

**SOUTHAMPTON CITY COUNCIL
PROPERTY SERVICES**

**STANDARD SPECIFICATION
FOR
ELECTRICAL ENGINEERING SERVICES**

ISSUE 11

27 April 2015

REVISIONS

ISSUE 2 – 1 Nov 03

Para	2.26	Soft Skin Fire Resistant Cables in Mini Trunking
	2.41.2	IT Circuits being protected by RCBOs
	2.51	BS 5839 not BS 5893
	2.51	Batteries to last 24 hours not 72 hours
	2.49	Amtech Certification contract lines
	Page 49	Symbols for electricity meter added

ISSUE 3 – 20 Sept 04

Index page altered

Para 1.3	Added
1.3	changed to Para 1.4
2.18	Note on Cable Colours added.
2.23	Has become a new section amalgamating cables with details on PVC insulated single core cables. PVC/PVC insulation cables and LSF/LSF Insulated cables added. Original section 2.23 and 2.24 added to this new section.
2.24	Has become a new section detailing wiring within building fabric (Building Regulations).
2.44	Specification for batten holders and pendants changed.
2.44	Additional paragraph added on support for luminaires in ceiling systems.
2.47 (p)	'to centre line' added.
2.47	Para (q) added.
2.49	Amtech version number changed.

ISSUE 4 – 1 Dec 04

Para 1.1	Contract Administrator changed to Southampton City Council.
2.23.4	LSOH Twin and Earth cable – 6242B to BS 7211.
2.23.6	Information on warning notices for different cable colours added.
2.49	Amtech Certification for Housing only. PDF format certificates for all other properties.

ISSUE 5 – 15 April 05

Para 2.19	Paragraph added regarding checking the routes of underground cables
2.36	Supply details and fuse sizes to be added to labels
2.45	Colour temperature of luminaires increased from 3500K to 4000K
2.53	Rewritten
2.54	Reference to BS 7718 removed. Reference to EN 50174 added. BS 6701 reissued as a full British Standard in 2004

ISSUE 6 – 1 October 05

- Para 2.3 Amended to include that 'operatives not in possession of ECS card shall be deemed not competent to work as any of the Authority's premises
- 2.41.1 Clarification on the use of RCD's in administration offices
- 2.49 Amtech version updated to 2005, V5.0.0
PDF Files shall be named by Property and date
- 2.51 BS 5445 changed to BS 5446
Reference to BS 5839 added
Call Point Covers omitted.
- 2.51 Divided into 2.5.1.1 Fire Alarm Systems for commercial buildings
2.51.2 Self Contained smoke detector for residential dwellings

ISSUE 7 – 30 March 06

- Para 1.2(e) 2001 added
 - Para 2.23.6 All references to different cable colours to be used for different building projects removed
 - Para 2.39 Compliance with Part M of Building Regulations required
 - Para 2.41.1 Compliance with part M of Building Regulations required
 - Para 2.47 (d) Type 'B' added
(e) New para on consumer unit fixing heights added
 - Para 2.49 All certification to be in PDF format
 - Para 2.52 BS 5266 uplifted to 1999 issue
Paragraph added on log books
- Appendices B & C added

ISSUE 8 – 20 December 06

- Para 2.3 CCNSG Safety Passport added
- Para 2.23.7 Add marking of wiring within Distribution Boards and Consumer Units
- Para 2.41.2 Dado Trunking added
- Para 2.41.2 Sentence regarding 20A circuit protection removed
- Para 2.41.2 Note: added
- Para 2.49 BS 5266, 1999 changed to BS 5266-1 2005
- Para 2.52 BS 5266, 1999 changed to BS 5266-1 2005
- Para 2.52.2 Changed to 2.51.2
- Para 2.56 BS 6651 changed to BS EN 62305

ISSUE 9 – 2 June 2008

- Para 1.2(e) BS 7671: 2001 changed to BS 7671: 2008 17th Edition
- (g) CDM 2007
- Para 1.3 Safe Working Procedure No 21 (Asbestos added)
- Para 2.6 BS 4607, BS 4678 & BS EN50086-2-1 changed to BS EN61386-1: 2004
Table 54c changed to 54.3
- Para 2.7 BS changed to BS EN 61386-1: 2004
Table 54c changed to 54.3
- Para 2.9 BS 4678 changed to BS EN 50085-2-1
- Para 2.22 Table 54F changed to 54.6, BS 4121 changed to BS 6121-1: 2005
- Para 2.23.5 BS 6899 deleted
- Para 2.26(a) BS changed to BS EN 60722-1: 2002
- Para 2.26(b) BS 7632, BS 6425, BS 7629, BS 4066 deleted
- Para 2.30 BS 6899 deleted
- Para 2.32 BS 1432, BS 1433 & BS 1977 deleted, high 'conductivity' added
- Para 2.35 BS 1432, BS 1435, BS 1977 deleted, high conductivity added
BS EN 60947-3 deleted
- Para 2.41.1 Sentence added regarding RCD protection for automatic doors
- Para 2.45 BS EN 60081, 60907, 61195, 61199
- Para 2.49 Guidance Note 3 deleted, Part 6 added
Table 41A1 & 41A2 deleted, tables 41.2, 41.3, 41.4 added
- Para 2.51.1 Para added regarding Apollo Protocol
Para added regarding including isolation switch to isolate link to remote monitoring station
- Para 2.60 BS 6799 deleted

ISSUE 10 – 3 December 2012

- Para 2.49 Names of persons test certificates sent to deleted
- Para 2.52 Para added relating to testing of emergency lighting.

ISSUE 11 – 27 April 2015

- Para 1.4 'Southampton City Council' deleted 'Capita' added
- Para 2.13 Paragraph added reference supporting of cables
- Para 2.26b Sentence added on effects of UV radiation.
- Para 2.32 RCBO's added
- Para 2.35 RCBO's added
- Para 2.51.2 AICO Part Number changed
- Para 2.55.1 Supplementary boning deleted
- Para 2.55.2 Report name amended
- Para 2.55.3 Section Deleted
- Para 2.61 Deleted

SECTION 1

1.0 GENERAL REQUIREMENTS

1.1 Introduction

This specification covers the requirement for the supply, assembly, installation, connecting, inspecting, testing and leaving in a working order new, modified or additional electrical installations.

The works shall be carried out so that it is complete in every detail and left in full working order to the satisfaction of the Southampton City Council.

The specification shall be read in conjunction with the following documents:

- (a) Contract Preliminaries
- (b) Contract Drawings
- (c) Works Specification
- (d) Form of Tender and Tender Summary

1.2 Regulations

Each installation shall comply with all relevant statutory instruments and regulations including the following:

- (a) British/European Standard Codes of Practice and British/European Standard Specifications (latest amendment)
- (b) Provision and Use of Work Equipment regulations
- (c) Home Office regulations
- (d) Electricity at Work Regulations 1989
- (e) BS 7671 latest edition (IEE Wiring Regulations 18th Edition)
- (f) Health and Safety at Work Act 1974
- (g) CDM Regulations 2015
- (h) Construction Health & Safety and Welfare Regulations
- (i) Fire Officer Committee Regulations
- (j) Building Regulations

- (k) Local Authority By-laws
- (l) Statutory Instruments and any other relevant Acts of Parliament
- (m) Recommendations of the Chartered Institution of Building Services Engineers

1.3 Other Related Documents

Southampton City Council's Safe Working Procedure – Electrical Safety in the Workplace

1.4 Definitions

The term 'Engineer' used in this specification shall mean 'Southampton City Council's Engineer'.

The term 'Contractor' used in this specification shall mean 'the Electrical Contractor'.

'SCC' used in this specification shall mean Southampton City Council.

