 mm ²	Metre	631.19
25-213	Same as item 25-211, but 50 mm ²	Metre	746.43
25-214	Same as item 25-211, but 70 mm ²	Metre	933.05
25-215	Same as item 25-211, but 95 mm ²	Metre	1106.98
25-216	Same as item 25-211, but 120 mm ²	Metre	1350.72
25-217	Same as item 25-211, but 150 mm ²	Metre	1504.21
25-218	Same as item 25-211, but 185 mm ²	Metre	1788.36
25-219	Same as item 25-211, but 240 mm ²	Metre	2220.54
25-220	Same as item 25-211, but 300 mm ²	Metre	2683.32
25-221	Cable electric LT PVC insulated, PVC sheathed, un-armoured, overall PVC 600/1000V with stranded aluminium conductor 25mm ² 4 core laid in GI /	Metre	327.01
	duct pipe/duct (excl cost of pipe / duct), supply and fixing.		
25-222	Same as item 25-221, but 35mm ²	Metre	382.61
25-223	Same as item 25-221, but 50 mm ²	Metre	497.85
25-224	Same as item 25-221, but 70 mm ²	Metre	684.47
25-225	Same as item 25-221, but 95 mm ²	Metre	858.39
25-226	Same as item 25-221, but 120 mm ²	Metre	1102.14
25-227	Same as item 25-221, but 150 mm ²	Metre	1255.63
25-228	Same as item 25-221, but 185 mm ²	Metre	1539.78
25-229	Same as item 25-221, but 240 mm ²	Metre	1971.96
25-230	Same as item 25-221, but 300 mm ²	Metre	24 <mark>34.</mark> 74
25-231	Same as item 25-211 to 25-220, but fixing only	Metre	294.64
25-232	Same as item 25-221 to 25-230, but fixing only	Metre	46.06
25-233	Add to item 25-211 to 25-220 or 25-231, if removal only.	Metre	46.06
25-234	Add to item 25-221 to 25-230 or 25-232, if removal only.	Metre	46.06
25-235	PVC, Straight joint LT consisting of mould resin, padding tape, funnels and ferrules etc	Each	4337.08

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SI No.	Description	Unit	Rate (Rs)
	as specified for PVC unarmoured LT cable 4 core, 16mm ² , supply and fixing.		
25-236	Same as item 25-235, but 25mm ² to 35mm ²	Each	8622.13
25-237	Same as item 25-235, but 50mm ² to 70mm ²	Each	10703.44
25-238	Same as item 25-235, but 95mm ² to 150mm ²	Each	14218.71
25-239	Same as item 25-235 but 185mm ² to 300mm ²	Each	16667.31
25-240	Same as item 25-235 to 25-237, but fixing only	Each	909.04
25-241	Same as item 25-238 to 25-239, but fixing only	Each	1363.56
25-242	Add to item 25-235 to 25-237 or 25-240, if removal only.	Each	165.28
25-243	Add to item 25-238 to 25-239 or 25-241, if removal only.	Each	247.92
25-244	PVC Straight Joint LT, complete with tapes, ferrules and heat tubes etc, as specified for PVC armuored LT Cable 4 core 16mm ² , supply and fixing.	Each	4826.80
25-245	Same as item 25-244, but 25mm ² to 35mm ²	Each	9846.43
25-246	Same as item 25-244, but 50mm ² to 70mm ²	Each	11525.25
25-247	Same as item 25-244, but 95mm ² to 150mm ²	Each	14061.09
25-248	Same as item 25-244, but 185mm ² to 300mm ²	Each	19570.44
25-249	Same as item 25-244 to 25-245, but fixing only	Each	909.04
25-250	Same as item 25-246, but fixing only.	Each	1363.56
25-251	Same as item 25-247 to 25-248, but fixing only	Each	1818.09
25-252	Add to item 25-44 to 25-251, if removal only	Each	247.92
25-253	PVC, T-Service Joint , LT comprising mould resin, padding tape, funnels and ferrules etc, as specified for LT cable 4 core 16mm ² , supply and fixing.	Each	694 <mark>3</mark> .01
25-254	Same as item 25-253, but $25mm^2$ to $50mm^2 \times 16mm^2$ to $25mm^2$	Each	8709.36
25-255	Same as item 25-253, but 70 mm^2 to $95 \text{ mm}^2 \times 35$ to 50 mm^2	Each	11979.78
25-256	Same as item 25-253, but 120mm ² to	Each	18751.68

SI No.	Description	Unit	Rate (Rs)
	185mm ² x 70mm ² to 95mm ²		
25-257	Same as item 25-253, but fixing only	Each	1090.85
25-258	Same as item 25-254, but fixing only	Each	1363.56
25-259	Same as item 25-255, but fixing only	Each	1818.09
25-260	Same as item 25-256, but fixing only	Each	2272.61
25-261	Add to item 25-253 to 25-260, if removal only.	Each	165.28
25-262	PVC Heat Shrink (HS) Termination Kit , LT indoor / outdoor consisting of heat shrink boot lugs, clips and earth wire etc, suitable for LT cables, 4 core 16 mm ² PVC un-armoured , supply and fixing.	Each	4151.60
25-263	Same as item 25-262, but 25 mm ² to 35mm ²	Each	9230.61
25-264	Same as item 25-262, but 50 mm ² to 70mm ²	Each	12382.26
25-265	Same as item 25-262, but 95 mm ² to 150mm ²	Each	13085.32
25-266	Same as item 25-262, but 185 mm ² to 300mm ²	Each	18800.66
25-267	Same as item 25-262, but fixing only	Each	1090.85
25-268	Same as item 25-263, but fixing only	Each	1272.66
25-269	Same as item 25-264, but fixing only	Each	1363.56
25-270	Same as item 25-265, but fixing only	Each	1454.47
25-271	Same as item 25-266, but fixing only	Each	2272.61
25-272	Add to item 25-262 to 25-271, if removal only.	Each	247.92
25-273	PVC Heat Shrink (HS) Termination kit LT indoor/outdoor consisting of heat shrink boot, lugs, clips and earth wire etc suitable for LT Cable armoured 16 mm ² , supply and fixing.	Each	4763.75
25-274	Same as item 25-273, but 25 mm ² to 35 mm ²	Each	10822.2
25-275	Same as item 25-273, but 50 mm ² to 70 mm ²	Each	13973.85
25-276	Same as item 25-273, but 95 mm ² to 150 mm ²	Each	16146.07
25-277	Same as item 25-273, but 185 mm ² to 300mm ²	Each	23697.86
25-278	Same as item 25-273, but fixing only	Each	1090.85
25-279	Same as item 25-274, but fixing only	Each	1272.66
25-280	Same as item 25-275, but fixing only	Each	1363.56
25-281	Same as item 25-276, but fixing only	Each	1454.47

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SI No.	Description	Unit	Rate (Rs)	
25-282	Same as item 25-277, but fixing only	Each	2272.61	
25-283	Add to item 25-273 to 25-282, if removal only	Each	247.92	
25-284	PVC Termination kit , HT 11 KV indoor heat shrink, complete with tubes, copper Lugs, HT and PIB tapes and earth wire, suitable for HT cables, XLPE, 3 core 16 mm ² to 35mm ² , supply and fixing.	Each	27757.33	
25-285	Same as item 25-284, but for HT cable XLPE, 3 core, 50 to 95mm ²	Each	31329.84	
25-286	Same as item 25-284, but for HT cable XLPE, 3 core, 120 to185mm ²	Each	34011.05	
25-287	Same as item 25-284, but for HT cable XLPE, 3 core, 240 to 300mm ²	Each	36102.16	
25-288	PVC Termination kit , HT, 11 KV outdoor, heat shrink, complete with tubes, copper lugs, HT and PIB tapes and earth wire suitable for HT cable, XLPE, 3 core 16 mm ² to 35 mm ² , supply and fixing.	Each	30634.43	
25-289	Same as item 25-288 but 50 mm ² to 95 mm ²	Each	36839.19	
25-290	Same as item 25-288 but 120 mm ² to 185 mm ²	Each	40720.22	
25-291	Same as item 25-288 but 240 mm ² to 300 mm ²	Each	53511.70	
25-292	Same as item 25-284 or 25-288, but fixing only	Each	2047.03	
25-293	Same as item 25-285 or 25-289, but fixing only.	Each	2558.79	
25-294	Same as item 25-286 or 25-290, but fixing only.	Each	2791.40	
25-295	Same as item 25-287 or 25-291, but fixing only.	Each	3070.54	
25-296	Add to item 25-284 to 25-295, if removal only.	Each	247.92	
25-297	PVC, Straight joint, HT, 11 KV for XLPE	Each	30573.22	
	cable, consisting of mould resin, HT tape, semi conducting tape, ferrules and earth wire etc suitable for HT cables 3 core, 16mm ² to 35mm ² , supply and fixing.		S.	
25-298	Same as item 25-297, but for HT cable XLPE, 3 core, 50 mm ² to 95mm ² .	Each	39471.43	
25-299	Same as item 25-297, but for HT cable XLPE, 120 mm ² to 185mm ²	Each	47022.91	
25-300	Same as item 25-297, but for HT cable XLPE, 240mm ² to 300 mm ²	Each	54619.08	

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SI No.	Description	Unit	Rate (Rs)
25-301	Same as item 25-297, but fixing only	Each	2047.03
25-302	Same as item 25-298, but fixing only	Each	2558.79
25-303	Same as item 25-299, but fixing only	Each	3070.54
25-304	Same as item 25-300, but fixing only	Each	3198.48
25-305	Add to item 25-297 to 25-304, if removal only	Each	348.93
25-306	Danger sign , for HT and LT, not less than 250 mm x 125 mm size, enamelled as required, supply and fixing	Each	619.15
25-307	Same as item 25-306, but fixing only	Each	160.04
25-308	Add to item 25-306 or 25-307, if removal only	Each	111.89
25-309	Non Climbable Device, as specified, supply and fixing	Each	1480.18
25-310	Same as item 25-309, but fixing only	Each	255.88
25-311	Add to item 25-309 or 25-310, if removal only.	Each	181.81
25-312	Phase Indicating sign, red, blue or yellow as required, supply and fixing.	Each	122.53
25-313	Same as item 25-312, but fixing only	Each	30.71
25-314	Add to item 25-312 or 25-313, if removal only.	Each	30.71
25-315	MS clamp for shackle, insulator or stay wire etc, of approved type, supply and fixing	Each	305.71
25-316	Same as item 25-315, but fixing only	Each	76.76
25-317	Add to item 25-315 or 25-316, if removal only.	Each	54.54
25-318	Lightning Arrester set of three pieces, complete, with all accessories, for 11 KV line, supply and fixing.	Each	14379.40
25-319	Same as item 25-318, but fixing only	Each	1279.39
25-320	Add to item 25-318 or 25-319, if removal only	Each	895.58
25-321	Fuse D-link /cut off fuses assembly, set of three, complete with fuse, angle iron, nut and bolt, etc for 11KV (assembly unit), supply and fixing.	Each	16461.41
25-322	Same as item 25-321, but fixing only	Each	2558.79
25-323	Add to item 25-320 or 25-321,	Each	1791.15

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SI No.	Description	Unit	Rate (Rs)
	if removal only		
25-324	Service Connection , complete with PVC insulated and PVC sheathed cable, 250V, twin core, run on GI wire No 8 SWG with brass / iron tinned clips of appropriate size at 20cm interval, size 2.5 mm ² , supply and fixing.	Metre	170.02
25-325	Same as item 25-324, but size, 4 mm ²	Metre	236.67
25-326	Same as item 25-324 or 25-325, but fixing only.	Metre	38.38
25-327	Add to item 25-324 to 25-326, if removal only.	Metre	26.87
25-328	Service Connection , complete with PVC insulated and PVC sheathed, 4 cores copper conductor cable 2.5 mm ² , run on No 8 SWG GI wire with brass / iron tinned clips of appropriate size at 10 cm interval, supply and fixing.	Metre	318.28
25-329	Same as item 25-328, but 4mm ² , 4 core cable.	Metre	439.55
25-330	Same as item 25-328 or 25-329, but fixing only	Metre	51.18
25-331	Add to item 25-328 to 25-330, if removal only	Metre	35.82
25-332	Service Bracket , comprising 50 mm dia tubing, GI/MS, upto 4.50 M long with 90 bends, 2nos, with hard wood bushes at both ends, necessary clamps, bolts etc, without cross arms, supply and fixing.	Each	6590.82
25-333	Same as item 25-332, but 6.00 M long	Each	7760.98
25-334	Same as item 25-332, but fixing only	Each	1919.09
25-335	Same as item 25-333, but fixing only	Each	2047.03
25-336	Add to item 25-332 or 25-334, if removal only	Each	1363.56
25-337	Add to item 25-333 or 25-335, if removal only	Each	1454.47
25-338	Stay Wire 3/10 SWG or 7/16 SWG upto 7M in length, complete with clamp and anchor bolts for service bracket, supply and fixing.	Each	2177.05
25-339	Same as item 25-338, but above 7M	Each	2962.81

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SI No.	Description	Unit	Rate (Rs)
	and upto 10 M		
25-340	Same as item 25-338 or 25-339, but fixing only.	Each	255.88
25-341	Add to item 25-338 to 25-340, if removal only.	Each	179.12
25-342	Steel Box (16 BG) for main switch, distribution board and meter, Type A, as per drawing in Figure 25-9, duly painted with premier and two coats of synthetic enamel paint, supply and fixing.	Each	8822.67
25-343	Same as item 25-342, but Type B	Each	4671.93
25-344	Same as item 25-342 to 25-343, but fixing only	Each	109.09
25-345	Add to item 25-342 to 25-344, if removal only.	Each	76.36
25-346	Fuse Aerial Porcelain up to 30A, supply and fixing	Each	464.62
25-347	Same as item 25-346, but 60A	Each	513.59
25-348	Same as item 25-346 or 25-347, but fixing only	Each	127.94
25-349	Add to item 25-346 to 25-348, if removal only	Each	89.56
25-350	Taps line for 10 SWG, supply and fixing	Each	253.74
25-351	Same as item 25-350, but fixing only	Each	63.97
25-352	Add to item 25-350 or 25-351, if removal only.	Each	44.78
25-353	Box guard, MS, 10 SWG, supply and fixing.	Each	143.57
25-354	Same as item 25-353, but 8 SWG.	Each	159.66
25-355	Same as item 25-353, but 6 SWG.	Each	192.90
25-356	Same as item 25-353 to 25-355, but fixing only	Each	76.76
25-357	Add to item 25-353 to 25-356, if removal only.	Each	53.73
25-358	Cradle guard , 8 SWG for HT, supply and fixing.	Each	113.85
25-359	Same as item 25-358, but fixing only.	Each	63.97
25-360	Add to item 25-358 or 25-359,	Each	44.78

SI No.	Description	Unit	Rate (Rs)
	if removal only.		
25-361	Cable marker, supply and fixing.	Each	974.09
25-362	Same as item 25-361, but fixing only.	Each	159.93
25-363	Add to item 25-361 or 25-362, if removal only.	Each	111.95
25-364	Jumpring, 8 SWG copper conductor, supply and fixing.	Each	297.30
25-365	Same as item 25-364, but 6 SWG.	Each	361.14
25-366	Same as item 25-364, but 4 SWG.	Each	407.06
25-367	Same as item 25-364, but 2 SWG.	Each	512.22
25-368	Same as item 25-364, but 1 SWG.	Each	611.27
25-369	Same as item 25-364, but 1/0 SWG.	Each	1174.02
25-370	Same as item 25-364, but 2/0 SWG.	Each	1318.80
25-371	Same as item 25-364, but 3/0 SWG.	Each	1500.75
25-372	Same as item 25-364, but 4/0 SWG.	Each	1721.77
25-373	Same as item 25-364, but 70 mm ² .	Each	1330.79
25-374	Same as item 25-364, but 95 mm ² .	Each	1899.78
25-375	Same as item 25-364, but 120 mm ² .	Each	2193.31
25-376	Same as item 25-364, but 150 mm ² .	Each	3206.74
25-377	Same as item 25-364 to 25-366, but fixing only	Each	127.94
25-378	Same as item 25-367 to 25-370, but fixing only	Each	216.19
25-379	Same as item 25-371 to 25-373, but fixing only	Each	255.88
25-380	Same as item 25-374, but fixing only.	Each	319.85
25-381	Same as item 25-375, but fixing only.	Each	383.82
25-382	Same as item 25-376, but fixing only.	Each	511.76
25-383	Add to item 25-364 to 25-376 or 25-377 to 25-382, if removal only.	Each	102.35
	Power Transformer		
25-384	Supply and erection in position on steel / PCC platform and connecting up, incl testing and commissioning Power Transformer , step down 11000/ 400 / 230V, 3 phase 50 cycles indoor / outdoor	Each	260396.37

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SI No.	Description	Unit	Rate (Rs)
	25KVA (excl cost of platform).		
25-385	Same as item 25-384, but 50 KVA.	Each	360666.54
25-386	Same as item 25-384, but 100 KVA.	Each	510337.21
25-387	Same as item 25-384, but 150 KVA.	Each	646595.68
25-388	Same as item 25-384, but 200 KVA.	Each	813161.70
25-389	Same as item 25-384, but 250 KVA.	Each	879540.18
25-390	Same as item 25-384, but 300 KVA.	Each	931594.36
25-391	Same as item 25-384, but 400 KVA.	Each	1397134.43
25-392	Same as item 25-384, but 500 KVA.	Each	1570507.55
25-393	Same as item 25-384, but 630 KVA.	Each	1700907.75
25-394	Same as item 25-384, but 1000 KVA.	Each	2094826.27
25-395	Same as item 25-384, but fixing only.	Each	2558.79
25-396	Same as item 25-385, but fixing only.	Each	2558.79
25-397	Same as item 25-386, but fixing only.	Each	2558.79
25-398	Same as item 25-387, but fixing only.	Each	3838.18
25-399	Same as item 25-388, but fixing only.	Each	3838.18
25-400	Same as item 25-389, but fixing only.	Each	5757.27
25-401	Same as item 25-390, but fixing only.	Each	7676.36
25-402	Same as item 25-391, but fixing only.	Each	7676.36
25-403	Same as item 25-392, but fixing only.	Each	9182.25
25-404	Same as item 25-393, but fixing only.	Each	10639.17
25-405	Same as item 25-394, but fixing only.	Each	10639.17
25-406	Add to item 25-384 to 25-386 or 25-395 to 25-397 if removal only.	Each	2558.79
25-407	Add to item 25-387 to 25-488 or 25-398 to 25-399, if removal only.	Each	3838.18
25-408	Add to item 25-389 or 25-400, if removal only	Each	5757.27
25-409	Add to item 25-390 to 25-391 or 25-401 to 25-402, if removal only.	Each	7676.36
25-410	Add to item 25-392 or 25-403, if removal only.	Each	10639.17
25-411	Add to item 25-393 to 25-394 or 25-404 to 25-405, if removal only.	Each	10639.17
	Power Transformers – Pad Mounted		

SI No.	Description	Unit	Rate (Rs)
25-412	Power Transformer pad mounted type oil immersed, naturally cooled, step down 11000/400/230 volts 50 cycles comprising with High / Low Voltage compartments and controls 25 KVA (excl pad), supply and fixing.	Each	415098.91
25-413	Same as item 25-412, but 50 KVA.	Each	568369.03
25-414	Same as item 25-412, but 100 KVA.	Each	919314.63
25-415	Same as item 25-412, but 200 KVA.	Each	1278701.77
25-416	Same as item 25-412, but 300 KVA.	Each	1454431.67
25-417	Same as item 25-412, but 400 KVA.	Each	2068173.26
25-418	Same as item 25-412 but 500 KVA.	Each	2458614.77
25-419	Same as item 25-412 to 25-414, but fixing only	Each	2558.79
25-420	Same as item 25-415, but fixing only.	Each	3838.18
25-421	Same as item 25-416 or 25-417, but fixing only.	Each	7676.36
25-422	Same as item 25-418, but fixing only.	Each	9157.76
25-423	Add to item 25-412 to 25-415 or 25-419 to 25-420, if removal only.	Each	1919.09
25-424	Add to item 25-416 to 25-418 or 25-421 to 25-422, if removal only.	Each	5757.27
	HL / LT Switch Gears	$\langle \rangle \rangle$	
25-425	OCB HT 11 KV panel upto 400 A, Rating 350 mva, complete with CTs (Ratio 25/5 to 100/5), PTs, over current and earth fault coils, in conjunction with TP relay, emergency trip system, voltmeter, Amp meter, with selector switches, indicator lamps, steel sheet cabinet factory wired and painted, floor mounted type incl jointing of cables, single panel unit all as specified in Para 25.2.14.1.and Para 25.2.14.2, without MDI and KVARH Meter, supply and fixing.	Each	793623.09
05 400	0	- I	0704440 74

25-426	Same a	as item	n 25-425,	but	one	in	Each	2701143.71
	coming	and two	o outgoing	(set	of the	ee		

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SI No.	Description	Unit	Rate (Rs)
	OCBs).		
25-427	Same as item 25-425,but two in coming and one out going (set of Three OCBs) incl all protections and arrangement for incoming supply sources and locking device system as per manufacturer's specifications.	Each	2876760.97
25-428	Same as item 25-425, but fixing only.	Each	3672.90
25-429	Same as item 25-426, but fixing only.	Each	5999.07
25-430	Same as item 25-427, but fixing only.	Each	7345.80
25-431	Add to item 25-425 or 25-428, if removal only	Each	1836.45
25-432	Add to item 25-426 or 25-429, if removal only.	Each	2509.82
25-433	Add to item 25-427 or 25-430, if removal only	Each	3672.90
25-434	Potential Transformer (PT), 11000 / 230 V or 110V, for HT panel, supply and fixing.	Each	54748.86
25-435	Same as item 25-434, but fixing only.	Each	639.70
25-436	Add to item 25-434 or 25-435, if removal only.	Each	447.79
	HT / LT Current Transformers (CT)		
25-437	Current Transformer (CT), Ratio 25/5, 35/5 or 75/5 A, for HT panel, supply and fixing.	Each	47775.25
25-438	Same as item 25-437, but CT Ratio 100/5 A	Each	36934.07
25-439	Same as item 25-437, but CT Ratio 25/5 A for LT panel.	Each	1669.03
25-440	Same as item 25-439 but CT Ratio 35/5A to 1000/5 A, for LT panel.	Each	3752.79
25-441	Same as item 25-437 to 25-438, but fixing only	Each	639.70
25-442	Same as item 25-439 to 27-440, but fixing only.	Each	319.85
25-443	Add to item 25-237 to 25-442, if removal only.	Each	319.85
25-444	LT Switch Board with 1250A, MCCB, incoming switch, complete with thermal	Each	805050.71

SI No.	Description	Unit	Rate (Rs)	
M	over current release adjustable magnetic short circuit release, shunt trip coil, CT ratio 1000/5, volt meter and Amp-meter with selector switches, earth fault relays, complete with TP, neutral common bus bar, incl upto 06 outgoing with neutral link 3-Phase MCCB switches, switch board steel sheet factory wired, painted and installed complete incl making connection, supply and fixing.			
25-445	Same as item 25-444, but 1000 A, upto 05 outgoings.	Each	698769.23	
25-446	Same as item 25-444, but 800 A, upto 04 outgoing.	Each	605661.21	
25-447	Same as item 25-444, but 600 A, upto 04 outgoing.	Each	432545.19	
25-448	Same as item 25-444, but 400 A, upto 03 outgoing.	Each	361137.89	
25-449	Same as item 25-444 to 25-447, but fixing only	Each	4040.19	
25-450	Same as item 25-448, but fixing only.	Each	3030.14	
25-451	Add to item 25-444 to 25-450, if removal only.	Each	1919.09	
	Voltage Regulator			
25-452	Auto Voltage Regulator (AVR), AC 380-400 / 220-230 V, 3 phase, 50 cycles, suitable for un-balanced load, capable of delivering steady output voltage upto variation of + 1%, complete with voltmeter and selection switch, pilot lamps and potentiometer, capacity 30 KVA with upto + 20% variation on input voltage, (European Origin), supply and fixing.	Each	1827739.11	
25-453	Same as item 25-452, but 72 KVA	Each	3765708.06	
25-454	Same as item 25-452, but 100 KVA.	Each	4933773.64	
25-455	Same as item 25-452, but 150 KVA.	Each	6595627.80	
25-456	Same as item 25-452, but 220 KVA.	Each	7181776.98	
25-457	Same as item 25-452, but 300 KVA.	Each	8139880.98	
25-458	Same as item 25-452, but 450 KVA.	Each	9759673.95	

SI No.	Description	Unit	Rate (Rs)
25-459	Same as item 25-452 to 25-453, but fixing only	Each	1279.39
25-460	Same as item 25-454 to 25-456, but fixing only	Each	2047.03
25-461	Same as item 25-457 to 25-458, but fixing only.	Each	3672.90
25-462	Add to item 25-452 to 25-453 or 25-459, if removal only.	Each	895.58
25-463	Add to item 25-454 to 25-456 or 25-460 if removal only.	Each	1432.92
25-464	Add to item 25-457 to 25-458 or 25-461 if removal only.	Each	2571.03
	Road / Street Lights		
25-465	Bracket for Road / Street / External light (MS / GI pipe), supply and fixing.	Each	1471.95
25-466	Same as item 25-465, but fixing only.	Each	153.53
25-467	Add to item 25-465 or 25-466, if removal only.	Each	107.47
	Earth for Transformers		
25-468	Special Earth for transformers , HT and LT, switchgear for areas having water table upto 3 M depth, supply and fixing vide Para 25.4 of Specifications.	Each	19609.41
25-469	Same as item 25-468, but for areas having water table more than 3 M depth, supply and fixing only.	Each	23395.61
25-470	Same as item 25-468, but fixing only.	Each	3611.69
25-471	Same as item 25-469, but fixing only.	Each	4835.99
25-472	Add to item 25-468 to 25-471, if removal only.	Each	581.54
	Road Light Accessories		NO.
25-473	Choke for Mercury Vapour lamp , 125 /150 W, supply and fixing.	Each	169 <mark>6.4</mark> 3
25-474	Same as item 25-473, but 250 W.	Each	2033.11
25-475	Same as item 25-473 but 400 W.	Each	2492.22
25-476	Choke for Sodium lamp , 70W, supply and fixing.	Each	1598.48
25-477	Same as item 25-476, but 150 W.	Each	2614.65
25-478	Same as item 25-476, but 250 W.	Each	2920.73

EXTERNAL ELECTRIFICATION

SI No.	Description	Unit	Rate (Rs)
25-479	Same as item 25-476, but 400 W.	Each	3777.74
25-480	Same as item 25-473 to 25-479, but fixing only.	Each	227.27
25-481	Add to item 25-473 to 25-479 or 25-480 if removal only.	Each	159.09
25-482	Mercury Vapour lamp, 125/150W, supply and fixing.	Each	385.47
25-483	Same as item 25-482, but 250 W.	Each	1340.42
25-484	Same as item 25-482, but 400 W.	Each	1487.34
25-485	Sodium lamp 70 W, supply and fixing.	Each	1058.84
25-486	Same as item 25-485, but 150 W.	Each	1181.27
25-487	Same as item 25-485, but 250 W.	Each	1181.27
25-488	Same as item 25-485, but 400 W.	Each	1242.48
25-489	Igniter for Sodium lamp, supply and fixing	Each	446.69
25-490	Same as item 25-482 to 25-489, but fixing only.	Each	18.18
25-491	Add to item 25-482 to 25-489 or 25-490 if removal only	Each	12.73

VCBs

- 25-492 Vacuum Circuit Breaker (VCB), HT 11 KV, panel floor mounting, 400/630 A, rating 20 KA, complete with selector switches, indicating lamps, sheet steel cubicle, factory assembled and duly painted, single panel unit consisting of all accessories and protections as specified in Para 25.2.15.1, 25.2.15.2 and 25.2.15.3 without MDI and KVARH Meter, supply and fixing.
- 25-493 Same as item 25-492 but one incoming and two outgoing (set of three).
- 25-494 Same as item 25-492, but two incoming and one outgoing (set of three) incl all protections and arrangement for incoming supply sources and locking device system as

Each 1493999.82

Each 4781477.94

Each 5122290.00

SI No.	Description	Unit	Rate (Rs)
	per manufacturer's specifications.		
25-495	Same as item 25-492 to 25-494, but fixing only.	Each	8080.38
25-496	Add to item 25-492 to 25-494 or 25-495, if removal only.	Each	3582.30
25-497	KWH + MDI and KVARH combined meter HT Panel , supply and fixing.	Each	165892.65
25-498	Road Lighting luminaries , complete with 1x125 MV Lamp, choke and capacitor (excl bracket), supply and fixing.	Each	9124.10
25-499	Same as item 25-498, but 250 W.	Each	10923.82
25-500	Same as item 25-498, but 400 W.	Each	28798.60
25-501	Road lighting, luminaries, complete with 1x70W sodium lamp, choke and capacitor, supply and fixing.	Each	7385.59
25-502	Same as item 25-501, but 150 W.	Each	12637.84
25-503	Same as item 25-50 <mark>1, bu</mark> t 250 W.	Each	14596.72
25-504	Same as item 25-501, but 400 W.	Each	27574.30
25-505	Same as item 25-498 to 25-504, but fixing only	Each	639.70
25-506	Add to item 25-498 to 25-504 or 25-505, if removal only.	Each	319.85
25-507	Digging hole in any soil, provision and erection in position and setting in 150mm thick, CC Type D (1:4:8), foundation and 80mm thick, muffler around for RCC poles, 9.14M long , supply and fixing.	Each	24155.97
25-508	Same as item 25-507, but 10.97M long, supply and fixing.	Each	28989.36
25-509	Same as item 25-507 or 25-508, but fixing only.	Each	5820.85
25-510	Add to item 25-507 to 25-508 or 25-509, if removal only.	Each	1380.40
25-511	Feeder Pillar Cabin , size 600 x 450 x 900 mm, made of steel sheet (14 BG) and angle iron frame size 38 x 38mm, with water resistance, hinged cover having locking arrangement, duly painted of approved quality, consisting	Each	28783.03

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SI No.	Description	Unit	Rate (Rs)
25-512	of hard drawn insulated copper bus- bars 4 nos capacity 800 -1000 A, mounted on good quality porcelain base/cleats with brass nut / bolts off sizes, drilled holes of appropriate size for inlets and outlets cables, earthing jointing system, Foundation of CC Type B and suitable arrangement for breakers incoming and out-going, (excl cost of breaker), supply and fixing. Same as item 25-511, but 400 - 600A.	Each	24915.44
25-513	Same as item 25-511, but 200 - 300A.	Each	21047.88
25-514	Same as item 25-511 to 25-213, but fixing only.	Each	420.87
25-515	Add to item 25-511 to 25-213 or 25-214, if removal only.	Each	154.95
	Cable Electric LT 4 Core		
25-516	Cable electric LT PVC insulated, PVC sheathed, armoured overall PVC 600/ 1000V with stranded copper conductor, 25 mm ² , 4 core, laid in trenches, complete with bricks, sand (excl cost of excavation), supply and fixing.	Metre	2044.58
25-517	Same as item 25-516, but 4 core, 35 mm ²	Metre	2648.98
25-518	Same as item 25-516, but 4 core, 50 mm ²	Metre	3552.51
25-519	Same as item 25-516, but 4 core, 70 mm ²	Metre	4854.75
25-520	Same as item 25-516, but 4 core, 95 mm ²	Metre	6545.51
25-521	Same as item 25-516, but 4 core, 120 mm ²	Metre	8032.63
25-522	Same as item 25-516, but 4 core, 150 mm ²	Metre	9782.16
25-523	Same as item 25-516, but 4 core, 185 mm ²	Metre	12110.36
25-524	Same as item 25-524, but 4 core, 240 mm ²	Metre	15488.20
25-525	Same as item 25-516, but 4 core, 300 mm ²	Metre	20066.68
25-526	Cable electric LT PVC insulated , PVC sheathed, armoured, overall PVC 600/ 1000V with stranded Copper conductor, 25 mm ² , 4 core, laid in Gl/RCC pipe/duct (exclcost of pipe/duct), supply and fixing.	Metre	1823.74
25-527	Same as item 25-526, but 4 core, 35 mm ²	Metre	2421.20
25-528	Same as item 25-526, but 4 core, 50 mm ²	Metre	3324.73
25-529	Same as item 25-526, but 4 core, 70 mm ²	Metre	4620.04

SI No.	Description	Unit	Rate (Rs)
25-530	Same as item 25-526, but 4 core, 95 mm ²	Metre	6310.80
25-531	Same as item 25-526, but 4 core, 120 mm ²	Metre	7790.98
25-532	Same as item 25-526, but 4 core, 150 mm ²	Metre	9540.50
25-533	Same as item 27-526, but 4 core, 185 mm ²	Metre	11861.78
25-534	Same as item 25-526, but 4 core, 240 mm ²	Metre	15239.62
25-535	Same as item 25-526, but 4 core, 300 mm ²	Metre	19811.16
25-536	Same as item 25-516 to 25-525, but fixing only	Metre	294.64
25-537	Same as item 25-526 to 25-535, but fixing only	Metre	46.06
25-538	Add to item 25-516 to 25-526 or 25-536, if removal only.	Metre	46.06
25-539	Add to item 25-526 to 25-535 or 25-537, if removal only.	Metre	46.06
25-540	Cable electric LT PVC insulated, PVC sheathed, un-armoured, overall PVC 600/1000V with stranded copper conductor 25 mm ² , 4 core laid in trenches complete with bricks, sand (excl cost of excavation), supply and fixing.	Metre	1828.69
25-541	Same as item 25-540, but 4 core, 35 mm ²	Metre	2400.44
25-542	Same as item 25-540, but 4 core, 50 mm ²	Metre	3133.79
25-543	Same as item 25-540, but 4 core, 70 mm ²	Metre	4358.09
25-544	Same as item 25-540, but 4 core, 95 mm ²	Metre	5966.82
25-545	Same as item 25-540, but 4 core, 120 mm ²	Metre	7401.70
25-546	Same as item 25-540, but 4 core, 150 mm ²	Metre	9043.49
25-547	Same as item 25-540, but 4 core, 185 mm ²	Metre	11287.63
25-548	Same as item 25-540, but 4 core, 240 mm ²	Metre	14535.70
25-549	Same as item 25-540, but 4 core, 300mm ²	Metre	18823.20
25-550	Cable electric LT 600/1000 volts PVC insulated, overall stranded copper conductor 25 mm ² , 4 core un-armoured, laid in GI / RCC pipe/duct (excl cost of pipe/duct), supply and fixing.	Metre	1580.11
25-551	Same as item 25-550, but 4 core, 35mm ²	Metre	2151.85
25-552	Same as item 25-550, but 4 core, 50 mm ²	Metre	2885.21
25-553	Same as item 25-550, but 4 core, 70 mm ²	Metre	4109.51
25-554	Same as item 25-550, but 4 core, 95 mm ²	Metre	5718.24
25-555	Same as item 25-550, but 4 core, 120 mm ²	Metre	7153.12
25-556	Same as item 25-550, but 4 core, 150 mm ²	Metre	8794.91

SI No.	Description	Unit	Rate (Rs)		
25-557	Same as item 25-550, but 4 core, 185 mm ²	Metre	11039.05		
25-558	Same as item 25-550, but 4 core, 240 mm ²	Metre	14287.12		
25-559	Same as item 25-550, but 4 core, 300 mm ²	Metre	18574.61		
25-560	Same as item 25-540 to 25-549, but fixing only	Metre	294.64		
25-561	Same as item 25-550 to 25-559, but fixing only	Metre	46.06		
25-562	Add to item 25-540 to 25-549 or 25-560, if removal only.	Metre	52.73		
25-563	Add to item 25-550 to 25-559 or 25-561, if removal only.	Metre	46.06		
25-564	Supply and erection in position on Each 106624.29 steel / PCC platform and connecting up, incl testing and commissioning Power Transformer, step down 11000 / 230V, single phase 50 cycles indoor / outdoor 25KVA (excl cost of platform)				
25-565	Same as item 25-564, but 50 KVA.	Each	137231.79		
25-566	Same as item 25-564, but 100 KVA.	Each	192325.29		
25-567	Same as item 25-564, but fixing only.	Each	2558.79		
25-568	Same as item 25-565, but fixing only.	Each	2558.79		
25-569	Same as item 25-566, but fixing only.	Each	2558.79		
25-570	Add to item 25-564 to 25-569 Each 2558.79 if removal only.				
			(City)		

SECTION - 26

NATURAL GAS

SPECIFICATIONS

26.0. This section covers all operations for provision of Natural gas and appliances. Specifications related to Mild Steel (MS), Polyethylene, High pressure / Low pressure pipes, valves, fittings, water heater, cooking range and accessories etc have been elaborated.

26.1. General:-

26.1.1. All Natural Gas installations shall be carried out strictly in accordance with the specifications / standards laid down by the local Gas Company as amended from time to time.

