

UN Common Services

UN City Refurbishment Projects
Access Doors

General Specifications

ACC-ARUP-ZZ-XX-SP-A-0001

Issue | 9 februar 2021

This report takes into account the particular instructions and requirements of our Employer.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number 267199-30

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1 Introduction

This specification document shall be read in conjunction with the other specifications and the rest of the contract documents.

Unless stated otherwise, the Contractor shall prepare the construction and carry out the construction, testing, commissioning and handover as required and described by each provision of this specification and its appendices, whether the provision is written as an obligation of the Contractor or is stated in the imperative form.

1.1 The Project

The project consists of a new internal partition wall with telescope doors in the western part of the main lobby at United Nations (UN) City in Copenhagen, Denmark.

This Project includes:

- Demolition works
- Installation of a vestibule with two sets of telescopic doors and glass wall partitions. This covers an area of approx. 25m² and is located at the ground floor.

1.2 General Scope

The Contractor is responsible for the preparation of the demolition the construction, testing, commissioning, and handover of the scope of work described in this specification.

The Contractor shall take full responsibility for the elements and components included in this document.

The Contractor shall undertake all procurement and construction activities:

- in accordance with the standards outlined in this specification and all other appendices to the Contract.
- in compliance with all applicable codes and laws.
- having regard for the concerns, need and interests of:
 1. all persons who will be facility users
 2. all authorities having jurisdiction
 3. the neighbouring properties and users
- in accordance with good industry practice.

The Contractor shall obtain all necessary approvals and directions from UN and shall comply with all requirements accordingly. The Contractor shall coordinate all works and provide all relevant technical information, calculations, samples, finishes, performance data and other details.

The Contractor is responsible for actively co-ordinating with its subcontractors and suppliers to ensure adherence to this technical specification and all requirements specified in the contract documents.

1.3 Codes and standards

Unless expressly stated otherwise, each reference to a code or standard in this document shall mean the latest version of that code or standard.

Compliance with the codes and standards noted in this document is mandatory. This includes any other codes and standards applicable to the project and the respective scope of work even if not listed in the contract documentation, whether noted in general or expressly referenced.

2 Scope

The works shall comprise, but not be limited to the following:

- Telescope glass doors
- Glass partition walls
- Gypsum board walls
- Re-fitting existing ceiling
- Painting
- Sprinklers
- Relocation of electrical and mechanical services affected by the partition wall
- Emergency escape signs.

3 General Requirements

3.1 Codes and Standards

Unless expressly stated otherwise, each reference to a code or standard in this document shall mean the latest version of that code or standard based on the submission tender.

Compliance with the codes and standards noted in this document is mandatory. This includes any other codes and standards applicable to the project and the respective scope of work even if not listed in the contract documentation, whether noted in general or expressly referenced.

The Contractor shall be responsible for complying all relevant codes and standards, not only limited to the codes and standards listed in this appendix.

General Codes & Standards:

ISO 9001:2015 Quality Management

DS EN ISO 14001:2015 Environmental Management Systems - Requirements with Guidance for Use

BR 18 The Danish Building Regulations 2018 – Bygningsreglementet 2018

SBI INSTRUCTION 272 (Danish Building Research Institute Instructions): Instructions for Building Regulations 2018

SBI INSTRUCTION (Danish Building Research Institute Instructions): Labour requirements. instructions for labour inspection requirements.

Danish working environment authority 3.a. At-Guidance (best practice) Workplace layout and fixtures - A.1.15; Edition 2008

BS 5606:1990 Guide to accuracy in building (or relevant Danish code & regulations)

BS 8000-0:2014 Workmanship on construction sites (or relevant Danish code & regulations)

DS EN 13238:2010 Reaction to fire tests for building products. Conditioning procedures and general rules for selection of substrates

DS/ISO 21542:2012 Building construction - Accessibility and usability of the built environment

3.2 Requirements for Elements

General Responsibilities

The Contractor is fully responsible for recommending methods and installation. The design, fabrication, installation, and performance requirements herein specified are intended to establish minimum performance standards and general principles.

At appointment, the Contractor shall provide and be responsible for all aspects of the planning and production of the construction solution(s) which shall be at his own expense.

- The Contractor shall be responsible for planning and details of their own designs.
- The Contractor shall be responsible for the selection of materials.
- If any performance requirement is specified elsewhere in this Specification, the Contractor shall be responsible to meet these requirements.

The Contractor is also responsible for testing and commissioning all utility networks and should allow for all necessary temporary works and fittings, third party attendances and associated costs as required.

Equivalent Products

Wherever product references are specified by proprietary name, alternative products may be permitted subject to the following:

- Submit, a comprehensive list of all proposed alternative products identifying in each case:
 - The relevant specification clause number.
 - The product named in the relevant specification clause.
 - The proprietary name of the proposed alternative product.
 - The justification for the proposed substitution including any cost variations.
 - Samples upon request
- For every proposed alternative product submit for verification documentary evidence that the alternative product is equivalent in respect of material, safety, reliability, function, compatibility with adjacent construction, availability of compatible accessories and, where relevant, appearance.
- Any proposal for use of an alternative product shall also include proposals for substitution of compatible accessory products and variation of details as necessary, with evidence of equivalent durability, function and appearance of the construction as a whole.
- Provide revised drawings, specification and manufacturer's guarantees as required by The Employer. Before ordering alternative products, the Contractor shall obtain written confirmation from the Employer.

3.3 Performance Requirements

3.3.1 Materials and Work Generally

Good Practice

All materials, products and workmanship, which are not fully detailed or specified, shall be of a standard appropriate to the works and suitable for the functions stated in or reasonably to be inferred from the project documents, and in accordance with good building practice.

Excluded Materials

The following materials shall not be used in the works, or any component or part thereof:

- Materials being deleterious in themselves.
- Materials becoming deleterious when used in a particular situation or in combination with other materials.
- Materials becoming deleterious without a level of maintenance which is higher than that which would normally be expected in a building of comparable type.
- Asbestos or asbestos-containing products.
- Aluminum Composite Panels with polyethylene insulation.
- Materials being damaged by, or causing damage to, the structure in which they are incorporated or to which they are affixed.

For the purpose of this clause the word "deleterious" shall be deemed to include the use of materials or combinations of materials that would or might be hazardous to health or would or might have the effect of reducing the normal life expectancy:

- of the materials themselves.
- of any materials to which they are affixed.
- of the structure in which they are incorporated or to which they are affixed.

to a period less than that which would normally be expected.

General Quality of Products

- The Contractor shall, before proceeding, obtain approval for any kind of material to be used. The materials to be used shall comply with samples, selected and approved by the Employer.
- Products to be new unless otherwise specified.
- For products specified to a Danish or European Standard obtain certificates of compliance from manufacturers when requested by Employer.

- Where a choice of manufacturer or source of supply is allowed for any product, the whole quantity required to complete the work shall be of the same type, manufacture and/or source unless otherwise approved. The Contractor shall produce written evidence of sources of supply when requested by the Employer.
- The Contractor shall ensure that the whole quantity of each product required to complete the work is of consistent kind, size, quality and overall appearance.
- Where consistency of appearance is desirable, the Contractor shall ensure consistency of supply from the same source. The Contractor shall not use different color batches where they can be seen together.
- If products are prone to deterioration or have a limited shelf life, the Contractor shall order in suitable quantities and use in appropriate sequence. The Contractor shall not use any product, if there are any signs of deterioration, settling or other unsatisfactory condition.

Proprietary Products

- The Contractor shall handle, store, prepare and use or fix each product in accordance with the manufacturer's current printed or written recommendations/instructions. The Contractor shall inform the Employer if these conflict with any other specified requirement. The Contractor shall submit copies to the Employer when requested.
- Ancillary products and accessories shall be of a type recommended by the main product manufacturer, unless otherwise specified.
- The Contractor shall obtain confirmation from manufacturers that the products specified and recommendations on their use have not been changed since that time. Where such change has occurred, the Contractor shall inform The Employer and not place for or use the affected products without further instructions.

Checking Compliance of Products

The Contractor shall check:

- All delivery tickets, labels, identification marks and, the products themselves to ensure that all products comply with the project documents. Where different types of any product are specified, the Contractor shall check to ensure that the correct type is being used in each location. In particular, the Contractor shall check that:
 - The sources, types, qualities, finishes and colors are correct, and match any approved samples.
 - All accessories and fixings which should be supplied with the goods have been supplied.
 - Sizes and dimensions are correct. Where tolerances of components are critical, measure a sufficient quantity to ensure compliance.
 - The delivered quantities are correct, to ensure that shortages do not cause delays in the work.
 - The products are clean, undamaged and otherwise in good condition.

