
Electrical Services.

Revision A
16/05/2013
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Project Revision Sheet

Leicestershire County Council Standard Part 2. Electrical Services

Revision A

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Prepared by C Perry

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Z Part 2 Clauses

CONDUIT AND TRUNKING

260.010 GENERAL:
Comply with work section general clauses reference Y60.1000 and those detailed below.

260.020 CONDUIT SYSTEMS:
- **Type A**
  - Application Flush where possible otherwise install surface, agree surface runs with Architect before first fixing.
  - Manufacturer and reference Approved BECMA member
    - Or approved equivalent
  - Metal
    - Rigid
      - Class 2 - reference Y60.2010A
      - Fittings - reference Y60.2020A
    - Class 4 - reference Y60.2010B
      - Fittings - reference Y60.2020A
  - Flexible, LSF sheathed - reference Y60.2010D
    - Fittings - reference Y60.2040A
  - Support and fixing - reference Y60.2170
see also 260.025

260.020B CONDUIT SYSTEMS:
- **Type B**
  - Application Surface in plantrooms.
  - Manufacturer and reference Approved BECMA member
  - Metal
    - Rigid
      - Class 4 - reference Y60.2010B
      - Fittings - reference Y60.2020A
  - Flexible, LSF sheathed - reference Y60.2010D
    - Fittings - reference Y60.2040A
  - Non-metallic
    - Rigid - reference Y60.2010E
      - Fittings - reference Y60.2030A
    - Flexible - reference Y60.2010F
      - Fittings - reference Y60.2050A
  - Support and fixing - reference Y60.2170
see also 260.025

260.020C CONDUIT SYSTEMS:
- **Type C**
  - Application Rigid to be used under direction of Engineer only. Flexible for connecting items of plant to rigid installation.
  - Manufacturer and reference Approved BECMA member
    - Or approved equivalent
  - Metal
    - Flexible, LSF sheathed - reference Y60.2010D
      - Fittings - reference Y60.2040A
  - Non-metallic
    - Rigid - reference Y60.2010E
      - Fittings - reference Y60.2030A
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- Flexible - reference Y60.2010F
  - Fittings - reference Y60.2050A
- Support and fixing - reference Y60.2170
see also 260.025

260.020 BC CONDUIT SYSTEMS:
- Type B
  - Application Surface in plantrooms.
  - Manufacturer and reference Approved BECMA member
  - Metal
    - Rigid
      - Class 4 - reference Y60.2010B
      - Fittings
        - Reference Y60.2020A
    - Flexible, LSF sheathed - reference Y60.2010D
      - Fittings - reference Y60.2040A
  - Non-metallic
    - Rigid - reference Y60.2010E
      - Fittings - reference Y60.2030A
    - Flexible - reference Y60.2010F
      - Fittings - reference Y60.2050A
    - Support and fixing - reference Y60.2170
see also 260.025

260.025C LCC GENERAL REQUIREMENTS FOR CONDUIT
Saddle types shall be as follows:
Type (i) Malleable iron distance type having two brass securing screws and single fixing to structure. Use as Surface drops to accessory boxes, trunking and distribution equipment. Surface runs at high level between conduit accessories to avoid small sets in conduits. Note: The use of standard two hole saddles is not precluded. However, conduit shall be set to suit the entry into equipment and is only acceptable for locations which are both flat and smooth.
(iii) Heavy gauge single hole clip and single fixing to structure. Concealed locations where conduit is unstressed and surface at high level where conduit is to be run tight into a horizontal corner. Note: Keyhole type spacer bar and cut down two hole saddles shall not be used. The system shall be designed to avoid total or partial enclosure in thermal insulation, in roof voids it shall be installed in the clear space of the void. Conduits shall NOT be run in heating service ducts. Electrical apparatus shall not be installed within 50mm. of acetylene and oxygen gas pipes and equipment.
In areas subject to weather, damp or adverse conditions all screwed joints etc. shall be made watertight using metal rich paint, gasket or other approved method. The joints shall be partially screwed home before application of sealant so that electrical continuity is maintained. Shall be completely assembled, fixed swabbed clean and proved dry before drawing in any cables, particular attention shall be paid in this respect to conduit on floors and in damp areas. On concealed installations all boxes shall finish flush with the surface of the floor, wall or ceiling, (to which the accessory or lid is to be drawn back onto) by careful positioning of the base box.

Conduits shall be completely assembled, fixed swabbed clean and proved dry before drawing in any cables, particular attention shall be paid in this respect to conduit on floors and in damp areas. On concealed installations all boxes shall finish flush with the surface of the floor, wall or ceiling, (to which the accessory or lid is to be drawn back onto) by careful positioning of the base box.

Maximum internal depth of any box and its extensions shall not exceed 75mm.
Conduit systems/outlets in ceiling voids above demountable suspended ceilings shall be installed within 500mm. of the ceiling grid and supported independent of it from the permanent ceiling/roof structure. Galvanised conduit shall not be embedded in plastered walls floor screed, insitu concrete or used in chlorinated areas and the like. However, where this is impracticable or unavoidable as a change in finish would result in lesser protection and it is agreed with the C.A. short length may be embedded in non chlorinated areas but must be protected by Painting. Conduit installed above insulation in 'Cold Roof Voids' shall be galvanised.
or flo coat, black enamel may be used but shall be painted as if installed surface to protect it from the effects of condensation.

260.025 LCC GENERAL REQUIREMENTS FOR CONDUIT

Saddle types shall be as follows:

Type (i) Malleable iron distance type having two brass securing screws and single fixing to structure.

(ii) Standard two hole used in conjunction with a purpose made packing strip or proprietary spacer bar and two fixings into structure. Use: Surface drops to accessory boxes, trunking and distribution equipment. Surface runs at high level between conduit accessories to avoid small sets in conduits. Note: The use of standard two hole saddles is not precluded. However, conduit shall be set to suit the entry into equipment and is only acceptable for locations which are both flat and smooth. (iii) Heavy gauge single hole clip and single fixing to structure. Concealed locations where conduit is unstressed and surface at high level where conduit is to be run tight into a horizontal corner. Note: Keyhole type spacer bar and cut down two hole saddles shall not be used. The system shall be designed to avoid total or partial enclosure in thermal insulation, in roof voids it shall be installed in the clear space of the void.

Conduits shall NOT be run in heating service ducts. Electrical apparatus shall not be installed within 50mm. of acetylene and oxygen gas pipes and equipment.

In areas subject to weather, damp or adverse conditions all screwed joints etc. shall be made watertight using metal rich paint, gasket or other approved method. The joints shall be partially screwed home before application of sealant so that electrical continuity is maintained. Shall be completely assembled, fixed swabbed clean and proved dry before drawing in any cables, particular attention shall be paid in this respect to conduit on floors and in damp areas. On concealed installations all boxes shall finish flush with the surface of the floor, wall or ceiling, (to which the accessory or lid is to be drawn back onto) by careful positioning of the base box.

i) relative to the finished surface, or

ii) by the addition of extension rings (Besa boxes) and accessory extensions (switch and socket boxes) where thick finishes/pinboard, ceiling tiles etc. are involved.

Maximum internal depth of any box and its extensions shall not exceed 75mm. Conduit systems/outlets in ceiling voids above demountable suspended ceilings shall be installed within 500mm. of the ceiling grid and supported independent of it from the permanent ceiling/roof structure.

Galvanised conduit shall not be embedded in plastered walls floor screed, insitu concrete or used in chlorinated areas and the like. However, where this is impracticable or unavoidable as a change in finish would result in lesser protection and it is agreed with the C.A. short length may be embedded in non chlorinated areas but must be protected by Painting.

Conduit installed above insulation in 'Cold Roof Voids' shall be galvanised or flo coat, black enamel may be used but shall be painted as if installed surface to protect it from the effects of condensation.

260.030 STEEL TRUNKING:

- Type Galvanised
- Application containment and segregation of circuits
- Cable trunking and fittings
  - To BS 4678 - reference Y60.2080A
- Trunking Type
  - Standard cable trunking.
  - Floor trunking
  - Wall/dado trunking.
  - Bench trunking.
  - Lighting trunking.
  - With Compartments.
- Installation
  - Surface.
- Trunking
  - Class 1/3 - reference Y60.2090B
  - Lighting trunking cover - reference Y60.2090C
  - Steel Dado trunking - reference Y60.2090E
- Aluminium Dado trunking - reference Y60.2090F
- Underfloor trunking
  - Reference Y60.2100A
- Service outlet boxes
  - Reference Y60.2110A
  - Recess lids to take floor finish
- Service poles
  - Reference Y60.2120A
- Separate or multi-compartment trunking
  - Reference Y60.2150A
- Support and fixing - reference Y60.2170

260.040 TRUNKING OF INSULATING MATERIAL:
- Type white UPVC
- Application containment and segregation of circuits
- Manufacturer and reference mita, Marshall Tuflex
  - Or approved equivalent
- Cable trunking and fittings
  - To BS 4678 - reference Y60.2080A
- Surface trunking
  - PVC general purpose - reference Y60.2130A
- Underfloor trunking
  - PVC - reference Y60.2140A
- Service outlet boxes
  - Reference Y60.2110A
  - Recess lids to take floor finish
- Service poles
  - Reference Y60.2120A
- Separate or multi-compartment trunking
  - Reference Y60.2150A
- Wall/Dado Trunking
  - PVC
  - Steel
- Support and fixing - reference Y60.2170

260.045 LCC GENERAL REQUIREMENTS FOR TRUNKING
Self tapping screws and pop rivets shall not be used.
Part lengths of trunking lid shall be secured using the appropriate manufacturer's fixings with a
minimum of two single or twin fixings dependent on type and irrespective of lid length. Such fixings
shall be located at no greater centres than those of the manufacturer and shall be set not more than
50mm. in from the ends of the lid.
Where above demountable ceiling trunking shall be positioned within 500mm. of the ceiling. Above
non-demountable ceiling where adequate access can be gained through removable light fittings
spaced at no more than 1800mm. it may be used but shall be within 20mm. of the ceiling.
Where switchgear, fuseboards, etc. are mechanically linked to the trunking network the associated
bonding lead/leads shall connect to the switchgear/fuseboards earthing terminal. Where trunking is
fixed to, or in close proximity to, structural steelwork, gas, water, or heating pipes, local bonding
connections shall be made to afford effective bonding of exposed metal parts.
All bonds shall be visible for inspection

260.050 GENERAL WORKMANSHIP:
- General
  - Reference Y60.3010A
- Layout - reference Y60.3020
- Spacing - reference Y60.3030
- Condensation prevention - reference Y60.3040
- Protection and repair of steel components
  - Reference Y60.3050A
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- Equipment connections - reference Y60.3060
- Cleaning before wiring - reference Y60.3070
- Wiring
  - Reference Y60.3080A
- Builderswork - reference Y60.3090

260.070 WORKMANSHIP FOR CONDUIT:
- Type All types
- Application As each situation dictates
- Draw-in boxes - reference Y60.4010
- Installation of cast in or buried conduit - reference Y60.4020
- Conduit boxes - reference Y60.4030
- Fixing conduit - reference Y60.4040
- Flexible and pliable conduit - reference Y60.4050
- Screwed steel conduit - reference Y60.4060
- Non-metallic conduit
  - Reference Y60.4070A
- Underground installation - reference Y60.4080

260.080 WORKMANSHIP FOR TRUNKING:
- Type All types
- Application As each situation dictates
- Manufacture of trunking - reference Y60.5010
- Access - reference Y60.5020
- Fixing trunking
  - Reference Y60.5030A
- Steel trunking
  - Reference Y60.5040A
- Underfloor and flush floor trunking installation
  Reference Y60.5050
- Trunking of insulating material - reference Y60.5060

HV/LV CABLES AND WIRING

261.010 GENERAL:
Comply with work section general clauses reference Y61.1000 and those detailed below.

- The Minimum size for power cables shall be 2.5mm².
- The minimum size for lighting cables shall be 1.5mm².

Stranded cables shall be used in conduits and trunking.

Where cable core pass against ballasts, chokes, etc., then heat resistant sleeving shall be fitted in the appropriate phase colour.

All cables shall be concealed wherever possible and they shall be run so as to avoid contact with water, gas or other service pipes and with any non-earthed metalwork. The cables, where clipped, shall be fixed with PVC covered wiring clips. PVC covered saddles or purpose made saddles constructed from copper strip. Clips and saddles shall be fixed with screws. Cables run in timber on areas where they are unlikely to be disturbed may be clipped with Hiat clips.

All cable routes shall be the shortest possible between the various items of equipment while following the building line. Cables shall not be installed diagonally to the general building line.
All main and sub-main cables shall be derated by a further factor of 0.86 after all other derating factors have been applied.

**Selection of Cables**

All cables selected shall be BASEC approved.

261.020 STANDARD FLEXIBLE CORDS AND INDUSTRIAL CABLES:
- Type To suite each situation
- Application As appropriate
- Manufacturer and reference BASEC
  - Or approved equivalent
- LSOH sheathing - reference Y61.2005
- Standard LSF flexible wires - single copper core - reference Y61.2010B
- Standard heat resisting (95°C or more) flexible wires - single copper core - reference Y61.2010C
- Standard ordinary flexible cords - multi copper cores - reference Y61.2010D
- Standard HOFR flexible cords - multi copper cores - reference Y61.2010E

261.040 MINERAL INSULATED WIRING AND POWER CABLES:
- Type To suite each situation
- Application As indicated on drawings or in circuit schedules
- Manufacture and reference AEI, BICC
  - Or approved equivalent
- LSOH sheathing - reference Y61.2005
- Light duty mineral insulated cables
  - LSF outer covering - reference Y61.2040B
- Heavy duty mineral insulated cables
  - LSF outer covering, enhanced fire performance - reference Y61.2040E
- Sheath colour Red when used for Fire Alarm, White for Emergency Lighting and Orange for Power circuits

261.050 STANDARD WIRING AND POWER CABLES:
- Type To suite each situation. All cables to have LSF sheath where ever possible
- Application As indicated on drawings or in circuit schedules
- Manufacturer and reference BASEC
  - Or approved equivalent
- LSOH sheathing - reference Y61.2005
- Standard power supply cables
  - Thermosetting insulation and copper conductors
    - Sheathed - reference Y61.2020A
    - Sheathed and armoured - reference Y61.2020B
  - PVC insulation and copper conductors
    - Sheathed - reference Y61.2020C
    - Sheathed and armoured - reference Y61.2020D
  - LSF sheathed and armoured - reference Y61.2020E
- Standard wires for conduit and trunking
  - PVC insulated, with copper conductors - reference Y61.2020F
  - LSF insulated, with copper conductors - reference Y61.2020G
  - 90°C PVC insulated - reference Y61.2020H
- Standard flat cables 2-core or 3-core, with copper conductors; with or without CPC
  - PVC insulated, sheathed - reference Y61.2020I
  - LSF insulated, sheathed - reference Y61.2020J
  - Standard power supply cables, LSF insulation, sheathed - reference Y61.2020K
  - Standard cables with definite fire performance - reference Y61.2020M
261.060 CONTROL AND AUXILIARY CABLES:
- Type To suite each situation. All cables to have LSF sheath where ever possible
- Application As indicated on drawings or in circuit schedules
- Manufacturer and reference BASEC
  - Or approved equivalent
- LSOH sheathing - reference Y61.2005
- Paired UTP unarmoured control cables - reference Y61.2050A
- Paired UTP armoured control cables - reference Y61.2050B
- Paired STP unarmoured control cables - reference Y61.2050C
- Paired STP armoured control cables - reference Y61.2050D
- Multi-core unarmoured auxiliary cables - reference Y61.2050E
- Multi-core armoured auxiliary cables - reference Y61.2050F
- Multi-core unarmoured LSF sheathed auxiliary cables - reference Y61.2050G
- Multi-core armoured LSF sheathed auxiliary cables - reference Y61.2050H
- Control and auxiliary cables with definite fire performance - reference Y61.2050I

261.080 STANDARD COMMUNICATIONS CABLES:
- Type To suite each situation. All cables to have LSF sheath where ever possible
- Application As indicated on drawings or in circuit schedules
- Manufacturer and reference Molex
  - Or approved equivalent
- LSOH sheathing - reference Y61.2005
- Standard filled communications cables, for outdoor and underground - reference Y61.2070A
- Standard communications cables, for indoor use - reference Y61.2070B

261.090 STANDARD COAXIAL CABLES:
- Type To suite each situation. All cables to have LSF sheath where ever possible
- Application As indicated on drawings or in circuit schedules
- Manufacturer and reference AEI,BICC
  - Or approved equivalent
- For broadcast receiving - reference Y61.2080A

261.100 OPTICAL FIBRE CABLES:
- Type To suite each situation. All cables to have LSF sheath where ever possible
- Application As indicated on drawings or in circuit schedules
- Manufacturer and reference AEI,BICC
  - Or approved equivalent
- Reference Y61.2090A