SECTION 2 – MATERIALS AND WORKMANSHIP

Clause No.	Description
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2.2	Storage of Materials
2.3	Workmanship
2.4	Tools and Appliances
2.5	Steel Conduit and Accessories
2.6	Non-Metallic Conduit and Accessories
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2.8	Conduit Installation
2.9	Steel Cable Trunking
2.10	Non-Metallic Trunking
2.11	Cable Trunking Installation
2.12	Cable Tray/Basket
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2.14	Lighting Trunking
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2.16	Bench and Skirting Trunking
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2.19	Installation of Armoured Cables
2.20	Underground Ducts
2.21	Cable Markers
2.22	Cable Jointing
2.23	General Wiring Cables
2.24	Wiring with Building Fabric (Building Regulations)
2.25	Wiring in Conduit and Trunking
2.26	Fire Resistant Cables
2.27	Cable Sizes
2.28	Flexible Cords PVC Insulated
2.29	Flexible Cords PVC Insulated Heat Resisting
2.30	Flexible Cords Butyl Rubber Insulated
2.31	Cable Manufacturer's Seals and Labels
2.32	Switchgear Low Voltage
2.33	Fabricated Switchboards
2.34	Cubicle Switchboard and Panel Boards
2.35	Distribution Boards
2.36	Labels
2.37	Circuit Lists
2.38	Line Diagram
2.39	Local Switches
2.40	Ceiling Lighting Switches
2.41	13A Socket Outlets and Fused Connection Unit

2.42	Cooker Control Unit
2.43	Shaving Outlets
2.44	Luminaire Wiring
2.45	Lamps
2.46	Lighting Design
2.47	Fixing Heights
2.48	Fixings
2.49	Testing
2.50	Stock Notices
2.51	Fire Detection and Alarms
2.52	Emergency Lighting
2.53	Electromagnetic Compatibility
2.54	Network Cabling
2.55	Bonding within Bathrooms of Domestic Dwellings
2.56	Lightning Protection Systems
2.57	Intruder Alarm Systems
2.58	CCTV Systems
2.59	Time Switches
2.60	Nurse Call Systems

2.0 MATERIAL AND WORKMANSHIP

2.1 Materials

Materials are to be of the type and quality defined in the Specification. Materials are to be manufactured by the Companies listed in the Schedule of Materials or defined in the Specification.

No deviations from the Specification are to be made without permission of the Engineer and his acceptance in writing of any alternative.

Any unspecified materials are to be the best of their respective kind and are to be to the Engineer's approval.

Specimens of materials and specimen finishes are to be submitted, if called for, to the Engineer for approval before work commences.

Specimens are to be submitted without charge and may be retained by the Engineer for reference.

Payment will not be made for the extra cost of alternative materials if the material first submitted fails to meet the Engineer's approval.

All materials are to comply with British and European Standards where these are applicable.

The selection and application of equipment and materials shall take full account of the location and environment.

2.2 Storage of Materials

Materials are to be stored on site and handled so as to avoid damage to the material. Adequate precautions are to be taken to avoid damage to the finish of items of equipment. The Engineer will have the power to reject materials which have deteriorated as a result of storage or handling, whether fixed or unfixed, and any rejected material is to be removed from site and replaced to the satisfaction of the Engineer without charge.

2.3 Workmanship

Operatives are to be fully skilled and experienced in the processes involved in the installations of the materials specified and shall all carry an Electrotechnology Certification Scheme (ECS) card or Client/Contractor National Safety Group (CCNSG) Safety Passport. If any operatives are not in possession of this card they shall be deemed not competent to work at any of the Authority's premises.

Materials are to be installed in accordance with the manufacturers' recommended installation procedure.

NOTE: BEFORE ANY ELECTRICAL WORKS ARE COMMENCED IT MUST BE ASCERTAINED THAT MAIN EQUIPOTENTIAL AND SUPPLEMENTARY BONDING IS PRESENT.

2.4 Tools and Appliances

All necessary tools and appliances for installation processes are to be supplied. Tools and appliances are to be maintained in serviceable condition. The Engineer is to have the right to inspect the condition of tools and appliances and to condemn and cause to be removed from site any tools or appliances which, in his opinion, are unsatisfactory or otherwise objectionable.

2.5 Steel Conduit and Accessories

Steel conduit is to be heavy gauge welded mild steel tubing, black enamel or galvanised finish as specified.

Conduit is to comply with BS 4568 Part I, and is to be manufactured by a member of the Conduit Manufacturers Association.

Conduit is to be not less than 20mm outside diameter. Conduit greater than 25mm diameter is not to be buried in floor screed unless approved in writing by the Engineer.

Conduit boxes are to be malleable iron, finished either black enamelled or galvanised as required and manufactured in accordance with BS EN 50086-1.

The maximum run of conduit without a draw-in box must not exceed 12 metres and no more than two right angle bends must occur between draw-in points.

Internal roughness, burrs, swarf, filings, oil, grease, etc. are to be removed from conduits and accessories before they are fixed. Threads must not be left exposed except for running joints, the exposed threads of which shall be painted to prevent corrosion.

Conduit terminations to loop-in boxes are to be made by means of a socket and hexagon headed externally threaded brass brush. For entries into fuseboards, adaptable boxes and cable trunking, conduit terminations are to be made by means of a flanged coupling, lead washer and hexagon headed brass brush.

Serrated sockets may be used as an alternative to flanged couplings on cast or malleable iron fuseboards, or adaptable boxes.

Conduit is to be fixed at intervals not exceeding 1200mm.

The circular cross section of the conduit is to be maintained throughout bends and sets. Bends and sets are to be free of flattening, kinking and wrinkling and the seam weld is to be continuous throughout.

Solid tees, inspection tees, elbows or 'normal' bends with threads are not to be used unless specified.

All conduit work is to be mechanically and electrically continuous and efficiently earthed. Additional earth bonding, in the form of heavy copper wire or tape, is to be provided if necessary to obtain satisfactory earth continuity.

Conduits shall be installed so as to allow additional circuits to be drawn in at a later date without disturbing the building fabric.

A minimum clearance of 150mm is to be maintained between conduit and pipework of heating, gas and other services.

Should difficulty be experienced in specific cases in complying with this spacing requirement, the Engineer's advice is to be sought, and if he so directs, the conduit concerned is to be effectively bonded to the other services. No extra charge will be allowed for bonding.

Conduit and accessories installed in damp, or potentially damp, or hostile situations, or exposed to the weather, are to be galvanised. Joints in external runs are to be made using an approved jointing compound and conduit boxes are to be of watertight pattern and fitted with gaskets. External conduit runs are to be graded to a low point. At the low point a drain is to be installed, consisting of a conduit box with a downwards facing spout and having a brass plug with 3mm hole installed in the box.

Connections to equipment mounted outside the building are to be so arranged that the conduit falls away from the equipment to prevent any water which has gained ingress into the conduit system being drained into the equipment.

Running joint threads and any exposed metal on black enamelled conduit or accessories are to be coated with red oxide paint after the exposed metal has been cleaned of rust, oil or grease.

Running joint threads and any exposed steel or galvanised conduit are to be coated with an approved rust inhibitor, followed by one undercoat and two top coats of best quality enamel to match the finish of the conduit.

Conduits installed in floor screed shall generally not be metallic.

2.6 Non-Metallic Conduit and Accessories

Non-metallic conduit and accessories are to be of the high impact heavy gauge type and are to comply with BS EN 61386-1: 2004. Accessories are to be dimensionally to BS 4568 Parts I and II. Conduit is to be not less than 20mm diameter. Conduit and accessories are to be non screwed. Joints between conduits are to be made using plain bore couplings and vinyl cement adhesive. Connections to conduit boxes having plain bore outlets are to be made using vinyl cement adhesive. Connections to metallic or non-metallic adaptable boxes and to accessory boxes, distribution boards and trunking, are to be made using screwed adaptors, cemented to the conduit and fixed to the boxes with externally threaded bushes. Solid or inspection tees, bends and elbows are not to be used unless specified.

Bends and sets are to be formed in accordance with the conduit manufacturer's recommendations.

The conduit and accessories are to be installed and fixed in accordance with the conduit manufacturer's recommendations, and so as to allow additional circuits to be drawn in at a later date without disturbing the building fabric.

Flexible conduit is to be corrugated and formed from polypropylene.

Green/yellow pvc single core cable, sized in accordance with Table 54.3 of BS 7671 (unless otherwise specified) is to be drawn into all non-metallic conduit runs to serve as a protective conductor and is to be bonded to accessories and to an earth point.

2.7 Flexible Conduit

Metallic flexible conduit is to be manufactured from galvanised mild steel and shall comply with BS EN 61386.1: 2004. Adaptors shall be of the solid type.

Protective continuity is to be provided by a green/yellow pvc single core cable run internally. The ends of the protective conductor are to be terminated in convenient boxes either side of the flexible conduit. The size of the protective conductor is to conform to Table 54.3 of BS 7671, unless otherwise specified.

