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Prepared By:

DarntonB3 Building Services

Ground Floor
3 Brooklands Place
Sale, Manchester
M33 3SS
T: 0161 713 0335

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V12 LV SUPPLY

PART 1 SYSTEM OBJECTIVES

100.010 PERFORMANCE OBJECTIVES

The electrical services contractor is to design, supply, install and commission a LV distribution system to facilitate the final circuit small power distribution & external lighting.

100.020 DESIGN PARAMETERS

Incoming supply shall be 400/230Volt, 4 wire, 50 Hz.

The installation shall comply with the following:

- BS7671:2018, 18th Edition Wiring Regulations, Requirements for Electrical Installations.
- The Electricity Supply Regulations.
- The Electricity at Work Regulations 1989.
- Building Regulations Part L2.
- Electricity Safety Quality and continuity Regulations 2002.
- Management strategy for building

100.030 SYSTEM DESCRIPTION

Ladybarn Park:

Ladybarn Park does not have an electrical supply.

The electrical contractor shall undertake a load assessment for the project and shall make the necessary applications to the DNO for the installation of a new dedicated LV supply for this project. The electrical contractor shall be responsible for the design, supply, installation and commissioning of the complete LV supply network, any liaison required with the DNO to ensure a complete energised installation.

The Electrical Contractor is to allow for any site coordination required with the DNO in terms of any temporary de-energisations required to complete the full electrical installation.

The new LV incoming supply shall terminate into an appropriately sized galvanised street cabinet. Final position and colour to be agreed. The electrical contractor shall make allowance that this enclosure will not be a standard finish in terms of material and colour.

Scotland Hall Road:

Scotland Hall Road does not have an electrical supply.

The electrical contractor shall undertake a load assessment for the project and shall make the necessary applications to the DNO for the installation of a new dedicated LV supply for this project. The electrical contractor shall be responsible for the design, supply, installation and commissioning of the complete LV supply network, any liaison required with the DNO to ensure a complete energised installation.

The Electrical Contractor is to allow for any site coordination required with the DNO in terms of any temporary de-energisations required to complete the full electrical installation.

The new LV incoming supply shall terminate into an appropriately sized galvanised street cabinet. Final position and colour to be agreed. The electrical contractor shall make allowance that this enclosure will not be a standard finish in terms of material and colour.

The main distribution board to serve the project shall also be within this enclosure. It shall be of sufficient size and load capacity to offer 25% spare for future development.

Civils/Builders Works:

The electrical contractor shall include for all works required for the complete installation. This will include all elements of builders/civil engineering works. The Electrical contractor is required to make known in detail all builders work requirements of the HV/LV network provider & the chosen electrical supply authority. These details are to be provided to the main contractor and client's team in good time so as not to jeopardise the project either in time or financially. Any un-necessarily incurred costs will be borne by the Electrical contractor. All excavations, ductwork and reinstatement required for the LV supply installation shall be provided by the electrical contractor.

100.050 SYSTEM SCHEMATICS

The Electrical Contractor is to provide detailed distribution schematics showing the arrangement of supplies, cable sizes and circuit breaker sizes with overload settings.

100.060 SYSTEM DRAWINGS

Indicative drawings have been included for tender purposes on drawings:

Scotland Hall Road: 13034-DB3-B01-XX-DR-E-63002
Ladybarn Park: 13034-DB3-B02-XX-DR-E-63002

The Electrical Contractor is to allow for producing all design, working and construction drawings to be used during the Contract works and As Fitted Drawings at the end of the Contract works to be incorporated into the overall Operating and Maintenance Manual. All drawings shall be provided in DWF and DWG format with any Xrefs attached as an overlay with relative paths.

The tender drawings are indicative of intent for tender purposes only and shall not be used to form the detail design or construction issue drawings

PART 2 SELECTION SCHEDULES FOR REFERENCE SPECIFICATIONS**200.000 PART 2 BY SECTION CONTENT**

Please see Y sections for Part 2 content

260.000 CONDUIT AND TRUNKING

Please see Section Y60 CONDUIT AND TRUNKING

261.000 HV/LV CABLES AND WIRING

Please see Section Y61 HV/LV CABLES AND WIRING

262.000 BUSBAR TRUNKING

Please see Section Y62 BUSBAR TRUNKING

263.000 SUPPORT COMPONENTS - CABLES

Please see Section Y63 SUPPORT COMPONENTS - CABLES

271.000 LV SWITCHGEAR AND DISTRIBUTION BOARDS

Please see Section Y71 LV SWITCHGEAR AND DISTRIBUTION BOARDS

280.000 EARTHING AND BONDING COMPONENTS

Please see Section Y80 EARTHING AND BONDING COMPONENTS

281.000 TESTING AND COMMISSIONING OF ELECTRICAL SERVICES:

Please see Section Y81 TESTING AND COMMISSIONING OF ELECTRICAL SERVICES:

282.000 IDENTIFICATION - ELECTRICAL

Please see Section Y82 IDENTIFICATION - ELECTRICAL

290.000 FIXING TO BUILDING FABRIC

Please see Section Y90 FIXING TO BUILDING FABRIC

291.000 OFF-SITE PAINTING AND ANTI-CORROSION TREATMENT

Please see Section Y91 OFF-SITE PAINTING AND ANTI-CORROSION TREATMENT

PART 3 SPECIFICATION CLAUSES SPECIFIC TO V12.

300.000 PRODUCTS/MATERIALS

300.010 FUSE PILLARS AND CABLE DISTRIBUTION CABINETS:

Manufacturer and reference Merlin Gerin, ABB, Siemens

Or approved equivalent following Technical submittal, any such approval shall not be unreasonably withheld

Cables in ducts and below ground to be XLPE / SWA / PVC or XLPE / AWA / PVC as appropriate.

Standard

Comply with requirements of ENA Technical Specification 37.

BS EN 60439-5.

Provide housing with a degree of protection to BS EN 60529 IP 3X.

Material

Cast iron.

Glass reinforced plastic.

Terminations

Make provision for termination and connection of cables and spare ways

Make provision for termination and connection of LV tails to the DNO MCCB.

MCCB CPD's in accordance with BS60947

Manufacturers standard colour powder coated finish

310.000 WORKMANSHIP

310.030 EARTHING:

- BS7671:2018, 18th Edition Wiring Regulations

BS APPENDIX

BS EN 60529:1992

Specification for degrees of protection provided by enclosures (IP code)

V20 LV DISTRIBUTION

PART 1 SYSTEM OBJECTIVES

100.010 PERFORMANCE OBJECTIVES

The distribution of low voltage electricity from new LV supply feeder cabinet to external lighting and local small power supplies.

100.020 DESIGN PARAMETERS

All internal supplies shall operate on a 400/230Volt, 4 wire, 50 Hz principle. The installation shall comply with the following:

- BS7671:2018, 18th Edition Wiring Regulations
- Requirements for Electrical Installations, including any and all amendments.
- The Electricity Supply Regulations.
- The Electricity at Work Regulations 1989.

100.030 SYSTEM DESCRIPTION

The new LV electrical supply shall terminate into SP&N distribution board which shall also be installed within the new street cabinet. This will be the main board to serve the project. It shall be the responsibility of the electrical contractor to adequately size all switchgear required for the complete projects, in accordance with BS7671.

Metering

The Electrical Services Contractor shall design, supply, install and commission energy consumption metering so that the main users of electricity can be monitored for use.

Energy consuming systems shall be monitored locally at each distribution Board.

Small Power (lighting and small power are to be separately monitored through split load boards with individual meters for both lighting and power circuits).

Meters shall be located within the LV street cabinet.

All meters shall be capable of displaying peak demand and reactive loads in kWh, kVA, Amps, Volts, Power Factor and frequency.

General Distribution

The new LV supply shall be utilised to serve the proposed schemes.

All Switchgear and distribution systems shall be sized with 20% spare load capacity and 25% spare way capacity, at the end of the project, or 2No TPN circuits for three phase DB's and 2No SPN circuits for consumer units, whichever is the greater. Cables installed during the contract shall be arranged so that additional cables can be installed by the client when using the spare ways.

All distribution boards shall be complete, including, MCCB's, MCB's, RCD's, RCBO's, blanks, typed circuit chart, lockable door. All distribution boards throughout the building shall have suited lock barrels so that one key will open them all.

Sub-main cabling shall be XLPE/SWA/LSF run on heavy duty return flange galvanized cable tray ladder rack. All cables will be to British Standard manufacture.

Where cable trays run vertically or where cables face the floor on a horizontal run the cables must be steel banded to the tray. All temporary cable ties must be removed prior to handover.

Final circuit wiring shall be in LSF singles/SWA in galvanised trunking/conduits as required.. All cables to be by AEI, Pirelli or Similar and approved.

100.050 SYSTEM SCHEMATICS

The Electrical Contractor is to provide detailed distribution schematics showing the arrangement of supplies, cable sizes and circuit breaker sizes with overload settings

The Electrical Contractor is to allow for producing all design, working and construction drawings to be used during the Contract works and As Fitted Drawings at the end of the Contract works to be incorporated into the overall Operating and Maintenance Manual. All drawings shall be provided in DWF and DWG format with any Xrefs attached as an overlay with relative paths.

The tender drawings are indicative of intent for tender purposes only and shall not be used to form the detailed design or construction issue drawings

PART 2 SELECTION SCHEDULES FOR REFERENCE SPECIFICATIONS

200.000 PART 2 BY SECTION CONTENT

Please see Y sections for Part 2 content

260.000 CONDUIT AND TRUNKING

Please see Section Y60 CONDUIT AND TRUNKING

261.000 HV/LV CABLES AND WIRING

Please see Section Y61 HV/LV CABLES AND WIRING

263.000 SUPPORT COMPONENTS - CABLES

Please see Section Y63 SUPPORT COMPONENTS - CABLES

271.000 LV SWITCHGEAR AND DISTRIBUTION BOARDS

Please see Section Y71 LV SWITCHGEAR AND DISTRIBUTION BOARDS

272.000 CONTACTORS AND STARTERS

Please see Section Y72 CONTACTORS AND STARTERS

274.000 ACCESSORIES FOR ELECTRICAL SERVICES

Please see Section Y74 ACCESSORIES FOR ELECTRICAL SERVICES

280.000 EARTHING AND BONDING COMPONENTS

Please see Section Y80 EARTHING AND BONDING COMPONENTS

281.000 TESTING AND COMMISSIONING OF ELECTRICAL SERVICES:

Please see Section Y81 TESTING AND COMMISSIONING OF ELECTRICAL SERVICES:

282.000 IDENTIFICATION - ELECTRICAL

Please see Section Y82 IDENTIFICATION - ELECTRICAL

290.000 FIXING TO BUILDING FABRIC

Please see Section Y90 FIXING TO BUILDING FABRIC

PART 3 SPECIFICATION CLAUSES SPECIFIC TO V20.

300.000 PRODUCTS/MATERIALS

300.010 METERING:

Single phase digital showing reactive and peak demand in kVA, kWh, Amps. Meter is also to show Voltage and Power Factor.

Manufacturer and reference Group Schneider, Siemens or approved equivalent following Technical submittal, any such approval shall not be unreasonably withheld

Make provision for check metering to comply with Building Regulations AD L2A - L2B as appropriate.

300.020 MAIN DISTRIBUTION BOARD:

A new SP&N distribution board is to have integral surge protection on the incomer and surge protection on all outgoing ways serving external electrical services.

Application Main Sub mains distribution panel

Manufacturer and reference Group Schneider, Siemens, ABB

Or approved equivalent following Technical submittal, any such approval shall not be unreasonably withheld

Standard

Comply with requirements of ENA Technical Specification 37.

Provide housing with a degree of protection to BS EN 60529.

IP 3X.

Material

Mild steel galvanised Powder coated to manufacturers standard colours

Terminations

Make provision for termination and connection of cables and spare ways

Access

Supply front access and labelled for identification.

Components

Isolating switches

Bus bars (phases, neutral & earth).

Fuse carriers.

Bases.

Cartridge fuse links in accordance with BS 88 (BS EN 60269).

Circuit breakers in accordance with BS EN 60947

Finish

Manufacturer's standard finish.

After final painting treat interior with a cork based paint to reduce level of condensation by providing a thermal barrier between enclosure metalwork and internal air.

Base unit

Supply purpose made root unit for cable entry.

Bolt-on.

310.000 WORKMANSHIP

310.010 INSTALLATION:

Install distribution boards in accordance with manufacturer's recommendations.

V22 GENERAL LV POWER

PART 1 SYSTEM OBJECTIVES

100.010 PERFORMANCE OBJECTIVES

The electrical contractor shall design, supply, install and commission outlets and connection units/ isolators etc., throughout the project so as to provide electrical supply connections to individual items of equipment and to provide means of connection for portable appliances.

100.020 DESIGN PARAMETERS

The general LV system shall operate at voltages of 400V 3 phase or 230V single phase.

The installation shall comply in all respects with the current edition of The Institute of Electrical Engineers Requirements for Electrical Installations (BS7671) and all relevant British Standards and statutory requirements.

100.030 SYSTEM DESCRIPTION

Cables shall generally be LSF singles in trunking and conduit, SWA cables via duct network

Any small power outlets are to be arranged in either 32A ring circuits or 20A radial circuits to suit the power loadings of the connected equipment.

Generally, all proposed electrical accessories, where required, are to be IP rated, metal clad.

All accessories / electrical supplies shall be labelled as to their "usage" and provided with self-adhesive labels indicating the full circuit reference.

Cabling shall be installed so as to be able to be rewired without major disruption to finishes unless specifically agreed otherwise. Final connections shall be such that any single element may be removed for repair without disabling the whole circuit indefinitely.

All power sockets shall be wired via ring circuits with RCBO protection where applicable to the 18th Edition Wiring Regulations

Other areas of particular consideration are as follows:

The Electrical Services Contractor shall provide all containment for the complete installation.

The Electrical Services Contractor is to allow for 1No. switched twin socket outlet to be installed within the new LV street cabinet.

All power supplies to all equipment must be transposed onto working drawings by the Successful Electrical Contractor prior to their commencement on site.

The Electrical Contractor is to submit full final Circuit cable Calculations for all Lighting and Power circuits to the Clients Engineer for comment and approval.

100.040 CONTROL REQUIREMENTS

100.060 SYSTEM DRAWINGS

Indicative layouts have been included for tender purposes on drawings 13034-DB3-B01-XX-DR-E-63001, 13034-DB3-B01-XX-DR-E-63002, 13034-DB3-B02-XX-DR-E-63001 & 13034-DB3-B02-XX-DR-E-63002,

The Electrical Contractor is to allow for producing all design, working and construction drawings to be used during the Contract works and As Fitted Drawings at the end of the Contract works to be incorporated into the overall Operating and Maintenance Manual.

All drawings shall be provided in DWF and DWG format with any Xrefs attached as an overlay with relative paths.

The tender drawings are indicative of intent for tender purposes only and shall not be used to form the detailed design or construction issue drawings.

PART 2 SELECTION SCHEDULES FOR REFERENCE SPECIFICATIONS

260.000 CONDUIT AND TRUNKING

Please see Section Y60 CONDUIT AND TRUNKING

261.000 HV/LV CABLES AND WIRING

Please see Section Y61 HV/LV CABLES AND WIRING

262.000 BUSBAR TRUNKING

Please see Section Y62 BUSBAR TRUNKING

263.000 SUPPORT COMPONENTS - CABLES

Please see Section Y63 SUPPORT COMPONENTS - CABLES

271.000 LV SWITCHGEAR AND DISTRIBUTION BOARDS

Please see Section Y71 LV SWITCHGEAR AND DISTRIBUTION BOARDS

274.000 ACCESSORIES FOR ELECTRICAL SERVICES

Please see Section Y74 ACCESSORIES FOR ELECTRICAL SERVICES

280.000 EARTHING AND BONDING COMPONENTS

Please see Section Y80 EARTHING AND BONDING COMPONENTS

281.000 TESTING AND COMMISSIONING OF ELECTRICAL SERVICES:

Please see Section Y81 TESTING AND COMMISSIONING OF ELECTRICAL SERVICES:

282.000 IDENTIFICATION - ELECTRICAL

Please see Section Y82 IDENTIFICATION - ELECTRICAL

290.000 FIXING TO BUILDING FABRIC

Please see Section Y90 FIXING TO BUILDING FABRIC

291.000 OFF-SITE PAINTING AND ANTI-CORROSION TREATMENT

Please see Section Y91 OFF-SITE PAINTING AND ANTI-CORROSION TREATMENT

V41 STREET/AREA/FLOOD LIGHTING

PART 1 SYSTEM OBJECTIVES

100.010 PERFORMANCE OBJECTIVES

To provide illumination to footpaths and associated areas for security/amenity/general use purposes. To provide illumination to MUGA pitch for sports use.

100.020 DESIGN PARAMETERS

BS7671: 2008, Requirements For Electrical Installations, including any and all amendments.
C.I.B.S.E. Lighting Guide especially LG4
Local Building Control and Landlord Requirements.
ILE Recommendations for Reduction of Obtrusive Light to neighbouring properties.

100.030 SYSTEM DESCRIPTION

Illumination will be via a mixture of column and post mounted luminaries as required to meet the design and as agreed aesthetically with the client's team.

New external lighting will be provided to:

Ladybarn Park: MUGA and associated playing areas
Scotland Hall Road: MUGA, associated playing areas and footpaths

The scheme proposed shall be LED lighting columns and LED post mounted lighting to the walkways and footpaths. The installation shall comply with requirements of; CIBSE LG6, LG4 and the ILE 'Recommendations for Reduction of Obtrusive Light to Neighbouring properties'.

The proposed external lighting scheme is to comprise of the following:-

MUGA pitch lighting shall be provided by Tam-lite/Thorlux Lighting (or similar and approved manufacturer) mounted on hinged columns/posts for ease of maintenance. All columns and posts shall be Cool Grey 11: Pantone Cool Grey 11 / C69 M59 Y51 K34 / R38 G44 B38 / #262C26

The contractor is to ensure two number mast lowering mechanisms are provided and handed over at project completion

The footpaths and walkways shall be provided by column/post mounted lighting.

The Electrical Contractor will be required to develop the DB3 design and submit the external lighting calculations to the Clients Engineer for comment and approval. The Electrical Services Contractor shall consider the impact of the external illumination upon the surrounding area, and roadways during installation

Due to the sites close proximity to a residential area, extreme care will be taken in the selection of suitable lighting fittings to minimise the visual impact to the adjacent residents. The external lighting to parking area and Building Perimeter will be designed to comply with the ILE "Guidance Notes for the Reduction of Obtrusive Light" - GN01 and utilise luminaries with double asymmetric beams to reduce the diffused light effects. Details of the fittings and the design of the system will be submitted to the Planning Department for approval prior to installation work commencing.

When considering the installation of external luminaries it is to be assumed that there will be attempts at vandalism and the installation should reflect this.

External lighting shall be switch controlled. Local switching/control shall be housed within the new LV street cabinet.

The street cabinet colour shall be Cool Grey 11:Pantone Cool Grey 11 / C69 M59 Y51 K34 / R38 G44 B38 / #262C26 in finish

All external light fittings for the building, access ways and pathways shall have luminous efficacy to comply with all planning conditions.

Builders work

The electrical contractor shall include for all builders/civil engineering works. Any unnecessarily incurred costs will be borne by the Electrical Services Contractor.

100.040 CONTROL REQUIREMENTS

Indicative layouts have been included for tender purposes on drawings:

Scotland Hall Road: 13034-DB3-B01-XX-DR-E-63002

Ladybarn Park: 13034-DB3-B02-XX-DR-E-63002

All external lighting shall be locally switched controls within the new LV street cabinet.

100.050 SYSTEM SCHEMATICS

The Contractor shall allow for the production of schematics showing the full cabling requirements of all systems and interface arrangements with all other relevant systems.

100.060 SYSTEM DRAWINGS

The Electrical Contractor is to allow for producing all design, working and construction drawings to be used during the Contract works and As Fitted Drawings at the end of the Contract works to be incorporated into the overall Operating and Maintenance Manual.

All drawings shall be provided in DWF and DWG format with any Xrefs attached as an overlay with relative paths.

The tender drawings are indicative of intent for tender purposes only and shall not be used to form the detailed design or construction issue drawings.

PART 2 SELECTION SCHEDULES FOR REFERENCE SPECIFICATIONS

260.000 CONDUIT AND TRUNKING

Please see Section Y60 CONDUIT AND TRUNKING

261.000 HV/LV CABLES AND WIRING

Please see Section Y61 HV/LV CABLES AND WIRING

263.000 SUPPORT COMPONENTS - CABLES

Please see Section Y63 SUPPORT COMPONENTS - CABLES

271.000 LV SWITCHGEAR AND DISTRIBUTION BOARDS

Please see Section Y71 LV SWITCHGEAR AND DISTRIBUTION BOARDS

273.000 LUMINAIRES AND LAMPS

Please see Section Y73 LUMINAIRES AND LAMPS

274.000 ACCESSORIES FOR ELECTRICAL SERVICES

Please see Section Y74 ACCESSORIES FOR ELECTRICAL SERVICES

280.000 EARTHING AND BONDING COMPONENTS

Please see Section Y80 EARTHING AND BONDING COMPONENTS

281.000 TESTING AND COMMISSIONING OF ELECTRICAL SERVICES:

Please see Section Y81 TESTING AND COMMISSIONING OF ELECTRICAL SERVICES:

282.000 IDENTIFICATION - ELECTRICAL

Please see Section Y82 IDENTIFICATION - ELECTRICAL

290.000 FIXING TO BUILDING FABRIC

Please see Section Y90 FIXING TO BUILDING FABRIC

291.000 OFF-SITE PAINTING AND ANTI-CORROSION TREATMENT

Please see Section Y91 OFF-SITE PAINTING AND ANTI-CORROSION TREATMENT

PART 3 SPECIFICATION CLAUSES SPECIFIC TO V41.

300.000 PRODUCTS/MATERIALS

300.030 LIGHTING CONTROL EQUIPMENT:

Application External Lighting

Manufacturer and reference Group Schneider

Or approved equivalent following Technical submittal, any such approval shall not be unreasonably withheld

Street lighting

310.000 WORKMANSHIP

310.010 INSTALLATION:

Install equipment for street, area or flood lighting in accordance with manufacturer's instructions.

W20 CCTV & VEHICLE/PERSONS COUNTER

PART 1 SYSTEM OBJECTIVES

100.010 PERFORMANCE OBJECTIVES

Provision of a new CCTV and vehicle/person counter systems to both **Ladybarn Park & Scotland Hall Road**.

100.020 DESIGN PARAMETERS

Client Requirements

100.030 SYSTEM DESCRIPTION & CONTROLS

CCTV System

The Contractor shall include for the installation of a networked digital CCTV system, associated containment and power supplies.

PLEASE NOTE: BOTH THE CCTV SYSTEM AND THE VEHICLE/PERSON COUNTER SYSTEMS WILL BE FREE ISSUE TO THE CONTRACTOR TO INSTALL.
INDICATIVE POSITIONS HAVE BEEN SHOWN ON TENDER DRAWINGS FOR INFORMATION.

The contractor shall include for co-ordination, installation and commissioning of these systems, which may require both hardwired and wireless connections from each CCTV location/Vehicle/Persons counter point back to the new street cabinets. The contract shall include for any excavations, duct networks required and reinstatement of the ground to complete the installation.

100.050 SYSTEM SCHEMATICS

The Contractor shall allow for the production of schematics showing the full cabling requirements of the CCTV systems and persons counter systems.

100.060 SYSTEM DRAWINGS

The Electrical Contractor is to allow for producing all design, working and construction drawings to be used during the Contract works and As Fitted Drawings at the end of the Contract works to be incorporated into the overall Operating and Maintenance Manual.

All drawings shall be provided in DWF and DWG format with any Xrefs attached as an overlay with relative paths.

The tender drawings are indicative of intent for tender purposes only and shall not be used to form the detailed design or construction issue drawings.

Cabling shall be designed so as to be able to be rewired without major disruption to finishes unless specifically agreed otherwise and final connections shall be such that any single element may be removed for repair without disabling the whole circuit indefinitely. It is to be assumed that the building operators will wish to keep a high standard of maintenance and the design shall assist that desire. The cable type will be determined by the specialist and shall be installed on an Extra low voltage cable basket network, which may be used for all ELV systems. Cables leaving the cable basket shall be enclosed in conduits to within 300mm of the camera position. The bulk cables dropping to the multiplex unit shall be enclosed in trunking.

The Electrical Contractor is to allow for fire seals to locations where cable tray and trunking etc. pass through fire compartments in floors and walls via intumescent pads fixed to the insides of the trunking to match the fire resistance of the fire compartment being penetrated.

Where containment systems pass through fire walls a section of solid lid is to be fixed over the containment and extend either side of the wall for a minimum distance of 150mm.

Where cable tray and basket tray pass through fire walls they shall be fire stopped using cablofil EZ-Path intumescent fire stopping modules or approved equivalent following Technical submittal, any such approval shall not be unreasonably withheld. Identification labels are to be permanently fixed either side of all fire stopping material installations.

All fire stopping to the external sides of the containment systems shall be carried out by the main contractor.

The electrical contractor shall include for the electrical and specialist services installation to be routed in a neat, symmetrical, and aesthetically pleasing manner around the building to comply with all regulations / British standards and to be co-ordinated with all other services and building constraints

Builders work

The main contractor will provide all builders' works above minor holes and chases. The electrical contractor is required to make known in detail all builders work requirements to the main contractor and the client's team in good time so as not to jeopardize the project either in time or financially. Any unnecessarily incurred costs will be borne by the Electrical Contractor. The Electrical Contractor must make known all the proposed Builders work elements for the CCTV / MATV System i.e. all Trenching and ducting details prior to Ground Works commencing.

PART 2 SELECTION SCHEDULES FOR REFERENCE SPECIFICATIONS

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Please see Section Y61 HV/LV CABLES AND WIRING

263.000 SUPPORT COMPONENTS - CABLES

Please see Section Y63 SUPPORT COMPONENTS - CABLES

274.000 ACCESSORIES FOR ELECTRICAL SERVICES

Please see Section Y74 ACCESSORIES FOR ELECTRICAL SERVICES

280.000 EARTHING AND BONDING COMPONENTS

Please see Section Y80 EARTHING AND BONDING COMPONENTS

281.000 TESTING AND COMMISSIONING OF ELECTRICAL SERVICES:

Please see Section Y81 TESTING AND COMMISSIONING OF ELECTRICAL SERVICES:

282.000 IDENTIFICATION - ELECTRICAL

Please see Section Y82 IDENTIFICATION - ELECTRICAL

290.000 FIXING TO BUILDING FABRIC

Please see Section Y90 FIXING TO BUILDING FABRIC

291.000 OFF-SITE PAINTING AND ANTI-CORROSION TREATMENT

Please see Section Y91 OFF-SITE PAINTING AND ANTI-CORROSION TREATMENT

PART 3 SPECIFICATION CLAUSES SPECIFIC TO W20.

300.000 GENERAL

300.100 CCTV SYSTEM SPECIALIST:

Engage a CCTV specialist to develop design, supply, install, commission and set to work a complete CCTV system.

ADT systems or similar and approved.

310.000 PRODUCTS/MATERIALS

310.219 CCTV NOTIFICATION SIGNS:

Manufacturer and reference As specialist recommendations and British Standard

Or approved equivalent following Technical submittal, any such approval shall not be unreasonably withheld

320.000 WORKMANSHIP

320.015 CCTV SYSTEM INSTALLATION:

Install the CCTV system in accordance with the manufacturers recommendations and BS 7958.

320.025 CCTV SYSTEM DEMONSTRATION:

Demonstrate that the CCTV system meets the specified requirements and record results. Handover CCTV and documented demonstration results to user.

Carry out demonstration using test objective as:

BS EN 50132-7 Annex A

320.026 CCTV SYSTEM DOCUMENTATION:

Prepare record documents and hand over to the client/end user.

320.030 TRAINING:

Train the personnel responsible for operating the system.

Radio and television reception and distribution system

CCTV system

BS APPENDIX

BS 6259:1997

Code of practice for the design, planning, installation, testing and maintenance of sound systems

BS 7587:1992

Specification for interconnection of radio and TV receivers to feeder system outlets

BS 7958:2009

Closed-circuit television (CCTV). Management and operation. Code of practice

BS 8418:2003

Installation and remote monitoring of detector activated CCTV systems. Code of practice

BS 8495:2007

Code of practice for digital CCTV recording systems for the purpose of image export to be used as evidence

BS EN 50132-5:2001

Alarm systems. Part 5 CCTV surveillance systems for use in security applications. Video transmission

BS EN 50132-7:1996

Alarm systems. Part 7 CCTV surveillance systems for use in security applications. Application guidelines

BS EN 60065:2002+A1:2006

Audio, video and similar electronic apparatus. Safety requirements

BS EN 61030:1993

Specification for domestic digital bus (D2B) for audio, video and audio-visual systems

W30 DATA TRANSMISSION
PART 1 SYSTEM OBJECTIVES
100.010 PERFORMANCE OBJECTIVES

There is no requirement for a data installation as part of this project.