261.110 INFORMATION TECHNOLOGY CABLES:
- Type To suite each situation. All cables to have LSF sheath where ever possible
- Application As indicated on drawings or in circuit schedules
- Manufacturer and reference AEI,BICC
  - Or approved equivalent
- Structured wiring - reference Y61.2100A

261.120 NON-STANDARD CABLES:
- Type To suite each situation. All cables to have LSF sheath where ever possible
- Application As indicated on drawings or in circuit schedules
- Manufacturer and reference AEI,BICC
  - Or approved equivalent
- LSOH sheathing - reference Y61.2005

261.130 CABLE GLANDS:
- Type To suite each situation
- Application To suite each situation
- Manufacturer and reference AEI,BICC
  - Or approved equivalent
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- Unarmoured cables, indoors - reference Y61.3010A
- Unarmoured cables, outdoors - reference Y61.3010B
- Armoured cables, dry indoors - reference Y61.3010C
- Armoured cables, indoors - reference Y61.3010D
- Armoured cables, outdoors - reference Y61.3010E

261.140 CABLE SEALS AND GLANDS - MINERAL INSULATED CABLES:
- Type To suite each situation
- Application To suite each situation
- Manufacturer and reference AEI,BICC
  - Or approved equivalent
- Heavy duty mineral insulated cables - protected 'd', 'i', or 'n' for hazardous areas - reference Y61.3020A
- Heavy and light duty mineral insulated cables - protected 'e' for hazardous areas - reference Y61.3020B
- Heavy or light duty mineral insulated cables - temperatures up to 105°C - reference Y61.3020C
- Light duty mineral insulated cables - temperatures up to 105°C - reference Y61.3020D

261.150 VOLTAGE SURGE SUPPRESSORS FOR CABLES:
- Type Provide voltage surge suppressors in accordance with cable and equipment manufacturer's recommendations.
- Application To suite each situation
- Manufacturer and reference AEI,BICC
  - Or approved equivalent

261.160 CABLE TERMINATING AND JOINTING SOCKETS:
- Type To suite each situation
- Application To suite each situation
- Manufacturer and reference AEI,BICC
  - Or approved equivalent
- Reference Y61.3040A

261.180 CABLE JOINTS AND TERMINATIONS:
- Type To suite each situation
- Application To suite each situation. But joints to be authorised by LCC Engineer before being carried out.
- Manufacturer and reference AEI,BICC
  - Or approved equivalent
- Reference Y61.3060A

261.200 CONNECTORS FOR COAXIAL CABLES:
- Type To suite each situation
- Application To suite each situation
- Manufacturer and reference AEI,BICC
  - Or approved equivalent
- Reference Y61.3080A

261.210 OPTICAL FIBRE TERMINATIONS:
- Type To suite each situation
- Application As approved by specialist
- Manufacturer and reference Molex
  - Or approved equivalent

261.220 OPTICAL FIBRE CABLE JOINTS:
- Type To suite each situation
- Application As approved by specialist
- Manufacturer and reference Molex
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- Or approved equivalent

261.230 CABLE DUCTS:
- Type To suite each situation
- Application To suite each situation
- Manufacturer and reference Bradstone
  - Or approved equivalent
- Reference Y61.3110A

261.240 CABLE SLEEVES:
- Type To suite each situation
- Application To suite each situation
- Manufacturer and reference Bradstone
  - Or approved equivalent
- Reference Y61.3120A

261.250 CABLE COVERS AND MARKERS:
- Type To suite each situation
- Application To suite each situation
- Manufacturer and reference Bradstone
  - Or approved equivalent
- Reference Y61.3130A

261.260 WORKMANSHIP
- Cable installation - general - reference Y61.4010
- Installation of LSF cable - reference Y61.4030
- Installation of unarmoured cables - reference Y61.4040
- Cable trenches.
  - Reference Y61.4050A
- Cable installation in trenches - reference Y61.4060
- Cable ducts.
  - Reference Y61.4070A
- Cable installation into ducts - reference Y61.4080
- Cable installation in conduit and trunking.
  - Reference Y61.4090A
- Cable installation on tray and rack - reference Y61.4100
- Cable surface installation.
  - Reference Y61.4110A
- Cable embedded installation.
  - Reference Y61.4120A
- Cable installation - mineral insulated cables
  - Reference Y61.4130A
- Cable installation - flexible cords - reference Y61.4140
- Cable jointing and terminating generally.
  - Reference Y61.4150A
- Cable jointing and terminating - paper insulated cables.
  - Reference Y61.4160A
- Cable jointing and terminating - elastomer and plastic insulated cables - reference Y61.4170
- Terminating - mineral insulated cables.
  - Reference Y61.4180A
- Cable joints - mineral insulated cables.
  - Reference Y61.4190A
- Communications coaxial, optical fibre and IT cable installation, jointing and terminating.
  - Reference Y61.4200A
- Cable sleeves - reference Y61.4210

SUPPORT COMPONENTS - CABLES
263.010 GENERAL:
Comply with work section general clauses reference Y63.1000 and those detailed below.

263.020 CABLE SUPPORT AND FINISHES:
- Type To suite each situation
- Application To suite each situation
- Cable supports and finishes
  - Reference Y63.2010A

263.030 CABLE SUPPORT SYSTEM:
- Type To suite each situation
- Application To suite each situation
- Manufacturer and reference Steel Support Systems
  - Or approved equivalent
- Perforated tray - reference Y63.2020A
- Cable rack - reference Y63.2020B
- Cable cleats - reference Y63.2020C
- Proprietary cable ties - reference Y63.2020D
- Cable clips - reference Y63.2020E
- Two way saddles - reference Y63.2020F
- Cable basket - reference Y63.2020G

263.040 WORKMANSHIP
- Cable tray installation - reference Y63.3010
- Cable cleats, ties, saddles and clips installation
  - Reference Y63.3020A

LV SWITCHGEAR AND DISTRIBUTION BOARDS

271.010 GENERAL:
Comply with work section general clauses reference Y71.1000 and those detailed below.

271.030 SWITCHBOARD:
- Type Form 4 type 2b to BS EN 60439-1 and BS EN 60947-1 IP3X
- Application Feed sub boards
- Manufacturer and reference Michael Smith
  - Or approved equivalent
- Electrical supply
  - Three phase - reference Y71.1020A
  - Single phase - reference Y71.1020B
- LV switchgear and controlgear assembly
  - Cubicle switchboard - reference Y71.2010A
  - Cubicle control panel - reference Y71.2010B
  - Multi-box switchboard - reference Y71.2010C
  - Multi-box control panel - reference Y71.2010D
- Details of equipment
  - Provide facilities to allow future extension of switchboard 25% spare ways
- Assembly construction
  - Floor mounted - reference Y71.2020A
  - Access for cabling - Front, top, bottom or rear
    - Access for cabling Front, cable entry top and bottom
- Enclosures finish
  - Reference Y71.2030A
- Type tests
  - Reference Y71.2040A
- Site built assemblies - reference Y71.2060
- Site modification - reference Y71.2070
271.035 LCC GENERAL ITEMS
Safety Mats
Provide electrical safety mats.

271.050 CIRCUIT BREAKERS, TRANSFER SWITCHES AND CONTROL AND PROTECTIVE SWITCHES:
- Type To suite each situation
- Application To provide circuit protection
- Manufacturer and reference MEM, MG
  - Or approved equivalent
- Air circuit breaker
  - Utilisation A, withdrawable - reference Y71.2090A
  - Utilisation A, MCCB - reference Y71.2090B
  - Utilisation B, withdrawable - reference Y71.2090C
  - Utilisation B, MCCB - reference Y71.2090D

271.060 SWITCHES, DISCONNECTORS AND FUSE COMBINATION UNITS:
- Type To suite each situation
- Application To suite each situation
- Manufacturer and reference MEM
  - Or approved equivalent
- Switch-disconnector - reference Y71.2100A
- Fuse combination unit - reference Y71.2100B

271.110 INSTRUMENTS AND METERS:
- Type a) Digital meter to give KW, kWh, V, A and KVA.
  b) Transient Voltage Surge Suppression. To UL1449 2nd Edition and UL 1283 with 10 year warranty.
  c) Outgoing: Physical size and current ratings shall be determined by the Contractor. Any indicated in the specification or shown on drawings are indicative only. Allow for all sub-main cables.
- Application To monitor various aspects of the supply
- Reference Y71.2150A

271.170 DISTRIBUTION BOARDS:
- Type To suite each situation
- Application 1) The Electrical Contractor shall supply and install final distribution boards in areas away from general view. The exact location shall be agreed with the C.A.
  2) Lighting and small power supplies shall be fed from MCB distribution boards.

  Heavier loads such as H & V and refrigeration shall be provided with separate supplies either terminating in control panels or at contactors or switches from which other contactors shall connect up.

  Supplies to H & V control panels requiring Fireman's Ventilation Control shall be provided with automatic isolation upon operation of the fire alarm.

  Distribution switchboards shall be MCB type with integral isolating switch. They shall comply with ME 159, L.C.C. Part 2 Specification, BS 5486 and BS 3871. MCB's shall comply with BS EN 60898. The distribution boards shall be of surface
pattern, generally mounted 1.8m to the centre line above finished floor level, with sheet steel stove enamelled enclosures, hinged, lockable doors fitted with locks, lockable dolly covers, and spare way blanks.

3) Final distribution boards for external lighting circuits shall be supplied via a contactor, its coil circuit being controlled by a photocell via a timeswitch with manual test/override switch.

4) The final distribution boards shall have Transient Voltage Surge Suppression to UL1449 2nd Edition and UL 1283 with 10 year warranty.

5) 25% spare capacity.

- Manufacturer and reference MEM or MG
- Or approved equivalent
- Electrical supply
- Three phase - reference Y71.1020A
- Single phase - reference Y71.1020B
- Reference Y71.2210A
- Provide spare ways
- 25% spare ways

271.175 LCC GENERAL REQUIREMENTS
Install new distribution boards, final location to be agreed on site with CA.
All distribution boards shall be supplied with a lockable door, blanks, RCD's, MCB, typed circuit chart and engraved label.
The positions of the distribution boards shall be co-ordinated with other equipment, fixtures and fittings within the rooms. A clear working area is to be left in front of any distribution board.
Three padlock devices, including padlock and keys, shall be supplied with each panel so that the protective device may be locked off for maintenance purposes.
Allow to co-ordinate installation of new distribution boards with the building and switch room and Plant Room areas due to limited access afterwards.

271.175B SURGE PROTECTION
Allow to supply, fit, wire and connect surge protectors.
At each of the distribution boards and main switch panel, allow to install a Furse ESP415M1 or ESP 240M1, or equal and approved on 1 ph boards in a MBX4 enclosure. Installed in parallel, directly onto the supply feeding the board.

271.175C CIRCUIT CHARTS

i) Distribution boards shall be fitted with circuit charts enclosed in clear Perspex or a substantial plastic envelope attached to the inside cover of the board. These charts shall provide the following information:

(a) The size of the sub-main cable
(b) The size of each sub-circuit cable
(c) The function of each sub-circuit
(d) The phase(s) to which the unit is connected
(e) The rating of each CPD

ii) Spare ways shall not be printed "SPARE" but left blank.
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iii) On A.C. systems the phase sequences shall be maintained throughout the installations and all phase connections shall be in the order Red, Yellow, Blue, from top to bottom and/or bus bars shall always be located above, below or to the side, not between the phase connections, links or bus bars.

iv) The particular phase connected to fuseways and bus bars shall be clearly indicated by marking with the appropriate colour.

v) The Contractor shall provide and install in each main switch room a framed and glazed schematic diagram indicating the distribution arrangements of the installation.

vi) Appropriate labels or notices shall be provided for the following:

a) Connections to ground electrode or terminal
b) Each fireman's switch
c) Access doors of all transformer rooms, switch rooms, generator rooms, etc.
d) Any apparatus or enclosure within which a voltage exceeding 250 volts exists and which would not normally be expected
e) Every item of apparatus or switchgear which requires special consideration before operating
f) Entry points of cables in buildings
g) Switchgear which must not be operated whilst work is carried out.

271.175D CABLE MARKERS
Ca Cable markers shall be fitted to all single core final sub-circuit cables within distribution boards designating the circuit numbers and at each outlet point or the first point in the case of lighting and ring main circuits.

271.175E IDENTIFICATION OF PHASES
The Contractor shall identify all cables and terminals at distribution switch and fusegear by means of coloured phase markers, using red, yellow and blue for the phase conductors and black for neutral. In three-phase distribution boards and switches, the phases shall be arranged in the order red, yellow, blue reading from top to bottom or left to right, as appropriate, when viewed from the front.

271.190 MINIATURE CIRCUIT BREAKERS:
- Type B normally
- Application to protect sub circuits
- Manufacturer and reference MEM or MG
  - Or approved equivalent
- Reference Y71.2230A

271.200 RESIDUAL CURRENT DEVICE:
- Type B normally
- Application to protect sub circuits
- Manufacturer and reference MEM or MG
  - Or approved equivalent
- RCCD's
  - Reference Y71.2240A
- RCBO's - reference Y71.2245
271.210 CABLE TERMINATIONS:
Reference Y71.2250

271.270 WORKMANSHIP
• Fixing - reference Y71.3010
• Mounting height - reference Y71.3020
• Access - reference Y71.3030
• Marking and drawing
  • Reference Y71.3040A
• Cable terminations - reference Y71.3050
• Installation and commissioning
  • Reference Y71.3060A

LUMINAIRES AND LAMPS

273.010 GENERAL:
Comply with work section general clauses reference Y73.1000 and those detailed below.
• Supply luminaires and lamps.
  • Location V21 General Lighting

273.015 LCC GENERAL REQUIREMENTS

• Any such positions that have 415V present shall be fitted with warning labels on the grids.
  Ordinary and emergency light fittings shall not form part of any conduit run.
  Allow for drilling the back of the luminaires as necessary to accept Besa boxes and 20mm glands.
  The letter E next to a luminaire indicates it is to be fitted with an integral inverter and batteries, installed and certified by the manufacturers.
  The lighting is to be controlled via standard 20A grid switches.
  Tri-phosphor lamps colour temperature of 4000°k are to be used unless detailed otherwise.
  Luminaires in/on suspended ceilings to be fed via plug in ceiling roses with the flex left long enough so that the luminaire can be moved one tile in any direction.
  Luminaires shall be switched parallel to windows.

Emergency Lighting
All emergency lights shall, where indicated, be supplied with an integral inverter and batteries from the luminaire manufacturer and shall be guaranteed and certificated.
Keyswitches shall be provided for test purposes, when operated they SHALL NOT extinguish the ordinary lighting but shall bring on the emergency lighting. A neon shall be incorporated in the grid adjacent the keyswitch to indicate by illumination that the keyswitch has been operated. The Electrical Contractor shall test and commission the emergency lighting and issue the necessary certifications.
The test keyswitches shall be mounted adjacent the appropriate distribution board.
The emergency lighting shall be installed in accordance with BS 5266 Part 1:1999 and EN 1838 : 1999.

The exit signs shall also be wired to operate under either/or phase or mains failure.
The external emergency luminaires shall be wired to operate when photocell causes contactor to operate and also when either/or phase or mains failure occurs.
Emergency lights shall operate under either/or phase or mains failure.
The Electrical Contractor shall ensure that the emergency invertors are of the 4 pole type before ordering any luminaires.