26.1.2. Gas installation works shall only be entrusted to the Contractor on the approved list of local Gas Company.

26.1.3. Local Building codes, effective in the area should be given consideration while applying these specifications / standards.

MATERIAL REQUIREMENTS

26.2. High Pressure Gas Pipe Work (MS):-

26.2.1. All High-pressure gas pipes plain end shall be MS black tubes of API 5L Grade "B" standard with specifications given in Table 26-1:-

TABLE 26-1

Nominal Bore mm	Wall Thickness mm	Weight Plain End (Kg /M)	Test Pressure Kg/ Sq. cm.
20	2.87	1.70	49.00
25	3.38	2.52	49.00
50	3.91	5.42	77.00
100	6.02	16.02	91.00
150	7.11	28.22	91.00
200	8.18	42.65	110.00

MS Pipes (High Pressure) - Specifications

26.2.2. All High-pressure gas piping shall be of welded construction and be tested at pressure specified by the Gas Company.

26.2.3. A double layer of bitumen with Fibre glass is provided for MS pipe of 100mm dia and above, whereas less dia with single layer .

26.3. Low Pressure Gas Pipe Work:-

26.3.1. Pipe used in internal installation (house piping) shall conform to BS 1387 'Medium grade' or equivalent as per Table 26-2:-TABLE 26-2

	Nominal	Gauge	Wall thickness	We	ight of black tube
	mm		mm	Plain End Kg/M	Screwed & socketed Kg/M
ľ	15	12	2.65	1.22	1.23
Ì	20	12	2.65	1.58	1,59
	25	10	3.25	2.44	2.46
	32	10	3.25	3.14	3.17
	40	10	3.25	3.61	3.65
[50	9	3.65	5.10	5.17

MS Pipes (Low Pressure) - Specifications

26.3.2. All low-pressure internal gas piping may be of screwed connection. Reduction in sizes should be with reduction tees, elbows or reducers. All changes in direction should preferably be made with the use of fittings. For this purpose pipe shall not be bent or set, as far as possible. If it becomes necessary, then special care is taken to avoid sharp bends and off-sets, particularly for GI pipes.

26.3.3. For other technical details on Low-Pressure pipes, refer to tables given in Section – 18-1.

26.4. Medium Density Polyethylene (MDPE) Pipes:- MDPE (T-flex) High Pressure Gas quality pipes sizes 20-63mm dia are available in 100 M coil length and above 63mm in 12M length. It conforms to Standards ISO 4437, (DIN 8074) ASTM D-2513 (DIN 8075) given in Tables 26-3 and 26-4:-

MDPE Pipe Dimensions (ISO 4437) Min Wall thickness (e min) mm Nominal Outside dia SDR 17.6 **SDR 11** (de) mm 20 2.3 3.0 2.3 25 3.0 3.0 32 2.3 2.3 40 3.7 50 2.9 4.6 63 3.6 5.8 75 4.3 6.8 110 6.3 10.0 125 7.1 11.4 9.1 14.6 160

TABLE 26-3

10.5 10.4

TABLE 26-4

Dimensions (ASTM D 2513)

Pipe	Outside Dia	Tolerance for	Wall Thickness and Tolerance		
Size mm (in)	mm (in)	Max. / Min. out of Roundness SDR 17/ SDR 13.5/ SDR 11	SDR	Min. mm (in)	Tolerance mm (in)
19 (3/4")	26.7 (1.050)	±0.254 (±0.0100)	11	2.41 (0.095)	+0.279 (+0.011)
25 (1")	33.4 (1.315)	±0.254 (±0.010)	11	3.02 (0.119)	+0.356 (+0.014)
31 (1¼")	42.1 (1.660)	±0.305 (±0.012)	11	3.84 (0.151)	+0.457 (+0.018)
38 (1½")	48.3 (1.900)	±0.305 (±0.012)	11	4.39 (0.173)	+0.533 (+0.021)
50 (2")	60.3 (2.375)	±0.305 (±0.012)	11	5.49 (0.216)	+0.660 (+0.026)
63 (2 ½")	73.02 (2.875)	±0.381 (±0.015)	11	6.63 (0.261)	+0.787 (+0.031)
75 (3")	88.9 (3.500)	± 0.381 (±0.015)	11	8.08 (0.318)	+0.965 (+0.038)
100 (4")	114.3 (4.5)	± 0.381 (±0.015)	11	10.39 (0.409)	+1.246 (+0.049)
150 (6")	168.3 (6.625)	± 0.889 (±0.035)	11	15.29 (0.602)	+1.829 (+0.072)



26.5. Butt Fusion / Electro-Fusion Fittings:- End Cap, Equal Tee, Reducer, 45° / 90° Elbow, Stub Flange, Coupler.

26.6. Materials:-

26.6.1. **Gas Equipment** used in gas installation will be of a make or type as approved by the E-in-C from time to time.

26.6.2. Malleable Iron galvd screw fittings used for internal house line installation shall be in accordance with the specifications of BS 143 Malleable Iron fittings screwed, British Standard taper thread, dimension in accordance with Table 26-I

26.6.3. Valve and Cocks

26.6.3.1. Low pressure cocks shall conform to the requirements of BSS-1552 "control plug cocks for low pressure". Lock wing pattern plug type cocks shall be of locking type so that the gas supply can be locked off, if desired. Manifold cock or burner cock shall be of the rigid-key or drop fan key type.

26.6.3.2. All cocks shall be made of brass, gun metal or equally suitable copper base alloy. If manufactured by hot pressings all cocks shall be of brass, manganese, bronze or equally suitable

copper based alloy. Locally manufactured cocks shall be used in domestic and commercial gas piping installation work, only if approved by the Engineer-in-Charge.

CONSTRUCTION REQUIREMENTS

26.7. High Pressure Gas Pipe Work (MS):-

26.7.1. All gas pipes, when laid underground shall be located in a manner, so as to be at least 300mm away from other services and min earth cover of 750mm shall be provided. These pipes shall be coated and wrapped with Fibre glass.

26.7.2. λ For coating and wrapping the exterior of pipe to be coated should first be thoroughly cleaned of all oil, grease, dirt, rust, moisture or any other foreign substance. As far as practicable, immediately after cleaning, pipe surface should be covered with bituminous primer leaving about 75mm from either end. Primer should be applied after ascertaining that pipe surface to be covered is thoroughly dry and clean as primer will not stick to wet and dirty surfaces. Primer should be applied thin. Primer should be dry before enamel (doped) is applied soon after this. Hot bituminous enamel at least 1.5 mm thick should be applied and a layer of Fibre glass simultaneously embedded in the enamel to a depth or approx half the enamel thickness. This in turn should be followed by another coat of enamel (dope) preferably in the opposite direction at least 1.5 mm thick, for less than 100mm dia pipe. Before applying enamel, care should be taken to see that primer is not dead. This can be tested by scraping the finger nail over the primer and see if it flakes off. If it happens, the surface of the pipe should be repainted, as enamel does not stick over dead primer. Bituminous enamel should be slowly heated to its application temperature of 120°-150°C.

26.8. Low Pressure Pipe Work:-

26.8.1. All exposed pipes be firmly clamped and adequately supported. Pipe clamp shall also be fixed near the bends to avoid any lateral movement. The clamped pipe must rigidly hang with the wall to which it is clamped. Spacing of support in piping installation should not be greater than the following:-

i.	15 mm	2.5 M
ii.	20 mm & 25 mm	3 M
iii.	Larger than 25 mm (horizontal)	3 M
iv.	Larger than 25 mm (vertical)	every Floor level

26.8.2. A control valve (emergency shut-off valve) should be provided on each of the gas pipe line connecting to the internal pipe work of the building. This valve should be installed outside the building

along with the building wall at a height of about 150 mm to 225 mm. Under no circumstances it should be concealed. It should be readily accessible in case of emergency for shutting off gas supply to the building, if the operating pressure upto this value is 0.6 Kg/Sq.cm. in closed position.

26.8.3. To reduce the pressure from max 0.6 Kg / Sq.cm. to 150 mm Water Column (wc), suitable regulator will be required which should be installed outside the building as a safeguard against any possible release of gas from the built-in relief valves. The gas fired equipment shall be installed at a location where facilities for ventilation permit satisfactory combustion of gas and proper vent under normal conditions of use. For this purpose natural draft chimney or a mechanical exhaust may be provided. For each gas fired-equipment, a plug type control valve or ball valve should be installed to enable the equipment to be disconnected in case gas supply is not required. A union should be installed just outside/inside the building so that equipment can easily be dismantled, if required.

26.9. Medium Density Polyethylene Gas Pipes (MDPE):-

26.9.1. **Jointing Methods:** Two most commonly used jointing methods are Butt-Fusion Method and Electro-Fusion Method.

26.9.1.1. **Butt Fusion Method:** A method of joining MDPE like (T-Flex) pipes where two pipe ends are heated to a molten state, and brought together to form a homogeneous bond. For long lasting and reliable fusion, only pipes and fittings of same size, MRS and SDR* rating should be used.

*Standard Dimension Ratio (SDR) = <u>Avg Outside Dia</u> Min Wall Thickness

- 26.9.1.1.1. **Preparation** (for Butt Fusion Joints):- Following points be ensured (**Do's**)
 - i Check that dia, Standard Dimension Ratio (SDR), Polymer (MRS) are same.
 - ii Check all equipment is clean and in good working condition.
 - iii Ensure that the pipe is undamaged.
 - iv Check fuel for generator (where applicable).
 - v Check fusion conditions for pipe to be welded.
 - vi Carry out dummy fusion to clean heating plate (where needed).

26.9.1.1.2. Following points be avoided (Don't's)

i Welding in wet or windy condition without protection of welding equipment.

NATURAL GAS

14/1

- ii Removing pipe from clamp before cooling period is complete.
- iii Using dirty or contaminated pipe.
- iv Using Butt Fusion equipment being not fully trained to do so.
- 26.9.1.1.3. General Procedure (Butt Fusion Installation):
 - i Ensure that the pipes to be joined are of same diameter, SDR and polymer.
 - ii If necessary, pipe and fittings should be washed with clean water and wiped with paper before clamping in machine.
 - iii The pipe ends must be reasonably square cut. If not, re-cut pipe ends after pipe is cleaned with moist cloth and dried.
 - iv At the start of each working day (welding session) the cold heater plate should be cleaned with moist cloth and dried.
 - Check to ensure that the Butt fusion equipment is clean and in working order, the correct size clamp inserts are available and heater plate is up to working temperature.
 - vi To avoid any risk of contamination at site, place Butt fusion machine on a clean base board or tarpaulin.
 - vii If the weather is windy or wet, jointing should be carried out inside a protective shelter.
 - viii To prevent cooling of heater plates from air drafts, the pipe ends should be plugged or covered before welding commences.
 - ix Before jointing commences the fusion pressure and fusion time should be established for the pipes being jointed. The information should be attached to the fusion machine, or contact Technical Department of the manufacturer to obtain fusion data.
 - x Check that the generator has sufficient fuel to last for the jointing cycle.

26.9.2. **Electro-Fusion Method:** - The jointing technique is based on sleeve coupler with an integrated coil. The pipe ends that are to be joined are placed in the coupler and electrical current is passed through the coil. As wire resistance generates heat, the material of coupler and pipe melts to fuse with each other.

- 26.9.2.1. Preparation for Electro Fusion Joints:-
 - 26.9.2.1.1. Following points be ensured (Do's) :
 - i. Cut pipe ends square and deburr.
 - ii. Scrape pipe ends.
 - iii. Use correct restraining clamps.

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- iv. Set correct fusion and cooling times.
- v. Check fuel for generator (where applicable).
- 26.09.2.1.2. Following points be avoided (Don'ts)
 - i. Use of sandpaper/emery cloth etc for cleaning pipe ends.
 - ii. Touch crapped pipe ends or inside of fittings.
 - iii. Make joints in wet and rephrase unless adequate protection is provided.
 - iv. Stop the fusion cycle mid way.
 - v. Touch the fusion indicator until the fitting has cooled.
 - vi. Move joints before fully cooled.
 - vii. Remove the fitting from the plastic bag till the time it is actually required.
- 26.9.2.2. General Procedure (Electro Fusion Installation):
 - i. **Clean:-** Use a clean, dry, lint free cloth or paper towel and wipe loose dirt off the pipe ends.
 - ii. **Scrape:-** Using an approved mechanical or handheld scraper, scrape each pipe in excess of half a socket length. Ensure the entire surface layer is removed. Do not touch pipe ends after scraping.
 - iii. **Mark:-** Using molded depth of entry mark and the fitting as a guide, clearly mark the depth of entry on the pipes.
 - iv. Align:- Remove the fitting from bag and assemble on the pipes up to the central stop. At this point an approved disposable wipe may be used to clean pipe ends and bore of the fitting. Otherwise, do not touch inside of the fitting.
 - v. **Clamp:-** Position pipes and fittings into the clamp. Check that pipes are in line. Fully tighten both restraining clamps.
 - vi. **Fuse:-** Connect the fusion box electrical wires to the fitting terminals. Press start and ensure the joint complete its full Fusion cycle (indicated by movement of Fusion Indicator.)
 - vii. **Cool:-** Leave the joint in clamp for cooling till the required time as marked on each fitting. Check that the Fusion Indicator has moved.

26.10. Location of Gas Appliances:-

26.10.1. Gas appliance shall not be installed in a location, where flammable vapours or explosive mixtures are likely to be present.

26.10.2. Service connection shall be provided at a point on the boundary of consumer's premises nearest to the existing gas mains

keeping in view drive ways, CI mains, water tanks, soakage pits and any other under ground structures. Service shall not be located in a closed space or any other place where it may be subject to damage or which in the opinion of Gas Company is unsafe. Service shall not be provided unless boundary wall has been constructed at least in the section where the service is to be provided.

26.10.3. Decision of Company regarding the location and space requirements shall be final.

26.10.4. Gas Meter shall be located at adequately ventilated space not farther than 1.5M horizontal distance from the service, unless this is impracticable and another location is approved by the company. This does not apply to a case, where one service feeds more than one consumer and the meter is located nearest to the points of fabrication of gas piping, leading to respective consumers.

26.10.5. **Multiple Meter Installation:-** Gas piping for multiple meter installation shall be plainly marked by the tags, as approved by the Engineer-in-Charge and attached by the contractor at his own cost with designation, particulars of house or flat being supplied.

26.11. Sizing of House Piping:- Gas piping shall be of such size, and so installed, as to provide adequate gas supply to meet max demand without any undue loss of pressure between the gas pressure regulator and the appliances. Max demand shall be based on the consumption of all appliances.

26.12. House Piping Installation:-

26.12.1. Piping shall be according to the sketch or plan approved by the Gas Company. Any deviation or alteration shall be subject to the prior approval of the Gas Company.

26.12.2. Building structure shall not be weakened by the installation of any gas piping. Before any beams or joint or pillars are cut or notched, permission in writing must be obtained from the Engineer-in-Charge.

26.12.3. Gas piping as far as possible shall not pass through habitable or closed rooms. However, in case where it is unavoidable, section of gas piping through such spaces shall be without joints and shall contain least number of fittings.

26.12.4. The gas piping shall not touch any existing building or site for future construction, nor through manholes, drains or other underground structures.

26.12.5. The ends of all gas piping shall be reamed. Jointing compound shall be of approved type and applied only to male threads of the joints.

26.12.6. Gas piping shall not be re-supported by any other piping but shall be installed with supports of sufficient strength and quality at proper intervals so that the piping cannot be moved accidentally from the installed position.

26.13. Underground Piping:-

26.13.1. Min depth of 750 mm shall be provided. Pipe other than GI shall be protected against corrosion by use of bitumen and Hessian cloth, Fibre glass or PVC tape. Threaded portion shall also be protected in the same manner as mentioned above.

26.13.2. Piping in concrete floors and passages shall have a clear top cover of 50 mm. If practicable, channel for pipe in concrete floor shall be cut along a joint or seam. Special care shall be exercised in locations where vehicles are likely to move across the gas piping. Steel pipe shall not be used unless properly coated and wrapped.

26.14. Concealed Piping:- Pipe smaller than 20 mm shall not be used in any location. However, if the extension involved be less than 3 M and the expected gas consumption not higher than 0.56 cum per hour, 15 mm dia piping may be used.

26.15. Location of Gas Points:-

26.15.1. Plugged points shall be left 15 mm clear from floors, walls and ceilings to permit use of proper tools. In case of concealed piping or points provided through walls, female threads should be fully clear of the wall.

26.15.2. Until the connection of appliances to the gas point is made, all points so proved shall be securely capped or plugged and physically disconnected from the section of piping carrying gas.

26.16. Shut-off Cocks:-

26.16.1. In multiple flat/dwelling buildings supplied through a bulk meter or one service regulator, an individual shut-off cock for each riser or separate houseline shall be provided at a convenient point of general accessibility. In all such cases, where the meter is installed inside the flat, a lock wing type plug cock shall be provided in the houseline before the gas installation piping enters consumer's premises.

26.16.2 **Meter Control Cock.** Lock wing pattern plug cock shall be installed at inlet of each meter in case of multiple dwelling establishments.

26.16.3. **Manifold Cock.** A plug type control cock shall be installed at a convenient height in the gas piping just above the manifold piping connecting appliances to the system. Burner control cock, if not provided as an integral part, shall be installed for each burner or appliance.

26.17. Appliances Installation:-

26.17.1. All appliances shall be connected directly to the gas piping with rigid pipe and fittings.

26.17.2. Gas applications shall be adequately supported and so connected to the piping as not to exert undue strain on connections.

26.17.3. Every gas appliance shall be located with respect to building construction and other equipment to permit access to the appliance. Sufficient clearance shall be maintained to permit cleaning of heating surfaces, adjustments and cleaning of burners and pilots.

26.17.4. Domestic gas burners and cookers shall have clearance above the cooking top of not less than 750 mm to combustible material of metal cabinets. When the underside is protected with Asbestos millboard, at least 3mm thick, the distance shall be more than 600 mm.

26.17.5. All Appliances shall be installed in level. Appliances of the following types shall be provided with a flue pipe for removing flue gases to the outside atmosphere:-

- i. Water heaters with inputs over 5000 BTUs per hour, except, auto controlled instantaneous water heaters, which supply water to a single faucet, attached to and made part of the appliance.
- ii. Room heaters
- iii. Baking Ovens
- iv. Somawars

26.17.6. Gas vent or chimney shall be engineered and constructed to develop a positive flow, adequate to remove all flue gases to outside atmosphere. The gas vent or chimney, if connected to single appliance, shall not be less than size of flue pipe of the appliance.

26.17.7. Following appliances do not require to be vented:-

- i Cookers and burners.
- ii Specialized equipment of limited input such as laboratory burners.
- iii Gas light.

26.18. Water Heaters:-
26.18.1. Water heaters shall not be installed in bedrooms or any occupied room, normally kept closed. These are installed outside.

26.18.2. Water heaters shall be connected in a manner to permit observation, maintenance and servicing. No storage water heater shall be installed in a closed system of water piping, unless an approved water pressure relief valve or an expansion pipe in the system is provided.

26.18.3. The water supply to any auto instant water heater shall be such as to provide sufficient pressure to properly operate the water actuator control valve, when drawing hot water from a faucet on the top floor.

26.18.4. Water heater may only be installed inside a room provided that:-

26.18.4.1. The volume of the room is not less than 0.93 cum per 1000 Btu/hr input to the water heater. When the room is directly connected to another room or space by door, which cannot be closed, the volume of such a room or space may be incl for this purpose.

26.18.4.2. The bathroom has two ventilators, one within 150 mm to 225 mm from the floor and the other at a min height of 300 mm above top of the water heater, which cannot be closed. The area of these ventilators shall not be less than 6.50 Sq.cm/ 1000 Btu/hr input to the water heater.

26.19. Inspection, Testing and Commissioning:-

26.19.1. Inspection and Testing

26.19.1.1. Before turning gas under pressure into any piping, all openings from which gas can escape, shall be closed. Before turning gas into the house piping the system shall be pressurized to 500 mm water column (w.c) with air and checked by one of the following methods to ascertain that no gas is escaping:-

26.19.1.2. **Checking for leakage using gas meter**:- Checking for leakage can be done carefully watching the test dial of the meter to determine whether gas is passing through the meter. In case careful observation of the test hand reveals no movement for a sufficient length of time, the piping shall be purged and a small gas burner turned on and lighted. The hand of the test dial is again observed. If the dial hand moves (as it should) it will show that the meter is operating properly. If the test hand does not move or register flow of gas through the meter, it is defective and it should be replaced.

26.19.1.3. **Checking for leakage using a "U" gauge** :- This can be done by attaching a 'U' Gauge calibrated so that it can read in division increments of 2mm water column and momentarily turning on the gas supply and observing the gauge for the pressure drop with the gas supply shut off. No discernible drop in pressure shall occur during a period of 10 mins. If the meter test hand moves, or a pressure drop on the gauge is noted, all appliance outlets supplied through the system shall be examined to see if they are shut off and do not leak. If they are found shut, there is a leak in the piping system. The gas supply shall be shut off until necessary repairs have been made after which the piping shall be subjected again to the pressure test.

26.19.2. **Commissioning**

26.19.2.1. After the piping has been checked all piping receiving gas shall be fully purged. Under no circumstances shall the piping be purged into the combustion chamber of an appliance. After the piping has been sufficiently purged, appliances shall be purged and pilots, if any, lighted.

26.19.2.2. Each burner shall be adjusted to its proper gas rate in accordance with the manufacturer's instructions. Over rating of the burner is prohibited. The burner gas rate can be checked with test hand on the meter. The gas rate shall be adjusted to the required rate by changing a fixed orifice. The primary air shall be adjusted for proper flame characteristics.

26.19.2.3. All protective devices furnished with the appliance shall be checked to ensure proper operation.

26.19.2.4. When an auto pilot is provided, it shall be checked for proper operation and adjustment in accordance with the manufacturer's instructions. If the pilot does not function properly to turn off the gas supply in the event of pilot outage it shall be properly serviced or replaced with new equipment.

26.19.2.5. All appliances connected to a flue shall be operated for a few minutes and checked to see that the products of combustion are being expelled properly by passing a lighted match around the edge of opening of the draft hood. If the flue pipe is drawing properly the match flame will be drawn in the draft hood. If not the product of combustion will tend to extinguish this flame, if the products of combustion are escaping from the opening, the appliance shall not be operated until proper adjustments or repairs are made to ensure adequate draft through the flue pipe of vent.

26.19.2.6. At the time of commissioning new installations or extension of gas piping work, consumer shall be instructed by

demonstration as to how to operate the appliance safely. Instructions regarding cleaning of appliance shall be given before leaving the premises.

METHOD OF MEASUREMENTS

- 26.20. Pipe work generally shall be measured:-
 - 26.20.1. Net overall length of pipes and fitting as fixed, except, where otherwise described.
 - 26.20.2. Fittings shall be enumerated, except where otherwise described.
 - 26.20.3. MDPE Gas Quality pipe is considered without any kind of Fusion joint as well as fittings, which will be accounted for separately, as required.

CLARIFICATION OF RATES

- 26.21. The rates, inter alia, incl particularly:-
 - 26.21.1. Fixing complete in long and short lengths.
 - 26.21.2. Fixing of High pressure pipes:
 - i Laid complete in trenches after cleaning, welding, applying primer coating with, BBES compound and wrapping with Fibre glass (excl excavation).
 - ii Making good surfaces disturbed.
 - iii Forming all necessary holes for making good.
 - 26.21.3. Fixing of Low Pressure pipes:
 - i Fixing to wall/roof/floor/pillar etc. Complete with pipe hooks.
 - ii Making good surfaces disturbed.
 - iii Forming all necessary holes and making good.
 - 26.21.4. Cuts in new mains.
 - 26.21.5. Testing of High Pressure/ Low Pressure pipes.
 - 26.21.6. Turning on the supply.
 - 26.21.7. All jointing materials as required.
 - 26.21.8. Butt Fusion / Electro-Fusion joint and fittings will be measured separately for payment (for MDPE pipe)

26.22. Low-Pressure pipe work (Medium grade) shall be paid under appropriate Schedule items described in Section 18-1.

ITEM RATES

SI No	Description	Unit	Rate (Rs)
	Sui Gas - Pipe Work		
26-1	M.S Pipe for high pressure, incl cleaning, applying primer, coating with BBES (Bitumen Binding Enamel Surface) compound and wrapping with fibre glass , welding, complete 20mm dia, laid in trenches (excl excavation), supply and fixing.	Metre	710.22
26-2	Same as item 26-1, but 25 mm dia.	Metre	951.06
26-3	Same as item 26-1, but 50 mm dia.	Metre	1598.53
26-4	Same as item 26-1, but 100mm dia, double wrapping with fiber glass	Metre	3399.84
26-5	Same as item 26-4, but 150 mm dia.	Metre	4899.95
26-6	Same as item 26-1, but fixing only.	Metre	130.85
26-7	Same as item 26-2, but fixing only.	Metre	145.39
26-8	Same as item 26-3, but fixing only.	Metre	159.93
26-9	Same as item 26-4, but fixing only.	Metre	174.46
26-10	Same as item 26-5, but fixing only.	Metre	189.01
26-11	Add to item 26-1 or 26-6, if removal only.	Metre	98.14
26-12	Add to item 26-2 or 26-7, if removal only.	Metre	109.04
26-13	Add to item 26-3 or 26-8, if removal only.	Metre	119.94
26-14	Add to item 26-4 or 26-9, if removal only.	Metre	130.85
26-15	Add to item 26-5 or 26-10, if removal only.	Metre	141.75
	Gas Valves / Cocks		
26-16	Eclipse valve 20 mm dia, supply and fixing.	Each	820.59
26-17	Same as item 26-16, but 25 mm dia	Each	1375.66
26-18	Same as item 26-16, but fixing only	Each	24.79
26-19	Same as item 26-17, but fixing only	Each	28.93
26-20	Add to item 26-16 or 26-18, if removal only.	Each	18.60
26-21	Add to item 26-17 or 26-19, if removal only.	Each	21.69
26-22	Audco Valve, 20mm dia, supply and fixing.	Each	759.37
26-23	Same as item 26-22, but 25 mm dia	Each	1253.23
26-24	Same as item 26-22, but 50 mm dia	Each	5554.81

SI No	Description	Unit	Rate (Rs)
26-25	Same as item 26-22, but fixing only	Each	24.79
26-26	Same as item 26-23, but fixing only	Each	28.93
26-27	Same as item 26-24, but fixing only	Each	45.46
26-28	Add to item 26-22 or 26-25, if removal only.	Each	18.60
26-29	Add to item 26-23 or 26-26, if removal only.	Each	21.69
26-30	Add to item 26-24 or 26-27, if removal only.	Each	34.08
26-31	Brass cock , Union type, gas quality, 15 mm dia, supply and fixing	Each	510.39
26-32	Same as item 26-31, but 20 mm dia	Each	732.44
26-33	Same as item 26-31, but 25 mm dia	Each	1008.37
26-34	Same as item 26-31, but fixing only	Each	20.67
26-35	Same as item 26-32, but fixing only	Each	24.79
26-36	Same as item 26-33, but fixing only	Each	28.93
26-37	Add to item 26-31 or 26-34, if removal only.	Each	15.50
26-38	Add to item 26-32 or 26-35, if removal only.	Each	18.60
26-39	Add to item 26-33 or 26-36, if removal only.	Each	21.69
26-40	Brass valve , ball type screwed both ends complete with steel handle, washer/ nut 15 mm dia, supply and fixing.	Each	387.96
26-41	Same as item 26-40, but 20 mm dia	Each	759.37
26-42	Same as item 26- 40, but 25 mm dia	Each	1008.37
26-43	Same as item 26-40, but fixing only	Each	20.67
26-44	Same as item 26-41, but fixing only	Each	24.79
26-45	Same as item 26-42, but fixing only	Each	28.93
26-46	Add to item 26-40 or 26-43, if removal only.	Each	15.50
26-47	Add to item 26-41 or 26-44, if removal only.	Each	18.60
26-48	Add to item 26-42 or 26-45, if removal only.	Each	21.69
	Tandoor Burner		
26-49	Tandoor burner (48 nozzles), complete with burner plate, regulator /manifold etc, supply and fixing.	Each	6798.70
26-50	Same as item 26-49, but fixing only.	Each	309.91
26-51	Add to item 26-49 or 26-50, if removal only.	Each	232.42

SI No	Description	Unit	Rate (Rs)
26-52	Plate for 48 nozzles, Tandoor burner, supply and fixing.	Each	3582.99
26-53	Same as item 26-52, but fixing only.	Each	154.95
26-54	Add to item 26-52 or 26-53, if removal only.	Each	116.21
	Gas Water Heater		
26-55	Gas water heater, complete with burner pilot, thermostat and safety valve, 68 lit capacity, supply and fixing	Each	18490.76
26-56	Same as item 26-55, but 136 lit capacity.	Each	23400.21
26-57	Same as item 26-55, but 225 lit capacity.	Each	28929.60
26-58	Same as item 26-55, but 455 lit capacity.	Each	65030.53
26-59	Same as item 26-55 to 26-56, but fixing only	Each	309.91
26-60	Same as item 26-57 to 26-58, but fixing only.	Each	413.20
26-61	Add to item 26-55 to 26-56 or 26-59, if removal only.	Each	232.42
26-62	Add to item 26-57 to 26-58 or 26-60, if removal only.	Each	309.91
	Gas Room Heater		
26-63	Gas room heater, complete with pilot, single burner, supply and fixing.	Each	5268.32
26-64	Gas room heater, complete with pilot, double burner, supply and fixing.	Each	7692.44
26-65	Same as item 26-63 to 26-64, but fixing only.	Each	309.91
26-66	Add to item 26-63 to 26-65, if removal only.	Each	232.42
	Gas Burner (Chullah)		
26-67	Gas burner (chullah), single burner, supply and fixing.	Each	1815.80
26-68	Same as item 26-67, but double burner.	Each	3174.77
26-69	Same as item 26-67 to 26-68, but fixing only	Each	309.91
26-70	Add to item 26-67 to 26-69, if removal only.	Each	232.42
	Gas Cooking Range		
26-71	Gas cooking range, two burner 27 single door complete with thermostat, oven, grill, rotisserie and tempered (heat-proof)	Each	20633.29

SI No	Description	Unit	Rate (Rs)
	crystal glass, supply and fixing.		
26-72	Same as item 26-71, but 34, 3 burner , double door.	Each	22255.48
26-73	Same as item 26-71, but 34, 5 burner single door.	Each	23449.18
26-74	Same as item 26-73, but 5 burners double door	Each	26411.98
26-75	Same as item 26-71 to 26-74, but fixing only	Each	309.91
26-76	Add to item 26-71 to 26-75, if removal only.	Each	232.42
	Miscellaneous		
26-77	Thermostat of gas water heater (imported USA) complete with thermocouple wire and pilot tube, supply and fixing.	Each	5758.04
26-78	Same as item 26-77, but Pak made.	Each	2006.79
26-79	Same as item 26-77 to 26-78, but fixing only	Each	309.91
26-80	Add to item 26-77 to 26-78 or 26-79, if removal only.	Each	232.42
26-81	Audco valve, high pressure, MW-13 type, 100 mm dia flanged with nuts and bolts, complete, supply and fixing.	Each	12127.30
26-82	Same as item 26-81, but 150 mm dia	Each	28084.83
26-83	Same as item 26-81 to 26-82, but fixing only	Each	413.20
26-84	Add to item 26-81 to 26-82 or 26-83, if removal only.	Each	309.91
26-85	Muller Tee 20 mm dia welded, supply and fixing.	Each	798.79
26-86	Same as item 26-85, but 25 mm dia	Each	1264.87
26-87	Same as item 26-85, but 50 mm dia	Each	3929.57
26-88	Same as item 26-85 or 26-86, but fixing only.	Each	88.84
26-89	Same as item 26-87, but fixing only	Each	144.77
26-90	Add to item 26-85 to 26-88 or 26-89, if removal only.	Each	66.63
26-91	Sui gas regulator, "Peeble type", domestic, Pak made, supply and fixing	Each	913.63

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SI No	Description	Unit	Rate (Rs)
26-92	Same as item 26-91, but 043 Type	Each	2841.91
26-93	Same as item 26-91 to 26-92, but fixing only.	Each	454.52
26-94	Add to item 26-91 to 26-92 or 26-93, if removal only.	Each	340.89
	Sui Gas Meter		
26-95	Sui gas Meter, domestic, with brass coupling, supply and fixing.	Each	5963.87
26-96	Sui gas Meter, commercial, complete with brass coupling, supply and fixing	Each	8412.47
26-97	Same as item 26-95 to 26-96, but fixing only.	Each	454.52
26-98	Add to item 26-95 to 26- 96 or 26-97, if removal only.	Each	340.89
26-99	Gas Heater, flue pipe assembly , fabricated with 24 gauge, GI sheet, supply and fixing.	Each	342.44
26-100	Same as item 26-99, but fixing only	Each	36.36
26-101	Add to item 26-99 to 26-100, if removal only.	Each	27.28
26-102	Locking cock brass, 20mm dia, gas quality, supply and fixing.	Each	718.82
26-103	Same as item 26-102, but fixing only.	Each	45.46
26-104	Add to item 26-102 or 26-103, if removal only.	Each	34.08
26-105	Poly Ethylene (PE) Gas Pipe , Class MDPE-80 , Yellow pipe (SDR-11) 20mm dia, without Butt Fusion joint, (excl cost of excavation), supply and fixing.	Metre	127.02
26-106	Same as item 26-105, but 25 mm dia	Metre	182.42
26-107	Same as item 26-105, but 40 mm dia	Metre	340.59
26-108	Same as item 26-105, but 50 mm dia	Metre	466.69
26-109	Same as item 26-105, but 75 mm dia	Metre	1061.70
26-110	Same as item 26-105, but 100 mm dia	Metre	1550.06
26-111	Same as item 26-105, but 160 mm dia	Metre	3226.01
26-112	Same as item 26-105, 26-106, but fixing only.	Metre	41.32
26-113	Same as item 26-107 to 26-109, but fixing only.	Metre	51.65
26-114	Same as item 26-110, 26-111, but fixing only.	Metre	103.31
26-115	Add to item 26-105 to 26-106 or 26-112	Metre	30,99

SI No	Description	Unit	Rate (Rs)
	if removal only.		
26-116	Add to item 26-107 to 26-109 or 26-113 if removal only.	Metre	38.74
26-117	Add to item 26-110 to 26-111 or 26-114 if removal only.	Metre	77.47
1.	Fitting		
26-118	Butt Fusion joint, for pipe 20 mm dia, joint complete as specified.	Each	673.37
26-119	Same as item 26-118 but for pipe 25 mm dia.	Each	734.58
26-120	Same as item 26-118 but for pipe 40 mm dia.	Each	857.01
26-121	Same as item 26-118 but for pipe 50 mm or 75 mm dia.	Each	1101.87
26-122	Same as item 26-118 but for pipe 100 mm dia	Each	1101.87
26-123	Same as item 26-118 but for pipe 160 mm dia.	Each	1101.87
26-124	Elbow 20 mm for gas pipe PE MD 80, supply and fixing.	Each	645.06
26-125	Same as item 26-124 but 25 mm dia.	Each	1147.02
26-126	Same as item 26-124 but 40 mm or 50 mm dia.	Each	2538.89
26-127	Same as item 26-124, but 75 mm dia.	Each	8953.00
26-128	Same as item 26-124, but 100 mm dia	Each	9907.27
26-129	Same as item 26-124, but 160 mm dia.	Each	24677.22
26-130	Cap, 20 mm or 25 mm dia, supply and fixing.	Each	724.64
26-131	Same as item 26-130, but 40 mm to 50 mm dia.	Each	938.89
26-132	Same as item 26-130, but 75 mm to 100 mm dia.	Each	4326.37
26-133	Same as item 26-130, but 160 mm dia.	Each	14243.20
26-134	Tee, 20mm or 25mm dia, supply and fixing.	Each	1412.54
26-135	Same as item 26-134, but 40 mm or 50 mm dia.	Each	3016.37
26-136	Same as item 26-134, but 75 mm or 100 mm dia.	Each	11682.50

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SI No	Description	Unit	Rate (Rs)
26-137	Same as item 26-134 but 160 mm dia.	Each	37515.23
26-138	Tapping Tee, Reducing, 25 x 20 mm or 50 x 20 mm dia, supply and fixing.	Each	3959.08
26-139	Same as item 26-138, but 100 x 20 mm dia.	Each	4961.10
26-140	Same as item 26-138, but 100 x 25 mm dia.	Each	6209.88
26-141	Same as item 26-138, but 100 x 50 mm dia.	Each	25405.00
26-142	Same as item 26-138, but 160 x 25 mm dia.	Each	5595.82
26-143	Same as item 26-138, but160 x 50 mm dia.	Each	25405.00
26-144	Same as item 26-124, 26-125, 26-130 or 26-131, but fixing only.	Each	20.67
26-145	Same as item 26-126, 26-127, 26-132 to 26-135 or 26-138, but fixing only.	Each	41.32
26-146	Same as item 26-128, 26-129, 26-136, 26-137, 26-139 or 26-140, but fixing only.	Each	51.65
26-147	Same as item 26-141 to 26-143, but fixing only.	Each	61.99
26-148	Add to item 26-124, 26-125, 26-130, 26-131 or 26-144, if removal only.	Each	15.50
26-149	Add to item 26-126, 26-127, 26-132 to 26-135, 26-138 or 26-145, if removal only.	Each	30.99
26-150	Add to item 26-128, 26-129, 26-136, 26-137, 26-139, 26-140 or 26-146, if removal only.	Each	38.74
26-151	Add to item 26-141 to 26-143 or 26-147, if removal only.	Each	46.49

SECTION - 27

HEATING, VENTILATION AND AIR CONDITIONING AND REFREGERATION

SPECIFICATIONS

27.0. This section cover all operations for heating, ventilation , Air Condition and Refrigeration .

MATERIAL REQUIREMENTS

27.1. GI Ducting :- Shall be constructed of Galvanized sheet steel conforming to ASTM A-366-B2T and Zinc coating shall conform to ASTM 526-64T.