W41 SECURITY DETECTION AND ALARM
PART 1 SYSTEM OBJECTIVES

100.010 PERFORMANCE OBJECTIVES

There is no requirement for a security installation as part of this project.

W50 FIRE DETECTION AND ALARM
PART 1 SYSTEM OBJECTIVES
100.010 PERFORMANCE OBJECTIVES

There is no requirement for a fire alarm installation as part of this project.

W51 EARTHING, BONDING, EMC MEASURES AND SURGE PROTECTION

PART 1 SYSTEM OBJECTIVES

100.010 PERFORMANCE OBJECTIVES

To provide an effective and complete earthing system and arrangements to suit the proposed electrical installation

100.020 DESIGN PARAMETERS

BS7671:2008, Requirements for Electrical Installations, including all subsequent amendments. BS 7430, Code of Practice for Earthing.

100.030 SYSTEM DESCRIPTION

The Electrical services contractor shall design, supply, install and commission a complete earthing system to cover all aspects of BS7671: Requirements for Electrical Installations and shall in particular note the requirements within of Part 5, sections 54: Earthing Arrangements and Protective Conductors plus the relevant sections of Part 6, and BS 7430, Code of Practice for Earthing.

A separate earth bar shall be installed at the mains intake from which all equipotential bonding is to be connected. A test link is to be included.

The Contractor is to allow for bonding the structural steelwork, main switchgear and lightning protection to the main earth bar. All extraneous metal to be cross bonded in line with BS7430.

The Contractor is to allow for bonding any proposed external metal street furniture within the scheme. Earthing cabling shall be arranged so as to be able to disconnect any element for repair without disturbing the electrical earthing connection of any other element.

Along with general earthing to BS7671/BS7430, the Electrical services contractor should note the requirement of a clean earth system to any data panel.

The electrical services contractor shall note on the electrical installation certificate the next time the site should be periodically inspected to comply with BS 7671

The electrical contractor shall include for the electrical and specialist services installation to be routed in a neat, symmetrical, and aesthetically pleasing manner around the building to comply with all regulations / British standards and to be co-ordinated with all other services and building constraints

Builders work

The main contractor will provide all builders' works above minor holes and chases. The electrical contractor is required to make known in detail all builders work requirements to the main contractor and the client's team in good time so as not to jeopardize the project either in time or financially. Any unnecessarily incurred costs will be borne by the Electrical Contractor.

100.040 CONTROL REQUIREMENTS

100.050 SYSTEM SCHEMATICS

The entire Earthing schematic shall be included on the mains distribution schematic showing all main equipotential bonds.

100.060 SYSTEM DRAWINGS

The Electrical Contractor is to allow for producing all design, working and construction drawings to be used during the Contract works and As Fitted Drawings at the end of the Contract works to be incorporated into the overall Operating and Maintenance Manual.

All drawings shall be provided in DWF and DWG format with any Xrefs attached as an overlay with relative paths.

The tender drawings are indicative of intent for tender purposes only and shall not be used to form the detailed design or construction issue drawings.

PART 2 SELECTION SCHEDULES FOR REFERENCE SPECIFICATIONS

280.000 EARTHING AND BONDING COMPONENTS

Please see Section Y80 EARTHING AND BONDING COMPONENTS

281.000 TESTING AND COMMISSIONING OF ELECTRICAL SERVICES:

Please see Section Y81 TESTING AND COMMISSIONING OF ELECTRICAL SERVICES:

282.000 IDENTIFICATION - ELECTRICAL

Please see Section Y82 IDENTIFICATION - ELECTRICAL

290.000 FIXING TO BUILDING FABRIC

Please see Section Y90 FIXING TO BUILDING FABRIC

PART 3 SPECIFICATION CLAUSES SPECIFIC TO W51

300.000 GENERAL

300.010 STANDARDS:

Carry out electrical system earthing work in accordance with BS 7671 (IEE wiring regulations), BS 7430, Electricity, Safety, Quality and Continuity Regulations and Local Electricity Supply Authority requirements. Comply with the requirements of BS EN 50174 and BS EN 50310.

300.020 EARTHING AND BONDING SCHEDULE:

Carry out earthing and bonding installation:-

300.030 PME INSTALLATIONS:

Type TNCS

Provide protective conductors.

Size As Electrical Contractor design

300.032 COMMON BONDING NETWORK:

Form a Common Bonding Network for information technology equipment by equipotential bonding of metalwork throughout the building. Carry out work to the Common Bonding Network in accordance with BS 7671, BS EN 50174 and BS EN 50310. Include in the CBN

Steel structural frames.

Reinforcement bars in concrete.

Metallic roof coverings.

Ceiling grids.

Services

Dry risers.

Water services.

Air duct lines.

Gas services.

Power cable containment

300.034 USE OF BUILDING ELEMENTS:

Ensure that building and structural elements used as items in or bonded to the Common Bonding Network are designed and erected in accordance with BS EN 50174 and BS EN 50310 as well as their appropriate constructional specification or code of practice. Ensure that all connections to building and structural elements are waterproof and corrosion protected to a degree appropriate to their exposure.

300.036 MESH BN:

300.050 SOIL TESTS:

Carry out soil tests in accordance with BS 1377 to establish soil electrical resistivity and
Redox potential (V).
Moisture content (%).
Dissolved salts
Chloride.
ph.
Organic acids.

300.060 RISE IN POTENTIAL IN TELECOMMUNICATIONS

Ensure the potential rise in telecommunications circuits due to power system earth faults is limited, as BS 6701

300.070 EXCHANGE OF INFORMATION:

Consult with the electricity supply company regarding the earthing arrangements of the installation. Construct the earthing system to the requirements of electricity supply company. Ensure any part of the earth fault current path provided by the electricity supply company or others is suitable for the operation of the earth fault protection to be installed. Obtain the agreement and permission of undertakings providing services which are to be bonded to the earthing system.

300.090 ELECTROMAGNETIC SITE SURVEY:

Carry out electromagnetic site survey and report findings to CA.
Area to be surveyed Site around the proposed building as highlighted on 91299-G7-GA-101
Take site measurements of
Conducted disturbances
Frequency ranges
Electromagnetic field strengths
Frequency range
Engage a specialist to carry out the electromagnetic site survey.

300.100 PROTECTION OF ELECTRONIC EQUIPMENT:

Protect electronic equipment in buildings in accordance with BS 7671 and BS EN 62305.
Equipment transient design level (Volts)
Transient control level (Volts)
Protect telecommunication lines in accordance with BS EN 61663.

310.000 PRODUCTS/MATERIALS

310.020 MAIN EARTH TERMINAL:

Provide earth bar at incoming electrical service position, for each switchboard.
Bond earth terminals and metallic structure of switch and control gear and plant.
Connect each earth terminal to all other earth terminals by a conductor sized as BS 7671.
Location
Adjacent to main LV switch panel.
Mounting
Mount earth bar on insulated supports located at 300mm centres for 25mm bar and 450mm centres for 50mm bar, giving 30mm clearance at rear of bar.
Drill clearance holes, one for each cable plus 30% spare holes (two minimum) at 50mm minimum centres through bar for connection of cable lugs. Ensure clearance holes are minimum necessary size to maintain adequate lug/bar contact.

310.030 MAIN EARTH TERMINAL CONNECTIONS:

Connect main earth conductors and main equipotential bonding conductors to main earth terminals.
Terminate circuit protective conductors on switchboard earthing bar.
Terminate conductors with
compression type lugs suitable for bolting direct to bar.
Extend protective conductor from incoming main cable gland direct to main earth terminal.

Extend separate protective conductor from main earth terminal to main switch/switch panel served by incoming main cable.

When main cable is provided by electrical supply Company, extend separate protective conductor from Main Cable armouring gland or direct earth terminals or PME earth installed by supply Company to main earth terminal.

Bond all main equipment and plant to an earth terminal, connected to the bonding ring conductor.

Connect telecommunications and data equipment in accordance with BS 6701.

310.060 NEUTRAL/EARTH CONNECTION:

Provide earth leakage protection system and position neutral/earth connection

310.140 SAFETY EARTHING:

Provide safety earthing in accordance with BS 6626.

Earthing switches

Integral earthing in circuit breakers

310.160 SURGE PROTECTION DEVICES:

Manufacturer and reference

Or approved equivalent following Technical submittal, any such approval shall not be unreasonably withheld

Standard - (LV Power) BS EN 61643-11.

Standard - (Telecommunications) BS EN 61663-2.

320.000 WORKMANSHIP

320.010 INSTALLATION OF EARTHING SYSTEM:

Carry out installation of earthing system in accordance with BS 7430.

320.020 WORK ON SITE:

Ensure that all building works are completed and service connections are provided,

By others.

320.030 QUALITY CONTROL:

Handle, store and install all equipment and components of the lightning protection system in accordance with the manufacturer's recommendations and

BS 7430.

BS 7671.

Inspect all equipment and components on delivery, before fixing and after installation and reject and replace any which are defective.

Test and commission the system in accordance with BS 7671 and as specified.

Record all test measurements.

320.040 EQUIPOTENTIAL BONDING:

Bond to main earth terminal all extraneous conductive parts of the installation in accordance with BS 7430.

BS 7671.

BS EN 50174.

BS EN 50310.

BS EN 62305.

Ensure the following services are bonded

Structured steel

Concrete steel reinforcement

Metallic ceiling grids

Main water pipes.

Main gas pipes.

Air duct lines.

Heating pipework.
Chilled water pipework.
Exposed metallic parts of building structure.
Thermal insulation metallic cladding.
Metallic cable sheaths of all cables except British Telecom.
Lightning protection systems.
Bond with supplementary equipotential bonds to protective conductor system, all simultaneous accessible conductive.
Ensure the following areas are bonded to BS 7671, Section 701.
bathrooms and shower rooms.
Bond to non-current carrying parts of electrical installation in associated spaces to BS 7430.
Use clamps to BS 951 for bonding of pipes.

320.060 LOW VOLTAGE SHEATHS AND ARMOUR:

Bond the sheaths and armour of low voltage cables solidly to earth,
3 core cables, at both ends.
Single core cables
At both ends.
Single point, with separate circuit protective conductors.

320.070 METALLIC FENCING:

Bond to earth any metallic fencing enclosing earth electrical system in accordance with BS 7430.

320.080 IDENTIFICATION:

Use numbered and/or lettered plastic cable sleeves to indicate circuit numbers and phases of corresponding phase conductors.
Ensure conductors are connected to earth bar in same sequence as phase and neutral conductors.
Identify at substation, switchboard and building earth bars each protective, bonding and earthing conductor. Provide labels on bars adjacent to each conductor.

320.160 EARTHING OF ELECTRICALLY SUPPLIED STREET FURNITURE:

Install earthing to street furniture in accordance with BS 7671.
TN-S systems. Use cable with separate phase neutral and protective conductors to supply street furniture. Ensure on the load side of the protective device separate phase, neutral and protective conductors are used. Bond conductive parts of the street furniture to the earthing terminal within the equipment. Connect the supply protective conductor to the same earthing terminal.
TN-C-S systems. Use a combined neutral and earth (CNE) cable to supply street furniture. Use separate conductors for phase, neutral and protection on the load side of the protective device. Bond exposed conductive parts of the street furniture using a 10mm², or the size of the neutral if smaller, cable. Do not bond small items unlikely to come into contact with exposed or extraneous conductive parts or earth. On circuits feeding more than one item of street furniture, provide an earth electrode of 20ohm or less resistance at the last or pen-ultimate item of furniture on the circuit. Where an electrode resistance of 20ohm cannot be achieved, provide earth electrodes at each item of furniture.
TN-C where the supplier's earth terminal is not used or TT systems. Install a protective earth electrode system at the source of supply. Use cable with separate phase neutral and protective conductors to supply the street furniture, with the protective conductor connected to the earth electrode. Ensure on the load side of the protective device separate phase, neutral and protective are used. Bond conductive parts of the street furniture to the earthing terminal within the equipment. Connect the supply protective conductor to the same earthing terminal.

320.190 SURGE PROTECTION DEVICES:

Install surge protection devices in accordance with BS 7671, BS EN 50174 and BS EN 61643-11 and the manufacturer's recommendations.
Provide transient suppression plates to BS EN 50174 as necessary

BS APPENDIX

BS 6626:1985

Code of practice for maintenance of electrical switchgear and control gear for voltages above 1 kV and up to and including 36 kV

BS 6701:2004

Telecommunications equipment and telecommunications cabling. Specification for installation, operation and maintenance

BS 7430:1998

Code of practice for earthing

BS 7671:2008

Requirements for electrical installations. IEE Wiring Regulations. Seventeenth edition

BS 951:2009

Electrical earthing. Clamps for earthing and bonding. Specification

BS EN 50174-2:2001

Information technology. Cabling installation. Part 2 Installation planning and practices inside buildings

BS EN 50310:2006

Application of equipotential bonding and earthing in buildings with information technology equipment

BS EN 61643-11:2002

Low voltage surge protective devices. Part 11 Surge protective devices connected to low-voltage power systems. Requirements and tests

BS EN 61663-2:2001

Lightning protection. Telecommunication lines. Part 2 Lines using metallic conductors

W52 LIGHTNING PROTECTION

PART 1 SYSTEM OBJECTIVES

100.010 PERFORMANCE OBJECTIVES

To protect the building and occupants against the possibility of damage brought about by a lightning strike

100.020 DESIGN PARAMETERS

BS6651: Protection of structures against lightning. BSEN 62305 2006

100.030 SYSTEM DESCRIPTION

The contractor shall engage a lightning protection specialist to design, supply install and commission a lightning protection system for the complete project, including MUGA lighting columns.

Down conductors are to be afforded by connecting the aerial termination network to the vertical; lighting columns.

The ground termination network is to be by connection to earth rods to a test position.

Earth rods provided with disconnecting clamps and inspection pits for testing. Surge protection to all roof mounted devices and external electrical services including but not limited to external lighting, external mech plant etc.

On completion the system shall be tested by the system specialist for compliance with BSEN 62305-01 2006.

The electrical contractor shall furnish the proposed specialist with a full set of structural and architectural layouts so all structural materials are known i.e. quantity of post/columns.

The specialist will be required to ascertain the ground conditions in the area prior to quoting/designing as earth matting may be required. The specialist will be required where possible to connect onto the structural re-bar to avoid/reduce the number of down tapes.

The Specialist is to provide surge protection to comply with BSEN 62305-01 2006.

They shall also include for 12 months maintenance and full commissioning.

To comply with the latest regulations all vertical structural steelwork not forming part of the lightning protection system shall be bonded to earth via a tape connection to the reinforcing bars in the structural piles. This work is to be carried out by the Civil / Structural contractor with materials supplied by the lightning protection specialist.

Builders work

The main contractor will provide all builders' works above minor holes and chases. The electrical contractor is required to make known in detail all builders work requirements to the main contractor and the client's team in good time so as not to jeopardize the project either in time or financially. Any unnecessarily incurred costs will be borne by the Electrical Contractor.

100.060 SYSTEM DRAWINGS

The Electrical Contractor is to allow for producing all design, working and construction drawings to be used during the Contract works and As Fitted Drawings at the end of the Contract works to be incorporated into the overall Operating and Maintenance Manual.

All drawings shall be provided in DWF and DWG format with any Xrefs attached as an overlay with relative paths.

The tender drawings are indicative of intent for tender purposes only and shall not be used to form the detailed design or construction issue drawings.

PART 2 SELECTION SCHEDULES FOR REFERENCE SPECIFICATIONS

280.000 EARTHING AND BONDING COMPONENTS

Please see Section Y80 EARTHING AND BONDING COMPONENTS

281.000 TESTING AND COMMISSIONING OF ELECTRICAL SERVICES:

Please see Section Y81 TESTING AND COMMISSIONING OF ELECTRICAL SERVICES:

282.000 IDENTIFICATION - ELECTRICAL

Please see Section Y82 IDENTIFICATION - ELECTRICAL

290.000 FIXING TO BUILDING FABRIC

Please see Section Y90 FIXING TO BUILDING FABRIC

PART 3 SPECIFICATION CLAUSES SPECIFIC TO W52

300.000 GENERAL

300.010 STANDARDS:

Provide lightning protection system in accordance with BS EN 62305.

Provide lightning protection connection components complying with BS EN 50164-1, BS EN 50164-2 and BS EN 50164-3.

300.015 TYPE OF LIGHTNING PROTECTION SYSTEM (LPS):

Provide a external isolated LPS.

300.020 USE OF BUILDING ELEMENTS:

Ensure that building and structural elements used in or bonded to the lightning protection system are designed and erected in accordance with BS EN 62305 as well as their appropriate constructional specification or code of practice. Ensure that all connections to building and structural elements are waterproof and corrosion protected to a degree appropriate to their exposure. Use BS EN 62305-3 Annex E as a code of practice for the design and construction of the LPS.

300.030 LIGHTNING PROTECTION SPECIALIST:

Engage a lightning protection specialist to carry out the following elements of the lightning protection system (LPS).

Design.

Installation.

Testing.

Commissioning.

Specialist: Santon Lightning Protection, BEST.

300.040 APPROVALS:

Obtain the approval of all authorities concerned for the installation of the lightning protection system. Comply with the regulations of all concerned authorities for the installation and connection of public utility services to a common earth termination network; comply with agreements made with bodies concerned with other services connected to a common earth termination network.

Public utility services

Electricity

Water

Gas

Telecommunication

300.050 REGULATIONS AND AGREEMENTS:

Comply with the regulations of all concerned authorities for the installation and connection of public utility services to a common earth termination network; comply with agreements made with bodies concerned with other services connected to a common earth termination network.

Public utility services

Electricity

Water

Gas

Telecommunication

Other services

Broadcast reception systems

Private telecommunication

Wide band cable systems

300.060 BONDING OF SERVICES:

Bond all metallic services in or on the structures in accordance with BS EN 62305 and as indicated in the Schedules and Drawings.

300.070 PROTECTION OF ELECTRONIC EQUIPMENT:

Protect electronic equipment in buildings in accordance with BS EN 62305.

Equipment transient design level (Volts)

Transient Control level (Volts)

Protect telecommunication lines in accordance with BS EN 61663.

310.000 PRODUCTS/MATERIALS

310.010 TEST JOINTS:

Manufacturer and reference As specialist standard

Or approved equivalent following Technical submittal, any such approval shall not be unreasonably withheld

Standards

BS EN 50164 and BS EN 62305.

Conductor

Form

Rod.

Strip.

Strand.

Flexible.

Material

Copper

Link disconnecting

Base

MS channel

Wooden

Insulators

Copper Link.

Stud.

Size

Material

Bronze

Test and Junction Clamp

Square

Oblong

Plate

Screw-down

Corrosion inhibitor used on disconnecting joints Denzel tape

310.020 BUILDING ELEMENTS:

Use building elements as natural conductors in accordance with BS EN 62305-3 using Annex E as a code of practice for design and construction.

Ensure reinforcing bars are in good electrical contact by

Multiple fortuitous contact by binding wire.

310.030 LIGHTNING PROTECTION SYSTEM BONDS:

Manufacturer and reference SLP, BEST

Or approved equivalent following Technical submittal, any such approval shall not be unreasonably withheld

Rigid.

Flexible.

Re-bar

Provide purpose made bonding clamp

Metal work clamp

Rain Water down pipe bond

Water main bond

Tower earth clamp

Re-bar earth point

Front plate

Re-bar clamp

Bond material

Form

Flexible Tape

Material

Copper

BS EN 60228.

Connectors to down conductor or air terminal

Test and Junction

Bolted

Compression joint

320.000 WORKMANSHIP

320.010 INSTALLATION:

Install the lightning protection system and its element in accordance with the manufacturer's recommendations and BS 7430.

320.020 WORK ON SITE:

Ensure that all building works are completed and service connections are provided,

By others.

320.030 QUALITY CONTROL:

Handle, store and install all equipment and components of the lightning protection system in accordance with the manufacturer's recommendations and

BS EN 62305.

BS 7430.

Inspect all equipment and components on delivery, before fixing and after installation and reject and replace any which are defective.

Test and commission the system in accordance with BS EN 62305 and as specified.

Record all test measurements.

320.040 BONDING:

Bond building structural elements and metallic services as BS EN 62305 including,

Steel structural frame.

Reinforcement bars in concrete.

Metallic roof coverings.

Services

Television and radio aerials and supports.

Metal flues and flue lining.

Window cleaning gear.

Dry risers.

Water services.

Air duct lines.

Gas services.

Roof level plant rooms.

Water tanks.

Isolate building structural elements and metallic services as BS EN 62305 including

Television and radio aerials and supports.

320.050 LABELLING:

Provide and fix system labels as required by

BS EN 62305.

320.055 SURGE PROTECTION DEVICES:

Install surge protection devices in accordance with BS 7671, BS EN 50174 and BS EN 61643-11 and the manufacturer's recommendations.

320.060 INSTALLATION RECORDS:

Prepare system records, including the following items:

To BS EN 62305.

As installed drawings.

Nature of soil

Earth resistivity measurement.

Earth electrode resistance.

Weather conditions

320.070 MAINTENANCE:

Carry out maintenance as required by BS EN 62305 for the defects liability period and provide proposal for continuing maintenance to

CA.

Building owner.

Building user.

BS APPENDIX

BS 7430:1998

Code of practice for earthing

BS 7671:2008

Requirements for electrical installations. IEE Wiring Regulations. Seventeenth edition

BS EN 50164-1:2008

Lightning protection components (LPC). Part 1 Requirements for connection components

BS EN 50164-2:2008

Lightning protection components (LPC). Part 2 Requirements for conductors and earth electrodes

BS EN 50164-3:2006

Lightning protection components (LPC). Part 3 Requirements for isolating spark gaps

BS EN 60228:2005

Conductors of insulated cables

BS EN 61643-11:2002

Low voltage surge protective devices. Part 11 Surge protective devices connected to low-voltage power systems. Requirements and tests

BS EN 62305-3:2006

Protection against lightning. Part 3 Physical damage to structures and life hazard

Y60 CONDUIT AND CABLE TRUNKING

260.010 GENERAL:

1000 GENERAL

1010 STANDARDS:

Provide conduit and cable trunking in accordance with the relevant British Standards and in particular the requirements of BS 7671 Requirements for Electrical Installations (The IEE Wiring Regulations).

260.020 CONDUIT SYSTEMS:

Application Secondary containment for all final circuit distribution to lighting and power

Manufacturer and reference Swifts, Legrand

Or approved equivalent following Technical submittal, any such approval shall not be unreasonably withheld

Metal

Rigid

2010B CONDUIT SYSTEMS METAL RIGID CLASS 4:

Fittings

2020A RIGID CONDUIT SYSTEM - METALLIC CONDUIT

Use couplers to match conduit grade and finish.

Conduit fittings and adaptable boxes

Material - Malleable iron adaptable boxes.

Do not use factory made bends, inspection bends or inspection couplers unless shown on drawings or schedules.

Ensure fittings are same class and finish as associated conduit system.

Supply covers for circular or adaptable boxes in the same material and finish as boxes.

Use steel dome or cheese headed screws to secure covers for Class 2 finish.

Use brass dome or cheese headed screws to secure covers for Class 4 finish.

Limit number of entry holes within loop-in boxes to four.

Adaptable box, minimum size - 100mm x 100mm x 50mm.

Connections

Use couplers and externally screwed brass bushes to connect conduit to loop-in circular conduit boxes, switchgear, distribution boards, and adaptable boxes. Use solid couplers.

Conduit fixing saddles - Distance saddles.

Plugs - Hexagonal malleable iron.

Locknuts - Hexagonal steel.

Provide conduit systems to BS EN 61386. Use conduit of each type from one manufacturer.

Material - Metal, steel.

Method of connection - Threadable.

Suitability for bending - Rigid, BS EN 61386-21.

Electrical characteristics - with electrical continuity.

Resistance against corrosive or polluting substances

Conduits with same protection outside and inside

High protection - Hot dip zinc coating. BS EN 61386-1 Table 10 Class 4.

2010D CONDUIT SYSTEMS - STEEL FLEXIBLE, LSF SHEATHED:

2040A PLIABLE OR FLEXIBLE CONDUIT SYSTEMS - METALLIC:

Type of Packing - Unpacked.

Type of sheath - Low smoke and fume material.

Usage Only to be used for final connection of equipment subject to vibration flexible conduit lengths to be no more than 600mm.

Fittings material - Brass adaptors.

Connections

Use brass male adaptors to connect flexible conduit to motors and any other equipment having a threaded entry.

Use male adaptors, solid couplers, flanged couplers with washer and externally screwed brass bushes to connect flexible conduit to trunking and equipment not having a threaded entry.

Provide conduit systems to BS EN 61386. Use conduit of each type from one manufacturer.

Material - Metal, steel.

Method of connection - Non-Threadable.

Suitability for bending - Flexible, BS EN 61386-23.

Resistance to flame propagation

Non-flame propagating conduit.

Resistance against corrosive or polluting substances

Conduits with same protection outside and inside

Medium protection

Conduits with greater protection outside than inside -Medium/high

Stove enamel inside, LSF sheathed outside. BS EN 61386-1 Table 10 Class 2.

Non-metallic

2010E CONDUIT SYSTEMS - NON-METALLIC RIGID:

2030A RIGID CONDUIT SYSTEM - INSULATING CONDUIT:

Connections

Do not use slip joints. Use expansion couplings as required. Use solvent solution connections.

Conduit fittings and adaptable boxes

Use boxes and connections to suit size of conduit and method of jointing.

Use heavy gauge, high impact rigid PVC conduit fittings.

Provide all boxes for supporting luminaires or other heavy devices with metal brackets or insert clips to provide a support independent of the box.

Provide boxes for flexible conduit, accessories and luminaire connection with a brass earthing terminal and/or steel circular earthing ring.

Conduit fixing saddles - Spacer bar or hospital.

Plugs - Spout entry plug.

Provide conduit systems to BS EN 61386. Use conduit of each type from one manufacturer.

Material - Insulating, PVC or equivalent material.

Method of connection - Non-Threadable.

Suitability for bending - Rigid, BS EN 61386-21.

Electrical characteristics

Without electrical insulating characteristics.

2040# PLIABLE OR FLEXIBLE CONDUIT SYSTEMS - METALLIC:

Type of Packing

Unpacked.

Cotton packed.

PVC packed.

Type of sheath

None.

PVC.

Low smoke and fume material.

Vacuum formed.

Fittings material

Brass adaptors.

Connections

Use brass male adaptors to connect flexible conduit to motors and any other equipment having a threaded entry.

Use female adaptors and externally screwed brass bushes to connect flexible conduit to trunking and equipment not having a threaded entry.

Use male adaptors, solid couplers, flanged couplers with washer and externally screwed brass bushes to connect flexible conduit to trunking and equipment not having a threaded entry.

2170 SUPPORTS AND FIXINGS:

Provide proprietary suspension systems comprising channel sections with return lips and compatible fixing accessories made of material to BS EN 10162, BS EN 10210 and/or slotted angles to BS 4345.

Ensure support components for Class 4 conduit have the same finishing method as the conduit carried out after manufacture. Ensure components in direct contact with conduit match profile of conduit.

Ensure all steel components such as studding, bolts and steel screws, bolts, nuts and washers are either cadmium plated and passivated or zinc electroplated to BS 7371 after manufacture. Do not use metal fixing components likely to deteriorate and/or cause damage through electrolytic action.

260.030 METAL TRUNKING:

Application Primary containment for final circuit distribution of all lighting and power

Manufacturer and reference Swifts, Legrand

Or approved equivalent following Technical submittal, any such approval shall not be unreasonably withhelds

Cable trunking and fittings

2080A CABLE TRUNKING AND FITTINGS:

Comply with BS EN 50085. Use trunking of each type from one manufacturer.

Provide trunking systems to BS EN 50085

Classification

Impact

Impact 0.5 J.

Impact 1 J.

Impact 2 J.

Impact 5 J.

Impact 20 J.

Temperature

Storage and transport

-45°C

-25°C

-15°C

-5°C

Minimum installation and application

-25°C

-15°C

-5°C

5°C

15°C

Maximum installation and application

60°C

90°C

105°C

120°C

Flame propagation

Propagation.

Non-propagation.

Electrical continuity

With conducting characteristics.

Without conducting characteristics.

Electrical insulation

With insulating characteristics.

Without insulating characteristics.

Degree of protection to BS EN 60529 IP41-D.

Degree of protection to BS EN 60529

Protection against corrosive or pollution substances

Inside

Low

Medium

High

Outside

Low

Medium

High

Access arrangements

With tools.