Individual lengths of flexible conduit are not to exceed 600mm and to be not less than 20mm diameter.

2.8 Conduit Installation

Conduit is to be run in straight lengths, necessary changes of direction are to be made by bends or sets formed in the conduit.

Conduits from more than one fuseboard are not to be connected to common junction boxes.

Draw boxes are to be installed so that the whole of the conduit work is readily rewirable and are to be large enough to prevent undue cramping of cables.

Outlet boxes for fittings, accessories, etc. are to be used as draw boxes where possible.

The location of draw boxes in concealed work is to be to the approval of the Engineer.

Boxes installed in walls or ceilings are to be provided with overlapping lids.

Floor boxes are not to be installed without prior approval of the Engineer. If floor boxes are approved, they must be provided with approved floor traps having recessed covers to receive a flooring infill.

As far as possible, conduit runs are to be planned to avoid crossing structural expansion joints, but where this is impossible, purpose-made conduit expansion joints are to be provided.

Surface conduit runs are to be plumb, horizontal or parallel to sloping surfaces and are to be to the Engineer's approval.

Conduit run on brickwork or blockwork, to be concealed by rendering or plastering, is to be fixed by crampets.

Conduit fixed to steelwork is to be secured by purpose-made girder clips attached without drilling the steelwork.

Surface conduit installed in dry situations is to be fixed by spacer bar saddles, secured to the structure by mild steel wood screws not less than 32mm No 8 onto wood or in plugged holes in brickwork, blockwork or concrete.

Steel conduit installed in damp, potentially damp and exterior location is to be fixed by galvanised hospital distance type saddles secured by stainless steel screws not less than 35mm No 8 into plugged holes.

Conduit runs on floor slabs to be concealed by screeds or false floors, are to be secured by crampets or, subject to the approval in writing by the Engineer, by shot fired fixings.

All boxes are to be securely fixed to the building structure with a minimum of two screws independently of conduit fixings.

Fixing screws used for boxes or other accessories containing wiring are to be countersunk head used in countersunk holes or round head if holes are not countersunk.

Final conduit connections to motors and flexibly mounted equipment are to be by means of a length of flexible conduit, connected to the rigid conduit by a draw box.

2.9 Steel Cable Trunking

The trunking is to be manufactured from mild steel, treated with primer and stove enamelled grey or galvanised as specified to BS EN 50085-2-1.

Any damage to the enamel finish or galvanised of the trunking or accessories is to be treated with two coats of rust inhibiting paint and finished to match the colour of the trunking.

Trunking up to and including 100mm x 75mm is to be of not less than 1.2mm gauge and sizes above 100mm x 75mm are to be of not less than 1.6mm gauge.

The covers of the trunking and junctions etc. are not to be secured by self tapping screws.

For the securing of trunking covers, toggle or spring strap operated by recessed screw in centre of cover is an acceptable arrangement.

All joints in the trunking system are to be made using purpose-made connection sleeves supplied by the manufacturers of the trunking.

All junctions, tees, bends and similar accessories are to be supplied by the manufacturers of the trunking and fitted by an approved method. All junctions, tees, bends and the like are to be gusseted and provided with approved earth bonding connections.

Expansion joints are to be fitted at not more than 15m intervals in straight lengths of trunking.

The expansion joints are to be self-adjusting, fitted with copper braid bonding strip and to be to the Engineer's approval.

Trunking is to be fixed by suitable brackets at intervals of not more than 1500mm and adjacent to changes of direction.

Any screw heads inside the trunking are to be of the mushroom or round type.

2.10 Non-Metallic Trunking

Non-metallic trunking is to be formed from rigid pvc and covers are to be of the 'clip on' type and shall conform to BS 4678 Part 4. Sections of trunking are to be connected together by coupling pieces and changes of direction and junctions are all to be made using accessories manufactured by the trunking manufacturers.

The trunking and accessories are to be installed and fixed in accordance with the manufacturers' recommendations. Unless specified otherwise, a 2.5mm² green/yellow pvc insulated single core cable is to be laid in the complete trunking run and bonded to an approved earth point. Protective conductors shall be connected to the principal conductor by nut type service taps in insulating shrouds.

Trunking is to be fixed by suitable brackets, at intervals of not more than 1500mm or not exceeding those indicated in BS 7671. Fixing brackets are to be provided adjacent to changes of direction. Self adhesive joints are to be fitted in straight lengths of trunking at the spacing recommended by the manufacturer.

Multi-compartment trunking shall be installed in accordance with the manufacturer's instructions using the manufacturer's accessories. Where compartments carrying data cabling include a metallic electro-magnetic the screen shall be continuously bonded to the system protective earth conductor.

NOTE: Non metallic trunking may not be used in public areas unless otherwise specified or authorised.

2.11 Cable Trunking Installation

Cable trunking is to be run in straight vertical or horizontal lengths; any necessary changes of direction are to be made using manufactured fittings.

All covers are to be arranged to be removable, except that sections of trunking passing through walls, floors, etc. are to have fixed covers for the thickness of the wall and floor only.

Where the cable trunking is fixed vertically for a distance of more than 3 metres the Contractor shall supply and install purpose made pin racks to support the cable.

All connections to apparatus are to be made by means of four sided terminating flanges, fitted with Paxolin sheet of not less than 2mm thickness to cover the opening in the apparatus and cut and drilled for cables. The drilling for cables must be with as little clearance as possible.

Fire barriers are to be provided where horizontal trunking passes through walls and partitions at intervals not exceeding 15m. Vertically installed trunking shall be provided with fire barriers at all floor levels or 5m centres whichever is the lesser.

The fire barriers are to be to the Engineer's approval.

Trunking is to follow the structure closely and all necessary bends, etc. are to be provided for sets around beams, etc. to enable this to be done. The trunking lid shall not be weakened by cutting or reducing the return edge.

Spacing pins shall be fixed in trunking in excess of 100mm to provide neat cable runs to assist in the tracing of circuits.

In a non-metallic trunking installation where cables pass through fire barriers they shall be contained within steel trunking installed at least 300mm either side of the barrier.

Conduit entries into trunking shall be by coupler and male, bush, plain holes or grommeted holes will not be allowed.

Cables leaving trunking shall do so through holes or slots bushed to prevent abrasion of the sheathing.

Holes made in trunking shall be neatly made and uniform, shall be filed or reamed to remove ragged, burred or sharp edges.

Trunking shall be sized for future expansion by assuming all spare fuseway/ MCB ways are utilised.

For the purpose of calculation the trunking shall accommodate all cables including circuit protective conductors with a 25% increase.

The manufacturer's standard fittings shall be used throughout unless it is not practicable. Where necessary special fittings shall be fabricated utilising the same material and gauge as the manufacturer's trunking and finished to the same standard.

Trunking and accessories shall be protected from the weather and other trades during installation. Building materials shall be prevented from entering the trunking installation.

2.12 Cable Tray/Basket

Cable tray is to be manufactured from galvanised mild steel sheet and perforated. It is to be supplied and fixed complete with all coupling pieces, bends and offsets, etc. and is to be fixed by purpose made brackets.

Cable basket shall be manufactured in the galvanised steel with zinc coating.

Cable tray/basket for supporting unsheathed MICS cable shall be pvc coated.

Cable tray/basket is to be run in straight lengths and any changes of direction are to be made using bends, offsets, etc.

Connections between lengths of cable tray are to be made using coupling pieces.

Bends, offsets and coupling pieces are to be manufactured and supplied by the manufacturer of the cable tray/basket.

Cable tray/basket runs are to fit closely to the structure and all necessary bends, etc. are to be provided to enable this to be done.

Minimum thickness of cable tray is to be as follows:-

150mm and under in width	1.2mm
Over 150mm to 450mm width	1.6mm
Above	2.0mm

Support brackets for cable tray are to be made from mild steel and are to be fixed at intervals not exceeding 1500mm.

For use in dry positions, the brackets are to be painted one coat red oxide or zinc chromate primer before erection and painted one coat undercoat and one coat gloss finish after erection.

In damp, potentially damp and exterior locations, the brackets are to be hot dipped galvanised or pvc dipped after manufacture and all bolts, nuts, washers, etc. are to be galvanised or sheradised.