273.060 SUPPORT SYSTEM:
• Type To suite each situation
• Application To suite each situation
• Conduit
  • Steel - reference Y73.2240A
  • Installation
    Support from conduit - reference Y73.4120
    Suspension - reference Y73.4160
    Connections to luminaires - reference Y73.4220
  • Direct to conduit
• Terminal box - reference Y73.4230A
  • At luminaire - reference Y73.4230B
  • Conduit suspension - reference Y73.4270
• Rod
  • Cadmium plated steel - reference Y73.2250A
    • Installation
      Suspension - reference Y73.4160
      Suspension by rod - reference Y73.4170
      Connections to luminaires - reference Y73.4220
  • Rod or chain suspension - reference Y73.4280
• Chain
  • Cadmium plated steel - reference Y73.2260A
    • Installation
      Suspension - reference Y73.4160
      Suspension by chain - reference Y73.4180
      Connections to luminaires - reference Y73.4220
  • Rod or chain suspension - reference Y73.4280
• Flexible cord
  • Reference Y73.2270A
    • Installation
      Suspension - reference Y73.4160
      Suspension by flexible cord - reference Y73.4190
• Wall brackets
  • Reference Y73.2280A
    • Installation
      Installation of wall mounted fittings - reference Y73.4050
  • Height
• Ball and socket - reference Y73.2290
  • Installation
    Suspension - reference Y73.4160
    Suspension by ball and socket - reference Y73.4200
  • Height

273.070 COLUMNS AND BOLLARDS:
• Type
• Application To illuminate external areas.
• Steel - reference Y73.2300A
• Aluminium - reference Y73.2300C
• Columns and bollards installation
  • Reference Y73.4210A

273.090 LUMINAIRES AND LAMPS WORKMANSHIP - GENERAL:
• Orientation - reference Y73.4010
• Cleanliness - reference Y73.4020
• Material of supporting surface - reference Y73.4060
• Luminaires in areas with infra-red control system
  Reference Y73.4080
• Installation of extra low voltage tungsten halogen lamps - reference Y73.4100
• Support - reference Y73.4110
• Support by direct fixing
  • Reference Y73.4140A
• Support in suspended ceiling
  • Reference Y73.4150A
• Connections to luminaires - reference Y73.4220
  • MICS cable - reference Y73.4290
• Lighting switches on different phases
  • Separate - reference Y73.4300A
  • Phase barrier - reference Y73.4300B
273.100 LUMINAIRES AND LAMPS WORKMANSHIP - RECESSED FITTINGS:

- Installation of recessed fittings
  Reference Y73.4030
- Installation of semi-recessed fittings
  - Manufacturer's details - reference Y73.4040A
- Connections to luminaires - reference Y73.4220
  - Recessed fittings
    - Plug and socket - reference Y73.4260A
    - Terminal box - reference Y73.4260B

273.110 LUMINAIRES AND LAMPS WORKMANSHIP -

- Support - reference Y73.4110
- Support from trunking - reference Y73.4130
- Connections to luminaires - reference Y73.4220
  - Direct to trunking
    - Terminal box - reference Y73.4240A
    - At luminaire - reference Y73.4240B
  - Suspended from trunking - reference Y73.4250

ACCESSORIES FOR ELECTRICAL SERVICES

274.010 GENERAL:
Comply with work section general clauses reference Y74.1000 and those detailed below.
- Supply accessories for electrical services as section

274.015 LCC GENERAL REQUIREMENTS
The position of all accessories etc. detailed on any drawings are approximate only unless specifically dimensioned from fixed points on the permanent structure.

In all instances where work is carried out under a subcontract, consult and liaise with the main contractor in order to ascertain the positions of cupboards, furniture, fixtures, other trades equipment etc., which may not be shown on the plan. In the event of dispute the CA decision shall be final.

When locating accessories/equipment the following instructions shall be adhered to as far as possible.
(i) Where a number of items are located in close proximity they shall form a regular layout, i.e. in line vertically and/or horizontally.
    Care shall be exercised to ensure segregation is not compromised and that cables of other circuits terminate in an accessory immediately adjacent to the box through which they pass.
(ii) Uniformity of layout shall be adopted and conformed to throughout any given contract, i.e. all switches shall be the same distance from architraves etc., and one from another where grouped together.
(iii) On short lengths of wall or piers etc. (i.e. under 600mm wide) accessories shall be positioned on the vertical centre line.
(iv) The plates of all accessories shall be fixed square in relation to the structure and one with another where grouped.
(v) Accessory/plates etc., shall not be erected until decorations have been completed, any accessories contaminated by paint or damaged by dilute acid used to clean down brickwork shall be replaced without cost to the Authority.

Exceptions may arise where you are employed as a subcontractor. In such circumstances the foregoing is recommended, however you shall comply with the requirements of the main contractor. Under this situation, the main contractor becomes responsible for any subsequent removal of paint, cleaning or replacement of damaged equipment.

In new or rewired properties where the socket outlets are generally protected by RCBO's or RCD devices, provide only labels for un-protected outlets, generally as detailed but stating 'WARNING THIS OUTLET IS NOT RCD PROTECTED USE ONLY FOR--------------------- (insert details) ONLY'

NOTE typical use - deep-freeze.
For each socket outlet located at the nearest point to the centre of each ring circuit provide a separate label stating 'APPROXIMATE CENTRE OF RING', Emergency Stop System
Shall be provided for each machine workshop, similar locations and other areas detailed on drawings.

A. General Requirement
   Each area shall be provided with an independent emergency stop system comprising master 'on' 'off' reset key switch controlling a contractor, motor starter or similar device, fitted with a control circuit fuse, no volt release coil and retaining contacts, controlled via stop buttons and/or other safety devices called for in supplementary Information.

B. Control Circuit
   Shall be designed and connected such that it fails safe by opening the safety circuit and shutting down the equipment controlled when tripped by manual or automatic safety devices, by failure of the control fuse or other protective device feeding the safety circuit, or if the safety circuit becomes open circuit.

   NOTE
   (i) Inadvertent grounding of one side of the no volt coil or control circuit shall not cause the contactor/motor starter etc. to close, or equipment to start up unexpectedly.
   (ii) Operation of the emergency stop circuit shall not disconnect those circuits whose operation is specifically to remove a hazard, e.g. fume extract etc.

C. No Volt Coil
   Shall not exceed 240 volt single phase a.c.; in non workshop/plantroom locations coil shall be d.c. rectified or fed from a d.c. source.

D. Key Switch
   Shall be single pole 5A 240V a.c. (or as appropriate) 'Off'- 'On' plus a momentary 'On' set of contacts providing 'Reset' provision from the 'On' position to initiate the safety circuit, i.e. puts a momentary feed across the retaining contacts of the contactor/motor starter to energise the 'No volt' coil.
   Key to be of the yale type removable in both 'On' and 'Off' positions.
   Key switch to be contained in its own surface IP55 sheet steel or polycarbonate enclosure, or form part of a combined control package with the contactor/motor starter.
   Mounting height 1200mm above finish floor level.

E. Emergency Stop Buttons
   Shall be single pole N/C 5A 240V a.c. (or as appropriate) having 50mm diam. (nominal) mushroom head, push to latch, twist to unlatch, stop button contained in surface mounted IP55 cast iron, sheet steel or polycarbonate enclosure or equal.
   Mounting height 1200mm above finish floor level, the surround on the mounting surface should be coloured yellow (BS Health and Safety in workshops of schools refers).

F. Labels
   Provide and fix the following
   (i) Label key switch
      WORKSHOP MASTER CONTROL
      FOR EMERGENCY STOP CIRCUIT
   (ii) Identify each key position and function i.e. 'OFF' - 'ON' - 'RESET'.
   (iii) Operational procedure
      EMERGENCY STOP CIRCUIT
      INSERT KEY, SWITCH TO 'ON' POSITION AND THEN TURN KEY MOMENTARILY TO
      'RESET' POSITION TO ENERGIZE SYSTEM.
      IF TRIPPED AT REMOTE STOP BUTTON ENSURE REASON FOR OPERATION HAS BEEN
      CORRECTED. TO RE-ENERGIZE SYSTEM TWIST RESPECTIVE RED STOP BUTTON TO RE-
      ACTIVATE IT THEN TURN KEY SWITCH TO 'RESET' POSITION.
      AT THE END OF TEACHING PERIOD SET KEY SWITCH TO 'OFF' POSITION.
   All labels shall comply with the requirement of Section 'Labelling'.

274.030 ACCESSORIES COMMON REQUIREMENTS:
• Type To suite each situation
• Application To suite each situation
• Manufacturer and reference MK,MEM or Crabtree
  • Or approved equivalent
• White plastic plates, flush installation - reference Y74.2010A
• Matt finish metal plates, flush installation - reference Y74.2010B
• White plastic plates, embedded cables, surface installation - reference Y74.2010C
• Metal clad plates, surface steel conduit installation - reference Y74.2010D
• Surface, steel conduit, weatherproof installation - reference Y74.2010E
• Surface, plastic, weatherproof installation - reference Y74.2010F
• Bronze finish metal plates, flush installation - reference Y74.2010G

274.035
Surface boxes SHALL NOT have knock outs

274.040 INTERIOR LIGHTING SWITCHES:
• Type To suite each situation
• Application To suite each situation
• Manufacturer and reference MK,MEM or Crabtree
  • Or approved equivalent
• General purpose moulded plastic - reference Y74.2020A
• Grid moulded plastic - reference Y74.2020B
• Pull cord - reference Y74.2020C
• General purpose secret key - reference Y74.2020D
• General purpose dimmer - reference Y74.2020E
• Grid secret key - reference Y74.2020F

274.060 TIME SWITCHES:
• Type Quartz
• Application To control circuits. Where installed in lighting circuit with Photo Cell install BEFORE photocell
• Manufacturer and reference Sangamo with 2 on and 2 off
  • Or approved equivalent
• 24 hour - reference Y74.2040A
• 7 day - reference Y74.2040B

274.090 ISOLATING SWITCHES:
• Type To suite each situation
• Application To suite each situation
• Manufacturer and reference MK,MEM or Crabtree
  • Or approved equivalent
• BS EN 60669-1 - reference Y74.2070A
• BS EN 60947-3 - reference Y74.2070B

274.100 FUSE CONNECTION UNITS:
• Type To suite each situation
• Application To suite each situation
• Manufacturer and reference MK,MEM or Crabtree
  • Or approved equivalent
• Switched - reference Y74.2080A
• Unswitched - reference Y74.2080B

274.110 SOCKET-OUTLETS:
• Type To suite each situation
• Application To suite each situation
• Manufacturer and reference MK,MEM or Crabtree
  • Or approved equivalent
• Single, switched - reference Y74.2090A
• Single with integral RCD, switched. Reference Y74.2090B
• Double, switched - reference Y74.2090C
• Single, unswitched - reference Y74.2090D
• Single with integral RCD, unswitched. Reference Y74.2090E

274.115 LCC GENERAL REQUIREMENTS
The positions of any socket outlets shown on drawings are approximate only on the drawing, and subject to confirmation on site before wiring commences.

Single socket outlets feeding fixed appliances below worktops to be switched via switched fused spur above worktop height, the spur unit shall be engraved to state what it is controlling.

Mounting heights to tiled areas shall be agreed by the Electrical Contractor with CA before first fixing.

Socket outlets are to be 30 mA RCD protected unless otherwise stated.

The socket outlets in all areas shall be installed in accordance with Section 607 of the IEE Regulations. They shall have twin earth terminals and the earths of the ring circuits shall be connected into separate holes on the earth bar.

Allow to mount any socket outlet so the bottom of it is a minimum of 50mm above a work surface. All socket outlets shall be switched.

No socket outlet shall be installed closer than 300mm to any sink/basin.

**274.120 COOKER CONTROL UNIT**
- Type To suite each situation
- Application To suite each situation
- With integral socket - reference Y74.2100A
- Without socket - reference Y74.2100B

**274.130 CORD OUTLETS:**
- Type To suite each situation
- Application To suite each situation
- Cooker connection unit - reference Y74.2110A

**274.150 TELEPHONE AND DATA OUTLET SOCKETS:**
- Type To suite level of system installed
- Application To suite level of system installed
- Manufacturer and reference Normally provided by others. If not then Molex
  - Or approved equivalent
- General purpose - reference Y74.2130A
- Details

**274.190 AERIAL SOCKETS:**
- Type Suitable for TV, FM Radio, Satellite, DAB Radio
- Application Suitable for TV, FM Radio, Satellite, DAB Radio
- Manufacturer and reference MK, MEM or Crabtree
  - Or approved equivalent
- TV and FM aerials - reference Y74.2170A
- Single TV aerials - reference Y74.2170B

**274.210 SHAVER POINTS:**
- Manufacturer and reference MK, MEM or Crabtree
  - Or approved equivalent
- Bath and washroom use - reference Y74.2190A

**274.240 WORKMANSHIP:**
- Earthing - reference Y74.3010
- Protection - reference Y74.3020
- Fixing - reference Y74.3030
- Measuring mounting heights - reference Y74.3040
- Accessories mounting heights
  - As indicated on Architects drawings.
  - As indicated on the drawings/schedules.
  - Standard - reference Y74.3050
  - For the disabled - reference Y74.3070

**EARTHING AND BONDING COMPONENTS**
280.010 GENERAL:
Comply with work section general clauses reference Y80.1000 and those detailed below.

280.040 EQUIPOTENTIAL BONDS:
- Main equipotential bonds
  - Reference Y80.2090A
- Supplementary equipotential bonds
  - Reference Y80.2100A

280.050 EARTHING:
- Circuit protective conductors
  - Reference Y80.2110A
- Earthing clamps - reference Y80.2120
- Earth busbars
  - Reference Y80.2130A
- Test links - reference Y80.2140
- Lugs/tags - reference Y80.2150
- Protective cable terminations - reference Y80.2160
- Protective conductor warning notices/labels
  - Reference Y80.2170
- Main earth conductor - reference Y80.2180
- Earth bar label - reference Y80.2190

280.060 WORKMANSHIP:
- Dissimilar metals - reference Y80.3020
- Tape joints
  - Application As the situation dictates
  - Copper - reference Y80.3030A
  - Aluminium - reference Y80.3030B
- Stranded conductor joints - reference Y80.3040
- Protective cable terminations
  - Reference Y80.3050A

TESTING AND COMMISSIONING OF ELECTRICAL SERVICES:

281.010 GENERAL:
Comply with work section general clauses reference Y81.1000 and those detailed below.

281.020 TESTING AND COMMISSIONING:
- Incorporated equipment characteristics
  - Reference Y81.2010A
- Prospective short circuit current (I_p)
  - Reference Y81.2020A
- Initial verification
  - Reference Y81.2030A
- Test equipment and consumables
  - Reference Y81.2040A
- Testing
  - Reference Y81.2050A
- Continuity of protective conductors
  - ac or dc - reference Y81.2060A
- Earth fault loop impedance (ZS)
  - Reference Y81.2070A
- Settings and adjustments - reference Y81.2080
- HV and LV switchgear
  - Reference Y81.2100A
- Specialist installations
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- Fire detection and alarm systems - BS 5839.
  Reference Y81.2120A
- Lightning protection - BS 5839.BS 6651 - reference Y81.2120B
- Emergency lighting installations - BS 6651 - reference Y81.2120BBBS 5266.
  Reference Y81.2120E
- Calibration - reference Y81.2130
- Certification and reporting
  Reference Y81.2140A
- Completion certificates
  Reference Y81.2150A
- Records - reference Y81.2160

281.030 WORKMANSHP:
- Conductive parts - reference Y81.3010
- Phase sequence - reference Y81.3020
- Cables
  - LV buried cables - reference Y81.3040A
  - Conduit, trunking and ducting - reference Y81.3050

IDENTIFICATION - ELECTRICAL

282.010 GENERAL:
Comply with work section general clauses reference Y82.1000 and those detailed below.

282.020 LABELS AND NOTICES:
- Reference Y82.2010A
- Fit labels and notices as shown on
  - As per the standard Part 2 for this project

282.030 LABELS AND NOTICES MATERIALS:
- Application To warn, inform and instruct
- Material
  - Reference Y82.2020Z
- Fixing
  - Reference Y82.2030A
- Arrangement
  - Reference Y82.2040A
- Lettering and size of labels and notices
  - Reference Y82.2050A

282.035 LCC GENERAL REQUIREMENTS
Lettering
A. Shall be capitals of the following minimum heights and colour combinations:-
   i) Informative titles - 7mm (29 point) high black letters on white ground.
   ii) Informative script - 3.5mm (15 point) high black letters on white ground.
   iii) Warning, Hazard or Safety titles - 12mm (50 point) high red letters on white ground.
   iv) Warning, Hazard or Safety script - 7mm (29 point) high red letters on white ground.
   NOTE: In respect of 'Fire Alarms', 'Emergency Lighting' and 'Alarm Labels' the label colour shall be reversed, i.e. white letters on red ground.

Fixings
A. Under no circumstances shall flexible self adhesive labels, or the fixing of rigid labels with adhesive be allowed.
B. Countersunk or pan head screws shall be used in conjunction with nyloc nuts; or rivets, or where fixed to the structure wood screws driven into inserts, to attach all labels as follows:-
   i) 2 No. for labels up to 20mm high.
   ii) 4 No. for labels over 20mm high.
   iii) Large or long labels shall have additional fixing as required to ensure their permanence.
   iv) Fixing holes shall be slightly oversize or slotted to stop distortion of labels due to expansion/contraction with temperature changes. Fixing devices shall be have oversized heads or be
Key Rings

Shall comprise spring steel, split ring fitted with an ivorine, trafficlite, brass or aluminium disc (minimum 40mm diameter) or equal rectangular plate having rounded corners, engraven to detail the equipment controlled and area in which it is located.

Other Requirements

All thermostats, detectors and similar devices that are supplied, fixed and connected as part of any named works shall be labelled to identify their purpose and the required temperature setting.