Without tools.

Internal electrical separation

With Metal galvanised partitions

With Compartments.

Trunking

2090B METAL SURFACE TRUNKING - ZINC FINISH:

Trunking type

Standard cable trunking with compartments.

Protection to BS EN 50085

Electroplated zinc having a minimum thickness of zinc coating of 0.0012mm inside and outside.

Hot dip zinc coated steel to BS EN 10327 or BS EN 10143.

Colour - Self Colour or Manufacturer's standard.

Ensure rigidity of trunking is maintained across joint.

Ensure external dimensions of trunking are maintained and not reduced by more than 4% across joints between trunking lengths and/or fittings.

Use purpose made fittings of the same manufacture where trunking connects to switchgear and distribution boards.

Provide flanges for connection of flush floor trunking to vertical trunking to maintain the cross sectional area of compartments with 50 mm minimum radius.

Maintain electrical continuity at each joint by a copper link, (tinned copper for galvanized trunking), fixed on outside of trunking, secured by screws, nuts and shake proof washers. Screws must not project through the nut. Make provision for continuity to be achieved without need to remove paint from ferrous metal where trunking has a painted finish.

Screws, Nuts, Washers

Do not use self-tapping screws. Use cheese or round head screws except where provision is made for the use of counter-sunk heads.

Material

Use steel zinc coated

BS 7371-3 or BS 7371-6.

Cable supports

Provide horizontal trunking with removable cable retainers or bridges to retain cables in situ.

Provide vertical trunking with pin racks to support cables at 3000 mm maximum spacing.

Use insulated pins or insulation sleeved pins on pin racks.

Colour - Manufacturer's standard or to BS 4800

2090E STEEL DADO TRUNKING:

Material steel - BS EN 50085.

Wall/dado trunking - three compartment.

Installation - surface.

Style.

Use trunking manufactured within ward return edge flanges and filled with flange couplers, which ensure that when the cover is removed a minimum of 80% of the nominal trunking or compartment width is available for access.

Colour - manufacturer's standard or BS 4800 shade to be approved.

Steel trunking

Protection

Service outlet boxes

2110A SERVICE OUTLET BOXES:

Recess lids

Provide service outlet boxes and junction boxes constructed from sheet steel with same finish as trunking.

Maintain continuity and segregation of compartments through boxes and fit flyovers where necessary.

Provide service outlet boxes with separate and segregated access to outlets associated with each wiring compartment. Fit cable guard or grommet to each section.

Incorporate spigots on boxes for connection to trunking.

Make frames adjustable on each corner, recess lids.

Manufacture frame and lids for service outlet boxes and junction boxes of cast metal, and suitable to accept type of floor covering.

Outlet plates

Provide outlet plates for each low voltage compartment equipped with socket outlets.

Provide outlet plates for each extra low voltage compartment equipped with items.

Provide outlet plates for each information technology compartment that ensures the IT compartment and its outlet plate conform to the requirements of BS EN 50174 and of the IT system installer, equipped with suitable outlets.

Provide blank outlet plates for any unused compartments.

Provide service outlet boxes and junction boxes constructed from sheet steel with same finish as trunking.

Maintain continuity and segregation of compartments through boxes and fit flyovers where necessary.

Provide service outlet boxes with separate and segregated access to outlets associated with each wiring compartment. Fit cable guard or grommet to each section.

Incorporate spigots on boxes for connection to trunking.

Make frames adjustable on each corner, recess lids.

Manufacture frame and lids for service outlet boxes and junction boxes of cast metal, and suitable to accept type of floor covering.

Carpet depth.

Cork tile thickness.

Ceramic or terrazzo tile thickness.

Provide outlet plates for each low voltage compartment equipped with

Single BS 1363 socket outlet.

Twin BS 1363 socket outlet.

Provide outlet plates for each extra low voltage compartment equipped with

Provide outlet plates for each information technology compartment that ensures the IT compartment and its outlet plate conform to the requirements of BS EN 50174 and of the IT system installer.

Provide blank outlet plates for any unused compartments.

Service poles

2120A POWER POLES:

Provide service poles complete with associated conduit or trunking fittings. Maintain continuity and segregation of circuits throughout. Provide outlet boxes with separate access to wiring compartments.

Standard - BS EN 50085-2-4.

Material - Extruded Aluminium.

Finish - Manufacturer's standard.

Fixings - Free standing or complete with fixing brackets at top.

Provide service poles with associated conduit or trunking fittings. Maintain continuity and segregation of circuits throughout. Provide outlet boxes with separate access to wiring compartments.

Standard - BS EN 50085-2-4.

Material.

Extruded Aluminium.

Finish

Rectangular.

Round.

Fixings.

Free Standing.

Complete with fixing brackets at top.

Accessories.

BS 1363 sockets

Telephone outlets

Data outlets

Ancillaries

Ceiling fixing plate.

White ceiling frame.

Adjustable floor fastening plate.

Desk furniture fixing clamp.

Separate or multi-compartment trunking

2150A SEPARATE OR MULTI-COMPARTMENT TRUNKING:

2170 SUPPORTS AND FIXINGS:

Provide proprietary suspension systems comprising channel sections with return lips and compatible fixing accessories made of material to BS EN 10162, BS EN 10210 and/or slotted angles to BS 4345.

Ensure support components for Class 4 conduit have the same finishing method as the conduit carried out after manufacture. Ensure components in direct contact with conduit match profile of conduit.

Ensure all steel components such as studding, bolts and steel screws, bolts, nuts and washers are either cadmium plated and passivated or zinc electroplated to BS 7371 after manufacture. Do not use metal fixing components likely to deteriorate and/or cause damage through electrolytic action.

Type

Application

Manufacturer and reference

Or approved equivalent following Technical submittal, any such approval shall not be unreasonably withheld.

Standards

BS EN 12385-1.

BS EN 13411-3.

BS EN 13411-4.

DIN 3093.

BSRIA COP 22/2002.

Dimensions

Safe working load (kg)

Length

Components

Wire rope

Safe working load (kg)

Length (mm)

Stainless steel grade 316

Fastener

Components

Springs - stainless steel grade 302

Fixing

Loop

Safe working load (kg)

Length (mm)

Stud (permanently fixed to wire rope length)

Single toggle

Double toggle

Accessories

Setting keys

Span/bearer supports

Ceiling clip fixings

Threaded adaptors

Anchor bolts

Anchor for stud fixings

Ceiling fixing kit

Corner saddle

Fastener décor cover

260.040 TRUNKING OF INSULATING MATERIAL:

Application

Trunking type

Standard cable trunking.

Floor trunking.

Skirting trunking.

Wall/dado trunking.

Cornice trunking.

Bench trunking.

Lighting.

With compartments.

Surface trunking

Separate or multi-compartment trunking

2150A SEPARATE OR MULTI-COMPARTMENT TRUNKING:

Wall/Dado Trunking

2130C PVC DADO TRUNKING - GENERAL PURPOSE:

Trunking to BS 4678-4

Mechanical properties, trunking for medium mechanical stress.

Temperature tolerances - BS 4678-4, Table 1.

Electrical characteristics

Without electrical insulating characteristics.

Resistance against ingress of solid objects

Protected against solid objects greater than 1.0mm (IP4X).

Resistance to ingress of water

Protected against dripping water (IPX2).

Resistance against corrosive or polluting substances

Medium protection.

Fittings

Use fittings from same manufacturer as trunking. Use 'Snap-On' covers. Use trunking fittings and accessories suitable for jointing by solvent welding.

Use proprietary cable retaining clips at 500mm maximum intervals on trunking that exceeds 1.8m in length. Where junctions occur ensure first clip is not more than 300mm from junctions.

2170 SUPPORTS AND FIXINGS:

Provide proprietary suspension systems comprising channel sections with return lips and compatible fixing accessories made of material to BS EN 10162, BS EN 10210 and/or slotted angles to BS 4345.

Ensure support components for Class 4 conduit have the same finishing method as the conduit carried out after manufacture. Ensure components in direct contact with conduit match profile of conduit.

Ensure all steel components such as studding, bolts and steel screws, bolts, nuts and washers are either cadmium plated and passivated or zinc electroplated to BS 7371 after manufacture. Do not use metal fixing components likely to deteriorate and/or cause damage through electrolytic action.

2175# WIRE ROPE SUSPENSION SYSTEM:

Application Suspension for all final circuit containment installations

Manufacturer and reference Gripple

Or approved equivalent following Technical submittal, any such approval shall not be unreasonably withheld.

Standards

BS EN 12385-1.

BS EN 13411-3.

BS EN 13411-4.

DIN 3093.

BSRIA COP 22/2002.

Dimensions

Safe working load (kg) To be calculated by contractor

Components

Fixing

Loop

Safe working load (kg) To be calculated by M&E Contractor

Stud (permanently fixed to wire rope length)

Single toggle

Double toggle

Accessories

Setting keys

Span/bearer supports

Ceiling clip fixings

Threaded adaptors

Anchor bolts

Anchor for stud fixings
Ceiling fixing kit
Corner saddle
Fastener décor cover

260.050 GENERAL WORKMANSHIP:

General

3010A GENERAL:

Comply with the requirements of BS 7671 wherever the conduit or trunking passes through the perimeter of a fire compartment (wall, floor or ceiling).

Make provision in conduit and trunking at expansion and settlement joints to allow for movement of building structure. Provide circular through or adaptable boxes no more than 300 mm either side of expansion or settlement joints for conduit crossing.

Join boxes with flexible steel conduit type C or conduits arranged to form a telescopic joint and cover overall with PVC sleeve to provide minimum degree of protection of IP44 or purpose made telescopic joint protected by a PVC sleeve to at least IP44.

Quality

Cut conduit clean and square with axis. Remove any burrs prior to erection.

Site form 90° in conduit wherever practical or use circular or adaptable boxes.

Construct bends and sets cold with a bending machine. Do not apply heat when forming sets or bends.

Use bending tools complying with British Standards appropriate to conduit material.

Ensure no indentation or reduction in cross sectional area occurs during installation.

Use correct tools to assemble conduit. Ensure no tool marks or damage to components occurs.

3010# GENERAL:

Ensure entire system is electrically and/or mechanically continuous, to BS 7671.

Fire barriers

Comply with the requirements of BS 7671 wherever the conduit or trunking passes through the perimeter of a fire compartment (wall, floor or ceiling).

Appearance

Arrange conduit, trunking and ducting to present neat appearance, parallel with other service runs and lines of building construction, except where in screed or in-situ concrete. Ensure plumb vertical runs.

Cable installation

Install cable in conduit, trunking or equipment enclosures only when completely erected throughout its length.

Do not use framework of partitions or similar unless indicated.

Building expansion and settlement

Make provision in conduit and trunking at expansion and settlement joints to allow for movement of building structure. Provide circular through or adaptable boxes no more than 300 mm either side of expansion or settlement joints for conduit crossing. Join boxes with

flexible steel conduit type

conduits arranged to form a telescopic joint and cover overall with PVC sleeve to provide minimum degree of protection of IP44.

purpose made telescopic joint protected by a PVC sleeve to at least IP44.

Quality

Cut conduit clean and square with axis. Remove any burrs prior to erection.

Site form 90° in conduit wherever practical or use circular or adaptable boxes.

Construct bends and sets cold with a bending machine. Do not apply heat when forming sets or bends.

Use bending tools complying with British Standards appropriate to conduit material.

Ensure no indentation or reduction in cross sectional area occurs during installation.

Use correct tools to assemble conduit. Ensure no tool marks or damage to components occurs.

3020 LAYOUT:

Ensure the maximum circuit lengths and groupings of cables indicated are not exceeded.

Conduit sizing

Where dimensions are not indicated select trunking and conduit sizes in accordance with Appendix A of Guidance Note I Selection and Erection published by the IEE (now IET).

3030 SPACING:

Install conduit, trunking and equipment clear of other services. Measure distance from external surface of any thermal insulation. Notify instances where minimum clearance cannot be achieved and bond items concerned. Minimum general spacing's between conduits, trunking, equipment and insulated steam services - 300 mm.

other services excluding steam - 150 mm.

above central heating radiators - 1000 mm.

ensure separation is in accordance with Appendix K of Guidance Note I Selection and Erection published by the IEE and BS EN 50174.

3040 CONDENSATION PREVENTION:

Install conduit and trunking systems to ensure internal condensation does not affect operation of associated circuits. Provide drainage points in accordance with BS 7671.

Where conduit passes through external wall between two areas of different ambient temperatures or in other locations likely to cause condensation, install a conduit or adaptable box. After wiring fill box with inert, permanently plastic compound with high insulation value.

Protection and repair of steel components

3050A PROTECTION AND REPAIR OF STEEL COMPONENTS:

Galvanized finish, use two coats zinc rich paint.

Black enamelled finish, use two coats of good quality, air drying, black enamel paint.

3060 EQUIPMENT CONNECTIONS:

Where surface mounted equipment is installed in conjunction with concealed conduit work, terminate concealed conduit at flush mounted conduit or adaptable box. Drill back of equipment, bush for back entry and mount equipment to conceal back box.

Connect to fixed equipment via conduit box located adjacent to termination point, using either solid or flexible conduit as indicated for final connection to equipment terminations.

Use conduit box as cable change point to facilitate changed wiring locally to adjacent equipment.

Connect trunking to equipment by specially fabricated connectors or by couplers and externally screwed brass bushes.

3070 CLEANING BEFORE WIRING:

Clean inside of conduits and trunking with swabs immediately before wiring.

Inspect all components and remove any foreign matter, fit temporary plugs to open ends of conduit and trunking to prevent ingress of water and solid material.

Wiring

3080A WIRING:

Comply with BS 7671 when wiring installations.

Segregate circuits as indicated.

Ensure draw wires are left within empty conduits for use of specialist installers. Use draw wires comprising nylon tapes with fitted eyelets.

3090 BUILDERSWORK:

Ensure conduit is not concealed until work has been inspected and approved.

Obtain permission before horizontally chasing walls.

Ensure that conduit and fittings buried in concrete or behind plaster are protected against corrosion or electrolytic action prior to rendering.

Ensure conduit concealed in wall chases is covered by plaster and/or rendering to minimum depth of 12 mm.

Ensure accessory boxes are set at depth that will ensure a flush finish with the plaster and or wall covering tile or other covering.

Where extension rings are used to bring the accessory box to the finished surface these shall be fitted prior to the wall being plastered to ensure a complete seal to the sides of the accessory box.

Flush accessory outlet boxes for all small power outlets and light switches shall be a minimum of 35mm deep and finish flush with the face of the plaster or tiled wall. In stud walls or where dot and dab dry lining is the wall finish 47mm deep boxes shall be used and finish flush with the face of the plaster or tiled wall.

260.070 WORKMANSHIP FOR CONDUIT:

Application All final Circuit Wiring

4010 DRAW-IN BOXES:

Provide draw-in boxes in conduit at maximum intervals of 10 metres or after bends and/or sets totalling 180 degrees.

4020 INSTALLATION OF CAST IN OR BURIED CONDUIT:

Ensure cast-in conduits are firmly secured to reinforcing steelwork and that accessory and/or conduit boxes are secured so they do not move during subsequent building operations.

Ensure there is no blockage immediately shuttering is removed.

Check there is no mechanical damage to conduit in floor screed prior to screeding. Fix securely before screed is poured. Provide temporary protection to conduits until screeds are laid.

Ensure minimum amount of cross-overs occur dependent upon screed depth. Do not install draw boxes in floors.

Do not install conduits

in screeds in areas indicated.

within site blinding.

in main structural slabs unless prior permission in writing is obtained.

4030 CONDUIT BOXES:

Ensure that wherever conduit boxes are cast in the face of the box is flush with the face of the concrete or plaster. Fit circular conduit boxes with extension rings to ensure a flush face with plaster or concrete or where terminal blocks are to be accommodated.

Ensure fixing holes are countersunk where material thickness allows or use round head screws to prevent damage to cables and remove burrs before cables are drawn in.

Use a minimum of two screw fixing for standard circular conduit boxes and four screws for large conduit boxes and adaptable boxes up to 150 mm x 100 mm.

Use back outlet boxes where surface conduits pass through walls, to outside accessories or lighting points.

Secure switch boxes and socket boxes using countersunk steel screws where provision is made for them or if not use round head screws. Use plug inserts and finally grout in position prior to plastering or screeding.

4040 FIXING CONDUIT:

Support conduit in accordance with Appendix I of Guidance Note I Selection and Erection published by the IEE.

Ensure conduit is not under mechanical stress. Fix conduit boxes independently of conduit. Make allowance for any additional mechanical loading supported by conduit boxes.

Conduit to be supported on Distance saddles in surface installations and spacer bar saddles where conduit is concealed within building voids.

Conduit is to be fixed by use of saddles spaced 300mm either side of a bend draw in box or electrical accessory outlet with spacing between saddles to be no greater than those required in BS7671 Table 4C.

Where protection is specified as IP44 or greater ensure fixings of conduit boxes are suitable to maintain degree of protection.

Use following methods of fixing conduit:-

LOCATION	TYPE OF FIXING
-----------------	-----------------------

Floor screeds.	Saddles or crampets.
----------------	----------------------

Buried in plaster or render.	Crampets or saddles.
------------------------------	----------------------

Above false ceilings.	Spacer Bar Saddles.
-----------------------	---------------------

Surface.	Distance saddles
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In food preparation areas	Hospital Saddles.
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4050 FLEXIBLE AND PLIABLE CONDUIT:

Use flexible conduit for final connections to motors, other equipment subject to vibration or adjustment and to thermostats, motorised valves and similar items mounted in pipelines or ducts.

Use sufficient length between equipment and circular through box at end of conduit run (minimum 450 mm) to allow necessary full range of withdrawal, adjustment or movement.

Use solid type adapters to terminate flexible conduit.

Use PVC covered flexible conduit where installed externally, exposed to weather or in any position where ingress of moisture or condensation may occur.

4060 SCREWED STEEL CONDUIT:

Use materials clean and free from defects, rust, scale and oil. Obtain prior permission in writing for use of materials subject to remedial work before erection. Repair any damage caused by threading, bending or erection by painting with zinc rich paint before any rust occurs.

Ensure length of thread on conduit matches that in conduit couplers, fittings or equipment with no thread exposed after erection except at running couplers.

Ensure conduits butt inside couplers.

Use lubricant when cutting threads.

Use minimum number of running couplings

For running couplings in Class 2 conduit, use coupler and locknut. Paint exposed thread with zinc rich paint.

For running couplings in Class 4 conduit, use three piece conduit unions.

Non-metallic conduit

4070A NON-METALLIC CONDUIT:

Comply with manufacturer's instructions for bending, setting and jointing of conduit. Use plastic conduit only where indicated.

Do not install conduit when ambient working temperature is or will be below -5°C or above 60°C.

Use solvents recommended by manufacturer of conduit when using solvent welded joints and ensure spigots enter full depth of sockets. Hold joints rigid and in position until weld sets. Remove excess solvent before surface damage occurs.

Use slip joints as necessary, but not exceeding 6 metres on straight lengths to allow for expansion and contraction over temperature variation as indicated.

Use semi-mastic adhesive where expansion joints are formed.

Where fittings do not have shaped or smooth conduit entries connect with male bushes and external couplings.

Ensure special care is taken to prevent mechanical damage or warping to conduit where mechanical loads are imposed on conduit system, e.g. lighting fittings.

4070# NON-METALLIC CONDUIT:

Comply with manufacturer's instructions for bending, setting and jointing of conduit. Use plastic conduit only where indicated.

Do not install conduit when ambient working temperature is or will be below -5°C or above 60°C.

Do not install conduit when ambient working temperature is or will be below -25°C or above 60°C.

Use solvents recommended by manufacturer of conduit when using solvent welded joints and ensure spigots enter full depth of sockets. Hold joints rigid and in position until weld sets. Remove excess solvent before surface damage occurs.

Use slip joints as necessary, but not exceeding 6 metres on straight lengths to allow for expansion and contraction over temperature variation as indicated.

Use semi-mastic adhesive where expansion joints are formed.

Where fittings do not have shaped or smooth conduit entries connect with male bushes and external couplings.

Ensure special care is taken to prevent mechanical damage or warping to conduit where mechanical loads are imposed on conduit system, e.g. lighting fittings.

4080 UNDERGROUND INSTALLATION:

Where buried below ground, use Class 4 conduit. Do not use any buried conduit boxes unless prior permission in writing has been obtained. Wrap conduit with PVC self-adhesive tape, half lapped. Extend taping 150 mm beyond point where conduit leaves ground. Install circular through conduit boxes at the end of the tape. Fill conduit boxes after cable installation with inert, permanently plastic compound with high insulation value, and wrap in PVC self-adhesive tape.

260.080 WORKMANSHIP FOR TRUNKING:

Application Final Circuit wiring Containment

5020 ACCESS:

Arrange trunking to allow access to wiring. Locate covers on top or sides of trunking if practicable.

Arrange access so covers are on a continuous face and cables can be laid in throughout the length of the trunking. Notify where either condition cannot be achieved.

Fixing trunking

5030A FIXING TRUNKING:

Ensure trunking is independently fixed and supported from building fabric. Obtain approval for proposed fixings/supports.

Support trunking in accordance with the manufacturers requirements and/or Guidance Note 1 Selection and Erection published by the IEE.

Use two fixings minimum per standard length.

5030# FIXING TRUNKING:

Ensure trunking is independently fixed and supported from building fabric. Obtain approval for proposed fixings/supports.

Support trunking in accordance with the manufacturers requirements and/or Guidance Note 1 Selection and Erection published by the IEE.

Use two fixings minimum per standard length.

Use fixings

Steel trunking

5040A STEEL TRUNKING:

Install steel trunking in accordance with the manufacturers requirements and those of BS 7671.

Use trunking to avoid multiple parallel conduit runs, subject to approval.

Cut trunking clean and square with axis, prepare ends and remove burrs and sharp edges. Ensure inside of trunking is free from anything liable to damage cables either during installation or after covers are fitted.

When trunking is held in a vice, ensure surfaces remain undamaged and components are not warped.

Avoid tool marking or damage to trunking system components.

Do not site fabricate trunking tees, bends, flanges and other accessories. Use only factory made accessories.

Form circular holes over 6 mm diameter in trunking body using correctly sized punch sets. Use twist drill for holes up to 6 mm maximum diameter.

Use only factory formed openings for accessories.

Line unprotected apertures in trunking with PVC or nylon edging strip.

Fit ends of runs with removable blanking plates.

Ensure connections are not made to covers unless indicated or approval obtained.

Provide fixed section of cover projecting 25 mm either side of fabric where trunking passes through wall, floors or ceiling.

Fit cable retaining straps at 500 mm intervals except where cover is on top.

5050 UNDERFLOOR AND FLUSH FLOOR TRUNKING INSTALLATION:

Lie under floor and flush floor trunking straight and level. Adjust height of services outlets, junction boxes and flush floor trunking to suit top of screed level. Ensure that spaces below trunking are free from voids and correctly packed. Prevent ingress of screed by masking where necessary.

Ensure trunking levelling and alignment is carried out in co-operation with person(s) responsible for confirming location and finish of floor levels.

Immediately following installation of trunking fit temporary covers to service outlets, junction boxes and flush floor trunking. Fit temporary blanking plates over open connections to vertical trunking.

Retain temporary covers until permanent covers are installed.

Ensure under floor trunking systems are fully rewire able to final circuit outlets.

Connect conduits only at inspection or other easy access points.

Y61 HV/LV CABLES AND WIRING

261.010 GENERAL:

1000 GENERAL

1010 CABLE MANUFACTURER:

Use new cables, delivered to site with seals intact, manufactured not more than one year prior to delivery, labelled with manufacturer's name, size, description, BS number, classification, length, grade and date of manufacture.

1020 CABLE CERTIFICATION MARKING:

Mark all types of cables with CENELEC cable certification marking or if included in British Approvals Service for Cables (BASEC) in accordance with BASEC regulations.

Supply HV/LV cables and wiring as work section Y61.1000

261.020 STANDARD FLEXIBLE CORDS AND INDUSTRIAL CABLES:

Application Final connection to fixed equipment and light fittings

Manufacturer and reference AEI, Draka

Or approved equivalent following Technical submittal, any such approval shall not be unreasonably withheld

2005 LSOH SHEATHING:

Supply cables with Low Smoke Zero Halogen (LSOH) sheathing, tested in accordance with BS EN 50267 and BS EN 60332.

2010A STANDARD ORDINARY FLEXIBLE WIRES - SINGLE COPPER CORE:

Standard - BS 6004, Table 4(b), 5 and 12.

2010B STANDARD LSF FLEXIBLE WIRES - SINGLE COPPER CORE:

Standard - BS 7211, Tables 3(b) and 4(b).

2010D STANDARD ORDINARY FLEXIBLE CORDS - MULTI COPPER CORES:

Standard - BS 6500, Tables 12 and 13, and 16; BS 7919 Tables 10 and 14.

261.040 MINERAL INSULATED WIRING AND POWER CABLES:

Light duty mineral insulated cables

2040B LIGHT DUTY MINERAL INSULATED CABLES, LSF OUTER COVERING:

261.050 STANDARD WIRING AND POWER CABLES:

Application Final Circuit wiring to small power and lighting

Manufacturer and reference AEI, Draka

Or approved equivalent following Technical submittal, any such approval shall not be unreasonably withheld

2005 LSOH SHEATHING:

Supply cables with Low Smoke Zero Halogen (LSOH) sheathing, tested in accordance with BS EN 50267 and BS EN 60332.

Standard power supply cables

Thermosetting insulation and copper conductors

2020A STANDARD POWER SUPPLY CABLES, COPPER CONDUCTORS, THERMOSETTING INSULATION, SHEATHED:

2020B STANDARD POWER SUPPLY CABLES, COPPER CONDUCTORS, THERMOSETTING INSULATION, SHEATHED AND ARMoured:

PVC insulation and copper conductors

2020C STANDARD POWER SUPPLY CABLES, COPPER CONDUCTORS, PVC INSULATION, SHEATHED:

2020E STANDARD POWER SUPPLY CABLES, COPPER CONDUCTORS, LSF SHEATHED AND ARMoured:

Standard - BS 6724, Tables 4, 6, 8, and 10.

Standard wires for conduit and trunking

Standard - BS 6004, Tables 4(a) and 5.

2020G STANDARD CABLES FOR CONDUIT AND TRUNKING, COPPER CONDUCTORS, LSF INSULATED:

Standard - BS 7211, Tables 3(a) and 4(a).

261.060 CONTROL AND AUXILIARY CABLES:

Application Mechanical ELV & LV control wiring

Manufacturer and reference Beldon

Or approved equivalent following Technical submittal, any such approval shall not be unreasonably withheld

2005 LSOH SHEATHING:

Supply cables with Low Smoke Zero Halogen (LSOH) sheathing, tested in accordance with BS EN 50267 and BS EN 60332.

2050A PAIRED, UNSCREENED CONTROL CABLES WITH OR WITHOUT METALLIC PROTECTION:

Standard - BS EN 50288-7.

With or without metallic protection.

2050B PAIRED, UNSCREENED AND ARMoured CONTROL CABLES:

Standard - BS EN 50288-1, BS EN 50288-3-1, BS EN 50288-3-2, BS EN 50288-6-1, BS EN 50288-6-2 and BS EN 50288-7. .

Mechanical protection - Armoured to BS EN 50288-1, Clause 4.14.

Standard - BS EN 50288-1, BS EN 50288-2-1, BS EN 50288-2-2, BS EN 50288-4-1, BS EN 50288-4-2, BS EN 50288-5-1, BS EN 50288-5-2 and BS EN 50288-7..

Mechanical protection - Armoured to BS EN 50288-1, Clause 4.14.

Standard - BS EN 50288, Parts 1 to 7.

Mechanical protection - Armoured to BS EN 50288-1, Clause 4.14.

2050G MULTI-CORE UNARMoured LSF, SHEATHED AUXILIARY CABLES:

Standard - BS 7211, Table 6

2050K FIRE ALARM CABLE:

Standard - BS 7629-1.

Mechanical protection - Unarmoured.

Fire performance - BS EN 50288-1, Clause 5.4.

Standard

BS 5467.

Table 18 (copper conductor).

BS 6708 (copper conductors)

BS 6724

Table 18 (copper conductors).

BS 7211 (copper conductors)

BS 7629 (copper conductors)

BS 7629-1.

BS 7846 (copper conductors)

Table 8.

BS 7870

BS EN 50288

Part 1 - Generic specification.

Part 2-1 - Horizontal and building backbone cables.

Part 2-2 - Screened work area and patch cord cables up to 100 MHz.

Part 3-1 - Unscreened horizontal and backbone cables up to 100 MHz.

Part 3-2 - Unscreened work area and patch cord cables.

Part 4-1 - Screened horizontal and backbone cables up to 600 MHz.