Damage to the galvanised finish of brackets and traywork is to be made good with approved cold galvanising paint.

Where cable trays/cable baskets are vertically through floor or run horizontally through fire partitions, the Contractor is to provide the necessary fire barriers in accordance with BS 7671.

2.13 Overhead and Ceiling Trunking

Overhead trunking shall be installed in close co-ordination with the main contractor to ensure levels are correct.

Ceiling trunking shall be installed in close co-operation with the ceiling erector and other trades as necessary.

All overhead surface containment must be either in metal conduits/trunking or non inverted tray/basket or if inverted then the cables be secured to the tray/basket using metal cable clips or if plastic containment is used then the cables must be secured using metal clips/banding. NO plastic tie wraps are to be used ONLY metal tie wraps. Cabling in scooter store shall be metal conduit.

2.14 Lighting Trunking

Lighting trunking shall be installed in accordance with the manufacturer's instructions and shall be complete with suspension stirrups, luminaire fixings and cover strips.

2.15 Floor Trunking

The Contractor shall work in close co-operation with the Main Contractor to ensure levels are correct and the trunking is adequately fixed to ensure it does not move during floor laying operation.

2.16 Bench and Skirting Trunking

Generally this type of trunking shall be compartmented for the installation of and segregation of different electrical and communications wiring systems.

The requirements for fittings, fixings and installation as 2.10 shall equally apply to this type of trunking.

When fixing skirting trunking to the wall prior to a floor finish or covering being fitted, sufficient clearance spaces below the trunking shall be allowed for the floor covering to be fitted underneath. When the floor covering is already in position the trunking should be mounted flush with the covering.

Bench trunking unless specifically required, shall not have its fixings direct into the bench or worktop, but shall be fixed independently into the wall or partition.

2.17 PVC Insulated Armoured Cables

PVC SWA PVC cables are to comply with BS 6346 and shall be produced by a BASEC manufacturer. Unless otherwise specified, cables are to have shaped copper conductors, single wire armouring and PVC oversheath to the appropriate colour where specified.

Cable colours shall be Phase 1 – Brown, Phase 2 – Black, Phase 3 – Grey, Neutral – Blue, Earth – Green/Yellow.

2.18 XLPE/LSF Insulated Armoured Cables

XLPE/LSF cables are to comply with the requirements of BS 6724 and shall be produced by a BASEC manufacturer. Unless otherwise specified, cables are to have shaped copper stranded conductors insulated with XLPE with LSF bedding, wire armour, and LSF oversheath and be rated at 600/1000v.

Cable colour note: Cable colours shall be Phase 1 – Brown, Phase 2 – Black, Phase 3 – Grey, Neutral – Blue, Earth – Green/Yellow.

2.19 Installation of Armoured Cables

All cables are to be installed along routes and at levels indicated on the drawings, or as agreed with the Engineer.

The design shall be carried out utilising a spacing of two diameters between centres of cables to prevent derating, and the cable trays sized to accommodate this fact.

Should the installation be unable to comply with the above, then the Electrical Contractor shall be responsible for notifying the Engineer for a decision.

Every effort is to be made to avoid damage to the armouring and serving of cables. Damage must be reported to the Engineer, who will give instructions on either the replacement of or the repair to the affected cable.

Damage to the serving of cables is to be repaired in the case of jute or similar serving by self-sealing bitumenised tape and in the case of PVC serving by self-sealing PVC tape.

A clearance of 300mm is to be maintained between cables and other equipment, or pipework (including lagging) etc. associated with other services. Where this condition is difficult to comply with, the Engineer is to be informed, prior to the installation being commenced, for a ruling to be obtained. If a ruling has not been obtained the Engineer may require the cable to be diverted or the fixings adjusted without any additional charge.

Great care is to be exercised in the handling of the cables. Cable drums are to be rolled smoothly in the direction of the arrow painted on the side of the drum. Cable drums are to be mounted on cable jacks to enable the drum to rotate freely and cable rollers are to be used as necessary.

Care is to be taken to ensure that the cables are not twisted or kinked and the minimum bending radius is to be as follows:-

- (i) with cables up to 50mm diameter, the bending radius is to be not less than 12 times the diameter.
- (ii) with cables over 50mm diameter, the bending radius is to be not less than 20 times the diameter.

Wire cable stockings are to be used with pulling ropes when pulling cables through duct.

Cables passing through walls are to be provided with sleeves, and suitably sealed with approved tape.

Hangers are to be spaced according to BS 7671, and particular care is to be taken to avoid undue sagging or stress on any cable.

Cables installed on horizontal tray shall be clipped using tie wraps, vertical cables shall only be held via cable cleats.

Additional cable hangers are to be provided on cable routes which are subject to numerous changes in level and direction or where structural beams or other building features or pipework, ducts, etc. exist so that cables clearly and neatly negotiate all such obstacles.

Cables installed above accessible ceilings, in roof voids or in floor voids shall be fitted with a durable pvc cable marker which shall denote its function i.e. 'Submain to DBI'. Markers shall be spaced every 2.5 metres with the information written with an indelible pen.

Cable cleats are to be of the claw type and shall be non-metallic unless specified otherwise. Multiple runs of cable are to be supported by cable racks. Fixings used in damp, potentially damp or exterior locations are to be hot dipped galvanised after manufacture.

Routes for underground cables shall be thoroughly surveyed for existing services and obstructions. If doubt exists as to their presence excavations by hand shall be carried out.

Underground cables are to be installed in trenches through virgin ground wherever possible. Excavations shall be carried out in accordance with BS 6031.

Low voltage cables are to be installed at a minimum depth of 600mm below finished ground level. They are to be spaced at least one cable diameter.

Before cables are laid in, trench is to be evenly graded and cleared of loose stones and rubble, then covered with a 75mm layer of sieved soil or sand. The cables are then to be carefully installed without dragging over the trench bottom and covered with a further 75mm layer of sieved soil or sand. The sieve shall have a maximum mesh of 12mm.

The layer thickness is to be measured after tamping has taken place.

Before sieved soil or sand is placed over the cables, the runs are to be temporarily marked by means of wooden pegs, until the cable warning tapes have been placed over such cables.

A warning tape shall be placed above each cable that is laid direct in the ground and above each cable duct. The tape shall be laid at a depth of 300mm below the finished surface level except where the depth of roadway or paved area base exceeds 300mm in which case the tape shall be laid immediately below the base. The tape shall run the full length of the cable route.

Warning tapes shall be of polythene not less than 150mm wide and 0.1mm thick. They shall be yellow in colour and bear the continuously repeated legend:-

CAUTION ELECTRIC CABLE BELOW

or similar, in black letters not less than 30mm high.

Cables shall generally be installed in ducts. Ducts shall be of a size suitable for the cables, the minimum size of bore shall be 100mm or twice the diameter of the cable, whichever is the larger. All cable ducts in the same position shall be same size. Ducts shall be twin walled and made of high density polyethylene.

Entries into buildings shall be by ducts with easy bends terminating flush with the finished floor level at an agreed position in the building. After the cable has been drawn into the duct, the duct shall be sealed by caulking and finished with a 1:3 cement/sand mix. Care shall be taken when drawing in cables to ensure that undue stress or strain is not placed on the cable.

Only one cable shall be drawn into each duct except for single core cables forming one circuit or where otherwise indicated.

Before cables are drawn into ducts, the ducts are to be checked for clearness and freedom from obstructions. Any cables damaged as a result of drawing into unsatisfactory ducts, are to be replaced or repaired, without any extra charge to the Engineer's satisfaction.

Cables are to be run in continuous lengths and through joints are not to be used without prior approval of the Engineer.

Armoured cables shall not be installed when the air temperature is 0°C or less and shall have been subject to a temperature not lower than 4°C for a period of 24 hours prior to installation.

2.20 Underground Ducts

All underground ducts shall be twin walled, high density polyethylene and shall be in accordance with the National Colour Coding Scheme for buried services as follows:

Colour Service

Black	LV Electricity
Red	HV Electricity
Grey/White	Communications & Alarms
Green	Cable and Closed Circuit Television
Orange	Street Lighting in England & Wales

Underground cables shall be installed segregated by a minimum horizontal distance of 400mm from other services.