- Products which have a limited shelf life are not out of date.

Protection of Products

- The Contractor shall prevent over-stressing, distortion and any other type of physical damage.
- The Contractor shall keep clean and free from contamination. Prevent staining, chipping, scratching or other disfigurement, particularly of products exposed to view in the finished work.
- The Contractor shall keep dry and in a suitably low humidity atmosphere to prevent premature setting, moisture movement and similar defects. Where appropriate, the Contractor shall store off the ground and allow free air movement around and between stored products.
- The Contractor shall prevent excessively high or low temperatures and rapid changes of temperature in the products.
- The Contractor shall protect adequately from rain, damp, frost, sun and other elements as appropriate. The Contractor shall ensure that products are at a suitable temperature and moisture content at time of use.
- The Contractor shall ensure that sheds and covers are of ample size, in good weatherproof condition and well secured.
- The Contractor shall keep different types and grades of products separately and adequately identified.
- So far as possible, the Contractor shall keep products in their original wrappings, packings or containers until immediately before they are used.
- Wherever possible the Contractor shall retain protective wrappings after fixing and until shortly before Completion.
- The Contractor shall ensure that protective measures are fully compatible with and not prejudicial to the products/materials.

Suitability of Related Work and Conditions

Before starting work, the Contractor shall check and confirm to the Employer that:

- Previous, related work is appropriately complete, in accordance with the works documents, to a suitable standard and in a suitable condition to receive the new work.
- All necessary preparatory work has been carried out.
- The environmental conditions are suitable.

General Quality of Workmanship

- The Contractor shall ensure the highest level of good workmanship consistent with BS 8000 Standard for Workmanship on Building Sites and the manufacturer's requirements.

- The Contractor shall provide all materials and workmanship necessary for the construction to meet the requirements of the Contract documents.
- All operatives shall be appropriately skilled and experienced for the type and quality of work.
- The Contractor shall take all necessary precautions to prevent damage to the work from frost, rain and other hazards.
- The Contractor shall inspect all components and products carefully upon receipt and before fixing or using and reject any which are defective.
- The Contractor shall fix or lay all works securely, accurately and in alignment.
- Where not specified otherwise, the Contractor shall select fixing and jointing methods and types, sizes and spacings of fastenings to comply with relevant Danish and European Standards.
- The Contractor shall provide suitable, tight packings at screwed and bolted fixing points to take up tolerances and prevent distortion. The Contractor shall not overtighten fixings.
- The Contractor shall adjust location and fixing of components and products so that joints which are to be finished with mortar or sealant or otherwise left open to view are even and regular.
- The Contractor shall ensure that all moving parts operate properly and freely. The Contractor shall not cut, grind or plane pre-finished components and products to remedy binding or poor fit without approval.

3.3.2 Samples/Approvals

Approval of Products

Where approval of a product is specified the requirement for approval relates to a sample of the product and not to the product as used in the works. The Contractor shall submit a sample and other evidence of suitability. The Contractor shall not confirm orders or use the product until approval of the sample has been obtained. The Contractor shall retain approved sample in good, clean condition on site. The Contractor shall ensure that the product used in the Works matches the approved sample.

Samples of Finished Work

Where a sample of finished work is specified for approval, the requirement for approval relates to the sample itself (if approval of the finished work as a whole is required this is required separately). The Contractor shall obtain approval of the stated characteristic(s) of the sample before proceeding with the works. The Contractor shall retain approved sample in good, clean condition on site. The Contractor shall ensure that the relevant characteristic(s) of the works match the approved characteristic(s) of the sample. The Contractor shall remove samples which are not part of the finished works when no longer required.

Approvals

Where and to the extent that products or work are specified to be approved or the Employer instructs or requires that they are to be approved, the same shall be supplied and executed to comply with all other requirements and in respect of the stated or implied characteristics either;

- To the express approval of the Employer or,
- To match a sample expressly approved by the Employer as a standard for the purpose.

3.3.3 Accuracy

Accuracy of Instruments

- The accuracy of dimensions scaled from the drawings is not guaranteed.
- The Contractor shall define all necessary any dimensions required.
- The Contractor shall only use instruments and methods described in BS 5606,
- Linear dimensions: +/-3mm up to and including 10m, +/-6mm over 10m and up to and including 30m.
- Angular dimensions: +/-5mm in 50m.
- Verticality: +/-5mm in 30m.
- Levels: +/-3mm per single sight of up to 60m.

Setting Out

The Contractor shall check the setting out of preparatory work by others against the dimensions shown on the drawings and record the results on a copy of the drawings. The Contractor shall notify the Employer in writing of any discrepancies and obtain instructions before proceeding.

Accuracy of Construction in General

The Contract Works shall be constructed to the following degrees of accuracy, in addition to any specific or particular requirements specified elsewhere in the contract documents:

Dimensional accuracy: The maximum permitted deviations, in the completed work, of dimensions and levels shown on, or calculable from, the drawings are:

- Up to 600mm: +/- 1mm.
- Over 600mm and up to 3m: +/- 3mm.
- Over 3m and up to 6m: +/- 5mm.
- 6m and above: +/- 8mm.

Variables: The permitted deviations referred to above relate to, but are not limited to, the following variables:

In the horizontal plane:

- The Contractor shall position in plan of any point or specified fair face in relation to the nearest setting-out point on the same floor level.

- The Contractor shall provide all dimensions on plan.

In the vertical plane:

- The Contractor shall provide all levels with reference to the nearest setting out point on the same floor level.
- The Contractor shall provide all dimensions in elevation and/or section.
- The Contractor shall provide all verticality (plumb) at any point. For verticality, the permitted deviation is measured at right angles to the vertical dimension.

Where a position, in either plane, may be located by more than one variable, the smallest permitted deviation shall apply.

Appearance and fit

The Contractor shall arrange the setting out, erection, juxtaposition of components and application of finishes (working within the practical limits of the design and the specification) to ensure that there is satisfactory fit at junctions, that there are no practically or visually unacceptable changes in plane, line or level and that the finished work has a true and regular appearance.

Wherever satisfactory accuracy, fit and/or appearance of the work are likely to be critical or difficult to achieve, the Contractor shall obtain approval of proposals or of the appearance of the relevant aspects of the partially finished work as early as possible.

Without prejudice to the above and unless specified otherwise, tolerances shall not be greater than those given in BS 5606, Tables 1 and 2.

3.3.4 Work at Completion

Completion of The Work Generally

- The Contractor shall make good all damage consequent upon the work.
- The Contractor shall remove all temporary markings, coverings and protective wrappings unless otherwise instructed.
- The Contractor shall clean the works thoroughly and remove all rubbish and surplus materials consequent upon the execution of the work.
- Cleaning materials and methods to be as recommended by manufacturers of products being cleaned, and to be such that there is no damage or disfigurement to other materials or construction.
- The Contractor shall touch up minor faults in newly painted/repainted work, carefully matching colour, and brushing out edges. Repaint badly marked areas back to suitable breaks or junctions.
- The Contractor shall adjust, ease and lubricate moving parts of new work as necessary to ensure easy and efficient operation.

4 Building Elements Specifications

4.1 Telescope Glazed Doors

Reference drawings

- ACC-ARUP-ZZ-00-DR-A-1001
- ACC-ARUP-ZZ-00-DR-A-3001
- ACC-ARUP-ZZ-00-DR-A-4001

Sliding telescope doors

Manufacturer and Product Code: TORMAX iMotion 2202 or equivalent to be approved by the Employer.

Glass: 10mm toughened low iron, marked DS/EN 12150

Free opening width min. 1700mm

Combi sensor detection. Doors shall be connected to the fire alarm system so they open automatically, also in the event of power interruption.

4.2 Glass Partition Wall

Reference drawings

- ACC-ARUP-ZZ-00-DR-A-1001
- ACC-ARUP-ZZ-00-DR-A-3001
- ACC-ARUP-ZZ-00-DR-A-4001

General specifications

- Glass: 10mm toughened low iron, marked DS/EN 12150
- Profiles: Anodized aluminum glass profiles / Horizontal RHS 50x100x5mm steel supports for the telescope doors – welded to the vertical RHS profiles and primed white painted similar.

4.3 Gypsum Board Partition Walls

Reference drawings

- ACC-ARUP-ZZ-00-DR-A-1001
- ACC-ARUP-ZZ-00-DR-A-3001
- ACC-ARUP-ZZ-00-DR-A-4001

General specifications

Manufacturer and Type: Knauf - VE MR70 450 A/A M45 or equivalent

Nominal total thickness: 95 mm.