Part 4-2 - Screened work area and patch cord cables up to 600 MHz.

Part 5-1 - Screened horizontal and backbone cables up to 250 MHz.

Part 5-2 - Screened work area and patch cord cables up to 250 MHz.

Part 6-1 - Unscreened horizontal and backbone cables up to 250 MHz.

Part 6-2 - Unscreened work area and patch cord cables up to 250 MHz.

Part 7 - Sectional specification for instrumentation and control cables.

Mechanical protection

Armour.

Unarmoured.

Conduit and trunking.

Fire performance

Standard
BS 5839-1
Standard.
Enhanced.
BS 6387
Category A.
Category B.
Category C.
Category S.
Category W.
Category X.
Category Y.
Category Z.
BS 7346-6
Category
FF.
LS.
Fire survival time
2h.
1h.
30 min.
BS EN 50200

261.090 STANDARD COAXIAL CABLES:

Application TV and Radio Systems
Manufacturer and reference AEI, Draka
Or approved equivalent following Technical submittal, any such approval shall not be unreasonably withheld
2080A STANDARD COAXIAL CABLES, FOR BROADCAST RECEIVING:
Standard - BS EN 50117. CAI benchmark status, cable types CT 100, CT 125, CT 165.

261.100 OPTICAL FIBRE CABLES:

Application New Fibre connection to Data patch panel in the ground floor communications room
Manufacturer and reference Beldon Fibre Optic
Or approved equivalent following Technical submittal, any such approval shall not be unreasonably withheld
2090A OPTICAL FIBRE CABLES:
Standard - BS EN 60794-2-11. Category of fibre to BS EN 60793-2-10 A1a or A1b.
Thickness of insulation
Thickness sheath
Overall cable dimensions
Mechanical requirements
Tensile strength
Crush resistance
Impact resistance
Isostatic pressure
Repeated bending
Torsion
Flexing
Snatch
Kink
Bend
Transmission and optical requirements
Attenuation
Back scattering
Baseband response
Band width

Numerical aperture.
Total dispersion
Mode field diameter
Concentricity of mode field diameter
Chromatic dispersion
Cut-off wavelength
Electrical requirements
Conductor resistance
Dielectric strength of insulation
Insulation resistance
Environmental requirements
Temperature cycling
Performance under fire conditions
Sheath integrity
Water penetration
Cold bend
Freezing
Nuclear radiation
Materials and cable dimensions
Fibre cladding
Coating
Loose tube
Buffer
Fibre armour
Kevlar.
Fibre sheath
Cable core filling
Strain member
Strain member sheath
Moisture barrier
Additional or outer strain member
Integral overhead suspension wire
Cable installation characteristics
Minimum bending radius, during installation
Minimum bending radius, fixed in position
Maximum installation tension
Nominal cable weight per km

261.110 INFORMATION TECHNOLOGY CABLES:

Type
Application
Manufacturer and reference
Or approved equivalent following Technical submittal, any such approval shall not be unreasonably withheld

2100A INFORMATION TECHNOLOGY CABLES - STRUCTURED WIRING: CATEGORY 6:

Type of system - Structured cabling - BS EN 50173-1.

Standard - BS EN 50288-3-1.

Termination reference - EIA/TIA TSB-40.

Cable construction - Multi pair; unshielded (UTP).

Conductors for information technology cables

BS 6234

O3

2

HO3

H2

TE1

XLPE.

EPR.
BS 7655.
2.
CL 1.
CL 2.
FR 1.
FR 2.
GP 4.
GP 5.
GP 6.
GP 7.
GP 8.
OR 1.
2.
BS EN 50290-2-21
TI 51.
TI 52.
TI 53.
TI 54.
TI 55.
BS EN 50290-2-23
BS EN 50290-2-25
BS EN 50290-2-26
BS EN 50290-2-29
BS EN 50290-2-30
BS EN 50363
EI 2.
EI 3.
EI 4.
EI 5.
EI 6.
EI 7.
EI 8.
TI 1.
TI 2.
TI 3.
TI 4.
TI 5.
TI 6.
TI 7.
XI 1.
BS EN 60811
Glass fibre.
BS 7919.
Silicone varnish.
EPR.
HOFR.
Silicone rubber.
EPR/CSP.
PCP.
PTFE.
ETFE.
Polyolefin
Polypropylene
Mineral.
Elastomer
Form

Cellular
Foam skin
Solid
Filled
BS EN 50290-2-28.
Insulation screen
Taped.
Extruded.
Metallic
Marking of cores to BS EN 50334
Usage
Bedding
Sheath
Inner Sheath
Extruded inner covering
Outer sheath
Over sheath
1900/3300V.
Single core.
Extruded.
Taped.
BS 6004.
BS 6004 para. 7.2.
BS 6234
O3.
2.
O3C.
2C.
HO3.
H2.
HO3C.
H2C.
TS 1.
TS 2.
Taped.
Extruded.
Semi-conductor.
BS 7655.
LTS 1.
LTS 2.
LTS 3.
LTS 4.
RS 2.
RS 3.
RS 4.
RS 5.
RS 6.
SW 1.
SW 2.
SW 3.
SW 4.
TS 2.
2.
5.
6.
9.
10.

BS EN 50290-2-22

TI 51.

TI 52.

TI 53.

TI 54.

TI 55.

BS EN 50290-2-24

BS EN 50290-2-27

BS EN 50290-2-30.

BS EN 50363

EM 2.

EM 3.

EM 4.

EM 5.

EM 6.

EM 7.

EM 8.

EM 9.

EM 10.

TM 1.

TM 2.

TM 3.

TM 4.

TM 5.

TMPU.

XM 1.

Elastomer

EPR.

CSP.

PTFE.

ETFE.

Reduced flame propagating compound.

Reduced HCl gas emission compound.

LSOH HCl emission level less than 0.5% to BS EN 50267.

LSOH

Colour.

Natural.

Black.

Red.

Metal sheath

Lead alloy to BS EN 12548.

Copper

Usage

Bedding

Sheath

Inner Sheath

Extruded inner covering

Outer sheath

Over sheath

1900/3300V.

Single core.

Extruded.

Taped.

BS 6004.

BS 6004 para. 7.2.

BS 6234

O3.

2.
O3C.
2C.
HO3.
H2.
HO3C.
H2C.
TS 1.
TS 2.
Taped.
Extruded.
Semi-conductor.
BS 7655.
LTS 1.
LTS 2.
LTS 3.
LTS 4.
RS 2.
RS 3.
RS 4.
RS 5.
RS 6.
SW 1.
SW 2.
SW 3.
SW 4.
TS 2.
2.
5.
6.
9.
10.
BS EN 50290-2-22
TI 51.
TI 52.
TI 53.
TI 54.
TI 55.
BS EN 50290-2-24
BS EN 50290-2-27
BS EN 50290-2-30.
BS EN 50363
EM 2.
EM 3.
EM 4.
EM 5.
EM 6.
EM 7.
EM 8.
EM 9.
EM 10.
TM 1.
TM 2.
TM 3.
TM 4.
TM 5.
TMPU.

XM 1.
Elastomer
EPR.
CSP.
PTFE.
ETFE.
Reduced flame propagating compound.
Reduced HCl gas emission compound.
LSOH HCl emission level less than 0.5% to BS EN 50267.
LSOH
Colour.
Natural.
Black.
Red.
Metal sheath
Lead alloy to BS EN 12548.
Copper
Class 1.
Class 2.
BS 6231 Table 1.
BS EN 60228.
Class 1.
Class 2.
Class 5.
Class 6.
Class 1.
Class 2.
BS EN 50214
Super flexible.
Flexible.
Stranded.
Solid.
Shaped.
Compacted.
Sectoral.
Milliken.
Circular.
Material
Copper.
Aluminium.
Aluminium alloy.
Plain.
Tinned.
Nickel plated.
Silver plated.
Tinsel.
Conductor screen
Conductor taping
BS 6007.
Crepe paper.
Glass fibre braid.
Outer conductor of co-axial cables.
Copper
Solid
Braided
Laminated foil
Foil/Braid combination

261.120 NON-STANDARD CABLES:

Type

Application

Manufacturer and reference

Or approved equivalent following Technical submittal, any such approval shall not be unreasonably withheld

2005 LSOH SHEATHING:

Supply cables with Low Smoke Zero Halogen (LSOH) sheathing, tested in accordance with BS EN 50267 and BS EN 60332.

Class 1.

Class 2.

BS 6231 Table 1.

BS EN 60228.

Class 1.

Class 2.

Class 5.

Class 6.

Class 1.

Class 2.

BS EN 50214

Super flexible.

Flexible.

Stranded.

Solid.

Shaped.

Compacted.

Sectoral.

Milliken.

Material

Copper.

Aluminium.

Aluminium alloy.

Plain.

Tinned.

Nickel plated.

Silver plated.

Tinsel.

Conductor screen

Conductor taping

BS 6007.

Crepe paper.

Glass fibre braid.

Outer conductor of co-axial cables.

Copper

Solid

Braided

Laminated foil

Foil/Braid combination

BS 6234

O3

2

HO3

H2

TE1

XLPE.

EPR.

BS 7655.
2.
CL 1.
CL 2.
FR 1.
FR 2.
GP 4.
GP 5.
GP 6.
GP 7.
GP 8.
OR 1.
2.
BS EN 50290-2-21
TI 51.
TI 52.
TI 53.
TI 54.
TI 55.
BS EN 50290-2-23
BS EN 50290-2-25
BS EN 50290-2-26
BS EN 50290-2-29
BS EN 50290-2-30
BS EN 50363
EI 2.
EI 3.
EI 4.
EI 5.
EI 6.
EI 7.
EI 8.
TI 1.
TI 2.
TI 3.
TI 4.
TI 5.
TI 6.
TI 7.
XI 1.
BS EN 60811
Glass fibre.
BS 7919.
Silicone varnish.
EPR.
HOFR.
Silicone rubber.
EPR/CSP.
PCP.
PTFE.
ETFE.
Polyolefin
Polypropylene
Mineral.
Elastomer
Form
Cellular

Foam skin
Solid
Filled
BS EN 50290-2-28.
Insulation screen
Taped.
Extruded.
Metallic
Marking of cores to BS EN 50334
Bedding
Sheath
Inner Sheath
Extruded inner covering
Outer sheath
Over sheath
Single core.
Multi core.
Extruded.
Taped.
BS 6004.
BS 6004 para. 7.2.
BS 6234
O3.
2.
O3C.
2C.
HO3.
H2.
HO3C.
H2C.
TS 1.
TS 2.
Taped.
Extruded.
Semi-conductor.
BS 7655.
LTS 1.
LTS 2.
LTS 3.
LTS 4.
RS 2.
RS 3.
RS 4.
RS 5.
RS 6.
SW 1.
SW 2.
SW 3.
SW 4.
TS 2.
2.
5.
6.
9.
10.
BS EN 50290-2-22
TI 51.

TI 52.
TI 53.
TI 54.
TI 55.
BS EN 50290-2-24
BS EN 50290-2-27
BS EN 50290-2-30.
BS EN 50363
EM 2.
EM 3.
EM 4.
EM 5.
EM 6.
EM 7.
EM 8.
EM 9.
EM 10.
TM 1.
TM 2.
TM 3.
TM 4.
TM 5.
TMPU.
XM 1.
Elastomer
EPR.
CSP.
PTFE.
ETFE.
Reduced flame propagating compound.
Reduced HCl gas emission compound.
LSOH HCl emission level less than 0.5% to BS EN 50267.
LSOH
Colour.
Natural.
Black.
Red.
Metal sheath
Lead alloy to BS EN 12548.
Copper
Bedding
Sheath
Inner Sheath
Extruded inner covering
Outer sheath
Over sheath
Single core.
Multi core.
Extruded.
Taped.
BS 6004.
BS 6004 para. 7.2.
BS 6234
O3.
2.
O3C.
2C.

HO3.
H2.
HO3C.
H2C.
TS 1.
TS 2.
Taped.
Extruded.
Semi-conductor.
BS 7655.
LTS 1.
LTS 2.
LTS 3.
LTS 4.
RS 2.
RS 3.
RS 4.
RS 5.
RS 6.
SW 1.
SW 2.
SW 3.
SW 4.
TS 2.
2.
5.
6.
9.
10.
BS EN 50290-2-22
TI 51.
TI 52.
TI 53.
TI 54.
TI 55.
BS EN 50290-2-24
BS EN 50290-2-27
BS EN 50290-2-30.
BS EN 50363
EM 2.
EM 3.
EM 4.
EM 5.
EM 6.
EM 7.
EM 8.
EM 9.
EM 10.
TM 1.
TM 2.
TM 3.
TM 4.
TM 5.
TMPU.
XM 1.
Elastomer
EPR.

CSP.
PTFE.
ETFE.
Reduced flame propagating compound.
Reduced HCl gas emission compound.
LSOH HCl emission level less than 0.5% to BS EN 50267.
LSOH
Colour.
Natural.
Black.
Red.
Metal sheath
Lead alloy to BS EN 12548.
Copper
Bedding
Sheath
Inner Sheath
Extruded inner covering
Outer sheath
Over sheath
Single core.
Multi core.
Extruded.
Taped.
BS 6004.
BS 6004 para. 7.2.
BS 6234
O3.
2.
O3C.
2C.
HO3.
H2.
HO3C.
H2C.
TS 1.
TS 2.
Taped.
Extruded.
Semi-conductor.
BS 7655.
LTS 1.
LTS 2.
LTS 3.
LTS 4.
RS 2.
RS 3.
RS 4.
RS 5.
RS 6.
SW 1.
SW 2.
SW 3.
SW 4.
TS 2.
2.
5.

6.
9.
10.
BS EN 50290-2-22
TI 51.
TI 52.
TI 53.
TI 54.
TI 55.
BS EN 50290-2-24
BS EN 50290-2-27
BS EN 50290-2-30.
BS EN 50363
EM 2.
EM 3.
EM 4.
EM 5.
EM 6.
EM 7.
EM 8.
EM 9.
EM 10.
TM 1.
TM 2.
TM 3.
TM 4.
TM 5.
TMPU.
XM 1.
Elastomer
EPR.
CSP.
PTFE.
ETFE.
Reduced flame propagating compound.
Reduced HCl gas emission compound.
LSOH HCl emission level less than 0.5% to BS EN 50267.
LSOH
Colour.
Natural.
Black.
Red.
Metal sheath
Lead alloy to BS EN 12548.
Copper
Bedding
Sheath
Inner Sheath
Extruded inner covering
Outer sheath
Over sheath
Single core.
Multi core.
Extruded.
Taped.
BS 6004.
BS 6004 para. 7.2.

BS 6234
O3.
2.
O3C.
2C.
HO3.
H2.
HO3C.
H2C.
TS 1.
TS 2.
Taped.
Extruded.
Semi-conductor.
BS 7655.
LTS 1.
LTS 2.
LTS 3.
LTS 4.
RS 2.
RS 3.
RS 4.
RS 5.
RS 6.
SW 1.
SW 2.
SW 3.
SW 4.
TS 2.
2.
5.
6.
9.
10.
BS EN 50290-2-22
TI 51.
TI 52.
TI 53.
TI 54.
TI 55.
BS EN 50290-2-24
BS EN 50290-2-27
BS EN 50290-2-30.
BS EN 50363
EM 2.
EM 3.
EM 4.
EM 5.
EM 6.
EM 7.
EM 8.
EM 9.
EM 10.
TM 1.
TM 2.
TM 3.
TM 4.

TM 5.
TMPU.
XM 1.
Elastomer
EPR.
CSP.
PTFE.
ETFE.
Reduced flame propagating compound.
Reduced HCl gas emission compound.
LSOH HCl emission level less than 0.5% to BS EN 50267.
LSOH
Colour.
Natural.
Black.
Red.
Metal sheath
Lead alloy to BS EN 12548.
Copper

261.130 CABLE GLANDS:

Application
Manufacturer and reference
Or approved equivalent following Technical submittal, any such approval shall not be unreasonably withhelds

3010A CABLES GLANDS - UNARMoured CABLES, INDOORS:
Cable type
Flexible; wiring and power; control and auxiliary; and communications.
Standard - BS EN 50262 non-metallic, cable retention, IP54; Type A1 as BS 6121-5 Annex A.
Environment - Indoor.

3010B CABLES GLANDS - UNARMoured CABLES, OUTDOORS:
Cable type
Flexible; wiring and power; control and auxiliary; and communications.
Standard - BS EN 50262 non-metallic, cable retention, IP54; Type A2 as BS 6121-5 Annex A.
Environment - Outdoor.

3010C CABLES GLANDS - ARMoured CABLES, DRY INDOORS:
Cable type
Wiring and power; and control and auxiliary.
Standard - BS EN 50262 metallic, cable retention Class A, protective connection to earth, IP54. Type B as BS 6121-5 Annex A.
Environment - Dry indoors.

3010D CABLE GLANDS - ARMoured CABLES, INDOORS:
Cable type
Wiring and power; and control and auxiliary.
Standard - BS EN 50262 metallic, cable retention Class A, protective connection to earth, IP54. Type B as BS 6121-5 Annex A.
Environment - Indoor.

3010E CABLE GLANDS - ARMoured CABLES, OUTDOORS:
Cable type
Wiring and power; and control and auxiliary.
Standard - BS EN 50262 metallic, cable retention Class A, protective connection to earth, IP54 with shroud. Type C as BS 6121-5 Annex A.
Environment - Outdoor.
Cable type
Flexible.
Industrial.
Wiring and power.

Control and auxiliary.
Communications.
Data.
Voltage range
600/1000V.
Standard
BS 6121-1.
BS EN 50262
Material
Metallic.
Non-metallic.
Composite.
Mechanical properties
Without cable anchorage.
With cable anchorage.
Type A.
Type B.
Impact category
Cable retention for armoured cable
Class A.
Class B.
Electrical properties
With electrical continuity
Equipotential bonding.
Electrical connection to metallic layers of cable.
Protective connection to earth
Category A.
Category B.
Category C.
With insulating characteristics.
Resistance to external influences
BS EN 60529
IP54.
Temperature range
-20⁰C to 65⁰C.
Resistance to salt and sulphur dioxide laden atmospheres.
Sealing system
Single orifice seal.
Multi orifice seal.
Type as BS 6121-5 Annex A
A1.
A2.
A3.
A4.
B.
C.
D1.
D2.
E1.
E2.
Functional components
Cable grip.
Outer seal.
Armour clamp.
Armour locking ring.
Inner seal.
Compound barrier.

Integral earth connection.
Earth path barrier.
Earth tag.
Back nut.
Shroud.
Armour type
Wire.
Strip.
Tape.
Braid.
Gland material
Brass.
Aluminium.
Nylon.
OHLS
Environment
Dry indoors.
Indoor.
Outdoor.
Certified to BS EN 60079 for hazardous areas

261.140 CABLE SEALS AND GLANDS - MINERAL INSULATED CABLES:

Type
Application
Manufacturer and reference
Or approved equivalent following Technical submittal, any such approval shall not be unreasonably withheld
3020B CABLE SEALS - HEAVY AND LIGHT DUTY MINERAL INSULATED CABLES - PROTECTED 'E' FOR HAZARDOUS AREAS:
Use seals for mineral insulated cables in accordance with BS EN 60702-2, recommended or supplied by cable manufacturer.
Plain; or earth tail and self-threading pot; or polymeric one piece.
Pot closure - Plastic disc.
Pot sealant - Epoxy putty.
Conductor insulation sleeving - Headed PTFE.
Seal maximum temperature rating - 100°C or 85°C.
Certified to BS EN 60079-14 for hazardous areas, 'e'.

261.150 VOLTAGE SURGE SUPPRESSORS FOR CABLES:

Type
Application
Manufacturer and reference
Or approved equivalent following Technical submittal, any such approval shall not be unreasonably withheld

261.170 INSULATING TAPE:

Type
Application
Manufacturer and reference
Or approved equivalent following Technical submittal, any such approval shall not be unreasonably withheld

261.200 CONNECTORS FOR COAXIAL CABLES:

Type
Application
Manufacturer and reference

Or approved equivalent following Technical submittal, any such approval shall not be unreasonably withheld

Standard

BS 3041-2.

BS 3041-7 - Type C.

BS 3041-12 - Type UHF.

BS EN 60169 - Type SC-A.

BS EN 60169 - Type SC-B.

BS EN 61169-8 - Type BNC.

BS QC 221100 - Type SMA.

BS QC 221300 - Type SMB.

BS QC 221400 - Type SMC.

BS QC 222000 - Type TNC.

BNC.

Sealed.

Unsealed.

IEC 95 (Belling or TV connector)

F.

Connectors to match equipment.

261.210 OPTICAL FIBRE TERMINATIONS:

Type

Application

Manufacturer and reference

Or approved equivalent following Technical submittal, any such approval shall not be unreasonably withheld

As shown on drawing ref

261.230 CABLE DUCTS:

Type

Application

Manufacturer and reference

Or approved equivalent following Technical submittal, any such approval shall not be unreasonably withheld

3110A CABLE DUCTS:

Standard

BS 4660 provided by Electricity Supply Company.

Standard

BS 65.

DN 90.

DN

Joints

BS 3506.

Class O.

Class B.

BS 4660.

BS 5911-1.

Reinforced.

Unreinforced.

BS EN 1916.

Reinforced.

Unreinforced.

BS EN 10255

BS EN 13244.

BS EN 1401-1.

261.240 CABLE SLEEVES:

Type

Application

Manufacturer and reference

Or approved equivalent following Technical submittal, any such approval shall not be unreasonably withheld

3120A CABLE SLEEVES:

Supply and hand to others for installation non-ferrous cable sleeves for incorporation into the structure where cables pass through fire compartment floors and walls.

Packing material

Weak mix mortar; intumescent, plaster or mastic; solid intumescent material; or intumescent granule filled bags.

Supply and hand to others for installation non-ferrous cable sleeves for incorporation into the structure where cables pass through fire compartment floors and walls.

Packing material

Weak mix mortar.

Intumescent.

Plaster.

Mastic

Solid intumescent material

Intumescent granule filled bags

261.250 CABLE COVERS AND MARKERS:

Type

Application

Manufacturer and reference

Or approved equivalent following Technical submittal, any such approval shall not be unreasonably withheld

3130A CABLE COVERS AND MARKERS:

Material - Recovered plastic, integral tape.

Marking - Electricity or telephone.

Plastic marker tape

Yellow, marked electricity or telephone.

261.260 WORKMANSHIP

4010 CABLE INSTALLATION - GENERAL:

Use and install cables only as directed in the appropriate standard or as directed by the manufacturer in writing. Lay cables in one length unless otherwise indicated. Obtain permission from supervising officer for all through joints, and where overall length requirement exceeds practical drum size.

Handle, install and dispose of cables on wooden drums in accordance with BS 8512.

Install cables when ambient temperature is 5°C or greater, using cables stored at or above this temperature for not less than 24 hours.

Use drum stands, drum axles, fair leads, rollers, cable stockings and other equipment as recommended by the cable manufacturer and as appropriate to the method of installation.

4020 CABLE INSTALLATION IN LOW TEMPERATURES:

Install cables at lower installation temperatures when authorised by manufacturer in a written statement.

4030 INSTALLATION OF LSF CABLE:

Install LSF cables in accordance with manufacturer's instructions. Ensure ambient temperature is above 5°C. Ensure over sheaths are not damaged by abrasion or scuffing.

4040 INSTALLATION OF UNARMoured CABLES:

Install and use unarmoured cable to BS 7540-1, BS 7540-2, BS 7540-3 or the manufacturer's written instructions.

Cable trenches.

4050A CABLE TRENCHES:

Ensure that trenches for cables and cable ducts are prepared, backfilled and reinstated.

Supervise all work to cable trenches by others.

Carry out walk over survey of trench route, dig trial hole in any area considered to be potentially difficult.

Establish location of any other underground service adjacent to cable route.

Re-plan cable routes after survey and trial holes. Submit report of survey and trial holes.
Carry out any instructed work to adjacent services. Set out cable trenches, excavate trench carefully setting aside any materials required for backfilling or reinstatement.
Minimum cover in cable trenches
HV cables 800mm; LV cables 500mm; communications cables 500mm; all cables 800mm under roadways.
Trench
Common trench for all underground services.
Grade trench bottom to a maximum slope of 1:12.
Clear trench bottom of loose stones and place bedding to full width of trench.
Bedding
Riddled earth 6mm grid for cables; riddled earth 12mm grid for ducts; imported soft sand; or pea shingle, for ducts.
Bedding thickness - 75mm; or 100mm for ducts.
Install cables or ducts. Haunch cables or ducts in bedding material to a minimum depth of 75mm above highest cable or duct.
Cable or duct identification
Warning tape - Yellow with black legend.
Backfill trench using two layers 100mm thick hand rammed. Complete backfilling in layers and reinstate trench.
Backfill material - as excavated from trench.
Ensure that trenches for cables and cable ducts are prepared, backfilled and reinstated.
Carry out all work to cable trenches.
Supervise all work to cable trenches by others.
Carry out work in adopted streets to comply with the New Roads and Streets Works Act 1991.
Carry out walk over survey of trench route, dig trial hole in any area considered to be potentially difficult.
Establish location of any other underground service adjacent to cable route.
Re-plan cable routes after survey and trial holes.
Submit report of survey and trial holes.
Carry out any instructed work to adjacent services. Set out cable trenches, excavate trench carefully setting aside any materials required for backfilling or reinstatement.
Remove excess excavated material from site.
Excess excavated material removed from site by others.
Minimum cover in cable trenches
HV cables 800mm.
LV cables 500mm.
Communications cables 500mm.
All cables 800mm under roadways.
Trench
Common trench for all underground services.
Separate trenches for each service.
Grade trench bottom to a maximum slope of 1:12. Clear trench bottom of loose stones and place bedding to full width of trench.
Bedding
Riddled earth 6mm grid.
Riddled earth 12mm grid for ducts.
Imported soft sand.
Pea shingle, for ducts.
Concrete grade C20 to table 1 of BS EN 206-1, 20mm aggregate sulphate resisting where necessary, for ducts.
Concrete for ducts
Bedding thickness
75mm.
100mm for ducts.
Install cables or ducts. Haunch cables or ducts in bedding material to a minimum depth of 75mm above highest cable or duct.
Cable or duct identification.

Recovered plastic tiles.

Warning tape to BS EN 12613

Yellow with blue legend.

Yellow with black legend.

Backfill trench using two layers 100mm thick hand rammed. Complete backfilling in layers and reinstate trench.

Backfill material

As excavated from trench.

Imported

4060 CABLE INSTALLATION IN TRENCHES:

Lay cables on newly prepared bedding. Ensure multiple layers of cable are separated vertically by a 50mm layer of hard rammed bedding material.

When using a power winch ensure tension on the cable is taken by element of the cable designed for that purpose, which is armour or conductor cores as appropriate and not plastic sheath, metal sheath or core insulation.

When hand pulling cable ensure no kinks are formed and that flaking, when used, is done in the correct direction.

Do not allow cable to twist during installation. Use swivels to connect pulling bond to cable stocking or equivalent fitting.

Check drum is suitable for jacking before commencing installation. If drum or reel is unsuitable for jacking, flake cable in correct direction in maximum size turns from drum or reel before commencing installation.

Use skilled labour to supervise all unreeling, flaking or running of cable from a drum.

Lay cables in the formation shown; ensure spacing is not reduced below that indicated.

Bind trefoil groups at 1m intervals. Bind any associated earth or protective conductor to its cable or trefoil group at 1m intervals.

Space multiple cables in trenches in accordance with BS 7671.

Ensure installation radii and permanent bending radii are not less than those recommended by the manufacturer.

Do not lay cables to BS 6007, BS 6500, BS 7211 or BS 7919 direct in the ground.

Cable ducts.

4070A CABLE DUCTS:

Duct work

Supervise the laying of ducts by others.

Lay ducts in the formation shown, on to newly prepared bedding. Joint ducts in accordance with the manufacturer's instructions.

Ensure that ducts slope no more than 1:60 vertically or 1:30 horizontally.

Ensure that pre-formed duct bends used at ends of duct routes meet the requirements of the cable manufacturer for bending radii.

Construct manholes, draw pits and jointing chambers.

Prove alignment of completed duct run by drawing through a mandrel 7mm diameter less than nominal duct bore for minimum length 250mm. Clean completed duct run by drawing through a circular wire brush 12mm diameter more than nominal duct bore.

Install a draw wire of corrosion resistant material and minimum breaking strength 550N in each empty duct.

Plug and seal all ducts with proprietary duct plugs, on completion.

Duct work

Carry out all duct laying.

Supervise the laying of ducts by others.

Lay ducts in the formation shown, on to newly prepared bedding. Joint ducts in accordance with the manufacturer's instructions.

Ensure that ducts slope no more than 1:60 vertically or 1:30 horizontally.