2.21 Cable Markers

Cable markers are to be precast concrete units reinforced with mild steel bars and fitted with lead insert labels indicating the size and rating of the cable.

They are to be provided in sufficient quantity to enable the runs to be clearly identified. All changes of direction are to be indicated together with underground joint boxes. The maximum interval between markers is to be 45m unless agreed to the contrary by the Engineer.

2.22 Cable Jointing

Cables are only to be jointed where specified or where approved by the Engineer. The joining or making off of each grade is to be carried out by fully qualified and experienced cable jointers.

XLPE/LSF/SWA/LSF insulated armoured cables are to be terminated using approved compression type glands. The glands are to comply with BS 6121-1: 2005, and are to be of the indoor or outdoor type as specified.

All cable cores are to be terminated by the use of copper cable sockets crimped to the core. The sockets are to be fixed by the use of manufacturer's crimping tools, used in strict compliance with the manufacturer's recommendations.

Unless the core insulation is self coloured the cable cores are to be covered with a final layer of coloured heat shrinkable PVC, the colours complying with Table 51A of the IEE Regulations.

All terminations, armouring and metal sheaths shall be connected directly to the external earthing terminal of the equipment by a bonding conductor having a cross sectional area in accordance with Table 54.6 of BS 7671. Unless otherwise indicated, metal sheaths of single core cables shall be bound at both ends of the run.

For terminating single core cables, non-ferrous gland plates shall be used with a clearance of not less than 25mm between the cable glands and ferrous metal.

2.23 General Wiring Cables

2.23.1 **PVC Insulated Single Core Cables**

PVC Insulated single core cables are to be 450/750 volt grade with copper conductors, manufactured generally in accordance with BS 6004 and known as 6491X. They shall be by an approved BASEC manufacturer.

2.23.2 **LSOH Insulated Single Core Cables**

LSOH insulated single core cables are to be 450/750 volt grade with copper conductors, manufactured generally in accordance with BS 7211 and known as 6491B. They shall be by an approved BASEC manufacturer.

If 1.5mm² or 2.5mm² multi stranded cable is available complying in all other respects with BS 7211, it is to be used in preference to single strand cable.

2.23.3 **PVC/PVC Insulated Cables**

PVC/PVC Insulated multicore cables are to be 300/500 volt grade with copper conductors, manufactured generally in accordance with BS 6004 and known as 6242Y (twin & ECC) and 6243Y (triple & ECC). They shall be by an approved BASEC manufacturer.

2.23.4 **LSOH/LSOH Insulated Cables**

LSOH/LSOH Insulated multicore cables are to 300/500 volt grade with copper conductors, manufactured generally in accordance with BS 7211 and known as 6242B (twin & ECC) and 6243B (triple & ECC). They shall be by approved BASEC manufacturer.

2.23.5 **Elastomer (Butyl Rubber) Insulated Cables**

Elastomer insulated cables are to be 450/750 volt grade, manufactured in accordance with BS 6007 and by an approved BASEC manufacturer. The cables are to be insulated with Butyl rubber. Conductors are to be copper.

If 1.5mm² or 2.5mm² multi stranded cable is available complying in all other respects with BS 6007, it is to be used in preference to single strand cable.

2.23.6 Cable Colours

Warning notices are to be fixed at the distribution board where there is a mix of cable colours. Label should be black characters on yellow background and should read:

CAUTION

This installation has wiring colour to two versions of BS 7671. Great care should be taken before undertaking extension, alteration or repair, that all conductors are correctly identified.

2.23.7 Marking of Wiring within Distribution Boards and Consumer Units

Neutral conductors within distribution boards and consumer units shall be marked with their circuit reference by means of sleeves or ferrules.

2.24 Wiring within Building Fabric (Building Regulations)

Wiring chases within the building structure shall comply with approved document A of the building regulations. Clause IC31 is reproduced below:

'Vertical chases shall not be deeper than one-third of the wall thickness or in cavity walls one-third of the thickness of the leaf. Horizontal chases should not be deeper than one-sixth of the thickness of the leaf or wall. Chases should not be so positioned as to impair the stability of the wall particularly where hollow blocks are used.'

Cables through joists should comply with approved document A of the building regulations. Clause 136 of Section A1:

- (i) Maximum diameter of holes should be 0.25 x joist depth.

- (ii) Holes on centre line in a zone between 0.25 x 0.4 x span.
- (iii) Maximum depth of notch should be 0.125 x joist depth.
- (iv) Notches on top in a zone between 0.1 x 0.25 x span.
- (v) Holes in the same joist should be at least 3 diameters apart.

2.25 Wiring in Conduit and Trunking

The Engineer's approval of all conduit work must be obtained before cables are drawn in.

Conduits are to be thoroughly cleaned, swabbed and dried out prior to the drawing in of cables, or draw wires for use by others.

Cables from more than one distribution board are not to be drawn into a common conduit.

Each circuit shall be provided with its own protective conductor. Unless otherwise indicated, it shall be sized in accordance with Table 54C of BS 7671.

All conductors (phases, neutral and protective) of a circuit are to be drawn into the same conduit.

The number of cables drawn into conduit or trunking is not to exceed the number stipulated in BS 7671.

Cables of 10mm² size and larger are to be terminated in crimped cable sockets fitted by means of crimping tools supplied by the cable socket manufacturer and used in accordance with his recommendation.

Cables are to be continuous and unjointed.

Mains voltage cables are to be coloured.

Single phase conductors on multi-phase connections are to be identified by colour sleeves on the ends of the cables.

3 phase circuit cables shall be coloured as the appropriate phase.

Wiring associated with safety lighting is to be coloured:-

Phase or positive conductor	Yellow
Neutral or negative conductor	Blue

Fire alarm wiring is to be coloured:-

Phase or positive conductor	White
Neutral or negative conductor	Grey

2.26 Fire Resistant Cable

(a) **Mineral Insulated Cable**

Mineral insulated cables are to have copper conductors and copper sheaths and are to be light duty (600 volts rating) and to comply with BS EN 60702.1: 2002. Cables are to be bare unless otherwise specified. PVC coated galvanised cable tray must be used for bare cables. Cables smaller than 1.5mm² are not to be used.

The cables are to be made-off or sealed immediately after cutting. Precautions are to be taken to expel all moisture before making final seals.

Each length of cable shall be tested after the seals have been fitted. Insulation resistances below 200MΩ will not be accepted.

All fixings are to be by means of standard brass or copper clips, PVC sheathed where sheathed cables are specified.

The cables are to be installed in a neat, workmanlike manner, being dressed into shape and free from corrugations and damage to the sheath.

All cables, wherever installed, are to be fixed in position in a manner suitable for the location, but the fixings, in no circumstances, are to be further apart than those detailed in BS 7671.

Cables are to be terminated using screw on or wedge type brass seals and brass compression type glands. PVC shrouds are to be installed over glands when terminating PVC sheathed cable.

Where MICS cables are glanded into non-metallic boxes or enclosures the seal shall be complete with earth tag which shall be connected to the system protective earth via an insulated connector fixed to the enclosure.

Cable termination in areas subject to high ambient temperatures is to be made using glass discs and PTFE sleeves with standard or medium temperature compound as required.

Seals and glands are to be supplied by the cable manufacturer and are to be installed in the manner recommended by the manufacturer.

Multicore cables are to be made off to trunking, adaptable boxes, switchgear and other equipment, using a flanged screwed coupler, lead washer and an externally threaded brass bush. Single core cables are to be made off by use of brass couplers, and bushes, passing through a brass plate of minimum thickness 3mm covering an elongated hole in ferrous enclosures.

Phase and neutral conductors are to enter ferrous enclosures through a common hole.

Conductors 6mm² and larger are to be terminated using copper cable sockets crimped to the conductors. The sockets are to be fixed using the manufacturers' crimping tools in strict compliance with the manufacturers' recommendations.

Cable sockets must be fixed with circumferential crimps made with hydraulic tools where recommended by the manufacturer.

A loop of approximately 450mm of MICC cable, in the form of a neat single turn, is to be provided adjacent to connections to motors, thermostats and any similar equipment.

Connections to equipment on flexible mountings are to be made in a similar manner, but extra length of cable is to be provided and formed into a two turn spiral approximately 150mm diameter to allow for the movement of the equipment.

Cables are to be in continuous lengths and through joints are not to be used.