282.040 CONDUCTOR ARRANGEMENT:
Reference Y82.2060

282.045 GRAPHICAL SYMBOLS FOR USE ON EQUIPMENT IN ACCORDANCE WITH BS EN 80416:
Reference Y82.2085

282.050 EQUIPMENT SIGNS AND LABELS:

- Safety signs
  - Reference Y82.2070A
- Plant and equipment labels
  - Reference Y82.2080A
- Maintenance notices - reference Y82.2090
  - Equipment as indicated on the drawings
- Colour corrected light fittings - reference Y82.2100
- Motors and starters labels
  - Reference Y82.2110A
- Engraved accessory plates
  - Reference Y82.2120A
- Switchgear
  - Reference Y82.2130A
- Distribution boards - reference Y82.2140

For each and every switch, switch fuse, isolator, MCCB, MCB, and distribution equipment provide as follows:

- Item Label to indicate Fuse switch/switch: or MCCB etc. i) Item of equipment ii) Location/Area controlled Section Boards: i) Board reference ii) Size and type of supply cable iii) Circuit charts (A4 size) indicating area and distribution boards controlled, and their location iv) 415 volt Distribution Boards: i) Board reference ii) Phase Colour(s) or 415 volt 3 phase iii) Designation (i.e. lighting, power) iv) Circuit charts (A4 size), indicating sub main size, value it's of PSC and Zs at board, sub circuit protective device, size and cable size; number and type of outlets, location of outlets i.e. room/area. Single phase switch and distribution equipment etc. shall be fitted with a 25mm disc of the respective phase colour.

For three phase switch and distribution equipment etc. operating at voltages exceeding 240 volt, shall where forming part of a label described above state the voltage involved i.e. 415 volts 3 phase 50 Hz or be fitted with a separate label stating 'WARNING 415 VOLTS' ETC. as appropriate.

(Approximate overall label size 90mm wide x 30mm high).

- Warning labels shall be provided at locations where 415 volts exits between separate enclosures which can be reached simultaneously (i.e. regulations 514-10 refers).
- Applicable to all distribution equipment located between the supply authority service and fire alarm, emergency lighting and alarm equipment supplies etc., provide warning labels having white letters on red ground to respective equipment stating: "WARNING: THIS DEVICE ALSO CONTROLS THE SUPPLY TO FIRE PROTECTION/EMERGENCY LIGHTING/ALARM EQUIPMENT"; insert as appropriate. (Approximate overall label size 180mm wide x 90mm high).

- Provide and install adjacent the main switch panel and each section board label having red letters on a white ground stating: "WARNING THIS INSTALLATION CONTAINS R.C.D.’S AND OR ELECTRONIC EQUIPMENT SUITABLE PRECAUTIONS MUST BE TAKEN BEFORE CARRYING OUT ELECTRICAL TESTS. (Approximate overall label size 180mm wide x 90mm high).

- Provide and fix in each main switch room, boiler house, plant rooms and adjacent each Section Boards, rigid plastic 'ELECTRIC SHOCK' resuscitation labels size 356 x 508mm, .

An engraved label shall be affixed to the door of each distribution board stating:

a) Its designation.
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b) The size and number of cores of the cable feeding it.
c) Which panel it is fed from and which way on that panel.

282.055 GRAPHICAL SYMBOLS FOR USE ON EQUIPMENT IN ACCORDANCE WITH BS EN 80416:
Reference Y82.2085

282.060 SCHEMATIC DIAGRAMS:
• Type See 282.065
• Application See 282.065
• Reference Y82.2150A

282.065 LCC GENERAL REQUIREMENTS
Provide a permanent drawing, Indian ink on paper or equal giving the diagrammatic distribution layout, including cable and equipment details, from electricity board intake through to sub circuit distribution boards and major items of plant, the drawing to be neatly affixed to a substantial hardboard backing, covered by a clear rigid acrylic/plastic sheet bound along all sides by push on grip type rigid plastic edging. Size shall be adequate to clearly indicate all sizes and ratings etc.
Include to fix the drawing at an agreed position, location to be agreed

282.070 SPECIAL PURPOSE EARTHING:
• Type As required
• Application As required
• Reference Y82.2160A

282.080 INDICATOR LAMPS AND PUSH BUTTONS FOR POWER SYSTEMS:
• Application For any stop/start systems and emergency stop systems
• Reference Y82.2170A

282.090 CONDUIT AND TRUNKING COLOUR CODING:
• Type As required
• Application As required
• Reference Y82.2180A

282.100 CABLE IDENTIFICATION:
• Cable identification
  • Reference Y82.2190Y
• Terminal marking and conductor identification
  • Reference Y82.2200A
• Underground cable identification
  • Reference Y82.2210A
• Cable conductor colour coding
  • Reference Y82.2220A
• Cable jointing and termination - reference Y82.2230
• Cable sheath identification - internal
  • Reference Y82.2240A
• Cable sheath identification - external
  • Reference Y82.2250Y

FIXING TO BUILDING FABRIC

290.010 GENERAL:
Comply with work section general clauses reference Y90.1000 and those detailed below.

290.015 LCC GENERAL REQUIREMENTS
Wood screws
A. Fixings into block/brickwork, concrete or timber shall be slotted round head type except where used in conjunction with countersunk holes.
B. For internal use they shall be twinthread, sheradised or bright zinc plated steel, or standard single thread brass.

C. For use externally or in damp situations they shall be standard thread brass or stainless steel, single or twin thread.

D. Fixings into block/brickwork or concrete shall be made in conjunction with non rotting fibre or plastic inserts.

**Machine Screws, Bolts and Threaded Rod etc.**

A. Shall be slotted, round, pan, cheese or countersunk head; hexagon head; Allen/torque cap or countersunk head, having machine formed parallel metric or imperial thread as appropriate.

B. For internal use they shall be brass, sheradised or bright zinc plated steel, threads of all bolts, nuts etc. which are required to be removed for maintenance shall be lightly lubricated with grease on assembly.

C. For use externally, in damp, or otherwise contaminated areas they shall be brass, galvanised or stainless steel, treated as in B. Exposed threads shall be protected by grease, ‘DENSO’ tape etc. after installation to ensure that holding down nuts etc., remain removable throughout life.

D. Fixings into block/brickwork or concrete shall comprise cavity or expansion type threaded inserts (incorporating integral threaded rod or bolt as supplied). Inserts shall be steel or comprise a combination rubber or plastic body with steel anchor nut.

Steel parts shall be plated and corrosion resistant.

E. In corrosive situations screws and bolts and threaded rod shall be used in conjunction with plain washers, lock washer or lock nut and plain nuts all of which shall be of the same type and finish as screws and bolts.

F. Where suspensions are required from precast floor beams, the fixings shall pass through the joints between the beams and be suspended from flat sheet steel plates of adequate size and thickness which shall then be grouted in position.

**Inserts**

A. Inserts required for fixings into block/brickwork and concrete etc. shall be of proprietary manufacture, i.e. _Rawlplug_, _Unifix_, _Fischer_, _Hilti_ or equal.

B. Inserts used on block or brickwork etc., shall be inserted into holes drilled into the masonry and not the joints between.

C. Inserts shall be recessed 3mm into the wall and not project forward of the face.

D. Fixings made through plaster, pinboard, other similar applied finish or cladding shall take no account of that finish as a fixing medium. All fixings shall be adequate length such that their embedded length into the masonry/structure is sufficient to ensure secure fixing.

**Fixing Devices and Brackets**

A. Fixing of lightweight equipment, (conduit, trunking up to 100 x 100mm and light duty cable tray), to structural steelwork shall be with clip type fixing of ERICO Europa (GB) Ltd. manufacture from their ‘Caddy’ fasteners range, or equal.

C. Fixings, brackets and spacers etc. shall be manufactured from materials that are/or have been suitably treated to be non-rusting, non-corrosive, and of adequate size and gauge concurrent with the weight to be supported, as shall all fixing bolts and screws etc.

E. Steelwork, brackets, and clamps etc. required for the support of fittings, cables, trunking, cable trays, conduits, etc. shall be of a proprietary type or fabricated from steel strip, angle iron, steel rod or fabricated from steel strip, angle iron, steel rod or fabricated steel channel, galvanised, zinc sheradised or otherwise suitably treated.

Fixing equipment, accessories, brackets etc., not treated against rust or corrosion shall receive two coats of zinc phosphate, yellow chromate or Galvafroid paint

F. The load applied to any one fixing or suspension device etc., shall not exceed its rated design capacity.

**Structural Steelwork etc.**

A. Drilling of structural steelwork to provide fixing or for any other purpose shall not take place without the written consent of the C.A. for named works.

B. All fixings required from structural steelwork shall be obtained by application of spring or clamp type devises detailed under item **Fixing Devices and Brackets** ‘A’ and ‘B’ or by the provision of purpose made straps.

C. Fixings used for connection of structural components shall not be disturbed, nor shall they be used as fixing or suspension points without written approval of the C.A. for named works.
Small Cable Fixing Devices

A. **Hyatt Clips**
   i) Hyatt or equal moulded p.v.c./nylon clips having hardened steel fixing pins may be used to fix small non essential service cables up to 5mm diameter to timber frames and the like in ducts, ceiling/roof voids and similar situations.

B. **Dowel Clips and Clamps**
   i) Hilti or equal moulded fixing device.

C. **Compatibility**
   P.V.C. nylon or similar material fixing shall be compatible with the cable sheath to ensure no adverse reaction between materials, damage to cable or fixing device.

**Shot Fired Fixings**

A. Shot fired fixings will not be allowed without the written consent of the C.A. and then only on that named works.

**Quantity**

A. A minimum of 2 No. fixings shall be used for any accessory or item of equipment, this number shall be increased in the case of multigang accessories or larger items of equipment.

B. The fixing recommendations of the equipment manufacturer shall be considered a minimum; fixings shall be increased in quantity and/or size where necessary to ensure an adequate and robust installation.

   Exception to the foregoing shall only apply when the manufacturer specially warns against it, or on increase in quantity/size of fixing will cause damage to the equipment or affect its operation.

C. In no circumstances shall conduits servicing equipment, plaster or other building medium, be considered as fixings for equipment, except where so designed to be ‘cast in’.

290.020 FIXINGS:
- Standards - reference Y90.2010
- Plugs - reference Y90.2020
- Cast-in fixings - reference Y90.2040
- Self adhesive fixings - reference Y90.2060
- Proprietary channel inserts - reference Y90.2070

290.030 WORKMANSHIP:
- Drilling - reference Y90.3010
- Proprietary fixings - reference Y90.3020
- Fixing to reinforced concrete - reference Y90.3030
- Fixing to brickwork - reference Y90.3040
- Fixing to timber rails - reference Y90.3050
- Fixing to hollow stud/tile/block wall
   - Reference Y90.3060A
- Fixing to concrete, brickwork or blockwork
   - Reference Y90.3070A
- Fixing to metalwork
   - Reference Y90.3080A
- Fixing to structural steelwork and concrete structures
   - Reference Y90.3090A

**OFF-SITE PAINTING AND ANTI-CORROSION TREATMENT**

291.010 GENERAL
Comply with work section general clauses reference Y91.1000 and those detailed below.

291.020 PAINT MATERIALS:
- Paint materials
  - Reference Y91.2010A
- Paint quality - reference Y91.2020
- Heat resistant paint - reference Y91.2030

291.030 WORKMANSHIP
- General - reference Y91.3010
• Weather and other conditions - reference Y91.3020
• Cleaning and preparing for painting
  • Steel surfaces - reference Y91.3030A
  • Surfaces - reference Y91.3030B
• Application off-site - reference Y91.3040
• Application - reference Y91.3050
• Cold galvanizing - reference Y91.3060
• Protection of bright machine parts - reference Y91.3070

BS APPENDIX

BS 6651:1999
Code of practice for protection of structures against lightning

BS EN 60669-1:2000
Switches for household and similar fixed electrical installations. Part 1 General requirements

BS EN 60947-3:1999
Specification for low-voltage switchgear and controlgear. Part 3 Switches, disconnectors, switch-disconnectors and fuse-combination units
Y60 CONDUIT AND CABLE TRUNKING

Y60.1000 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).

Y60.2010A CONDUIT SYSTEMS METAL RIGID CLASS 2:
- Fittings
  - 2020A RIGID CONDUIT SYSTEM - METALLIC CONDUIT
    Use couplers to match conduit grade and finish.
    Use solid couplers to join lengths of conduit unless inspection couplers are shown on the drawings or schedules.
    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 - Spacer bar.
      Plugs - Hexagonal malleable iron.
      Locknuts - Hexagonal steel.
  - As drawings/schedules - reference Y60.2020B
  - 2020# RIGID CONDUIT SYSTEM - METALLIC CONDUIT:
    - Use couplers to match conduit grade and finish.
    - Use solid couplers to join lengths of conduit unless inspection couplers are shown on the drawings or schedules.
    - Conduit fittings and adaptable boxes
      - Material
        - Malleable iron conduit fittings.
        - Malleable iron adaptable boxes.
        - Steel 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 - 100 mm x 100 mm x 50 mm.
    - 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.
      - Use flanged couplers with washers.
    - Conduit fixing saddles
      - Spacer bar.
      - Plain.
      - Hospital.
Leicestershire County Council Standard Part 2

- **Plugs**
  - Hexagonal malleable iron.
  - Slotted brass plugs.
- **Locknuts**
  - Hexagonal steel.
  - Hexagonal malleable iron.
  - Circular steel milled edge.
  - Circular steel crenellated.

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 BS EN 61386-1 Table 10 Class 2
  - Medium protection
  - e.g. stove enamel or air drying paint.

Y60.2010B CONDUIT SYSTEMS METAL RIGID CLASS 4:

**Fittings**

- **2020A RIGID CONDUIT SYSTEM - METALLIC CONDUIT**
  
  Use couplers to match conduit grade and finish.

  Use solid couplers to join lengths of conduit unless inspection couplers are shown on the drawings or schedules.

  **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 - Spacer bar.
  - Plugs - Hexagonal malleable iron.
  - Locknuts - Hexagonal steel.

- **As drawings/schedules - reference Y60.2020B**

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

Y60.2010D 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.

  **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.
Leicestershire County Council Standard Part 2

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.

Y60.2010E 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.

Y60.2010F CONDUIT SYSTEMS - NON METALLIC FLEXIBLE:
- 2050A PLIABLE OR FLEXIBLE CONDUIT SYSTEMS - NON-METALLIC:
   Method of connection - Threadable conduit.
   Connections
      Use plastic adaptors and bushes.
      Use male adaptors to connect flexible conduit to motors and other equipment having a threaded entry.
      Use female adaptors and externally screwed 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 - Insulating, PVC.
Method of connection - Threadable or non-threadable.
Suitability for bending - Flexible, BS EN 61386-23.
Electrical characteristics
   Without electrical insulating characteristics.

Y60.2030A 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.
Y60.2040A Pliable or Flexible Conduit Systems - Metallic:
Type of Packing - Unpacked.
Type of sheath - Low smoke and fume material.
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.

Y60.2050A Pliable or Flexible Conduit Systems - Non-Metallic:
Method of connection - Threadable conduit.
Connections
Use plastic adaptors and bushes.
Use male adaptors to connect flexible conduit to motors and other equipment having a threaded entry.
Use female adaptors and externally screwed bushes to connect flexible conduit to trunking and equipment not having a threaded entry.

Y60.2080A Cable Trunking and Fittings:
Comply with BS 4678. Use trunking of each type from one manufacturer.

Y60.2090B Metal Surface Trunking - Zinc Finish:
Material
Steel trunking to BS 4678-1. Supply partitions and covers same material as trunking.
Gauge of metal - Table 1 BS 4678.
Trunking type
Standard cable trunking with compartments.
Style
Use trunking manufactured with inward return edge flanges and fitted 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.
Protection to BS 4678-1
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.
Finish - Manufacturer's standard, all surfaces.
Colour - Self Colour or Manufacturer's standard.
Fixings
Use purpose made brackets to fix to structural steel or suspension rods. Provide external fixing lugs where specified protection for the installation is IP44 or greater.
Fittings
Use bends, tees and angles of similar gauge, type and finish as trunking body and supplied by same manufacturer.
Partitions and Covers
Ensure partitions are electrically continuous with the body of the trunking or provide a connector for a circuit protective conductor. Ensure gap between partitions and lids maintains segregation of circuits. Provide individual mounting plates for each accessory mounted on trunking covers.
Material - Same material as trunking.
Joints
Use purpose made jointing pieces fixed with screws into captive nuts. Ensure screws do not protrude through the nuts. 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.
Leicestershire County Council Standard Part 2

Maintain electrical continuity at each joint by a copperlink, (tinned copper for galvanized trunking), fixed on outside of trunking, secured by screws, nuts and shakeproof 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 3382 Parts 1 and 2.

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.

Y60.2090C LIGHTING TRUNKING COVER:
Provide cover strip to prevent ingress of foreign materials, locate cabling in place and act as closure strips between luminaires. Use trunking cover strip clipped into place in trunking body.