Ensure that pre-formed duct bends used at ends of duct routes meet the requirements of the cable manufacturer for bending radii.

Construct manholes, draw pits and jointing chambers.

Prove alignment of completed duct run by drawing through a mandrel 7mm diameter less than nominal duct bore for minimum length 250mm. Clean completed duct run by drawing through a circular wire brush 12mm diameter more than nominal duct bore.

Install a draw wire of corrosion resistant material and minimum breaking strength 550N in each empty duct.

Plug and seal all ducts with proprietary duct plugs, on completion.

Cable installation in conduit and trunking.

4090A CABLE INSTALLATION IN CONDUIT AND TRUNKING:

In vertical trunking provide pin racks at 3m intervals. Use ties at 2m intervals for all wires of the same circuit reference. Mark ties with circuit reference number at 10m intervals.

Provide cable clamps in conduit boxes at 10m intervals in vertical conduit.

Allow for full range of movement at building construction movement joints. Make all joints to wiring at terminal blocks in conduit boxes.

4100 CABLE INSTALLATION ON TRAY AND RACK:

Place cables side by side or as indicated. Fix using cleats or cable ties so that any cable may be individually removed. Use metallic ties on cables with specified fire performance.

Cable surface installation.

All SWA cables above 35mm od shall be fixed to cable trays using cleats tytraps are only to be used for temporary fixings and are to be removed in their entirety once installations complete.

4110A CABLE SURFACE INSTALLATION:

Dress cables flat free from twists, kinks and strain, and align parallel to building elements. When glands and clamps are not required, take sheathing of cables into accessory boxes and equipment and protect against abrasion using grommets or similar sharp edge protection.

Cable embedded installation.

4120A CABLE EMBEDDED INSTALLATION:

Ensure plaster or screed over cable is a minimum of 12mm. Protect embedded cables with metal galvanised conduit.

Cable installation - mineral insulated cables

4130A CABLE INSTALLATION - MINERAL INSULATED CABLES: manufacturer.

4140 CABLE INSTALLATION - FLEXIBLE CORDS:

Grip cords securely at connections. Where they do not form an integral part of the connected accessory or equipment, provide separate proprietary cord grips.

Cable jointing and terminating generally.

4150A CABLE JOINTING AND TERMINATING GENERALLY: 6121-5.

Cut all cable ends immediately prior to jointing or terminating. Seal cables left unconnected for more than 24 hours to prevent the ingress of moisture. Seal plastic sheathed cables using proprietary shrink on end caps. Seal lead sheathed cables by a plumbed dressed lead cap with an airspace to allow conductor movement.

Form all compression connections to components using tools that cannot be released unless the correct degree of compression has been achieved.

Make cable joints and terminations using the material and methods recommended by the cable manufacturer. Employ labour certified by cable manufacturer as qualified to make paper insulated cable joints.

Ensure cores are insulated and separated using compatible materials. Keep all materials for paper insulated joints in sealed containers until used. Where proprietary mechanical glands and armour clamps are not used, use tinned brass wiping gland and armour clamp plumbed to sheath.

Make cable joints and terminations using the material and methods recommended by the cable manufacturer. Employ labour certified by cable manufacturer as qualified to make paper insulated cable joints.

Ensure cores are insulated and separated using compatible materials. Keep all materials for paper insulated joints in sealed containers until used. Where proprietary mechanical glands and armour clamps are not used, use tinned brass wiping gland and armour clamp plumbed to sheath.

Jointing method

Paper tube.

Crepe paper tape.

Impregnated cotton tape.

Heat shrink.

Paper separators.

Joint cables using glands of the type indicated, in accordance with the manufacturer's instructions.

Terminating - mineral insulated cables.

4180A TERMINATING - MINERAL INSULATED CABLES:

At equipment not provided with threaded entries secure glands using lock washers and locknuts or brass conduit bush. Use gland shrouds when plastic covered MI cables are used.

Using PVC, PIB or LSF material tape to BS 3924 or BS EN 60454 to match sheath, tape overall gland any bare copper sheath and form seal to cable sheath under all shrouds.

Install voltage surge suppressors in accordance with manufacturer's recommendations and surge suppressors to BS 7671, Section 331-01-01.

Cable joints - mineral insulated cables.

4190A CABLE JOINTS - MINERAL INSULATED CABLES:

Joint mineral insulated cables using methods and materials recommended by cable manufacturer. Terminate cables in externally threaded glands using seals with temperature rating indicated. Join conductors using crimped connectors.

Insulate connectors using PVC tape to BS 3924 or BS EN 60454, ensuring good seal to conductor sleeving. Make off glands into either end of internally threaded brass sleeve of correct size. Protect brass sleeve using heat shrink sleeve.

Communications coaxial, optical fibre and IT cable installation, jointing and terminating.

Use methods approved by cable and accessory manufacturers.

Y63 SUPPORT COMPONENTS - CABLES

263.010 GENERAL:

1000 GENERAL

1010 APPLICATION:

Cables referred to in this section are only those types that can be installed without further mechanical protection.

Supply support components as specified in section

263.020 CABLE SUPPORT AND FINISHES:

Type

Application

Cable supports and finishes

2010A CABLE SUPPORTS AND FINISHES:

Cable supports

Support all cables throughout their length using conduit; or trunking and enclosures; or cable tray; or cable racking; or special support systems; or cleat or clip fixing direct to building fabric as indicated on the drawings/schedules.

Ensure tray, racking and special support systems are continuous and firmly fixed to building fabric. Allow space for additional cables as indicated on the drawings/schedules.

Ensure cable support system allows for spacing in accordance with BS 7671 for the design current of the cable.

Ensure finish for all support components, fixings, hangers and accessories is as cable support system or manufacturer's standard.

Where cables are supported on inverted or vertical cable / basket trays they shall be fastened to the containment metal Panduit tyrap shall be used every 2m and 300mm from every change in direction.

All life safety systems cabling and fire rated cabling shall be fixed to containment using metal Panduit tyrap along the entire length with metal tyrap. Where the cables are supported by and laid on the containment metal Panduit tyrap shall be installed at 2m intervals and 300mm from every change in direction.

263.030 CABLE SUPPORT SYSTEM:

2020A CABLE SUPPORT SYSTEM - PERFORATED TRAY:

Type - Flanged or return flanged.

Perforations

Admiralty pattern for light or medium duty; GD&C pattern standard 23; or manufacturer's standard pattern.

Thickness - Manufacturer's standard thickness for type.

Fittings

Use factory made fittings throughout of same material, type, pattern, finish and thickness as cable tray.

Use reducers, inside angles and outside angles as manufacturer's standard.

Use flat bends, equal tees, unequal tees and crosses with corners gusseted.

Join lengths of tray and fittings using manufacturer's standard shouldered ends, fish plates, or couplers, with galvanized or zinc plated slotted domed head 'roofing' bolts, nuts, washers and shake proof washers.

Material

Hot rolled steel galvanized after manufacture to BS EN 10327 or BS EN 10143.

Finish - Self colour galvanized.

2020B CABLE SUPPORT SYSTEM - CABLE RACK:

Hot rolled steel galvanized after manufacture to BS EN 10327 or BS EN 10143.

Finish - Self colour galvanized.

2020C CABLE SUPPORT SYSTEM - CABLE CLEATS:

One piece or single way pattern or claw pattern or two bolt pattern.

Die cast aluminium alloy; moulded black polyethylene; or nylon.

Finish - Self finish.

Single toggle

2025A CABLE SUPPORT SYSTEM - PROPRIETARY CABLE TIES:

Two piece cable tray pattern, on cable tray only. Wrap round self-locking non releasable pattern on everything except cable trays.

2025C CABLE SUPPORT SYSTEM - TWO WAY SADDLES:

Bright copper for unsheathed mineral insulated cables. PVC covered bright copper for sheathed mineral insulated cables.

2025D CABLE SUPPORT SYSTEM - CABLE BASKET:

Proprietary system of wire basket with compatible jointing and fixing accessories.

263.040 WORKMANSHIP

3010 CABLE TRAY INSTALLATION:

Support from building fabric with minimum clearance behind of 20mm. Install fixings at regular intervals to prevent visible sagging when loaded, with maximum spacing 1.2m and 230mm from fittings.

Keep cutting of cable tray to a minimum. Cut along a line of unperforated metal. Make good finish with zinc rich paint, primer and top coat, or two pack epoxy paste, as appropriate to tray material and finish.

Fit holes cut in tray for passage of cables with grommets, bushes or other lining.

Install all bolts, fixings and hangers with threaded portion away from cables. Cable routes to cross at right angles or spacing to BS EN 50374.

Cable cleats, ties, saddles and clips installation

3020A CABLE CLEATS, TIES, SADDLES AND CLIPS INSTALLATION:

For cables on horizontal tray use ties for each circuit. Use tie manufacturer's special tensioning tool where available. Crop off tie ends.

For cables on vertical tray use cleats bolted to tray for paper, plastic or elastomeric insulated cables and saddles or clips for mineral insulated cables. Use cleats sized to grip cables firmly without undue pressure or strain on cable, but preventing slipping.

For cables on vertical or horizontal rack use proprietary fixings to rack for paper, plastic or elastomeric insulated cables and saddles or clips for mineral insulated cables. On continuous flat surfaces of wood, plaster, brick etc.

Use polypropylene surface fixing clips with prefixed hardened steel pin for PVC insulated and sheathed cables and sheathed or bright mineral insulated cables. Use round or flat or flat twin pattern as appropriate, manufactured specifically for cable being fixed.

Use one hole 'P' clips or two way saddles of bright copper for unsheathed mineral insulated cable. Use PVC covered for sheathed mineral insulated cables.

Space cleats, ties, saddles and clips

As Appendix G of Guidance Notes 'Selection & Erection' published by the IEE (now IET).

As Appendix G of Guidance Notes 'Selection & Erection' published by the IEE (now IET).

Y71 LV SWITCHGEAR AND DISTRIBUTION BOARDS**271.010 GENERAL:**

1000 GENERAL

1010#

CO-ORDINATION

STUDY:

Carry out a complete protection grading and setting calculation of the complete electrical distribution system, including all connected equipment. Engage an independent Chartered Electrical Engineer to: Authenticate the calculation. Undertake the calculation. Provide fault (short circuit) calculations for the distribution system as indicated on the drawings and a protective device co-ordination study to ensure that all protective devices are co-ordinated. Base the study on the actual devices and cable lengths installed. Prepare the fault calculations and protective device study with a network analyser, digital computer or by written calculations, include complete fault calculations for each proposed source and combinations thereof including motor and generator contributions. Present the fault calculations including the following: General description of calculations methods, assumptions and base per unit quantities selected. One line diagrams, source impedance data including X/R ratio and source system characteristics. Impedance diagrams, typical calculations, tabulations of calculation quantities and results, conclusions and recommendations. Calculation of three phase symmetrical fault currents at each switchboard, motor control centre and distribution board. Calculation of earth fault currents including the associated zero sequence impedance diagram. Tabulations which include fault impedance, X/R ratios, asymmetry factors, motor contributions, short circuit MVA and symmetrical and asymmetrical fault currents. Carry out the protective device co-ordination study including the following: Time-current co-ordination curves graphically indicating the proposed co-ordination for the system on log-log graph transparencies. Include on each sheet, a complete title and one line diagram identifying the specific portion of the system covered. A detailed description of each protective device identifying its type, function, manufacturer and time current characteristics and tabulation of recommended settings. Include on the curve sheets, system HV equipment relay characteristics, pertinent transformer, motor and generator characteristics including up to the largest outgoing LV circuit breaker/fuse for each distribution board. Indicate manufacturing tolerances clearly showing the final grading margin.

Submit the calculation:
As a bound report for approval by the CA

Upon approval by the CA, submit copies of the approved report

Carry out adjustments of the protection settings to conform with the requirements of the report. Ensure that discrimination is achieved throughout the network and select protective devices and settings accordingly.

1020#

ELECTRICITY

SUPPLY:

Ensure all electrical equipment supplied and installed is suitable for power supply indicated to BS 7697.

Supply switchboards and distribution boards as schedule reference Y71-Distboards

Supply switchboards and distribution boards as schedule reference

Location

At end of this work section.

On drawing number

271.030 SWITCHBOARD:

Application Main Distribution Board

Manufacturer and reference Group Schneider, Siemens

Or approved equivalent following Technical submittal, any such approval shall not be unreasonably withheld

Electrical supply

LV switchgear and control gear assembly

2010A CUBICLE SWITCHBOARD - LV SWITCHGEAR AND CONTROLGEAR ASSEMBLY:

External design - Cubicle type assembly.

Usage - Switchboard.

Conditions of installation - Indoors.

Rated operational voltage 400V +10% -6%

Ambient air temperature and altitude as BS EN 60439.

2010B CUBICLE CONTROL PANEL - LV SWITCHGEAR AND CONTROLGEAR ASSEMBLY:

External design - Cubicle type assembly.

Usage - Control panel.

Conditions of installation - Indoors.

Rated operational voltage 400V +10% -6%

Ambient air temperature and altitude as BS EN 60439.

2010C MULTI-BOX SWITCHBOARD - LV SWITCHGEAR AND CONTROLGEAR ASSEMBLY:

External design - Multi-box type assembly.

Usage - Switchboard.

Conditions of installation - Indoors.

Electrical characteristics

Rated operational voltage 400V +10% -6%

Service conditions

Ambient air temperature and altitude as BS EN 60439.

2010D MULTI-BOX CONTROL PANEL - LV SWITCHGEAR AND CONTROLGEAR ASSEMBLY:

External design - Multi-box type assembly.

Usage - Control panel.

Conditions of installation - Indoors.

Electrical characteristics

Rated operational voltage 400V +10% -6%

Service conditions

Ambient air temperature and altitude as BS EN 60439.

Details of equipment

As shown on drawing/schedules

Rated current and rated prospective short - circuit withstand current for indicated seconds

2010# LV SWITCHGEAR AND CONTROLGEAR ASSEMBLY:

Standard - BS EN 60439-1.

External design

Multi-cubicle type assembly.

Assembly for Construction Site (ACS) to BS EN 60439-4.

Usage

Switchboard.

Conditions of installation

Indoors.

Electrical characteristics

Rated operational voltage 400v TPN

Rated insulation voltage 1000V

Rated current 800A

Rated short-time withstand current

Rated peak withstand current

Rated prospective short-circuit withstand current

Rated conditional short-circuit current

Rated fused short-circuit current

Prospective short-circuit current

Co-ordinate short-circuit protection devices

Service conditions

Ambient air temperature as BS EN 60439.

EMC

Environment 1.

Environment 2.

Suitable for use at altitudes above 1000m.

Provide facilities to allow future extension of switchboard

Assembly construction

2020A FLOOR STANDING ASSEMBLY CONSTRUCTION:

Enclosure standard - BS EN 62208.

Material of enclosure - Manufacturer's standard.

Accommodate cross-sectional area of copper cables in accordance with BS EN 60439-1.

Terminal block. Mounting as manufacturer's standard.

Size of neutrals on three phase supplies - Full sized.

Degree of protection to BS EN 60529, IP31 for assembly.

Protection against direct and indirect contact

Manufacturer's standard.

Arrange for following operations to be performed when assembly is in service and under voltage

Visual inspection of switching devices and other apparatus; settings and indicators of relays and releases; conductor connections and markings.

Adjusting and re-setting of relays, releases and electronic devices.

Replacement of fuse links and indicating lamps.

Fault location by voltage and current measuring.

Provide space between functional unit or group and adjacent functional units or groups. Provide retainable fastening means for parts likely to be removed for maintenance.

Removable parts and withdrawable parts as manufacturer's standard.

Internal separation - Form 4.

Input voltage variations for electronic equipment supply - BS EN 60439.

Supply frequency deviation - BS EN 60439.

Mounting - Floor standing.

2020B WALL MOUNTED ASSEMBLY CONSTRUCTION:

Enclosure standard - BS EN 62208.

Material of enclosure - Manufacturer's standard.

Accommodate cross-sectional area of copper cables in accordance with BS EN 60439-1.

Terminal block. Mounting as manufacturer's standard.

Size of neutrals on three phase supplies - Full sized.

Degree of protection to BS EN 60529, IP31 for assembly.

Protection against direct and indirect contact

Manufacturer's standard.

Arrange for following operations to be performed when assembly is in service and under voltage

Visual inspection of switching devices and other apparatus; settings and indicators of relays and releases; conductor connections and markings.

Adjusting and re-setting of relays, releases and electronic devices.

Replacement of fuse links and indicating lamps.

Fault location by voltage and current measuring.

Provide space between functional unit or group and adjacent functional units or groups. Provide retainable fastening means for parts likely to be removed for maintenance.

Removable parts and withdrawable parts as manufacturer's standard.

Internal separation - Form 4.

Input voltage variations for electronic equipment supply - BS EN 60439.

Supply frequency deviation - BS EN 60439.

Mounting - Wall mounted.

Access for cabling - Front, top, bottom or rear

As shown on drawings/schedules

Enclosures finish

2030A ENCLOSURE FINISH:

Finish - Manufacturer's standard.

Colour - Manufacturer's standard colour.

Type tests

Carry out test on site.

Repeat test on site.

2060 SITE BUILT ASSEMBLIES:

Ensure that components of site assemblies are part of a proprietary system and type tested as appropriate.

Install assemblies in accordance with manufacturer's drawings and instructions.

2070 SITE MODIFICATION:

Do not make site alterations unless authorised. Where site modifications to assemblies are authorised make in accordance with manufacturer's certified drawings and instructions. Ensure that modifications made comply with type test certificate obtained for arrangement of components.

271.050 CIRCUIT BREAKERS, TRANSFER SWITCHES AND CONTROL AND PROTECTIVE SWITCHES:

Application As above

Manufacturer and reference Group Schneider, Siemens

Or approved equivalent following Technical submittal, any such approval shall not be unreasonably withheld

2090B UTILISATION A, MCCB AIR BREAK CIRCUIT BREAKERS:

Provide circuit breakers in accordance with BS EN 60947. Ensure that uninterrupted current rating indicated applies when unit is enclosed and in operating environment at rated operational voltage.

Standard - BS EN 60947-2

Details of equipment - Circuit breaker.

Characteristics of circuit breakers

arc. Interrupting medium - Air.

Rated and limiting values for the main circuit.

Rated voltage (Volts) - operational, 400.

Rated frequency 50 Hertz.

Circuit breaker Utilisation category - A.

Enclosure degree of protection IP 31.

Circuit breakers and switches

Provide manual closing air-break circuit breakers, (MCCB).

Closing mechanism

Independent manual spring operated.

Provide automatic shutters to cover all live contacts when circuit breaker is isolated, withdrawn or removed from housing.

Provide a padlock to lock circuit breaker in isolated/withdrawn position, and to lock automatic shutters covering live contacts when removed from housing.

Provide moulded case circuit breakers with provision for safe maintenance.

Characteristics of circuit breakers, transfer switches and control and protective switches:

As shown on drawings/schedules

271.060 SWITCHES, DISCONNECTORS AND FUSE COMBINATION UNITS:

Application As Above

Manufacturer and reference Group Schneider, Siemens

Or approved equivalent following Technical submittal, any such approval shall not be unreasonably withheld

2100A SWITCH DISCONNECTORS:

Supply switch disconnectors in accordance with BS EN 60947.

Standard - BS EN 60947-3

Details of equipment - Switch-disconnector.

arc. Interrupting medium - Air.

Rated and limiting values for the main circuit.

Rated voltage (Volts) 230/400.

Rated frequency 50 Hertz.

Utilisation category - AC 23A.

Enclosure degree of protection IP 65.

Fit each switch with facility to padlock in OFF position.

Provide switches with auxiliary contacts as indicated. Where switches isolate final connections between a starter and its motor fit one set of contacts to open starter coil circuit when switch is opened.

2100B FUSE COMBINATION UNITS:

Supply fuse combination units in accordance with BS EN 60269 (BS 88).

Standard - BS EN 60947-3.

Details of equipment - Fuse combination unit.

arc. Interrupting medium - Air.

Rated and limiting values for the main circuit

Rated voltage (Volts) 230/400.

Rated frequency 50 Hertz.

Utilisation category - AC23A

Enclosure degree of protection IP 31.

Fit removable neutral link in switches controlling circuits with neutral conductor.

Fit solid links in isolating switches.

Fit each switch with facility to padlock in OFF position.

Ensure that withdrawable chassis isolating type switches are provided with fully shrouded fixed contacts or insulated cover plates, to prevent accidental contact with live parts.

Ensure that switches in individual enclosures have an earth terminal, meet the degree of protection for the switchboard and have operating mechanisms interlinked with access door.

Provide switches with auxiliary contacts as indicated. Where switches isolate final connections between a starter and its motor fit one set of contacts to open starter coil circuit when switch is opened.

271.070 PROTECTION DEVICES INTERPOSING RELAYS AND INTER-TRIPPING RELAYS:

2110B MANUAL RESET PROTECTION DEVICES INTERPOSING RELAYS AND INTERTRIPPING RELAYS:

271.090 TRIP/CLOSE SWITCHES AND CONTROL SELECTOR SWITCHES:

271.110 INSTRUMENTS AND METERS:

2150A INSTRUMENTS AND METERS:

Comply with BS 7856, BS EN 62053-11, BS EN 62053-22 or BS EN 62053-21 for kWh meters, kVA and kW maximum demand meters and polyphase reactive kVA meters, and BS EN 62053-23 for KVAhr meters.

Protect wiring to voltmeters by separate fuses.

Protect potential coils of watt meters, frequency indicators, power factor indicators and kWh meters, kVA and kW maximum demand meters and polyphase reactive kVA meters by separate fuses.

Supply instruments and meters suitable for flush mounting and type, size and accuracy as indicated.

Ensure that indicating scales for all instruments comply with BS 3693.

Supply so that normal indication is 50% to 75% of full scale deflection.

271.140 LOW VOLTAGE COILS RATING:

2180 LOW VOLTAGE COILS RATING:

Ensure coils for switching relays, contactors and other applications are capable of withstanding inherent voltage drop within system without armature or switching apparatus dropping out of position.

271.170 DISTRIBUTION BOARDS:

Type MCB TPN 400V

Application Final Circuit Distribution Boards for lighting and small power circuits

Manufacturer and reference Group Schneider, Hager

Or approved equivalent following Technical submittal, any such approval shall not be unreasonably withheld

Electrical supply

1020A 3 PHASE ELECTRICITY SUPPLY:

Ensure all electrical equipment supplied and installed is suitable for 3 phase power supply to BS 7697.

1020B SINGLE PHASE ELECTRICITY SUPPLY:

Ensure all electrical equipment supplied and installed is suitable for single phase power supply to BS 7697.

2210A DISTRIBUTION BOARDS:

Comply with BS EN 60439-3 as appropriate. Make internal separation Form 1 unless otherwise indicated. Make fuse boards fully shrouded. Fit each distribution board with an isolating switch.

Install bus bars in same position relative to their fuse carriers or miniature circuit-breakers (MCBs) for each pole. In TPN distribution boards supply neutral bus bars with one outgoing terminal for each outgoing circuit.

Provide a multi-terminal earthing bar for circuit protective conductors for both insulated and metal-cased boards, with one terminal for each outgoing circuit. Connect directly to earthing terminal without dependence on exposed conductive parts of enclosure.

Identify each fuse way and MCB way by numbering. Identify each terminal on neutral bus bar and earthing bar with its respective fuse way or MCB way.

Where specific ratings are indicated incorporate fuses or MCBs, otherwise leave ways blank for future additions.

Enclosures finish

Finish - Manufacturer's standard.

Colour - Manufacturer's standard colour.

Provide spare ways

271.180 CONSUMER UNITS:

Application Emergency Lighting Distribution

Manufacturer and reference Group Schneider Merlin Gerin or Hager

Or approved equivalent following Technical submittal, any such approval shall not be unreasonably withheld

Electrical supply

1020B SINGLE PHASE ELECTRICITY SUPPLY:

Ensure all electrical equipment supplied and installed is suitable for single phase power supply to BS 7697.

2220A CONSUMER UNITS:

Comply with BS EN 60529, IP 31.

Provide fuses or miniature circuit-breakers and means of isolation.

As shown on drawings/schedules

271.190 MINIATURE CIRCUIT BREAKERS:

Application Type C for lighting circuits and type B for power circuits.

Manufacturer and reference Group Schneider, Siemens

Or approved equivalent following Technical submittal, any such approval shall not be unreasonably withheld

2230A MINIATURE CIRCUIT BREAKERS:

Standard - BS EN 60898-1.

Supply miniature circuit-breakers with voltage and current ratings, type according to instantaneous tripping current, energy limiting class, category of duty and frequency in accordance with BS EN 60898-1.

271.200 RESIDUAL CURRENT DEVICE:

Application Type C RCBO for all final ring circuits serving socket outlets.

Manufacturer and reference Group Schneider, Siemens

Or approved equivalent following Technical submittal, any such approval shall not be unreasonably withheld

Supply combined residual current/over current operated circuit breakers (RCBOs) in accordance with BS EN 61009.

271.210 CABLE TERMINATIONS:

2250 CABLE TERMINATIONS:

Ensure that switchgear and distribution boards are provided with facilities to terminate size, number and type of cable indicated. Where necessary use fabricated steel extension boxes for glanding large and multiple cables.

Provide non-ferrous metal glanding plates for single core cable terminations.

271.230 AUTOMATICALLY CONTROLLED CAPACITOR BANKS:

271.240 HARMONIC FILTER:

271.270 WORKMANSHIP

3010 FIXING:

Fix all equipment independently of wiring system. Use cadmium or zinc electroplated bolts, nuts, washers and screws.

3020 MOUNTING HEIGHT:

Mount single items of equipment 1450mm above finished floor level to centre of equipment, unless otherwise indicated.

Arrange groups of equipment, other than floor mounted assemblies, so that all parts of equipment requiring access for operation or maintenance are at least 500mm and no more than 2000mm above finished floor level, unless otherwise indicated.

3030 ACCESS:

Ensure that clearance in front of switchgear and control gear is not less than 1m, or as indicated.

Marking and drawing

3040A MARKING AND DRAWING:

3050 CABLE TERMINATIONS:

Terminate paper-insulated cable by means of switchboard manufacturer's standard compound filled cable boxes.

Terminate PVC SWA PVC and MICS cables inside enclosure by securing cables to switchboard with glanding plates or glanding brackets; and outside enclosure with glanding plates or fabricated steel extension boxes.

Installation and commissioning

3060A INSTALLATION AND COMMISSIONING:

Y72 CONTACTORS AND STARTERS

272.010 GENERAL:

1000 GENERAL

Supply contactors and starters as specified in work section

Supply contactors and starters as schedule reference

Location

At end of this work section

On drawing number

272.020 CONTROL PANEL:

Type

Application

Manufacturer and reference

Or approved equivalent following Technical submittal, any such approval shall not be unreasonably withhelds

Electrical supply

1010A 3 PHASE SUPPLY:

Ensure all electrical equipment supplied and installed is suitable for 3 phase power supply to BS 7697.

1010B SINGLE PHASE ELECTRICAL SUPPLY:

Ensure all electrical equipment supplied and installed is suitable for single phase power supply to BS 7697.

Surge suppressors

1020B INSTALLER FITTED SURGE SUPPRESSORS:

Supply surge suppressors to star connected motors and to all motors subject to star-delta starting to limit peak voltage to 1200 volts. Fitted by installer.

Transient suppressors

1030A MANUFACTURER FITTED TRANSIENT SUPPRESSORS:

Supply transient suppressors in the form of resistor and capacitor networks across the starter contactor coils. Fitted by Manufacturer.

Control gear assembly

2010A CONTROLGEAR ASSEMBLY:

Standard - BS EN 60439-1.

External design - Cubicle type assembly.

Usage - Control panel, motor control centre or single starter enclosure.

Conditions of installation - Indoors.

Rated operational voltage, 400 V. Rated short-time withstand current, 20 times rated current.

Service conditions - Ambient air temperature and altitude as BS EN 60439.

As shown on drawings/schedules

Prospective short-circuit current arising from rotating machine

Assembly construction

2020A ASSEMBLY CONSTRUCTION:

Enclosure standard - BS EN 62208.

Material of enclosure - Manufacturer's standard.

Terminals for external conductors, main power circuits

Accommodate cross-sectional area of copper cables in accordance with BS EN 60439-1, Appendix A.

Terminals for external conductor, control and auxiliary circuits

Terminal block. Mounting - top hat rails (35mm) to BS 5584 (EN 50022).

Size of neutrals on three phase supplies

Full current-carrying capacity of phase conductor.

Degree of protection to BS EN 60529

IP 31 for units installed inside buildings excluding boiler rooms and pump rooms.

IP 55 for units installed in boiler rooms, pump rooms and outside buildings.

Protection against direct and indirect contact as Manufacturer's standard.