Cables installed below a height of 1350mm above finished floor level or in other positions subject to accidental damage, are to be protected by steel conduit or steel capping.

MICC tails are to be phase identified at equipment connections with appropriately coloured neoprene sleeves in accordance with BS 7671.

Precautions shall be taken to avoid electrolytic action between dissimilar metals damaging the sheath of the cable. Glands, saddles, brushes and non-ferrous conduit fittings shall be of the same material, or if an alloy, be of the same base metal as the cable sheath.

(b) **Soft Skin Fire Resistant Cables (Delta Firetuff or Pirelli FP200)**

The cables are to have copper conductors insulated with silicone rubber aluminium foil tape and low smoke zero halogen (LSOH) sheathing, and comply with BS 5839, BS 5266, BS 6387, BS 7629.

All fixings are to be by means of proprietary metal clips secured by non ferrous screws and shall be spaced according to the manufacturer's recommendations and BS 7671.

Where vertical drops of cable are protected by mini trunking the cable shall be secured through the mini trunking into the structure by means of proprietary metal clips.

The cables are to be installed in a neat, workmanlike manner, being dressed into shape and free from corrugations and damage to the sheath. Cable bends shall have a minimum radius of six times the outer diameter of the cable.

Cables are to be terminated in equipment using either the grommet entry in dry locations, or PVC compression glands in damp situations, to the manufacturer's recommendations.

No joints are permitted in a cable run. Every precaution shall be taken to avoid damage to the silicon insulation. Red FP200 Cable cannot be installed externally due to the effects of UV radiation

2.27 Cable Sizes

Cables used for sub-circuits are to be not smaller than those listed below:-

	<u>Phase</u>	<u>CPC</u>
Lighting	1.5mm ²	1.0mm ²
Socket outlets	2.5mm ²	1.5mm ²
Control circuits	1.5mm ²	1.0mm ²
Motor circuits	2.5mm ²	1.5mm ²

unless otherwise stated and subject to the foregoing, the cross-sections of final circuit cables are to be of such sizes that the voltage drop at the points of usage do not exceed those as stated in BS 7671. The voltage drop in the neutral conductor is to be included in these limits. The cross sections of the cables shall also be of such a size to ensure compliance with the earth fault loop impedance figures as stated in BS 7671 and adequately protected thermally.

2.28 Flexible Cords PVC Insulated

PVC insulated flexible cords are to have copper conductors and be in accordance with BS 6500. The flexible cords are to be sized in accordance with the IEE Regulations, except that 0.75mm² is to be the smallest size used.

Flexible cable shall not be run where it is concealed. Flexible cables installed where they are subject to heat and in enclosed fittings shall conform to the requirements of BS 6500 table reference 82.

Flexible cables shall be coloured in accordance with BS 7671.

2.29 Flexible Cords PVC Insulated Heat Resisting

Heat resisting PVC flexible cords are to be in accordance with BS 6500, temperature classification 85°C and with copper conductors. The flexible cords are to be sized in accordance with BS 7671, except that 0.75mm² is to be the smallest size used.

2.30 Flexible Cords Butyl Rubber Insulated

Butyl insulated flexible cords are to have copper conductors and are to conform, as far as possible, to BS 6007. The cables are to be insulated with butyl rubber. The cable is to be of minimum size 0.75mm².

2.31 Cable Manufacturer's Seals and Labels

Cables are to be delivered to site with manufacturer's seals and labels intact. The seals and labels are to be made available for the Engineer's inspection.

2.32 Switchgear Low Voltage

All low voltage switchgear, whether installed separately or incorporated in a switch panel, it to be totally enclosed, metal clad, industrial type, 500 volts, unless otherwise specified. Fuses are to be HRC cartridge type. Switchgear and all associated connections are to be continuously rated and the temperature rise on terminals is to be low enough to avoid damage to or softening of the insulation on the cable tails connected thereto.

All switchgear is to comply with BS 5486.

Air break switches and isolators are to comply with BS EN 60947-3.

Circuit breakers are to comply with BS EN 60898.

Residual Current Operated Circuit breakers (RCBO's) are to comply with BS EN 61009.

All fuses are to be in accordance with BS 88 Part II, category of duty 415 AC80, fusing factor Class Q1.

Residual current devices shall comply with BS EN 61008-1, BS EN 61008-2-1, BS IEC 61008-2-2.

All conductors, interconnections, busbars and neutral bars are to be copper.

All solid conductors, busbars and neutral bars are to be formed from high conductivity copper for electrical purposes.

All switchgear is to have making and breaking capacity not less than that specified, or to suit the fault level of the system if making or breaking capacity is specified.

Switchgear installed in dry locations is to be stove enamelled finish. In damp or potentially damp locations, switchgear enclosures are to be finished galvanised or other approved rust resisting finish.

All composite switch panels shall form a Factory Built assembly in accordance with BS 5486 and shall be performance certified where specified.

Switchgear installed in external locations is to be watertight and finished hot dipped galvanised and access doors are to be fitted with watertight gaskets. Operating handles are to be brought out of the enclosure through watertight glands.

All connections on switchgear are to be checked for tightness after installation, using torque wrenches where tightening torques are specified or recommended by the switchgear manufacturer.

2.33 Fabricated Switchboards

Site fabricated switchboard shall be constructed from steel or angle iron bolted and welded to form a frame which shall support all equipment required for the switchboard. The frame shall be bolted to a wall and shall extend to the floor if necessary to support the downward thrust. The frame shall be primed, undercoated and paint finished to the specified colour.

All equipment of the switchboard shall be metal clad and of the same manufacturer with HRC fuses, MCCBs, MCBs and RCBO's of the type and rating as detailed. All equipment shall be labelled as to its function and shall be affixed

by means of mild steel fixing bolts with anti vibration spring washers and nuts. An earth bar shall be provided and all equipment bonded to the frame.

Equipment shall be positioned so that it can be operated comfortably and subsequently withdrawn and replaced if necessary without removing other equipment first. All interconnections of the switchboard shall be included and capable of taking the maximum current rating of the switchgear being connected.

The contractor shall liaise with the electricity supply company to ensure provision is made on the switchboard to accommodate their equipment.

Fabricated switchboard will, in the majority of cases, include a busbar chamber. The busbar chamber shall be totally enclosed with copper busbars and spare clamps for the connection of future equipment.

All holes in the busbar chamber shall be large enough to comfortably accommodate the number of cables, free from burrs and sharp edges and grommeted to prevent cable abrasion.

2.34 Cubicle Switchboards and Panel Boards

Cubicle type main and sub-main panel boards shall be manufactured in accordance with BS EN 60439-1 and IEC 60439, incorporating MCCBs and HRC switch fuse disconnectors as specified complying with BS EN 60947-2.

All devices shall be labelled as to their function and warning labels fitted in accordance with BS 7671 and the Health & Safety at Work Act. The board shall be finished with a stove enamelled or epoxy powder paint finish in accordance with the detailed specification.

All busbars shall be housed in a separate compartment and manufactured, including the earth bar, from hard drawn high conductivity copper. Earthing facilities shall be provided the full length of the switchboard.

Segregation shall be provided between devices, and where constructed on a modular basis shall be arranged so that devices can be interchangeable. The panel shall incorporate all necessary cable wiring ways with cable tray, top and bottom removable gland plates, and gasketed doors with key locking.

Cubicle switchboard shall be designed for floor mounting and panel board designed for wall mounting. Both are to be securely bolted in position with sufficient access for maintenance. Care shall be taken to ensure final positions line up with ducts and trenches.

Switchboard shall be designed with a spare capacity of 25% for future expansion.

2.35 Distribution Boards

Distribution boards, unless otherwise specified, are to be metal clad, industrial type, 500 volt rating and are to comply with BS 5486 Parts 11, 12, 13. The enclosure is to be formed from heavy gauge rustproofed mild steel sheet. Corners are to be welded or locked to cast iron cover pieces. Doors are to be hinged on one side and secured by captive screws on turn-buckle type fixings or locks as specified. Doors are to close onto a dust excluding gasket. Bushes and neutral bars are to be high conductivity copper.

Fuses are to comply with BS 88, Class Q1, Category 400 AC 80.

Moulded case circuit breakers are to comply with BS EN 60947-2.