4 vertical RHS 70x70mm profiles min. 5mm shall span from the upper slab to the floor. Fixation to the upper slab shall be with elongated bolt holes to accommodate vertical movements. Fixations to the floor by shallow anchors, so any floor heating is not damaged, concealed within the skiting. The profiles shall be primed, and the lower part exposed in the glass partitions, shall also have a high durable white paint application.

4.4 Gypsum Board Suspended Ceiling

Reference drawings

- ACC-ARUP-ZZ-00-DR-A-2001

General specification

Existing ceiling type: Gypsum Board Suspended Ceiling

Dimensions 25x500x1200mm - cut to fit the new partition wall.

The ceiling sub-structure and the build-up shall be corrosion protected metal

Integrated services

General: Position services accurately, support adequately. Align and level in relation to the ceiling and suspension system. Do not diminish performance of ceiling system.

Small fittings: Support with rigid backing boards or other suitable means. Do not damage or distort the ceiling.

Cuts shall be sharp and precise. Curved cuts sharp edge / Straight cuts 5mm chamfer.

Support: By ceiling system and wall L-profile

Coordination with service fittings and installations:

Ceilings shall be designed and constructed to allow the installation of all service fittings and installations, indicated on the drawings, to achieve the desired visual appearance and without deterioration in the specified performance.

Service fittings and installations include, but are not limited to, the following:

- Air Conditioning Diffusers
- Light Fittings
- Sprinkler Heads.
- Smoke Detectors
- Speakers

before hand over.

4.5 Painting

Wall:

MBA N2175JU (Malerfagerts Behandlingsanvisninger) – White to match adjacent walls.

Visible Steel:

MBA N8028AG (Malerfagerts Behandlingsanvisninger) – White to match adjacent walls.

4.6 Electrical

Reference drawings:

- *ACC-ARUP-ZZ-00-DR-E-2001*
- *ACC-ARUP-ZZ-00-DR-E-2002*

4.6.1 Codes and Standards

The Contractor shall comply with all applicable and relevant standards indicated, but not limited, to those within each section of the following specification. The latest applicable version of these specifications shall be used. These are:

- Bygningsreglementet 2018 (BR18)
- *DS HD 60364* 'Low Voltage Electrical Installations'
- *DS/EN 60228* 'Conductors of insulated cables'
- *DS/EN 60332* 'Tests on Electric and Optical Fibre Cables under Fire Conditions'
- *DS/EN 61034* 'Measurement of smoke density of cables burning under defined conditions'
- *DS/EN 61140* 'Protection Against Electric Shock – Common Aspects for Installation and Equipment'
- Isolators, Fuse-Switches – *DS/EN 60947-3*
- *DS/EN 12464* 'Light and Lighting – Lighting of Work Places'
- *DS/EN 60598* 'Luminaires'.
- *DS/EN 1838* 'Lighting Applications – Emergency Lighting'
- *DS/EN 50172* 'Emergency Escape Lighting Systems'
- *DS/EN 60598-2-22* 'Luminaires – Part 2-22: Particular Requirements – Luminaires for Emergency Lighting'
- *DS/EN 62034* 'Automatic Test Systems for Battery Powered Emergency Escape Lighting'
- *DS/EN 7010* 'Graphical symbols - Safety colours and safety signs - Registered safety signs'
- Safety, Health and Welfare at Work (General Application) Regulations 2007, Chapter 1 of Part 7 'Safety Signs at Place of Work'
- *DS/EN 50085-2-2:2008* 'Cable trunking systems and cable ducting systems for electrical installations. Particular requirements for cable trunking systems and cable ducting systems intended for mounting underfloor, flush floor, or on floor'

- *DS/EN 60309* ‘Plugs, socket-outlets and couplers for industrial purposes’
- *DS/EN 61558* ‘Safety of power transformers, power supplies, reactors and similar products’
- *DEMKO 107-2-D1* ‘13A plugs, socket-outlets, adaptors and connection units’
- *DS/EN 54* ‘Fire Detection and Fire Alarm Systems’
- *DS/EN 50136* ‘Alarm Systems – Alarm Transmission Systems’
- *DBI Retningslinje 232* ‘Automatiske brandalarmanlæg. Projektering, installation og vedligeholdelse’
- *DS/EN 54-16* ‘Fire Detection and Fire Alarm Systems - Part 16: Voice Alarm Control and Indicating Equipment’
- *DS/EN 60849* ‘Sound Systems for Emergency Purposes’
- *ISO 7240-16:2007* Fire detection and alarm systems -.Part 16: Sound system control and indicating equipment
- *DS/EN 50173* ‘Low Voltage Electrical Installations’
- *DS/EN 50310* ‘Application of equipotential bonding and earthing at premises with information technology present’
- *DS/EN 50133* ‘Alarm Systems – Access Control Systems for use in Security Applications’.

4.6.2 Cables and Wiring

4.6.2.1 Materials and Products

The Contractor shall supply, install, terminate and test all cables as shown on the drawings, described herein and/or listed in the cable schedules.

All cables shall fully comply with European, Danish or International standards and carry an EU Notified Body (NB) such as 3P, Force Certification or equivalent. They shall be delivered to site correctly packaged with manufacturer’s traceability information.

All cables shall be marked (indelibly on the sheath) with the following information at a minimum:

- Manufacturer’s Name and Factory Identifier
- CE Mark
- Relevant EN or DS standard number
- Name of Third Party Approver (3P, Force Certification, etc)
- Number of Cores and Cross Sectional Area
- Voltage Rating
- Cable Code

- Year of Manufacture

4.6.2.2 Sizes

All cables and wiring shall be metric sizes. Imperial sizes are not acceptable. If installed, the contractor shall remove the full imperial installation and replace with metric at his own expense.

4.6.2.3 Colours

The system of colour coding of conductors throughout the installation shall be as per the European harmonised core colour code as follows:

400V AC three phase circuits:	1st phase	–	Brown
	2nd phase	–	Black
	3rd phase	–	Grey
	Neutral		Blue
230V AC single phase circuits:	Phase	–	Brown
	Neutral		Blue
Earth/Protective conductor:	Green/Yellow		
24V DC circuits:	Positive		Brown
	Earthed Negative		Blue

Power cables shall generally have a black sheath.

Fire alarm cables shall have a red sheath.

Instrumentation cables shall have a grey sheath.

4.6.2.4 General Requirements

All conductors shall have a minimum cross section of 1.5mm².

4.6.2.5 LV Power

Generally, LV power cables shall be as follows:

Multi-core cables shall be:

- Internally: AL, XLPE, LSZH, 5-Core, 600/1000V

Single core cables shall be:

- Internally: AL core, LSZH, 600/1000V

4.6.2.6 Small Power & Lighting Circuits

Multicore Low Smoke Zero Halogen (LSZH) insulated and LSZH sheathed flexible cable for fixed installation within buildings rated 300/500V with class 5 flexible stranded plain copper conductors (to DS/EN 60228) suitable for operation up to 70°C. Type H05Z1Z1-F / 318-B or equal and approved.

4.6.2.7 Fire Alarm Cabling

The entire system internally shall be wired using the following cable:

- Standard Fire Resistant, 110V, tested in accordance with DS/EN 60331

Cable shall be Nexans Alsecure Premium Infit PT or equal and approved.

Final cable connections to devices shall provide the same degree of fire resistance as the main cable.

Voltage drops in cables shall not exceed the limit which will prevent devices operating within their specified range at all times.

Cross-sectional area of any conductors shall be at least 1.0mm². The Contractor shall confirm the final cable size requirements of the Fire Alarm system with the designated manufacturer, Autronica (refer to the Fire Alarm & Detection specification).

4.6.2.8 Execution

The Contractor shall install cables generally along the routes and in the manner indicated on the drawings and in accordance with the notes and instructions thereon and herein.

All cables shall be delivered to site with the manufacturers' seals, labels, or other proof of origin intact. Such labels and seals shall not be removed until the cable is required for use and shall be retained for inspection.

Cables shall be handled, terminated and installed in accordance with the cable manufacturer's recommendations. The technical advice of the manufacturer's specialists shall be followed if any special conditions or unusual circumstances apply.

In order to avoid any damage, cables should be carefully laid and installed. Cables shall not be pulled over hard or sharp edges, exceed the manufacturer's recommended bending radius or exceed the maximum permissible tensile strength.