Accessibility for inspection

Arrange for following operations to be performed when assembly is in service and under voltage.

Visual inspection of switching devices and other apparatus; settings and indicators of relays and releases; conductor connections and markings.

Adjusting and re-setting of relays, releases and electronic devices.

Replacement of fuse links and indicating lamps.

Fault location by voltage and current measuring.

Accessibility for maintenance

Provide space between functional unit or group and adjacent functional units or groups. Provide retainable fastening means for parts likely to be removed for maintenance.

Use barrier protected sub-sections for each functional unit or group.

Use compartments for each functional unit or group.

Removable parts and withdrawable parts

Degree of protection of assembly after removal or withdrawal of part as manufacturer's standard.

Internal separation - Manufacturer's standard.

Input voltage variations for electronic equipment supply - BS EN 60439, Section 7.9.1.

Supply frequency deviation - BS EN 60439, Section 7.9.4.

Mounting - Floor standing or wall mounted.

Access for cabling

As shown on drawings/schedules

Enclosure standard - BS EN 62208.

Material of enclosure

Steel.

Impact resistant moulded plastic

Terminals for external conductors, main power circuits

Accommodate cross-sectional area of copper cables in accordance with BS EN 60439-1, Appendix A.

Accommodate cross-sectional area of copper cables

Accommodate cross-sectional area of aluminium cables

Terminals for external conductor, control and auxiliary circuits

Terminal block

Fused

Removable link

Socket for test pin

Mounting.

Removable back plates.

Top hat rails (35mm) to BS 5584 (EN 50022).

Top hat rails (75mm) to BS 5585 (EN 50023).

Marking

Mark terminals as BS 7671

Size of neutrals on three phase supplies

Full current-carrying capacity of phase conductor.

Degree of protection to BS EN 60529

For assembly

For bottom plate

IP 31 for units installed inside buildings excluding boiler rooms and pump rooms.

IP 55 for units installed in boiler rooms, pump rooms and outside buildings.

Degree of mechanical protection to BS EN 62262, IK

Protection against direct contact

Protection by insulation of live parts.

Protection by barriers or enclosures.

Protection by obstacles.

Protection against indirect contact

Protection by using protective circuits.

Protection by separation of circuits.

Protection by total insulation.

Accessibility for inspection

Arrange for following operations to be performed when assembly is in service and under voltage.

Visual inspection of switching devices and other apparatus; settings and indicators of relays and releases; conductor connections and markings.

Adjusting and re-setting of relays, releases and electronic devices.

Replacement of fuse links.

Replacement of indicating lamps.

Fault location by voltage and current measuring.

Accessibility for maintenance

Provide space between functional unit or group and adjacent functional units or groups. Provide retainable fastening means for parts likely to be removed for maintenance.

Use barrier protected sub-sections for each functional unit or group.

Use compartments for each functional unit or group.

Accessibility for extension under voltage

Removable parts and withdrawable parts

Degree of protection of assembly after removal or withdrawal of part as manufacturer's standard.

Internal separation

Form 1.

Form 2.

Form 3.

Form 4.

Input voltage variations for electronic equipment supply

BS EN 60439, Section 7.9.1.

Supply frequency deviation

BS EN 60439, Section 7.9.4.

Mounting

Floor standing.

Wall mounted.

Access for cabling

Front

Top

Bottom

Rear

Side

Enclosure finish

2030A ENCLOSURE FINISH:

Finish - Manufacturer's standard.

Colour - Manufacturer's standard colour.

2040 SITE MODIFICATION:

Do not make site alterations unless authorised. Where site modifications to assemblies are authorised make in accordance with manufacturer's certified drawings and instructions. Ensure that modifications made comply with type test certificate obtained for arrangement of components.

272.030 LV CONTACTORS AND MOTOR STARTERS:

Type

Application

Manufacturer and reference

Or approved equivalent following Technical submittal, any such approval shall not be unreasonably withhelds

Electrical supply

1010A 3 PHASE SUPPLY:

Ensure all electrical equipment supplied and installed is suitable for 3 phase power supply to BS 7697.

1010B SINGLE PHASE ELECTRICAL SUPPLY:

Ensure all electrical equipment supplied and installed is suitable for single phase power supply to BS 7697.

LV contactors

2050C CONTINUOUS LV CONTACTORS AND MOTOR STARTERS:

Rated duty - Continuous.
Details of equipment
As shown on drawings/schedules
Rated operational current (Amps)
Utilisation category
Relays and releases, type

272.040 CONTROL CIRCUIT DEVICES:

Type
Application
Manufacturer and reference
Or approved equivalent following Technical submittal, any such approval shall not be unreasonably withheld
Electrical supply
1010A 3 PHASE SUPPLY:
Ensure all electrical equipment supplied and installed is suitable for 3 phase power supply to BS 7697.
1010B SINGLE PHASE ELECTRICAL SUPPLY:
Ensure all electrical equipment supplied and installed is suitable for single phase power supply to BS 7697.
2060A CONTROL CIRCUIT DEVICES:
Type of equipment.
 arc. control circuit device
 Manual control switches; emergency stop; control relays; pilot switches; position switches; associated equipment; auxiliary contacts and indicating lamps.
 Interrupting medium, Air.
 Operating condition.
 Method of operation - electromagnetic.
 Method of control - automatic.
 Rated voltage (Volts) - operational, 230.
 Rated frequency (Hertz), 50.
 Contact element classification.
 Enclosure degree of protection IP 31.
Details
As shown on drawings/ schedules
Rated operational current (Amps)
Utilisation category

272.050 ISOLATING SWITCHES:

Type
Application
Manufacturer and reference
Or approved equivalent following Technical submittal, any such approval shall not be unreasonably withheld
Electrical supply
1010A 3 PHASE SUPPLY:
Ensure all electrical equipment supplied and installed is suitable for 3 phase power supply to BS 7697.
1010B SINGLE PHASE ELECTRICAL SUPPLY:
Ensure all electrical equipment supplied and installed is suitable for single phase power supply to BS 7697.
2070A ISOLATING SWITCHES:
Isolation as shown on drawings/schedules

272.060 CONTROL SELECTOR SWITCHES:

Type
Application
Manufacturer and reference

Or approved equivalent following Technical submittal, any such approval shall not be unreasonably withheld

Electrical supply

1010A 3 PHASE SUPPLY:

Ensure all electrical equipment supplied and installed is suitable for 3 phase power supply to BS 7697.

1010B SINGLE PHASE ELECTRICAL SUPPLY:

Ensure all electrical equipment supplied and installed is suitable for single phase power supply to BS 7697.

2080A CONTROL SELECTOR SWITCHES:

Provide panel mounting independent manual operation rotary type switch to select local/off/remote control.

272.070 IN-BUILT PUSH BUTTONS:

Type

Application

Manufacturer and reference

Or approved equivalent following Technical submittal, any such approval shall not be unreasonably withheld

Electrical supply

1010A 3 PHASE SUPPLY:

Ensure all electrical equipment supplied and installed is suitable for 3 phase power supply to BS 7697.

1010B SINGLE PHASE ELECTRICAL SUPPLY:

Ensure all electrical equipment supplied and installed is suitable for single phase power supply to BS 7697.

2090A IN-BUILT PUSH BUTTONS:

Supply flush button type start/on and reset push buttons. Supply mushroom actuator type stop/off push buttons released by turning the actuator.

272.080 INDICATOR LIGHTS:

Type

Application

Manufacturer and reference

Or approved equivalent following Technical submittal, any such approval shall not be unreasonably withheld

Electrical supply

1010A 3 PHASE SUPPLY:

Ensure all electrical equipment supplied and installed is suitable for 3 phase power supply to BS 7697.

1010B SINGLE PHASE ELECTRICAL SUPPLY:

Ensure all electrical equipment supplied and installed is suitable for single phase power supply to BS 7697.

2100A INDICATOR LIGHTS:

Supply interchangeable indicators for respective units. Provide neon indicators. Provide 230V indicator circuits and lamps.

Lens colour - In accordance with BS EN 60073.

272.090 CONTACTOR CONTROL RELAYS:

Type

Application

Manufacturer and reference

Or approved equivalent following Technical submittal, any such approval shall not be unreasonably withheld

Electrical supply

1010A 3 PHASE SUPPLY:

Ensure all electrical equipment supplied and installed is suitable for 3 phase power supply to BS 7697.

1010B SINGLE PHASE ELECTRICAL SUPPLY:

Ensure all electrical equipment supplied and installed is suitable for single phase power supply to BS 7697.

2110A CONTACTOR CONTROL RELAYS:

Standard BS EN 60947-5-1, install relays in contactor enclosure.

Compatible with contactor enclosure.

272.100 CONTROL AND INDICATOR LIGHT CIRCUIT FUSES:

Type

Application

Manufacturer and reference

Or approved equivalent following Technical submittal, any such approval shall not be unreasonably withheld

Electrical supply

1010A 3 PHASE SUPPLY:

Ensure all electrical equipment supplied and installed is suitable for 3 phase power supply to BS 7697.

1010B SINGLE PHASE ELECTRICAL SUPPLY:

Ensure all electrical equipment supplied and installed is suitable for single phase power supply to BS 7697.

2120A CONTROL AND INDICATOR LIGHT CIRCUIT FUSES:

272.110 MOTOR STARTERS:

Type

Application

Manufacturer and reference

Or approved equivalent following Technical submittal, any such approval shall not be unreasonably withheld

Electrical supply

1010A 3 PHASE SUPPLY:

Ensure all electrical equipment supplied and installed is suitable for 3 phase power supply to BS 7697.

1010B SINGLE PHASE ELECTRICAL SUPPLY:

Ensure all electrical equipment supplied and installed is suitable for single phase power supply to BS 7697.

General

2130A MOTOR STARTERS - MOTORS BELOW 0.37 KW:

Provide fuses or circuit breakers for motors below 0.37 kW.

2130B MOTOR STARTERS - MOTORS OF 0.37KW AND ABOVE:

Provide starters incorporating overcurrent protection for motors of 0.37kW and above.

Provide starter with manual reset, adjustable, inverse time delay, and ambient temperature compensated thermal overcurrent release to BS EN 60947-4-1. Ensure overcurrent release is compatible with starting, accelerating and running characteristics of motor, starter and driven machine combination.

Use phase unbalance protection on three phase equipment.

2150 DIRECT-ON-LINE MOTOR STARTERS:

Use direct-on-line starter to BS EN 60947-4-1, with single phase motors and three phase motors.

2160 STAR DELTA MOTOR STARTERS:

Use star delta starter to BS EN 60947-4-1 with three phase motors.

Incorporate adjustable time delay contactor relays, to control star delta changeover, ensuring electrical endurance compatible with starter contactors. Ensure starting sequence activated on voltage restoration.

Auto-transformer type

Operating cycles per hour

2190A CONTROL PANEL INVERTOR MOTOR STARTERS:

Inverter type - Digital PWM.

Location - Control panel.

Control range - 0.5 to 120 Hz

Power factor - 0.95 or better.

Starting current - Not to exceed 1 x FLC.

Ensure acceleration and deceleration ramps are independently adjustable.

Allow connection to a turning motor without braking to a standstill.

Allow connection to a reverse wind milling fan without causing tripping and return fan to correct speed.

Ensure inverters require no additional means for starting. Supply inverters that do not require electrical matching to motor. Ensure inverters are capable of running motors in parallel.

EMC characteristics to BS EN 61800.

Ensure inverter does not cause tripping through a mains interruption of 200 msec.

Ensure inverter incorporates the following protection to cause electronic shut down without operating circuit protective devices.

Motor phase to phase fault; motor phase to earth fault; overvoltage; under voltage; inverter overheat; motor overheat; loss of control signal; loss of auxiliary control voltage; current limit.

Inverter controls - Local/remote facility.

Make provision for inverter to display externally, external and internal faults following a failure.

Show 1st, 2nd and 3rd up sequential faults.

Provide digital readout to show output frequency Hz; reference 1 (Hand); reference 2 (Auto); motor current (% or Amps); fault memory.

Provide volt free remote signalling contacts to indicate common fault; running/stopped conditions; healthy/tripped conditions.

Ensure parameters can be set and fault memory interrogated with door closed, and without additional instrumentation.

2190B MOTOR CONTROL CENTRE INVERTER MOTOR STARTERS:

Inverter type - Digital PWM.

Location - Motor control centre.

Control range - 0.5 to 120 Hz Power factor - 0.95 or better.

Starting current - Not to exceed 1 x FLC.

Ensure acceleration and deceleration ramps are independently adjustable.

Allow connection to a turning motor without braking to a standstill.

Allow connection to a reverse wind milling fan without causing tripping and return fan to correct speed.

Ensure inverters require no additional means for starting. Supply inverters that do not require electrical matching to motor. Ensure inverters are capable of running motors in parallel.

EMC characteristics to BS EN 61800.

Ensure inverter does not cause tripping through a mains interruption of 200 msec.

Ensure inverter incorporates the following protection to cause electronic shut down without operating circuit protective devices.

Motor phase to phase fault; motor phase to earth fault; overvoltage; under voltage; inverter overheat; motor overheat; loss of control signal; loss of auxiliary control voltage; current limit.

Inverter controls - Local/remote facility.

Make provision for inverter to display externally, external and internal faults following a failure.

Show 1st, 2nd and 3rd up sequential faults.

Provide digital readout to show output frequency Hz; reference 1 (Hand); reference 2 (Auto); motor current (% or Amps); fault memory.

Provide volt free remote signalling contacts to indicate common fault; running/stopped conditions; healthy/tripped conditions.

Ensure parameters can be set and fault memory interrogated with door closed, and without additional instrumentation.

272.120 AUTOMATIC CHANGEOVER FOR RUN/STANDBY DUTY:

Application

2200 AUTOMATIC CHANGEOVER FOR RUN/STANDBY DUTY - SINGLE POWER SUPPLY:

Provide system malfunction audible alarm.

Fit a control switch to starter enclosure arranged to select either motor for "run" or "standby" duty. Indicate selection of respective motor by illumination of indicator lights on starter enclosure.

Provide facilities for connection of remote indicator lights to indicate selection/operation of system and for connection of a system malfunction audible alarm where indicated.

Arrange for selected "run" duty motor to operate in response to system controls, and in event of operation of duty motor starter overcurrent trip, for automatic changeover to "standby" motor.

Control power supply to starter by an air break isolating switch interlocked with starter enclosure access door.

2210 AUTOMATIC CHANGEOVER FOR RUN/STANDBY DUTY - DUAL POWER SUPPLY:

Provide system malfunction audible alarm.

Fit a control switch to starter enclosure arranged to select either motor for "run" or "standby" duty.

Indicate selection of respective motor and availability of the two power supplies by illumination of indicator lights on starter enclosure.

Provide facilities for connection of remote indicator lights to indicate selection/operation of system and for connection of a system malfunction audible alarm where indicated.

Arrange for selected "run" duty motor to operate in response to system controls, and on loss of power supply to "run" duty motor or operation of motor starter overcurrent trip, for automatic changeover to "standby" motor.

Control the two power supplies by a single air break multiple isolating switch interlocked with starter enclosure access door.

272.130 CONTROL CIRCUIT TRANSFORMERS:

2220 CONTROL CIRCUIT TRANSFORMERS:

Provide control circuit transformers to supply power at voltages to suit control components.

Standard

Use transformers in accordance with BS EN 61558-2-9 or BS EN 61558-1 and provide an external label of approved type and size.

Protection - Primary and secondary fuses.

Application

272.140 SWITCHING AND INDICATION:

Type

Application

2230A SWITCHING AND INDICATION:

Fit on panel or access doors Stop/Start/Reset push buttons; Auto/Off/Manual control selector switch; run and trip indicator lights.

As shown on drawings/schedules

272.150 AUDIBLE ALARMS:

2240 AUDIBLE ALARMS:

Ensure that operation of any starter trip lamp, safety circuit lamp or alarm lamp operates a common audible alarm with mute and test facilities and terminals for remote alarm signal.

When an alarm condition has had the audible alarm muted, ensure that terminals for a remote "alarm accepted" light are energised. The audible alarm circuit and terminals for remote alarm signal must still be capable of indicating another fault occurring even though original fault has not been cleared. The test facilities are to test momentarily both the audible alarm and all alarm indicator lamps, whilst the push button is depressed.

Use alarms that interface with a sensor or controller to sense set-point and measured value. Provide adjustable upper and lower limits on face of unit. Provide unit with indicating lamps to show which limit has been exceeded. Provide each unit with connections for remote alarm.

Application

272.160 PROGRAMMABLE LOGIC CONTROLLERS:

Type

Application

Manufacturer and reference

Or approved equivalent following Technical submittal, any such approval shall not be unreasonably withheld

Electrical supply

1010A 3 PHASE SUPPLY:

Ensure all electrical equipment supplied and installed is suitable for 3 phase power supply to BS 7697.

1010B SINGLE PHASE ELECTRICAL SUPPLY:

Ensure all electrical equipment supplied and installed is suitable for single phase power supply to BS 7697.

2250A PROGRAMMABLE LOGIC CONTROLLERS:

Provide programmable logic controllers in accordance with the manufacturer's recommendations and the specified control requirements.

Standard - BS EN 61131.

Provide fuse and isolator for the Programmable Logic Controller. Install PLC with control components.

Programming language standard - BS EN 61131-3

272.180 STARTER AND CONTROL PANEL INTERNAL WIRING:

Type

Application

2260A STARTER AND CONTROL PANEL INTERNAL WIRING:

Standard - BS 6231.

Wiring coding - Random colours and CPC green/yellow.

Segregate control wiring from power circuits. Contain control wiring in ventilated plastic trunking.

Identify each end of each wire with a unique number.

Take account of thermal effects of grouping when routing power wiring. Identify each end of each wire with a unique number.

272.190 COMPONENT MOUNTING:

Type

Application

2270A COMPONENT MOUNTING:

Mount control components on top hat rails (35mm) to BS 5584 (EN 50022).

272.200 CONTROL SYSTEM FUNCTION CHARTS:

Type

Application

2280A CONTROL SYSTEM FUNCTION CHARTS:

Function chart format - Combined function chart/circuit diagram.

272.210 WORKMANSHIP:

3010 INSTALLATION:

Install control panels, motor control centres, contactors and starters in accordance with BS EN 60947 and manufacturer's recommendations.

Y73 LUMINAIRES AND LAMPS

273.010 GENERAL:

1000 GENERAL

Supply luminaires and lamps as schedule reference

Location

Supply luminaires and lamps as schedule reference Y73-Luminaires

Location

273.020 LUMINAIRES:

Type

Application

Manufacturer and reference

Or approved equivalent following Technical submittal, any such approval shall not be unreasonably withheld

2005 LAMP EFFICACY:

The system is designed to achieve an average initial circuit of at least 65 lumens/watt for fixed lighting equipment within the building.

2010A LUMINAIRES - GENERAL PURPOSE:

Safety Support for Components

Provide secondary support for translucent covers, diffusers and gear trays so they are prevented from falling when their primary fixing is released.

Photometric performance

Ensure luminaires of similar type have same photometric performance as published data within the tolerances defined by BS EN 13032-1.

2010B LUMINAIRES - GENERAL PURPOSE WITH SAFETY GLASS:

Safety

Fit luminaire with cover glass to protect against ultra-violet emission and risk from explosion of lamps.

Safety Support for Components

Provide secondary support for translucent covers, diffusers and gear trays so they are prevented from falling when their primary fixing is released.

Photometric performance

Ensure luminaires of similar type have same photometric performance as published data within the tolerances defined by BS EN 13032-1.

2010C LUMINAIRES - SPECIAL APPLICATIONS:

Emergency lighting

2020A EMERGENCY LIGHTING LUMINAIRES:

Hazardous areas

2040A HAZARDOUS AREA LUMINAIRES:

BS EN 60079-15 or BS EN 60079-25 as appropriate.

Standard

BS EN 60079-0.

BS EN 60079-1.

BS EN 60079-6.

BS EN 60079-11.

BS EN 60079-14.

BS EN 60079-15.

BS EN 60079-25.

Supply luminaires with photometric data in accordance with BS EN 13032-1.

Supply luminaires in accordance with BS EN 60598).

Fixed general purpose luminaires to BS 4533-102.1 (EN 60598-2-1)

Supply luminaires with type N protection in accordance with BS EN 60079-152

Supply luminaires with type N protection in accordance with BS EN 60079-15.

Supply luminaires with type N protection in accordance with BS EN 60079-15.

Supply luminaires with type N protection in accordance with BS EN 60079-15.

Ground recessed luminaires to BS EN 60598-2-13.

Extra low voltage lighting systems for filament lamps to BS EN 60598-2-23.

Luminaires with limited surface temperature to BS EN 60598-2-24.

Luminaires for hospitals and health care buildings to BS EN 60598-2-25.

Electrical supply track systems for luminaires to BS EN 60570.

LED modules for general lighting to BS EN 62031.

Classification - to BS EN 60598-1

Safety

Fit luminaire with cover glass to protect against ultra-violet emission and risk from explosion of lamps.

Safety Support for Components

Provide secondary support for translucent covers, diffusers and gear trays so they are prevented from falling when their primary fixing is released.

Photometric performance

Ensure luminaires of similar type have same photometric performance as published data within the tolerances defined by BS EN 13032-1.

Ensure luminaires comply with BS EN 61547 for EMC immunity.

Physical protection

BS EN 62262 (IK),

BS EN 60529 (IP),

273.030 LAMPHOLDERS:

Type

Application

General

2060A LAMPHOLDERS - GENERALLY:

Lamp holders with enhanced safety features - BS 7895.

Bayonet lamp holders - BS EN 61184.

2070 LAMPHOLDERS - TUNGSTEN FITTINGS:

Use following lamp holders for tungsten filament lamps unless indicated otherwise.

Lamp holder

up to 150 W bayonet B22d

200 W Edison screw E27 2A

300 W Edison screw 16A

Shade rings

Provide a shade carrier ring for separately mounted lamp holders for GLS tungsten filament lamps.

Polarity of Edison Screw Lamp holders

Ensure phase conductor is connected to centre contact.

Mounting

2080A LAMPHOLDERS - MOUNTING:

Cord grip

Provide integral cord grip type when lamp holders are suspended by cord.

Conduit Mounted

When mounted directly to conduit system use back plate lamp holder for conduit box.

273.040 CONTROL GEAR AND COMPONENTS:

Type

Application

2090A CONTROL GEAR AND COMPONENTS:

Ensure control gear and components are suitable for lamp type, wattage and starting characteristics.

Obtain from manufacturers written confirmation of compatibility.

2095 CIRCUIT LOSSES:

Use high frequency ballasts to ensure the installed circuit load does not exceed $3 \text{ W/m}^2 / 100 \text{ lux}$.

Fluorescent lamp ballasts and starters

2100A FLUORESCENT LAMP BALLASTS AND STARTERS:

BS EN 61347-2-8 and BS EN 60921.

BS EN 61347-2-4, BS EN 61347-2-5, BS EN 61347-2-6 & BS EN 61347-2-7 and BS EN 60925 for d.c. supplied electronic ballasts.

BS EN 60081 and BS EN 60901.

Supply thermal protectors for ballasts for tubular fluorescent lamps to BS EN 60730-2-3.
BS EN 61347-2-4, BS EN 61347-2-5, BS EN 61347-2-6 & BS EN 61347-2-7 and BS EN 60925 for d.c. supplied electronic ballasts.

2110A DISCHARGE LAMP BALLASTS AND STARTERS:

Capacitors

2120A CAPACITORS:

2130 SUPPLY TERMINALS:

Use screw terminals for supply cables and circuit protective conductors, sized to terminate up to three 2.5mm² conductors. Provide separate terminal blocks for each incoming circuit, with marking to identify each circuit.

2140 FUSE:

Include a fuse holder and BS 1362 fuse in each incoming circuit phase connection.

2150 INTERFERENCE:

Comply with BS EN 55015.

2160 REMOTE GEAR:

Locate control gear in separate lockable cabinet of sheet steel with same degree of protection and finish specified for luminaire. Comply with manufacturer's recommendations for maximum cable length between gear and lamp.

273.050 LAMPS:

Type

Application

Manufacturer and reference

Or approved equivalent following Technical submittal, any such approval shall not be unreasonably withheld

Types of high efficiency lamp for non-daylight areas

2165 TYPES OF HIGH EFFICIENCY LAMP FOR NON-DAYLIT AREAS:

Light Source	Type
High pressure sodium	All ratings above 70W
Metal halide	All ratings above 70W
Tubular fluorescent	All 26mm diameter (T) lamps and 16mm (T5) lamps rated above 11W, provided with low loss or high frequency control gear. 38mm diameter (T12) linear fluorescent lamps 2400mm in length
Compact fluorescent	All ratings above 26W

Tungsten filament lamps

2170A TUNGSTEN FILAMENT LAMPS:

Comply with BS EN 60064, BS EN 60432-1 and BS EN 60630. Supply electronic step-down converters for filament lamps to BS EN 61047 and BS EN 61347-2-2. Comply with BS EN 61549 for double capped and ELV lamps.

Fluorescent lamps

2180A FLUORESCENT LAMPS:

Internationally specified tubular fluorescent lamps to BS EN 60081.

UK tubular fluorescent lamps to BS 1853-2.

Single capped fluorescent lamps to BS EN 60901 and BS EN 61199.

Double capped fluorescent lamps to BS EN 60081 and BS EN 61195.

2185A TUNGSTEN HALOGEN LAMPS:

Comply with BS EN 60432-2 or BS EN 60357.

2190 HIGH PRESSURE MERCURY VAPOUR LAMPS:

Comply with BS EN 60188 and BS EN 62035.

2215A LED LAMPS:

Comply with BS EN 62031, DD IEC/PAS 62612, BS EN 62386-207 and BS EN 61347-2-13.

2215# LED LAMPS:

BS EN 62301.

DD IEC/PAS 62612.

Control gear

BS EN 62386-207.

BS EN 61347-2-13.

Colour

Output (W)

Voltage (V)

Accessories

2220A TRANSFORMERS FOR LV LUMINAIRES:

Input voltage 230 volts.

Output voltage to suit lamp.

Single phase.

Frequency 50Hz.

Rating (kVA) to suit lamp.

or BS EN 61558 as appropriate.

Manufacturer's standard.

Secondary maximum cable length as manufacturer's recommendations.

273.060 SUPPORT SYSTEM:

Type

Application

Conduit

2240A SUPPORT SYSTEM - CONDUIT:

Material - steel.

Installation

4120 SUPPORT FROM CONDUIT:

Where luminaire is supported from conduit provide a conduit box forming an integral part of conduit system at each point of suspension. Ensure suspensions are vertical.

Where conduit enters luminaire use back-nuts and washers to secure luminaire body to conduit support.

Provide tube with corrosion resistance equal to conduit system.

Do not support luminaires directly from conduit boxes made from non-metal or heat sensitive materials, where the temperature of the material may exceed 60°C or the mass suspended exceeds 3kg.

4160 SUSPENSION:

Suspend luminaires at height indicated. Ensure suspensions hang vertically unless otherwise indicated.

4220 CONNECTIONS TO LUMINAIRES

Cable Protection

Use appropriate size of grommet where cables enter through hole in luminaire body.

Earthing

Ensure that the earthing terminal of Class 1 luminaires is connected to the conduit protective conductor of the supply circuit.

Loose Wiring

Clip or tie back with suitable proprietary devices loose wiring within luminaire, at 300mm intervals.

Direct to conduit

4230A CONNECTIONS TO LUMINAIRES - DIRECT TO CONDUIT – PLUG IN CEILING ROSE:

Terminate circuit wiring in plug in ceiling rose adjacent to luminaire position make final connection to luminaire via flexible cable and stuffing gland

4270 CONNECTIONS TO LUMINAIRES - CONDUIT SUSPENSION:

Terminate circuit wiring in terminal block within supporting conduit box. Use flexible cable from terminal block to luminaire, installed within tube.

Rod

2250A SUPPORT SYSTEM - ROD:

Diameter - 6mm.

Installation

4160 SUSPENSION:

Suspend luminaires at height indicated. Ensure suspensions hang vertically unless otherwise indicated.

4170 SUSPENSION BY ROD:

Use washers, nut and lock-nut at top and bottom of rod. Paint cut ends with calcium plumbate primer or zinc rich paint.

4220 CONNECTIONS TO LUMINAIRES**Cable Protection**

Use appropriate size of cable stuffing gland where cables enter through hole in luminaire body.

Earthing

Ensure that the earthing terminal of Class 1 luminaires is connected to the conduit protective conductor of the supply circuit.

Loose Wiring

Clip or tie back with suitable proprietary devices loose wiring within luminaire, at 300mm intervals.

4280 CONNECTIONS TO LUMINAIRES - ROD OR CHAIN SUSPENSION:

Terminate circuit wiring in terminal block within supporting conduit box. Use flexible cord from terminal block to luminaire and clip cable to one of the rods or chains; do not weave cable through links of the chain.