Miniature circuit breakers are to comply with BS EN 60898 and are to be of the duty and type specified. Residual current devices shall comply with BS EN 61008-1, BS EN 61008-2-1, BS IEC 61008-2-2. Residual Current Operated Circuit Breakers are to comply with BS EN 61009 and are to be of the duty and type specified. Residual Current Operated Circuit breaker devices shall comply with BS EN 61009-1. Unless otherwise specified RCDs or RCBO's protecting single final circuits shall have an operating current of 30mA or 10mA as indicated.

Residual current devices shall be sensitive to pulsating DC fault currents.

All live electrical connections are to be protected by insulated shields against accidental contact. The shields are to be removable for wiring purposes.

Neutral bars are to be provided with a numbered separate terminal for each sub-circuit neutral. Where DPN or TPN distribution boards are used to supply single phase loads, a neutral bar is to be provided in line with each phase bank, and the neutral bars are to be interconnected. Wiring from distribution boards is to be so arranged that neutral connections are in the same sequence as the protective devices associated with the circuits.

Where the circuit protective conductors are provided by separate conductors (ie. not conduit or trunking) a protective bar is to be provided complying with the previous paragraph.

The neutral bars are to be isolated from earth.

Distribution boards installed in dry locations are to be stove enamelled finish. In damp, or potentially damp, locations, distribution boards are to be galvanised or other approved rust resisting finish.

Distribution boards installed in external locations are to be hot dipped galvanised and are to be fitted with watertight gasket doors to IP65.

Fuse carriers are to be installed in all unused ways of fuse boards, and blanking plates in MCB boards.

Unless otherwise specified, all distribution boards shall be equipped with an internal switch-disconnector.

Distribution boards not incorporated in switchboards shall be mounted no higher than 2000mm from floor level to underside of the board.

2.36 Labels

All switchgear, distribution boards and busbar chambers are to be clearly labelled to indicate their function, supply details and fuse size. The wording of labels is to conform to that specified.

Labels on switchgear and equipment are to be ivorine or Traffolyte, machine engraved with upper case letters, not less than 6mm high.

Letters are to be black on yellow background and wax filled if ivorine is used. The labels are to be fixed by means of nylon fasteners to the switchgear. Steel set screws and nuts, self tapping screws, pop rivets or adhesive will not be accepted.

Equipment operating at voltages in excess of 230 volts RMS is to have a label affixed, as described, but upper case letters not less than 12mm high and red filled, to read:-

CAUTION 400 VOLTS

2.37 Circuit Lists

A typed circuit list is to be installed in a clear plastic wallet inside the lid of each distribution board. The wallet is to be secured by not less than four nylon screws or pop rivets. The circuit lists are to show for each fuseway or MCB way:

Details of load (including number and location of lighting points or socket outlets)

Rating of fuseways, MCBs or RCBO's

Phase colour

Conductor size

The list is also to show the board's name or reference, its source of supply, short circuit current and the external earth loop impedance.

2.38 Line Diagram

A line diagram, prepared for the purpose, is to be supplied and installed in a glazed hardwood frame in the main switchroom.

The line diagram is to be to the Engineer's approval and is to be submitted in draft to the Engineer for approval before the final diagram is prepared.

2.39 Local Switches

Switches for the control of lighting are to comply with BS 3676 and are to be of the make, type, rating and finish specified and equipped with rocker action.

Switches shall be selected in accordance with Part M of the Building Regulations which recommend a contrast of 30% Light Reflectance Value between front plate and wall.

Switches for use in plastered or other finished wall surfaces, are to be of the grid mounting flush type and are to be fixed in zinc plated boxes complying with BS 1363.

Switches for use with surface conduit installations are to be of the metal clad or insulated and moulded on surface steel or uPVC boxes with protected rockers. For use in damp, or potentially damp, situations the assemblies are to be galvanised or uPVC.

Switches for use in exterior locations are to be weatherproof insulated impact resistant type with neoprene seals to aluminium and to a minimum rating of IP54.

Where multi-gang switches are used, all switches are to be of the same current rating.

If switches connected to more than one phase or to more than one distribution board are installed in common boxes, barriers are to be installed in the boxes and clear warning labels affixed, e.g. DANGER 400V.

In non-metallic conduit installations, switch boxes are to be dimensionally similar to the boxes specified above, and in other respects as detailed in Clause 2.6.

Earthing terminal shall be fixed inside each accessory box and on the grids of gridswitches. The earthing terminal of each grid shall be connected by a separate protective conductor to the earthing terminal of the box.

Metal front plates shall be provided with an earthing terminal connected by a separate protective conductor to the earthing terminal of the box.

2.40 Ceiling Lighting Switches

Ceiling switches shall comply with BS EN 60669-1 and shall be one way, two way 6A, 16A, 32A or 45A as specified. The switches shall be supplied with pull cords of the required length with a visible indicator identifying that the switch is on the 'ON' position. Generally ceiling switches shall be of the surface pattern for fixing directly onto a standard 50mm Besa conduit box.

2.41 13A Socket Outlets and Fused Connection Unit

2.41.1 **General**

13A socket outlets and fused plugs are to be in accordance with BS 1363. Socket and fused outlets shall be selected in accordance with Part M of the Building Regulations which recommends a contrast of 30% Light Reflectance Value between front and wall.

Socket and fused outlets for use in flush installations are to be fixed in zinc plated steel boxes, complying with BS 1363.

Socket outlets for use with surface installations are to be mounted in the manufacturer's pressed steel, or grey cast iron boxes. Where used in damp or potentially damp situations, boxes shall be galvanised or upvc having an overall rating to IP54.

Socket outlets and fused spur boxes used in non metallic conduit installations are to be mounted in non metallic boxes, dimensionally to BS 1363 and otherwise complying with Clause 2.6.

Earthing terminals shall be fixed inside each accessory box. The earth terminal of the accessory shall be connected to the box earthing terminal by a separate sleeved protective conductor of size 2.5mm².

Metal front plates shall be provided with an earthing terminal connected to the box earthing terminal by a separate protective conductor.

All circuits shall be protected by a 30mA RCD or 10mA dependent on application apart from circuits supplying computer network equipment,

telephone equipment, and fridges and freezer etc. which because of the importance of continuance of supply shall not be protected by RCDs.

In addition RCD protection is not considered necessary to protect final circuits supplying desktop power within administration offices apart from circuits supplying kettles, microwave, etc.

RCD protection shall be provided for those circuits supplying automatic doors.

2.41.2 **Circuits for Computers and other IT Equipment**

Circuits which are specifically for use with IT equipment must comply with BS 7671 section 543.7 in that they must provide High Integrity Earthing. Ring main circuits shall be installed using 2.5mm² conductors with equally sized CPCs. Each end of the CPC ring is to be connected into separate terminals in the distribution board earth bar and into separate terminals in the specified accessory.

Radial circuits shall be installed with 2 separate CPCs of equal size to the phase conductors with the minimum size being 4.0mm².

Within trunking and conduit systems 6491X stranded cables (LSF) may be installed.

Where cables are installed in ceiling voids, false floors, walls, dado trunking, etc. the cable used shall be as manufactured by Pirelli ref. AFUMEX LSX or equivalent. No joints or junction boxes will be allowed throughout their length. All cables shall be adequately supported and sized appropriately for their design use.

Note: Afumex is specified for circuits supplying IT equipment, it is not required for those circuits intended to supply a range of equipment. Its use has been selected to reduce by virtue of its appearance additions to a circuit where the possibility of earth leakage currents flowing is higher.

2.41.3 **Fuse Connection Unit**

Fuse connection units shall comply with BS 5733 and BS 1362-4, be of a 13A rating incorporating a DP switch and single pole fuse to BS 1362, certified by ASTA and of size to suit the appliance being supplied and its interconnecting flexible cord.

Fuse connection units shall include an indicator light and flex outlet if specified.

2.42 Cooker Control Unit

The Cooker Control Unit shall comply with BS 4177 and shall incorporate a 45A DP switch with pilot light. The front plate shall be engraved COOKER and shall be either all insulated or metal clad as specified.

The Cooker Control Unit shall either be flush mounted onto a steel back box set into the wall and surface mounted onto an all insulated steel box match to the profile of the front plate.