27.2. Diffusers :- Grills and Register shall be fabricated of anodized Aluminium.

27.3. Gate valves , Globe valves " y" strainers and vent valves upto 2 inch shall be bronze and above 2" shall be cast iron.

27.4. Insulation shall be rockwool or glass wool and density should be 24Kg/m³.

CONSTRUCTION REQUIREMENTS

27.5. GI Sheet Metal Duct

Shall be fabricated according to the Table 27-1 dimension.

Large Dimension of Ducting (in)	SWG Gauge GI Sheet	Nominal Thickness (in)
Upto 8	26	0.022
9-27	24	0.028
28-51	22	0.034
52-81	20	0.040
Above 81	18	0.052

Table 27-1 Gauge Ducting

27.6. Ducts Joints

a- Longitudinal

Pitts Burg Lock Double Seam or Groove

b- Circumferential

Upto 23"	Larger Dimension Drive Slip
24"—42"	1" High pocket Lock or standing seam
43"—72"	1-1/2" High Pocket Lock or standing seam
73"—96"	1-1/2" High pocket lock or standing seam
	Reinforced with bracing angle.

27.7 Bracing

The bracing for ducting shall be as follows duct larger dimension

24"—30"	Joints at 4" centres with bracing or joint @ 8"C/C
31"—42"	1" x 1" x 1/8" @4"C/C
43"—72"	1" x 1" x 1/8" @4"C/C
73"—84"	1 ½ " x 1- ½ " x 1/8 " @4"C/C
85"—96"	1 ½ " x 1- ½ " x 1/8" @2"C/C

The 2" centres bracing would be located at joints and between joints. The bracing shall be carried all around four sides and riveted with ducts at maximum 6" centres.

27.8 Bottom Support

Upto 12" v	vidth 1- 1	4 " x ¼"MS Flat or 1 ¼ " x 1/8" MS Angle Iron
13" to 30"	1	4 " x 1/8" MS Angle Iron
31" to 72"	1 1	ź " x 1/8" MS Angle Iron
73" to 96"	2"	x 3/16" MS Angle Iron

27.9 Hanger

Hanger spacing on average 10'-0" centre with a hanger.

27.10 Special nor for GI Duct

- 27-10-1 All un-insulated ducts above 18" to be cross broken.
- 27-10-2 No Lateral joint to come under beam
- 27-10-3 Clean all iron works with wire brush and paint with red oxide before fixing.

Table 27-2 Insulation for Duct

S.No	Service	Thickness	Material	Vapour Barrier	External Covering
1	All supply and return air duct in AHU Unit room and non conditioned areas in side the building	1"	Fiber glass or Rockwool	2 ply Kraft paper and aluminum foil with internal fibre glass yarn reinforcement	Coarse cloth covering
2	Supply and return ducts in return ducts in conditioned areas	1"	-do-	-do-	-do-
3	Ducts exposed to weather (Loc out side the building)	1-1/2"	-d0-	-do-	 (i) Roofing felt 45lbs. (ii) canvas cloth jacketing (iii) 26 gauge aluminum sheet jacketing

27.11. Method of Measurement

- 27-11-1 GI Sheet metal duct , duct insulation and covering to be paid per Sqm.
- 27-11-2 Grill, diffuser and register will be paid per Sqm.
- 27-11-3 Valves and fitting will be paid in each No.



Figure -27-2





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ITEM RATES

S/No.	Description	Unit	Rate (Rs)
27-1	GI Sheet metal duct complete with hanger for ceiling suspended, proper support for duct running on roof and bracing complete in all respect 26 SWG supply and fixing.	Sqm	2193.96
27-2	Same as Item 27-1 but 24 SWG	Sqm	2236.81
27-3	Same as Item 27-1 but 22 SWG	Sqm	2415.56
27-4	Same as Item 27-1 but 20 SWG.	Sqm	2759.35
27-5	Same as Item 27-1 but 18 SWG	Sqm	2873.21
27-6	Same as Item 27-1 but fixing only.	Sqm	518.42
27-7	Same as Item 27-2 but fixing only.	Sqm	457.2
27-8	Same as Item 27-3 but fixing only.	Sqm	457.2
27-9	Same as Item 27-4 but fixing only.	Sqm	589.19
27-10	Same as Item 27-5 but fixing only.	Sqm	589.19
27-11	Added to Item 27-1 or 27-6 if removal only.	Sqm	260.10
27-12	Add to Item 27-2 or 27-7 if removal only.	Sqm	260.10
27-13	Add to Item 27-3 or 27-8 if removal only.	Sqm	260.10
27-14	Add to item 27-4 or 27-9, if removal only.	Sqm	316.35
27-15	Add to item 27-5 or 27-10, if removal only.	Sqm	316.35
27-16	Fiber glass or rock wool insulation for GI duct 1 inch thickness. supply and fixing.	Sqm	2173.13
27-17	Same as item 27-16 but 1.5 inch thickness.	Sqm	2968.93
27-18	Vapour barrier for GI duct consist of 2 ply kraft foil with internal fiber glass yarn reinforcement at maximum i inch centre to centre.	Sqm	527.98
27-19	External covering for GI duct consist of coarse cloth covering.	Sqm	595.32
27-20	Sound liner thickness 1 inch for GI duct where required. supply and fixing.	Sqm	3303.16
27-21	Same as item 27-20 but 2 inch thickness.	Sqm	5815.43
27-22	Same as item 27-16 but fixing only.	Sqm	581.540
27-23	Same as item 27-17 but fixing only.	Sqm	581.540

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S/No.	Description	Unit	Rate (Rs)
27-24	Same as item 27-18 but fixing only.	Sqm	123.96
27-25	Same as item 27-19 but fixing only.	Sqm	123.96
27-26	Same as item 27-20 but fixing only.	Sqm	826.40
27-27	Same as item 27-21 but fixing only.	Sqm	1071.26
27-28	Added to item 27-16 or 27-22, if removal only.	Sqm	436.16
27-29	Added to item 27-17 or 27-23, if removal only.	Sqm	436.16
27-30	Added to item 27-18 or 27-24, if removal only.	Sqm	92.97
27-31	Added to item 27-19 or 27-25, if removal only.	Sqm	92.97
27-32	Added to item 27-20 or27-26, if removal only.	Sqm	619.80
27-33	Added to item 27-21 or 27-27, if removal only.	Sqm	619.80
27-34	Supply air diffusers, supply and fixing.	Sqm	19775.20
27-35	Return air diffusers, supply and fixing.	Sqm	19775.20
27-36	Return air grill, supply and fixing.	Sqm	19775.20
27-37	Exhaust air diffusers, supply and fixing.	Sqm	19775.20
27-38	Same as item 27-34 to 27-37 but fixing only.	Sqm	619.80
27-39	Add to item 27-34 to 27-37 or 27-38 if removal only.	Sqm	464.85
27-40	Balancing Valve for chilled / hot water 25mm dia (KITZ Japan) supply and fixing.	Each	2254.01
27-41	Same as Item 27-40 but 32mm dia.	Each	5926.91
27-42	Same as Item 27-40 but 40mm dia.	Each	7396.07
27-43	Same as Item 27-40 but 50mm dia.	Each	8865.23
27-44	Same as Item 27-40 but 65mm dia.	Each	11803.55
27-45	Same as Item 27-40 but flanged and drilled BS Table 18-1-9 75mm dia	Each	29754.47
27-46	Same as Item 27-45 but 100mm dia.	Each	32607.09
27-47	Same as Item 27-45 but 125 mm dia.	Each	37558.16
27-48	Same as Item 27-45 but 150 mm dia.	Each	66941.36
27-49	Same as Item 27-45 but 200 mm dia.	Each	96324.56
27-50	Non-Return Valve screwed 75mm dia (Kitz Japan) flanged and drilled B.S Table 18-1-9.	Each	43094.44
27-51	Same as Item 27-50 but 100mm dia.	Each	46808.97

S/No.	Description	Unit	Rate (Rs)
27-52	Same as Item 27-50 but 125mm dia.	Each	51706.17
27-53	Same as Item 27-50 but 150mm dia.	Each	56185.88
27-54	Same as Item 27-50 but 200mm dia.	Each	110544.80
27-55	Y Strainer 75mm dia (Kitz Japan) flanged and drilled B.S Table 18-1-9 supply and fixing	Each	44318.74
27-56	Same as Item 27-55 but 100mm dia.	Each	51706.17
27-57	Same as Item 27-50 but 125mm dia.	Each	59051.97
27-58	Same as Item 27-50 but 150mm dia.	Each	117890.60
27-59	Same as Item 27-50 but 200mm dia.	Each	161965.40
27-60	Automatic Air Vent Valve 20mm dia (Kitz Japan) supply and fixing.	Each	4335.32
27-61	Same as Item 27-60 but 25mm dia.	Each	5192.33
27-62	Same as Item 27-40 to 27-44, 27-60 to 27- 61 but fixing only.	Each	50.27
27-63	Same as Item 27-45 to 27-49, 27-50 to 27- 54, 27-55 to 27-59 but fixing only.	Each	316.18
27-64	Add to Item 27-40 to 27-44, 27-60 to 27-61 and 27-62 if removal only.	Each	223.20
27-65	Add to Item 27-45 to 27-49, 27-50 to 27-54, 27-55 to 27-60 and 27-64, if removal only.	Each	92.97
27-66	Pipe line thermostat supply and fixing.	Each	6134.89
27-67	Pipe line pressure guage . supply and fixing.	Each	3637.32
27-68	Same as item 27-66,27-67 but fixing only.	Each	258.25
27-69	Added to item 27-66, 27-67 or 27-68, if removal only.	Each	194.21
27-70	Installation AC Unit , wall mounted split type upto 1.5 Ton (except cost of AC unit and electric wiring).	Each	3672.90
27-71	Same as item 27-70 but 2 Ton capacity.	Each	3672.90
27-72	Installation AC unit, floor mounted split type, 3 phase, 5 Ton capacity (except cost of AC unit , electric wiring and PCC foundation).	Each	6121.50
27-73	Same as item 27-72 but upto 10 Ton capacity.	Each	6121.50

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S/No.	Description	Unit	Rate (Rs)
27-74	Same as item 27-72 but upto 16 Ton capacity	Each	18364.50
27-75	Same as item 27-72 but upto 20 Ton capacity.	Each	22037.40
27-76	Same as item 27-72 but upto 25 Ton capacity.	Each	26934.60
27-77	Electric Water Cooler , SP, 220/240V, cooling capacity 30 to 40 lits/ hour, complete, supply and fixing.	Each	37670.18
27-78	Same as item 27-77, but 60 lits/ hour, capacity.	Each	44281.40
27-79	Same as item 27-77, but 80 lits/hour capacity.	Each	48792.19
27-80	Same as item 27-77, but 100 lits/hour capacity.	Each	50995.93
27-81	Same as item 27-77, but 200 lits/hour capacity.	Each	100193.65
27-82	Same as item 27-77 to 27-78, but fixing only.	Each	206.60
27-83	Same as item 27-79 to 27-80, but fixing only.	Each	309.91
27-84	Same as item 27-81 but fixing only.	Each	413.20
27-85	Add to item 27-77 to 27-78 or 27-82, if removal only.	Each	154.95
27-86	Add to item 27-79 to 27-80 or 27-83, if removal only.	Each	232.42
27-87	Add to item 27-81 or 27-84, if removal only.	Each	309.91
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SECTION 28

MATERIALS SUPPLIED ONLY RATES

Buildings, Roads, Landing Ground, etc

The rates for materials given below have been used in compiling the item rates in this schedule and the same will be used as defined in General Rules. In case where MES Stores are issued to the contractors under various contracts on payment, the recovery will be affected at these rates as given in General Rules.

S/No.	Description	Unit	Rate (Rs)
	Aggregates		·
28-1	Aggregate (bajri, ballast, gravel, shingle) graded as specified.	Cum	560.00
28-2	Ghera, approved gauge 40mm to 50mm (soil aggregate).	Cum	517.94
28-3	Sand (Washed).	Cum	570.90
28-4	Khaka (Stone dust).	Cum	459.04
	Bricks		
28-5	Brick, burnt, 1 st class.	M.Nos	8000.00
28-6	Brick, burnt, machine made.	M.Nos	18000.00
28-7	Fire bricks.	C.Nos	10000.00
28-8	Fireclay.	Kg	15.00
28-9	Brick tiles 300 x 150 x 50mm.	M.Nos	11000.00
28-10	Brick tiles 300 x 150 x 38mm.	M.Nos	9000.00
	Boarding		
28-11	Boarding , 13mm thick, 1 st class Softwood.	Sqm	1572.48
28-12	Boarding, 19mm thick, 1 st class Softwood.	Sqm	2329.00
28-13	Boarding, 25mm thick, 1 st class Softwood.	Sqm	2995.00
28-14	Boarding, 13mm thick, 1 st class Shisham.	Sqm	518.00
28-15	Boarding, 19mm thick, 1 st class Shisham.	Sqm	765.00
28-16	Boarding, 25mm thick, 1 st class Shisham.	Sqm	982.00
28-17	Boarding, 13mm thick, 1 st class Burma Teak.	Sqm	4322.00

S/No.	Description	Unit	Rate (Rs)
28-18	Boarding, 19mm thick, 1 st class Burma Teak.	Sqm	6370.00
28-19	Boarding, 25mm thick, 1 st class BurmaTeak.	Sqm	8190.00
28-20	Medium Density Fibre Board 16mm thick.	Sqm	1592.00
28-21	Formica 0.8 mm thick.	Sqm	227.50
28-22	PVC/uPVC - Wall Panelling/ceiling 1.5 mm thick (Pak made).	Sqm	2371.00
28-23	Chipboard, 13 mm thick.	Sqm	247.00
28-24	- do -, but 19 mm thick.	Sqm	350.00
28-25	- do -, but 25 mm thick.	Sqm	521.00
	Cement		
28-26	Cement, white / Coloured in cloth or paper bags cost of 40 Kg bag (rates incl).	Bag	470.00
28-27	Cement, Ordinary , normal setting in cloth jute, paper bags (rates incl cost of 50 Kg bag).	Bag	760.00
28-28	Cement - Sulphate Resisting in cloth or paper bags cost of 50 Kg bag (rate incl).	Bags	480.00
28-29	Broken or crushed stone, 50mm, graded, for roads.	Cum	776.84
28-30	Broken or crushed stone, 13/19mm, graded.	Cum	847.46
28-31	Broken or crushed stone, but 3mm, graded.	Cum	877.00
28-32	Boulders, suitable for plum concrete.	Cum	1050.00
28-33	Stones, Random Rubble , quarried for hand packing.	Cum	777.00
28-34	Stones, Random Quarried , selected for walling.	Cum	777.00
28-35	Dressed Stone (stone in blocks) (47 stones in cum).	Cum	2750.00
28-36	Boulders, for filling in crates, pitching etc (packed measure).	Cum	1050.00
	Steel		
28-37	Mild Steel (MS), bars.	Tonne	66000.00

S/No.	Description	Unit	Rate (Rs)
28-38	Deformed Bar, Grade 40.	Tonne	77000.00
28-39	Deformed Bar, Grade 60.	Tonne	81600.00
28-40	High Tensile carbon steel wire.	Kg	149.00
28-41	MS rolled sections such as joist, channel, angle or tee in available lengths.	Tonne	104000.00
28-42	MS , rolled sections, such as plates for wheel-runs, plates, plain or chequered etc.	Tonne	106600.00
28-43	MS, soft drawn binding wire, black, 14 -18 SWG.	Tonne	117000.00
	Sheetings		
28-44	Steel corrugated black sheeting 24 gauge.	Tonne	91789.00
28-45	- do -, but 22 gauge.	Tonne	92937.00
28-46	Steel corrugated galvd sheeting, 24 gauge of any standard size.	Tonne	125589.00
28-47	- do -, but 22 gauge.	Tonne	121537.00
28-48	- do -, but 20 gauge.	Tonne	120004.00
28-49	Steel plain black sheeting, but 24 gauge, of any standard size.	Tonne	91000.00
28-50	Steel plain galvd sheeting, 24 gauge,of any standard size.	Tonne	124800.00
28-51	- do - but 22 gauge.	Tonne	120900.00
28-52	- do - but 20 gauge.	Tonne	119600.00
	Asbestos Sheets and Fittings		
28-53	Asbestos Cement (AC), sheets, corrugated or ribbed, of any approved make, in stock sizes.	Sqm	488.00
28-54	AC, two piece ridging, serrated or close fitting, of any approved make.	Metre	832.00
28-55	AC, two piece ridging, un-serrated or ventilating, of any approved make.	Metre	819.00
28-56	AC, aprons, of any approved make.	Metre	819.00
28-57	AC, barge board or corner pieces, of any approved make.	Metre	832.00
28-58	AC, ridge finals, of any approved make.	Metre	455.00

S/No.	Description	Unit	Rate (Rs)
28-59	AC, eaves gutter, 150mm dia, half round (with socket or plain rebated joints), of an approved make.	Metre	325.00
28-60	AC sheet plain 6mm thick, of any approved make, in stock sizes.	Sqm	624.00
28-61	Aluminium sheet, 20 BG (Imported).	Kg	325.00
28-62	Aluminium sheet, 20 BG (Pak made).	Kg	975.00
28-63	Barbed wire, 12 SWG.	Metre	15.00
28-64	Concertina GI wire, 12 SWG, loop dia 0.991M.	Metre	308.00
28-65	Razor, GI wire 12 SWG, loop dia 0.700M.	Metre	208.00
28-66	Razor, GI wire 12 SWG, loop dia 0.450M.	Metre	294.00
28-67	U bolts 10mm dia for roofs.	C.No	1600.00
28-68	L hook 10 mm dia for roof.	C.No	1000.00
28-69	Hoop iron.	Metre	27.00
28-70	Steel nails, of any size and gauge.	Kg	150.00
28-71	Expended Metal (XPM), 38 x 44 x2mm (16 gauge).	Sqm	295.00
28-72	XPM, 38 x 44 x 2 mm (18 gauge).	Sqm	197.00
28-73	XPM, 25 x 25 x 2 mm (16 gauge).	Sqm	322.00
28-74	XPM, 25 x 25 x 2 mm (18 gauge).	Sqm	214.00
	Scantlings		
28-75	Scantlings, First class Soft wood.	Cum	88276.00
28-76	Scantlings, First class Shisham.	Cum	27300.00
28-77	Scantlings, First class Burma Teak.	Cum	227500.00
	Ballies		
28-78	Ballies, 75mm to 100mm mean dia.	Metre	105.00
28-79	Ballies, 100mm to 150mm mean dia.	Metre	115.00
	Sheet Glass		
28-80	Sheet glass, in squares cut to size, as required, 3mm thick.	Sqm	367.00
28-81	Sheet glass, in squares cut to size, as	Sqm	539.00

S/No.	Description	Unit	Rate (Rs)
	required, 5mm thick.		<u> </u>
28-82	Sheet glass, milky, 3mm thick.	Sqm	367.00
28-83	Sheet glass, tinted, 5mm thick.	Sqm	786.00
28-84	Sheet glass, tinted, 8mm thick.	Sqm	969.00
28-85	Sheet glass, frosted, 3mm thick.	Sqm	450.00
28-86	Sheet glass, frosted, 5mm thick.	Sqm	460.00
28-87	Bitumen grade 10-20.	Tonne	87281.00
28-88	Asphalt bitumen grade 60/70 or 80/100.	Tonne	60120.00
28-89	Cold Emulsion, incl of containers.	Tonne	65620.00
28-90	Coal tar.	Lit	120.00
28-91	Linseed oil, raw.	Lit	140.00
28-92	Oil, Creosote.	Lit	80.00
28-93	Oil, Crude.	Lit	55.00
28-94	Turpentine.	Lit	117.00
28-95	Black Japan, or ordinary varnish.	Lit	315.00
28-96	Bee-wax.	Kg	350.00
28-97	Bitumen washer.	C.Nos	65.00
	Paint		
28-98	Oil bound Distemper.	Kg	195.00
28-99	Paint, Synthetic Enamel.	Lit	480.00
28-100	Paint, Plastic Emulsion.	Lit	481.75
28-101	Paint, Aluminium.	Lit	480.76
28-102	Paint, Weather Shield / Resistant.	Lit	535.71
	Marble		<i>¹</i> 0,
28-103	Marble Tiles, 20 to 22 mm thick, light Colour, 300 x 300 mm (except green and yellow).	Each	56.00
28-104	Marble Tiles , 20 to 22 mm thick, brilliant white Colour, 300 x 300mm.	Each	225.00
28-105	- do - but yellow (Lasbela).	Each	105.00
28-106	- do - but green (Onyx).	Each	313.00

S/No.	Description	Unit	Rate (Rs)
28-107	Marble Slab, 20 to 22mm thick, light Colour, exc 900 sq cm (except green and yellow).	Sqm	3498.00
28-108	Marble Slab, 20 to 22mm thick brilliant white Colour, exc 900 sq cm.	Sqm	2018.00
28-109	- do - but yellow (Lasbela).	Sqm	4373.00
28-110	- do - but green (Onyx).	Sqm	4547.00
28-111	25mm thick white / Coloured marble slab around WHB.	Sqm	336.00
28-112	Marble Tile, 10 to 12 mm thick light Colour. (except green and yellow).	Sqm	350.00
28-113	Marble Tile, 10-12 mm thick, brilliant white.	Sqm	1211.00
28-114	- do - but yellow (Lasbela).	Sqm	565.00
28-115	- do - but green (Onyx).	Sqm	2421.00
28-116	Sodium silicate.	Kg	180.00
28-117	Calcium carbide.	Kg	200.00
28-118	Marble chips.	Cum	6075.00
28-119	Sand paper.	Each	12.00
	Tiles		
28-120	White / Light Colour, glazed / non skid tiles not.exc 225 Sq Cm (Pak made).	Sqm	709.00
28-121	- do - but dark Colour. / printed / textured (Pak made).	Sqm	774.00
28-122	White / light Colour. / glazed / non skid tiles exc 225 Sq Cm (Pak made).	Sqm	683.00
28-123	- do - but dark Colour. / printed / textured.	Sqm	722.00
28-124	White / light Colour. / glazed / non skid tiles exc 400Sq cm but not exc 900Sq cm (Pak made).	Sqm	696.00
28-125	- do- but dark Colour. / printed / textured (Pak made).	Sqm	754.00
28-126	White / light Colour. / glazed / non skid tiles exc 900 Sq cm (Pak made).	Sqm	793.00
28-127	- do- but dark Colour. /printed /textured	Sqm	858.00

S/No.	Description	Unit	Rate (Rs)
	(Pak made).		
28-128	White / light Colour. / glazed / non skid tiles upto 600 Sq Cm. Imported (Asian- origin, China, Malaysia, Thailand or equivalent).	Sqm	1040.00
28-129	- do – but dark Colour. / printed / textured.	Sqm	1170.00
28-130	Glazed / non skid tiles in any Colour. printed / textured but not exc 1000 Sq Cm. Imported (Asian-origin, China, Malaysia, Thailand or equivalent).	Sqm	910.00
28-131	- do- but, European origin (Spain or equivalent).	Sqm	2080.00
28-132	Glazed / non skid tiles, in any Colour. printed / textured exc 1000 Sq Cm. Imported (Asian – origin, China, Malaysia, Thailand or equivalent).	Sqm	1235.00
28-133	-do- but European origin (Spain or equivalent)	Sqm	2340.00
28-134	Glazed / non skid tiles in any Colour./ printed, textured exc 1600 Sq Cm. Imported (Asian origin, China, Malaysia, Thailand or equivalent).	Sqm	1625.00
28-135	do, but European origin (Spain or equivalent).	Sqm	2600.00
28-136	Border, glazed tiles 100mm wide, any Colour / size (except gold Colour), Pak made.	Metre	533.00
28-137	- do – but Imported, but 75mm wide.	Metre	2050.52
28-138	Unglazed split tiles, 10mm thick (Light/dark Colour, printed / textured), Pak made	Sqm	780.00
28-139	Rough / glossy glazed double matt split tiles facing strip and chequered tiles laid on walls light Colour (Pak made).	Sqm	910.00
28-140	Glazed / non skid tiles in any Colour./ printed, textured exc 1600 Sq Cm.	Sqm	1625.00

S/No.	Description	Unit	Rate (Rs)
	Imported (Asian origin, China, Malaysia, Thailand or equivalent).		
28-141	-do, but European origin (Spain or equivalent)	Sqm	2600.00
28-142	Artificial Stone.	Sqm	420.00
28-143	Unglazed split tiles, 10mm thick (Light/dark Colour., printed / textured), Pak made.	Sqm	780.00
28-144	Rough / glossy glazed double matt split tiles facing strip and chequered tiles laid on walls light Colour (Pak made).	Sqm	910.00
28-145	Mosaic tiles 200 x 200 x 20mm of white cement.	Each	21.00
28-146	Mosaic tiles 300 x 300 x 25mm of white cement.	Each	39.00
28-147	Mosaic tiles 200 x 200 x 20mm of ordinary cement.	Each	18.00
28-148	Mosaic tiles 300 x 300 x 25mm of ordinary cement.	Each	33.00
28-149	Rubbing and chemical polishing to mosaic tiles.	Sqm	
28-150	PVC plain floor tiles, 2mm thick.	Sqm	560.00
28-151	- do – but textured.	Sqm	588.00
28-152	PVC floor plain tiles, 3mm thick.	Sqm	700.00
28-153	- do – but textured.	Sqm	728.00
28-154	PVC floor plain tiles, 5mm thick.	Sqm	1189.00
28-155	PVC floor plain sheet, 2mm thick.	Sqm	588.00
28-156	- do – but textured.	Sqm	602.00
28-157	PVC floor plain sheet, 3mm thick.	Sqm	728.00
28-158	- do – but textured.	Sqm	742.00
28-159	Anti static tiles, 3mm thick, size (300 x 300mm).	Sqm	1889.00
	Paving Stone		
28-160	Paving Stone, Coloured 50mm thick.	Sqm	588.00

S/No.	Description	Unit	Rate (Rs)
28-161	Paving Stone, natural Colour 50mm thick.	Sqm	532.00
28-162	Paving Stone, Coloured 60 mm.	Sqm	672.00
28-163	Paving Stone, natural Colour. 60mm.	Sqm	616.00
28-164	Paving Stone, red/black Colour, 80 mm.	Sqm	784.00
28-165	Paving Stone, natural Colour., 80 mm.	Sqm	728.00
	Wire Netting		
28-166	Wire netting, iron galvd 50x50 mm mesh, 8 gauge.	Sqm	529.00
28-167	Wire netting, iron galvd 50 x 50 mm mesh, 10 gauge.	Sqm	632.00
28-168	Wire netting, iron galvd 50 x 50 mm mesh, 12 gauge.	Sqm	271.42
28-169	Wire netting, iron galvd 50 x 50 mm mesh, 14 gauge.	Sqm	215.00
28-170	Wire netting, iron galvd 40 x 40 mm mesh, 8 gauge.	Sqm	858.99
28-171	Wire netting, iron galvd 40 x 40 mm mesh, 10 gauge.	Sqm	544.05
28-172	Wire netting, iron galvd 40 x 40 mm mesh, 12 gauge.	Sqm	400.05
28-173	Wire netting, iron galvd 40 x 40 mm mesh, 14 gauge.	Sqm	257.70
28-174	Wire netting, iron galvd 25 x25 mm mesh, 10 gauge.	Sqm	858.99
28-175	Wire netting, iron galvd 25 x25 mm mesh, 12 gauge.	Sqm	572.24
28-176	Wire netting, iron galvd 25 x25 mm mesh, 14 gauge.	Sqm	400.70
28-177	8 SWG, GI wire, made into mattress,100 x 100mm.	Sqm	300.58
28-178	8 SWG, GI wire, made into mattress,150 x 150mm.	Sqm	200.00
28-179	Iron tinned wire gauze, fly proof, 9x9 mesh, 24 gauge.	Sqm	197.00

S/No.	Description	Unit	Rate (Rs)
28-180	Iron tinned wire gauze, fly proof, 9x9 mesh, 22 gauge.	Sqm	585.00
28-181	Iron tinned wire gauze, fly proof, 8x8 mesh, 22 gauge.	Sqm	1649.00
28-182	Iron tinned wire gauze, fly proof,18x18 mesh, 28 gauge.	Sqm	166.00
28-183	Iron tinned wire gauze, fly proof,18x18 Mesh, 24 gauge.	Sqm	678.00
28-184	Wire gauze plastic, 18 x 18 mesh.	Sqm	54.00
28-185	14 SWG wire.	Metre	5.00
	Survey Instruments		
28-186	Levelling beam, for Rapid Run way repairs all as per Drg No. CEP/Misc 405.	Each	275600.00
28-187	Hoisting bar, for Rapid Run Way repairs all as per Drg No. CEP/Misc 405.	Each	35800.00
	Miscellaneous		
28-188	Hardcore, of any approved description.	Cum	754.00
28-189	Pudlo	Kg	100.00
28-190	Plaster of Paris.	Kg	15.00
28-191	Red or white lead.	Kg	150.00
28-192	Hessian cloth.	Sqm	52.00
28-193	Jute chopped.	Kg	11.00
28-194	Lime un-slaked.	Kg	8.00
28-195	Limpet or embossed washers.	C.No	66.00
28-196	Screws wood, steel any gauge, 13 to 25mm long.	C.No	66.00
28-197	Screws wood, steel any gauge, 25 to 50mm long.	C.No	80.00
28-198	Screws wood, steel any gauge over 75mm long.	C.No	260.00
28-199	Screws wood, steel any gauge over 100mm long.	C.No	400.00
28-200	Screw 100mm long brass with Rawal plug.	Each	9.00

S/No.	Description	Unit	Rate (Rs)
28-201	Screw 25mm with Rawal plug.	Each	2.25
28-202	Chopped straw, (Bhoosa).	Kg	11.00
	FAISAL SANITARY FITTINGS		
	Singal Lever Basin		
28-203	Single Lever Basin Mixer (5401) Waterfall Service Chrome.	Each	7040.00
28-204	Single Lever Basin Mixer (4801) Recta Service Chrome.	Each	7395.00
28-205	Single Lever Basin Mixer (4601) Grace Service Chrome.	Each	5715.00
28-206	Single Lever Basin Mixer (4901) Casper Service CP.	Each	6996.00
28-207	Single Lever Basin Mixer (5501) Carrera Service CP.	Each	5316.00
28-208	Single Lever Basin Mixer (4701) Artic Service CP.	Each	5225.00
28-209	Single Lever Basin Mixer (4701) Artic Service Youthful Colour.	Each	4967.00
28-210	Single Lever Basin Mixer (5701) Novia Service CP.	Each	4659.00
28-211	Single Lever Basin Mixer (2101) Excel Service CP.	Each	5242.00
28-212	Single Lever Basin Mixer (2101) Excel Service YC.	Each	4890.00
28-213	Single Lever Basin Mixer (1501) Faisal Pride CP.	Each	5525.00
28-214	Single Lever Basin Mixer (1501) Faisal Pride YC.	Each	5247.00
28-215	Single Lever Basin Mixer (3801) Solar Service CP.	Each	5327.00
28-216	Single Lever Basin Mixer (3801) Solar Service YC.	Each	5060.00
28-217	Single Lever Basin Mixer (2801) Venus / Pearl Services (Ecnomy) CP.	Each	3922.00
28-218	Single Lever Basin Mixer (2801) Venus /	Each	3724.00

S/No.	Description	Unit	Rate (Rs)
	Pearl Services (Ecnomy) YC.		
28-219	Single Lever Basin Mixer (2701) Indus Services (Ecnomy) CP.	Each	3949.00
28-220	Single Lever Basin Mixer (2701) Indus Services (Ecnomy) YC.	Each	3751.00
28-221	Single Lever Basin Mixer (3401) Gemini Services (Ecnomy) CP.	Each	3922.00
28-222	Single Lever Basin Mixer (3401) Gemini Services (Ecnomy) YC.	Each	3724.00
28-223	Single Lever Basin Mixer (3601) Aqua Services (Ecnomy) CP.	Each	3949.00
28-224	Single Lever Basin Mixer (3601) Aqua Services (Ecnomy) YC.	Each	3751.00
28-225	Single Lever Basin Mixer (5801) Project Services CP.	Each	2057.00
28-226	Single Lever Basin Mixer (5801) Project Services YC.	Each	1955.00
	Basin Mixer		
28-227	Basin Mixer (5601) Sleek Series CP.	Each	4540.00
28-228	Basin Mixer (2001) Diamond Series CP Chrome.	Each	5225.00
28-229	Basin Mixer (2001) Diamond Series YC.	Each	4964.00
28-230	Basin Mixer (3201) Royal Series CP.	Each	4961.00
28-231	Basin Mixer (3201) Royal Series YC.	Each	4714.00
28-232	Basin Mixer (3501) Admiral Series CP.	Each	5115.00
28-233	Basin Mixer (3501) Admiral Series YC .	Each	4848.00
28-234	Basin Mixer (1701) Bolan Range CP.	Each	4353.00
28-235	Basin Mixer (1701) Bolan Range YC.	Each	4023.00
28-236	Basin Mixer (1701) Bolan Range Chrome Gold.	Each	5225.00
28-237	Basin Mixer (1401) Moon Series CP.	Each	5085.00
28-238	Basin Mixer (1401) Moon Series YC.	Each	4832.00
28-239	Basin Mixer (1901) Noble Series CP.	Each	4752.00

S/No.	Description	Unit	Rate (Rs)
28-240	Basin Mixer (1901) Noble Series YC.	Each	4513.00
28-241	Basin Mixer (601) Swan Range CP.	Each	3748.00
28-242	Basin Mixer (601) Swan Range YC.	Each	3561.00
28-243	Basin Mixer (701) Victrian Classic CP.	Each	2940.00
28-244	Basin Mixer (701) Victrian Classic YC.	Each	2794.00
28-245	Basin Mixer (701) Victrian Classic Chrome Gold.	Each	3528.00
28-246	Basin Mixer (801) Galaxy Series CP.	Each	3773.00
28-247	Basin Mixer (801) Galaxy Series YC.	Each	3586.00
28-248	Basin Mixer (801) Galaxy Series Chrome Gold.	Each	4529.00
28-249	Basin Mixer (901) Jewel Series CP.	Each	4675.00
28-250	Basin Mixer (901) Jewel Series YC.	Each	4441.00
28-251	Basin Mixer (1001) Libra Series CP.	Each	5000.00
28-252	Basin Mixer (1001) Libra Series YC.	Each	4829.00
28-253	Basin Mixer (5001) Falcon Series CP.	Each	3809.00
28-254	Basin Mixer (5001) Falcon Series YC.	Each	3616.00
28-255	Basin Mixer (5201) Serena Series CP.	Each	3575.00
28-256	Basin Mixer (5201) Serena Series YC.	Each	3396.00
28-257	Basin Mixer (3901) Capri Series CP.	Each	3564.00
28-258	Basin Mixer (3901) Capri Series YC.	Each	3385.00
28-259	Basin Mixer (1201) Super Series CP.	Each	2750.00
28-260	Basin Mixer (1201) Super Series YC.	Each	2637.00
28-261	Basin Mixer (1301) Margalla Series CP.	Each	2442.00
28-262	Basin Mixer (1301) Margalla Series YC.	Each	2332.00
28-263	Basin Mixer (3101) Shaheen Series CP.	Each	2742.00
28-264	Basin Mixer (3101) Shaheen Series YC.	Each	2604.00
28-265	Basin Mixer (2301) Omega Series CP.	Each	2318.00
28-266	Basin Mixer (2501) Star Series CP.	Each	2360.00
28-267	Basin Mixer (2501) Star Series YC.	Each	2239.00
28-268	Basin Mixer (3701) Askari Range YC.	Each	2742.00