Chain**2260A SUPPORT SYSTEM - CHAIN:****Installation****4160 SUSPENSION:**

Suspend luminaires at height indicated. Ensure suspensions hang vertically unless otherwise indicated.

4180 SUSPENSION BY CHAIN:

Use hook cover for suspension from circular conduit box. For connection to luminaires use luminaire manufacturer's own chain hook, but if not available use hook with standard screw threaded body to be secured to luminaire body with nuts and washers. Where indicated use captive hooks.

4220 CONNECTIONS TO LUMINAIRES**Cable Protection**

Use appropriate size of grommet where cables enter through hole in luminaire body.

Earthing

Ensure that the earthing terminal of Class 1 luminaires is connected to the conduit protective conductor of the supply circuit.

Loose Wiring

Clip or tie back with suitable proprietary devices loose wiring within luminaire, at 300mm intervals.

4280 CONNECTIONS TO LUMINAIRES - ROD OR CHAIN SUSPENSION:

Terminate circuit wiring in terminal block within supporting conduit box. Use flexible cord from terminal block to luminaire and clip cable to one of the rods or chains; do not weave cable through links of the chain.

Flexible cord**2270A SUPPORT SYSTEM - FLEXIBLE CORD:**

Use size and type as indicated.

Size and type as indicated on the drawings/schedules

Installation**4160 SUSPENSION:**

Suspend luminaires at height indicated. Ensure suspensions hang vertically unless otherwise indicated.

Wall brackets**2280A SUPPORT SYSTEM - WALL BRACKETS:**

Provide wall brackets. Confirm wall brackets are suitable for supporting luminaire.

Installation**Height****2290 SUPPORT SYSTEM - BALL AND SOCKET:****Installation****4160 SUSPENSION:**

Suspend luminaires at height indicated. Ensure suspensions hang vertically unless otherwise indicated.

Height

Provide ball and socket as top support, complete with cover fixed to circular conduit box.

2295 SUPPORT SYSTEM - WIRE ROPE:**Installation****4160 SUSPENSION:**

Suspend luminaires at height indicated. Ensure suspensions hang vertically unless otherwise indicated.

4205# WIRE ROPE SUSPENSION SYSTEM:

Type

Application

Manufacturer and reference

Or approved equivalent following Technical submittal, any such approval shall not be unreasonably withheld

Standards

BS EN 12385-1.

BS EN 13411-3.

BS EN 13411-4.

DIN 3093.

BSRIA COP 22/2002.

Dimensions

Safe working load (kg)

Length

Components

Wire rope

Safe working load (kg)

Length (mm)

Stainless steel grade 316

Galvanised

Fastener

Components

Springs - stainless steel grade 302

Adjustment

Tamperproof

Fixing

Loop

Safe working load (kg)

Length (mm)

Stud (permanently fixed to wire rope length)

Single toggle

Double toggle

Double karabiner

Hook

Accessories

Setting keys

Span/bearer supports

Ceiling clip fixings

Threaded adaptors

Anchor bolts

Anchor for stud fixings

Ceiling fixing kit

Corner saddle

Fastener décor cover

Height

Provide wire rope support system. Confirm wire rope is suitable for supporting luminaires.

273.070 COLUMNS AND BOLLARDS:

Application

Manufacturer and reference

Or approved equivalent following Technical submittal, any such approval shall not be unreasonably withheld

2300A STEEL COLUMNS AND BOLLARDS:

Finish as shown on drawings/schedules

Standards - BS EN 40-2 and BS EN 40-5.

Material - Steel.

2300C ALUMINIUM COLUMNS AND BOLLARDS:

Columns and bollards installation

4210A COLUMNS AND BOLLARDS:

Bases - Install bases in accordance with bollard or column manufacturer's instructions.

273.080 LUMINAIRES AND LAMPS ACCESSORIES:

Type

Application

Manufacturer and reference

Or approved equivalent following Technical submittal, any such approval shall not be unreasonably withheld

Track lighting

3010A TRACK LIGHTING:

Class, poles and current rates as indicated on drawings/schedules

Air handling luminaires

3030A AIR HANDLING LUMINAIRES:

Allow for the path of exhaust air in the diffuser.

Provide an outlet for the air via a series of circular openings in top of assembly casing.

273.090 LUMINAIRES AND LAMPS WORKMANSHIP - GENERAL:

4060 MATERIAL OF SUPPORTING SURFACE:

Ensure classification of luminaires is appropriate. Do not mount luminaires on readily flammable surfaces.

4100 INSTALLATION OF EXTRA LOW VOLTAGE TUNGSTEN HALOGEN LAMPS:

Use same wattage lamp on luminaires fed from common transformer. Supply each luminaire on common transformer by separate cable of same cross-sectional area.

4110 SUPPORT

Ensure support is adequate for weight of luminaires.

Number

Provide the following minimum number of supports for each luminaire longer than 600mm.

Luminaire width (mm)	Minimum number of supports
Up to and including 300	2
Over 300	4

Support by direct fixing

4140A SUPPORT BY DIRECT FIXING:

Refer to fixing methods, use luminaire supporting coupler to follow manufacturer's recommendations.

Support in suspended ceiling

4220 CONNECTIONS TO LUMINAIRES

4290 CONNECTIONS TO LUMINAIRES - MICS CABLE:

Fix cable gland to luminaire and continue conductors to supply terminals of luminaire.

Cable Protection

Use appropriate size of grommet where cables enter through hole in luminaire body.

Earthing

Ensure that the earthing terminal of Class 1 luminaires is connected to the conduit protective conductor of the supply circuit.

Loose Wiring

Clip or tie back with suitable proprietary devices loose wiring within luminaire, at 300mm intervals.

Lighting switches on different phases

4300A SEPARATE LIGHTING SWITCHES ON DIFFERENT PHASES:

4300B PHASE BARRIER LIGHTING SWITCHES ON DIFFERENT PHASES:

273.100 LUMINAIRES AND LAMPS WORKMANSHIP - RECESSED FITTINGS:

Installation of recessed fittings

Installation of semi-recessed fittings

4220 CONNECTIONS TO LUMINAIRES

Recessed fittings

4260A CONNECTIONS TO LUMINAIRES - RECESSED FITTINGS - PLUG AND SOCKET:

Cable Protection

Use appropriate size of grommet where cables enter through hole in luminaire body.

Earthing

Ensure that the earthing terminal of Class 1 luminaires is connected to the conduit protective conductor of the supply circuit.

Loose Wiring

Clip or tie back with suitable proprietary devices loose wiring within luminaire, at 300mm intervals.

273.110 LUMINAIRES AND LAMPS WORKMANSHIP -**4110 SUPPORT**

Ensure support is adequate for weight of luminaires.

Number

Provide the following minimum number of supports for each luminaire longer than 600mm.

Luminaire width (mm)	Minimum number of supports
Up to and including 300	2
Over 300	4

4130 SUPPORT FROM TRUNKING:

Where luminaire is supported from trunking use proprietary clamps or brackets appropriate to the luminaire and trunking.

Do not support luminaires directly from trunking made from non-metal or heat sensitive materials, where the temperature of the material may exceed 60°C or the mass suspended exceeds 3kg.

4220 CONNECTIONS TO LUMINAIRES

Direct to trunking

4240B CONNECTIONS TO LUMINAIRES - DIRECT TO TRUNKING - AT LUMINAIRE:

Cable Protection

Use appropriate size of grommet where cables enter through hole in luminaire body.

Earthing

Ensure that the earthing terminal of Class 1 luminaires is connected to the conduit protective conductor of the supply circuit.

Loose Wiring

Clip or tie back with suitable proprietary devices loose wiring within luminaire, at 300mm intervals.

Y74 ACCESSORIES FOR ELECTRICAL SERVICES

274.010 GENERAL:

1000 GENERAL:

1010 APPLICATION:

Supply fixed electrical wiring accessories for use with fixed and portable peripheral equipment using either power or signalling cables.

1020 SAMPLES:

Submit samples of proposed materials and equipment for approval before work is started. Label each sample with name, catalogue number and reference to the use or services.

Supply accessories for electrical services in accordance with schedule reference

274.020 SAMPLES:

274.030 ACCESSORIES COMMON REQUIREMENTS:

Application All accessories switches sockets connection units etc. to all areas. All accessories to colour contrast with background generally white plastic and are to be suitably IP rated for the environment i.e. plant room, etc. they are installed in.

Manufacturer and reference MK Caradon

Or approved equivalent following Technical submittal, any such approval shall not be unreasonably withheld

2010A ACCESSORIES COMMON REQUIREMENTS - WHITE PLASTIC PLATES GRID, FLUSH INSTALLATION:

Adjustable steel grid for grid switches or direct to enclosure for all other accessories.

Enclosure material- Pressed steel.

Moulded plastic, colour - white.

Neon indicator with red lens, illuminated in "ON" position, for connection units.

Switch rocker bar colour - white.

Fuses to BS 1362.

Blank inserts for spare ways on grid switches.

Method - engraving. Mark front plate to indicate equipment served on connection units.

2010D ACCESSORIES COMMON REQUIREMENTS - METAL CLAD PLATES, SURFACE STEEL CONDUIT INSTALLATION:

Pressed steel or cast iron.

As conduit system or galvanized.

Metal clad.

Threaded entries, top, bottom or side to suit conduit system.

2010E ACCESSORIES COMMON REQUIREMENTS - SURFACE, STEEL CONDUIT, WEATHERPROOF INSTALLATION:

Area of installation - Exterior.

Enclosure pattern - Surface and weatherproof.

Enclosure material - Cast iron.

Enclosure finish - As conduit system or galvanized.

As enclosure.

Screwed weathering cap and chain for socket outlets.

Threaded entries, top, bottom or side to suit conduit system.

2010F ACCESSORIES COMMON REQUIREMENTS - SURFACE, PLASTIC, WEATHERPROOF INSTALLATION:

Area of installation - Exterior.

Enclosure degree of protection to BS EN 60529, IP 54.

Enclosure pattern - Surface and weatherproof.

Enclosure material - Impact resistant plastic.

Enclosure finish - Natural or self-coloured.

Moulded plastic, colour as indicated.

Protective shrouds to rocker bars.

Screwed weathering cap and chain for socket outlets.

Threaded entries to suit cable/conduit system.

274.040 INTERIOR LIGHTING SWITCHES:

Application All Interior manual lighting switches shall be colour contrast with background and suitably IP rated for the environment which they are installed, Switch banks incorporating 3 phases will require phase barriers to be fitted.

Manufacturer and reference MK Caradon

Or approved equivalent following Technical submittal, any such approval shall not be unreasonably withheld

2020A INTERIOR LIGHTING SWITCHES - GENERAL PURPOSE MOULDED PLASTIC:

Switch type - Rocker bar - moulded plastic.

Single pole, double pole, 2 way or intermediate as indicated.

2020B INTERIOR LIGHTING SWITCHES - GRID MOULDED PLASTIC:

Switch type - Rocker bar - moulded plastic.

Single pole, 1 way, 2 way or intermediate as indicated.

2020C INTERIOR LIGHTING SWITCHES - PULL CORD:

Switch type - Cord to BS EN 61058-2-1.

Rating - 6A. Pole configurations - Single pole.

2020D INTERIOR LIGHTING SWITCHES - GENERAL PURPOSE SECRET KEY:

Switch type - Rocker bar - secret key.

2020F INTERIOR LIGHTING SWITCHES - GRID SECRET KEY:

Switch type - Rocker bar - secret key.

Pole configurations - Single pole, 1 way, 2 way or intermediate as indicated.

HBES systems BS EN 50428; enclosure box to BS 4662.

274.050 EXTERIOR LIGHTING SWITCHES:

Application External lighting switches shall be colour contrast with background and suitably IP rated for the environment which they are installed, Switch banks incorporating 3 phases will require phase barriers to be fitted

Manufacturer and reference MK Caradon

Or approved equivalent following Technical submittal, any such approval shall not be unreasonably withheld

2030A EXTERIOR LIGHTING SWITCHES - METAL CLAD ROTARY:

Standard - BS EN 60669-1, enclosure box to BS 4662.

Switch type - Rotary disc or lever operating through sealing gland.

Rating - 6A.

Gangs as indicated.

Action - Two position.

Pole configurations as indicated.

2030B EXTERIOR LIGHTING SWITCHES - SEALED ROCKER BAR:

Standard - BS EN 60669-1, enclosure box to BS 4662.

Switch type - Rocker bar with sealed in plastic membrane.

Rating - 6A.

Gangs as indicated.

Action - Two position.

Pole configurations as indicated.

Switch details

As indicated on drawings/schedules

Pole characteristics

274.060 TIME SWITCHES:

Application External Lighting

Manufacturer and reference Group Schneider Digital

Or approved equivalent following Technical submittal, any such approval shall not be unreasonably withheld

2040B TIME SWITCHES - 7 DAY:

Time switch type

Quartz stabilized solid state 50 hour nickel cadmium battery backup.

Number of "ON" and "OFF" operations - 4

Programme repeat cycle - 7 day.

Time switch type

Synchronous motor 30 hour spring reserve.

Quartz stabilized motor 30 hour spring reserve.

Quartz stabilized solid state 50 hour nickel cadmium battery backup.

Contacts duty

Inductive.

Contacts rating

20A.

Day omit.

Contacts manual status advance to next operation.

Manual bypass continuous "ON" for each separate switch circuit.

Manual bypass continuous "OFF" for each separate switch circuit.

Programme repeat cycle

7 day.

Provide number of independently programmable contact circuits indicated.

274.070 LUMINAIRE CONNECTORS:

Application Wieland plug and socket wired from Ceiling Hub

Manufacturer and reference The IntelliClymac Solution

Or approved equivalent following Technical submittal, any such approval shall not be unreasonably withheld

2050A LUMINAIRE CONNECTORS - GENERAL AND EMERGENCY LIGHTING:

2050B LUMINAIRE CONNECTORS - GENERAL LIGHTING:

Cord grip general and emergency lighting.

2050C LUMINAIRE CONNECTORS - CORD GRIP GENERAL AND EMERGENCY LIGHTING:

Cord grip type plug/socket and screw on retaining cover to BS 5733 3 pin or 4 pin.

274.080 LAMPHOLDERS:

Details

As indicated on drawings/schedules

Fixings

Ancillaries

274.090 ISOLATING SWITCHES:

Application Local isolation for High Load Current Equipment (Mechanical Equipment

Manufacturer and reference MK, Crabtree, Legrand

Or approved equivalent following Technical submittal, any such approval shall not be unreasonably withheld

2070A ISOLATING SWITCHES - BS EN 60669-1:

Provide isolating switches for fixed appliances.

Utilization category as indicated.

Making capacity as indicated.

Standard - BS EN 60669-1, enclosure box to BS 4662.

Switch type - Rotary.

Rating as indicated on schedule.

Pole configuration - DP, three pole or TPN as indicated.

2070B ISOLATING SWITCHES - BS EN 60947-3:

Provide isolating switches for fixed appliances.

Utilization category as indicated on schedule.

Making capacity as indicated.

Standard - Enclosure box to BS 4662, BS EN 60947-3.

Switch type - rotary.

Rating as indicated on schedule.

Pole configuration - DP, three pole or TPN as indicated.

274.100 FUSE CONNECTION UNITS:

Application Connection units to such items as Hand Dryers, Hair Dryers, Fire Alarm, Intruder Alarm and all other ancillary devices etc.

Manufacturer and reference MK Caradon

Or approved equivalent following Technical submittal, any such approval shall not be unreasonably withheld

2080A FUSE CONNECTION UNITS - SWITCHED:

Standard - BS 1363-4, enclosure box to BS 4662 and switched.

Unit type - Rocker bar - plastic.

Pole configuration - DP.

Ancillaries

Cord outlet or cord grip and fuse as indicated.

2080B FUSE CONNECTION UNITS - UNSWITCHED:

Standard - BS 1363-4, enclosure box to BS 4662 and unswitched.

Pole configuration - DP.

Ancillaries

Cord outlet or cord grip and fuse as indicated.

Lockable fuse carrier.

Details

As indicated on drawings/schedules

Ancillaries

274.110 SOCKET-OUTLETS:

Application

General Socket Outlets Socket outlets for cleaners circuits in public areas to have hinged covers

Manufacturer and reference MK Caradon

Or approved equivalent following Technical submittal, any such approval shall not be unreasonably withheld

2090A SOCKET-OUTLETS - SINGLE, SWITCHED:

Standard - 13A socket-outlet to BS 1363, enclosure box to BS 4662.

Switching - Switched.

Switch type - Rocker bar - plastic.

Rating - 13A.

Ancillaries

Plug tops 25% of number of sockets, fused as indicated.

Gangs - 1

2090C SOCKET-OUTLETS - DOUBLE SWITCHED:

Standard - 13A socket-outlet to BS 1363, enclosure box to BS 4662.

Switching - Switched

Switch type - Rocker bar - plastic.

Rating - 13A.

Ancillaries

Plug tops 25% of number of sockets, fused as indicated.

Gangs - 2

2090D SOCKET-OUTLETS - SINGLE, UNSWITCHED:

Standard - 13A socket-outlet to BS 1363, enclosure box to BS 4662.

Switching - Unswitched.

Rating - 13A.

Gangs - 1

Enclosed box to BS 4662, BS 7288.

HBES systems BS EN 50428, enclosure box to BS 4662.

Switching - Unswitched.

Rating - 13A.

RCD, BS 7288. Mains failure trip, sensitivity 30mA.

Gangs - 1

Details

As indicated on drawings/schedules

Mains trip failure sensitivity

Fused

274.120 COOKER CONTROL UNIT

Application Cooker outlet in kitchens

Manufacturer and reference MK Caradon

Or approved equivalent following Technical submittal, any such approval shall not be unreasonably withheld

2100A COOKER CONTROL UNIT - WITH INTEGRAL SOCKET:

2100B COOKER CONTROL UNIT - WITHOUT SOCKET:

274.130 CORD OUTLETS:

Application As Above

Manufacturer and reference As above

Or approved equivalent following Technical submittal, any such approval shall not be unreasonably withheld

2110A CORD OUTLETS - COOKER CONNECTION UNIT:

Standard - BS 5733, enclosure box to BS 4662.

Format - Cooker connection.

Rating - 45A

Pole configuration - DP&E.

DP&E.

TPN&E.

274.140 CABLE AND APPLIANCE COUPLERS:

Manufacturer and reference MK Commando

Or approved equivalent following Technical submittal, any such approval shall not be unreasonably withheld

2120A CABLE AND APPLIANCE COUPLERS - 16A, 240V SINGLE PHASE, GENERAL PURPOSE:

Standard - BS EN 60309-2.

Material - Polycarbonate male and female connectors.

Rating - Voltage 220 - 240V; Current 16A.

Configuration - 2PE.

Colour - 220 - 240V, Blue.

Ancillaries as indicated.

ON/OFF switch; gang combinations 1, 2, 3 and 4; RCD. BS 7288 sensitivity 30mA.

Standard

BS EN 60309-2.

Industrial couplers, BS EN 60309-1.

BS EN 60320-2-2.

Material

Polycarbonate male and female connectors.

Metal clad male and female connectors.

Rating- voltage

25V.

50V.

110 - 130V.

220 - 240V.

380 - 415V.

500 - 750V.

Rating - current

16A.

32A.

63A.

125A.

Configuration

3PNE.

3PE.

2PE.

2P.

Colour

25V, Violet.

50V, White.

110 - 130V, Yellow.

220 - 240V, Blue.

380 - 415V, Red.

500 - 750V, Black.

Generally grey.

274.150 TELEPHONE AND DATA OUTLET SOCKETS:

Application Telephone and Data outlets to all office areas.

Manufacturer and reference MK Caradon

Or approved equivalent following Technical submittal, any such approval shall not be unreasonably withheld

2130A TELEPHONE AND DATA OUTLET SOCKETS - GENERAL PURPOSE:

For jack socket to telephone service provider requirements and enclosure box to BS 4662.

274.160 TELEPHONE CORD OUTLETS:

Application

274.190 AERIAL SOCKETS:

Application Satellite / Digital TV & Radio distribution to Pa System rack and TV display equipment in gymnasium and reception areas.

Manufacturer and reference MK Caradon

Or approved equivalent following Technical submittal, any such approval shall not be unreasonably withheld

2170A AERIAL SOCKETS - TV AND DAB AERIALS:

Standard - BS 3041-2.

Circuit configurations - Dual TV and DAB.

Ancillaries

Safety isolation to CAI recommendations for communal aerial systems.

2170B AERIAL SOCKETS - SINGLE TV AERIALS:

Standard - BS 3041-2.

Circuit configurations - Single TV.

Ancillaries

Safety isolation to CAI recommendations for communal aerial systems.

2170# AERIAL SOCKETS:

Standard

BS EN 50083 and BS EN 60728-11.

Circuit configurations

Twin UHF.

Single UHF.

Twin VHF.

Single VHF.

Single DAB.

Dual UHF and DAB

Dual VHF and FM.
Satellite IF.
Characteristics
Insertion loss.
Isolation.
Ancillaries
Safety isolation to CAI recommendations for communal aerial systems.

274.210 SHAVER POINTS:

Application In the male toilets and changing village grooming areas.
Manufacturer and reference MK Caradon
Or approved equivalent following Technical submittal, any such approval shall not be unreasonably withheld
2190A SHAVER POINTS - BATHROOM AND WASHROOM USE:
BS EN 61558-2-9, BS EN 61558-1 and BS EN 61558-2-23, enclosure box to BS 4662.
Rating - 20VA.
Double wound single phase transformer 240/240V and 110V to BS EN 61558-2-9, BS EN 61558-1 and BS EN 61558-2-23.
Internal overload protection.
Marking - Input and output voltages and "SHAVERS ONLY".

274.220 INDICATOR LAMPS:

274.240 WORKMANSHIP:

3010 EARTHING:

Ensure metal framework of equipment is bonded to main earth point. Ensure that cable CPC's are connected to earth bar.
Provide earth CPC between earth lug on metal box and accessory casing except where accessory is encased in plastic.

3020 PROTECTION:

Ensure there is no physical or electrical damage to accessories when they are removed from their packaging and during installation.
Provide masking covers for surface mounted accessories to protect surface from paint.
Where accessories are flush mounted install front plate after painting is finished.

3030 FIXING:

Align accessories horizontally and vertically. Where accessories are grouped, mount horizontally in line and parallel to each other and equidistant.
Fix cover plates to boxes with brass fixing screws.

3040 MEASURING MOUNTING HEIGHTS:

Take measurement for position of electrical accessories to the centre line of equipment from either finished floor or worktop. Where specified height coincides with top of tiling, leave a clear gap of 50mm above tiling.
Mount equipment below a worktop 100mm below underside of worktop.
Accessories mounting heights
As indicated on Architects drawings.
As indicated on the drawings/schedules.

3050 STANDARD ACCESSORIES MOUNTING HEIGHTS:

Accessory	Location	Height (mm)
Lighting switch		1200
Socket outlet	General	450
	Kitchen	1000
	Above worktop	200
Shaver socket outlet		1000
Fused connection unit	General	450
	Above worktop	200
Fused connection unit	Radiator heater, wall	1800
	Radiator heater, focal point	450
	Tubular heater	450
	Clock	1900
Cooker control unit	Above worktop	200
Cooker connection unit		600
Safety isolating transformer		1200
Room thermostat		1400
Telephone outlet		450
Radio/TV outlet		450
Push button		1200
Fire alarm manual call point		1200
Bell or buzzer		2000
Visible alarm indicator		2000

3060# SPECIAL ACCESSORIES MOUNTING HEIGHTS:

Switched fused Connection Units for hand / Hair dryers to be mounted 200mm below ceiling to top of accessory with conduit and outlet box concealed within the fabric and terminating at the manufacturers cable insertion point behind the unit.

3070 ACCESSORIES MOUNTING HEIGHTS:

Provide switches and socket outlets for lighting and other equipment in habitable rooms at appropriate heights between 450mm and 1200mm from finished floor level, in accordance with Building Regulations Approved Document M and BS 8300.

3080 FLUSH MOUNTED ACCESSORY BOXES

Flush mounted accessory boxes are to finish flush with the surface of the wall finish plaster or tile.

Where the wall finish including –plaster is greater than 11mm the accessory box may be extended to the surface using extension frames.

Y80 EARTHING AND BONDING

280.010 GENERAL:

1000 GENERAL

1010

MATERIALS

GENERALLY:

Use materials and installations methods in accordance with BS EN 62305, BS 7671, BS 7430, Electricity Safety, Quality and Continuity Regulations and Local Electricity Supply Authority Requirements as appropriate.

280.020 CONDUCTORS:

Application Local equipotential bonding and bonding of extraneous conductive parts

Manufacturer AEI Draka

Conductors for lightning protection system

Conductor joints

2020A LIGHTNING PROTECTION CONDUCTOR JOINTS:

2020B EARTHING SYSTEMS CONDUCTOR JOINTS:

280.030 EARTH ELECTRODES:

Earth electrodes for system earthing.

2040B ROD EARTH ELECTRODES FOR SYSTEM EARTHING:

Standard - BS 7430.

Form - rod with female thread each end.

Dimensions

Rod Diameter - 15 mm - nominal.

Rod Length - 2.4m (2 x 1.2) minimum.

Earth electrode couplings

Use high strength driving cap in contact with driven rod and couplings of compatible material fully enclosing the rod threads.

Interconnect electrodes using bare copper tape 25mm x 6mm.

Earth electrodes in drawpits

Provide concrete cover, permanently labelled, for electrodes installed through cable draw pit bases.

Main earth conductor connection

Connect main earth conductor to first electrode using heavy duty purpose made silicon aluminium bronze body conductor clamp and high tensile phosphor bronze bolt.

Material, minimum size as BS 7430 Table 4 - Copper.

Accessories

Rod to tape clamp. Sized to suit earth rod and connector.

2040D BUILDING OR STRUCTURAL ELEMENT EARTH ELECTRODES FOR SYSTEM EARTHING:

Standard - BS 7430.

Form - Building or structural element, as shown on the drawings.

Interconnect electrodes using bare copper tape 25mm x 6mm.

Standard

Building elements to BS EN 62305.

BS 7430.

BS EN 50164-2.

Earth electrode couplings

Use silicon bronze alloy or aluminium bronze alloy, counter bored to completely enclose rod threads.

Material standard

Ensure rods meet in centre of coupling.

Use high strength driving cap in contact with driven rod and couplings of compatible material fully enclosing the rod threads.

Interconnect electrodes using,

25 x 3 mm bare copper tape.

25 x 6 mm bare copper tape.

Earth electrodes in drawpits

Provide concrete cover, permanently labelled, for electrodes installed through cable draw pit bases.

Main earth conductor connection

Connect main earth conductor to first electrode using heavy duty purpose made silicon aluminium bronze body conductor clamp and high tensile phosphor bronze bolt.

Main earth conductor cover tiles

Provide interlocking cover tiles over complete external lengths of main earth conductors.

Permanent test electrodes

Provide permanently located test electrodes.

Material, minimum size

BS 7430 Table 4.

BS EN 50164-2 Table 3.

Molecularly bonded copper clad steel rods to BS 7430 or BS EN 50164-2.

Copper

Annealed.

Hard drawn.

Standard

Cast iron BS EN 1561

Galvanised steel.

Accessories

Rod to tape clamp

Rod to strand clamp

U-bolt clamp

Eyebolt

Soil conditioning aClymac

Moisture retaining clay

Bentonite.

Conductive materials

Aggregate

Concrete

Earth electrode clamps

2060A EARTH ELECTRODE CLAMPS:

Connect tape to electrode head using heavy duty purpose made silicon aluminium bronze body connector clamps or leaded gunmetal body connector clamps, and high tensile phosphor bronze bolts to BS EN 12163.

Earth electrode inspection facilities

2070A EARTH ELECTRODE INSPECTION FACILITIES:

Provide enclosure for each connection between earth conductor and associated earth electrode system. Install so that top is flush with finished ground or floor level. Ensure enclosure provides adequate access for testing purposes. Provide pit details for builders work.

Labelling - Wording, Earth.

280.040 EQUIPOTENTIAL BONDS:

Main equipotential bonds

2090A MAIN EQUIPOTENTIAL BONDS:

Material - Insulated cable, single core to BS 6004.

Use no joints in main equipotential bonds.

Supplementary equipotential bonds

2100A SUPPLEMENTARY EQUIPOTENTIAL BONDS:

Provide supplementary equipotential bonds to BS 7430, BS 7671 and BS EN 50310. Do not use joints in supplementing bonds.

Material - Insulated cable, single core to BS 6004.

Provide supplementary equipotential bonds to BS 7430, BS 7671 and BS EN 50310.

Do not put joints in supplementary equipotential bonds.