The minimum internal radius of bend shall be eight times the overall diameter of the cable.

The Contractor shall exercise all care during cable installation. Any cable which, in the opinion of the Engineer, has been damaged during storage, handling or installation shall be replaced at the expense of the Contractor. This includes damage to any part of the cable including conductors, insulation, armour, sheath etc. Re-sheathing damaged cable is not acceptable.

3-phase groups of single-core cables carrying alternating current shall be laid in trefoil formation and touching each other.

Circuits of different voltage shall not be run in the same conduit.

All cables shall have their conductors tested for insulation resistance immediately prior to terminating the cable end. Tests shall be carried out with a 500V 'Megger' insulation tester, or similar instrument, to prove the integrity of the insulation between cores and the cable sheath.

Cable clips and saddles shall be purpose-made by the cable manufacturer. The use of bare or PVC covered copper strip for site fabrication of saddles or clips will not be permitted. Clips with single hole fixings may be used when installing single cables. Where two or more cables are grouped together then saddles with two hole fixings shall be employed. Plain copper sheathed cables shall be held with bare copper clips or saddles. LSZH sheathed cables shall be held with LSZH covered clips or adjustable nylon saddles. The type of fixings employed shall be consistent throughout the installation.

Where multi-core cables are installed and one or more cores are unused, then the spare cores shall be bonded to earth.

4.6.2.9 Cables Installed in ceiling

Cables shall be installed using one of the following methods:

- Laid in trays or trunking supported from walls, ceilings, structural steelwork or purpose designed steelwork.
- Supported in cleats, clips, saddles or hangers on walls, structural steelwork or purpose designed steelwork.

Where cables are installed on cable tray, they shall be neatly grouped and arranged to cause the absolute minimum of crossovers. Where crossovers are unavoidable, they shall be neatly arranged and properly secured.

All cables shall be securely fixed to cable ladders and trays using black polypropylene cable ties, tightened to the manufacturer's recommendations and neatly trimmed. Use of nylon cable ties shall not be accepted).

Where cables have to be carried on structural steelwork, the cable supports shall be attached to the steelwork by means of girder clips or other patented attachment devices not requiring drilling of the steelwork. Welding of cable supports to structural steelwork or the drilling of the steelwork for the attachment of cable supports will not be permitted.

Cables fixed to the building structure or to cable tray shall have clips or saddles spaced at the following regular intervals:

Overall Diameter of Cable (mm)	Fixing Centres (mm)	
	Horizontal	Vertical
≤ 15	300	400
15 < & ≤ 40	400	500
40 < & ≤ 100	600	750

Cables shall be fixed 150mm on either side of a set or bend.

Cable saddles and clips shall be fixed to the building fabric or cable tray as follows:

- Building fabric - brass roundhead screws and fibrous or approved plastic plugs.
- Cable trays in general - brass roundhead screws, nuts and washers.
- Cable trays in damp or wet conditions - zinc coated roundhead screws, nuts and washers.

Where cables pass through walls and/or floors which form part of the building's fire compartmentalisation, the hole(s) through which the cables pass shall be sealed after the cables have been installed, so as to give the same standard of fire resistance as the original wall or floor. Details of the proposed sealing method shall be submitted prior to implementation.

4.6.2.10 Small Power & Lighting Wiring

Wiring of small power and lighting circuits shall be carried out using one or more of the following wiring systems:

- Single-core unsheathed cables drawn into metallic or non-metallic conduit and/or trunking
- Multi-core sheathed cables, armoured or unarmoured, clipped to building surfaces or structures or to cable tray.

Cables shall not be embedded in the building fabric.

Unprotected cables shall not, under any circumstances, be installed externally or be embedded in concrete.

4.6.2.11 Control

No samples required.

The Contractor shall submit a technical submittal complete with all manufacturer information to the Engineer for final approval of the material prior to any orders being placed.

4.6.3 Cable Containment and Support Systems

4.6.3.1 Materials and Products

The Contractor shall supply and install a complete cable support system using cable tray, trunking, conduit and support steelwork as shown on the drawings and as detailed herein.

The Contractor shall include for all incidental cable tray which may not be shown on the drawings but which may be required to effect cable routes to final distribution boards, luminaires etc.

4.6.3.2 Cable Support Systems for Life Safety and Fire Fighting Applications

For life safety and fire-fighting applications (e.g. fire detection and alarm, fire-fighting lifts, sprinkler systems etc.) where fire-resistant cables are installed, the cable support system shall be in accordance with DS/EN 50575 “*Power, Signal and Communications Cables – Cables for general use in construction and installations with fire response requirements.*”.

The cable support system shall have a fire survival time equal to that of the cables it supports and for the same defined fire conditions.

Support brackets shall be sized to take into account the fact that the tensile strength of steel will be significantly reduced in a fire situation.

Cable accessories shall meet similar testing requirements to the cables and shall not compromise the defined performance of the cables.

Cable fixings shall be in accordance with the cable manufacturer’s recommendations. They shall be steel or cast iron with a specified non-combustible coating. Plastic, nylon or aluminium is not suitable. Cable fixing centres shall be within the cable manufacturer’s recommended maximum spacings.

4.6.3.3 Cable Tray

Cable tray types shall be as follows:

Location	Type
Internally	Manufactured from high quality galvanised sheet steel to DS/EN 10346
High corrosion external areas	Manufactured from high quality sheet steel to DS/EN 10130 and hot dipped deep galvanised (min 85µm) after manufacture
Aggressive and corrosive environments (e.g. extreme weather, high temperature, chemicals, salt spray etc.)	Manufactured from galvanised sheet steel with an epoxy resin coat applied after manufacture.

4.6.3.4 Conduits

The Contractor shall include for the design, supply, installation, testing and commissioning of the complete conduit installation complete with backboxes, boxes, bends, tees, etc. and all other accessories as indicated on the drawings and detailed herein.

Conduits and conduit fittings shall be rigid halogen free PPE/PP0 with a minimum nominal size of 20mm to DS/EN 61386-21, DS/EN 60423 and DS/EN 60614-2-2.

Couplings shall be factory threaded and manufactured from the same material as the conduit. Adaptable and accessory boxes entries shall be effected using flanged couplers and heavy pattern male brass bushings.

All conduits shall be free of defects on delivery and shall be protected from mechanical damage and weather when stored on site.

4.6.3.5 Draw-in Boxes

Draw-in boxes shall be of the same material and manufacturer as the selected conduits and shall remain part of a continuous system.

Draw-in boxes shall be of ample size to enable the cables to be neatly diverted from one conduit to another without undue cramping.

4.6.3.6 Flexible Conduit

Conduit connections to motors or other equipment subject to vibration or movement shall be made in heavy gauge, weather-proof type, oil-resistant, flexible metallic conduit, LSF-sheathed overall and provided with heavy brass screwed adaptors with a male thread for connection to the rigid conduit system via an adaptable box at each end termination.

A flexible connection greater than 1000mm long shall not be used without the Engineer's approval.

Flexible conduits shall be installed in accordance with the manufacturer's instructions and in such a way as to ensure that there is no risk to personnel in the area.

4.6.3.7 Back Boxes

Back boxes throughout for all outlets shall have a minimum depth of 32mm.

4.6.3.8 Execution

4.6.3.8.1 Conduits

All conduits shall be free of cracks or other defects on delivery and shall be protected from mechanical damage and weather when stored on site.

Where conduit is connected to surface mounted equipment or accessories it shall be additionally supported within 150mm of each side of the item. Where bends and sets occur the conduit shall be fixed at a distance of 150mm on each side of such diversion.

All conduit drops to switches, socket outlets etc. shall be vertical. Surface mounted conduit shall be run truly horizontal or vertical.

Rigid conduits shall be fixed using spacer saddles for surface work and pipe hooks for flush work. Multiple runs of conduits may be fixed to Unistrut supports using fixings approved by the manufacturer for the purpose. Where conduit is to be fixed to structural steel, approved proprietary clamp type fasteners shall be used. Where necessary, Unistrut supports spanning the structural steelwork shall be provided by the Contractor. Drilling of steelwork shall not be permitted without the Engineer's permission.

The inner radius of any conduit bend shall not be less than 2.5 times the external diameter of the conduit. Where conduit has to be bent, it must be bent without

altering its section. No more than two 90° bends shall be installed in any run of conduit without a conduit draw-in box.

Conduits shall be sealed to prevent the ingress of dirt, dust etc, after installation and shall be cleaned out and dried prior to the installation of any cables. The whole of the conduit system in any particular section shall be completed and free from any dirt or loose matter before cables are drawn in.