Cover strip material
To match lighting trunking body or high quality colour fast extruded plastic.
Colour - Manufacturer's standard or to BS 4800 Shade as approved.

Y60.2090E STEEL DADO TRUNKING:
Material steel - BS 4678-1.
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.

Y60.2090F ALUMINIUM DADO TRUNKING:
Material extruded aluminium - BS EN 50085.
Wall/dado trunking - three compartment.
Installation - surface.
Style - extrusion as manufacturer's standard.
Colour - manufacturer's standard or BS 4800 shade to be approved.

Y60.2100A UNDERFLOOR STEEL TRUNKING:
Trunking material
Sheet steel trunking to BS 4678-2.
Gauge of Metal - Table 1 BS 4678.
Degree of Protection - Class 3.
Connection to vertical trunking
Provide flanges for connection of vertical trunking and temporary blanking plates.
Maintain cross sectional area of compartments with 50 mm minimum radius for connections to vertical trunking.
Trunking bodies
Supply trunking bodies complete with flanged connections for service outlet boxes.
Use screwed levelling devices.

Y60.2110A 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.

Y60.2120A 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.
- Material - Extruded Aluminium.
- Finish - Manufacturer's standard.
- Fixings - Free standing or complete with fixing brackets at top.

Y60.2130A PVC SERVICE 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 500 mm maximum intervals on trunking that exceeds 1.8 m in length. Where junctions occur ensure first clip is not more than 300 mm from junctions.

Y60.2140A PVC UNDERFLOOR TRUNKING:
- Material
  - Heavy gauge PVC trunking to BS 4678-4.

Y60.2150A SEPARATE OR MULTI-COMPARTMENT TRUNKING:
- Use separate trunking or multi-compartment trunking for segregation of services. Ensure steel partitions have a provision for connecting a circuit protective conductor.
- Provide separation of wiring for circuits as required by BS 7671.

Y60.2170 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 3382 after manufacture. Do not use metal fixing components likely to deteriorate and/or cause damage through electrolytic action.

Y60.3010A 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 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 toolmarks or damage to components occurs.

Y60.3020 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).

Y60.3030 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 spacings 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.

Y60.3040 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.

Y60.3050A PROTECTION AND REPAIR OF STEEL COMPONENTS:

Paint joints of conduit and minor damages to finish of conduit and trunking immediately after erection or after damage occurs. Use paint compatible with finish as follows

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

Remove grease, oil, dirt and rust before applying protective paint. Notify serious damage and repair or replace as instructed.

Y60.3060 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.

Y60.3070 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.

Y60.3080A 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.
For concealed conduit ensure system is installed to enable re-wiring to be carried out from boxes for fittings or accessories only. Draw-in boxes will only be permitted with prior permission in writing.
Do not use tallow or any other substances to facilitate drawing-in of cables.

Y60.3090 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.

Y60.4010 DRAW-IN BOXES:
Provide draw-in boxes in conduit at maximum intervals of 10 metres or after bends and/or sets totalling 180 degrees.

Y60.4020 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.

Y60.4030 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 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.

Y60.4040 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.

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:-

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>TYPE OF FIXING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Floor screeds.</td>
<td>Saddles or crampets.</td>
</tr>
<tr>
<td>Buried in plaster or render.</td>
<td>Crampets or saddles.</td>
</tr>
<tr>
<td>Above false ceilings.</td>
<td>Saddles.</td>
</tr>
<tr>
<td>Surface.</td>
<td>Saddles.</td>
</tr>
</tbody>
</table>

**Y60.4050 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.

**Y60.4060 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 couplings.

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.

**Y60.4070A 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 fitments 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, eg. lighting fittings.

**Y60.4080 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.

**Y60.5010 MANUFACTURE OF TRUNKING:**

Take measurements on site before producing drawings for manufacture of trunking.
Y60.5020 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 throughout the length of the trunking. Notify where either condition cannot be achieved.

Y60.5030A 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.

Y60.5040A 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.

Y60.5050 UNDERFLOOR AND FLUSH FLOOR TRUNKING INSTALLATION:  
Lay underfloor 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 underfloor trunking systems are fully rewirable to final circuit outlets. Connect conduits only at inspection or other easy access points.

Y60.5060 TRUNKING OF INSULATING MATERIAL:  
Comply with manufacturer's instructions. Do not install trunking where ambient temperature is below -5°C or working temperature is above 60°C. Use solvents recommended by trunking manufacturer when making solvent welded joints. Remove excess solvent before surface damage occurs. Hold joints rigid and in position until welds set. Use manufacturer's standard radiused bends, connector tees, off-sets, end plates and component parts of trunking system assembly. Ensure no type of trunking other than that specified is installed without approval. Trunking may be substituted for conduit at certain positions subject to approval.
Y61 HV/LV CABLES AND WIRING

Y61.1000 GENERAL
1010 CABLE MANUFACTURE:
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.

Y61.2005 LSOH SHEATHING:
Supply cables with Low Smoke Zero Halogen (LSOH) sheathing, tested in accordance with BS EN 50267 and BS EN 60332.

Y61.2010B STANDARD LSF FLEXIBLE WIRES - SINGLE COPPER CORE:
Standard - BS 7211, Tables 3(b) and 4(b).

Y61.2010C STANDARD HEAT RESISTING (110 DEGREES CENTIGRADE OR MORE) FLEXIBLE WIRES - SINGLE COPPER CORE:
Standard - BS 6007, Tables 5, 8, and 10.

Y61.2010D STANDARD ORDINARY FLEXIBLE CORDS - MULTI COPPER CORES:
Standard - BS 6500, Tables 12 and 13, and 16; BS 7919 Tables 10 and 14.

Y61.2010E STANDARD HOFR FLEXIBLE CORDS - MULTI COPPER CORES:
Standard - BS 6500, Table 16.

Y61.2020A STANDARD POWER SUPPLY CABLES, COPPER CONDUCTORS, THERMOSETTING INSULATION, SHEATHED:
Standard - BS 5467, Tables 4, 6, 8, and 10. Mechanical protection - Unarmoured.

Y61.2020B STANDARD POWER SUPPLY CABLES, COPPER CONDUCTORS, THERMOSETTING INSULATION, SHEATHED AND ARMOURED:
Standard - BS 5467, Tables 4, 6, 8, and 12. Mechanical protection - Armour.

Y61.2020C STANDARD POWER SUPPLY CABLES, COPPER CONDUCTORS, PVC INSULATION, SHEATHED:
Standard - BS 6346, Tables 5, 7, 9, and 11. Mechanical protection - Unarmoured.

Y61.2020D STANDARD POWER SUPPLY CABLES, COPPER CONDUCTORS, PVC INSULATION, SHEATHED AND ARMOURED:
Standard - BS 6346, Tables 5, 7, 9, and 11. Mechanical protection - Armour.

Y61.2020E STANDARD POWER SUPPLY CABLES, COPPER CONDUCTORS, LSF SHEATHED AND ARMOURED:
Standard - BS 6724, Tables 4, 6, 8, and 10. Mechanical protection - Armour.

Y61.2020F STANDARD CABLES FOR CONDUIT AND TRUNKING, COPPER CONDUCTORS, PVC INSULATED:
Standard - BS 6004, Tables 4(a) and 5. Mechanical protection - Conduit and trunking.

Y61.2020G STANDARD CABLES FOR CONDUIT AND TRUNKING, COPPER CONDUCTORS, LSF INSULATED:
Leicestershire County Council Standard Part 2

Standard - BS 7211, Tables 3(a) and 4(a).
Mechanical protection - Conduit and trunking.

Y61.2020H STANDARD CABLES FOR CONDUIT AND TRUNKING, COPPER CONDUCTORS. 90 DEGREES CENTIGRADE PVC INSULATED:
Standard - BS 6004, Tables 11(a) and 12.
Mechanical protection - Conduit and trunking.

Y61.2020I STANDARD FLAT CABLES, 2-CORE OR 3-CORE, COPPER CONDUCTORS, WITH OR WITHOUT CPC, PVC INSULATED, SHEATHED:
Standard - BS 6004, Tables 7, 8 and 9.

Y61.2020J STANDARD FLAT CABLES, 2-CORE OR 3-CORE, COPPER CONDUCTORS WITH OR WITHOUT CPC, LSF INSULATED SHEATHED:
Standard - BS 7211, Table 7.

Y61.2020K STANDARD POWER SUPPLY CABLES, COPPER CONDUCTORS LSF INSULATION, SHEATHED:
Standard - BS 7211, Tables 5 and 6.
Mechanical protection - Unarmoured.

Y61.2020M STANDARD CABLES WITH DEFINITE FIRE PERFORMANCE:
Standard - BS 7629-1 type as shown on drgs/schedules.
Fire performance BS 5839-1 Standard.
Sheath colour - red.
Mechanical protection, as shown on drgs/schedules.

Y61.2040B LIGHT DUTY MINERAL INSULATED CABLES, LSF OUTER COVERING:
Standard - 500V light duty to BS EN 60702-1, section 14.
Outer covering
Halogen free material to BS EN 60702-1, section 8.3.

Y61.2040E HEAVY DUTY MINERAL INSULATED CABLES, LSF OUTER COVERING:
Standard - 750V heavy duty to BS EN 60702-1, section 15.
Outer covering
Halogen free material to BS EN 60702-1, section 15.
Fire performance BS 5839-1 enhanced.
Sheath colour - Red.

Y61.2050A PAIRED, UNSCREENED AND UNARMOURED CONTROL CABLES:
Standard - BS 5308-1, Tables 2, 4 and 8.
Mechanical protection - Unarmoured, Type 1.

Y61.2050B PAIRED, UNSCREENED AND ARMOURED CONTROL CABLES:
Standard - BS 5308-1, Tables 2, 4 and 8.
Mechanical protection - Armour, Type 2.

Y61.2050C PAIRED, SCREENED AND UNARMOURED CONTROL CABLES:
Standard - BS 5308-1, Tables 3, 5 and 9.
Mechanical protection - Unarmoured, Type 1.

Y61.2050D PAIRED, SCREENED AND ARMOURED CONTROL CABLES:
Standard - BS 5308-1, Tables 3, 5 and 9.
Mechanical protection - Armour, Type 2.

Y61.2050E MULTI-CORE UNARMOURED AUXILIARY CABLES:
Standard - BS 5308-2, Tables 2, 3 and 6; BS 6346, Table 19.
Mechanical protection - Unarmoured, BS 5308 Type 1.

Y61.2050F MULTI-CORE ARMOURED AUXILIARY CABLES:
Leicestershire County Council Standard Part 2

Standard - BS 5308-2, Tables 2, 3 and 6; BS 6346, Table 19.
Mechanical protection - Armour, BS 5308 Type 2.

Y61.2050G MULTI-CORE UNARMOURED LSF, SHEATHED AUXILIARY CABLES:
Standard - BS 7211, Table 6
Mechanical protection - Unarmoured.

Y61.2050H MULTI-CORE ARMoured LSF, SHEATHED AUXILIARY CABLES:
Standard - BS 6724, Table 18.
Mechanical protection - Armour.

Y61.2050I CONTROL AND AUXILIARY CABLES WITH DEFINITE FIRE PERFORMANCE:
- Drawing/schedule reference
  Standard - BS 7629; type as shown on drgs/schedules.
  Fire performance approval - LCPB.
  Sheath colour - red.
  Mechanical protection, as shown on drgs/schedules.

Y61.2070A STANDARD FILLED COMMUNICATIONS CABLES FOR OUTDOOR AND UNDERGROUND:
Standard - BS 3573, Tables 7, 8, 9, 10 and 11.

Y61.2070B STANDARD COMMUNICATIONS CABLES FOR INDOOR USE:
Standard - BT CW 1308; BT CW 1370; BT CW 1700; and BT CW 1750.

Y61.2080A STANDARD COAXIAL CABLES, FOR BROADCAST RECEIVING:
Standard - BS EN 50117. CAI benchmark status, cable types CT 100, CT 125, CT 165.

Y61.2100A INFORMATION TECHNOLOGY CABLES - STRUCTURED WIRING: CATEGORY 5:
Provide IT cables in accordance with the IT system suppliers specification.
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).

Y61.3010A 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.

Y61.3010B 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.

Y61.3010C 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.

Y61.3010D 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.
Y61.3010E 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.

Y61.3020A CABLE SEALS AND GLANDS - HEAVY DUTY MINERAL INSULATED CABLES - PROTECTED FOR 'D' 'I' 'N' HAZARDOUS AREAS:
Use seals and glands for mineral insulated cables in accordance with BS EN 60702-2, recommended or supplied by cable manufacturer.
Gland Type
Cable grip type, externally threaded for threaded entry. Certified for hazardous areas to BS EN 60079-14, 'd', 'i' or 'n'.
Gland Shroud
Thermoplastic or LSF material to match sheath.
Seal type
Plain or earth tail and self-threading pot.
Pot closure - Plastic stub cap.
Pot sealant - Compound, 105°C
Conductor insulation sleeving - Plain PVC.
Seal maximum temperature rating - 105°C.
Other seal characteristics
Certified to BS EN 60079-14 for hazardous areas.

Y61.3020B 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.
Seal type
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.
Other seal characteristics
Certified to BS EN 60079-14 for hazardous areas, 'e'.

Y61.3020C CABLE SEALS AND GLANDS - HEAVY OR LIGHT DUTY MINERAL INSULATED CABLES - TEMPERATURES UP TO 105 DEGREES CENTIGRADE:
Use seals and glands for mineral insulated cables in accordance with BS EN 60702-2, recommended or supplied by cable manufacturer.
Gland Type
Cable grip type, externally threaded with lock washer and nut.
Gland Shroud
Thermoplastic or LSF material to match sheath.
Seal type - Plain or earth tail and self-threading pot.
Pot closure - Plastic stub cap.
Pot sealant - Compound, 105°C
Conductor insulation sleeving - Plain PVC.
Seal maximum temperature rating - 105°C.

Y61.3020D CABLE SEALS AND GLANDS - LIGHT DUTY MINERAL INSULATED CABLES - TEMPERATURES UP TO 105 DEGREES CENTIGRADE:
Use seals and glands for mineral insulated cables in accordance with BS EN 60702-2 recommended or supplied by cable manufacturer.
Gland Type
Cable grip type, internally threaded, with bush.
Gland Shroud
Leicestershire County Council Standard Part 2

Thermoplastic or LSF material to match sheath.
Seal type - Plain or earth tail and self-threading pot.
Pot closure - Plastic stub cap.
Pot sealant - Compound, 105°C
Conductor insulation sleeving - Plain PVC.
Seal maximum temperature rating - 105°C.

Y61.3040A CABLE TERMINATING AND JOINTING SOCKETS:
• Connection type
  • As shown on drawings/schedules
Standard and type - compression to BS EN 61238-1.

Y61.3060A CABLE JOINTS AND TERMINATIONS:
Use only cable joints as supplied or recommended by cable manufacturer.
Cable type - Power or control and auxiliary.
Joint arrangement - Straight through or tee.
Joint type - BS 7888, cold pour or heat shrink.
Accessories - Armour bonds, BS 7197; filling compounds.
Environment - Underground.

Y61.3080A CONNECTORS FOR COAXIAL CABLES - BROADCAST RECEIVING:
IEC 95 (Belling or TV connector) and type F to match equipment.

Y61.3110A CABLE DUCTS:
Standard
  BS 4660 provided by Electricity Supply Company.

Y61.3120A 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.

Y61.3130A CABLE COVERS AND MARKERS:
Material - Recovered plastic, integral tape.
  Marking - Electricity or telephone.
Plastic marker tape
  Yellow, marked electricity or telephone.

Y61.4010 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.

Y61.4030 INSTALLATION OF LSF CABLE:
Install LSF cables in accordance with manufacturer's instructions. Ensure ambient temperature is above 5°C. Ensure oversheaths are not damaged by abrasion or scuffing.

Y61.4040 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.

Y61.4050A 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 walkover 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.

Y61.4060 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, that 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.

Y61.4070A 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.

**Y61.4080 CABLE INSTALLATION INTO DUCTS:**
Install cables into newly proved and cleaned duct. Use lubricants, recommended by the cable manufacturer in writing, to assist drawing process. Flake cable if drums or reels are not suitable for jacking. At intermediate draw pits with exit duct more than 15 degrees off line of entry duct, flake cable before entering or provide comprehensive system of corner plates, roller and blocks. Use maximum practical size of turns when flaking and ensure direction is correct. Do not exceed manufacturer's installation tension on cable and ensure the pulling tension is taken on cable elements designed for that purpose, that is armour or conductor cores and not on other elements, such as plastic sheath or conductor insulation. Do not allow cables being pulled into ducts to twist. Use appropriate swivel between pulling bond and cable stocking or similar appliance. Bind trefoil groups of single core cables installed into a single duct at 1m intervals. Install earth or protective conductors into the same duct as the associated cable where practical, through manholes, draw pits and jointing chambers. Bind the two cables together. Pull all cables in one duct as a group. Ensure group does not twist or cross over. Report any damage to cable sheath during installation and carry out any instructed work to remedy the damage. Seal between cable and duct ends after cable installation. Ensure cable ends in jointing chambers are temporarily sealed where required.