S/No.	Description	Unit	Rate (Rs)
28-269	Basin Mixer (3001) Ocean Series YC.	Each	2318.00
28-270	Basin Mixer (5101) Project Set CP.	Each	1936.00
28-271	Basin Mixer (5101) Project Set YC.	Each	1840.00
	Wall Hand / Hand Shower		
28-272	Wall Shower / Hand Shower Type (5602) Sleek Series CP.	Each	6716.00
28-273	Wall Shower / Hand Shower Type (2002) Diamond Series CP.	Each	6991.00
28-274	Wall Shower / Hand Shower Type (2002) Diamond Series YC.	Each	6641.00
28-275	Wall Shower / Hand Shower Type (3202) Royal Series CP.	Each	6157.00
28-276	Wall Shower / Hand Shower Type (3202) Royal Series YC.	Each	5847.00
28-277	Wall Shower / Hand Shower Type (3502) Admiral Series CP.	Each	7549.00
28-278	Wall Shower / Hand Shower Type (3502) Admiral Series YC.	Each	7172.00
28-279	Wall Shower / Hand Shower Type (1702) Bolan Range CP.	Each	6144.00
28-280	Wall Shower / Hand Shower Type (1702) Bolan Range YC.	Each	5838.00
28-281	Wall Shower / Hand Shower Type (1702) Bolan Range Chrome. Gold.	Each	7373.00
28-282	Wall Shower / Hand Shower Type (1402) Moon Series CP.	Each	5918.00
28-283	Wall Shower / Hand Shower Type (1402) Moon Series YC.	Each	5621.00
28-284	Wall Shower / Hand Shower Type (1902) Noble Series CP.	Each	5525.00
28-285	Wall Shower / Hand Shower Type (602) Sawan Range CP.	Each	5431.00
28-286	Wall Shower / Hand Shower Type (602) Sawan Range YC.	Each	5159.00
28-287	Wall Shower / Hand Shower Type (702)	Each	5088.00

S/No.	Description	Unit	Rate (Rs)
	Victorian Classic CP.		
28-288	Wall Shower / Hand Shower Type (702) Victorian Classic YC.	Each	4832.00
28-289	Wall Shower / Hand Shower Type (702) Victorian Classic Chrome Gold.	Each	6105.00
28-290	Wall Shower / Hand Shower Type (802) Galaxy Series CP.	Each	5376.00
28-291	Wall Shower / Hand Shower Type (802) Galaxy Series YC.	Each	5110.00
28-292	Wall Shower / Hand Shower Type (802) Galaxy Series Chrome Gold.	Each	6452.00
28-293	Wall Shower / Hand Shower Type (902) Jewel Series CP.	Each	5525.00
28-294	Wall Shower / Hand Shower Type (902) Jewel Series YC.	Each	5247.00
28-295	Wall Shower / Hand Shower Type (1002) Libra Series CP.	Each	6633.00
28-296	Wall Shower / Hand Shower Type (1002) Libra Series YC.	Each	6303.00
28-297	Wall Shower / Hand Shower Type (5002) Falcon Series CP.	Each	5429.00
28-298	Wall Shower / Hand Shower Type (5002) Falcon Series YC.	Each	5159.00
28-299	Wall Shower / Hand Shower Type (5202) Serna Series CP.	Each	5225.00
28-300	Wall Shower / Hand Shower Type (5202) Serna Series YC.	Each	4967.00
28-301	Wall Shower / Hand Shower Type (3902) Capri Series CP.	Each	5225.00
28-302	Wall Shower / Hand Shower Type (3902) Capri Series YC.	Each	4969.00
28-303	Wall Shower / Hand Shower Type (1202) Super Series CP.	Each	5137.00
28-304	Wall Shower / Hand Shower Type (1202) Super Series YC.	Each	4931.00

S/No.	Description	Unit	Rate (Rs)
28-305	Wall Shower / Hand Shower Type (1302) Margalla Series CP.	Each	4601.00
28-306	Wall Shower / Hand Shower Type (1302) Margalla Series YC.	Each	4417.00
28-307	Wall Shower / Hand Shower Type (3102) Shaheen Series CP.	Each	4494.00
28-308	Wall Shower / Hand Shower Type (3102) Shaheen Series YC.	Each	4307.00
28-309	Wall Shower / Hand Shower Type (2302) Omega Series CP.	Each	4307.00
28-310	Wall Shower / Hand Shower Type (2502) Star Series CP.	Each	4529.00
28-311	Wall Shower / Hand Shower Type (2502) Star Series YC.	Each	4425.00
28-312	Wall Shower / Hand Shower Type (3702) Askari Range CP.	Each	4307.00
28-313	Wall Shower / Hand Shower Type (3002) Ocean Series CP.	Each	4813.00
28-314	Wall Shower / Hand Shower Type (5102) Project Set CP.	Each	3251.00
28-315	Wall Shower / Hand Shower Type (5102) Project Set YC.	Each	3088
	Double Bib Cock	$\langle \rangle$,	
28-316	Double Bib Cock (5603) Sleek Series CP.	Each	1540.00
28-317	Double Bib Cock (2003) Diamond Series CP.	Each	1114.00
28-318	Double Bib Cock (2003) Diamond Series YC.	Each	1056.00
28-319	Double Bib Cock (1703) Bolan Range CP.	Each	1210.00
28-320	Double Bib Cock (1703) Bolan Range YC.	Each	1152.00
28-321	Double Bib Cock (1703) Bolan Range Chrome Gold.	Each	1452.00
28-322	Double Bib Cock (1403) Moon Series CP.	Each	1394.00
28-323	Double Bib Cock (1403) Moon Series YC.	Each	1328.00
28-324	Double Bib Cock (603) Swan Range CP.	Each	1100.00
28-325	Double Bib Cock (603) Swan Range YC.	Each	1045.00
S/No.	Description	Unit	Rate (Rs)
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28-326	Double Bib Cock (1003) Libra Series YC.	Each	1337.00
28-327	Double Bib Cock (1003) Libra Series CP.	Each	1320.00
28-328	Double Bib Cock (5003) Falcon Series CP.	Each	1040.00
28-329	Double Bib Cock (5003) Falcon Series CP.	Each	990.00
28 -33 0	Double Bib Cock (3903) Capri Series CP.	Each	1009.00
28-331	Double Bib Cock (3903) Capri Series YC.	Each	982.00
28-332	Double Bib Cock (Rectangular) (1203) Super Series CP.	Each	1045.00
28-333	Double Bib Cock (Rectangular) (1203) Super Series YC.	Each	996.00
28-334	Double Bib Cock (Rectangular) (2303) Omega Series CP.	Each	982.00
28-335	Double Bib Cock (3003) Ocean Series CP.	Each	1064.00
28-336	Double Bib Cock (5103) Project Set CP.	Each	877.00
28-337	Double Bib Cock (5103) Project Set YC.	Each	836.00
	Sink Mixers		
28-338	Sink Mixer (700) Victorian CP.	Each	2239.00
28-339	Sink Mixer (700) Victorian YC.	Each	2277.00
28-340	Sink Mixer (800) Galaxy CP.	Each	3402.00
28-341	Sink Mixer (800) Galaxy YC.	Each	3176.00
28-342	Sink Mixer (900) Jewel CP.	Each	3856.00
28-343	Sink Mixer (900) Jewel YC.	Each	3594.00
28-344	Sink Mixer (Quarter Round) (1100) Bolan CP.	Each	3913.00
28-345	Sink Mixer (Quarter Round) (1100) Bolan YC.	Each	3655.00
28-346	Sink Mixer (1300) Margalla CP.	Each	2626 .00
28-347	Sink Mixer (1300) Margalla YC.	Each	2450.00
28-348	Sink Mixer Single Lever (1600) Ravi CP.	Each	5940.00
28-349	Sink Mixer Single Lever (1600) Ravi YC.	Each	5550.00
28-350	Sink Mixer Single Lever (1700) Indus CP.	Each	5376.00
28-351	Sink Mixer Single Lever (1700) Indus YC.	Each	5019.00
28-352	Sink Mixer Single Lever (Long Neck) (1900) CP.	Each	4884.00

S/No.	Description	Unit	Rate (Rs)
28-353	Sink Mixer Single Lever (Long Neck) (1900) YC.	Each	4560.00
28-354	Waste Sink (551).	Each	193.00
	Bath Set Complete 8 Pieces		
28-355	Bath Set Complete 8 Pieces (5607) Sleek Series CP.	Each	16231.00
28-356	Bath Set Complete 8 Pieces (2007) Diamond Series CP.	Each	16624.00
28-357	Bath Set Complete 8 Pieces (2007) Diamond Series YC.	Each	15645.00
28-358	Bath Set Complete 8 Pieces (3207) Royal Series CP.	Each	15527.00
28-359	Bath Set Complete 8 Pieces (3207) Royal Series YC.	Each	14600.00
28-360	Bath Set Complete 8 Pieces (3507) Admiral Series CP.	Each	17072.00
28-361	Bath Set Complete 8 Pieces (3507) Admiral Series YC.	Each	16060.00
28-362	Bath Set Complete 8 Pieces (1707) Bolan Range CP.	Each	15381.00
28-363	Bath Set Complete 8 Pieces (1707) Bolan Range YC.	Each	14691.00
28-364	Bath Set Complete 8 Pieces (1707) Bolan Range Chrome. Gold.	Each	18235.00
28-365	Bath Set Complete 8 Pieces (1407) Moon Series CP.	Each	16236.00
28-366	Bath Set Complete 8 Pieces (1407) Moon Series YC.	Each	15285.00
28-367	Bath Set Complete 8 Pieces (1907) Noble Series CP.	Each	14685.00
28-368	Bath Set Complete 8 Pieces (1907) Noble Series YC.	Each	13800.00
28-369	Bath Set Complete 8 Pieces (607) Swan Range CP.	Each	13492.00
28-370	Bath Set Complete 8 Pieces (607) Swan	Each	12667.00

S/No.	Description	Unit	Rate (Rs)
	Range YC.		·
28-371	Bath Set Complete 8 Pieces (707) Victorian Classic CP.	Each	12339.00
28-372	Bath Set Complete 8 Pieces (707) Victorian Classic YC.	Each	11580.00
28-373	Bath Set Complete 8 Pieces (707) Victorian Classic Chrome Gold.	Each	14586.00
28-374	Bath Set Complete 8 Pieces (807) Galaxy Series CP.	Each	13461.00
28-375	Bath Set Complete 8 Pieces (807) Galaxy Series YC.	Each	12642.00
28-376	Bath Set Complete 8 Pieces (907) Jewel Series CP.	Each	14512.00
28-377	Bath Set Complete 8 Pieces (907) Jewel Series YC.	Each	13635.00
28-378	Bath Set Complete 8 Pieces (1007) Libra Series CP.	Each	16503.00
28-379	Bath Set Complete 8 Pieces (1007) Libra Series YC.	Each	15749.00
28-380	Bath Set Complete 8 Pieces (5007) Falcon Series CP.	Each	13266.00
28-381	Bath Set Complete 8 Pieces (5007) Falcon Series YC.	Each	12485.00
28-382	Bath Set Complete 8 Pieces (5207) Serena Series CP.	Each	12829.00
28-383	Bath Set Complete 8 Pieces (5207) Serena Series YC.	Each	12073.00
28-384	Bath Set Complete 8 Pieces (3907) Capri Series CP.	Each	12788.00
28-385	Bath Set Complete 8 Pieces (3907) Capri Series YC.	Each	12056.00
28-386	Bath Set Complete 8 Pieces (1207) Super Series CP.	Each	11938.00
28-387	Bath Set Complete 8 Pieces (1207) Super Series YC.	Each	11300.00

S/No.	Description	Unit	Rate (Rs)
28-388	Bath Set Complete 8 Pieces (1307) Margalla Series CP.	Each	11355.00
28-389	Bath Set Complete 8 Pieces (1307) Margalla Series YC.	Each	10695.00
28-390	Bath Set Complete 8 Pieces (3107) Shaheen Series CP.	Each	11234.00
28-391	Bath Set Complete 8 Pieces (3107) Shaheen Series YC.	Each	10612.00
28-392	Bath Set Complete 8 Pieces (2307) Omega Series CP.	Each	10326.00
28-393	Bath Set Complete 8 Pieces (2507) Star Series CP.	Each	11107.00
28-394	Bath Set Complete 8 Pieces (2507) Star Series YC.	Each	10530.00
28-395	Bath Set Complete 8 Pieces (3707) Askari Range YC.	Each	10750.00
28-396	Bath Set Complete 8 Pieces (3007) Ocean Series YC.	Each	10940.00
28-397	Bath Set Complete 8 Pieces (5107) Project Set CP.	Each	8819.00
28-398	Bath Set Complete 8 Pieces (5107) Project Set YC.	Each	8327.00
	Basin Mixer	$\langle \rangle$,	
28-399	Basin Mixer Bravo (4023) Colour.	Each	2292.00
28-400	Basin Mixer Bravo (4023) Chrome.	Each	2413.00
28-401	Bath Mixer Flora (4033) Colour.	Each	2302.00
28-402	Bath Mixer Flora (4033) Chrome.	Each	2424.00
28-403	Basin Mixer Gipsy (4013) Colour.	Each	2299.00
28-404	Basin Mixer Gipsy (4013) Chrome.	Each	2420.00
28-405	Basin Mixer Cleopatra (253) Colour.	Each	4136.00
28-406	Basin Mixer Cleopatra (253) Chrome.	Each	4457.00
28-407	Bath Mixer Classic (303) Colour.	Each	4816.00
28-408	Bath Mixer Classic (303) Chrome.	Each	5137.00
28-409	Basin Mixer Rosy (318) Colour.	Each	4445.00

S/No.	Description	Unit	Rate (Rs)
28-410	Basin Mixer Rosy (318) Chrome.	Each	4809.00
28-411	Basin Mixer Zoom (353) Colour.	Each	2386.00
28-412	Basin Mixer Zoom (353) Chrome.	Each	2798.00
28-413	Basin Mixer EVA (623) Colour.	Each	6306.00
28-414	Basin Mixer EVA (623) Chrome.	Each	6580.00
28-415	Basin Mixer K.B (201) Colour.	Each	7084.00
28-416	Basin Mixer K.B (201) Chrome.	Each	7438.00
28-417	Basin Mixer Roomy (633) Colour.	Each	6609.00
28-418	Basin Mixer Roomy (633) Chrome.	Each	7093.00
28-419	Basin Mixer Style (263) Colour.	Each	6962.00
28-420	Basin Mixer Style (263) Chrome.	Each	7291.00
28-421	Basin Mixer Orial (583) Colour.	Each	7536.00
28-422	Basin Mixer Orial (583) Chrome.	Each	8039.00
28-423	Basin Mixer Slimline (227) Colour.	Each	8342.00
28-424	Basin Mixer Slimline (227) Chrome.	Each	8802.00
28-425	Basin Mixer Cera (593) Colour.	Each	7761.00
28-426	Basin Mixer Cera (593) Chrome.	Each	8205.00
28-427	Basin Mixer Royal (603) Colour.	Each	9433.00
28-428	Basin Mixer Royal (603) Chrome.	Each	9884.00
28-429	Bath Mixer Stream (3193) Colour.	Each	2301.00
28-430	Bath Mixer Stream (3193) Chrome.	Each	2422.00
28-431	Basin Mixer Economy (4043) Colour.	Each	2303.00
28-432	Basin Mixer Economy (4043) Chrome.	Each	2424.00
28-433	Basin Mixer Victoria (322) Colour.	Each	4401.00
28-434	Basin Mixer Victoria (322) Chrome.	Each	4650.00
28-435	Bath Mixer Fancy (493) Colour.	Each	6876.00
28-436	Bath Mixer Fancy (493) Chrome.	Each	7204.00
	Sink Mixer		
28-437	Sink Mixer System (314) Colour.	Each	4443.00
28-438	Sink Mixer System (314) Chrome.	Each	4937.00

S/No.	Description	Unit	Rate (Rs)
28-439	Sink Mixer Classic (315) Colour.	Each	3812.00
28-440	Sink Mixer Classic (315) Chrome.	Each	4285.00
28-441	Sink Mixer System (316) Colour.	Each	4376.00
28-442	Sink Mixer System (316) Chrome.	Each	4892.00
28-443	Sink Mixer Unique (410) Colour.	Each	6793.00
28-444	Sink Mixer Unique (410) Chrome.	Each	7150.00
28-445	Sink Mixer Elite (310) Colour.	Each	7857.00
28-446	Sink Mixer Elite (310) Chrome.	Each	8448.00
28-447	Ablution Mixer (333) Colour.	Each	5942.00
28-448	Ablution Mixer (333) Chrome.	Each	6411.00
28-449	Sink Mixer Economy (411) Colour.	Each	3125.00
28-450	Sink Mixer Economy (411) Chrome.	Each	3289.00
28-451	Sink Mixer Amy Single Lever (907) Colour.	Each	8687.00
28-452	Sink Mixer Amy Single Lever) (907) Chrome.	Each	9339.00
28-453	Sink Mixer Liza (Long Neck Ocean Lever) (908) Colour.	Each	8960.00
28-454	Sink Mixer Liza (Long Neck Ocean Lever) (908) Chrome.	Each	9678.00
28-455	Sink Mixer Liza (Long Neck Single Lever) (905) Colour.	Each	8960.00
28-456	Sink Mixer Liza (Long Neck Single Lever) (905) Chrome.	Each	9678.00
28-457	Sink Mixer Liza (Long Neck Ocean Lever) (912) Colour.	Each	8960.00
28-458	Sink Mixer Liza (Long Neck Ocean Lever) (912) Chrome.	Each	9678.00
28-459	Sink Mixer K.B (909 , 212) Colour.	Each	5931.00
28-460	Sink Mixer K.B (909 , 212) Chrome.	Each	6521.00
28-461	Sink Mixer Florence (Venus Lever) (914) Colour.	Each	8733.00
28-462	Sink Mixer Florence (Venus Lever) (914) Chrome.	Each	9391.00
28-463	Sink Mixer Glorious (941) Colour.	Each	5830.00

S/No.	Description	Unit	Rate (Rs)
28-464	Sink Mixer Glorious (941) Chrome.	Each	6368.00
	Double Bib Cock		
28-465	Double Bib Cock Zoom (355) Colour.	Each	1519.00
28-466	Double Bib Cock Zoom (355) Chrome.	Each	1631.00
28-467	Double Bib Cock Eva (624) Colour.	Each	2859.00
28-468	Double Bib Cock Eva (624) Chrome.	Each	3144.00
28-469	Double Bib Cock K.B (401) Colour.	Each	2436.00
28-470	Double Bib Cock K.B (401) Chrome.	Each	2617.00
28-471	Double Bib Cock Royal (427) Colour.	Each	2898.00
28-472	Double Bib Cock Royal (427) Chrome.	Each	3087.00
28-473	Double Bib Cock Stylish (405) Colour.	Each	1770.00
28-474	Double Bib Cock Stylish (405) Chrome.	Each	1990.00
	6 Piece Set		
28-475	6 Piece Set (2403) Colour, with double bib cock KB,3.T cocks , K.B (Head Ruby) Toilet Shower with pipe and waste.	Each	7245.00
28-476	6 Piece Set (2403) Chrome. , with double bib cock KB,3.T cocks , K.B (Head Ruby) Toilet Shower with pipe and waste.	Each	8159.00
28-477	6 Piece Set (2413) Colour, with double bib cock KB,3xT cocks, Classic Toilet Shower with pipe and waste.	Each	5874.00
28-478	6 Piece Set (2413) Colour, with double bib cock KB,3xT cocks, Classic Toilet Shower with pipe and waste.	Each	6644.00
28-479	6 Piece Set (2405) Colour, with double bib cock Eva, 3xT cocks Eva Toilet Shower with pipe and waste.	Each	8499.00
28-480	3 Piece Set (2405) Colour, with double bib cock Eva, 3xT cocks Eva Toilet Shower with pipe and waste.	Each	9718.00
28-481	6 Piece Set (2402) Colour, with double bib cock KB, 3xT cocks, K.B Toilet Shower with pipe and waste.	Each	7245.00

S/No.	Description	Unit	Rate (Rs)
28-482	6 Piece Set (2402) Colour, with double bib cock KB, 3xT cocks, K.B Toilet Shower with pipe and waste.	Each	8159.00
28-483	6 Piece Set (2412) Colour, with double bib cock, 3xT cocks, Classic Toilet Shower with pipe and waste.	Each	5874.00
28-484	7 Piece Set (2412) Colour, with double bib cock, 3xT cocks, Classic Toilet Shower with pipe and waste.	Each	6644.00
28-485	6 Piece Set (2409) Colour, with double bib cock ,Cera 3.T cocks, Cera Toilet Shower with pipe and waste.	Each	8499.00
28-486	6 Piece Set (2409) Colour, with double bib cock, Cera 3xT cocks, Cera Toilet Shower with pipe and waste.	Each	9718.00
28-487	6 Piece Set (2409) Colour, with double bib cock, Cera 3xT cocks, Cera Toilet Shower with pipe and waste.	Each	6297.00
28-488	6 Piece Set (2409) Colour, with double bib cock, Cera 3xT cocks, Cera Toilet Shower with pipe and waste.	Each	7171.00
28-489	6 Piece Set (2404) Colour, with double bib cock Royal, 3xT cocks, Royal Toilet Shower with pipe and waste.	Each	7821.00
28-490	6 Piece Set (2404) Colour, with double bib cock Royal, 3xT cocks, Royal Toilet Shower with pipe and waste.	Each	8746.00
28-491	6 Piece Set (2414) Colour, with double bib cock Royal, 3xT cocks, Classic Toilet Shower with pipe and waste.	Each	6336.00
28-492	6 Piece Set (2414) Colour, with double bib cock Royal, 3xT cocks, Classic Toilet Shower with pipe and waste.	Each	7114.00
28-493	6 Piece Set (2381) Colour, with double bib cock Zoom (Head Grohe), 3xT cocks , (Classic) Toilet Shower with pipe and waste.	Each	4957.00

S/No.	Description	Unit	Rate (Rs)
28-494	7 Piece Set (2381) Colour, with double bib cock Zoom (Head Grohe), 3 xT cocks , (Classic) Toilet Shower with pipe and waste.	Each	5658.00
28-495	6 Piece Set (2381-C) Colour, with double bib cock Zoom, 3xT cocks, (Classic) Toilet Shower with pipe and waste.	Each	5928.00
28-496	6 Piece Set (2403-C) Chrome, with double bib cock, K.B (Head Ruby) CP Toilet Shower with Chain waste.	Each	8429.00
28-497	6 Piece Set (2410) Colour, with double bib cock Zoom, 3xT cocks, Classic Toilet Shower with pipe and waste.	Each	4957.00
28-498	6 Piece Set (2410) Colour, with double bib cock Zoom, 3xT cocks, Classic Toilet Shower with pipe and waste.	Each	5658.00
28-499	6 Piece Set (2410) Colour, with double bib cock Zoom, 3xT cocks, Classic Toilet Shower with pipe and waste.	Each	4957.00
28-500	6 Piece Set (2410) Colour, with double bib cock Zoom 3xT cocks, Classic Toilet Shower with pipe and waste.	Each	5658.00
28-501	6 Piece Set (2408) Colour, with double bib cock Stylish, 3xT cocks, Classic Toilet Shower with pipe and waste.	Each	5823.00
28-502	6 Piece Set (2408) Colour, with double bib cock Stylish, 3xT cocks, Classic Toilet Shower with pipe and waste.	Each	6869.00
28-503	6 Piece Set (2410) Colour, with double bib cock Zoom, 3xT cocks, Classic Toilet Shower with pipe and waste.	Each	4957.00
28-504	7 Piece Set (2410) Colour, with double bib cock Zoom, 3xT cocks, Classic Toilet Shower with pipe and waste.	Each	5658.00
	Wall Shower		
28-505	Bath Mixer Bravo (4021) Colour.	Each	4450.00

S/No.	Description	Unit	Rate (Rs)
28-506	Bath Mixer Bravo (4021) Chrome.	Each	4684.00
28-507	Bath Mixer Drizal (3171) Colour.	Each	5733.00
28-508	Bath Mixer Drizal (3171) Chrome.	Each	6035.00
28-509	Bath Mixer Unique (3181) Colour.	Each	6711.00
28-510	Bath Mixer Unique (3181) Chrome.	Each	7064.00
28-511	Bath Mixer Flora (4031) Colour.	Each	4470.00
28-512	Bath Mixer Flora (4031) Chrome.	Each	4705.00
28-513	Bath Mixer Gipsy (4011) Colour.	Each	4464.00
28-514	Bath Mixer Gipsy (4011) Chrome.	Each	4699.00
28-515	Bath Mixer Stream (3191) Colour.	Each	4467.00
28-516	Bath Mixer Stream (3191) Chrome.	Each	4703.00
28-517	Bath Mixer Victoria (320) Colour.	Each	6544.00
28-518	Bath Mixer Victoria (320) Chrome.	Each	7119.00
28-519	Bath Mixer Classic (324) Colour.	Each	8199.00
28-520	Bath Mixer Classic (324) Chrome.	Each	8887.00
28-521	Bath Mixer Rosy (2181) Colour.	Each	14504.00
28-522	Bath Mixer Rosy (2181) Chrome.	Each	15311.00
28-523	Bath Mixer Rosy (2182) Colour.	Each	7062.00
28-524	Bath Mixer Rosy (2182) Chrome.	Each	7989.00
28-525	Bath Mixer Fancy (491) Colour.	Each	12080.00
28-526	Bath Mixer Fancy (491) Chrome.	Each	12602.00
28-527	Bath Mixer Nova (4061) Colour.	Each	11549.00
28-528	Bath Mixer Nova (4061) Chrome.	Each	12121.00
28-529	Bath Mixer Remax (421) Colour.	Each	11554.00
28-530	Bath Mixer Remax (421) Chrome.	Each	12074.00
28-531	Bath Mixer Apex (112) Colour.	Each	11448.00
28-532	Bath Mixer Apex (112) Chrome.	Each	11997.00
28-533	Bath Mixer New Crystal (451) Colour.	Each	11549.00
28-534	Bath Mixer New Crystal (451) Chrome.	Each	12121.00
28-535	Bath Mixer Canal (991) Colour.	Each	11917.00

S/No.	Description	Unit	Rate (Rs)
28-536	Bath Mixer Canal (991) Chrome.	Each	12439.00
28-537	Bath Mixer Elegance (981) Colour.	Each	15519.00
28-538	Bath Mixer Elegance (981) Chrome.	Each	16107.00
28-539	Bath Mixer Riva (671) Colour.	Each	14651.00
28-540	Bath Mixer Riva (671) Chrome.	Each	15242.00
28-541	Bath Mixer Amy (682) Colour.	Each	11307.00
28-542	Bath Mixer Amy (682) Chrome.	Each	12392.00
28-543	Bath Mixer Florence (381-A) Colour.	Each	12199.00
28-544	Bath Mixer Florence (381-A) Chrome.	Each	12692.00
28-545	Bath Mixer Florence (381-B) Colour.	Each	10995.00
28-546	Bath Mixer Florence (381-B) Chrome.	Each	11761.00
28-547	Bath Mixer Florence (691) Colour.	Each	18460.00
28-548	Bath Mixer Florence (691) Chrome.	Each	19294.00
28-549	Bath Mixer Florence (692) Colour.	Each	11353.00
28-550	Bath Mixer Florence (692) Chrome.	Each	12443.00
28-551	Bath Mixer Economy (4041) Colour.	Each	6551.00
28-552	Bath Mixer Economy (4041) Chrome.	Each	6895.00
28-553	Bath Mixer Zoom (351) Colour.	Each	4392.00
28-554	Bath Mixer Zoom (351) Chrome.	Each	5548.00
28-555	Bath Mixer Rosy (317) Colour.	Each	7090.00
28-556	Bath Mixer Rosy (317) Chrome.	Each	7629.00
28-557	Bath Mixer Unique (3131) Colour.	Each	5801.00
28-558	Bath Mixer Unique (3131) Chrome.	Each	6107.00
28-559	Bath Mixer Cleopatra (251) Colour.	Each	7593.00
28-560	Bath Mixer Colepatra (251) Chrome.	Each	8338.00
28-561	Bath Mixer Eva (621) Colour.	Each	10825.00
28-562	Bath Mixer Zoom (621) Chrome.	Each	11275.00
28-563	Bath Mixer Under Ground Florence (3021) Colour.	Each	13175.00
28-564	Bath Mixer Under Ground Florence (3021) Chrome.	Each	13697.00

S/No.	Description	Unit	Rate (Rs)
28-565	Bath Mixer Rosy (305) Colour.	Each	6378.00
28-566	Bath Mixer Rosy (305) Chrome.	Each	7345.00
28-567	Bath Mixer K.B (206) Colour.	Each	12091.00
28-568	Bath Mixer K.B (206) Chrome.	Each	12608.00
28-569	Bath Mixer Roomy (631) Colour.	Each	12796.00
28-570	Bath Mixer Roomy (631) Chrome.	Each	13757.00
28-571	Bath Mixer Style (261) Colour.	Each	13212.00
28-572	Bath Mixer Style (261) Chrome.	Each	13734.00
28-573	Bath Mixer Orial (581) Colour.	Each	14149.00
28-574	Bath Mixer Orial (581) Chrome.	Each	14878.00
28-575	Bath Mixer Aroma (225) Colour.	Each	13380.00
28-576	Bath Mixer Aroma (225) Chrome.	Each	14106.00
28-577	Basin Mixer Cera (591) Colour.	Each	13826.00
28-578	Basin Mixer Cera (591) Chrome.	Each	14471.00
28-579	Bath Mixer Royal (601) Colour.	Each	12823.00
28-580	Bath Mixer Royal (601) Chorme.	Each	13571.00
28-581	Bath Mixer K.B (2081) Colour.	Each	15436.00
28-582	Bath Mixer K.B (2081) Chrome.	Each	16152.00
28-583	Bath Mixer K.B (2082) Colour.	Each	8551.00
28-584	Bath Mixer K.B (2082) Chrome.	Each	9573.00
28-585	Bath Mixer Galaxy (3111) Colour.	Each	11549.00
28-586	Bath Mixer Galaxy (3111) Chrome.	Each	12121.00
28-587	Bath Mixer Dragon (3161) Colour.	Each	39156.00
28-588	Bath Mixer Dragon (3161-C) Chrome.	Each	40788.00
28-589	Bath Mixer Wave (4081) Colour.	Each	10154.00
28-590	Bath Mixer Wave (4081) Chrome.	Each	10847.00
28-591	Bath Mixer Super (4091) Colour.	Each	6383.00
28-592	Bath Mixer Super (4091) Chrome.	Each	6685.00
28-593	Bath Mixer Swiss (4071) Colour.	Each	10331.00
28-594	Bath Mixer Swiss (4071) Chrome.	Each	11282.00

S/No.	Description	Unit	Rate (Rs)
28-595	Bath Mixer Grande (4051) Colour.	Each	12796.00
28-596	Bath Mixer Grande (4051) Chrome.	Each	13757.00
28-597	Bath Mixer Venus (271) Colour.	Each	9456.00
28-598	Basin Mixer Venus (271) Chrome.	Each	10170.00
28-599	Bath Mixer Royal (601) Colour.	Each	12823.00
28-600	Bath Mixer Royal (601) Chrome.	Each	13571.00
28-601	Basin Mixer Romina (441) Colour.	Each	10459.00
28-602	Basin Mixer Romina (441) Chrome.	Each	10970.00
28-603	Basin Mixer Sarina (296) Colour.	Each	11629.00
28-604	Basin Mixer Sarina (296) Chrome.	Each	12730.00
28-605	Basin Mixer Ocean (124) Colour.	Each	9631.00
28-606	Basin Mixer Ocean (124) Chrome.	Each	10582.00
28-607	Bath Mixer Gala (391) Colour.	Each	11262.00
28-608	Bath Mixer Gala (391) Chrome.	Each	11816.00
28-609	Bath Mixer Amy (681) Colour.	Each	18770.00
28-610	Bath Mixer Amy (681) Chrome.	Each	19338.00
	Hand Shower		
28-611	Bath Mixer Brave (4022) Colour.	Each	4094.00
28-612	Bath Mixer Brave (4022) Chrome.	Each	4310.00
28-613	Bath Mixer Flora (4032) Colour.	Each	4113.00
28-614	Bath Mixer Flora (4032) Chrome.	Each	4329.00
28-615	Bath Mixer Gipsy (4012) Colour.	Each	4106.00
28-616	Bath Mixer Gipsy (4012) Chrome.	Each	4323.00
28-617	Bath Mixer Stream (3192) Colour.	Each	4110.00
28-618	Bath Mixer Stream (3192) Chrome.	Each	4326.00
28-619	Bath Mixer Drizal (3172) Colour.	Each	5275.00
28-620	Bath Mixer Drizal (3172) Chrome.	Each	5552.00
28-621	Bath Mixer Unique (3132) Colour.	Each	5337.00
28-622	Bath Mixer Unique (3132) Chrome.	Each	5619.00
28-623	Bath Mixer Zoom (352) Colour.	Each	3736.00

S/No.	Description	Unit	Rate (Rs)
28-624	Bath Mixer Zoom (352) Chrome.	Each	4876.00
28-625	Bath Mixer Victoria (321) Colour.	Each	5848.00
28-626	Bath Mixer Victoria (321) Chrome.	Each	6389.00
28-627	Bath Mixer Rosy (319) Colour.	Each	6184.00
28-628	Bath Mixer Rosy (319) Chrome.	Each	6886.00
28-629	Bath Mixer Clopetra (252) Colour.	Each	6773.00
28-630	Bath Mixer Clopetra (252) Chrome.	Each	7545.00
28-631	Bath Mixer Classic (304) Colour.	Each	7148.00
28-632	Bath Mixer Classic (304) Chrome.	Each	8060.00
28-633	Bath Mixer Fancy (492) Colour.	Each	9276.00
28-634	Bath Mixer Fancy (492) Chrome.	Each	9798.00
28-635	Bath Mixer Eva (622) Colour.	Each	8955.00
28-636	Bath Mixer Eva (622) Chrome.	Each	9984.00
28-637	Bath Mixer K.B (204) Colour.	Each	9600.00
28-638	Bath Mixer K.B (204) Chrome.	Each	10758.00
28-639	Bath Mixer Roomy (632) Colour.	Each	12796.00
28-640	Bath Mixer Roomy (632) Chrome.	Each	13757.00
28-641	Bath Mixer Style (262) Colour.	Each	11472.00
28-642	Bath Mixer Style (262) Chrome.	Each	11993.00
28-643	Bath Mixer Orial (582) Colour.	Each	12142.00
28-644	Bath Mixer Orial (582) Chrome.	Each	13035.00
28-645	Bath Mixer Aroma (224) Colour.	Each	10959.00
28-646	Bath Mixer Aroma (224) Chrome.	Each	12071.00
28-647	Bath Mixer Cera (592) Colour.	Each	12089.00
28-648	Bath Mixer Cera (592) Chrome.	Each	12881.00
28-649	Bath Mixer Royal (602) Colour.	Each	11250.00
28-650	Bath Mixer Royal (602) Chrome.	Each	12477.00
28-651	Bath Mixer Galaxy (3112) Colour.	Each	9308.00
28-652	Bath Mixer Galaxy (3112) Chrome.	Each	10007.00
28-653	Bath Mixer Dragon (3162) Colour.	Each	34592.00

S/No.	Description	Unit	Rate (Rs)
28-654	Bath Mixer Dragon (3162) Chrome.	Each	35700.00
28-655	Bath Mixer Distal (3142) Colour.	Each	7196.00
28-656	Bath Mixer Distal (3142) Chrome.	Each	8071.00
28-657	Bath Mixer Daizy (3152) Colour.	Each	10959.00
28-658	Bath Mixer Daizy (3152) Chrome.	Each	12071.00
28-659	Bath Mixer Prime (3122) Colour.	Each	37101.00
28-660	Bath Mixer Prime (3122) Chrome.	Each	37799.00
28-661	Bath Mixer Nova (4062) Colour.	Each	9308.00
28-662	Bath Mixer Nova (4062) Chrome.	Each	10007.00
28-663	Bath Mixer Wave (4082) Colour.	Each	9226.00
28-664	Bath Mixer Wave (4082) Chrome.	Each	9699.00
28-665	Bath Mixer Super (4092) Colour.	Each	5925.00
28-666	Bath Mixer Super (4092) Chrome.	Each	6202.00
28-667	Bath Mixer Swiss (4072) Colour.	Each	7896.00
28-668	Bath Mixer Swiss (4072) Chrome.	Each	8771.00
28-669	Bath Mixer Grand (4052) Colour.	Each	11260.00
28-670	Bath Mixer Grand (4052) Chrome.	Each	12108.00
28-671	Bath Mixer Venus (272) Colour.	Each	8033.00
28-672	Bath Mixer Venus (272) Chrome.	Each	8279.00
28-673	Bath Mixer Romina (442) Colour.	Each	8383.00
28-674	Bath Mixer Romina (442) Chrome.	Each	8829.00
28-675	Bath Mixer Sarea (292) Colour.	Each	8198.00
28-676	Bath Mixer Sarea (292) Chrome.	Each	8687.00
28-677	Bath Mixer Ocean (122) Colour.	Each	7196.00
28-678	Bath Mixer Ocean (122) Chrome.	Each	8071.00
28-679	Bath Mixer Glorious (152) Colour.	Each	7921.00
28-680	Bath Mixer Glorious (152) Chrome.	Each	9541.00
28-681	Bath Mixer Caniy (472) Colour.	Each	9469.00
28-682	Bath Mixer Caniy (472) Chrome.	Each	9956.00
28-683	Bath Mixer Gala (392) Colour.	Each	9469.00