No cables shall be installed until all conduit and accessories are securely fixed and in the case of flush installations until the plastering has been completed and passed by the Architect as sufficiently dry.

No conduit smaller than 20mm diameter shall be installed unless shown on the drawings.

The maximum number of cables drawn into any one conduit shall not exceed those allowed by the DS HD 60364.

4.6.3.8.2 Draw-in Boxes

Draw-in boxes shall be provided to give access to all conduits for the drawing in or out of any cable. Generally where conduit is to be installed from point to point in a straight line, draw-in boxes shall be installed every 9m of conduit run.

No cable joints will be allowed in draw-in boxes under any circumstances.

No box shall be fixed in such a position as to be inaccessible on the completion of the building structure or other services.

All conduit boxes not carrying lighting or other fittings shall be installed with a suitable cover fixed with brass or stainless steel round head screws. Covers for external application shall have machined faces and shall be provided with neoprene type gaskets.

4.6.3.8.3 Flexible Conduit

A flexible connection greater than 1000mm long shall not be used without the Engineer's approval.

Flexible conduits shall be installed in accordance with the manufacturer's instructions and in such a way as to ensure that there is no risk to personnel in the area.

4.6.3.8.4 Final Cable Drops

The Contractor shall provide all final cable ladder, tray and droppers from the main cable support network as required to allow cabling to individual items of equipment (or small groups of adjacent equipment) installed in this project.

4.6.3.8.5 Back Boxes

Recessed outlet boxes or adaptable boxes shall not be installed back to back without the permission of the Engineer.

4.6.3.9 Control

No samples required.

The Contractor shall submit a technical submittal complete with all manufacturer information to the Engineer for final approval of the material prior to any orders being placed.

4.6.4 Emergency Lighting

4.6.4.1 Materials and Products

The Contractor shall supply, install, test and commission a complete emergency lighting installation as requested by the Engineer following investigations onsite to determine the exact nature of the existing emergency lighting already installed within the lobby area.

The emergency lighting system consists of separate dedicated emergency LED light fittings supplied from the local power supply and the central battery system. The exit signs will also form part of the emergency lighting system.

Emergency lighting shall generally be provided by the following:

- Non-maintained emergency recessed LED luminaires within lobby
- Non-maintained emergency LED luminaires externally over doors
- Maintained exit signs on escape routes

The emergency lighting installation shall be supplied, installed and tested, in its entirety, in accordance with I.S. 3217.

4.6.4.2 Emergency Light Fittings

On exit signs, the legend shall occupy a minimum of 80% of the height of the signs. The legend shall comply with EN 7010 and shall incorporate a directional arrow.

Emergency luminaires that incorporate inverter/battery packs shall be fitted with a green LED, fixed either to the body or the trim in such a way as to be visible at all normal times, and to indicate that the inverter supply is healthy.

The emergency exit signs shall be SafeExit 1234, from the GuideLED CG-S series, 11011 or equivalent. Pictogram shall have a down arrow.

4.6.5 Execution

4.6.5.1 Testing & Commissioning

On satisfactory completion of the installation the emergency lighting system shall be inspected, tested and commissioned by a competent person complying with the requirements of IS 3217.

The Contractor shall carry out a light level test to record the emergency lighting levels in all areas. It shall be carried out during the hours of darkness. The

results of the test shall be submitted to the Engineer for information and included in the O&M Manuals.

As part of the tests, the system shall be operated for its rated duration.

Upon satisfactory commissioning of the emergency lighting system, the Contractor shall provide a Certificate for Emergency Lighting Commissioning.

A log book shall be provided and shall form part of the Operating and Maintenance Manual.

4.6.6 Control

The Contractor shall submit a technical submittal complete with all manufacturer information to the Engineer for final approval of the material prior to any orders being placed.

4.6.7 Small Power

The Contractor shall supply, install, test and commission a complete small power services installation as indicated on the drawings and detailed herein.

4.6.7.1 Materials and Products

Socket outlets and small power services outlets shall be wired with cables as detailed in the cables and wiring section and circuited as shown on the drawings. Cable sizes shall be as follows:

- 4mm² – 230V Socket Outlets, Control Panels

4.6.7.2 Outlet Types

General outlet types shall be as follows:

Area	Accessory Type	Options or Equal & Approved
General	Flush mounted, steel finish	LK Fuga Slim Steel LeGrand Mosaic (with brushed aluminium finish)

4.6.7.3 Socket Outlets

Socket outlets shall be 230V, 13A, 3-pin DEMKO compliant, single or twin, outlets as shown on the drawings and detailed herein.

Inserts shall be a different colour than the plate to provide visual contrast.

4.6.7.4 Execution

Flush mounting accessories shall be fitted into purpose made metal boxes only and surface mounting accessories shall be fitted onto metal or all insulated moulded boxes as shown on the drawings or in the schedules.

All boxes or sections of boxes for use with accessories must incorporate a suitably marked earth terminal. Accessory plates shall be secured to boxes by not less than two fixing screws. Where these screws do not provide adequate earth continuity to metal plates or plates including parts to be earthed then a bonding connection shall be provided from the earth terminal to the plate or part. The bonding shall be protected with a green/yellow insulated sleeve. The above requirement shall not apply to the earth socket on a socket outlet when directly connected to a protective conductor.

Where more than one phase of a supply exists in a multigang box the following requirements shall apply:

- A clearly visible label showing the maximum voltage present shall be arranged as a warning notice before access can be gained to live parts.
- Wiring and accessories connected to each phase shall be separated from each other by fixed screens or barriers.

4.6.7.5 Control

The Contractor shall submit a technical submittal complete with all manufacturer information to the Engineer for final approval of the material prior to any orders being placed.

4.6.8 Fire Alarm

4.6.9 Materials and Products

The Contractor shall supply, install, test and commission the Fire Detection and Alarm System (FDAS) for the lobby, that is a direct extension of the existing Fire Detection and Alarm system of the UN City building, in accordance with this specification and as indicated on the drawings.

The Contractor shall include for developing fire alarm strategy with the Engineer and the Employer's designated FDAS supplier.

The Contractor shall also include for witness testing, proving to the Fire Officer, demonstrating to the Employer and demonstrating to the Occupiers the operation of the system.

The Contractor shall supply full system Operation and Maintenance Manuals, display diagrams and log book in accordance with this specification.

4.6.9.1 System Description and Requirements

The system shall be supplied, installed, tested and commissioned in its entirety fully in accordance with DS/EN 54.

The system shall be an extension of the existing Autronica Autosafe 4 system installed within the UN City building.

Detector types shall be as shown on the drawings and as follows:

Area	Detector Type
Lobby	Optical smoke

The fire alarm system shall interface with the following:

- Access Control Points
- Electro Magnetic Locks

The Contractor shall be responsible for updating the cause and effect matrix for the fire detection and alarm system and all interfaced systems and equipment.

Note the requirement in the standards and in this specification for full segregation of the fire alarm cabling and for providing a fire rated support system with marked containment. These requirements will be fully enforced by the engineer.

The Contractor may only take the fire detection and alarm system or part of the system out of service after agreement with the Employer and their designated Fire Alarm Supplier Autronica. The fire detection and alarm system must always be left operational overnight.

All wiring systems for communications, detection and alarms shall be monitored for open and short circuits, removal of detectors as well as alarm/healthy conditions.

All faults shall be registered by audible and visible fault alarms, the latter being yellow LEDs.

4.6.9.2 Components (Detectors, Call-Points, Alarms etc.)

All components shall comply with the relevant sections of EN 54 as a minimum and shall be part of the Autronica range of products.

All detection devices shall be independently certified to the relevant local and/or international standards.

All components shall be IP30 minimum.

Any detectors in voids or attics where they aren't visible shall have visible LED units mounted on the ceiling of the room underneath the space.

All equipment in external areas shall be minimum IP65 rated.

It shall be possible to connect and mix manual call-points and automatic detectors within the same zone irrespective of the operating principle.

4.6.9.3 Detectors

Detectors shall be of the plug-in type, the insertion and removal of which requires a push and twist action, unless otherwise specified.

Detector bases shall be of a standard type, allowing any point type detector to be plugged into any base.

Standard bases shall be equipped with clamp type wiring terminals. The cable entry shall have a grommet type seal fitting tightly around the wires. Removable dust covers shall be provided to protect the detector contacts until these are fitted. Once inserted, the detector shall be securely held in place so that it cannot become loose when subject to vibration.

Detectors shall not be damaged by reversed polarity.