280.050 EARTHING:

Application Final Circuit Lighting and Small Power Circuits

Circuit protective conductors

2110A CIRCUIT PROTECTIVE CONDUCTORS:

Material

Insulated cable, single core to BS 6004 as indicated; metallic screwed conduits (excluding flexible); metallic trunking with tinned copper links; armouring and/or metallic sheathing of armoured cables or integral conductor of multi-core cable.

Size

Provide protective conductors sized in accordance with BS 7671 (IEE Regulations) 543.1.4 and Table 54.7.

2110# CIRCUIT PROTECTIVE CONDUCTORS:

Material

Insulated cable

Single core to BS 6004

Single core to BS 7211.

Single core to BS 6007

Copper conductors without insulation.

Tape

Copper tape

Sheathed

LSF.

Metallic screwed conduits (excluding flexible).

Metallic trunking with tinned copper links.

Armouring and/or metallic sheathing of armoured cables.

Armouring of armoured cables where armouring includes copper strands to improve earth conductance.

Integral conductor of multi-core cable.

Size

Provide protective conductors sized in accordance with BS 7671 (IEE Regulations) 543.1.3 and Tables 54.2, 54.3, 54.4, 54.5 and 54.6.

Provide protective conductors sized by reference to BS 7454.

Provide protective conductors sized in accordance with BS 7671 (IEE Regulations) 543.1.4 and Table 54.7.

2120 EARTHING CLAMPS:

Use clamps complying with BS 951, for bonding pipes and lead sheathed cables.

Earth bus bars

2130A EARTH BUSBARS:

Material

Manufacture earth bus bars from hard drawn, tinned, high conductivity copper bar.

Substation Earth bus bar

75 x 13mm cross section 600mm minimum length.

Main Earth Terminal bus bar

25 x 6 mm minimum for incoming live conductor not exceeding 50mm and 50 x 6 mm minimum for incoming live conductor over 50mm².

Material

Manufacture earth bus bars from hard drawn, tinned, high conductivity copper bar.

Substation Earth bus bar

Size

75 x 13mm cross section 600mm minimum length.

Main Earth Terminal bus bar

Size

25 x 6 mm minimum for incoming live conductor not exceeding 50mm and 50 x 6 mm minimum for incoming live conductor over 50mm².

2140 TEST LINKS:

Provide two test links, in connections between main earth conductors and earth bus bar. Fabricate each from two additional sections of earth bus bar. Mount one section on stand-off insulators matching earth bus bar; use remaining section as removable test link. Secure 12mm high tensile brass studs to fixed

sections of bus bar and drill corresponding clearance holes in test links and provide brass washers, nuts and locking devices to secure frame/neutral earthing and test links.

2150 LUGS/TAGS:

Provide lugs or tags to enable connection of bonding conductors to equipment earth terminals.

2160 PROTECTIVE CABLE TERMINATIONS:

For bolted connections use crimp type lugs compressed by automatic tool to achieve correct pressure and crimp depth.

Protective conductor warning notices/labels

2170 PROTECTIVE CONDUCTOR WARNING NOTICES/LABELS:

Provide a permanent label durably marked in letters 4.75mm minimum height "SAFETY ELECTRICAL CONNECTION - DO NOT REMOVE", in visible position, at each bonding conductor connection to extraneous conductive parts.

2180 MAIN EARTH CONDUCTOR - WARNING TAPES:

Provide green/yellow PVC tapes labelled "EARTHING CONDUCTOR" over complete external lengths of main earth conductors at 300mm depth below finished ground.

2190 EARTH BAR LABEL:

Label earth bar "SAFETY ELECTRICAL CONNECTION - DO NOT REMOVE" with wall mounted laminated plastic tablet engraved in 10mm high red letters on white ground.

280.060 WORKMANSHIP:**3010 CLEAN EARTH DISTRIBUTION:**

Install clean earth distribution in double insulated cables from earth electrodes to equipment points. Mount all bus bars with insulators and separate from other earthing systems.

3020 DISSIMILAR METALS:

Ensure, where dissimilar metals are used for system, that purpose made jointing materials are used such that corrosion and deterioration of the electrical connection are not caused. Ensure bonding connections to other metal parts of building are electrolytically compatible with those metal parts. Use the guidance given in BS 7430 Table 8 when bonding dissimilar materials.

Tape joints

3030A COPPER TAPE JOINTS:

Joint copper tapes by brazing, using zinc-free brazing metal with melting point at least 600°C or thermic welding.

3030B ALUMINIUM TAPE JOINTS:

Joint aluminium tapes by welding to BS EN 1011-4.

3040 STRANDED CONDUCTOR JOINTS:

Joint copper stranded conductors with compression joints to BS EN 61284.

Protective cable terminations

3050A PROTECTIVE CABLE TERMINATIONS:

For bolted connections use crimp type lugs compressed by automatic tool to achieve correct pressure and crimp depth.

Make connections between tape and equipment using high tensile grade brass bolts with brass nuts, washers and locking devices. Use phosphor bronze bolts, nuts and washers where connections are liable to corrosion.

3050# PROTECTIVE CABLE TERMINATIONS:

For bolted connections use crimp type lugs compressed by automatic tool to achieve correct pressure and crimp depth.

Make connections between tape and equipment.

using high tensile grade brass bolts with brass nuts, washers and locking devices.

using phosphor bronze bolts, nuts and washers where connections are liable to corrosion.

Earth electrodes

Application

3060A EARTH ELECTRODES:

Location

Locate electrodes not less than 2m distant from building/structure protected, and away from telecommunication and pilot cables and metallic fences.

Driving

Drive rods vertically into ground with purpose designed electric hammer. (Where impenetrable strata encountered at shallow depth, drive at 30° to horizontal).

Depth of rod

2.4m minimum below finished ground surface.

Depth of Electrode heads

Locate electrode heads just below ground level.

Spacing

Where electrodes are installed in a group ensure minimum distance between electrodes is twice depth of rods. Where rods for clean earth are installed ensure distance from any other system rods is six times depth of clean rods.

Tape Depth

Install interconnecting or electrode tape 750mm below finished ground level, rising vertically at each electrode.

Connect groups of electrodes to main earth conductor via bolted link in inspection pit as BS 7430 for test purposes.

Location

Locate electrodes not less than 2m distant from building/structure protected, and away from telecommunication and pilot cables and metallic fences.

Locate electrodes

Barriers

Provide permanent non-conducting barriers to BS 7430 at 2m radius around any electrode liable to product a voltage gradient of more than, (V/m)

Driving

Drive rods vertically into ground with purpose designed electric hammer. (Where impenetrable strata encountered at shallow depth, drive at 30° to horizontal).

Depth of rod

2.4m minimum below finished ground surface.

Depth of Electrode heads

Locate electrode heads just below ground level.

Spacing

Where electrodes are installed in a group ensure minimum distance between electrodes is twice depth of rods. Where rods for "clean" earth are installed ensure distance from any other system rods is six times depth of "clean" rods.

Tape Depth

Install interconnecting or electrode tape 750mm below finished ground level, rising vertically at each electrode.

Install interconnecting or electrode tape at depth below finished ground level as ground conditions permit, (maximum 750mm).

Connect groups of electrodes to main earth conductor via bolted link in inspection pit as BS 7430 for test purposes.

Y81 TESTING AND COMMISSIONING OF ELECTRICAL SERVICES

281.010 GENERAL:

1000 GENERAL

Carry out testing and commissioning of electrical services as section

281.020 TESTING AND COMMISSIONING:

Incorporated equipment characteristics

2010A INCORPORATED EQUIPMENT CHARACTERISTICS:

Prospective short circuit current (I_p)

2020A PROSPECTIVE SHORT CIRCUIT CURRENT:

Initial verification

2030A INITIAL VERIFICATION:

Carry out detailed inspection to verify the requirements of BS 7671, Section 611 in the order given in clause 611.3.

Test equipment and consumables

2040A TEST EQUIPMENT AND CONSUMABLES:

Provide test equipment and consumables to complete tests satisfactorily, and to retest any failed installations following corrective measures.

Testing

2050A TESTING

Carry out in the same order as published the tests required by BS 7671, Section 612 for New Installation or Altered or Added Installation as appropriate.

Continuity of protective conductors

Earth fault loop impedance (ZS)

2070A EARTH FAULT LOOP IMPEDANCE:

2080 SETTINGS AND ADJUSTMENTS:

Confirm characteristics and settings of protective devices are within maximum and minimum specified tripping times. Check correct operation of devices. Confirm interlocks and sequences operate safely and as indicated.

Standby generators

2090A STANDBY GENERATORS:

Perform works tests on standby generators and provide test certificates. Comply with BS 5000-3 and BS 5000-11 or BS EN 60034-3 as appropriate.

HV and LV switchgear

2100A HV AND LV SWITCHGEAR:

HV power transformers

2110A HV POWER TRANSFORMERS:

Specialist installations

Fire detection and alarm systems.

2120A FIRE DETECTION AND ALARM INSTALLATIONS:

Carry out site testing and inspection and provide test certificates for fire detection and alarm systems in accordance with BS 5839-1.

Emergency lighting installations

2120E EMERGENCY LIGHTING INSTALLATIONS:

Carry out site testing and inspection and provide test certificates for emergency lighting installations in accordance with BS EN 50172.

Carry out site testing and inspection and provide test certificates for specialist installations in accordance with

fire detection and alarm systems - BS 5839-1.

lightning protection - BS EN 62305.

fire protection of electronic data processing installations- BS 6266.

emergency lighting installations - BS EN 50172.

2130 CALIBRATION:

Provide current certificates of calibration for all instruments used during test procedures. Record particular instrument identity on record sheets.

Certification and reporting

2140A CERTIFICATION AND REPORTING:

Complete and hand over to the Client a Completion and Inspection Certificate to BS 7671 Appendix 6 for New Installation or Altered or Added Installation as appropriate.

Completion certificates

2150A INSTALLATION CERTIFICATES:

2160 RECORDS:

Record all results and instrument readings on approved Record Sheets and hand over to the client two copies for each inspection and test.

Hand over copies of complete Record Sheets to

Client.

Provide copies of Record Sheets

2.

281.030 WORKMANSHIP:

3010 CONDUCTIVE PARTS:

Test conductive parts simultaneously accessible with exposed conductive parts of extraneous conductive parts. Establish that they are either not an extraneous conductive part, or that they are reliably connected by metal to main equipotential bonding.

Confirm conductive parts which are not extraneous conductive parts are separated from earth by an impedance greater than 50,000 ohms. Confirm other conductive parts are bonded to equipotential zone earth bar by an impedance not exceeding 0.1 ohms.

High voltage tests

3030A HIGH VOLTAGE TESTS:

Conduct high voltage tests for equipment indicated. Comply with BS 923-1, BS EN 61180 and BS EN 60060-2. Comply with BS EN 61180.

Cables

3040A LV BURIED CABLES:

Test continuity and insulation of buried cables immediately after back-filling. Test continuity and insulation of buried cables prior to handover.

Y82 IDENTIFICATION - ELECTRICAL

282.010 GENERAL:

1000 GENERAL

Supply identification - electrical as specified in section

282.020 LABELS AND NOTICES:

2010A LABELS AND NOTICES:

Apply identification labels and notices in accordance with BS 7671 (IEE Wiring Regulations), section 514 to all electrical cables plant and equipment including components of mechanical systems.

Identification of protective devices.

Diagrams, charts or tables to comply with Clauses 514.9 and 560.7.9.

Warning notices, voltages in excess of 230 volts.

Periodic inspection and test notices.

Residual current device notices.

Earth electrode safety electrical connection label.

Bonding conductor connector point to extraneous conductive parts label.

Earth free local equipotential bonding areas warning notice.

Electrical separation areas warning notice.

Outdoor equipment socket outlet notice.

Diagrams, charts or tables to comply with Clauses 514.9 and 560.7.9.
contract drawings.

282.030 LABELS AND NOTICES MATERIALS:

Type

Application

Material

2020A MATERIALS:

Use materials for labels and notices with a predicted life equal to or greater than the design life of the electrical cables, plant, equipment or installation to which it refers.

External

Sign written, or stencil in paint compatible with surface.

Colour - Background, plant standard finish. Lettering, white.

Internal

Engraved thermosetting plastic laminate.

Colour - Background, white or red. Lettering, red or white.

Use materials for labels and notices with a predicted life equal to or greater than the design life of the electrical cables, plant, equipment or installation to which it refers.

Ensure durability of identification is to BS ISO 17398.

External

Engraved thermosetting plastic laminate.

Rigid plastic, hot press printed.

Printed pressure sensitive labels to BS 4781, Type

Brass, and engraved.

Lead sheet to BS EN 12588, punched lettering.

Offcut lead cable sheath to BS EN 12548, punched lettering.

Stainless steel engraved

Sign written, or stencil in paint compatible with surface.

Internal

Engraved thermosetting plastic laminate.

Screen printed thermosetting rigid plastic, thickness

Screen printed flexible plastic

Flexible plastic with manuscript lettering

Rigid plastic, hot press printed.

Printed pressure sensitive adhesive labels to BS 4781.

Aluminium or aluminium alloy, general lettering pressed, particular lettering engraved.

Aluminium or aluminium alloy lettering embossed.

Stainless steel, engraved

Sign written or stencil in paint compatible with surface.

Colour

Background

Lettering

Fixing

2030A FIXING - INTERNAL:

Fix labels and notices using materials compatible with label or notice and surface to which it is fixed by screws into tapped hole or bolted complete with washer nut and locking device.

Fix labels and notices using materials compatible with label or notice and surface to which it is fixed using, External

Screwed into tapped hole size

Bolted through complete with washer nut and locking device, size

Rivets to BS 4894 size

Rivets to BS 4895 size

Adhesive

Internal

Screwed into tapped hole size

Bolted through complete with washer nut and locking device, size

Rivets to BS 4894, size

Rivets to BS 4895, size

Adhesive

Arrangement

2040A ARRANGEMENT:

Provide sample showing style, colour, lettering and size, for approval.

Lettering and size of labels and notices

2050A LETTERING AND SIZE OF LABELS AND NOTICES:

Font - Helvetica Medium.

Size - BS 5499-1 or 5mm minimum high letters.

282.040 CONDUCTOR ARRANGEMENT:

2060A CONDUCTOR ARRANGEMENT:

282.045 GRAPHICAL SYMBOLS FOR USE ON EQUIPMENT IN ACCORDANCE WITH BS EN 80416:

282.050 EQUIPMENT SIGNS AND LABELS:

Safety signs

2070A SAFETY SIGNS:

Label all electrical plant and equipment using safety sign 8.A.0044 of BS 5499-5 where voltages above ELV exist.

Provide supplementary or text signs complying with BS 5499-5 with each safety sign 8.A.0044 as indicated.

Label all electrical plant and equipment with the labels specified in the appropriate British Standards for that plant or equipment.

Identify each substation and main switch room with safety sign 8.A.0044 to BS 5499-5 for any fire extinguishing system and notice giving details of,

Name of the Substation or switch room

The presence of Medium and Low Voltages.

Administrative instructions for access.

Location and method of contacting controlling authority.

Actions to be taken in an emergency.

Label all electrical plant and equipment using safety sign 8.A.0044 of BS 5499-5 where voltages above ELV exist.

Provide with each safety sign 8.A.0044 supplementary or text signs complying with BS 5499-5

Label all electrical plant and equipment with the labels specified in the appropriate British Standards for that plant or equipment. Identify each substation and main switch room with safety sign 8.A.0044 to BS 5499-5 for any fire extinguishing system and notice giving details of,

Name of the Substation or switch room.

The presence of Medium and Low Voltages.

Administrative instructions for access.

Location and method of contacting controlling authority.

Actions to be taken in an emergency.

Position safety signs in accordance with BS 5499-10.

Plant and equipment labels

2080A PLANT AND EQUIPMENT LABELS:

Fit labels on all items of plant, equipment, switches, etc., include the following information: service controlled, circuit reference, voltage, type of supply and phase etc., circuit protection type and rating.

2090 MAINTENANCE NOTICES:

Equipment

Fix notices giving warning of and instructions on, any special maintenance procedures to plant and equipment.

2100 COLOUR CORRECTED LIGHT FITTINGS:

Fix a warning or identification disc to light fittings containing colour corrected fluorescent tubes or other colour corrected light sources to ensure that maintenance staff install the correct lamps.

Motors and starters labels

2110A MOTORS AND STARTERS LABELS:

Engraved accessory plates

2120A LABELLED ACCESSORY PLATES - ENGRAVED:

Label accessory plates, including lighting switches, socket outlets and connection units to indicate their use. Label by engraving, lettering 6mm high colour red.

Label accessory plates, including

Lighting switches

Socket outlets

Connection units

Security system

Bed head units.

Call system units.

Fire alarm

Label

Engraving

Permanent stick on labels.

Lettering, as schedule

6mm high colour red.

6mm high colour black.

Switchgear

2130A SWITCHGEAR:

2140 DISTRIBUTION BOARDS:

On each distribution board identify every outgoing way with a renewable circuit chart in a transparent plastic envelope permanently fitted inside distribution board cover. Clearly indicate in typed script, circuit identification number, cable size, fuse or circuit breaker rating and a description of item supplied and area supplied by circuit.

Distribution Boards to have a Traffolite label with 6mm High Black on White lettering denoting the DB designation Cable size and source of supply circuit reference.

282.060 SCHEMATIC DIAGRAMS:

Type

Application

2150A SCHEMATIC DIAGRAMS:

Locations and materials as indicated in contract preliminaries.

282.070 SPECIAL PURPOSE EARTHING:

Type

Application

2160A SPECIAL PURPOSE EARTHING:

IT equipment "Clean Earths".

Telecommunications functional earths as BS 6701.

282.080 INDICATOR LAMPS AND PUSH BUTTONS FOR POWER SYSTEMS:

Type

Application

2170A INDICATOR LAMPS AND PUSH BUTTONS FOR POWER SYSTEMS:

Red, danger or alarm; yellow, caution; green, safety.

Red, emergency action; red, stop or off; yellow, intervention; green, start or on.

Illuminated push buttons - Type a.

282.090 CONDUIT AND TRUNKING COLOUR CODING:

Type

Application

2180A CONDUIT AND TRUNKING COLOUR CODING:

In areas of mechanical plant or voids accommodating mechanical services, or where otherwise indicated, identify electrical conduits and ducts in accordance with BS 1710. Apply colour orange to BS 4800 by painting on service as a band over 150mm or applying an adhesive tape type wrap around services over a length of 150mm.

282.100 CABLE IDENTIFICATION:

Cable identification

2190A CABLE IDENTIFICATION:

Provide all cables, other than final sub-circuit wiring enclosed in conduits or trunking, with labels fixed at each end of cable either side of wall and floor penetrations at approximately 12m intervals at convenient inspection points by means of non-releasable plastic straps, minimum width 4mm.

Ensure labels show the reference number of cable.

Terminal marking and conductor identification

2200A TERMINAL MARKING AND CONDUCTOR IDENTIFICATION:

Adjacent to terminals. documentation.

Underground cable identification

2210A UNDERGROUND CABLE IDENTIFICATION:

Identify external underground cable routes by means of approved markers along their length at distances not exceeding 50m and where a change of direction occurs on such routes. Provide cables markers with a brass plate or impress concrete to clearly indicate the reference of group of cables or reference number of cable and operating voltage of cable. Provide key to any reference system used at switchgear. Mark and protect direct buried cables with plastic tape yellow printed black "DANGER ELECTRIC CABLES" elsewhere.

Cable conductor colour coding

2220A CABLE CONDUCTOR COLOUR CODING:

Identify cable conductors in accordance with BS 7671 (IEE Wiring Regulations) section 514 and Appendix 7; note that a lighting sub-circuit switch wire is a phase conductor in a single phase circuit.

Identify cable conductors in accordance with BS 7671 (IEE Wiring Regulations) section 514 and Appendix 7; note that a lighting sub-circuit switch wire is a phase conductor in a single phase circuit.

In alterations or additions to an existing installation

Identify conductors and terminals as BS 7671 Appendix 7.

In single phase installation and terminals as BS 7671 Appendix 7 and identify all phase conductors brown and all phase terminals L.

2230 CABLE JOINTING AND TERMINATION:

Connect all cables in the installation so that the correct sequence of phase rotation is maintained throughout. Where straight through joints are approved joint medium voltage conductors as they lie,

ensuring their complete length is phased out on completion. Ensure connections at terminations of MV cables are made in the correct phase rotation and ensure cable conductor termination marking if any, complies with this phase sequence. Where straight through joints are approved on low voltage cables, whether power cables or control or auxiliary cables, joint conductors strictly in accordance with their colour or numeric coding. Where such joints are approved on mineral insulated or other non-coded conductor cables, identify each core at the joint and make the joint core to core.

Cable sheath identification - internal

telecommunications, Grey.

Cable sheath identification - external

282.110 ADDITIONAL SAFETY SIGNS:

Type

Application

Manufacturer and reference

Or approved equivalent following Technical submittal, any such approval shall not be unreasonably withheld

2260A ADDITIONAL SAFETY SIGNS:

Application

For main switch and electrical plant room access doors. BS 5499-5, complete with supplementary signs as shown.

6. C.0019. 6. A.002, with supplementary sign "Authorised persons only".

7. A.022

Application

For use with permit to work systems, BS 5499-5, complete with supplementary signs as shown.

6. C.0021. Printed on rigid plastic, with hanging loop, with supplementary wording "Do not operate. Work in progress".

Application

For use at each emergency stop. BS 5499-5, complete with supplementary signs as shown.

9. B.0097. With supplementary sign "Emergency stop push-button".

Y90 FIXING TO BUILDING FABRIC

290.010 GENERAL:

1000 GENERAL

1010 PREPARATION:

Mark-out, set-out and firmly fix all equipment, components and necessary brackets and supports.

1020 MANUFACTURER'S DRAWINGS:

Use manufacturer's drawings and templates for purposes of marking and setting out.

1030 FIXINGS:

Ensure structure and fixings are suitable for items to be fixed.

1040 LOADING DETAILS:

Provide loading details for all fixing types.

1050 BUILDING-IN BY OTHERS:

Provide all necessary assistance to enable any item of building-in type to be built in by others.

1060 SIZE OF FIXING:

Use largest size of bolt, screw or other fixing permitted by diameter of hole in item to be fixed.

1070 GREASING OF FIXINGS:

Ensure all bolts, screws or other fixings used are greased or lubricated in accordance with manufacturer's instructions.

Carry out fixing to building fabric as specified in work section

290.020 FIXINGS:

Type

Application

2010 STANDARDS:

Ensure that fixings such as expanding anchors are tested for tensile loading in accordance with BS 5080-1.

2020 PLUGS:

Use plugs of suitable size and length for fixings. Use plastic, fibrous or soft metal non-deteriorating plugs to suit application. Do not use wood plugs.

Ensure that when screw is in place, threaded length is in plug. Ensure plugs used for screw fixing are set-in to correct depth prior to final tightening.

2030 SCREWS:

Use screws to BS 1210. Generally use sherardized steel wood screws for fixing to concrete, brickwork or block work.

In damp or exposed situations use greased brass wood screws.

2080 NON-PENETRATIVE SUPPORT SYSTEMS FOR ROOF MOUNTED EQUIPMENT:

Manufacturer and reference

Or approved equivalent following Technical submittal, any such approval shall not be unreasonably withheld

Obtain approval prior to using non-penetrative support systems for roof mounted equipment.

290.030 WORKMANSHIP:

Type

Application

3010 DRILLING:

Drill holes squarely. Use drills of requisite size and depth, and appropriate to fabric. Do not flame-cut holes in metal work.

3050 FIXING TO TIMBER RAILS:

Fix equipment, brackets and supports by drilling hole through timber rail and fixing with bolt, back plate, washer and loose nut.

Fixing to hollow stud/tile/block wall

3060A FIXING TO HOLLOW STUD/TILE/BLOCK WALLS:

Fix equipment, brackets and supports where there is no access at rear of wall, drill hole and use screw anchor type fixing or gravity type toggle fixing.

Fixing to concrete, brickwork or block work

3070A FIXING TO CONCRETE, BRICKWORK OR BLOCKWORK:

Fix equipment, brackets and supports using wood screws in plugs or, as appropriate, drill holes and fix using steel bolts of grouted bolt type or expanding bolt type fixing.

Fix equipment, brackets and supports, drill holes and use wood screws in plugs.

use shot fired fixing.

Drill holes and fix using steel bolts of grouted bolt type.
expanding bolt type fixing.
resin bolts.

studs.

Fixing to metalwork

3080A FIXING TO METALWORK:

Fix equipment, brackets and supports by drilling holes and fixing using set screws or bolts complete with washers, shake proof washers and loose nuts.

Fixing to structural steelwork and concrete structures

3090A FIXING TO STRUCTURAL STEELWORK AND CONCRETE STRUCTURES:

Obtain approval to cut holes in structural steelwork or concrete structures or weld to structural steelwork.

3100# NON-PENETRATIVE SUPPORT SYSTEMS FOR ROOF MOUNTED EQUIPMENT:

Provide manufacturer's information on recommended support systems.

Obtain the necessary approvals to use non-penetrative support systems as follows:

Ensure that the roof surface is compatible with non-penetrative supports

Ensure that necessary approval is given by

The Structural Engineer

The Architect

Mounting positions

Roof loading parameters

Wind Loadings

Point Loads

Pressures

Components

Support leg type

Support frame type

Maintenance

Ensure that future maintenance access to roof finish is provided under support system.

Y91 PAINTING AND ANTI-CORROSION TREATMENTS

291.010 GENERAL

1000 GENERAL:

Carry-out off-site painting and anti-corrosion treatment as work section

291.020 PAINT MATERIALS:

Type

Application

Paint materials

2010A PAINT MATERIALS:

Use the following materials as appropriate

Solvent borne priming paint to BS 7956 for bare woodwork.

Red Oxide priming paint for bare iron and steelwork.

Zinc Chromate priming paint for bare ferrous and non-ferrous metals.

Calcium Plumbate priming paint to BS 3698 for galvanized steel or composite wood/metal components.

Undercoating paint for previously primed or painted surfaces before the application of finishing coats.

Gloss finishing paint for previously primed or painted/undercoated surfaces.

Epoxy resin paint for specialist coatings requiring resistance to acids, alkalis, oils, solvents, abrasion or high humidity.

Aluminium paint to BS 388 for structural steelwork, storage vessels, heated metallic surfaces and similar applications where moisture and heat resistant properties are required.

Cold galvanizing paint for making good damage to previously galvanized surfaces and protection to galvanized materials modified during installation.

Zinc-rich metallic to BS 4652 for bare iron and steelwork where electrical conductivity has to be assured.

Black tar-based paint to BS 1070 for moisture resistant protection to metal surfaces where decorating appearance is not important.

Bitumen based coatings for cold application to BS 3416 protection to iron and steel, particularly pipelines and fittings for use in contact with potable water.

Bitumen based coatings for cold application to BS 6949 not to be used in contact with potable water.

Use the following materials as appropriate

Solvent borne priming paint to BS 7956.

Red Oxide priming paint.

Zinc Chromate priming paint.

Calcium Plumbate priming paint to BS 3698.

Undercoating paint.

Gloss finishing paint.

Water borne emulsion paints to BS 7719.

Epoxy resin paint.

Aluminium paint to BS 388.

Cold galvanizing paint.

Zinc-rich metallic to BS 4652.

Black tar-based paint to BS 1070.

Bitumen based coatings for cold application to BS 3416.

Paints for aluminium alloys to BS 4842, BS 6496.

Paints for galvanized steel to BS EN 13438.

Bitumen based coatings for cold applications to BS 6949.

Undercoats and finishing paints to BS 7664.

2020 PAINT QUALITY:

Ensure paints used are of quality and type to suit application and that:-

primers have good adhesion, covering power, rust-inhibiting and grain filling properties.

gloss finishing paints are of machine finish grade having high adhesion and high resistance to solvents, mineral oils, cutting oils, deter Clymacs, chipping and impact damage.

FINANCIAL SUMMARY**Financial Summary****£**

V12 LV SUPPLY/PUBLIC UTILITY SUPPLY	
V20 LV DISTRIBUTION	
V21 GENERAL LIGHTING	
V22 GENERAL LV POWER	
V40 EMERGENCY LIGHTING	
V41 STREET/AREA/FLOOD LIGHTING	
W12 PUBLIC ADDRESS/SOUND AMPLIFICATION	
W15 FACILITIES FOR THE DISABLED	
W20 RADIO/TV/CCTV	
W30 DATA TRANSMISSION	
W40 ACCESS CONTROL	
W41 SECURITY DETECTION AND ALARM	
W50 FIRE DETECTION AND ALARM	
W51 EARTHING, BONDING, EMC MEASURES AND SURGE PROTECTION	
W52 LIGHTNING PROTECTION	
Total	
Signed	
For and on behalf of	
Date	

All