S/No.	Description	Unit	Rate (Rs)
28-684	Bath Mixer Gala (392) Chrome.	Each	9956.00
28-685	Bath Mixer Romar (422) Colour.	Each	8843.00
28-686	Bath Mixer Romar (422) Chrome.	Each	9500.00
28-687	Bath Mixer Apex (110) Colour.	Each	9315.00
28-688	Bath Mixer Apex (110) Chrome.	Each	10001.00
28-689	Bath Mixer Crystal (452) Colour.	Each	9308.00
28-690	Bath Mixer Crystal (452) Chrome.	Each	10007.00
28-691	Bath Mixer Canal (992) Colour.	Each	10443.00
28-692	Bath Mixer Canal (992) Chrome.	Each	10965.00
28-693	Bath Mixer Elegana (982) Chrome.	Each	13969.00
28-694	Bath Mixer Elegana (982) Chrome.	Each	14694.00
28-695	Bath Mixer Riva (672) Colour.	Each	13102.00
28-696	Bath Mixer Riva (672) Chrome.	Each	13827.00
28-697	Bath Mixer Flourena (382-A) Colour.	Each	10602.00
28-698	Bath Mixer Flourena (382-A) Chrome.	Each	11506.00
28-699	Bath Mixer Flourena (382-B) Colour.	Each	9401.00
28-700	Bath Mixer Flourena (382-B) Chrome.	Each	10304.00
28-701	Bath Mixer Amy (642) Colour.	Each	11851.00
28-702	Bath Mixer Amy (642) Chrome.	Each	12742.00
	Single Lever Basin Mixer		
28-703	Basin Mixer Drizal (3173) Colour.	Each	2954.00
28-704	Basin Mixer Drizal (3173) Chrome.	Each	3109.00
28-705	Basin Mixer Unique (3133) Colour.	Each	2989.00
28-706	Basin Mixer Unique (3133) Chrome.	Each	3146.00
28-707	Basin Mixer Galaxy (3113) Colour.	Each	6229.00
28-708	Basin Mixer Galaxy (3113) Chrome.	Each	6563.00
28-709	Basin Mixer Distal (3163) Colour.	Each	16531.00
28-710	Basin Mixer Distal (3163) Chrome.	Each	17220.00
28-711	Basin Mixer Distal (3143) Colour.	Each	5617.00
28-712	Basin Mixer Distal (3143) Chrome.	Each	6002.00

S/No.	Description	Unit	Rate (Rs)
28-713	Basin Mixer Daizy (3153) Colour.	Each	8342.00
28-714	Basin Mixer Daizy (3153) Chrome.	Each	8802.00
28-715	Basin Mixer Prime (3123) Colour.	Each	17388.00
28-716	Basin Mixer Prime (3123) Chrome.	Each	18112.00
28-717	Basin Mixer Nova (4063) Colour.	Each	6229.00
28-718	Basin Mixer Nova (4063) Chrome.	Each	6563.00
28-719	Basin Mixer Wave (4083) Colour.	Each	5058.00
28-720	Basin Mixer Wave (4083) Chrome.	Each	5404.00
28-721	Basin Mixer Super (4093) Colour.	Each	3204.00
28-722	Basin Mixer Super (4093) Chrome.	Each	3359.00
28-723	Basin Mixer Swiss (4073) Colour.	Each	5917.00
28-724	Basin Mixer Swiss (4073) Chrome.	Each	6302.00
28-725	Basin Mixer Grande (4053) Colour.	Each	6609.00
28-726	Basin Mixer Grande (4053) Chrome.	Each	7093.00
28-727	Basin Mixer Venus (273) Colour.	Each	5204.00
28-728	Basin Mixer Venus (273) Chrome.	Each	5293.00
28-729	Basin Mixer Romina (443) Colour.	Each	4588.00
28-730	Basin Mixer Romina (443) Chrome.	Each	4851.00
28-731	Basin Mixer Sariea (293) Colour.	Each	4622.00
28-732	Basin Mixer Sariea (293) Chrome.	Each	5122.00
28-733	Basin Mixer Ocean (125) Colour.	Each	5617.00
28-734	Basin Mixer Ocean (125) Chrome.	Each	6002.00
28-735	Basin Mixer Glorious (153) Colour.	Each	3757.00
28-736	Basin Mixer Glorious (153) Chrome.	Each	4535.00
28-737	Basin Mixer Camy (473) Colour.	Each	4697.00
28-738	Basin Mixer Camy (473) Chrome.	Each	4989.00
28-739	Basin Mixer Gala (393) Colour.	Each	5218.00
28-740	Basin Mixer Gala (393) Chrome.	Each	5548.00
28-741	Basin Mixer Apex (111) Colour.	Each	5712.00
28-742	Basin Mixer Apex (111) Chrome.	Each	6083.00

S/No.	Description	Unit	Rate (Rs)
28-743	Basin Mixer New Crystal (453) Colour.	Each	6229.00
28-744	Basin Mixer New Crystal (453) Chrome.	Each	6563.00
28-745	Basin Mixer Canal (993) Colour.	Each	5598.00
28-746	Basin Mixer Canal (993) Chrome.	Each	5927.00
28-747	Basin Mixer Elegance (983) Colour.	Each	7003.00
28-748	Basin Mixer Elegance (983) Chrome.	Each	7413.00
28-749	Basin Mixer Riva (673) Colour.	Each	6724.00
28-750	Basin Mixer Riva (673) Chrome.	Each	7132.00
28-751	Basin Mixer Pool (3003) Colour.	Each	7003.00
28-752	Basin Mixer Pool (3003) Chrome.	Each	7412.00
28-753	Basin Mixer Sarina (293) Colour.	Each	4622.00
28-754	Basin Mixer Sarina (293) Chrome.	Each	5115.00
28-755	Basin Mixer Amy Short (644) Colour.	Each	6892.00
28-756	Basin Mixer Amy Short (644) Chrome.	Each	7392.00
28-757	Basin Mixer Amy long (643) Colour.	Each	8281.00
28-758	Basin Mixer Amy long (643) Chrome.	Each	8784.00
28-759	Basin Mixer Flourence Short (384) Colour.	Each	5752.00
28-760	Basin Mixer Flourence Short (384) Chrome.	Each	6040.00
28-761	Basin Mixer Flourence Long (383) Colour.	Each	7688.00
28-762	Basin Mixer Flourence Long (383) Chrome.	Each	7976.00
	MASTER SANITARY FITTINGS		
	Basin Mixer Singal Lever		7.
28-763	Common single Hole Basin Mixer with HU Type Medium Neck (023) CP & YC.	Each	3161.00
28-764	Common single Hole Basin Mixer with Cast Neck (025) CP & YC.	Each	3766.00
28-765	Common single Hole Basin Mixer with Cast Neck (025) CG.	Each	4708.00
28-766	Single Hole Basin Mixer with Fixed Cast Neck (026) CP & YC.	Each	2905.00
28-767	Single Hole Basin Mixer with Fixed Cast Neck (026) CG.	Each	3631.00
28-768	Victorian Single Hole Basin Mixer (034)	Each	4163.00

S/No.	Description	Unit	Rate (Rs)
	CP & YC.		<u> </u>
28-769	Victorian Single Hole Basin Mixer (034) CG.	Each	5203.00
28-770	Regal Single Hole Basin Mixer (035) CP &YC	Each	3430.00
28-771	Delta Single Hole Basin Mixer (040) CP &YC	Each	4858.00
28-772	Delta Single Hole Basin Mixer (040) CG.	Each	6073.00
28-773	Kira Single Hole Basin Mixer (042) CP &YC.	Each	5526.00
28-774	Kira Single Hole Basin Mixer (042) CG.	Each	6908.00
28-775	Charisma Single Hole Basins Mixer with HU Type Cast Neck (051) CP & YC.	Each	4480.00
28-776	Master Charisma Single Hole Basins Mixer with HU Type Cast Neck (051) CG.	Each	5600.00
28-777	Master Cobra Single Hole Basins Mixer (055) CP & YC.	Each	5827.00
28-778	Master Cobra Single Hole Basins Mixer (055) CG.	Each	7283.00
28-779	Master Elite Single Hole Basins Mixer (071) CP & YC.	Each	4845.00
28-780	Master Elite Single Hole Basins Mixer (071) CG.	Each	6056.00
28-781	Master Lexus Single Hole Basins Mixer (072) CP & YC.	Each	4274.00
28-782	Master Lexus Single Hole Basins Mixer (072) CG.	Each	5342.00
28-783	Master Iris Single Lever Basin Mixer without Pop-up Waste (113) CP & YC.	Each	4965.00
28-784	Master Iris Single Lever Basin Mixer without Pop-up Waste (113) CG.	Each	6206.00
28-785	Master Pansy Quarter Round (with disc Head work) Basin Mixer without Pop-up Waste (117) CP & YC.	Each	4491.00
28-786	Master Pansy Quarter Round (with disc Head work) Basin Mixer without Pop-up Waste (117) CG.	Each	5613.00
28-787	Master Caper Quarter Round (with disc Head work) Basin Mixer with Pop-up Waste (119) CP & YC.	Each	8752.00

S/No.	Description	Unit	Rate (Rs)
28-788	Master Caper Quarter Round (with disc Head work) Basin Mixer with Pop-up Waste (119) CG.	Each	10940.00
28-789	Master Jazz Quarter Round (with disc Head work) Basin Mixer without Pop-up Waste (125) CP & YC.	Each	5062.00
28-790	Master Jazz Quarter Round (with disc Head work) Basin Mixer without Pop-up Waste (125) CG.	Each	6327.00
28-791	Master Asbshar Single Lever Basin Mixer (159) CP & YC.	Each	5080.00
28-792	Master Asbshar Single Lever Basin Mixer (159) CG.	Each	6350.00
28-793	Master Dream Single Lever Basin Mixer (163) CP & YC.	Each	4861.00
28-794	Master Dream Single Lever Basin Mixer (163) CG.	Each	6077.00
28-795	Master Bello Single Lever Basin Mixer (165) CP & YC.	Each	3203.00
28-796	Master Dura Single Lever Basin Mixer (167) CP & YC.	Each	5578.00
28-797	Master Dura Single Lever Basin Mixer (167) CG.	Each	6973.00
28-798	Master Alba Single Lever Basin Mixer (172) CP & YC.	Each	3133.00
28-799	Master Alba Single Lever Basin Mixer with 4" height (172) CP & YC.	Each	3970.00
28-800	Master Alba Single Lever Basin Mixer with 6" height (172A) CP & YC.	Each	4469.00
28-801	Master Alba Single Lever Basin Mixer (172B) CP & YC.	Each	3814.00
28-802	Master Alba Single Lever Basin Mixer (174) CG.	Each	4768.00
28-803	Master Tempo Single Lever Basin Mixer (133) CP & YC.	Each	4751.00
28-804	Master Tempo Single Lever Basin Mixer	Each	5939.00

S/No.	Description	Unit	Rate (Rs)
	(133) CG.		
28-805	Master Orient Single Lever Basin Mixer (145) CP & YC.	Each	5141.00
	Sink Mixers		
28-806	Master Charisma Sink Master HU Type Cast Neck (014) CP & YC.	Each	4870.00
28-807	Master Charisma Sink Master HU Type Cast Neck (014) CG.	Each	6087.00
28-808	Master Delta Single Lever Sink Mixer Master (015) CP & YC.	Each	6453.00
28-809	Master Delta Single Lever Sink Mixer Master (015) CG.	Each	8066.00
28-810	Master High Neck Piller Cock (Cold) (017) CP & YC.	Each	1463.00
28-811	Wall Sink Mixer with HU Type Medium Neck (018) CP & YC.	Each	2837.00
28-812	Wall Sink Mixer with HU Type Large Neck (019) CP & YC.	Each	2992.00
28-813	Wall Sink Mixer with Cast Neck (020) CP & YC.	Each	3569.00
28-814	Wall Sink Mixer with U Type Neck (021) CP & YC.	Each	2773.00
28-815	Sink Volve with S Type Nec (Cold) (022) CP & YC.	Each	1557.00
	Wall Shower / Hand Shower		\sim
28-816	Cammon Master Bath Mixer Wall Type with Shower Deluxe in Colour face & 4 Feet Rod in 4 Knobs (Special) (030) CP & YC.	Each	7704.00
28-817	Master Victorian Bath Mixer with Noble Hand Shower (038) CP & YC.	Each	6022.00
28-818	Master Victorian Bath Mixer with Noble Hand Shower (038) CG.		7535.00
28-819	Master Regal Master Bath Mixer with	Each	5140.00

S/No.	Description	Unit	Rate (Rs)
,	Noble Hand Shower (039) CP & YC.		
28-820	Master Delta Bath Mixer wall Type with Noble Hand Shower (041) CP.	Each	9986.00
28-821	Master Delta Bath Mixer wall Type with Noble Hand Shower (041) YC.	Each	9488.00
28-822	Master Common Bath Mixer wall Type with Common Hand Shower (027) CP & YC.	Each	5204.00
28-823	Master Common Bath Mixer wall Type with Common Hand Shower (027) CG.	Each	6692.00
28-824	Master Common Bath Mixer wall Type with Shower Deluxe in Colour. face and 4 feet Rod (029) CP & YC.	Each	7033.00
28-825	Master Common Bath Mixer wall Type with Shower Deluxe in Colour. face and 4 feet Rod (029) CG.	Each	8791.00
28-826	Master Charisma Bath Mixer wall Type with Noble Over Head Shower & 4 Feet Road (054) CP & YC.	Each	8367.00
28-827	Master Kira Bath Mixer with common Hand Shower (043) CP & YC.	Each	5884.00
28-828	Master Cobra Bath Mixer with common Hand Shower 045) CP & YC.	Each	4986.00
28-829	Master Elite Bath Mixer with elite Hand Shower (073) CP & YC.	Each	9040.00
28-830	Master Lexus Bath Mixer with elite Hand Shower (074) CP & YC.	Each	8375.00
28-831	Master Lexus Bath Mixer with elite Hand Shower (074) CG.	Each	10469.00
28-832	Master Iris Single Lever Bath Mixer with elite Hand Shower (114) CP.	Each	9190.00
28-833	Master Iris Single Lever Bath Mixer with elite Hand Shower (114) YC.	Each	8692.00
28-834	Master Pansy Quarter Round (with disc Head work) Bath Mixer with Noble Hand Shower (118) CP.	Each	8169.00
28-835	Master Pansy Quarter Round (with disc Head work) Bath Mixer with Noble Hand	Each	7670.00

S/No.	Description	Unit	Rate (Rs)
	Shower (118) YC.		
28-836	Master Pansy Quarter Round (with disc Head work) Bath Mixer without Hand Shower (118-A) CP & YC.	Each	6221.00
28-837	Master Pansy Quarter Round (with disc Head work) Bath Mixer without Hand Shower (118-A) CG.	Each	7776.00
28-838	Master Pansy Quarter Round (with disc Head work) Bath Mixer Wall Type with item (118-B) CP & YC.	Each	10008.00
28-839	Master Pansy Quarter Round (with disc Head work) Bath Mixer Wall Type with item (118-B) CG.	Each	12610.00
28-840	Master Jazz Quarter Round (with disc Head work) Bath Mixer with Noble Hand Shower (126) CP.	Each	8065.00
28-841	Master Jazz Quarter Round (with disc Head work) Bath Mixer with Noble Hand Shower (126) YC.	Each	7566.00
28-842	Master Jazz Quarter Round (with disc Head work) Bath Mixer wall Type with 4 feet rod 126-B) CP & YC.	Each	9026.00
28-843	Master Jazz Quarter Round (with disc Head work) Bath Mixer wall Type with 4 feet rod (126-B) CG.	Each	11283.00
28-844	Master Bravo Single Lever with Noble Hand Shower (148) CP.	Each	15005.00
28-845	Master Bravo Single Lever with Noble Hand Shower (148) YC.	Each	14507.00
28-846	Master Bravo Single Lever with Bath Mixer with Bravo Wall Shower (148-B) CP & YC.	Each	20356.00
28-847	Master Bravo Single Lever with Bath Mixer with Bravo Wall Shower (148-B) CG.	Each	25414.00
28-848	Master Solo Single Lever Bath Mixer with Common Hand Shower (154) CP & YC.	Each	5141.00
28-849	Master Solo Single Lever Bath Mixer with Wall Shower (154-B) CP & YC.	Each	6714.00
28-850	Master Ideal Bath Mixer Wall Type with	Each	13538.00

S/No.	Description	Unit	Rate (Rs)
	Noble Hand Shower (156) CP.		
28-851	Master Ideal Bath Mixer Wall Type with Noble Hand Shower (156) YC.	Each	13039.00
28-852	Master Tempo Single Lever Bath Mixer with Noble Hand Shower (134) CP.	Each	9053.00
28-853	Master Tempo Single Lever Bath Mixer with Noble Hand Shower (134) YC.	Each	8554.00
28-854	Master Orient Single Lever Bath Mixer with Noble Hand Shower (146) CP.	Each	9192.00
28-855	Master Orient Single Lever Bath Mixer with Noble Hand Shower (146) YC.	Each	8693.00
28-856	Master Dream Single Lever Bath Mixer without Hand Shower (164-A) CP & YC.	Each	12120.00
28-857	Master Dream Single Lever Bath Mixer Wall Type with Dream Overhead Shower (164-B) CP & YC.	Each	15667.00
28-858	Master Dream Single Lever Bath Mixer Wall Type with Dream Overhead Shower (164-B) CG.		19584.00
28-859	Master Bello Single Lever Bath Mixer with Common Hand Shower (166) CP & YC.	Each	6354.00
28-860	Master Bello Single Lever Bath Mixer with Wall Shower (166-B) CP & YC.	Each	8136.00
28-861	Master Dura Single Lever Bath Mixer with Noble Hand Shower (168) CP.	Each	13923.00
28-862	Master Dura Single Lever Bath Mixer with Noble Hand Shower (168) YC.	Each	13424.00
28-863	Master Dura Single Lever Bath Mixer with Brvo Wall Shower (168-B) CP & YC.	Each	18467.00
28-864	Master Ideal Bath Mixer Wall Type with Ideal Overhead Shower (156-B) CP & YC.	Each	15650.00
28-865	Master Sigma Bath Mixer with Noble Hand Shower (158) CP.	Each	13758.00
28-866	Master Sigma Bath Mixer with Noble Hand Shower (158) CG.	Each	17257.00
28-867	Master Sigma Bath Mixer with Wall Shower (158-B) CP & YC.	Each	18368.00

S/No.	Description	Unit	Rate (Rs)
28-868	Master Sigma Bath Mixer with Wall Shower (158-B) CG.		22960.00
28-869	Master Aabshar Single Lever Bath Mixer with Noble Hand Shower (160) CP.	Each	10564.00
28-870	Master Aabshar Single Lever Bath Mixer with Noble Hand Shower (160) YC.	Each	10065.00
28-871	Master Aabshar Single Lever Bath Mixer with Noble Hand Shower (160) CG.	Each	13264.00
28-872	Master Aabshar Single Lever Bath Mixer with Aabshar Wall Shower 160-B) CP & YC.	Each	10776.00
28-873	Master Dream Single Lever Bath Mixer with Noble Hand Shower (164) CP	Each	14069.00
28-874	Master Dream Single Lever Bath Mixer with Noble Hand Shower (164) YC	Each	13570.00
28-875	Master Dream Single Lever Bath Mixer with Noble Hand Shower 164) CG.	Each	17645.00
28-876	Master Caprice Bath Mixer Wall Type with Noble Hand Shower (179) CP.	Each	8368.00
28-877	Master Caprice Bath Mixer Wall Type with Noble Hand Shower (179) YC.	Each	7869.00
28-878	Master Caprice Bath Mixer Wall Type with Noble Hand Shower (179) CG.	Each	10518.00
28-879	Master Cello Single Lever Bath Mixer with Common Hand Shower (181) CP & YC.	Each	6057.00
28-880	Master Cello Single Lever Bath Mixer Wall Type with alba Overhead Shower (181-B) CP & YC.	Each	7676.00
28-881	Master Alba Single Lever Bath Mixer with Common Hand Shower (173) CP & YC.	Each	6057.00
28-882	Master Alba Single Lever Bath Mixer with Alba Overhead Shower 173-B) CP & YC.	Each	7676.00
28-883	Master Alba Single Lever Bath Mixer with Alba Overhead Shower 175) CP & YC.	Each	8368.00
28-884	Master Alpha Single Lever Bath Mixer with Noble Hand Shower (175) YC.	Each	7869.00
28-885	Master Alpha Single Lever Bath Mixer	Each	10518.00

S/No.	Description	Unit	Rate (Rs)
28-886	with Noble Hand Shower (175) CG. Master Alpha Single Lever Bath Mixer wall Type with Deluxe Overhead Shower (175-B) CP & YC.	Each	9225.00
28-887	Master Chicada Single Lever Bath Mixer with Noble Hand Shower (177) CP	Each	9195.00
28-888	Master Chicada Single Lever Bath Mixer with Noble Hand Shower (177) YC.	Each	8696.00
28-889	Master Chicada Single Lever Bath Mixer with Noble Hand Shower (177) CG.	Each	11553.00
28-890	Master Thermaster (Thermostat) Bath Mixer Wall Type with Noble Hand Shower (196) CP.	Each	10267.00
28-891	Master Thermaster (Thermostat) Bath Mixer Wall Type with Noble Hand Shower (196) CG.	Each	12892.00
28-892	Master Thermaster (Thermostat) Bath Mixer Wall Type with Thermaster Overhead Shower & 4 feet rod (196-B) CP.	Each	11978.00
28-893	Master Thermaster (Thermostat) Bath Mixer Wall Type with Thermaster Overhead Shower & 4 feet rod (196-B) CG.	Each	14973.00
28-894	Master Sunsan Plus Single Lever Bath Mixer Wall Type with Noble Hand Shower (198) CP & YC.	Each	5860.00
28-895	Master Sunsan Plus Single Lever Bath Mixer Wall Type with Alba Overhead Shower & 4 feet (198-B) CP & YC.	Each	6716.00
28-896	Master Desire Single Lever Bath Mixer with bold Hand Shower (231) CP & YC.	Each	12238.00
28-897	Master Desire Single Lever Bath Mixer with bold Hand Shower (231) CG.	Each	15297.00
28-898	Master Bold Single Lever Bath Mixer with bold Overhead Shower & 4 feet rod (183-B) CP & YC.	Each	14267.00
28-899	Master Bold Single Lever Bath Mixer with bold Overhead Shower & 4 feet rod (183-B) CG.	Each	17834.00

S/No.	Description	Unit	Rate (Rs)
28-900	Master Eco Bath Mixer Wall Type with Noble Hand Shower(192) CP & YC.	Each	5206.00
	Bath Set		
28-901	Common Bath Set with Noble Hand Shower 009/1,010/3,025/1, 027B/1,085/1, 2015/1 (3002) CP & YC. (Set consists of 8 pieces. One Bath Mixer with hand Shower or Wall Shower, one single hole basin mixer, three Tee stop cocks, one double Bib Cock, one waste for basin and one toilet Shower).	Each	15412.00
28-902	Common Bath Set with Noble Hand Shower 009/1,010/3,025/1,027B/1,085/1, 2015/1 (3002 CG. (Set consists of 8 pieces. One Bath Mixer with hand Shower or Wall Shower, one single hole basin mixer, three Tee stop cocks, one double Bib Cock, one waste for basin and one toilet Shower).	Each	19712.00
28-903	Cobra Set with Noble Hand Shower 009/1,010/3 ,025/1, 045B/1,055/1, 085/1, 2015/1 (3003) CP & YC. (Set consists of 8 pieces. One Bath Mixer with hand Shower or Wall Shower, one single hole basin mixer, three Tee stop cocks, one double Bib Cock, one waste for basin and one toilet Shower).	Each	17253.00
28-904	Cobra Set with Noble Hand Shower 009/1,010/3 ,045B/1, 055/1, 085/1,2015/1 (3003) CG. (Set consists of 8 pieces. One Bath Mixer with hand Shower or Wall Shower, one single hole basin mixer, three Tee stop cocks, one double Bib Cock, one waste for basin and one toilet Shower).	Each	22015.00
28-905	Charisma Set with Noble Hand Shower 009/1,010/3 ,051/1, 0538/1, 085/1, 2015/1 (3006) CP & YC. (Set consists of 8 pieces. One Bath Mixer with hand Shower or Wall Shower, one single hole basin	Each	17397.00

S/No.	Description	Unit	Rate (Rs)
	mixer, three Tee stop cocks, one double Bib Cock, one waste for basin and one toilet Shower).		
28-906	Charisma Set with Noble Hand Shower 009/1,010/3 ,051/1, 0538/1, 085/1, 2015/1 (3006) CG. (Set consists of 8 pieces. One Bath Mixer with hand Shower or Wall Shower, one single hole basin mixer, three Tee stop cocks, one double Bib Cock, one waste for basin and one toilet Shower).	Each	22195.00
28-907	Common Bath Set with Wall Shower 009/1,010/3, 025/1, 029/1, 085/1, 2015/1 (3007) CP & YC. (Set consists of 8 pieces. One Bath Mixer with hand Shower or Wall Shower, one single hole basin mixer, three Tee stop cocks, one double Bib Cock, one waste for basin and one toilet Shower).	Each	16522.00
28-908	Common Bath Set with Wall Shower 009/1,010/3 ,051/1, 054/1, 085/1, 2015/1 (3007) CG. (Set consists of 8 pieces. One Bath Mixer with hand Shower or Wall Shower, one single hole basin mixer, three Tee stop cocks, one double Bib Cock, one waste for basin and one toilet Shower).	Each	21073.00
28-909	Charisma Set with Wall Shower 009/1,010/3 ,051/1, 054/1, 085/1, 2015/1 (3008) CP & YC. (Set consists of 8 pieces. One Bath Mixer with hand Shower or Wall Shower, one single hole basin mixer, three Tee stop cocks, one double Bib Cock, one waste for basin and one toilet Shower).	Each	18571.00
28-910	Charisma Set with Wall Shower 009/1,010/3 ,051/1, 054/1, 085/1, 2015/1 (3008) CG. (Set consists of 8 pieces. One Bath Mixer with hand Shower or Wall	Each	23652.00

S/No.	Description	Unit	Rate (Rs)
	Shower, one single hole basin mixer, three Tee stop cocks, one double Bib Cock, one waste for basin and one toilet Shower).		
28-911	Kira Set with Noble Hand Shower 009/1,010/3 ,042/1, 0438/1, 085/1, 2015/1 (3009) CP & YC. (Set consists of 8 pieces. One Bath Mixer with hand Shower or Wall Shower, one single hole basin mixer, three Tee stop cocks, one double Bib Cock, one waste for basin and one toilet Shower).	Each	17851.00
28-912	Kira Set with Noble Hand Shower 009/1,010/3 ,042/1, 0438/1, 085/1, 2015/1(3009) CG. (Set consists of 8 pieces. One Bath Mixer with hand Shower or Wall Shower, one single hole basin mixer, three Tee stop cocks, one double Bib Cock, one waste for basin and one toilet Shower).	Each	22763.00
28-913	Kira Set with Wall Shower 009/1,010/3 ,042/1, 043A/1, 129/1, 085/1, 2015/1 (3009-A) CP & YC. (Set consists of 8 pieces. One Bath Mixer with hand Shower or Wall Shower, one single hole basin mixer, three Tee stop cocks, one double Bib Cock, one waste for basin and one toilet Shower).	Each	20340.00
28-914	Kira Set with Wall Shower 009/1,010/3 ,042/1, 043A/1, 129/1, 085/1, 2015/1 (3009-A) CG. (Set consists of 8 pieces. One Bath Mixer with hand Shower or Wall Shower, one single hole basin mixer, three Tee stop cocks, one double Bib Cock, one waste for basin and one toilet Shower).	Each	25867.00
28-915	Iris Set with Noble Hand Shower 009/1,010/3 ,113/1, 114/1, 085/1, 2015/1 (3011) CP (Set consists of 8 pieces. One	Each	22098.00

S/No.	Description	Unit	Rate (Rs)
	Bath Mixer with hand Shower or Wall Shower, one single hole basin mixer, three Tee stop cocks, one double Bib Cock, one waste for basin and one toilet Shower).		
28-916	Iris Set with Noble Hand Shower 009/1,010/3 ,113/1, 114/1, 085/1, 2015/1 (3011) YC (Set consists of 8 pieces. One Bath Mixer with hand Shower or Wall Shower, one single hole basin mixer, three Tee stop cocks, one double Bib Cock, one waste for basin and one toilet Shower).	Each	20685.00
	Double Bib Cock		
28-917	Master Vicrorian double Bib Cock (069) CP & YC.	Each	2313.00
28-918	Master Vicrorian double Bib Cock (069) CG.	Each	2891.00
28-919	Master Regal double Bib Cock (070) CP & YC.	Each	1729.00
28-920	Master Regal double Bib Cock (070) CG.	Each	2162.00
28-921	Master Elite double Bib Cock (072) CP & YC.	Each	3092.00
28-922	Master Elite double Bib Cock (072) CG.	Each	3865.00
28-923	Double Bib Cock without Toilet Shower 90 (009) CP & YC.	Each	1832.00
28-924	Double Bib Cock without Toilet Shower 90 (009) CG.	Each	2289.00
28-925	Master Caprice Double Bib Cock (185) CP & YC.	Each	2388.00
28-926	Master Caprice Double Bib Cock (185) CG.	Each	2985.00
28-927	Master Eco Double Bib Cock (199) CP & YC.	Each	1521.00
28-928	Master Eco Double Bib Cock (199) CG.	Each	1901.00
28-929	Thermaster Double Bib Cock (233) CP & YC.	Each	2172.00
28-930	Thermaster Double Bib Cock (233) CG.	Each	2715.00
28-931	Master Hexa Double Bib Cock (263) CP & YC.	Each	3504.00
28-932	Master Hexa Double Bib Cock (263) YC.	Each	3403.00
28-933	Master Quad Double Bib Cock (266) CP.	Each	3726.00

S/No.	Description	Unit	Rate (Rs)
28-934	Master Quad Double Bib Cock (266) YC.	Each	3637.00
28-935	Master Lexus Double Bib Cock (078) CP & YC.	Each	2466.00
28-936	Master Lexus Double Bib Cock (078) CG.	Each	3082.00
28-937	Master Caper Double Bib Cock (123) CP & YC.	Each	3191.00
28-938	Master Caper Double Bib Cock (123) CG.	Each	3989.00
	Bath Room Accessories Set		
28-939	Master Royal Bath Room Accessories Set (101) of 7 Pieces Consiting of one Cosmetic Shelf, one Towel Rod with Bracket, one Toothbrush Holder with Glass & Cover, one Tissue Paper Holder, one Soap Dish, one Double Hook, One Towel Ring CP & YC.	Each	6833.00
28-940	Master Royal Bath Room Accessories Set (101A) of 6 Pieces consisting of one Towel Rod with Bracket, one Toothbrush Holder with Glass & Cover, one Tissue Paper Holder, one Soap Dish, one Double Hook, One Towel Ring CP & YC.	Each	5093.00
28-941	Master Esso Bath Room Accessories Set (162) of 7 Pieces consisting of one Cosmetic Shelf, one Towel Rod with Bracket, one Toothbrush Holder with Glass & Cover, one Tissue Paper Holder, one Soap Dish, one Double Hook, One Towel Ring CP & YC.	Each	12934.00
28-942	Master Esso Bath Room Accessories Set (162) of 7 Pieces consisting of one Cosmetic Shelf, one Towel Rod with Bracket, one Toothbrush Holder with Glass & Cover, one Tissue Paper Holder, one Soap Dish, one Double Hook, One Towel Ring CG.	Each	16165.00
28-943	Master Esso Bath Room Accessories Set (162A) of 6 Pieces consisting of one Towel Rod with Bracket, one Toothbrush Holder with Glass & Cover, one Tissue	Each	8462.00

S/No.	Description	Unit	Rate (Rs)
	Paper Holder, one Soap Dish, one Double Hook, One Towel Ring CP & YC.		
28-944	Master Esso Bath Room Accessories Set (162A) of 6 Pieces consisting of one Towel Rod with Bracket, one Toothbrush Holder with Glass & Cover, one Tissue Paper Holder, one Soap Dish, one Double Hook, One Towel Ring CG.	Each	10575.00
28-945	Master Eden Bath Room Accessories Set (161) of 7 Pieces consisting of one Towel Rod with Bracket, one Toothbrush Holder with Glass & Cover, one Tissue Paper Holder, one Soap Dish, one Double Hook, One Towel Ring CP & YC.	Each	7586.00
	G		
28-946	Master Eden Bath Room Accessories Set (161) of 7 Pieces consisting of one Towel Rod with Bracket, one Toothbrush Holder with Glass & Cover, one Tissue Paper Holder, one Soap Dish, one Double Hook, One Towel Ring CG.	Each	9482.00
28-947	Master Eden Bath Room Accessories Set (161A) of 6 Pieces consisting of one Towel Rod with Bracket, one Toothbrush Holder with Glass & Cover, one Tissue Paper Holder, one Soap Dish, one Double Hook, One Towel Ring CP & YC.	Each	5570.00
28-948	Master Eden Bath Room Accessories Set (161A) of 6 Pieces consisting of one Towel Rod with Bracket, one Toothbrush Holder with Glass & Cover, one Tissue Paper Holder, one Soap Dish, one Double Hook, One Towel Ring CG.	Each	6962.00
28-949	Master Bronco Bath Room Accessories Set (187) of 7 Pieces consisting of one Towel Rod with Bracket, one Toothbrush Holder with Glass & Cover, one Tissue Paper Holder, one Soap Dish, one Double	Each	9586.00

S/No.	Description	Unit	Rate (Rs)
	Hook, One Towel Ring CP & YC.		
28-950	Master Bronco Bath Room Accessories Set (187) of 7 Pieces consisting of one Towel Rod with Bracket, one Toothbrush Holder with Glass & Cover, one Tissue Paper Holder, one Soap Dish, one Double Hook, One Towel Ring CG.	Each	11982.00
28-951	Master Bronco Bath Room Accessories Set (187-A) of 6 Pieces consisting of one Towel Rod with Bracket, one Toothbrush Holder with Glass & Cover, one Tissue Paper Holder, one Soap Dish, one Double Hook, One Towel Ring CP & YC.	Each	7177.00
28-952	Master Bronco Bath Room Accessories Set (187-A) of 6 Pieces consisting of one Towel Rod with Bracket, one Toothbrush Holder with Glass & Cover, one Tissue Paper Holder, one Soap Dish, one Double Hook, One Towel Ring CP & YC. Miscellaneous Sanitary items	Each	8971.00
28-960	Cistern, flushing, low down, glazed ware, white Colour. of approved quality, capacity 13 lit, complete with fittings (Pak made).	Each	2500.00
28-961	- do -, but, light Colour.	Each	2650.00
28-962	- do -, but, special Colour.	Each	2860.00
28-963	Cistern flushing low down plastic of approved quality, capacity 13 lit, complete with fittings (Pak made).	Each	1530.00
28-964	-do- but light Colour.	Each	1725.00
28-965	-do- but special Colour.	Each	1875.00
28-966	Flushing pipe plastic long.	Each	245.00
28-967	P.V.C flush pipe.	Each	65.00
28-968	P or S Trap.	Each	125.00
	Water Closet.		
28-969	W.C European with cistern (Couple set) in white Colour. without seat cover (I.F.O or Equivalent) (Pak made).	Each	4700.00

S/No.	Description		Unit	Rate (Rs)
28-970	-do- but light Colo	ur.	Each	6750.00
28-971	-do- but special C	Colour.	Each	8250.00
28-972	W.C Asiatic pattern full size white Colou	n, best quality, Orissa, Ir. (Pak made).	Each	1980.00
28-973	-do- but light Cold	our.	Each	2335.00
28-974	-do- but special C	Colour.	Each	2235.00
	Urinal			
28-975	Urinal Basin, Pak m Colour.	ade, best quality white	Each	2055.00
28-976	-do- but light Cold	our.	Each	2040.00
28-977	-do- but special C	Colour.	Each	2750.00
28-978	Flushing cistern to ur	rinal basin (Pak made).	Each	3375.00
28-979	Plastic connection v	vhite.	Each	150.00
28-980	-do- but light Colo	ur.	Each	190.00
28-981	Bath Tub, fibre glass 1	473x736mm (Pak made)	Each	10500.00
28-982	Waste coupling.		Each	400.00
28-983	Rawal plug (for 100) mm Screw).	Each	0.65
28-984	Rubber washer.		Each	0.55
28-985	Chain with plug.		Each	160.00
28-986	Trap for tub.	$\langle O \rangle$	Each	195.00
	Sink Stainless Ste	el		
28-987	Sink stainless steel single drainage board	upto 6000 cm, square, l, single bowl ,Pak made.	Each	7550.00
28-988	Sink waste coupling	l.	Each	400.00
28-989	Bracket for sink.		Pair	260.00
28-990	Sink stainless steel double drainage, sir	exc 6000 cm, square ngle bowl, (Pak made).	Each	10775.00
28-991	Sink stainless steel single drainage, dou	upto 6000 cm, square uble bowl, Pak made.	Each	14500.00
28-992	Sink stainless steel double drainage, do	exc 6000 cm, square buble bowl, Pak made.	Each	16300.00
28-993	Screw 65 mm long l	brass.	Each	90.00
28-994	Sink waste pipe.		Each	95.00
28-995	Sink scullery,	glazed ware	Each	3500.00

S/No.	Description	Unit	Rate (Rs)
	615 x 440 x 240mm (Pak made).		
28-996	Shower Tray, fibre glass, 940 x 940mm.	Each	6500.00
28-997	Shower Rose, adjustable (CP) any dia.	Each	825.00
	Wash Hand Basin (WHB)		
28-998	Wash Hand basin (WHB) one hole white Colour. IFO or equivalent (Pak made).	Each	6750.00
28-999	-do- but light Colour.	Each	2195.00
28-1000	-do- but special Colour.	Each	2745.00
28-1001	WHB with pedestal (Pak made) white Colour.	Each	3400.00
28-1002	WHB with pedestal (Pak made) light Colour.	Each	4208.00
28-1003	WHB with pedestal (Pak made) special Colour.	Each	4584.00
28-1004	Bidet in white Colour. (Pak made).	Each	3585.00
28-1005	Bidet in light Colour.	Each	3360.00
28-1006	Bidet in special Colour.	Each	4110.00
28-1007	Bidet Mixer best quality.	Each	8150.00
28-1008	Mirror, 600 x 450 x 5 mm thick , any shape (with plastic frame).	Each	1050.00
28-1009	Glass shelf (Foreign made).	Each	1475.00
28-1010	Clip for mirror.	Each	13.00
28-1011	Plastic shelf best quality (Pak made).	Each	790.00
28-1012	Toilet paper holder (Foreign made).	Each	2000.00
28-1013	Soap / Sponge tray (Foreign made) Plastic.	Each	1050.00
28-1014	- do-, but brush / tumbler holder, Plastic.	Each	260.00
28-1015	Toilet paper holder, (Pak made), Plastic.	Each	325.00
28-1016	Soap / Sponge tray, (Pak made).	Each	245.00
28-1017	Bolt Kit.	Each	125.00
28-1018	Towel Rail, single rod, C.P best quality (Pak made).	Each	750.00
28-1019	Towel Rail, C.P, double rod, (Pak made).	Each	1055.00
28-1020	Towel Rail, single rod, C.P (Foreign made).	Each	825.00
28-1021	Towel Rail, CP, double rod, (Foreign made).	Each	2000.00
28-1022	Toilet shower (Pak made) 15 mm dia.	Each	1120.00
28-1023	Plastic, Bath Cabinet 450 x 450x 100 mm deep Double shutters (Pak made).	Each	450.00

S/No.	Description	Unit	Rate (Rs)
28-1024	Mirror any shape and pattern 5 mm thick (imported).	Sqm	1050.00
28-1025	Bath curtain (1.78 x 1.78m) (imported).	Each	325.00
28-1026	CI Floor trap incl reducer 100 mm dia.	Each	125.00
28-1027	Casted grating 100 mm x 100 mm.	Each	1050.00
28-1028	Casted grating 150 mm x 150 mm.	Each	325.00
28-1029	Bottle trap complete.	Each	725.00
28-1030	Plastic float valve 15 mm dia.	Each	55.00
28-1031	Copper float valve 20 mm dia.	Each	75.00
28-1032	Brass connection with brass union on both ends, 15 mm dia, 300 to 450 mm long.	Each	60.00
28-1033	-do-, but 20mm dia.	Each	135.00
28-1034	Plastic connection 20 mm dia.	Each	155.00
28-1035	Plastic connection 15 mm dia.	Each	115.00
28-1036	CP copper connection, 20mm dia upto 450mm long.	Each	215.00
28-1037	Seat cover (Plastic) for European W.C, best quality.	Each	325.00
	No.	RL	
SECTION – 29

MATERIAL SUPPLIED ONLY RATES

Electrification, Water Supply, Natural Gas

The rates for materials given below have been used in compiling the item rates in this schedule and the same will be used as defined in General Rules. In case where MES Stores are issued to the contractors under various contracts on payment, the recovery will be affected at these rates as given in. General Rules.