Detectors shall include built-in alarm indicators and provision shall be made for the connection of remote visual indicators where required.

Detectors used in addressable systems shall have provision for fitting into the fixed base the interface card required for communication with the system.

Remote indicators shall be provided where detectors are normally concealed from view. The indicators shall be labelled to show the location of the corresponding detector.

Detectors shall have built in screens to prevent the entry of insects.

Where detectors are mounted at heights exceeding 3m above finished floor level, the Contractor shall submit proposals for the testing and exchange of detector heads.

Detectors shall not be fitted to their bases until all finishing works have been completed unless otherwise specified.

In all systems the electrical power for operation of detectors shall be provided through the circuit wiring.

4.6.9.4 Interfacing with Systems

The fire alarm system shall be interfaced with associated and ancillary systems as detailed in the specification.

The contractor shall supply, install and connect the interface units on the fire alarm system required for these interfaces.

Ancillary equipment shall be equipped with means of isolation and disabling of automatic operation so that servicing and maintenance can be carried out in complete safety.

Extension and alterations to associated systems including the isolation and removal of parts, shall be possible without affecting the operation and performance of the fire alarm system.

Indicators and detectors associated with ancillary equipment shall be taken into account in calculating the maximum load of the fire alarm system power supply.

Faults in equipment for other functions shall not affect the performance of the fire alarm system.

Software to generate the signals to the interfaced equipment shall be arranged such that the signals are not transmitted during fire alarm test routine, but only in the event of actual fire detection in the building.

4.6.9.5 System Requirements

All signals to and from ancillary systems shall be via volt-free relay contacts (where appropriate) located in the fire alarm panels and remote equipment, the connecting cables being monitored by the fire alarm panel(s).

The layout of control panels in integrated systems shall be arranged so that fire alarm controls cannot be confused with other controls.

4.6.9.6 Access Control System

On registering a fire alarm, signals shall be automatically transmitted to deactivate the magnetic locks and open the automatic doors.

4.6.10 Execution

The installation and method of fixing of all devices shall be co-ordinated with the building fabrics and finishes to which they are fixed.

Under no circumstances shall any device be fixed to temporary or movable parts of the building fabric, including doors and furniture.

4.6.10.1 Cable Support

Fire alarm cables shall be run in cable ducts. Single or dual cables may be clipped direct for runs of up to 2 metres using cable manufacturer's fire resistant fixings. Sleeving with conduit is required for runs over 2 metres.

Methods of cable support shall be non-combustible and such that circuit integrity will not be reduced below that afforded by the cable used, and should withstand a similar temperature and duration to that of the cable, while maintaining adequate support. The use of plastic cable clips, cable ties or plastic conduit/ trunking/ cableways are not acceptable where these products are the sole means of cable support.

The cable support system shall comply with all requirements of the Cable Support Systems for Life Safety and Fire-Fighting Applications section of this specification.

Overhead lines shall not be used for any fire alarm system interconnections.

4.6.10.2 Junction Boxes

Fire alarm junction boxes shall be coloured red, fire resistant, galvanised steel or die-cast alloy, sealed to IP 54, fitted with rail mounted, numbered terminals and a permanently fixed engraved traffolyte label, white script on a red background, reading ‘**Fire Alarm – Detection Circuit / Sounder Circuit**’ as appropriate.

Ceramic heat resistant connectors shall be used (plastic terminal blocks are not acceptable).

Sounder circuits and detection circuits shall have separate junction boxes.

4.6.11 Control

No samples required.

The Contractor shall submit a technical submittal complete with all manufacturer information to the Engineer for final approval of the material prior to any orders being placed.

4.7 Public Address & Voice Alarm Systems

4.7.1 Materials and Products

The Contractor shall extend the public address system within the new lobby. This shall include wiring and speakers and auxiliary input equipment etc. to serve areas as outlined on the drawings.

4.7.1.1 System Description and Requirements

The public address system shall generally be used for the broadcast of routine public address messages and shall be capable of delivering high intelligibility messages to all areas in the UN City building.

The system shall be supplied, installed and tested, in its entirety, in accordance with DS/EN 60268.

The public address system shall also be used as a voice alarm system in conjunction with the fire alarm system and shall comply with the relevant requirements of DS/EN 60849, DS/EN 54-16, inline with the UN City building.

The system shall consist of the following:

- Internal recessed ceiling mounted speakers and associated cabling.

Generally, ceiling mounted speakers shall be 6W, flush mounting, white circular speakers.

4.7.1.2 Specialist Manufacturer

The Contractor shall engage with a Sound Systems Contractor to supply, test, commission and certify the system and to co-ordinate all elements of the installation in order to provide a complete system in accordance with the intent of this specification and to the satisfaction of the Engineer.

The specialist Contractor shall be Autronica.

Equipment and components of the public address system shall be manufactured by Autronica. All equipment for each system shall, be designed and provided by the identified manufacturer.

4.7.1.3 General Requirements

Voice reproduction shall be of good quality and natural sounding, excepting those areas with average noise levels in excess of 80 dB(A).

The system shall be free from audible distortion hum and noise and all switching shall be inaudible.

The system shall be capable of producing good overall sound levels with a pink noise signal limited to the operating bandwidth of the system.

Sound levels shall be a minimum of 5 dB(A) above any ambient noise level which exists or is likely to occur for 30 seconds or more.

The specialist Contractor shall be responsible for checking the location and quantity of speakers shown in conjunction with the type of equipment proposed and ensuring that this requirement is met.

4.7.1.4 Speakers

All speakers shall be suitable for public address and shall give a very high level of vocal clarity. Recessed ceiling mounted speakers shall be 6W ABS white circular speakers.

The assembly shall comprise of a bass/mid-range 215mm diameter coned loudspeaker and a 25mm Mylar dome tweeter complete with 12.5mm moving coil and neodymium magnet.

The speaker baffle shall be a round two part bezel comprising of an inner metal mesh grille and chassis with integral speaker having no visible fixings.

The unit shall be fitted with a 6W / 100V line factory fitted transformer.

Transformer shall be 100V line with 3dB power taps of 6, 3, 1.5 and 0.75W to be clearly marked on the assembly.

The speaker shall have wide angle dispersion of 160° @ 1kHz. Cone shall be a damped, high compliance type with a smooth extended frequency response over a range of 50Hz ~ 20 kHz. Sensitivity shall be a minimum of 94dB @ 1m, 1W test signal bandwidth 100Hz ~10 kHz.

4.7.1.5 Installation and Cables

The PAF shall occupy a new zone. All speaker circuits shall be wired in 2 core fire resistant cables with attention being paid to the table below:

Cable Size	Loudspeaker Circuit Loads						
	4 W	10 W	20 W	40 W	100 W	200 W	400 W
1.00mm ²	8,000	3,200	1,600	800	320	160	80
1.50mm ²	12,000	4,800	2,400	1,200	480	240	120
2.50mm ²	20,000	8,000	4,000	2,000	800	400	200
4.00mm ²	32,000	12,800	6,400	3,200	1,280	640	320
6.00mm ²	48,000	19,200	9,600	4,800	1,920	960	480

4.7.2 Execution

4.7.2.1 Testing & Commissioning

On completion of the installation the Contractor shall have the entire system tested, commissioned and certified by the specialist Contractor in accordance with BR18.

The Contractor shall include for attendances on the specialist supplier during testing and commissioning of the system.

Sound levels shall be measured and recorded. They shall be measured at 1.5m above floor level (1m above floor level in seating areas) in all normally accessible areas, using a sound level meter complying with DS/EN 61672 Type 1 or 2, set to "S" (slow) response and calibrated immediately before the measurements.

The calibration procedure and the measurements may be witnessed by the Engineer who shall be provided with a written set of results.

4.7.2.2 Documentation

The Contractor shall update the Operation and Maintenance Manual including as installed drawings and commissioning certificates signed by all relevant parties shall be submitted to the Engineer at the practical completion stage.

4.7.3 Control

No samples required.

The Contractor shall submit a technical submittal complete with all manufacturer information to the Engineer for final approval of the material prior to any orders being placed.

4.8 Mechanical

Reference drawings:

- *ACC-ARUP-ZZ-00-DR-M-2001*

4.8.1 Ductwork and ductwork fittings

4.8.1.1 Materials and Products

The Contractor shall supply, install, and test all ductwork and ductwork fittings as shown on the drawings and described herein.

Exposed surfaces of outside ductwork, and all associated fittings, shall comply with corrosion class C4 according to DS EN ISO 12944-2.