**Y61.4090A CABLE INSTALLATION IN CONDUIT AND TRUNKING:**
Install cables so that they are orderly and capable of being withdrawn. Arrange single core wiring generally using the loop-in method. 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. Conduit
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.

**Y61.4100 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.

**Y61.4110A 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.

**Y61.4120A CABLE EMBEDDED 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. Ensure plaster or screed over cable is a minimum of 12mm. Protect embedded cables with metal capping or PVC oval conduit.

**Y61.4130A CABLE INSTALLATION - MINERAL INSULATED CABLES:**
Straighten and dress cables using methods and tools recommended by cable manufacturer. Use thermoplastic or LSF sheathed cables in location indicated, and where cables may come into direct contact with any material that may be corrosive to copper. Do not allow extra length on installed cables to allow for cutting back of moisture affected ends. Store mineral insulated cables in the form as supplied by manufacturer.

**Y61.4140 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.
Y61.4150A CABLE JOINTING AND TERMINATING GENERALLY:
Ensure all joints and terminations are made by appropriately qualified cable jointers, using jointing
materials, components and workmanship recommended by the cable manufacturer and the jointing
accessory manufacturer. Install cable glands in accordance with BS 6121-5.
- Cold pour resin and heat shrink joints.
- 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.
Strip cables to bring out the cores and expose conductors, for the minimum length required for
connection, to leave no exposed length of conductor after termination. Ensure that strands are not
damaged when stripping cable cores. Twist strands together. Do not reduce number of strands.
Secure all strands at terminations.
- Clean armour thoroughly prior to jointing or terminating.
- At connections to equipment and switchgear without integral cable clamping terminals, use
  compression or solder type lugs for bolted terminal connections, of correct bore.
- Form all compression connections to components using tools that cannot be released unless the
  correct degree of compression has been achieved.
- Install and inspect compression and mechanical connectors on conductors in accordance with BS
  EN 60228 and BS 7609.
Bolt core terminations with lugs to equipment using washers or proprietary shakeproof devices.
Do not bunch more than three cores at clamping terminals or bolted connections.
Mark cable conductor phasing, or other core identification, at each end of all cables, and at all joints,
maintaining consistency of marking with any existing system.
Connect all cores, including multicore cable spare cores, at all joints and terminations. Bond any
unused cores or multicore cables to earth at both ends, unless otherwise indicated.

Y61.4160A CABLE JOINTING AND TERMINATING - PAPER INSULATED CABLES:
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.
- Cold pour resin and heat shrink 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.

Y61.4170 CABLE JOINTING AND TERMINATING - ELASTOMER AND PLASTIC INSULATED
CABLES:
Joint cables using glands of the type indicated, in accordance with the manufacturer's instructions.
Use shrouds at all glands, unless otherwise instructed.
At core connections to equipment without integral clamping terminals use compression lugs unless
otherwise indicated.

Y61.4180A TERMINATING - MINERAL INSULATED CABLES:
Use terminations in accordance with BS EN 60702-2 and components and materials recommended or
supplied by cable manufacturer.
Use seals with maximum temperature rating indicated, stub caps to the largest size available, and
drilled caps and headed sleeves for larger sizes.
Use glands of type indicated. At terminations to accessory boxes within a plaster or render finish,
cable clamps fixed to accessory box and firmly gripping cable sheath may be used. Use earth tail
seals with sheath grip type accessory boxes.
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.
Mark core sleeving with appropriate identification.
Install voltage surge suppressors in accordance with manufacturer's recommendations and surge
suppressors to BS 7671, Section 331-01-01.

Y61.4190A 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.

Y61.4200A COMMUNICATIONS COAXIAL, OPTICAL FIBRE AND IT CABLE INSTALLATION, JOINTING AND TERMINATING:
Use methods approved by cable and accessory manufacturers. Employ labour certified by acceptable body as qualified to install and make joints and terminations in the referenced cable. Obtain in writing approval of cable manufacturer for accessories not supplied by them. Identify cables using structured numbering scheme. Install communication, coaxial, optical fibre and IT cables in accordance with BS EN 50174-3.

Y61.4210 CABLE SLEEVES:
Pack sleeves with fire resistant material after cable installation.
Leicestershire County Council Standard Part 2

Y63 SUPPORT COMPONENTS - CABLES

Y63.1000 GENERAL
1010 APPLICATION:
Cables referred to in this section are only those types that can be installed without further mechanical protection.

Y63.2010A 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.

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

Y63.2020A CABLE SUPPORT SYSTEM - PERFORATED TRAY:
Type - Flanged or return flanged.

Perforations
- Admiralty pattern for light or medium duty; GDCD 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 shakeproof washers.

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

Finish - Self colour galvanized.

Y63.2020B CABLE SUPPORT SYSTEM - CABLE RACK:
Proprietary system of channel sections with return lip and compatible jointing and fixing accessories

Fittings
- Use factory made fittings throughout of same material finish and section as rack, for risers, bends, reducers, tees, crosses and drop outs.

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

Finish - Self colour galvanized.

Y63.2020C CABLE SUPPORT SYSTEM - CABLE CLEATS:
One piece or single way pattern or claw pattern or two bolt pattern.

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

Finish - Self finish.

Y63.2025A 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.

Y63.2025B CABLE SUPPORT SYSTEM - CABLE CLIPS:
Polypropylene surface type with pre-fixed hardened steel pin for general use except on mineral insulated cables.
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For mineral insulated cables use bright copper one hole 'P' clips for unsheathed mineral insulated cables, PVC covered for sheathed mineral insulated cables.

Y63.2025C CABLE SUPPORT SYSTEM - TWO WAY SADDLES:
Bright copper for unsheathed mineral insulated cables. PVC covered bright copper for sheathed mineral insulated cables.

Y63.2025D CABLE SUPPORT SYSTEM - CABLE BASKET:
Proprietary system of wire basket with compatible jointing and fixing accessories.
Fittings
Use factory made fittings throughout of same material finish as basket, for risers, bends, reducers, tees, crosses and drop outs.

Y63.3010 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.

Y63.3020A 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).
Y71 LV SWITCHGEAR AND DISTRIBUTION BOARDS

Y71.1000 GENERAL

Y71.1020A 3 PHASE ELECTRICITY SUPPLY: Ensure all electrical equipment supplied and installed is suitable for 3 phase power supply to BS 7697.

Y71.1020B SINGLE PHASE ELECTRICITY SUPPLY: Ensure all electrical equipment supplied and installed is suitable for single phase power supply to BS 7697.


- Rated operational voltage 400V +10% -6%

Service conditions

- Ambient air temperature and altitude as BS EN 60439.


- Rated operational voltage 400V +10% -6%

Service conditions

- Ambient air temperature and altitude as BS EN 60439.


- Rated operational voltage 400V +10% -6%

Service conditions

- Ambient air temperature and altitude as BS EN 60439.


- Rated operational voltage 400V +10% -6%

Service conditions

- Ambient air temperature and altitude as BS EN 60439.

Leicestershire County Council Standard Part 2

Protection against direct and indirect contact
   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 fuselinks 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.
   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.

Y71.2030A ENCLOSURE FINISH:
   Apply high standard finish to enclosure and supporting metalwork. Degrease metal and remove rust
   prior to applying finish.
   Comply with paint manufacturer's recommendations regarding preparation, stoving times,
   temperatures, mixing of finishes, application and coat thickness.
   Finish - Manufacturer's standard.
   Colour - Manufacturer's standard colour.

Y71.2040A TYPE TESTS:
   Provide certificates of verification.

Y71.2060 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.

Y71.2070 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.

Y71.2090A UTILISATION A, WITHDRAWABLE 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
         a.c. 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 metal clad withdrawable isolating removable type circuit breakers with provision for safe
         maintenance.
         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.

Y71.2090B 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
a.c. 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.

Y71.2090C UTILISATION B, WITHDRAWABLE 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
a.c. Interrupting medium - Air.
Rated and limiting values for the main circuit.
Rated voltage (Volts) - operational, 400.
Rated frequency 50 Hertz.
Circuit breaker Utilisation category - B.
Enclosure degree of protection IP 31.
Circuit breakers and switches
Provide metal clad withdrawable isolating removable type circuit breakers with provision for safe maintenance.
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.

Y71.2090D UTILISATION B, 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
a.c. Interrupting medium - Air.
Rated and limiting values for the main circuit.
Rated voltage (Volts) - operational, 400.
Rated frequency 50 Hertz.
Circuit breaker Utilisation category - B.
Enclosure degree of protection IP 31.
Circuit breakers and switches
Leicestershire County Council Standard Part 2

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.

Y71.2100A SWITCH DISCONNECTORS:
Supply switch disconnectors in accordance with BS EN 60947.
Standard - BS EN 60947-3
Details of equipment - Switch-disconnector.
a.c. 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.

Y71.2100B 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.
a.c. 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 coverplates, 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.

Y71.2150A INSTRUMENTS AND METERS:
Standards
Comply with BS 89 and BS EN 60051-1 for voltmeters, ammeters, watt meters, frequency indicators and power factor indicators.
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.
Completely segregate all instruments in instrument compartments. Panel mount meters on front of instrument compartment.
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Y71.2210A DISTRIBUTION BOARDS:
Comply with BS EN 60439-3 as appropriate. Make internal separation Form 1 unless otherwise indicated. Make fuseboards fully shrouded. Fit each distribution board with an isolating switch. Install busbars in same position relative to their fuse carriers or miniature circuit-breakers (MCBs) for each pole. In TPN distribution boards supply neutral busbars 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 fuseway and MCB way by numbering. Identify each terminal on neutral busbar and earthing bar with its respective fuseway 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.

Y71.2230A 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.

Y71.2240A RESIDUAL CURRENT DEVICE:
Comply with BS EN 61008. Supply residual current devices (RCCDs) with rated voltage, rated current, rated tripping current, rated tripping time and rated breaking capacity as indicated. Ensure dc component does not affect operation. Overcurrent protection
  Fit RCDs with integral overcurrent protection.

Y71.2245 COMBINED RESIDUAL CURRENT/OVER CURRENT OPERATED CIRCUIT BREAKERS:
Supply combined residual current/over current operated circuit breakers (RCBOs) in accordance with BS EN 61009.

Y71.2250 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.

Y71.3010 FIXING:
Fix all equipment independently of wiring system. Use cadmium or zinc electroplated bolts, nuts, washers and screws.

Y71.3020 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.

Y71.3030 ACCESS:
Ensure that clearance in front of switchgear and controlgear is not less than 1m, or as indicated.

Y71.3040A MARKING AND DRAWING:
Number terminals, cables and component parts to correspond with manufacturer's certified drawings.

Y71.3050 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.

Y71.3060A INSTALLATION AND COMMISSIONING:
Install and commission switchgear and controlgear in accordance with the appropriate standard and the manufacturer's recommendations. Include CT Polarity check in commission tests.
Y73 LUMINAIREs AND LAMPS

Y73.1000 GENERAL

Y73.2240A SUPPORT SYSTEM - CONDUIT:
Use not less than 20mm conduit of same type as main conduit system.
Material - steel.

Y73.2250A SUPPORT SYSTEM - ROD:
Use continuously threaded rods with matching washers and nuts.
Diameter - 6mm.
Material - Cadmium plated steel.

Y73.2260A SUPPORT SYSTEM - CHAIN:
Use cadmium plated steel chain with load carrying capacity of not less than twice weight of complete luminaire.

Y73.2270A SUPPORT SYSTEM - FLEXIBLE CORD:
Use size and type as indicated.
Confirm temperature rating is suitable for operating temperature of luminaire or lampholder. Confirm that cord is adequate for mass to be supported.

Y73.2280A SUPPORT SYSTEM - WALL BRACKETS:
Provide wall brackets. Confirm wall brackets are suitable for supporting luminaire.

Y73.2290 SUPPORT SYSTEM - BALL AND SOCKET:
• Installation
  4160 SUSPENSION:
    Suspend luminaires at height indicated. Ensure suspensions hang vertically unless otherwise indicated.
  4200 SUSPENSION BY BALL AND SOCKET:
    Install cable through ball and socket connected to conduit box.
• Height
Provide ball and socket as top support, complete with cover fixed to circular conduit box.

Y73.2300A STEEL COLUMNS AND BOLLARDS:
• Finish as shown on drawings/schedules
Standards - BS EN 40-2 and BS EN 40-5.
Material - Steel.
Bracket - Match column.
Earthing
  Include earthing terminal fixed within service compartment.
Column base plate - Standard.

Y73.2300C ALUMINIUM COLUMNS AND BOLLARDS:
Standards - BS EN 40-2 and BS EN 40-6.
Material - Aluminium.
Bracket - Match column.
Earthing
  Include earthing terminal fixed within service compartment.
Column base plate - Standard.

Y73.4010 ORIENTATION:
Install luminaires in positions indicated, and in horizontal plane unless otherwise indicated.

Y73.4020 CLEANLINESS:
Ensure luminaires are clean and grease free on handover.

Y73.4030 INSTALLATION OF RECESSED FITTINGS:
Install luminaires flush with finished ceiling level.
Y73.4040A INSTALLATION OF SEMI-RECESSED FITTINGS:
Install luminaires as manufacturer's detail.

Y73.4050 INSTALLATION OF WALL MOUNTED FITTINGS:
Install luminaires at height indicated.

Y73.4060 MATERIAL OF SUPPORTING SURFACE:
Ensure classification of luminaires is appropriate. Do not mount luminaires on readily flammable surfaces.

Y73.4080 LUMINAIRES IN AREAS WITH INFRA-RED CONTROL SYSTEM:
Install luminaires in areas with infra-red control systems or data bearers so as to cause minimum disturbance to the infra-red transmission system in accordance with BS 7693.

Y73.4100 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.

Y73.4110 SUPPORT
Ensure support is adequate for weight of luminaires.
Number
- Provide the following minimum number of supports for each luminaire longer than 600mm.

<table>
<thead>
<tr>
<th>Luminaire width (mm)</th>
<th>Minimum number of supports</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to and including 300</td>
<td>2</td>
</tr>
<tr>
<td>Over 300</td>
<td>4</td>
</tr>
</tbody>
</table>

Y73.4120 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.

Y73.4130 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.

Y73.4140A SUPPORT BY DIRECT FIXING:
Refer to fixing methods, use luminaire supporting coupler to follow manufacturer's recommendations.

Y73.4150A SUPPORT IN SUSPENDED CEILING:
Support luminaires directly from building fabric.

Y73.4160 SUSPENSION:
Suspend luminaires at height indicated. Ensure suspensions hang vertically unless otherwise indicated.

Y73.4170 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.

Y73.4180 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.

Y73.4190 SUSPENSION BY FLEXIBLE CORD:
Suspend cord from ceiling rose.

Y73.4200 SUSPENSION BY BALL AND SOCKET:
Install cable through ball and socket connected to conduit box.

Y73.4210A COLUMNS AND BOLLARDS:
Location - Confirm location before excavation.
Bases - Install bases in accordance with bollard or column manufacturer's instructions.
Mounting
- Mount column or bollard on base as recommended by manufacturer.
- Ensure columns and bollards are vertical unless otherwise indicated.
Earthin g
- Install circuit protective conductor to connect luminaire to earthing terminal in service compartment; size circuit protective conductor same as live conductors. Bond accessible metal parts of column or bollard to earthing terminal.

Y73.4220 CONNECTIONS TO LUMINAIRES
- Direct to trunking
  - 4240A CONNECTIONS TO LUMINAIRES - DIRECT TO TRUNKING - TERMINAL BOX:
    Terminate circuit wiring in terminal block in an adaptable box located on side of trunking. Use flexible cord from terminal block to luminaire.
  - 4240B CONNECTIONS TO LUMINAIRES - DIRECT TO TRUNKING - AT LUMINAIRE:
    Terminate circuit wiring at supply terminals of luminaire. Take all conductors through same cable entry into luminaire.
  - 4240# CONNECTIONS TO LUMINAIRES - DIRECT TO TRUNKING:
    - Terminate circuit wiring in terminal block in an adaptable box located on side of trunking. Use flexible cord from terminal block to luminaire.
    - Terminate circuit wiring at supply terminals of luminaire. Take all conductors through same cable entry into luminaire.
  - 4250 CONNECTIONS TO LUMINAIRES - SUSPENDED FROM TRUNKING:
    Where luminaires are suspended from trunking, secure plug and socket to BS 546, adjacent to, or on side of, trunking. Terminate circuit wiring at socket. Take flexible cord from plug of ceiling rose to supply terminals of luminaire.
Cable Protection
- Use appropriate size of grommet where cables enter through hole in luminaire body.
Earthin g
- 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.