S No	Description	Unit	Rate (Rs)
	Transformer		
29-01	Transformer, power, step down, 11000/400/230 volts 3 phase, 50 cycles indoor / outdoor 25 KVA.	Each	210600.00
29-02	Same as item 29-01 but 50 KVA.	Each	292500.00
29-03	Same as item 29 -01 but 100 KVA.	Each	414750.00
29-04	Same as item 29 -01 but 150 KVA.	Each	525000.00
29-05	Same as item 29-01 but 200 KVA.	Each	661050.00
29-06	Same as item 29-01 but 250 KVA.	Each	713700.00
29-07	Same as item 29-01 but 300 KVA.	Each	754650.00
29-08	Same as item 29-01 but 400 KVA.	Each	1134900.00
29-09	Same as item 29-01 but 500 KVA.	Each	1275300.00
29-10	Same as item 29-01 but 630 KVA.	Each	1380600.00
29-11	Same as item 29-01 but 1000 KVA.	Each	1702350.00
29-12	Transformer power step down, 11000/ 400 / 230 volts 3 phase, 50 cycles 25 KVA, Pad mounted type.	Each	336960.00
29-13	Same as item 29-12 but 50 KVA.	Each	462150.00
29-14	Same as item 29 -12 but 100 KVA.	Each	748800.00
29-15	Same as item 29 -12 but 200 KVA.	Each	1041300.00
29-16	Same as item 29-12 but 300 KVA.	Each	1181700.00
29-17	Same as item 29-12 but 400 KVA.	Each	1683000.00
29-18	Same as item 29-12 but 500 KVA.	Each	2000700.00
29-19	Energy meter with MDI, complete, suitable for HT panel.	Each	134550.00
29-20	Potential Transformer (PT) 100/230 V or 110 volts for HT panel.	Each	38500.00

S No	Description	Unit	Rate (Rs)
	Pole Steel Tubular		
29-21	Pole steel tubular un-galvd upto 9 M long complete with base plate, as specified in Section-25.	Each	17000.00
29-22	Same as item 29-21, but galvd.	Each	20500.00
29-23	Pole tubular un-galvd upto 12 M long complete with base plate, as specified in Section-25.	Each	24500.00
29-24	Same as item 29- 23, but galvd.	Each	29000.00
29-25	Pole steel tubular un- galvd upto 10.792 M long for street light, single arm, complete with base plate, as specified in Section-25.	Each	19500.00
29-26	Same as item 29-25, but galvd.	Each	23500.00
29-27	Pole steel tubular un- galvd upto 10.792 M long for street light, double arm, complete with base plate, as specified in Section-25.	Each	21000.00
29-28	Same as item 29- 27, but galvd.	Each	25000.00
29-29	Steel pole Latticed "L" type un-galvd, as per WAPDA drawing No. PDW/DF-10.	Each	23587.00
29-30	Same as item 29- 29, but galvd.	Each	24336.00
29-31	Steel pole Latticed "H" type un-galvd, as per WAPDA drawing No. PDW/DF-11.	Each	36130.00
29-32	Same as item 29-31, but galvd.	Each	37440.00
29-33	Wire stay, steel galvd, stranded, all sizes.	KG	150.00
29-34	Stay assembly, comprising elbow, rod and washers as per BS No. 16 for use with stay wire 7/10 SWG. 13.75 M long.	Each	3896.00
29-35	Insulators pin, glazed, porcelain, vitreous or glass caps galvd pins, max dia in groove 150 mm, LT.	Each	300.00
29-36	Same as item 29-35, but for HT, upto 11 KV	Each	410.00
29-37	Insulators shackle with straps, or D/iron for cross arms upto 30mm deep and 175mm max top dia, LT.	Each	280.00
29-38	Insulator for stay.	Each	375.00
29-39	Starter for fluorescent tubes, 200/250V 40-80 W.	Each	25.00

S No	Description	Unit	Rate (Rs)
29-40	Choke for fluorescent tube, 200/250 V 20 W (PHILIPS).	Each	285.00
29-41	Same as item 29-40 but for 40W.	Each	285.00
29-42	Choke for mercury vapour lamp 200/250 V, 80/125/150 W.	Each	1200.00
29-43	Same as item 29-42, but for 250W.	Each	1475.00
29-44	Same as item 29-42, but for 400W.	Each	1850.00
29-45	Mercury vapours lamp, 200/250V, and 80W.	Each	300.00
29-46	Same as item 29-45 but for 125/150W.	Each	300.00
29-47	Same as item 29-45 but for 160W.	Each	300.00
29-48	Same as item 29-45 but for 250W.	Each	1080.00
29-49	Same as item 29-45 but 400W.	Each	1200.00
29-50	Choke for sodium lamps 70/125W.	Each	1120.00
29-51	Same as item 29-50 but 250 W.	Each	2200.00
29-52	Same as item 29-50 but 400 W.	Each	2900.00
29-53	Sodium lamp 70/125 W.	Each	850.00
29-54	Same as item 29-53 but 250 W.	Each	950.00
29-55	Same as item 29-53 but 400 W.	Each	1000.00
29-56	Igniter, for Sodium lamp.	Each	350.00
29-57	Flood light Halogen lamp, 300/500W complete, (PHILIPS) QVF- 433/QVF- 435.	Each	1500.00
29-58	Same as item 29-57, but 1000/1500 W (PHILIPS).	Each	3750.00
29-59	Capacitor for fan, 2.2 mfd, 6 micron 250 v.	Each	33.30
29-60	Same as item 29-59 but 2.5 mfd 6 micron 250 v.	Each	35.80
29-61	Same as item 29-59 but 3.00 mfd 6 micron 250 v.	Each	40.30
29-62	Same as item 29-59 but 3.50 mfd 6 micron 250 v	Each	45.40
29-63	Same as item 29-59 but 4 mfd 6 micron 250 v.	Each	49.90
29-64	Same as item 29-59 but 4.50 mfd 6 micron 250 v.	Each	55.50
29-65	Same as item 29-59 but 12 mfd 6 micron 250 v $$	Each	122.00
29-66	Same as item 29-59 but 25 mfd 6 micron 250 v.	Each	221.00
29-67	Same as item 29-59 but 30 mfd 6 micron 250v.	Each	245.00

S No	Description	Unit	Rate (Rs)
29-68	Conduit tubing black or galvd, ET, 20mm dia.	Metre	133.00
29-69	Same as item 29-68, but 25mm dia.	Metre	192.00
29-70	Same as item 29-68, but 40mm dia.	Metre	270.00
29-71	Same as item 29-68, but 50mm dia.	Metre	380.00
29-72	Tee solid or inspection 20mm dia.	Each	60.00
29-73	Same as item 29-72, but 25mm dia.	Each	82.00
29-74	Same as item 29-72, but 40mm dia.	Each	195.00
29-75	Same as item 29-72, but 50mm dia.	Each	265.00
29-76	Elbow solid or inspection 20mm dia.	Each	85.00
29-77	Same as item 29-76, but 25mm dia.	Each	110.00
29-78	Same as item 29-76, but 40mm dia.	Each	220.00
29-79	Same as item 29-76, but 50mm dia.	Each	355.00
29-80	Bend 90° solid or inspection 20mm dia	Each	85.00
29-81	Same as item 29-80, but 25mm dia.	Each	110.00
29-82	Same as item 29-80, but 40mm dia.	Each	220.00
29-83	Same as item 29-80, but 50mm dia.	Each	355.00
29-84	Bush male or female 20mm dia.	Each	20.00
29-85	Same as item 29-84, but 25mm dia.	Each	40.00
29-86	Same as item 29-84, but 40mm dia.	Each	75.00
29-87	Same as item 29-84, but 50mm dia.	Each	80.00
29-88	Lock nuts, 15mm dia.	Each	15.00
29-89	Same as item 29-88, but 20mm dia.	Each	25.00
29-90	Same as item 29-88, but 25mm dia.	Each	45.00
29-91	Same as item 29-88, but 30mm dia.	Each	55.00
29-92	Saddles, spacer bar, 20mm dia.	Dozen	25.00
29-93	Same as item 29-92, but 25mm dia.	Dozen	30.00
29-94	Same as item 29-92, but 40mm dia.	Dozen	43.00
29-95	Same as item 29-92, but 50mm dia.	Dozen	60.00
	Cable PVC		
29-96	Cable PVC, sheathed, single core, 250/ 440 V, solid copper conductor, 1 mm^2 .	90 M coil	1832.00
29-97	Same as item 29-96, but 1.5mm ² .	90 M coil	2587.00
29-98	Same as item 29-96, but 2.5mm ² .	90 M coil	3882.00

S No	Description	Unit	Rate (Rs)
29-99	Same as item 29-96, but 4mm ² .	90 M coil	6112.00
29-100	Cable PVC, sheathed single core 250/ 440V, stranded copper conductor, 6mm ² .	90 M coil	8364.00
29-101	Same as item 29-100, but 10mm ² .	90 M coil	13966.00
29-102	Same as item 29-100, but 16mm ² .	90 M coil	20340.00
29-103	Same as item 29-100, but 25mm ² .	90 M coil	32620.00
29-104	Same as item 29-100, but 35mm ² .	90 M coil	44630.00
29-105	Same as item 29-100, but 50mm ² .	90 M coil	60612.00
29-106	Same as item 29-100, but 70mm ² .	90 M coil	86610.00
29-107	Cable electric, PVC insulated 250/440V, with solid copper conductor, 1mm ² .	90 M coil	1455.00
29-108	Same as item 29-107, but 1.5mm ² .	90 M coil	2074.00
29-109	Same as item 29-107, but 2.5mm ² .	90 M coil	3680.00
29-110	Cable electric, PVC insulated 250/440V with stranded copper conductor, 3 /.029	90 M coil	1927.00
29-111	Same as item. 29-110, but 3/.036.	90M coil	2715.00
29-112	Same as item 29-110, but 7/.029.	90M coil	4104.00
29-113	Cable electric, PVC insulated 250/440V single core, with stranded copper conductor, 4mm ² .	90M coil	5350.00
29-114	Same as item 29-113, but 6mm ² .	90M coil	7954.00
29-115	Same as item 29-113, but 10mm ² .	90M coil	13204.00
29-116	Same as item 29-113, but 16mm ² .	90M coil	19530.00
29-117	Same as item 29-113 but 25mm ² .	90M coil	31410.50
29-118	Same as item 29-113 but 35mm ² .	90M coil	43370.00
29-119	Same as item 29-113 but 50mm ²	90M coil	58713.30
29-120	Same as item 29-113 but 70mm ² .	90M coil	83250.00
29-121	Cable electric, flexible, 0.75mm ² twin core.	90M coil	5537.00
29-122	Cable electric, PVC insulated PVC sheathed $600/1000$ V, twin core with copper conductor 4 mm ² .	Metre	141.22
29-123	Same as item 29-122, but 6mm ² .	Metre	200.56
29-124	Same as item 29-122, but 10mm ² .	Metre	327.39
29-125	Same as item 29-122, but 16mm ² .	Metre	548.94
29-126	Same as item 29-122, but 25mm ² .	Metre	751.32

S No	Description	Unit	Rate (Rs)
29-127	Same as item 29-122, with Aluminium conductor but 10mm ² .	Metre	66.36
29-128	Same as item 29-127, but 16 mm ² .	Metre	81.56
29-129	Same as item 29-127, but 25 mm ² .	Metre	125.73
29-130	Chlorine gasmasks, full vision, twin lens face piece, chest harness and chlorine protection industrial canister (filter) with hose etc, all packed in weather proof carrying bag.	Each	7500.00
29-131	Electric bell, "Bird's voice" single phase, 220/230 V, AC.	Each	165.00
29-132	Ding-dong electric bell, single phase 200/230 V, AC.	Each	130.00
29-133	Remote control bell.	Each	650.00
29-134	Earth leakage circuit breaker, 4 pole, 500 / 660V, 50/ 60 cycles, complete with earth leakage overload and short-circuit protection, 15 to 100A (breaking capacity 1.5 KA).	Each	51000.00
	Ceiling Fans		
29-135	Ceiling Fan Supreme Golden Model 48".(1200 mm, Without regulator, CLIMAX, Hi Deluxe	Each	3600.00
29-136	Same as item 29-135, but Super Hi- Deluxe 48".(1200 mm) Sweep.	Each	2900.00
29-137	Same as item 29-135, but Supreme Golden 56" (1400 mm) Sweep.	Each	3700.00
29-138	Same as item 29-135, but Hi-Deluxe.	Each	3000.00
29-139	Ceiling Fan 36" (900 mm) Sweep, without regulator, Royal Fan	Each	2930.00
29-140	Same as Item 29-139, but 48" (1200mm) Sweep.	Each	3375.00
29-141	Same as Item 29-139, but 56" (1400mm) Sweep.	Each	3395.00
29-142	Ceiling Fan 36" (900 mm) Sweep without regulator, PAK Fan.	Each	2630.00
29-143	Same as Item 29-142, but 48" (1200mm) Sweep.	Each	3075.00
29-144	Same as Item 29-142, but 56" (1400 mm) Sweep.	Each	3095.00

S No	Description	Unit	Rate (Rs)
29-145	Ceiling Fan 36" (900 mm) Sweep without regulator, GFC Fan.	Each	2900.00
29-146	Same as Item 29-145, but 48" (1200mm) Sweep	Each	3325.00
29-147	Same as Item 29-145, but 56" (1400 mm) Sweep.	Each	3395.00
29-148	Ceiling Fan 48" (1200 mm) Sweep without regulator Super Asia Fan.	Each	3040.00
29-149	Same as Item 29-148, but 56" (1400 mm) Sweep.	Each	3040.00
29-150	Ceiling Fan 56" (1400 mm) Sweep, Without regulator, water proof, CLIMAX.	Each	3200.00
29-151	Ceiling Fan 56" (1400 mm) Sweep Without regulator, Water Proof, GFC fan.	Each	3450.00
	Exhaust Fan		
29-152	Exhaust Fan metal body 8" (200 mm) Royal fan.	Each	1835.00
29-153	Same as item 29-152 but10"(250 mm).	Each	2020.00
29-154	Same as item 29-152, but 12"(300 mm).	Each	2225.00
29-155	Same as item 29-152 but 16" (400 mm).	Each	3570.00
29-156	Same as item 29-152, but 18" (450 mm).	Each	3735.00
29-157	Same as item 29-152, but 20" (500 mm).	Each	4190.00
29-158	Same as item 29-152 but 24" (600 mm).	Each	4560.00
29-159	Exhaust fan metal body 6" (150 mm), GFC Fan.	Each	1705.00
29-160	Same as item 29-159 but 8" (200 mm).	Each	1860.00
29-161	Same as item 29-159 but 10"(250 mm).	Each	2100.00
29-162	Same as item 29-159 but 12"(300 mm).	Each	2275.00
29-163	Same as item 29-159 but 16"(400 mm).	Each	3400.00
29-164	Same as item 29-159 but 18"(450 mm).	Each	3615.00
29-165	Same as item 29-159 but 20"(500 mm).	Each	4050.00
29-166	Same as item 29-159 but 24"(600 mm)	Each	4300.00
29-167	Exhaust Fan metal body 6"(150 mm) PAK fan.	Each	1495.00
29-168	Same as item 29-167 but 8" (200 mm).	Each	1660.00
29-169	Same as item 29-167, but 10"(250 mm).	Each	1850.00
29-170	Same as item 29-167 but 12" (300 mm).	Each	2030.00

S No	Description	Unit	Rate (Rs)
29-171	Same as item 29-167 but 16" (400 mm).	Each	3115.00
29-172	Same as item 29-167 but 18" (450 mm).	Each	3280.00
29-173	Same as item 29-167 but 20" (500 mm).	Each	3690.00
29-174	Same as item 29-167 but 24" (600 mm).	Each	4060.00
29-175	Exhaust Fan, metal body 12" (300 mm) CLIMAX fan.	Each	2350.00
29-176	Same as item 29-175 but 16" (400 mm).	Each	2800.00
29-177	Same as item 29-175 but 18" (450 mm).	Each	3100.00
29-178	Same as item 29-175 but 24" (600 mm).	Each	4100.00
29-179	Exhaust Fan metal 8" (200 mm) Super Asia fan.	Each	1630.00
29-180	Same as item 29-179 but 10" (250 mm).	Each	1810.00
29-181	Same as item 29-179 but 12" (300 mm).	Each	1980.00
29-182	Same as item 29-179 but 16" (400 mm).	Each	2985.00
29-183	Same as item 29-179 but 18" (450 mm).	Each	3145.00
29-184	Same as item 29-179 but 24" (600 mm).	Each	3870.00
29-185	Exhaust Fan 8" (200 mm) Capacitor with shutter / grill plastic body single action (PAK fan).	Each	1920.00
29-186	Same as item 29-185 but 10" (250 mm).	Each	2000.00
29-187	Same as item 29-185 but 12" (300 mm).	Each	2230.00
29-188	Exhaust Fan 8" (200 mm) Capacitor with shutter / grill plastic body single action Super Asia	Each	1770.00
29-189	Same as item 29-188 but 10" (250 mm).	Each	1835.00
29-190	Same as item 29-188 but 12" (300 mm).	Each	2025.00
29-191	Exhaust Fan 8" (200 mm) Capacitor with shutter /grill plastic body single action (GFC Fan).	Each	2095.00
29-192	Same as item 29-191 but 10" (250 mm).	Each	2175.00
29-193	Same as item 29-191 but 12" (300 mm).	Each	2405.00
29-194	Exhaust Fan plastic body capacitor with grill/shutter 8" (200 mm) double action 200mm (CLIMAX FAN).	Each	1900.00
29-195	Same as item 29-194 but 10"(250 mm).	Each	2000.00
29-196	Same as item 29-194 but 12"(300 mm).	Each	2100.00

S No	Description	Unit	Rate (Rs)
29-197	Exhaust Fan plastic body capacitor with grill/shutter 8" (200mm) double action 200mm Royal Fan.	Each	2170.00
29-198	Same as item 29-197 but 10" (250 mm).	Each	2250.00
29-199	Same as item 29-197 but 12" (300 mm).	Each	2510.00
29-200	Exhaust Fan plastic body capacitor with grill/shutter 8" double action 200mm, PAK fan.	Each	1995.00
29-201	Same as item 29-200 but 10"(250 mm).	Each	2080.00
29-202	Same as item 29-200 but 12" (300 mm).	Each	2340.00
29-203	Exhaust Fan plastic body capacitor with grill / shutter 8" double action 200mm, GFC fan.	Each	2175.00
29-204	Same as item 29-203 but 10" (250 mm).	Each	2255.00
29-205	Same as item 29-203 but 12" (300 mm).	Each	2255.00
29-206	Exhaust Fan plastic body capacitor with grill / shutter 8" double action 200mm Super Asia Fan .	Each	1875.00
29-207	Same as item 29-206 but 10" (250 mm).	Each	1945.00
29-208	Same as item 29-206 but 12" (300 mm).	Each	2160.00
	Wall Bracket Fan		
29-209	Wall Bracket Fan Fancy plastic body, 18" (450 mm) CLIMAX Fan.	Each	3300.00
29-210	Wall Bracket Fan Fancy plastic body, 16" (400 mm) Royal Fan.	Each	3165.00
29-211	Same as item 29-210 but 18" (400 mm).	Each	3240.00
29-212	Same as item 29-210 but 20" (500 mm).	Each	3660.00
29-213	Wall Bracket Fan Fancy plastic body, 12" (300 mm) GFC fan.	Each	2500.00
29-214	Same as item 29-213 but 14" (350 mm).	Each	2550.00
29-215	Same as item 29-213 but 16" (400 mm).	Each	3135.00
29-216	Same as item 29-213 but 18" (450 mm)	Each	3220.00
29-217	Wall Bracket Fan Fancy plastic body, 12" (300 mm) PAK fan .	Each	2275.00
29-218	Same as item 29-217 but 14" (350 mm).	Each	2835.00
29-219	Same as item 29-217 but 16" (400 mm).	Each	2915.00
29-220	Same as item 29-217 but 18" (450 mm).	Each	2995.00

S No	Description	Unit	Rate (Rs)
29-221	Wall Bracket Fan Fancy plastic body, 18" (450 mm) Super Asia Fan .	Each	2875.00
29-222	Circiomatic Fan deluxe w/o regulator, 24" (600 mm)	Each	4150.00
29-223	Circiomatic Fan deluxe w/o regulator, 16" (400mm)	Each	2765.00
29-224	Same as item 29-223 but 18" (450 mm).	Each	2990.00
29-225	Circiomatic Fan 12" (300 mm) PAK fan.	Each	2575.00
29-226	Same as item 29-225 but 14" (350 mm).	Each	2845.00
29-227	Same as item 29-225 but 16" (400 mm).	Each	3045.00
29-228	Same as item 29-225 but 18" (450mm).	Each	3185.00
29-229	Circiomatic Fan deluxe w/o regulator, 16" (400 mm) GFC fan.	Each	3290.00
29-230	Same as item 29-229 but 18"(450 mm).	Each	3370.00
	Pedestal Fan		
29-231	Pedestal Fan deluxe 18" Roya Fan.	Each	4180.00
29-232	Same as item 29-231, but 20".	Each	5010.00
29-233	Same as item 29-231, but 24".	Each	5510.00
29-234	Same as item 29-231, but 26".	Each	6580.00
29-235	Same as item 29-231, but 30".	Each	6945.00
29-236	Pedestal Fan deluxe 20" PAK Fan.	Each	4610.00
29-237	Same as item 29-236, but 22".	Each	4710.00
29-238	Same as item 29-236, but 24".	Each	5060.00
29-239	Same as item 29-236, but 26".	Each	6180.00
29-240	Same as item 29-236, but 30".	Each	6545.00
29-241	Pedestal Fan deluxe 20" GFC Fan.	Each	4950.00
29-242	Same as item 29-241, but 22".	Each	5020.00
29-243	Same as item 29-241, but 24".	Each	5195.00
29-244	Same as item 29-241, but 26".	Each	6500.00
29-245	Same as item 29-241, but 30".	Each	7650.00
29-246	Pedestal Fan deluxe 22" CLIMAX Fan.	Each	4300.00
29-247	Pedestal Fan Deluxe 18" Super Asia	Each	3585.00
29-248	Same as item 29-247, but 20"	Each	3915.00
29-249	Same as item 29-247, but 22"	Each	4560.00
29-250	Same as item 29-247. but 24"	Each	4650.00

S No	Description	Unit	Rate (Rs)
29-251	Same as item 29-247, but 26"	Each	5580.00
29-252	Same as item 29-247, but 30"	Each	6285.00
	Energy Saver Bulbs		
29-253	Energy saver, Plain, 14 W.	Each	155.00
29-254	Same as item 29-253, but 18 W.	Each	171.00
29-255	Same as item 29-253, but 23 W.	Each	196.00
29-256	Energy saver ,Full Spiral, 11 W.	Each	193.00
29-257	Same as item 29-256, but 15 W.	Each	190.00
29-258	Same as item 29-256, but 20 W.	Each	200.00
29-259	Same as item 29-256, but 23 W.	Each	210.00
29-260	Energy saver ,Spiral, 5,8 or 11 W.	Each	193.00
	Electric Water Cooler		
29-261	Electric Water Cooler 35 lit Model TS- 033., TSFA	Each	30600.00
29-262	Same as item 29-261, but 45 lit, Model TS-044.	Each	32400.00
29-263	Same as item 29-261, but 65 lit, Model TS-055.	Each	36000.00
29-264	Same as item 29-261, but 85 lit, Model TS-066.	Each	39600.00
29-265	Same as item 29-261, but 100 lit, Model TS-077.	Each	41400.00
29-266	Same as item 29-261, but 200 lit, Model TS-099.	Each	43200.00
29-267	Electric Water Cooler 35 lit Make Model NC-35. NASGAS	Each	31160.00
29-268	Same as item 29-267, but 40 lit, Model NC-65.	Each	34440.00
29-269	Electric Water Cooler, 25 lit, CORONA.	Each	32175.00
29-270	Same as item 29-269, but 45 lit.	Each	33345.00
29-271	Same as item 29-269, but 65 lit.	Each	36855.00
29-272	Same as item 29-269, but 80 lit.	Each	41535.00
29-273	Same as item 29-269, but 100 lit.	Each	57330.00
29-274	Same as item 29-269, but 125 lit.	Each	59670.00

S No	Description	Unit	Rate (Rs)
L	Flood Lights		
29-275	SUNLIGHT decorative post bollards complete with 1X80W, MV lamp capacitor and choke pole mounted bracket (Code No. 715/80 HPL-N and PMB).	Each	13500.00
29-276	Same as item 29 -275, but (Code No OD-715 with 26 W CFT).	Each	10500.00
29-277	Same as item 29-275, but (Code No. OD-6020 with 70 W SON).	Each	17500.00
29-278	Same as item 29-275, but (Code No. Power-Sun/SON-250 W , igniters).	Each	15500.00
29-279	PHILIPS flood light luminaries complete with 1 x 400W Sodium lamp igniters, capacitor and Choke, (Code No. H-SVF- 10/SON 400 W, Igniters).	Each	15355.00
29-280	Same as item 29-279 but SUNLIGHT (Code No Power-Sun/SON-400 W igniters).	Each	16500.00
29-281	Same as item 29-279 but SUNLIG (Code No. Power-Sun/SON 400 W igniters HPI T Lamp).	Each	16500.00
29-282	PHILIPS Industrial High Bay luminaries complete with 1 x 250W MV lamp capacitor and Choke. (Code No. HDK-463 / 250 WHPL-N).	Each	5377.00
29-283	Same as item 29-282 but SUNLIGHT (Code No. AHB/250W HPL-N).	Each	7200.00
29-284	PHILIPS Industrial High Bay luminaries complete with 1 x 400W MV lamp capacitor and Choke (Code No. HDK-463 / 400 WHPL-N).	Each	6330.00
29-285	Same as item 29-284 but SUNLIGHT (Code No. AHB/400W HPL-N).	Each	8200.00
29-286	PHILIPS Industrial High Bay luminaries complete with 1 x 150W MV lamp capacitor and Choke. (Code No. HDK-580 / 150 W SON and igniters).	Each	7815.00
29-287	PHILIPS Industrial High Bay luminaries complete with 1 x 250W Sodium lamp igniters capacitor and Choke. (Code HDK-580 / 400 W SON and igniters).	Each	9850.00
29-288	Same as item 29-287, but SUNLIGHT (Code No. AHB/250W SON and igniters).	Each	8200.00

S No	Description	Unit	Rate (Rs)
29-289	Same as item 29-287, but SUNLIGHT (Code No. AHB/400W SON and igniters).	Each	9200.00
	Luminaries		
29-290	SUNLIGHT Basic batten complete with 1 X 36 W tube lamp starter and capacitor (Code No. Delta-136).	Each	1525.00
29-291	Same as item 29-290 but 2 X 36 W (Code No. Delta-236).	Each	2150.00
29-292	SUNLIGHT Basic Batten complete with cover 1 X 36 W tube lamp starter and capacitor (Code No. SOS-136).	Each	2350.00
29-293	Same as item 29-292 but (Code No. SOS-236).	Each	2850.00
29-294	SUNLIGHT Surface mounted luminaries with diffuser complete with 1 X 36W tube lamp starter and capacitor. (Code No. Beeta-136).	Each	2450.00
29-295	SUNLIGHT Industrial batten with reflector complete with 2 X 36W tube lamp starter and capacitor (Code No. Beeta-236).	Each	2650.00
29-296	PHILIPS surface mounted luminaries with Metal reflector' L' complete with 2 x 40W tube lamp starter and capacitor(Code No. TCS 240L).	Each	4660.00
29-297	Same as item 29-296 but SUNLIGHT (Code No. Surfer 236 P with TLD 18/84 and PFI).	Each	5200.00
29-298	PHILIPS surface mounted luminaries with Metal reflector 'MI' complete with 2 x 40W tube lamp starter and capacitor. (Code No. TCS 240MI).	Each	4680.00
29-299	Same as item 29-299 but SUNLIGHT (Code No. Surfer 236/AG with 18/84 and PFI	Each	5600.00
29-300	SUNLIGHT surface mounted luminaries with metal reflector complete with 4X18 W tube lamp starter and capacitor.(Code No. Surfer 418/AG with TLD 18/84 and PFI).)	Each	5800.00
29-301	PHILIPS surface mounted luminaries with Metal reflector 'MI' complete with 4 x 20W tube lamp starter and capacitor. (Code No. TCS 420MI).	Each	5390.00

S No	Description	Unit	Rate (Rs)
29-302	Same as item 29-301 but SUNLIGHT (Code No. Surfer 418 Zerox with TLD and PFI).	Each	6800.00
29-303	PHILIPS recessed ceiling luminaries with Metal reflector' L' complete with 4 x 20W tube lamp starter and capacitor (Code No. TBS 300E / 420L).	Each	4790.00
29-304	Same as item 29-303 but SUNLIGHT (Code No. Surfer 418 MT with TLD 18/84 and PFI).	Each	6800.00
29-305	PHILIPS recessed ceiling luminaries with Metal louver 'MI' complete with 4 x 20W tube lamp starter and capacitor, (Code No. TBS 300/420MI).	Each	4880.00
29-306	Same as item 29-305 but SUNLIGHT (Code No. ALPHA-418/Zerox MT with TLD 18/84 and FPI).	Each	6200.00
29-307	PHILIPS recessed ceiling luminaries with Metal louver 'L' complete with 2 x 40 W tube lamp starter and capacitor (Code No. TBS 088 / 240L).	Each	4530.00
29-308	Same as item 29-307 but SUNLIGHT (Code No. Alpha 236P with TLD 18/84 and PFI).	Each	5100.00
29-309	PHILIPS recessed ceiling luminaries with Metal louvre 'MI' complete with 2 x 40W tube lamp starter and capacitor (Code No. TBS 300E / 240MI).	Each	4200.00
29-310	Same as item 29-309 but SUNLIGHT (Code No. Alpha -236 Aerofoil with TLD 18/84 and PFI).	Each	7100.00
29-311	PHILIPS road lighting luminaries complete with 1 x 125 MV lamp Choke and Capacitor (Code No. HRP-38/125W).	Each	5370.00
29-312	Same as item No. 29-311 but SUNLIGHT (Code No Appalo-1-B/125W).	Each	7000.00
29-313	Same as item No. 29-311 but SUNLIGHT (Code No Apollo-1-B/70W).	Each	8000.00
29-314	PHILIPS Street lighting luminaries complete with1 x 80W, MV lamp choke and capacitor (Code No HRC-510/80W HPL-N and PMD).	Each	7500.00

S No	Description	Unit	Rate (Rs)
29-315	PHILIPS street lighting luminaries complete with 1 x 125W, MV lamp choke and capacitor (Code No.HRC-510/125 BHL).	Each	6930.00
29-316	SUNLIGHT street lighting luminaries complete with 1 x 150W sodium lamp choke, capacitor and igniter, (Code No Apollo-II / 150W SON.).	Each	12500.00
29-317	SUNLIGHT street lighting luminaries complete with 1 x 250W Sodium lamp choke, capacitor and igniter, (Code No Apollo-II / 250W SON).	Each	13500.00
29-318	PHILIPS road lighting tube rod complete with 1 x 40 W with starter and capacitor (Code NoTRB-01/40 W).	Each	3420.00
29-319	PHILIPS road lighting tube rod completes 2 x 40 W with starter and capacitor, (Code No TRB-01/240W).	Each	4200.00
29-320	SUNLIGHT Road Light, Aluminium die cast, dust and water proof light classification IP-66; Model CN400A, complete with 150W SON-T lamp, ballast, igniters and capacitor.	Each	14500.00
29-321	SUNLIGHT Road Light, Aluminium die cast, dust and water proof light classification IP-66; Model CN400A, complete with 250W SON-T lamp, ballast, igniter and capacitor.	Each	15500.00
29-322	SUNLIGHT Road Light, Aluminium die cast, dust and water proof light classification IP-66; Model CN400A, complete with 250W Metal Halide lamp, ballast and capacitor.	Each	13500.00
29-323	SUNLIGHT Road Light, Aluminium die cast, dust and water proof light classification IP-66; Model SPARK (RW- 608) complete with 250W SON-T lamp, ballast and capacitor.	Each	23500.00
29-324	SUNLIGHT Road Light, Aluminium die cast, dust and water proof light classification IP-66; Model SPARK (RW-608) complete with 250W Metal Halide lamp, ballast and capacitor.	Each	22000.00