All ductwork and ductwork fittings shall fully comply with European, Danish or International standards and carry a third-party approval certification CE pipes. They shall be delivered to site correctly packaged with manufacturer's traceability information.

The Contractor shall provide the products as per the specifications listed in the subsections below.

4.8.1.2 Standards & Regulations

The Contractor shall ensure all ductwork and ductwork fittings follow the following standards:

- DS 134 - *Identification colours and letter codes to be used for drawings and pipelines*
- DS 447:2013 - *Ventilation in buildings – Mechanical, natural and hybrid ventilation systems*
- BESA DW 144 – *Specification for Sheet Metal Ductwork*
- EN 13779 - *Ventilation for non-residential buildings - Performance requirements for ventilation and room-conditioning systems*
- EN 13030 - *Ventilation for buildings - Terminals - Performance testing of louvres subjected to simulated rain*
- DS EN ISO 1461 - *Hot dip galvanized coatings on fabricated iron and steel articles - Specifications and test methods*
- DS EN ISO 12944-2:2017 - *Paints and varnishes – Corrosion protection of steel structures by protective paint systems – Part 2: Classification of environments*
- BESA TR/19 - *Guide to Good Practice - Internal Cleanliness of Ventilation Systems*

4.8.1.3 Supply diffuser

- As part of the execution of the new wall divide, a single supply diffuser must be re located. The Contractor shall move the existing diffuser directly outside the Lobby area parallel with the supply duct.

4.8.1.4 Hangers & Supports

The supply duct must be shortened and rerouted to the reallocated supply diffuser.

All ductwork shall be securely held and aligned.

Support spacing and loads shall include all ductwork system components which cannot be provided with individual supports such as acoustic insulation or fire cladding and balancing dampers.

The size strength and materials used for external ductwork supports shall be suitable for the ductwork, system components, insulation, cladding and prevailing external conditions. Cross bracing shall be provided between adjacent supports where necessary to resist wind loading.

Duct hangers wherever exposed in humid air or to view shall be protected by a suitable paint scheme or hot dip galvanizing after manufacture.

4.8.1.5 Ductwork Accessory

Existing Ductwork Accessory, including but not limited to attenuators and dampers, must be reallocated on the same ventilation branch to ensure that the system function as intended.

4.8.1.6 Colours

Equipment are given identification colours in accordance with DS 134. End fittings like air terminals/diffusers and grilles shall not be colour coded or tagged.

4.8.1.7 Access

Access openings shall be located, arranged and sized to permit full access required for maintenance. Inspection covers shall permit associated equipment item to be viewed.

Access openings and inspection covers shall be rigidly framed, with gasketed airtight covers designed for easy removal and accurate relocation and fixing.

Self-tapping screws shall not be used.

4.8.2 Execution

4.8.2.1 Installation

Access hatches shall be provided as per DW144, DW172 and specifically access hatches shall be allowed in the ductwork at all louver connections to facilitate louver cleaning and inspection.

The ductwork system shall be designed to have a low leakage level and shall comply with class C in DS 447:2013.

All necessary ductwork, control, isolating, fire, smoke and balancing dampers, grilles and diffusers to form complete air distribution systems shall be provided.

Sheet metal for fabrication shall be new, smooth and free from blisters, pits and imperfections in coating. Galvanising shall be to DS EN ISO 1461.

Holes in main ducts for branches shall not be greater than the branch size.

Duct sizes are clear internal required airway dimensions. Allowance shall be made for any acoustic linings and their coverings. There shall be no obstructions or rough surfaces within any ductwork.

Duct branches and equipment items shall be supported locally to prevent distortion.

Flexible connections shall be made between ductwork and fans and other equipment items.

Access shall be maintained to ductwork system components which require inspection, cleaning, or adjustment.

At every point of duct penetration of the building envelope, a sealed louvre, weather cowl or protective flashing and full closure plate shall be provided to prevent ingress of water.

All metal fasteners shall be entirely compatible with the materials used.

Circular radius pressed bends shall have one diameter throat radius.

Tapers for circular ducts shall not exceed 22.5°C.

Self-adhesive tapes shall not be used. Glass fibre reinforced tape only shall be used and shall be fixed with spray-applied adhesive at site. The use of tape shall be restricted to the completion of site joints in extremely difficult locations only where alternative methods are not possible. A record of these locations shall be submitted.

Ductwork connections to building openings, external louvres, grilles etc. shall have compatible flanges for airtight fixing.

Test holes shall be accessible for airflow measurement, system balancing, testing and commissioning.

Ductwork shall be cleaned without detrimental effect to finished areas.

Ductwork installations shall be rigid, free from sway, drumming and movement. Ductwork shall be true-to-size and accurately aligned.

Connections to associated equipment and other fittings must also be in proper alignment, to prevent turbulence and associated noise and vibration.

A Medium cleanliness quality class as defined in TR/19 shall be achieved for all ventilation systems unless otherwise specified. Testing shall be carried out on all systems to demonstrate that the acceptable dust accumulation levels are achieved.

Ductwork protection, delivery and installation shall meet TR/19 Intermediate PDI unless otherwise specified.

Provisions made for access for cleaning shall be generally to TR/19. Specialist cleaning contractor shall confirm whether additional provisions are required.

4.8.2.2 Control

No samples required.

The Contractor shall submit a technical submittal complete with all manufacturer information to the Engineer for final approval of the material prior to any orders being placed.

4.8.3 Error! Reference source not found.Error! Reference source not found.Sprinklers

Two new sprinklers and associated pipe work shall be provided to facilitated fire extinguishing for the new access door and lobby area. The sprinkler system shall be provided in accordance with:

- DS/EN 12259 – *Fixed Firefighting systems*
- DBI 251/4001 – *Sprinkleranlæg*.

4.8.3.1 Materials

The Contractor shall supply, install and test all water installation pipes as shown on the drawings, described herein.

All pipes shall fully comply with European, Danish or International standards and carry a third-party approval certification CE pipes. They shall be delivered to site correctly packaged with manufacturer's traceability information.

All pipes shall be marked with the following information at a minimum:

- Manufacturer's Name and Factory Identifier
- CE Mark
- Relevant EN or DS standard number
- Name of Third-Party Approver.

4.8.3.2 General Requirements

The sprinkler pipes shall be complete with all necessary offsets, bends, branches, shoes/connections sprinkler mains within basement to all sprinklers.

Pipes shall be provided with bearings of A2-s1,d0 fire resistance and be provided maximum 900 mm from sprinklers and maximum 4000m for the remain pipework.

All welding shall be in accordance with the description in DBI 251/4001.

4.8.3.3 Sprinkler pipes

New sprinkler pipe shall be delivered as steel pipes, the contractor shall investigate the existing pipe material and provide the new pipework in a similar material in the event that the material deviates from steel.

Sprinkler shall be provided with isolation valve locked in the open position.

The new branch shall be provided with an isolation valves locked in the open position and be provided with drain valves to facilitate drainage of the new branch.

Flushing valves shall be provided at the end of distribution pipes.

4.8.3.3.1 Sizes

All pipes shall be metric sizes. Imperial sizes are not acceptable. If installed, the contractor shall remove the full imperial installation and replace with metric at his own expense.

4.8.3.3.2 Colours

The sprinkler system is given identification and labelling in accordance with DBI 251/4001, section 16.

4.8.3.3.3 Joints

Only joint rings supplied by the manufacturers of the pipes shall be used. Joints shall not be made within the thickness of the structure.

All pipe joint must be approved.

4.8.3.4 Execution

Spigots, sockets and joint rings shall be thoroughly cleaned before laying.

4.8.3.5 Control

Pipework shall be clear of debris prior to testing.

Tests shall be made with air or water. A further water test shall be made on completion of backfilling and surface reinstatement

The Contractor shall submit a technical submittal complete with all manufacturer information to the Engineer for final approval of the material prior to any orders being placed.

5 Decommissioning Works

Reference drawing

- ACC-ARUP-ZZ-00-DR-S-6002

Project conditions

- If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify the Employer, proceed accordingly.
- Maintain existing utilities indicated to remain in service and protect them against damage during deconstruction operations.
- Maintain fire-protection facilities in service during deconstruction operations.

Pre-Deconstruction Site Visit

Review methods and procedures related to deconstruction including, but not limited to, the following:

- Inspect and discuss condition of building to be deconstructed.
- Review structural load limitations of existing structure.
- Review and finalize deconstruction schedule and verify availability of materials, personnel, equipment, and facilities needed to make progress and avoid delays.
- Review requirements of work performed by other trades that rely on substrates exposed by deconstruction operations.
- Review areas where existing construction is to remain and requires protection.
- Review method for removing materials from the site.
- Review staging area for materials on the site.