Y73.4230A CONNECTIONS TO LUMINAIRES - DIRECT TO CONDUIT - TERMINAL BOX:
Terminate circuit wiring in terminal block within supporting conduit box. Use flexible cord from terminal block to luminaire.

Y73.4230B CONNECTIONS TO LUMINAIRES - DIRECT TO CONDUIT - AT LUMINAIRE:
Terminate circuit wiring at supply terminals of luminaire. Take all conductors through same cable entry into luminaire.

Y73.4240A CONNECTIONS TO LUMINAIRES - DIRECT TO TRUNKING - TERMINAL BOX:
Terminate circuit wiring in terminal block in an adaptable box located on side of trunking. Use flexible cord from terminal block to luminaire.
Y73.4240B CONNECTIONS TO LUMINAIRES - DIRECT TO TRUNKING - AT LUMINAIRE:
Terminate circuit wiring at supply terminals of luminaire. Take all conductors through same cable entry into luminaire.

Y73.4250 CONNECTIONS TO LUMINAIRES - SUSPENDED FROM TRUNKING:
Where luminaires are suspended from trunking, secure plug and socket to BS 546, adjacent to, or on side of, trunking. Terminate circuit wiring at socket. Take flexible cord from plug of ceiling rose to supply terminals of luminaire.

Y73.4260A CONNECTIONS TO LUMINAIRES - RECESSED FITTINGS - PLUG AND SOCKET:
Where luminaires are recessed in a suspended ceiling, terminate circuit wiring at plug and socket to BS 546, located not more than 500mm from the access through the ceiling. Use flexible cord from plug of ceiling rose to supply terminals of luminaire.

Y73.4260B CONNECTIONS TO LUMINAIRES - RECESSED FITTINGS - TERMINAL BOX:
Where luminaires are recessed in a suspended ceiling, terminate circuit wiring in terminal block within conduit box. Install wiring to luminaire as indicated in wiring diagram.

Y73.4270 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.

Y73.4280 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.

Y73.4290 CONNECTIONS TO LUMINAIRES - MICS CABLE:
Fix cable gland to luminaire and continue conductors to supply terminals of luminaire.

Y73.4300A SEPARATE LIGHTING SWITCHES ON DIFFERENT PHASES:
Install lighting switches on different phases at least 2m apart.

Y73.4300B PHASE BARRIER LIGHTING SWITCHES ON DIFFERENT PHASES:
When lighting switches on different phases are in a common box, use phase barrier switches in accordance with BS 7671.
Y74 ACCESSORIES FOR ELECTRICAL SERVICES

Y74.1000 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.

Y74.2010A ACCESSORIES COMMON REQUIREMENTS - WHITE PLASTIC PLATES GRID, FLUSH INSTALLATION:
Area of installation - Interior.
Enclosure pattern - Flush.
Accessory mounting
- Adjustable steel grid for grid switches or direct to enclosure for all other accessories.
Enclosure material - Pressed steel.
Enclosure finish - Galvanized.
Coverplate finish, all accessories to match
- Moulded plastic, colour - white.
Coverplate pattern - Overlapping; with architrave where indicated.
Ancillaries
- Earthing terminal integral within switch box.
- Neon indicator with red lens, illuminated in "ON" position, for connection units.
- Switch rocker bar colour - white.
- Operating keys for key operated switches, minimum number 2.
- Fuses to BS 1362.
- Blank inserts for spare ways on grid switches.
Marking
- Method - engraving. Mark front plate to indicate equipment served on connection units.
Conduit and cable entries
- Knockouts side, top and rear.
Cable termination - Manufacturer's standard.

Y74.2010B ACCESSORIES COMMON REQUIREMENTS - MATT CHROME FINISH METAL PLATES, FLUSH INSTALLATION:
Area of installation - Interior.
Enclosure pattern - Flush.
Accessory mounting
- Adjustable steel grid for grid switches or direct to enclosure for all other accessories.
Enclosure material - Pressed steel.
Enclosure finish - Galvanized.
Coverplate finish, all accessories to match
- Brass with matt chrome surface.
Coverplate pattern - Overlapping; with architrave where indicated.
Ancillaries
- Earthing terminal integral within switch box.
- Neon indicator with red lens, illuminated in "ON" position, for connection units.
- Switch rocker bar colour as indicated.
- Operating keys for key operated switches, minimum number 2.
- Fuses to BS 1362.
- Blank inserts for spare ways on grid switches.
Marking
- Method - engraving. Mark front plate to indicate equipment served on connection units.
Conduit and cable entries
- Knockouts side, top and rear.
Cable termination - Manufacturer's standard.

Y74.2010C ACCESSORIES COMMON REQUIREMENTS - WHITE PLASTIC PLATES, EMBEDDED CABLES, SURFACE INSTALLATION:
Area of installation - Interior.
Enclosure pattern - Surface.
Accessory mounting - Direct to enclosure.
Enclosure material - White moulded plastic.
Coverplate finish, all accessories to match
Moulded plastic, colour - white.
Coverplate pattern - Surface type.
Ancillaries
    Earthing terminal integral within switch box.
    Neon indicator with red lens, illuminated in "ON" position, for connection units.
    Switch rocker bar colour as indicated.
    Operating keys for key operated switches, minimum number 2.
    Fuses to BS 1362.
Marking
    Method - engraving. Mark front plate to indicate equipment served on connection units.
Conduit and cable entries
    Knockouts side, top and rear.
Cable termination - Manufacturer's standard.

Y74.2010D ACCESSORIES COMMON REQUIREMENTS - METAL CLAD PLATES, SURFACE STEEL CONDUIT INSTALLATION:
Area of installation - Interior.
Enclosure pattern - Surface.
Accessory mounting - Direct to enclosure.
Enclosure material
    Pressed steel or cast iron.
Enclosure finish
    As conduit system or galvanized.
Coverplate finish, all accessories to match
    Metal clad.
Coverplate pattern - Surface type.
Ancillaries
    Earthing terminal integral within switch box.
    Neon indicator with red lens, illuminated in "ON" position, for connection units.
    Switch rocker bar colour as indicated.
    Operating keys for key operated switches, minimum number 2.
    Fuses to BS 1362.
Marking
    Method - engraving. Mark front plate to indicate equipment served on connection units.
Conduit and cable entries
    Threaded entries, top, bottom or side to suit conduit system.
Cable termination - Manufacturer's standard.

Y74.2010E ACCESSORIES COMMON REQUIREMENTS - SURFACE, STEEL CONDUIT, WEATHERPROOF INSTALLATION:
Area of installation - Exterior.
Enclosure pattern - Surface and weatherproof.
Accessory mounting - Direct to enclosure.
Enclosure material - Cast iron.
Enclosure finish - As conduit system or galvanized.
Coverplate finish, all accessories to match
    As enclosure.
Coverplate pattern - Surface type.
Ancillaries
    Earthing terminal integral within switch box.
    Neon indicator with red lens, illuminated in "ON" position, for connection units.
    Screwed weathering cap and chain for socket outlets.
    Operating keys for key operated switches, minimum number 2.
    Fuses to BS 1362.
Marking
Method - engraving. Mark front plate to indicate equipment served on connection units.

Conduit and cable entries
- Threaded entries, top, bottom or side to suit conduit system.

Cable termination - Manufacturer's standard.

Y74.2010F 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.
- Accessory mounting - Direct to enclosure.
- Enclosure material - Impact resistant plastic.
- Enclosure finish - Natural or self coloured.
- Coverplate finish, all accessories to match moulded plastic, colour as indicated.
- Coverplate pattern - Surface type.

Ancillaries
- Earthing terminal integral within switch box.
- Neon indicator with red lens, illuminated in "ON" position, for connection units.
- Protective shrouds to rocker bars.
- Screwed weathering cap and chain for socket outlets.
- Switch rocker bar colour as indicated.
- Operating keys for key operated switches, minimum number 2.
- Fuses to BS 1362.

Y74.2010G ACCESSORIES COMMON REQUIREMENTS - BRONZE FINISH METAL PLATES GRID, FLUSH INSTALLATION:
- Area of installation - Interior.
- Enclosure pattern - Flush.
- Accessory mounting
  - Adjustable steel grid for grid switches or direct to enclosure for all other accessories.
- Enclosure material - Pressed steel.
- Enclosure finish - Galvanized.
- Coverplate finish, all accessories to match brass with BMA/bronze surface.
- Coverplate pattern - Overlapping; with architrave where indicated.

Ancillaries
- Earthing terminal integral within switch box.
- Neon indicator with red lens, illuminated in "ON" position, for connection units.
- Switch rocker bar colour as indicated.
- Operating keys for key operated switches, minimum number 2.
- Fuses to BS 1362.
- Blank inserts for spare ways on grid switches.

Marking
- Method - engraving. Mark front plate to indicate equipment served on connection units.

Y74.2020A INTERIOR LIGHTING SWITCHES - GENERAL PURPOSE MOULDED PLASTIC:
- Standard - BS EN 60669-1, enclosure box to BS 4662.
- Switch type - Rocker bar - moulded plastic.
- Rating - 6A.
- Gangs as indicated.
- Switch mechanism - Snap action microgap.
- Pole configurations
  - Single pole, double pole, 2 way or intermediate as indicated.
Y74.2020B INTERIOR LIGHTING SWITCHES - GRID MOULDED PLASTIC:
Standard - BS EN 60669-1, enclosure box to BS 4662.
Switch type - Rocker bar - moulded plastic.
Rating - 6A.
Switch mechanism - Snap action microgap.
Pole configurations
  Single pole, 1 way, 2 way or intermediate as indicated.

Y74.2020C INTERIOR LIGHTING SWITCHES - PULL CORD:
Standard - BS EN 60669-1, enclosure box to BS 4662.
Switch type - Cord to BS EN 61058-2-1.
Rating - 6A. Pole configurations - Single pole.

Y74.2020D INTERIOR LIGHTING SWITCHES - GENERAL PURPOSE SECRET KEY:
Standard - BS EN 60669-1, enclosure box to BS 4662.
Switch type - Rocker bar - secret key.
Rating - 6A.
Gangs as indicated.
Switch mechanism - Snap action microgap.
Pole configurations - Single pole, double pole, 2 way or intermediate as indicated.

Y74.2020E INTERIOR LIGHTING SWITCHES - GENERAL PURPOSE DIMMER:
Standard - BS EN 60669-1, enclosure box to BS 4662.
Switch type - Rocker bar - dimmer.
Rating - 6A.
Gangs as indicated.
Switch mechanism - Snap action microgap.
Pole configurations - Single pole, double pole, 2 way or intermediate as indicated.

Y74.2020F INTERIOR LIGHTING SWITCHES - GRID SECRET KEY:
Standard - BS EN 60669-1, enclosure box to BS 4662.
Switch type - Rocker bar - secret key.
Rating - 6A.
Switch mechanism - Snap action microgap.
Pole configurations - Single pole, 1 way, 2 way or intermediate as indicated.

Y74.2040A TIME SWITCHES - 24 HOUR:
Wire timer and switch circuits to separate terminals.
Standard - BS EN 60730-2-7.
Time switch type - Quartz stabilized solid state 50 hour nickel cadmium battery backup.
Contacts duty - Inductive.
Contacts rating - 15A.
Special programme facilities
  Number of 'ON' and 'OFF' operations - 4
Programme repeat cycle - 24 hour.

Y74.2040B TIME SWITCHES - 7 DAY:
Wire timer and switch circuits to separate terminals.
Standard - BS EN 60730-2-7.
Time switch type
  Quartz stabilized solid state 50 hour nickel cadmium battery backup.
Contacts duty - Inductive.
Contacts rating - 15A.
Special programme facilities
  Number of "ON" and "OFF" operations - 4
Programme repeat cycle - 7 day.

Y74.2070A 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 - Rocker bar.
Rating as indicated on schedule.
Pole configuration - DP, three pole or TPN as indicated.

Y74.2070B 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 - Rocker bar.
Rating as indicated on schedule.
Pole configuration - DP, three pole or TPN as indicated.

Y74.2080A 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.

Y74.2080B 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.

Y74.2090A 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

Y74.2090B SOCKET-OUTLETS - SINGLE WITH INTEGRAL RCD, SWITCHED:
Standard - Enclosure box to BS 4662, BS 7288.
Switching - Switched.
Switch type - Rocker bar - plastic.
Rating - 13A.
Ancillaries
  RCD, BS 7288. Mains failure trip, sensitivity 30mA. Plug tops 25% of number of sockets, fused as indicated.
Gangs - 1

Y74.2090C 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

Y74.2090D SOCKET-OUTLETS - SINGLE, UNSWITCHED:
Standard - 13A socket-outlet to BS 1363, enclosure box to BS 4662.
Leicestershire County Council Standard Part 2

Switching - Unswitched.
Rating - 13A.
Gangs - 1

Y74.2090E SOCKET-OUTLETS - SINGLE WITH INTEGRAL RCD, UNSWITCHED:
- Standard
  - Enclosed box to BS 4662, BS 7288.
  - HBES systems BS EN 50428, enclosure box to BS 4662.
Switching - Unswitched.
Rating - 13A.
Ancillaries
  RCD, BS 7288. Mains failure trip, sensitivity 30mA.
Gangs - 1

Y74.2100A COOKER CONTROL UNIT - WITH INTEGRAL SOCKET:
Standard - BS 4177, enclosure box to BS 4177.
Unit type - With integral 13A switched socket-outlet and pilot lamp.
Pole configuration - DP.
Rating - 45A.

Y74.2100B COOKER CONTROL UNIT - WITHOUT SOCKET:
Standard - BS 4177, enclosure box to BS 4177.
Unit type - With pilot lamp.
Pole configuration - DP.
Rating - 45A.

Y74.2110A CORD OUTLETS - COOKER CONNECTION UNIT:
Standard - BS 5733, enclosure box to BS 4662.
Format - Cooker connection.
Rating - 45A
Pole configuration - DP&E.

Y74.2130A TELEPHONE AND DATA OUTLET SOCKETS - GENERAL PURPOSE:
Standard
  For jack socket to telephone service provider requirements and enclosure box to BS 4662.
Size - Standard.
Circuit configurations as indicated.

Y74.2170A 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.

Y74.2170B AERIAL SOCKETS - SINGLE TV AERIALS:
Standard - BS 3041-2.
Circuit configurations - Single TV.
Ancillaries
  Safety isolation to CAI recommendations for communal aerial systems.

Y74.2190A SHAVER POINTS - BATHROOM AND WASHROOM USE:
Provide shaver points, internally switched by plug insertion.
Standard
  BS EN 61558-2-9, BS EN 61558-1 and BS EN 61558-2-23, enclosure box to BS 4662.
Rating - 20VA.
Components
  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".
Leicestershire County Council Standard Part 2

Y74.3010 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.

Y74.3020 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.

Y74.3030 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.

Y74.3040 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.

Y74.3050 STANDARD ACCESSORIES MOUNTING HEIGHTS:

<table>
<thead>
<tr>
<th>Accessory</th>
<th>Location</th>
<th>Height (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lighting switch</td>
<td></td>
<td>1200</td>
</tr>
<tr>
<td>Socket outlet General</td>
<td>General</td>
<td>450</td>
</tr>
<tr>
<td></td>
<td>Kitchen</td>
<td>1000</td>
</tr>
<tr>
<td></td>
<td>Above worktop</td>
<td>200</td>
</tr>
<tr>
<td>Shaver socket outlet</td>
<td></td>
<td>1000</td>
</tr>
<tr>
<td>Fused connection unit General</td>
<td></td>
<td>450</td>
</tr>
<tr>
<td></td>
<td>Above worktop</td>
<td>200</td>
</tr>
<tr>
<td>Fused connection unit controlling</td>
<td>Radiator heater, wall</td>
<td>1800</td>
</tr>
<tr>
<td></td>
<td>Radiator heater, focal point</td>
<td>450</td>
</tr>
<tr>
<td></td>
<td>Tubular heater</td>
<td>450</td>
</tr>
<tr>
<td></td>
<td>Clock</td>
<td>1900</td>
</tr>
<tr>
<td>Cooker control unit</td>
<td>Above worktop</td>
<td>200</td>
</tr>
<tr>
<td>Cooker connection unit</td>
<td></td>
<td>600</td>
</tr>
<tr>
<td>Accessory</td>
<td>Height (mm)</td>
<td></td>
</tr>
<tr>
<td>---------------------------------</td>
<td>-------------</td>
<td></td>
</tr>
<tr>
<td>Safety isolating transformer</td>
<td>1200</td>
<td></td>
</tr>
<tr>
<td>Room thermostat</td>
<td>1400</td>
<td></td>
</tr>
<tr>
<td>Telephone outlet</td>
<td>450</td>
<td></td>
</tr>
<tr>
<td>Radio/TV outlet</td>
<td>450</td>
<td></td>
</tr>
<tr>
<td>Push button</td>
<td>1200</td>
<td></td>
</tr>
<tr>
<td>Fire alarm manual call point</td>
<td>1200</td>
<td></td>
</tr>
<tr>
<td>Bell or buzzer</td>
<td>2000</td>
<td></td>
</tr>
<tr>
<td>Visible alarm indicator</td>
<td>2000</td>
<td></td>
</tr>
</tbody>
</table>

In car parks and garages comply with appropriate petroleum regulation for mounting heights of socket outlets.