S No	Description	Unit	Rate (Rs)
29-325	SUNLIGHT Road Light, Aluminium die cast, dust and water proof light classification IP-66; Model SPARK (RW-608) complete with 400W Metal Halide lamp, ballast and capacitor.	Each	23500.00
29-326	SUNLIGHT Road Light, Aluminium die cast, dust and water proof light classification IP-66; Model SPARK (RW-608) complete with 150W Metal Sodium lamp, ballast and capacitor.	Each	21000.00
	LED Street Light		
29-327	Sunlight 63 W LED Road Light Fixture Model Radius-I	Each	31000.00
29-328	Sunlight 90W LED Road Light Fixture Model Radius-I	Each	34800.00
29-329	Sunlight 108 W LED Road Light Fixture Model Radius-II	Each	42500.00
29-330	Sunlight 126 W LED Road Light Fixture Model Radius-II	Each	47000.00
29-331	Sunlight 70 W LED Road Light Fixture Model ARC-I	Each	38750.00
29-332	Sunlight 100 W LED Road Light Fixture Model ARC-I	Each	43500.00
29-333	Sunlight 120 W LED Road Light Fixture Model ARC-II	Each	58750.00
29-334	Sunlight 140 W LED Road Light Fixture Model ARC-II	Each	65700.00
	LED Panel Light		\mathbf{X}
29-335	Sunlight 36W LED panel light Fixture Model Alpha- ULP –SM1-36 W	Each	9800.00
29-336	Sunlight 50 W LED panel light Fixture Model Alpha- ULP –SM1-50 W	Each	12400.00
29-337	Sunlight 36W LED panel light Fixture Model Alpha- ULP –SM2-36 W	Each	9800.00
29-338	Sunlight 50 W LED panel light Fixture Model Alpha- ULP –SM2-50 W	Each	12400.00
29-339	Sunlight 7W LED panel light Fixture Model Ultra-Slim –S21 (Round)	Each	2110.00

S No	Description	Unit	Rate (Rs)
29-340	Sunlight127W LED panel light Fixture Model Ultra-Slim –S21 (Round)	Each	2750.00
29-341	Sunlight 7W LED panel light Fixture Model Ultra-Slim –S21(Square)	Each	2110.00
29-342	Sunlight127W LED panel light Fixture Model Ultra-Slim –S21 (Square)	Each	2750.00
	LED Flood Light		
29-343	Sunlight 80 W LED Flood Light Fixture Model Omega-80	Each	13200.00
29-344	Sunlight 100 W LED Flood Light Fixture Model Omega-80	Each	15840.00
29-345	Sunlight 160 W LED Flood Light Fixture Model Omega-80	Each	21300.00
29-346	Sunlight 120 W LED Flood Light Fixture Model Omega-80	Each	32000.00
29-347	Sunlight 180 W LED Flood Light Fixture Model Omega-80	Each	38000.00
29-348	Capacitor for fluorescent tube 10/7mfd 250 V.	Each	395.00
29-349	Fluorescent tube holder with starter socket.	Each	50.00
	Fire Alarm System		
29-350	Fire Alarm Control Panel 2-Triggering Zones and 2-Alarming Zones make Honeywell USA.	Each	54000.00
29-351	Smoke Detector (Ionization Type) Honeywell.	Each	2300.00
29-352	Heat Detector (Rise Type) Honeywell.	Each	2300.00
29-353	Alarm bell 6" dia gong type Honeywell.	Each	2000.00
29-354	Manual Call Point Break Glass Type Honeywell.	Each	1800.00
29-355	Wiring Installation Testing Commission with material and Labour.	point	2000.00
29-356	Gate light, fancy type.	Each	910.00
29-357	Patty fitting complete with 0.6 M, 20W fluorescent tube chokes starter and holders, complete.	Each	650.00
29-358	Same as item 29-357 but 1.2M, 40 W, complete.	Each	610.00

S No	Description	Unit	Rate (Rs)
29-359	Industrial shoe socket complete 3 pin, 16 A, Best Quality.	Each	1065.00
29-360	Same as item 29-359 but 32 A.	Each	1515.00
29-361	Same as item 29-359 but 63 A.	Each	5200.00
	Water Tank - Fibre glass		
29-362	Water tank fibre glass, 100 gallon capacity.	Each	6786.00
29-363	Same as item 29-362 but 150 gallon.	Each	10350.00
29-364	Same as item 29-362, but 200 gallon.	Each	13572.00
29-365	Same as item 29-362, but 300 gallon.	Each	20358.00
29-366	Same as item 29-362, but 400 gallon.	Each	27144.00
29-367	Same as item 29-362, but 500 gallon.	Each	33930.00
29-368	Same as item 29-362, but 600 gallon.	Each	41418.00
29-369	Same as item 29-362, but 800 gallon.	Each	55224.00
29-370	Same as item29-362 but 1000 gallon.	Each	69030.00
	Fire Extinguisher		
29-371	Fire Extinguisher (Portable) CO ₂ , 7 Kg capacity.	Each	4914.00
29-372	Fire extinguisher (Portable) dry powder type, 6 Kg capacity.	Each	2574.00
29-373	Fire extinguisher (Portable) dry powder type, 5 Kg capacity.	Each	1872.00
	Gas Water Heater		
29-374	Gas water heater, complete with burner, thermostat and pilot capacity 68 litres, Make " SKY FLAME ".	Each	11000.00
29-375	Same as item 29-374, but 136 lit.	Each	12500.00
29-376	Gas water heater" complete with burner, thermostat and pilot, capacity 70 lit , Make " NASGAS " Model DG 15.	Each	15375.00
29-377	Same as item 29-376 but capacity 110 lit, Model DG 30.	Each	18860.00
29-378	Same as item 29-376 but capacity 140 lit, Model DG 35.	Each	20500.00
29-379	Gas water heater, complete with burner thermostat and pilot, capacity 68 lit, Make "CORONA".	Each	16900.00
29-380	Same as item 29-379, but 117 lit.	Each	20700.00

S No	Description	Unit	Rate (Rs)
29-381	Same as item 29-379, but 157 lit.	Each	22500.00
29-382	Same as item 29-379, but 225 lit.	Each	24500.00
29-383	Gas water heater, complete with burner, thermostat etc capacity 68 lit, Make TSFA , Model TS-008.	Each	15300.00
29-384	Same as item 29-383 but 136 lit, Model TS-009.	Each	19800.00
29-385	Same as item 29-383 but 225 lit, Model TS-010.	Each	23400.00
29-386	Same as item 29-383 but 450 lit, Model TS-015.	Each	62100.00
29-387	Gas water heater complete with burner, thermostat etc capacity 68 lit, Make "MARVEL".	Each	15018.00
29-388	Same as item 29-387 but 136 lit.	Each	22227.00
	Same as item 29-387 but 225 lit.	Each	27033.00
29-389	Same as item 29-387 but 400 lit.	Each	61855.00
29-390	Gas water heater complete with burner, thermostat etc capacity 136 lit, Model AG-5130 Gold Make " Admiral".	Each	14036.00
29-391	Gas water heater complete with burner, thermostat etc capacity 225 lit, Model AG-5150 Gold Make "" Admiral".	Each	16456.00
	Gas Room Heater		
29-392	Gas room heater Complete with pilot double burner, double panel. Model (No. 202) Make " CORONA ".	Each	5500.00
29-393	Same as item 29-392, but Single burner, double panel. Model (No. 101).	Each	7150.00
29-394	Gas room heater, complete with pilot single burner, front half tamchini model (No. DG-792) Make NAS GAS .	Each	4264.00
29-395	Same as item 29-394, but full tamchini, Model (No. DG-796).	Each	6640.00
29-396	Same as item 29-394 but complete with pilot, front half tamchini Model (No. DG-793).	Each	5976.00
29-397	Same as item 29-394 but complete full tamchini, Model (No. DG-795).	Each	5084.00
29-398	Gas room heater, single burner, Make " TSFA " Model TS-001.	Each	4050.00

S No	Description	Unit	Rate (Rs)
29-399	Same as item 29-398, but double burner Model No. TS-002.	Each	6030.00
29-400	Same as item 29-398, but Single Panel, Ignition safety system, Model TS-025.	Each	8550.00
29-401	Same as item 29-398, Double Panel, Ignition safety system, Model TS-026.	Each	9000.00
29-402	Gas room heater, single burner Make "MARVEL" Model-101.	Each	5340.00
29-403	Same as item 29-402 but double burner, Model-102.	Each	7120.00
29-404	Gas room heater, single panel, Make "Admiral". Model AG-201.	Each	2964.00
29-405	Gas room heater, double panel, Make "Admiral". Model AG-402.	Each	4658.00
	Gas Burner (Chullah)		
29-406	Gas burner (Chullah) Make "NASGAS" single, small size, Model DG 107.	Each	1230.00
29-407	Same as item 29-406 but double burner tamchini, Model No. DG-109.	Each	2460.00
29-408	Gas burner (Chullah), single burner deluxe, Model No. TS-004, MAKE " TSFA ".	Each	12600.00
29-409	Same as item 29-408, but double burner, Model No. TS-005.	Each	2340.00
29-410	Gas burner (Chullah), small single burner, Model AG-I Make " SKY FLAME ".	Each	1100.00
29-411	Same as item 29-410, but Medium burner, Model AG- II.	Each	1200.00
29-412	Same as item 29-410, but double burner, Model AG- III.	Each	1800.00
29-413	Gas burner Chullah single burner medium, Make "MARVEL".	Each	1424.00
29-414	Same as item 29-413, but double burner	Each	2670.00
29-415	Gas burner Chullah single burner with tray Make " Admiral" Model AG-4011.	Each	1264.00
29-416	Gas burner Chullah double burner with tray Make "Admiral". Model AG-4013.	Each	1869.00
	Gas Cooking Range		
29-417	Cooking Range 27" 3 Burners Double door metal top complete with oven grill, rotisserie, Make " CORONA " Model C-45	Each	17600.00

S No	Description	Unit	Rate (Rs)
29-418	Cooking Range 34," 3 Burners Double door metal top complete with oven, grill and rotisserie, Model C-53.	Each	21500.00
29-419	Cooking Range 34" 5 Burners Double door metal top complete with oven grill and rotisserie Model C-60.	Each	22000.00
29-420	Cooking Range 34" 3 Burner Single door metal top complete with oven grill and rotisserie, Model C-75.	Each	24500.00
29-421	Cooking Range 34" 3 Burner Single door fully stainless steel body, timer, glass top Auto Ignition complete with oven grill and rotisserie, Model C-500.	Each	37500.00
29-422	Cooking range make "NASGAS" complete with 2 burners with oven and grill. Model DG 224.	Each	16400.00
29-423	Cooking range complete with 3 burners, oven and grill. Model DG324.	Each	21320.00
29-424	Cooking range, 5 burners double door with oven grill and rotisserie, Model SG 534.	Each	21320.00
29-425	Cooking range 2 burners 27 inch with oven and grill, Make " TSFA " Model TS 011.	Each	16650.00
29-426	Cooking range 3 burners 34 inch with oven and grill, Model TS 007.	Each	18000.00
29-427	Cooking range 5 burners 34 inch with oven and grill, Model TS 016.	Each	18900.00
29-428	Cooking range 2 burners 27 inch with Roastery, Make " MARVEL " Model MV 327.	Each	16821.00
29-429	Cooking range 3 burner's 34 inch Double door with Roaster, Model MV-318.	Each	22227.00
29-430	Cooking range 5 burner's 34 inch Double door with Roastery, Model MV-518.	Each	23429.00
29-431	Cooking range 5 burner's 34 inch Single door with Roastery, Model M-534.	Each	31229.00
29-432	Cooking range 3 burners 34 inch Single door with Roastery, Make " SKY FLAME " Model AGVI.	Each	16000.00
29-433	Cooking range 3 burner's 27 inch Single door with Roastery, Model AGVII.	Each	16500.00
29-434	Cooking range 5 burner's 34 inch Single door with Roastery, Model AGVIII.	Each	17600.00

S No	Description	Unit	Rate (Rs)
29-435	Cooking Range 27", 3 Burners with oven, Make "Admiral". Model AG-3900	Each	12705.00
29-436	Cooking Range 34", 5 Burners with oven and hot case, Make "Admiral". Model AG-5500	Each	13915.00
	Tandoor Gas Burners		
29-437	Gas burner, Heavy Duty, 48 Nozzles.	Each	1550.00
29-438	Same as item 29-437 but 40 Nozzles.	Each	1350.00
29-439	Same as item 29-437 but 32 Nozzles.	Each	1100.00
29-440	Same as item 29-437 but 24 Nozzles.	Each	850.00
29-441	Same as item 29-437 but 18 Nozzles.	Each	750.00
29-442	Same as item 29-437 but 12 Nozzles.	Each	475.00
29-443	Gas burner, STAR, heavy duty 12" (300mm) size.	Each	750.00
29-444	Same as item 29-443 but 9" (225mm) size.	Each	450.00
29-445	Same as item 29-443 but 6" (150mm) size.	Each	320.00
29-446	Plate for gas tandoor burner 2'-0" (600 mm) size.	Each	2800.00
29-447	Same as item 29-446, but 1'-6" (450 mm) size.	Each	2300.00
	Refrigerator		
29-448	Refrigerator (Pak made), 10 cft. Make" SINGER".	Each	33000.00
29-449	Same as 29-448, but 12 cft.	Each	38600.00
29-450	Refrigerator (Pak made) 10 cft, Make "PEL".	Each	33000.00
29-451	Same as item 29-450, but 10 cft,	Each	37000.00
29-452	Same as item 29-450 but 12cft, Deluxe.	Each	39800.00
29-453	Same as item 29-450 but 14cft .	Each	40000.00
29-454	Same as item 29-450 but 14cft Deluxe.	Each	450000.00
	Deep Freezer		
29-455	Deep freezer 14 cft, SINGER	Each	41900.00
	Split Unit		
29-456	Wall mounted spilt type, Air conditioner 1 Ton Capacity with 10 Rft installation Kit, Cooling only, (WAVES).	Each	30000.00
29-457	Same as item 29-456 but 1.5 Ton.	Each	39900.00
29-458	Same as item 29-456 but 2 Ton.	Each	44000.00

S No	Description	Unit	Rate (Rs)
29-459	Wall mounted spilt type, Air conditioner 0.8 Ton Cooling only, (Koolman).	Each	58800.00
29-460	Wall mounted spilt type, Air conditioner 1 Ton Cooling only, (Koolman).	Each	78500.00
29-461	Wall mounted spilt type, Air conditioner 1.5 Ton Cooling only, (Koolman).	Each	102000.00
29-462	Wall mounted spilt type, Air conditioner 2 Ton Cooling only, (Koolman).	Each	114000.00
29-463	Wall mounted spilt type, Air conditioner 0.8 Ton Heat/Cool, (Koolman).	Each	70200.00
29-464	Wall mounted spilt type, Air conditioner 1 Ton Heat/Cool, (Koolman).	Each	90600.00
29-465	Wall mounted spilt type, Air conditioner 1.5 Ton Heat/Cool, (Koolman).	Each	118800.00
29-466	Wall mounted spilt type, Air conditioner 2 Ton Heat/Cool, (Koolman).	Each	130800.00
29-467	Cassette type unit , Air conditioner 1 Ton Heat/Cool, (Koolman).	Each	127200.00
29-468	Cassette type unit , Air conditioner 1.5 Ton Heat/Cool, (Koolman).	Each	168600.00
29-469	Cassette type unit , Air conditioner 2 Ton Heat/Cool, (Koolman).	Each	186000.00
29-470	Cassette type unit , Air conditioner 2.5 Ton Heat/Cool, (Koolman).	Each	244200.00
29-471	Cassette type unit , Air conditioner 3.3 Ton Heat/Cool, (Koolman).	Each	302400.00
29-472	Cassette type unit , Air conditioner 4.2 Ton Heat/Cool, (Koolman).	Each	308400.00
29-473	Cassette type unit , Air conditioner 5 Ton Heat/Cool, (Koolman).	Each	319800.00
29-474	Ceiling and Floor Monted type unit , Air conditioner 1 Ton Heat/Cool, (Koolman).	Each	127800.00
29-475	Ceiling and Floor Monted type unit , Air conditioner 1.5 Ton Heat/Cool, (Koolman).	Each	151200.00
29-476	Ceiling and Floor Monted type unit , Air conditioner 2 Ton Heat/Cool, (Koolman).	Each	244200.00
29-477	Ceiling and Floor Monted type unit , Air conditioner 2.5 Ton Heat/Cool, (Koolman).	Each	302400.00
29-478	Ceiling and Floor Monted type unit , Air conditioner 3.3 Ton Heat/Cool, (Koolman).	Each	319800.00

S No	Description	Unit	Rate (Rs)
29-479	Ceiling and Floor Monted type unit, Air conditioner 4.2 Ton Heat/Cool, (Koolman).	Each	348000.00
29-480	Ceiling and Floor Monted type unit, Air conditioner 5 Ton Heat/Cool, (Koolman).	Each	429600.00
29-481	Ceiling Concealed / Ducted type unit, Air conditioner 1 Ton Heat/Cool, (Koolman).	Each	127200.00
29-482	Ceiling Concealed / Ducted type unit, Air conditioner 1.5 Ton Heat/Cool, (Koolman).	Each	151200.00
29-483	Ceiling Concealed / Ducted type unit, Air conditioner 2 Ton Heat/Cool, (Koolman).	Each	244200.00
29-484	Ceiling Concealed / Ducted type unit, Air conditioner 2.5 Ton Heat/Cool, (Koolman).	Each	302400.00
29-485	Ceiling Concealed / Ducted type unit, Air conditioner 3.3 Ton Heat/Cool, (Koolman).	Each	308400.00
29-486	Ceiling Concealed / Ducted type unit, Air conditioner 4.2 Ton Heat/Cool, (Koolman).	Each	319800.00
29-487	Ceiling Concealed / Ducted type unit, Air conditioner 5 Ton Heat/Cool, (Koolman).	Each	348000.00
29-488	Floor standing type unit , Air conditioner 2 Ton Heat/Cool, (Koolman).	Each	252000.00
29-489	Ceiling Concealed / Ducted type unit, Air conditioner 3 Ton Heat/Cool, (Koolman).	Each	438000.00
29-490	Ceiling Concealed / Ducted type unit, Air conditioner 4 Ton Heat/Cool, (Koolman).	Each	510000.00
29-491	Ceiling Concealed / Ducted type unit, Air conditioner 5 Ton Heat/Cool, (Koolman).	Each	522000.00
29-492	Air conditioner, Split type floor mounted metal body, 3 phase 400 Volts capacity 5 Ton Cooling only . (WAVES).	Each	350000.00
29-493	Same as item 29-492 but 10 Ton.	Each	624000.00
29-494	Same as item 29-492 but 16 Ton.	Each	1040000.00
29-495	Same as item 29-492 but 20 Ton.	Each	1300000.00
29-496	Same as item 29-492 but 25 Ton.	Each	1664000.00
29-497	Air conditioner, Split type floor mounted metal body, 3 phase 400 Volts capacity 5Ton Heat and Cool . (WAVES).	Each	410000.00
29-498	Same as item 29-497 but 10 Ton.	Each	660000.00
29-499	Same as item 29-497 but 16 Ton.	Each	1080000.00
29-500	Same as item 29-497 but 20 Ton.	Each	1350000.00
29-501	Same as item 29-497 but 25 Ton.	Each	1715000.00

S No	Description	Unit	Rate (Rs)
29-502	ACSON ceiling Cassette type Air conditioner (Reverse-able) Remote control and plasma filter 2.5 Ton Model ACK30AR/ALC30CR.	Each	152000.00
29-503	ACSON ceiling wall mounted spilt type Air conditioner (Reverse-able) Remote control and plasma filter 1.5 Ton Model AWM20GR/ALC20CR.	Each	85800.00
29-504	Same as item 29-503, but 2 Ton Model AWM25GR/ALC25CR.	Each	99000.00
29-505	ACSON ceiling wall mounted spilt type Air conditioner Remote control and plasma filter (COOLING ONLY) 1.5 Ton Model AWM20G/ALC20C.	Each	74800.00
29-506	Same as item 29-505 but 2 Ton Model AWM25G/ALC25C.	Each	88000.00
29-507	Split Air Conditioner 12000 BTU 1 Ton Make Admiral.	Each	33800.00
29-508	Split Air Conditioner 18000 BTU 1.5 Ton Make Admiral.	Each	49610.00
	Water Purifier / Filter SO Safe		
29-509	Water purifier / filter 3 stage with UVM- 9322, SO SAFE.	Each	37700.00
29-510	Water purifier / filter 3 stage, Gold, with UVM-9311 SO SAFE.	Each	25320.00
29-511	Water purifier / filter 3 stage, UV-2000, SO SAFE.	Each	5080.00
29-512	Water filter Double stage, SO SAFE.	Each	7540.00
29-513	Water filter Single stage, SO SAFE.	Each	4060.00
29-514	UV Lamp 9322.	Each	9280.00
29-515	UV Lamp 9311.G	Each	8700.00
29-516	UVM 9322 Sterilizer.	Each	21460.00
29-517	UVM 9311 Sterilizer.	Each	17400.00
29-518	Quartz sleeve 9322.	Each	6960.00
29-519	Quartz sleeve 9311.	Each	6380.00
29-520	Quartz sleeve 2000 S.	Each	2320.00
29-521	Spun Cart 10"	Each	406.00
29-522	PP Yarn cart 10" Regular.	Each	464.00

S No	Description	Unit	Rate (Rs)
29-523	PP Yarn 10" Extra winding Cart Gold.	Each	551.00
29-524	PP Yarn 10" Jumbo.	Each	1856.00
	Water Tank - Polyethylene (PE)		
29-525	Water tank polyethylene (PE) vertical 227 lits, 50 gallons capacity	Each	4550.00
29-526	Same as item 29-525 but 680 lits, 150 gallons capacity.	Each	10200.00
29-527	Same as item 29-525 but 900 lits, 200 gallons capacity.	Each	13500.00
29-528	Same as item 29-525 but 1136 lits, 250 gallons capacity.	Each	17200.00
29-529	Same as item 29-525 but 1360 lits, 300 gallons capacity.	Each	19000.00
29-530	Same as item 29-525 but 1810 lits, 400 gallons capacity.	Each	23800.00
29-531	Same as item 29-525 but 2270 lits, 500 gallons capacity.	Each	27600.00
29-532	Same as item 29-525 but 4540 lits, 1000 gallons capacity.	Each	54500.00
29-533	Same as item 29-525 but horizontal 680 lits, 150 gallons capacity.	Each	12900.00
29-534	Same as item 29-525 but 900 lits, 200 gallons capacity.	Each	17800.00
29-535	Same as item 29-525 but 1136 lits, 250 gallons capacity.	Each	23100.00
29-536	Same as item 29-525 but 1360 lits, 300 gallons capacity.	Each	26750.00
	GENERATING SETS		×C>
29-537	Diesel Generating set Elcos Brands (Made in Italy) Model GE.PK 10/9.SS 9 kw 10 KVA.	Each	1170240.00
29-538	Diesel Generating set Elcos Brands (Made in Italy) Model GE.PK 15/13.SS 13 kw 15 KVA.	Each	1254000.00
29-539	Diesel Generating set Elcos Brands (Made in Italy) Model GE.PK 21/20.SS 21 KVA.	Each	1287000.00
29-540	Diesel Generating set Elcos Brands (Made in Italy) Model GE.PK 30/26.SS 30 KVA.	Each	1408000.00

S No	Description	Unit	Rate (Rs)
29-541	Diesel Generating set Elcos Brands (Made in Italy) Model GE.PK 33/30.SS 33 KVA.	Each	1639000.00
29-542	Diesel Generating set Elcos Brands (Made in Italy) Model GE.PK 50/45.SS 50 KVA.	Each	1914000.00
29-543	Diesel Generating set Elcos Brands (Made in Italy) Model GE.PK 66/60.SS 66 KVA.	Each	2288000.00
29-544	Diesel Generating set Elcos Brands (Made in Italy) Model GE.PK 88/80.SS 88 KVA.	Each	2508000.00
29-545	Diesel Generating set Elcos Brands (Made in Italy) Model GE.PK 94/85.SS 95 KVA.	Each	2618000.00
29-546	Diesel Generating set Elcos Brands (Made in Italy) Model GE.PK 115/105.SS 115 KVA.	Each	3322000.00
29-547	Diesel Generating set Elcos Brands (Made in Italy) Model GE.PK 150/135.SS 150 KVA.	Each	4213000.00
29-548	Diesel Generating set Elcos Brands (Made in Italy) Model GE.PK 165/150.SS 165 KVA.	Each	4686000.00
29-549	Diesel Generating set Elcos Brands (Made in Italy) Model GE.PK 205/185.SS 205 KVA.	Each	5324000.00
29-550	Diesel Generating set Elcos Brands (Made in Italy) Model GE.PK 225/205.SS 225 KVA.	Each	5929000.00
29-551	Diesel Generating set Elcos Brands (Made in Italy) Model GE.PK 275/250.SS 275 KVA.	Each	6347000.00
29-552	Diesel Generating set Elcos Brands (Made in Italy) Model GE.PK 305/275.SS 305 KVA.	Each	7502000.00
29-553	Diesel Generating set Elcos Brands (Made in Italy) Model GE.PK 360/325.SS 360 KVA.	Each	7832000.00
29-554	Diesel Generating set Elcos Brands (Made in Italy) Model GE.PK 375/350.SS 375 KVA.	Each	8734000.00

S No	Description		Unit	Rate (Rs)
29-555	Diesel Generating set Elcos (Made in Italy) Model 410/375.SS 410 KVA.	Brands GE.PK	Each	9757000.00
29-556	Diesel Generating set Elcos (Made in Italy) Model 450/410.SS 450 KVA.	Brands GE.PK	Each	11176000.00
29-557	Diesel Generating set Elcos (Made in Italy) Model 500/445.SS 500 KVA.	Brands GE.PK	Each	13057000.00
29-558	Diesel Generating set Elcos (Made in Italy) Model 550/500.SS 550 KVA.	Brands GE.PK	Each	14955000.00
29-559	Diesel Generating set Elcos (Made in Italy) Model 630/570.SS 630 KVA.	Brands GE.PK	Each	16845000.00
29-560	Diesel Generating set Elcos (Made in Italy) Model 700/630.SS 700 KVA.	Brands GE.PK	Each	18550000.00
	Sky LED Light			
29-561	9 Watt LED ceiling light		Each	2025.00
29-562	12 Watt LED ceiling light	\sim	Each	2395.00
29-563	4 Watt LED down light	\sim	Each	875.00
29-564	7 Watt LED down light		Each	1550.00
29-565	7 Watt LED Bulb Light		Each	725.00
29-566	9 Watt Bulb Light		Each	1390.00
29-567	12 Watt Bulb Light		Each	1660.00
29-568	4 Watt Super panel		Each	2550.00
29-569	16 Watt super panel		Each	3450.00
29-570	7 Watt LED Bulb Light		Each	4895.00
29-571	22 Watt small panel 2x2		Each	6795.00
29-572	50 Watt Street Light-BR		Each	20500.00
29-573	80 Watt Street Light-BR		Each	27500.00
29-574	100 Watt Street Light-BR		Each	38500.00
29-575	120 Watt Street Light-BR		Each	42500.00
29-576	60 Watt Street Light-CR		Each	51600.00
29-577	70 Watt Street Light-CR		Each	61300.00
29-578	80 Watt Street Light-CR		Each	71100.00
29-579	90 Watt Street Light-CR		Each	79800.00

S No	Description	Unit	Rate (Rs)
29-580	30 Watt Flood Light	Each	5875.00
29-581	50 Watt Flood Light	Each	7595.00
29-582	80 Watt Flood Light	Each	17500.00
29-583	100 Watt Flood Light	Each	21595.00
29-584	120 Watt Flood Light	Each	24500.00
29-585	150 Watt Flood Light	Each	30500.00
29-586	3 watt ceiling Light dimmable	Each	1230.00
29-587	7 watt ceiling Light dimmable	Each	2710.00
29-588	Street Light Pole Round Conical Galavanized Iron 9metre long including "J" Bolt Set . Single Arm	Each	28500.00
29-589	Same as item 29-588 but Double Arm	Each	32250.00
29-590	Street Light Pole Octagonal Galavanized Iron 10 metre long including "J" Bolt Set . Single Arm	Each	47250.00
29-591	Same as item 29-590 but Double Arm	Each	52250.00
29-592	Street Light Pole Octagonal Conical Galavanized Iron 12 metre long including "J" Bolt Set . Single Arm	Each	54125.00
29-593	Same as item 29-592 but Double Arm	Each	54570.00
29-594	Electrech Made Cable Tray out of 16 Guage GI Sheet without cover complete in jointing plates. Cable tray size 4" x 2"	Metre	820.00
29-595	Same as item 29-594 but Cable tray size 6" x 2"	Metre	885.60
29-596	Same as item 29-594 but Cable tray size 9" x 2"	Metre	1148.00
29-597	Same as item 29-594 but Cable tray size 12" x3"	Metre	1476.00
29-598	Same as item 29-594 but Cable tray size 15" x 3" $$	Metre	1722.00
29-599	Same as item 29-594 but Cable tray size 18" x 4" $$	Metre	2066.40
29-600	Same as item 29-594 but Cable tray size 24" x 4" $$	Metre	2460.00
29-601	Electrech made Bus Tie Ducts1000ATP & N Made out of 14 SWG M.S Sheet Steel painted with electro static powder coated paint RAL-7032 Complete in all respect.	Metre	42850.00
29-602	Same as item 29-601 but 1250 ATP & N	Metre	57500.00
29-603	Same as item 29-601 but 1600 ATP & N	Metre	68600.00
29-604	Same as item 29-601 but 2000 ATP & N	Metre	105700.00
29-605	Same as item 29-601 but 2500 ATP & N	Metre	128550.00

S No	Description	Unit	Rate (Rs)
29-606	Same as item 29-601 but 3200 ATP & N	Metre	188500.00
29-607	Electrech made10 KVA ATS Panels ATP & N Made out of 14 SWG M.S Sheet Steel painted with electro static powder coated paint RAL-7032ATS Panes will be Complete in all respect and will be ready to use.	Each	85247.00
29-608	Same as item 29-608 but made15 KVA ATS Panels.	Each	91258.05
29-609	Same as item 29-608 but made 20 KVA ATS Panels.	Each	97618.05
29-610	Same as item 29-608 but made 30 KVA ATS Panels.	Each	111991.65
29-611	Same as item 29-608 but made 40 KVA ATS Panels.	Each	122167.65
29-612	Same as item 29-608 but made 50 KVA ATS Panels.	Each	1336125.65
29-613	Same as item 29-608 but made 60 KVA ATS Panels	Each	142201.65
29-614	Same as item 29-608 but made 75 KVA ATS Panels.	Each	166662.60
29-615	Same as item 29-608 but made 100 KVA ATS Panels.	Each	225318.60
29-616	Same as item 29-608 but made 125 KVA ATS Panels.	Each	271182.60
29-617	Same as item 29-608 but made 150 KVA ATS Panels.	Each	299886.60
29-619	Same as item 29-608 but made 175 KVA ATS Panels.	Each	349494.60
29-621	Same as item 29-608 but made 200 KVA ATS Panels.	Each	349494.60
29-62	Same as item 29-608 but made 250 KVA ATS Panels.	Each	386934.60
29-623	Same as item 29-608 but made 300 KVA ATS Panels.	Each	452454.60
29-624	Same as item 29-608 but made 400 KVA ATS Panels.	Each	661026.60
29-625	Same as item 29-608 but made 500 KVA ATS Panels.	Each	1394008.65
29-626	Same as item 29-608 but made 600 KVA ATS Panels.	Each	1413762.17
29-627	Same as item 29-608 but made 700 KVA ATS Panels.	Each	1473012.22

MILLITARY ENGINEERS SERVICES

SECTION -30

CALCULATION SHEET FOR CEMENT REQUIRED

S/No.	Description	Unit	Bags 50 Kg
<u> </u>	CC		
30-1	СС Туре А	Cum	8.31
30-2	СС Туре В	Cum	6.54
30-3	СС Туре С	Cum	4.57
30-4	CC (1:4:8)	Cum	3.51
30-5	CC (1:6:12)	Cum	2.40
30-6	CC (1:8)	Cum	5.07
30-7	CC (1:10)	Cum	4.16
	Solid / Hollow Block		
30-8	Solid / Hollow Blocks, Set in CM (1:6)	Cum	0.30
	a. 300mm x 150mm x 200mm (L x B x H).		
	b. 300mm x 100mm x 200mm.		
	c. 300mm x 200mm x 200mm.		
30-9	Solid / Hollow Blocks, Set in CM (1:3).	Cum	0.53
	a. 300mm x 150mm x 200mm.		
	b. 300mm x 100mm x 200mm.		
	c. 300mm x 200mm x 200mm.		
30-10	Solid/ Hollow Blocks, Set in CM (1:6)	Cum	0.36
	300mm x 200mm x 150mm.		
30-11	Solid/ Hollow Blocks, Set in CM (1:3)	Cum	0.63
	300mm x 200mm x 150mm.		\mathcal{S}
30-12	Solid/ Hollow Blocks, Set in CM (1:6)	Cum	0.26
	a. 400mm x 150mm x 200mm.		
	b. 400mm x 100mm x 200mm.		
20.42	c. 400mm x 200mm x 200mm.	C	0.40
30-13	Solid/ Hollow Blocks, Set in Civi (1:3) 2,400 mm x 150 mm x 200 mm	Cum	0.40
	b 400 mm x 100 mm x 200 mm		

CALCULATION SHEET FOR CEMENT REQUIRED

S/No.	Description	Unit	Bags 50 Kg
	c. 400mm x 200mm x 200mm.		·ı
30-14	CC Type C in wall, copings, sills etc, setting, jointing and pointing in CM (1:4).	Cum	4.84
30-15	CC Type B in wall, copings, sills etc, setting, jointing and pointing in CM (1:4).	Cum	6.81
4	Brick Work In CM		
30-16	Burnt brick work in CM (1:6), more than 6m radius.	Cum	1.40
30-17	Burnt brick work in CM (1:4) ,more than 6m radius.	Cum	1.95
30-18	Burnt brick work in CM (1:3), more than 6m radius.	Cum	2.44
30-19	Machine made brick work in CM (1:6), more than 6m radius.	Cum	1.04
30-20	Machine made brick work in CM (1:4), more than 6m radius.	Cum	1.47
30-21	Machine made brick work in CM (1:3), more than 6m radius.	Cum	1.84
30-22	Burnt brick work in CM (1:6), less than 6m radius.	Cum	1.40
30-23	Burnt brick work in CM (1:4), less than 6m radius.	Cum	1.96
30-24	Burnt brick work in CM (1:3), less than 6m radius.	Cum	2.44
30-25	Burnt brick work in Honey comb in CM (1:6).	Cum	1.01
30-26	Burnt brick work in Honey Comb, in CM (1:4).	Cum	1.21
30-27	Burnt brick work in Honey Comb, in CM (1:3).	Cum	1.51
	Pointing - Brick Work		
30-28	Pointing brick work (flush), in CM (1:3).	Sqm	0.05
30-29	Pointing brick work (flush), in CM (1:4).	Sqm	0.04
30-30	Pointing brick work (flush), in CM (1:6).	Sqm	0.03
30-31	Pointing brick work (struck), in CM (1:1).	Sqm	0.10
30-32	Pointing brick work (struck), in CM (1:2).	Sqm	0.06

CALCULATION SHEET FOR CEMENT REQUIRED

Bags 50 Kg S/No. Description Unit Stone Masonry 30-33 Random Rubble masonry, in CM (1:4). Cum 2.00 30-34 Random Rubble masonry, in CM (1:6). Cum 1.42 30-35 Pointing in CM (1:3), flush to Stone masonry. Sqm 0.07 30-36 Pointing in CM (1:4), flush to Stone masonry. Sqm 0.06 30-37 Pointing in CM (1:1), flush to Stone masonry. Sam 0.14 30-38 Doors, windows sills, steps etc, set in CM (1:4). 2.10 Sqm Tiles Facing, Machine made tiles. 30-39 Sqm 0.23 30-40 Single layer of 300mm x 150mm x 50mm, Sqm 0.033 flat brick tiles, in CM (1:3). 30-41 Same as item 30-40, but 38mm thick. Sam 0.021 Single layer of 300mm x 150mm x 50mm, 30-42 0.35 Sqm CC Type B tiles, in CM (1:3). 30-43 Two lavers of 300mm x 150mm x 50mm. Sam 0.099 flat brick tile, setting and pointing in CM (1:3). 0.16 30-44 One layer of 300mm x 150mm x 50mm flat Sqm bricks tiles bedded, jointed and pointed in CM (1:3) incl 300 x 75 x115 mm, perforated **CC Type B tiles**, set in CM (1:3). 30-45 Sqm One layer of 300x 300 x 50 mm CC Type B, 0.61 Pre cast tiles, bedded, jointed and pointed in CM (1:3), incl CC Type B perforated tiles, 300x75x100mm, set in CM (1:3),as shown

in Figure 10-2, Section-10. 30-46 13 mm thick, Stonolithic. 0.153 Sqm 30-47 20 mm thick, Stonolithic. Sqm 0.236 30-48 10 mm thick, Terrazzo (1:2). Sqm 0.214 0.266 30-49 13 mm thick, Terrazzo (1:2). Sqm White/ Coloured glazed tiles in wall / floor 30-50 Sqm 0.06 30-51 Mosaic / Marble floor tiles, laying only set Sqm 0.119 in CM (1:2). Cement Plaster. 30-52 13 mm thick, cement plaster (1:6). Sqm 0.087

CALCULATION SHEET FOR CEMENT REQUIRED

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S/No.	Description	Unit	Bags 50 Kg
30-53	13 mm thick, cement plaster (1:4).	Sqm	0.12
30-54	13 mm thick, cement plaster (1:3).	Sqm	0.15
30-55	19 mm thick, cement plaster (1:6).	Sqm	0.116
30-56	19 mm thick, cement plaster (1:4).	Sqm	0.16
30-57	19 mm thick, cement plaster (1:3).	Sqm	0.20
30-58	13 mm thick, rough cast cement plaster 1:2.	Sqm	0.155
30-59	19 mm thick, rough cast cement plaster 1:2.	Sqm	0.22
30-60	6 mm thick, rough cast cement plaster 1:2.	Sqm	0.0714
30-61	Cement slurry wash	Sqm	0.14
30-62	Surface gullies as per SI 21-19.	Each	0.67
30-63	Cleaning Eyes as per SI 21-18.	Each	0.66
	Manholes		
30-64	Manholes, not exc 600mm in depth of burnt brick work in CM (1:3) 230mm walls.	Each	5.13
30-65	Manholes, not exc 600mm in depth of CC Type C, 230 mm walls.	Each	6.95
30-66	Manholes, not exc 600mm in depth of stone masonry in CM (1:3) 300mm walls.	Each	5.40
30-67	Manholes, not exc 600mm in depth of R.C.C Type B 150 mm walls.	Each	5.70
30-68	Manholes, exc 600mm but not exc 1800 mm in depth of burnt brick work in CM (1:3) 230 mm walls.	Each	7.40
30-69	Manholes, exc 600mm CC Type C but not exc 1800 mm in depth of 230 mm walls.	Each	9.63
30-70	Manholes exc 600mm, but not exc 1800 mm in depth of stone masonry in CM(1:3) 300mm walls.	Each	8.59
30-71	Manholes exc 600mm, but not exc 1800 mm in depth of RCC Type B, 150 mm walls.	Each	9.05

SECTION 31

LABOUR RATES

These Labour Rates have been used in compiling the item rates in this Schedule and shall be used in accordance with the General Rules, where applicable.