Deconstruction plan

Present a deconstruction plan to the Employer:

- **Material Identification:** Indicate anticipated types and quantities of materials to be salvaged, recycled, and disposed of. Indicate quantities by weight or volume, but use same units of measure throughout.
- **Procedure:** Describe deconstruction methodology, sequencing, and materials handling and removal procedures. Include the anticipated final destination of each material.

The existing elements to be modified and kept

- Ceiling panels

Examination

- Verify that utilities have been disconnected and capped.

- Survey existing conditions and correlate with requirements indicated to determine extent of deconstruction required.
- Inventory and record the condition of items to be removed and salvaged.
- Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs or videos.
- Perform surveys as the Work progresses to detect hazards resulting from deconstruction activities.

Utility services and mechanical/electrical systems

- Existing Services/Systems: Maintain services/systems indicated to remain and protect them against damage during deconstruction operations.
- Service/System Requirements: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems.

Preparation

- Site Access and Temporary Controls: Conduct deconstruction operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities. The works will be blocking an emergency escape route, hence precautions require coordination and approval well ahead of closing of the site.
- Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to workers and damage to salvageable materials.
- Provide protection to ensure safe passage of workers around deconstruction area.
- Provide weather protection for all salvage materials (and items to remain) before, during and after deconstruction.
- Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain
- Strengthen or add new supports when required during progress of deconstruction.

Deconstruction

- General: Deconstruct and remove existing construction in accordance with the materials identified for removal in the deconstruction plan. Use methods required to complete the Work within limitations of governing regulations and as follows:
- Proceed with deconstruction systematically, from higher to lower level. Complete deconstruction operations above each floor or tier before disturbing supporting members on the next lower level.
- Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing, prying

or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain

- Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
- Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
- Maintain adequate ventilation when using cutting torches.
- Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site in accordance with all federal, state and local regulations.
- Remove structural framing members in such a way as to maintain their highest value.
- Locate deconstruction equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
- Dispose of demolished items and materials promptly.
- Salvaged Items:
 - Sort and organize salvaged materials as they are removed from the structure.
 - Pack, crate or band materials to keep them contained and organized.
 - Store items in a secure and weather protected area until removed from the site or transferred to Owner.
- Transport items to the Employer's long-term storage area, designated by the Employer
- Protect items from damage during transport and storage
- Existing Items to Remain: Protect construction indicated to remain against damage and soiling during deconstruction activities. When permitted by the Employer, items may be removed to a suitable, protected storage location during deconstruction and cleaned and reinstalled in their original locations after deconstruction operations are complete.

Disposal of demolished materials

- General: Except for items or materials indicated to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain the Employer's property, remove demolished materials from Project site and legally dispose of them.
- Do not allow demolished materials to accumulate on-site.
- Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.

- Burning: Do not burn demolished materials.

Cleaning

- Clean adjacent structures and improvements of dust, dirt, and debris caused by deconstruction operations. Return adjacent areas to condition existing before deconstruction operations began.

Compatibility of the existing and the new elements

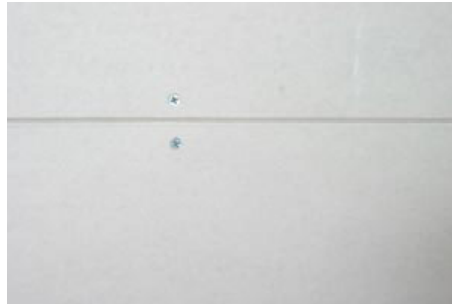
- If a reused element will be used together with the new of the same product, make sure that they fit visually as much as possible. For example: Colors, Textures, Shininess, etc.

Appendix A

Painting

**Sted****UN City Access doors****Kategori**

Indvendig

Underlag

Gipsplade, forsænket kant t. spartling, Q2.

Pladerne skal monteres i henhold til gipspecjen "Hvor går grænsen" 5. udgave 2019.

Q2/Normal klasse: Kvalitetsniveau Q2/Normal klasse opfylder typisk kravene en tapetseret eller malet overflade, hvor der må forventes skyggeeffekter ved strejflys. Eks.: Opholdsrum, soverum, køkken, toilet, entre, kontorlokaler, korridor etc.

Planhedstolerance (målt over 2 m med retskinne): +/- 3mm på stålskelet, +/-5mm på træskelet.

Skelet/underlag: Træ eller stål. Beklædning: Minimum 2 lag gipsplader, yderste lag skal være understøttet under kortkanter.

Det pågældende Q-kvalitetskrav skal klart og tydeligt fremgå af projektbeskrivelsen, fremgår dette ikke vil det være Q2 kvalitetskravet der er gældende.

Forventet udfald

Dækket, Lukket, Glat og Udfyldt flade

Planhedsafvigelser i malerarbejdet følger specifikationerne til underlaget, dvs. at udfaldskravet til spartelarbejdet/malerarbejdet ikke kan blive mere plan end indfaldskravet på det emne der bearbejdes.

Funktionsklasse

II Middel funktionelle krav

Behandlinger2 g. Pletspartling, Loft/vægge: Sandspartelmasse
Ilæg papirstrimmel i spartelmasse, Vægge.: Sandspartelmasse, Papirstrimmel
2 g. spartling af samlinger inkl. slibning.: Sandspartelmasse
Grunding.: Plastgrunder microdisp.
2 g. Maling: Acrylplastmaling mat
Lukning mellem bygningsdele maks 2mm.**Vedligeholdelse****V2013A1**

**Overførselskode****MBA-807SRUQ06****Kommentar**

Hvid som omgivende vægge

Generelle forhold**Prøvningsmetode:**

I forbindelse med afprøvning af den eksisterende overflades bæredygtighed for efterfølgende malebehandling, henvises der til (i forbindelse med tilstandsvurdering) at udføre såvel tapeprøve som afsmitningsprøve

Kulørskifte og glanstrin:

Ved kulørskifte eller ændring af glanstrin må det forventes, at der skal tilkøbes minimum 1 ekstra malebehandling udover det beskrevne. Behov vurderes konkret i hver enkelte opgave/sag.

Behandlingsanvisninger og udbudsmateriale:

Udskrift af behandlingsanvisningerne bør for god ordens skyld altid vedlægges udbudsmaterialet. Dette skyldes, at der under opbygningen af beskrivelserne fremkommer nogle valgmuligheder, der ikke kan fortolkes udelukkende via nummeret på behandlingsanvisningerne, eksempelvis hvilken type vægbeklædning der ønskes.

Negative porehuller:

Negative porehuller kan ikke forventes lukket med almindelig malerbehandling, medmindre der tilvælges beklædning i form af tapet, filt eller lign.

Planhedsafvigelser:

Planhedsafvigelser i malerarbejdet følger specifikationer til underlaget, dvs. at udfaldskravet til spartelarbejdet/malerarbejdet ikke kan blive mere plan end indfaldskravet på det emne der bearbejdes.



Kategori

Indvendig

Underlag



Stål, varmvalset · rør

Der må ikke forekomme overskydende materialer eller skader forårsaget ved monteringen, og fladerne skal være fastsiddende. Rust, glødeskal kan forekomme, dog kan der maks. accepteres rust jf. rustgrad B, ISO 8501-1.

Forventet udfald



Dækket, Lukket og Glat flade

Funktionsklasse

III Høje funktionelle krav

Behandlinger

Rensning, indv. jern: Grundrengøringsmiddel
Grunding indv. jern: Acryl rusth.grundmal
2 g. Maling: Acrylplastmal.halvmat

Vedligeholdelse

V8010A1

Overførselskode

MBA-A07TTUP06

Kommentar

Malerbehandling RHS profiler - hvid

Generelle forhold

Prøvningsmetode:

I forbindelse med afprøvning af den eksisterende overflades bæredygtighed for efterfølgende malebehandling, henvises der til (i forbindelse med tilstandsvurdering) at udføre såvel tapeprøve som afsmitningsprøve

Kulørskifte og glanstrin:

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Behandlingsanvisninger og udbudsmateriale:

Udskrift af behandlingsanvisningerne bør for god ordens skyld altid





vedlægges udbudsmaterialet. Dette skyldes, at der under opbygningen af beskrivelserne fremkommer nogle valgmuligheder, der ikke kan fortolkes udelukkende via nummeret på behandlingsanvisningerne, eksempelvis hvilken type vægbeklædning der ønskes.

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