Y74.3070 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.
Leicestershire County Council Standard Part 2

**Y80 EARTHING AND BONDING**

**Y80.1000 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.

**Y80.2090A MAIN EQUIPOTENTIAL BONDS:**
Provide main equipotential bonds in accordance with BS 7671.
- Material - Insulated cable, single core to BS 6004.
- Use no joints in main equipotential bonds.

**Y80.2100A 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.

**Y80.2110A 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.

**Y80.2120 EARTHING CLAMPS:**
Use clamps complying with BS 951, for bonding pipes and lead sheathed cables.

**Y80.2130A EARTH BUSBARS:**
- Material
  - Manufacture earth busbars from hard drawn, tinned, high conductivity copper bar.
- Substation Earth busbar
  - 75 x 13mm cross section 600mm minimum length.
- Main Earth Terminal busbar
  - 25 x 6 mm minimum for incoming live conductor not exceeding 50mm and 50 x 6 mm minimum for incoming live conductor over 50mm².

**Y80.2140 TEST LINKS:**
Provide two test links, in connections between main earth conductors and earth busbar. Fabricate each from two additional sections of earth busbar. Mount one section on stand-off insulators matching earth busbar; use remaining section as removable test link. Secure 12mm high tensile brass studs to fixed sections of busbar and drill corresponding clearance holes in test links and provide brass washers, nuts and locking devices to secure frame/neutral earthing and test links.

**Y80.2150 LUGS/TAGS:**
Provide lugs or tags to enable connection of bonding conductors to equipment earth terminals.

**Y80.2160 PROTECTIVE CABLE TERMINATIONS:**
For bolted connections use crimp type lugs compressed by automatic tool to achieve correct pressure and crimp depth.

**Y80.2170 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.

**Y80.2180 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.

**Y80.2190 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.

**Y80.3020 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.

**Y80.3030A COPPER TAPE JOINTS:**
Provide waterproof protection at joints subject to moisture.
Joint copper tapes by brazing, using zinc-free brazing metal with melting point at least 600°C or thermic welding.

**Y80.3030B ALUMINIUM TAPE JOINTS:**
Provide waterproof protection at joints subject to moisture.
Joint aluminium tapes by welding to BS EN 1011-4.

**Y80.3040 STRANDED CONDUCTOR JOINTS:**
Provide waterproof protection at joints subject to moisture.
Joint copper stranded conductors with compression joints to BS EN 61284.

**Y80.3050A 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.
Y81 TESTING AND COMMISSIONING OF ELECTRICAL SERVICES

Y81.1000 GENERAL

Y81.2010A INCORPORATED EQUIPMENT CHARACTERISTICS:
Obtain and use information from manufacturers of equipment provided.
Use information provided, for equipment supplied by others and incorporated into installation.

Y81.2020A PROSPECTIVE SHORT CIRCUIT CURRENT:
Determine values of \( I_P \) by measurement, unless other means are indicated. Determine \( I_P \) at all necessary points within installation to confirm correct equipment selections.
Obtain from supply undertaker written confirmation of maximum and minimum values of \( I_P \) at origin of installation. Adjust subsequent measured values of \( I_P \) accordingly.

Y81.2030A INITIAL VERIFICATION:
Carry out detailed inspection to verify the requirements of BS 7671, Section 611 in the order given in clause 611.3 for New Installation or Altered or Added Installation as appropriate.

Y81.2040A TEST EQUIPMENT AND CONSUMABLES:
Provide test equipment and consumables to complete tests satisfactorily, and to retest any failed installations following corrective measures.
Test equipment quality assurance requirements to BS EN ISO 10012.

Y81.2050A 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.

Y81.2060A CONTINUITY OF PROTECTIVE CONDUCTORS:
Confirm continuity. Use ac source or dc source.

Y81.2070A EARTH FAULT LOOP IMPEDANCE:
Use 25 A test current. Measure and record source impedance \( Z_E \).
If alternative LV supply arrangements are available, measure \( Z_S \) when using supply with highest impedance.
Measure \( Z_S \) with main equipotential bonding conductors connected. Do not summate values of several parts of each loop.

Y81.2080 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.

Y81.2100A HV AND LV SWITCHGEAR:
Perform works tests on HV and LV switchgear in accordance with BS EN 62271-200 and BS EN 60439-1, as appropriate, and provide test certificates.

Y81.2120A 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.

Y81.2120B LIGHTNING PROTECTION INSTALLATIONS:
Carry out site testing and inspection and provide test certificates for lightning protection installations in accordance with BS EN 62305.

Y81.2120E EMERGENCY LIGHTING INSTALLATIONS:
Carry out site testing and inspection and provide test certificates for emergency lighting installations in accordance with BS EN 50172.

Y81.2130 CALIBRATION:
Provide current certificates of calibration for all instruments used during test procedures. Record
particular instrument identity on record sheets.

Y81.2140A 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.

Y81.2150A INSTALLATION CERTIFICATES:
Provide installation certificates for electrical installations in accordance with BS 7671 (IEE Regulations).
Record details of departures from BS 7671 (IEE Wiring Regulations) on certificate.
Provide copies of calculations justifying departure from BS 7671 (IEE Wiring Regulations) and attach to certificates.

Y81.2160 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.

Y81.3010 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 earthbar by an impedance not exceeding 0.1 ohms.

Y81.3020 PHASE SEQUENCE:
Check and confirm correct polarity of all conductors in all circuits.

Y81.3040A LV BURIED CABLES:
Test continuity and insulation of buried cables immediately after back-filling. Test continuity and insulation of buried cables prior to handover.

Y81.3050 CONDUIT, TRUNKING AND DUCTING:
Test and confirm electrical continuity before installing cables.
Y82 IDENTIFICATION - ELECTRICAL

Y82.1000 GENERAL

Y82.2010A LABELS AND NOTICES:
Apply identification labels and notices in accordance with BS 7671 (IEE Wiring Regulations), Clause 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 250 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.

Y82.2030A 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.

Y82.2040A ARRANGEMENT:
Obtain approval prior to manufacture, with regard to style, colour, lettering, size and position of all labels and notices.
Provide sample showing style, colour, lettering and size, for approval.

Y82.2050A LETTERING AND SIZE OF LABELS AND NOTICES:
Ensure that all lettering and symbols comply with the requirements laid out in BS 5499-1 for height of lettering where not otherwise indicated. Ensure labels and notices of adequate size for the lettering required, and allow a minimum margin around all lettering of one line space vertically and two letter spacing horizontally.
Font - Helvetica Medium.
Size - BS 5499-1 or 5mm minimum high letters.

Y82.2060A CONDUCTOR ARRANGEMENT:
Arrange circuit polarity so that phases read in phase rotation order followed by the neutral, if any, from top to bottom in horizontal conductor layouts and left to right in vertical conductor layouts. Ensure flat horizontal arrays have leading phase to the left and neutral to the right from left to right when viewed from supply point. Arrange phase or live pole of two wire apparatus at top or left hand and neutral and earth both at bottom or right hand side. In all cases, ensure conductor arrangements defined are when viewed from front face of all equipment and terminating facilities. Apply identification markers in accordance with BS 7671 (IEE Wiring Regulations), Clause 514 to all conductor termination points.

Y82.2070A SAFETY SIGNS:
• Details of supplementary or text signs as indicated on drawing
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 switchroom 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 switchroom
• 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.
Y82.2080A 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.

Y82.2085 GRAPHICAL SYMBOLS FOR USE ON EQUIPMENT IN ACCORDANCE WITH BS EN
80416:
Graphical symbols for use on equipment to be created and applied in accordance with BS EN 80416-1, BS EN 80416-2, BS EN 80416-3.

Y82.2090 MAINTENANCE NOTICES:
Equipment
Fix notices giving warning of, and instructions on, any special maintenance procedures to plant and
equipment.

Y82.2100 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.

Y82.2110A MOTORS AND STARTERS LABELS:
Fit identification labels to all motors, starters and starter panels. Ensure positive identification of
respective motors and starters. Provide motors with non-corrodible labels attached adjacent to each
bearing giving details of the lubricant to be used. Mark direction of normal rotation on motor casing.
Provide labels to identify motor equipment fitted with surge suppressors and thermistors stating that
insulation test voltages must not be applied to thermistors and thermistor control units. Ensure
labelling is compatible with schematic and wiring diagrams, and complies with BS EN 60034-8.

Y82.2130A SWITCHGEAR:
Fit labels on switchgear as required by BS EN 60439 to indicate duty of unit, its voltage, phase and
current rating, protective device rating size of conductor involved, and all other necessary details.
Use an agreed serial coding system, provide at the switch a key to the coding system.

Y82.2140 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.

Y82.2150A SCHEMATIC DIAGRAMS:
Provide a purpose made schematic diagram permanently fixed showing the connections of the
equipment and plant.
Locations and materials as indicated in contract preliminaries.

Y82.2160A SPECIAL PURPOSE EATING:
Fit labels to special purpose earthing conductors and connection points, describing their purposes and
any instructions necessary for their operation and maintenance.
IT equipment “Clean Earths”.
Telecommunications functional earths as BS 6701.

Y82.2170A INDICATOR LAMPS AND PUSH BUTTONS FOR POWER SYSTEMS:
Use indicator lamp and push button colours in accordance with BS EN 60073.
Indicator lamp
Red, danger or alarm; yellow, caution; green, safety.
Push buttons
Red, emergency action; red, stop or off; yellow, intervention; green, start or on.
Illuminated push buttons - Type a.

Y82.2180A 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.
Place identification colours at bulkheads, wall penetrations and any other place where identification is necessary.

Y82.2200A TERMINAL MARKING AND CONDUCTOR IDENTIFICATION:
Provide for switchgear and control gear elements whose terminals are marked in accordance with BS 5472 (EN 50005) and BS 6272 (EN 50042). Use a unique reference to identify each element in the switchgear or control gear. Mark on or adjacent to each element its reference. Identify each terminal for connection to external wiring or cabling using a reference system complying with BS EN 60445 based on the element reference and the appropriate element terminal reference.
Adjacent to terminals.
Use lettered or numbered ferrules or sleeves to BS 3858 to mark each auxiliary conductor or control cable core with the identity of the terminal to which it is connected and the reference of plant or equipment to which it is connected and the identity of the terminal at the remote end. Ensure that main circuit conductors are identified in accordance with BS 7671 (IEE Wiring Regulations) paragraph 514. Ensure that all identification of terminals and conductors is recorded and included on record drawings and in operation and maintenance documentation.

Y82.2210A 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.

Y82.2220A CABLE CONDUCTOR COLOUR CODING:
Identify cable conductors in accordance with BS 7671 (IEE Wiring Regulations) paragraph 514 and Appendix 7, note that a lighting sub-circuit switch wire is a phase conductor in a single phase circuit.

Y82.2230 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.

Y82.2240A CABLE SHEATH IDENTIFICATION - INTERNAL:
Use to identify coloured cables sheaths for various services as follows.
- Fire alarm, red;
- Clock circuits, brown;
- Telecommunications, grey;
- Data as system suppliers requirements;
- Control, black;
- LV, black;
- LV mineral insulated, orange;
- MV red.
Code cables for various services using alpha numeric symbols as follows.
- Code letters preceding cable reference.
  - Fire alarm, FA.
  - Clock, CL.
  - Telecommunications, T.
  - Data, D.
  - Control, C.
  - Low voltage, LV.
  - Extra low voltage, ELV.
  - LV Essential circuits EM.
Medium voltage, HV.
Y90 FIXING TO BUILDING FABRIC

Y90.1000 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.

Y90.2010 STANDARDS:
Ensure that fixings such as expanding anchors are tested for tensile loading in accordance with BS 5080-1.

Y90.2020 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.

Y90.2040 CAST-IN FIXINGS:
Where cast-in fixings are permitted, mark out and set fixings in accordance with manufacturer's instructions.

Y90.2060 SELF ADHESIVE FIXINGS:
Obtain approval prior to using self adhesive type fixings.

Y90.2070 PROPRIETARY CHANNEL INSERTS:
Provide proprietary channel inserts for casting in where indicated.

Y90.3010 DRILLING:
Drill holes squarely. Use drills of requisite size and depth, and appropriate to fabric. Do not flame-cut holes in metal work.

Y90.3020 PROPRIETARY FIXINGS:
Comply with manufacturer's instructions for all fixings.

Y90.3030 FIXING TO REINFORCED CONCRETE:
Take precautions to avoid fixing through reinforcement.

Y90.3040 FIXING TO BRICKWORK:
Do not fix to unsound material or mortar between brickwork courses.

Y90.3050 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.

Y90.3060A FIXING TO HOLLOW STUD/TILE/BLOCK WALLS:
Fix equipment, brackets and supports where there is access at rear of wall, by drilling hole through wall and fixing with bolt, back-plate, washer and loose nut.
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.

**Y90.3070A 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.

**Y90.3080A FIXING TO METALWORK:**
Fix equipment, brackets and supports by drilling holes and fixing using set screws or bolts complete with washers, shakeproof washers and loose nuts.

**Y90.3090A FIXING TO STRUCTURAL STEELWORK AND CONCRETE STRUCTURES:**
Provide manufacturer's information on recommended fixing. Obtain approval for any fixing to structure steelwork and concrete structures. Generally use proprietary fixings to structural steelwork and concrete structures. Obtain approval to cut holes in structural steelwork or concrete structures or weld to structural steelwork.
Y91 PAINTING AND ANTI-CORROSION TREATMENTS

Y91.1000 GENERAL:
1010 GENERAL REQUIREMENTS:
Ensure, where particular methods of finish and painting are not specified, the following requirements are met.
Protect all metal work, plant, equipment, pipelines, ductlines, ancillaries, brackets and supports against corrosion and oxidization.
Provide ferrous metals, machined or otherwise with protective coatings at manufacturer's works.
Ensure all items requiring on-site decorative finishes are provided primed to suit base material and required finish.
1020 DAMAGED FINISHES:
Following delivery to site, storage on site and installation make good any damage to finishes, by cleaning, degreasing and re-furbishing.

Y91.2010A 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.

Y91.2020 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, detergents, chipping and impact damage.

Y91.2030 HEAT RESISTANT PAINT:
Use heat resistant paints for applications to surfaces over 80°C.

Y91.3010 GENERAL:
Ensure paints are applied in accordance with manufacturer's instructions and to BS 6150.

Y91.3020 WEATHER AND OTHER CONDITIONS:
Do not apply paints where weather, temperature, humidity or other conditions may have a damaging effect upon finish or paint.

Y91.3030A CLEANING AND PREPARING STEEL SURFACES FOR PAINTING:
Ensure metal surfaces are thoroughly cleaned, all mill and weld scale removed and finally degreased. Clean steel surfaces in accordance with BS EN ISO 8503 and prepare surfaces for painting in accordance with BS EN ISO 4618.
Y91.3030B CLEANING AND PREPARING SURFACES FOR PAINTING:
Ensure metal surfaces are thoroughly cleaned, all mill and weld scale removed and finally degreased.
Prepare surfaces for painting in accordance with BS EN ISO 4618.

Y91.3040 APPLICATION OFF-SITE:
Wherever possible ensure paint finishes applied by component manufacturers are spray applied.

Y91.3050 APPLICATION:
Apply paint evenly and ensure finish shows no excessive brush marks, grinning, runs, sagging,
ropiness or other application defects.

Y91.3060 COLD GALVANIZING:
Repair damage to galvanized components due to installation process, i.e. following cutting, drilling or
welding, by applying 2 no. substantial coats of cold galvanizing paint.

Y91.3070 PROTECTION OF BRIGHT MACHINE PARTS:
Apply a protective coating to all bright machined parts before despatch from works.
Do not remove protective coatings unless required for installation, testing or commissioning purposes
and in such cases reinstate upon completion.
Repair any damaged protective coating or bright machined part, or where necessary replace damaged
component.
Use and apply metal coatings in accordance with manufacturer's instructions.
Complete where possible all welding, drilling, bending and other work before metal coating.