S/No.	Description	Rate per day (Rs)
31-1	Aluminium Fixer	800.00
31-2	Black Smith	800.00
31-3	Brick-Layer (Mason)	800.00
31-4	Cabinet maker	800.00
31-5	Cable jointer	800.00
31-6	Carpenter	800.00
31-7	Carpenter boy	450.00
31-8	Chowkidar	400.00
31-9	Electrician	800.00
31-10	Fitter Mechanic	900.00
31-11	Gas Fitter	800.00
31-12	Glazier	700.00
31-13	Hammer-man	500.00
31-14	Labour	500.00
31-15	Labour Electric	550.00
31-16	Line Man	800.00
31-17	Mali	400.00
31-18	Painter	800.00
31-19	Pipe Fitter	800.00
LABOUR RATES

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S/No.	Description	Rate per day (Rs)
31-20	Plumber	800.00
31-21	Polisher / Grinder	800.00
31-22	Roof Tiler	800.00
31-23	Sanitary Worker / Khakrob	500.00
31-24	Sawyer	650.00
31-25	Sign-Writer	750.00
31-26	Stone Breaker	500.00
31-27	Stone Mason	800.00
31-28	Supervisor	700.00
31-29	Tile Fixer (for floor and wall tiles work, any type, glazed / unglazed, ceramic, porcelain, marble, granite, vinyl etc).	1000.00
31-30	Tin smith	900.00
31-31	Up-holster	800.00
31-32	Welder	800.00
31-33	Well Sinker - In charge	750.00
31-34	Wire man	800.00
31-35	X-Ray Welder	1000.00
		2.1

S. No	Description	Page Reference
	SECTION - 1	
1	Excavation	1,5,14,15,16
2	Classification of Excavations	1,14
3	Classification of Soils	7
4	Borrow pit	1,15,16
5	Measures (Solid, Loose, Packed, Conversion factors)	3
6	Compaction, Ramming Earth	4,9,15,16
7	Survey and Setting out profiles	4
8	Measurement - Excavation and Earth work	4,5
9	Earth filling under Floors / Area	5,15
10	Earth filling	15
11	Transportation of Spoils and Materials, Lead	5, 15
12	Stripping	7
13	Removal of trees	5,7
14	Clearing and Grubbing	7, 12,16
15	Making Embankment	7,11, 12,16
15-1	- Formation of Embankment with Borrow Excavation	10
15-2	- Formation of Embankment on Steep Slopes	10
15-3	- Formation of Embankment on Existing roads	11
15-4	- Formation of Embankment in Waterlogged areas	11
16	Compaction of Natural Ground	9,16
17	Formations from Borrow Excavations, Roadway Excavations and Structural Excavations	12,13,16
	SECTION - 2	
18	Roads, Hard standings, Landing grounds	17
19	Sub Base	17, 51
19-1	- Sub Base – Granular	17, 51
19-2	- Sub Base - Soil Aggregate (Ghera)	18, 51
20	Base	18, 51
20-1	- Base – Aggregate Base course	18, 51
20-2	- Base – Water Bound Macadam (WBM)	20, 51
21	Bituminous Surface Treatment	22,51, 52, 53
22	Asphaltic Materials for Surface treatment	23
23	Procedure for Bituminous Surface Dressing	26
24	Premix Carpet (Bit-Mac)	27, 55,
24-1	- Hot Bitmac	27, 55

24-2	- Quantity of material for Premix Carpet (Bit Mac)	28
24-3	- Cold Bitmac	31, 55
25	Prime / Tack / Seal Coat	33, 57
S. No	Description	Page Reference
26	Asphaltic Courses (Plant Mix)	35, 56
26-1	- Asphaltic Base Course	35, 56
26-2	- Asphaltic Wearing Course	39, 56
27	Concrete Pavements – Roads, Hard standings, Landing grounds	43, 57
28	Formation	43
29	Cut / fill	50
30	Compaction	50
31	Bottoming / Sub Base	51
32	Rapid Runway Repairs	44, 57
33	Joint Sealants / Fillers	44,45
34	Asphalt Wearing Course for runways / taxi ways	45
35	- Pot holes	29, 47, 54
35-1	- Expansion Joints	44, 58
35-2	- Sand cushion	57
	SECTION - 3	
36	Classification of Concrete	59
36-1	- Normal Concrete	59,66, 80, 81,82
36-2	- Special Concrete	60, 67
37	Material Requirements	60
37-1	- Aggregates	61, 62, 87
37-2	- Water	63, 75
37-3	 Cement (Types and Properties) 	60
37-4	- Admixture	63
38	Sulfate Resistant Cement	61
39	Mix Design – Concrete	65
39-1	- Water – Cement Ratio	65
39-2	- Minimum Cement	65
40	Weigh batched Concrete	67, 79, 82
41	Handling, Placing, Depositing	67,68,69
42	Curing Concrete	69
43	Testing of Concrete	70
44	Reinforced Concrete	64,72,81,82
45	Pre-stressed Concrete	64,72,82
46	Construction and Expansion Joints	71, 86
47	Pre cast Concrete	72, 83
47-1	- Concrete Blocks	72,83,84,85

47-2	- Kerbs, Jali etc	74,85,86
48	Form work	74
	SECTION - 4	
49	Brick Masonry	87, 89, 92,93,94
50	Bricks (Type, sizes, properties)	87, 89,
S. No	Description	Page Reference
50-1	- Brick work (Burnt bricks)	88, 92,93,94,95
50-2	Brick work (Machine made bricks)	88, 94
51	Mortar (Cement , Mud)	89
52	Pointing	89, 96
53	Brickwork in Arches	89, 90, 96
54	Brickwork in Cavity wall	89, 90, 96
55	DPC	90, 97
	SECTION – 5	
56	Stone Masonry	99,103,106
57	Properties of Stones	99
58	Stone Walling	100,106
59	Random Rubble brought upto Courses	100,106
60	Squared Rubble – un Coarsed	101,106
61	Squared Rubble - Coursed	101,106
62	Block in Course and Ashlars	102,106
63	Dressed stone work	102,107
64	Pointing- stone masonry	103,104,107
65	Boulders in Crates, Pitching etc	107
	SECTION - 6	
66	Wood work	109, 114, 115
67	Timber	109
68	Classification of Timber	109, 110
69	Sawn, un sawn, logs & ballies, wrought timber	109, 118
70	Plywood, Malaysian ply	110,117
71	Seasoning of Timber	110
72	Boarding (Hard / Soft), Chip board, Formica etc	111, 115,116,117
73	Timbering	112
74	Shoring	114
75	Old Roof Trusses	118
76	Trellis work, Moulding and Turned work	118
77	Jobbing work	119
	SECTION -7	
78	Doors & Windows	121
79	Frames and Chowkats	121,133
80	MDF	121,142

81	Glass	121, 143, 144
82	Wooden Doors	122, 140,141
82-1	- Panelled Doors	122,140
82-2	- Framed Panelled Partitions & Dados	122
82-3	- Half glazed doors	122, 148
82-4	- Flush doors (Solid, Hollow)	122, 141,142
82-5	- Hold fasts	122
S. No	Description	Page Reference
82-6	- Preservatives	122
82-7	- Mongery	124,159, 160
83	Aluminium Doors & Windows	125, 135, 136,137,138, 143
83-1	- Sliding / Swing Doors	125,143, 144
83-2	- Sliding/ Fixed Windows	125,135,136,137
83-3	- Fly Screens	126, 144
83-4	- Standard Hardware	126
84	u PVC. Doors & Windows	126.128.151
85	"Z" Type Steel Windows	127. 139
86	Steel Chowkats	127, 129, 150
87	Dolly Frame Chowkats	151
88	Kitchen Cabinet	127,130,149
89	Box Type Windows	131, 140.
90	Jobbing Work – Doors / Windows	145
91	Glass Partition and Door	152
	SECTION - 8	
92	Mongery	153 154 155
93	Tower bolts	156, 157
94	Hinges, Spring Hinges	157, 158, 159
95	Latches	160
96	Locks (Rim , Ordinary cup board, furniture))	160
97	Cleats (Belaying, Hinges)	161, 163
98	Eyes, Screws	161, 165
99	Catches - Spring	161
100	Fasteners – Cock spur	162
101	Pivot & Sockets	162
102	Casement Stays	163
103	Handles	163
104	HOOKS	166
105	NIUUS Hasn & Stanle	166
107	Springs for Doors, Door Closer	159,166

108	Push & Kick plates	167,168
109	Aluminum Door - Locks & Closers	168
	SECTION - 9	
110	Plain & Corrugated Steel Sheets	169, 184
111	Galvanizing	169, 183
112	CI Casting	169, 183
113	Steel & Iron	169
114	Pre stressing Steel	170,173,174,175,176,177
115	High Strength Alloy Steel bars	171
116	Nut Bolts, Rivet etc	171
S. No	Description	Page Reference
117	XPM	172, 184
118	Steel Reinforcement	173, 183
119	Structural Steel work	180
120	General Steel work	181
121	Welding	182
122	CI work	183
123	Wire for Fencing	186
124	Woven wire	186
125	Concertina coil	188
126	Razor wire	188
	SECTION - 10	
127	Roof Coverings & Treatments	189, 199
128	AC / FC sheets	190, 203
129	Plain / Corrugated sheets (MS, GI etc)	189,190, 202
130	Naini Tal Pattern Roofing	190,201
131	Roof Treatments	192, 206
131-1	- Bitumen Felts	192, 205
131-2	- Building Papers	192, 206
131-3	- Membranes	192, 206
132	Roof Insulations	196, 205
132-1	Brick Tiles	196, 205
132-2	Cement Tiles	196, 205
132-3	Poly Extruded Board (like Jambolon etc)	207
133	Aluminium sheets	201
134	Rain Water pipes / Guttering	204
135	Mud Roofs	205
	SECTION - 11	
136	Termite Treatment	209, 210
	SECTION - 12	
137	Flooring	211

137-1	- Stonolithic	211, 216
137-2	- Terrazo	211, 216, 225
137-3	- Terrazo (Mosaic) Tiles	211, 216, 228
137-4	- Glazed / un-Glazed / Ceremic / Porcelain Tiles	211, 217, 226, 227, 232
137-5	- PVC Tiles	212, 230
137-6	- Marble Tiles	212, 217, 228
137-7	- Granite Tiles	212, 217,231
137-8	- Sub Floors	223
137-9	- Floors	223
138	Wall Cladding	212, 217,231
138-1	- Face Tiles / Artificial Stone	246,230,
138-2	- Aluminium Composite Panels	212, 231
S. No	Description	Page Reference
139	Wall Panelling (Wood, Aluminium, uPVC etc)	217,231
140	Parquet Wooden Tile flooring	212, 217, 230
141	Paving Stones	212, 213, 214, 215, 219, 224
142	Screed on Bond Breaking Layer	221, 230
143	Sodium Silicate Application	221
144	Flush Pointing	229
145	Floor Toping	229
146	Floor Polishing	226
147	Floor Grinding	226
148	Border Tiles	228
149	Plinth Protection	231
	SECTION - 13	
150	Plastering	233
151	Plaster (Cement, Gypsum, mud)	233, 234, 236, 237
152	Rough Cast Plaster	236
153	Scraping Plaster	237
154	Filleting	237
155	Dubbing out	234
	SECTION - 14	<u> </u>
156	Ceiling & Paneling	239
157	AC / FC Sheets	239, 241
158	Hard Board	239, 242
159	Soft Board	239, 242
160	Chip Board	239, 242
161	Thermopore	239, 243
162	Dampa Sheets	239, 240, 242
163	Fibre / Gypsum / Mineral Acoustic Sheets	239, 240, 242, 243, 244

164	POP	239, 240, 244
165	PVC, uPVC	239, 240, 244
166	MDF	239, 240, 245
	SECTION - 15	
167	SECTION - 13	245
169		245
160	Coment Oil Reint	245, 255
170		245, 255
170	Whiteping	245, 255
171		245, 255
172	Deinting	245, 255
173 1	Painting Wood work	247, 254, 256
173-1	- Painting – Wood work	254, 255
173-2	- Painting- Steel and Iron Work	250, 256
S. No	Description	Page Reference
173-3	- Aluminium Painting	257
174	Oiling Woodwork	247, 253,
175	Camouflage Paint	247, 259
176	Epoxy Coating/ paint for POL Tanks	247, 251, 259
177	Weather Resistant Paint	248, 258
178	Wall paper	247, 250, 259
179	Wall Coatings	247, 260
180	Acrylic Based Paint	247, 251
181	Textured Coatings(Roll on, Zola, Graffito etc)	247, 260
182	Wood Preservatives	248
183	Tarring	249, 254
184	Painting on Plastered Wall- Alkali Resistant Paint	257
185	Burning Old Paint	258
186		258
187	Road Marking Paint	258
	SECTION - 16	
188	Glazing	261, 263
189	Putty	261
190	Sheet Glass (Plain, Frosted, Tinted)	261, 263
191	Plate Glass (Plain, Frosted, Tinted)	261, 262, 263
192	Glass Blocks / Tiles (Plain, Coloured)	261, 262, 264
193	Fixing Sheet Glass	261, 263
194	Tempered Glass	264
195	Hacking out	264
	SECTION - 17	
196	Sanitary Wares and Fittings	265

197	Sanitary Ware	265
198	Sanitary Fittings	265
199	Traps	265
200	Workmanship	266
201	Joints	266, 267
202	Ceramic Sanitary Ware (Pak made / Imported)	269
203	WC, Urinal	269, 270, 271
204	Bath Tubs	272
205	Sink Scullery	272
205	Shower Tray	273
206	Bidet	274
207	WHB	274
208	Mirror	275
209	Bath Accessories	275
210	Vanity Bowl	277
211	WC Seat Cover	278

S. No	Description	Page Reference
	SECTION - 18	
211	Water Supply, Pipes / Fittings (GI, MS, uPVC, PPR, PE)	279, 299,
212	GI/ MS, Water Quality Pipes	279, 299,300,301
213	GI Fittings, Sockets, Bends, Elbows, Tees, Check nut, Plugs, Bib cocks, Lavatory cocks etc	302, 305, 306,308
214	Sluice Valves	280, 310
215	Other Valves / Brass Spindle	309, 310,314, 315
216	Water Meters	282, 309
217	uPVC, Pipes and Fittings	285,318
218	PPR, Pipes and Fittings	293, 335
219	PE, Pipes and Fittings	295, 327
220	Laying u PVC pipes	288
221	Back filling	296
222	Plumber's Brass work	297
223	Canvas Pipe	318
224	Disinfection of Water Supply System	298
225	Testing of Water Supply System	298
226	Fire Hydrant	313
227	Flanges	313
228	Water Tanks (Fibre Glass, PE)	298, 315, 316
229	Water Coolers	298, 316
230	Water Filters	298, 317
231	FRP Fuel Pipe & Fitting	342, 343

	SECTION - 19	
232	Water Supply - Installations	345
233	Blind Pipes and Casing	345
234	Strainers / Filters	345
235	Water Supply Pumping sets	345
236	Chlorinators	345
236-1	- Standard Chlorinators	345, 355
236-2	- Hypo-Chlorinators	345, 356
237	Chlorine Gas Cylinder	346, 357
238	Tube Well Drilling / Boring	346, 349
237-1	- Hydraulic Drilling	346
237-2	- Percussion Drilling	346
239	Trial Bore	347
240	Well Development	347, 351
241	Well Sterilization	347, 351
242	Well Measurement	347
243	Centrifugal pumps	348
244	Deep well Turbines	351
245	Submersible Pumps	354

S. No	Description	Page Reference
246	Reciprocating Pumps	357
247	Motor-Electric	357
248	Extra Column pipes	353
249	Disinfection of Water Pipelines	358
250	Sluice Valves (Oil Quality)	358
250.1	Mono Block Pumping Set	358
	SECTION - 20	
251	Soil, Waste & Ventilation (SWV)	359, 363,36 <mark>4,365</mark>
252	CI Pipes (SWV) Sand Cast and Fittings	363
253	CI Pipes (SWV) Spun and Fittings	359, 365, 366, 367
254	Inlet Ventilation	360
255	u PVC (Non Pressure type like NAKASI) SW pipe and Fittings	360, 367
256	u PVC Vent Pipes and Fittings	360, 367, 368, 369, 370, 371
	u PVC - Jointing Techniques	361
	SECTION - 21	
257	Drainage / Sewage	373
258	RCC Pipes (BSS)	373, 382
259	RCC Pipes (ASTM)	373, 375,382

260	Sludge Pumps	377, 386
261	Submersible Pumps (for drainage, fountains, de-watering)	377
262	Laying of RCC Pipes	378
263	Interception Chambers	379
264	Gullies	379, 383
265	Manholes	379, 381, 383
266	Manhole Covers	380, 384
267	Testing of Drains / Pipes (Smoke Test etc)	380, 383
268	Sinking of Well	384
269	Taking up Glazed pipes	385
	SECTION - 22	
270	Pre Engineered Construction	387, 390
271	Pre cast Conventional Roofing System	387, 388, 389
272	Pre cast Concrete Boundary Wall system	387, 389, 392, 393, 394, 395, 409
273	Single / Double Tee beam	387,396,397,398,399, 408
274	Pre Cast Inverted 'T" and "L" beams	387,400,401,402,403 ,408, 409
275	Precast Girders	388, 4 07
276	Precast Slabs	389, 407
277	Pre Engineered Construction System	390
278	Pre Cast / Pre- Engineered Structures	390
279	High Tensile Carbon Reinforcement	388
279 280	High Tensile Carbon Reinforcement	388 390, 404,410
279 280 S. No	High Tensile Carbon Reinforcement Steel "K" Span Description	388 390, 404,410 Page Reference
279 280 S. No	High Tensile Carbon Reinforcement Steel "K" Span Description SECTION - 23	388 390, 404,410 Page Reference
279 280 S. No 281	High Tensile Carbon Reinforcement Steel "K" Span Description SECTION - 23 Demolition & Dismantling	388 390, 404,410 Page Reference
279 280 S. No 281 282	High Tensile Carbon Reinforcement Steel "K" Span Description SECTION - 23 Demolition & Dismantling Demolition / Dismantling	388 390, 404,410 Page Reference 411 411
279 280 S. No 281 282 283	High Tensile Carbon Reinforcement Steel "K" Span Description SECTION - 23 Demolition & Dismantling Demolition / Dismantling Damage	388 390, 404,410 Page Reference 411 411 411
279 280 S. No 281 282 283 284	High Tensile Carbon Reinforcement Steel "K" Span Description SECTION - 23 Demolition & Dismantling Demolition / Dismantling Damage Cutting Opening through Wall	388 390, 404,410 Page Reference 411 411 411 411, 413
279 280 S. No 281 282 283 284 285	High Tensile Carbon Reinforcement Steel "K" Span Description SECTION - 23 Demolition & Dismantling Demolition / Dismantling Damage Cutting Opening through Wall Demolition of Concrete	388 390, 404,410 Page Reference 411 411 411 411, 413 413
279 280 S. No 281 282 283 284 285 286	High Tensile Carbon Reinforcement Steel "K" Span Description SECTION - 23 Demolition & Dismantling Demolition / Dismantling Damage Cutting Opening through Wall Demolition of Concrete Demolition of Wall , Foundations	388 390, 404,410 Page Reference 411 411 411 411 411 413 413
279 280 S. No 281 282 283 284 285 286 287	High Tensile Carbon Reinforcement Steel "K" Span Description SECTION - 23 Demolition & Dismantling Demolition / Dismantling Damage Cutting Opening through Wall Demolition of Concrete Demolition of Wall , Foundations Removing Mud from roof	388 390, 404,410 Page Reference 411 411 411 411 411 413 413 413
279 280 S. No 281 282 283 284 285 286 287 288	High Tensile Carbon Reinforcement Steel "K" Span Description SECTION - 23 Demolition & Dismantling Demolition / Dismantling Damage Cutting Opening through Wall Demolition of Concrete Demolition of Wall , Foundations Removing Mud from roof Demolition of Floors	388 390, 404,410 Page Reference 411 411 411 411 411 411 413 413 413
279 280 S. No 281 282 283 284 285 286 287 288 289	High Tensile Carbon Reinforcement Steel "K" Span Description SECTION - 23 Demolition & Dismantling Demolition / Dismantling Damage Cutting Opening through Wall Demolition of Concrete Demolition of Wall , Foundations Removing Mud from roof Demolition of Floors Demolition of Wood work	388 390, 404,410 Page Reference 411 411 411 411 411 411 411 411 413 413 413 414
279 280 S. No 281 282 283 284 285 286 287 286 287 288 289 290	High Tensile Carbon Reinforcement Steel "K" Span Description SECTION - 23 Demolition & Dismantling Demolition / Dismantling Damage Cutting Opening through Wall Demolition of Concrete Demolition of Wall , Foundations Removing Mud from roof Demolition of Floors Demolition of Iron and Steel	388 390, 404,410 Page Reference 411 411 411 411 411 413 413 413 414 414
279 280 S. No 281 282 283 284 285 286 287 288 289 290 291	High Tensile Carbon Reinforcement Steel "K" Span Description SECTION - 23 Demolition & Dismantling Demolition / Dismantling Damage Cutting Opening through Wall Demolition of Concrete Demolition of Concrete Demolition of Wall , Foundations Removing Mud from roof Demolition of Floors Demolition of Floors Demolition of Iron and Steel Dismantling of Roof	388 390, 404,410 Page Reference 411 411 411 411 411 413 413 413 414 415
279 280 S. No 281 282 283 284 285 286 287 288 289 290 291 292	High Tensile Carbon Reinforcement Steel "K" Span Description SECTION - 23 Demolition & Dismantling Demolition / Dismantling Damage Cutting Opening through Wall Demolition of Concrete Demolition of Concrete Demolition of Wall , Foundations Removing Mud from roof Demolition of Floors Demolition of Floors Demolition of Vood work Demolition of Iron and Steel Dismantling of Roof Taking down Plumbing and Drain	388 390, 404,410 Page Reference 411 411 411 411 411 413 413 413 413 413 414 415 416
279 280 S. No 281 282 283 284 285 286 287 288 289 290 291 292 293	High Tensile Carbon Reinforcement Steel "K" Span Description SECTION - 23 Demolition & Dismantling Demolition / Dismantling Damage Cutting Opening through Wall Demolition of Concrete Demolition of Wall , Foundations Removing Mud from roof Demolition of Floors Demolition of Iron and Steel Dismantling down Plumbing and Drain Miscellaneous Demolition	388 390, 404,410 Page Reference 411 411 411 411 411 411 413 413 413 413 414 415 415
279 280 S. No 281 282 283 284 285 286 287 288 289 290 291 292 293	High Tensile Carbon Reinforcement Steel "K" Span Description SECTION - 23 Demolition & Dismantling Demolition / Dismantling Damage Cutting Opening through Wall Demolition of Concrete Demolition of Wall , Foundations Removing Mud from roof Demolition of Floors Demolition of Iron and Steel Dismantling of Roof Taking down Plumbing and Drain Miscellaneous Demolition SECTION - 24	388 390, 404,410 Page Reference 411 411 411 411 411 411 411 411 413 413 413 413 414 415 416 415
279 280 S. No 281 282 283 284 285 286 287 288 289 290 291 292 293 293	High Tensile Carbon Reinforcement Steel "K" Span Description SECTION - 23 Demolition & Dismantling Demolition / Dismantling Damage Cutting Opening through Wall Demolition of Concrete Demolition of Wall , Foundations Removing Mud from roof Demolition of Floors Demolition of Iron and Steel Dismantling of Roof Taking down Plumbing and Drain Miscellaneous Demolition SECTION - 24 Internal Electrification	388 390, 404,410 Page Reference 411 411 411 411 411 411 411 411 411 411 413 413 413 413 414 415 416 415 417

296	Material Specifications	417
297	Siting of Electrical Equipment in Buildings	418
298	Mounting of Fittings and Accessories	418
299	Wiring	434, 477
299-1	- Open Wiring on Batten	434,443, 464
299-2	- PVC Conduit Wiring	418, 438
299-3	- Surface Conduit Wiring	420, 438
299-4	- Concealed Conduit Wiring	420, 438
299-5	 Flame proof Conduit wiring 	421, 434, 444
299-6	- Point Wiring	423,
299-7	- External Wiring	423
300	PVC Sheathed Wiring	422
301	Main Control	423
302	Earth Neutral Conductor	424
303	Portable Appliances	424
304	Earthing	424,451,452
305	Meters – Electric	425, 452
306	Switch Connections	426
307	Bus Bar Trunking	426, 461
308	Bus Bar Chamber	461
309	Lightning Conductor	427, 430,452
1.510		428
311	Samples	128
311	Samples Fittings & Accessories for Pendants	428
311 312 313	Samples Fittings & Accessories for Pendants Brackets	428 446 447
311 312 313	Samples Fittings & Accessories for Pendants Brackets	428 446 447
311 312 313 S. No	Samples Fittings & Accessories for Pendants Brackets Description	428 446 447 Page Reference
311 312 313 S. No 314	Samples Fittings & Accessories for Pendants Brackets Description Lamp holder	428 446 447 Page Reference 447
311 312 313 S. No 314 315	Samples Fittings & Accessories for Pendants Brackets Description Lamp holder Shades	428 446 447 Page Reference 447 447
311 312 313 S. No 314 315 316	Samples Fittings & Accessories for Pendants Brackets Description Lamp holder Shades Fluorescent Light Fittings	428 446 447 Page Reference 447 447 447, 448
311 312 313 S. No 314 315 316 317	Samples Fittings & Accessories for Pendants Brackets Description Lamp holder Shades Fluorescent Light Fittings Switches and Sockets	428 446 447 Page Reference 447 447 447 447 449
311 312 313 S. No 314 315 316 317 318	Samples Fittings & Accessories for Pendants Brackets Description Lamp holder Shades Fluorescent Light Fittings Switches and Sockets Bulk Head Fittings	428 446 447 Page Reference 447 447 447, 448 449 451
311 312 313 S. No 314 315 316 317 318 319	Samples Fittings & Accessories for Pendants Brackets Description Lamp holder Shades Fluorescent Light Fittings Switches and Sockets Bulk Head Fittings Switch Fuses	428 446 447 Page Reference 447 447 447, 448 449 451 455
311 312 313 S. No 314 315 316 317 318 319 320	Samples Fittings & Accessories for Pendants Brackets Description Lamp holder Shades Fluorescent Light Fittings Switches and Sockets Bulk Head Fittings Switch Fuses HRC Fuses	428 446 447 Page Reference 447 447 447 447 447 447 449 451 455 457
311 312 313 S. No 314 315 316 317 318 319 320 321	Samples Fittings & Accessories for Pendants Brackets Description Lamp holder Shades Fluorescent Light Fittings Switches and Sockets Bulk Head Fittings Switch Fuses HRC Fuses MCCB	428 446 447 Page Reference 447 447 447 447 447 447 447 451 455 457 457
311 311 312 313 S. No 314 315 316 317 318 319 320 321 322	Samples Fittings & Accessories for Pendants Brackets Description Lamp holder Shades Fluorescent Light Fittings Switches and Sockets Bulk Head Fittings Switch Fuses HRC Fuses MCCB Board Distribution	428 446 447 Page Reference 447 447 447 447 447 447 447 447 455 455
311 312 313 S. No 314 315 316 317 318 319 320 321 322 323	Samples Fittings & Accessories for Pendants Brackets Description Lamp holder Shades Fluorescent Light Fittings Switches and Sockets Bulk Head Fittings Switch Fuses HRC Fuses HRC Fuses MCCB Board Distribution Cut outs - IC	428 446 447 Page Reference 447 447 447 447 447 447 447 447 447 451 455 457 457 459 460
311 312 313 S. No 314 315 316 317 318 319 320 321 322 323 324	Samples Fittings & Accessories for Pendants Brackets Description Lamp holder Shades Fluorescent Light Fittings Switches and Sockets Bulk Head Fittings Switch Fuses HRC Fuses HRC Fuses MCCB Board Distribution Cut outs - IC Blocks- Hardwood	428 446 447 Page Reference 447 447 447 447 447 447 447 447 447 447 451 455 457 459 460 462
311 311 312 313 S. No 314 315 316 317 318 319 320 321 322 323 324 325	Samples Fittings & Accessories for Pendants Brackets Description Lamp holder Shades Fluorescent Light Fittings Switches and Sockets Bulk Head Fittings Switch Fuses HRC Fuses HRC Fuses MCCB Board Distribution Cut outs - IC Blocks- Hardwood Conduits	428 446 447 Page Reference 447 447 447 447 447 447 447 447 447 447 447 447 447 451 455 457 457 459 460 462
311 311 312 313 S. No 314 315 316 317 318 319 320 321 322 323 324 325 326	Samples Fittings & Accessories for Pendants Brackets Description Lamp holder Shades Fluorescent Light Fittings Switches and Sockets Bulk Head Fittings Switch Fuses HRC Fuses MCCB Board Distribution Cut outs - IC Blocks- Hardwood Conduits Fan work	428 446 447 Page Reference 447 455 457 457 459 460 462 465

328	Heater – Electric	467
329	Geyser - Electric	476
330	Rewinding	468
331	Starters	469
332	Flame proof Fittings	453
333	Exhaust Fans	473
334	Lawn / Garden Lights	479
335		-
336	Air Compressors	474
337	Pumping set for fuel	475
338	Flood Lights	475, 479
339	Change over Switch	455
340	Circuit Breakers	457
341	Energy Saver Bulbs	478
342	Mechanical Replacement Indicator	465
343	Bell Push / Electric, Buzzer	464
344	Box / Board Junction	470
	SECTION - 25	
345	External Electrification	481
346	Electrical Standards	481
347	Equipment	481, 486
348	Aerial Line	486
348-1	- Height from Ground	486
348-2	- Earthing of Metal Supports	487
S. No	Description	Page Reference
348-3	- Factor of Safety	487,488
348-4	- Line Crossing or Approaching Each other	488
348-5	Protection from Lightning	488
249.7	- Spacing of Conductors	409
348-8	- Conductors of Different Pressure – Same support	400
040 0	Din	480
348-9	- Dip	489
348-9 348-10	Dip Sag Steel Tubular Poles	489 489 489 505 506 516
348-9 348-10 348-11	Dip Sag Steel Tubular Poles Lattice Steel Poles ('L' Type and 'H' Type)	489 489 489, 505,506,516 496, 510, 511, 517
348-9 348-10 348-11 348-12	Dip Sag Steel Tubular Poles Lattice Steel Poles ('L' Type and 'H' Type) Stringing of Conductors	489 489 489, 505,506,516 496, 510,511,517 497
348-9 348-10 348-11 348-12 348-13	Dip Sag Steel Tubular Poles Lattice Steel Poles ('L' Type and 'H' Type) Stringing of Conductors Testing of Overhead Line, Sample Tests	489 489 489, 505,506,516 496, 510,511,517 497 493, 495, 496
348-9 348-10 348-11 348-12 348-13	 Dip Sag Steel Tubular Poles Lattice Steel Poles ('L' Type and 'H' Type) Stringing of Conductors Testing of Overhead Line- Sample Tests 	489 489, 505,506,516 496, 510,511,517 497 493, 495, 496

349-1	- Excavation of Trenches	498
349-2	- Laying of Cables	498
349-3	- Jointing of Cables	499
349-4	- Crossing Roads, Pavements, Culverts, Bridges	499
349-5	- Tests	503
350	Siting of External Services to Important Buildings	503
351	Stays, stay wires	498, 519, 531
352	Copper Conductors	521
353	Aluminium Conductors	520
342	Cable Electric – HT, LT	521, 522
343	PVC Joints	526
344	PVC Termination Kit	502, 528
349	Non Climbable Device	487, 512, 529
350	Lightning Arrestor	530
351	Service Connection	530
353	Steel Box – Main Switch	513, 531
354	Fuse – Aerial	531
355	Guards	532
356	Jumprings	532
357	Power Transformer	533, 534
358	Current Transformer	536
359	Potential Transformer	535
360	HT Switch Gear	483, 535
361	Voltage Regulator (AVR etc)	537
362	Road / Street Lights	537
363	Road Light Accessories	538

S. No	Description	Page Reference
364	Earth for Transformer	486, 537
365	VCBs	539
366	Feeder Pillar Cabin	540
	SECTION – 26	
367	Natural Gas	541
368	High Pressure Gas Pipe work	543,546,556
369	Low Pressure Gas Pipe work	544, 546
370	Medium Density Poly Ethylene, High Pressure Gas Pipe, (MDPE)	544, 547

371	Jointing of MDPE Pipe	560
371-1	- Butt Fusion	543, 547
371-2	- Electro Fusion	545, 548, 561
372	Location of Gas Points	551
373	Location of Gas Appliances	549
374	Sizing of House Pipes	550
375	House Piping Installation	550
376	Multiple Meter Installation	550
377	Underground Piping	551
378	Concealed Piping	551
379	Checking for Leakage	553
380	Shut off Valve/ Cock	551, 556
381	- Meter Control Cock	551
382	- Manifold Cock	551
383	Gas Room Heaters	552, 558
384	Gas Water Heaters	552, 558
385	Inspection, Testing of Gas Lines	553
386	MS Pipe work	543, 556
387	MDPE Pipe work	544, 560
388	Gas Valves / Cocks	545, 556
389	Tandoor / Burner	557
390	Gas Burner (Chullah)	558
391	Gas Cooking Range	558
392	Sui Gas Meter	559
393	Thermostat	559
394	Muller Tee	559
394	Miscellaneous	559
	SECTION – 27	
395	HVAC	563
396	GI Ducting	563
397	Diffusers	563, 570
398	Gate Valve	563
S. No	Description	Page Reference
399	GI Sheet Metal Duct	563-569
400	Ducts Joints	563
401	Bracing	564
402	Bottom Support	564
403	Hanger	564
404	Table Insulation for Duct	565
405	Balancing Valve	570

406	Non-Return Valve	570
407	Y Strainer	571
408	Automatic Air Vent Valve	571
409	Installation AC Unit	571
410	Electric Water Cooler	572
	1,	
	X P L	
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