For both installations a flush mounted connector box to BS 5733 comprising a 3 way 45A shrouded terminal box shall be positioned 450mm from the floor and directly behind the cooker position. The connector box shall be provided with an overlapping front plate incorporating an exit point for the final connection cable to the cooker. Wiring between the cooker control unit and connector box shall be carried out in 10mm² pvc cable enclosed within conduit.

2.43 Shaving Outlets

Where shaving outlets are to be installed in bathrooms they shall comply with BS EN 61558-2-1 and incorporate a high vacuum varnish impregnated double wound transformer to provide an earth free supply at mains frequency.

The outlets shall be fitted with a self resetting thermal trip fitted in the primary circuit. The outlet shall be provided with a shuttered socket outlet suitable to accommodate shaver plugs to British, American, Continental and Australian Standards.

Where shaving outlets are to be installed in areas other than bathrooms, they shall comply with the BS 4573 and contain a socket outlet of the pattern detailed above, and shall be fitted with a thermal cutout to limit the output to 200mA and be provided with fuse protection.

The outlets shall be single voltage 230v output.

All shaving outlets shall be of the all insulated pattern finished white, front plate engraved:

SHAVER ONLY

Where installed as part of a flush installation, they shall be mounted in a steel accessory box set flush in the wall.

2.44 Luminaire Wiring

Where luminaires, other than those covered by the following clause, are fixed direct to circular conduit boxes or are supported by pendants, the final circuit wiring shall terminate at a terminal block in the conduit box. The final connection shall be by flexible cord.

Where luminaires having fluorescent tubes are fixed direct to circular conduit boxes, the final circuit wiring may be terminated within the luminaire unless otherwise indicated. The wiring shall enter each luminaire at the conduit entry nearest to the terminal block and, where a loop-in wiring system is used, leave by the same entry; wiring shall not pass through a luminaire unless the approval of the Engineer is given.

Where luminaires are mounted on or recessed into a suspended ceiling, connection shall be by flexible cord from a plug-in ceiling rose unless otherwise indicated. The plug-in ceiling rose shall be located not more than 500mm from the access in the ceiling and shall be firmly supported. The maximum weight that can be supported by plug in ceiling roses is 5 kg.

Luminaires mounted on or recessed into a suspended ceiling shall generally be independently supported unless it can be shown that the ceilings system is more than capable of supporting the load.

Cables, terminations and flexible cords for final connections to luminaires shall be suitable for the operating temperature of the luminaire and not more than 3 conductors being bunched at each terminal. Cables and cords passing to a ballast within a luminaire shall be suitable for the operating temperature of the ballast.

A protective conductor shall connect the earthing terminal or earthing contact of each luminaire to an earthing terminal incorporated in the adjacent box. Where the final connection is by flexible cord the protective conductor shall form part of the cord.

Safety batten holders should be of the heat resistant type, two terminal with loop-in and earth, complete with Home Office Shield, and a facility that automatically shields contacts when the lamp is removed, all in compliance with BS EN 61184 T2 rated.

Safety pendant lighting points shall comprise, either a two terminal and earth, or two terminal, loop-in terminal and earth ceiling rose. Circular heat resisting PVC flexible cord and heat resistant lampholder. The pendant holder shall include a facility that automatically shields the contacts when the lamp is removed. All in compliance with BS EN 61184 T2 rated.

Ceiling roses shall comply to BS 67 and lampholders to BS EN 61184 T2 rated with an efficient cord grip.

2.45 Lamps

Fluorescent tubular and compact type lamps shall comply with BS 1853-2, BS EN 60081, BS EN 60907, BS EN 61195 & BS EN 61199. Tubular lamps shall be T8/26mm diameter or T5/16mm energy saving type unless otherwise specified. If colour is not indicated on the drawings or in the specification they shall be white with a colour temperature of 4000k.

High pressure mercury vapour lamps shall comply with BS EN 62035
Low pressure sodium vapour lamps shall comply with BS EN 62035
High pressure sodium vapour lamps shall comply with BS EN 62035

Low voltage tungsten halogen lamps with internal reflector, shall be either of the sealed type with front glass or if open fronted be housed in luminaires with a safety front glass.

2.46 Lighting Design

An interior lighting design is to comply with the requirements of the Lighting Guide series of documents published by CIBSE and Building Regulation L2: Conservation of Fuel and Power in Buildings.

2.47 Fixing Heights

Confirmation of all fixing heights is to be obtained from the Engineer before commencing the works, but for the purposes of tendering, and unless specified to the contrary elsewhere, fixing heights are to be as follows:-

- (a) Lighting switches are to be 1100mm to centre of box above finished floor level and 225mm to centre of box from outside edge of door architrave.
- (b) Ceiling pull-cord switches are to be mounted with 75mm clearance from the adjacent wall. Where a pull-cord switch is adjacent to a door the switch is to be fixed 150mm from the outside edge of the door architrave, to the centre of the switch.
- (c) Socket outlets to be mounted at a height of 550mm to the centre of box above finished floor level in sales floors, corridors, staff quarters, office areas and under kitchen counters; and 1375mm in plant rooms, stockrooms and kitchens. All drawings should be consulted to ensure that the siting of the socket outlets co-ordinate with the tile layouts in kitchen and toilet areas.

- (d) Individual Type B distribution boards not forming part of distribution assemblies, are to be 1800mm to the top from finished floor level, except that where this would prevent board doors from being fully opened the advice of the Engineer must be obtained.
- (e) Consumer units are to be between 0.75m to 1.2m to centre above finished floor level.
- (f) Clocks are to be mounted at a height of 2400mm to the centre of the dial above the finished floor level, unless otherwise shown on the drawing.
- (g) Bells are to be mounted at a height of 2400mm to the centre of the bell from the finished floor level unless otherwise stated.
- (h) Wall mounted telephones are to be fixed at a height of 1350mm above the finished floor level.
- (i) The connector outlets for desk mounting and mobile telephones are to be fixed at a height of 550mm to the centre of the outlet above the finished floor level.
- (j) Fire alarm call points are to be mounted at 1200mm to centre of box, above finished floor level.
- (k) Fire alarm control panels are to be 1800mm to the top from finished floor level, except that where this would prevent the doors from being fully opened the advice of the Engineer must be obtained.
- (l) Motor starters, not forming part of an assembly, are to be mounted at a height of 1350mm to centre of starter from finished floor level.
- (m) Suspended luminaires shall be mounted 2400mm to the lowest part of the luminaire, above finished floor level.
- (n) Escalator stop buttons shall be mounted 1000mm from the escalator in the horizontal direction, and 1600mm from centre to finished floor level.
- (o) Electric hand dryers are to be mounted at 1250mm above finished floor level.
- (p) Dado trunking is to be mounted 200mm to centre line above work surface.
- (q) Isolation switch controlling ceiling mounted sockets for overhead projector and other such equipment are to be mounted 1800mm above finished floor level.

2.48 Fixings

Screw fixings in brick, concrete or similar structural materials, which necessitate plugging, are to be made with approved proprietary wall plugs. Screw fixings to sheet material or hollow pot partitions are to be made using approved proprietary toggle bolts or other approved methods.

Screws used to fix galvanised or aluminium alloy accessories or equipment are to be galvanised or sheradised finish. Screws used to fix steel equipment outdoors or in hostile environments shall be stainless steel.

Brass screws are to be used to fix accessories or equipment made from copper, brass, bronze or gunmetal.

Heavy apparatus, cable racks or equipment are to be secured by ragbolts grouted into walls and floors or by the use of proprietary expanding bolts or nuts into drilled holes. Ragbolts, expanding bolts, nuts and washers are to be galvanised or sheradised or stainless where used in damp, potentially damp or exterior locations.

Fixings to waterproofed parts of the structure must be devised to avoid damage to any waterproofed membrane, and must be to the Engineer's approval.

The drilling of structural steelwork is not permitted. Fixings made to structural steelwork are to be by girder clips or other equal and approved method.

Fixing by the use of adhesives is not permitted.

Shot fired fixings are only to be used with the Engineer's prior approval in writing.

Fixings penetrating the space in accessories or equipment used to carry wiring are to be without sharp edges capable of damaging the insulation of cables. Countersunk screws are to be used only in countersunk holes and round or mushroom headed screws are to be used elsewhere.

Luminaires mounted on, or recessed into, a suspended ceiling shall be separately supported from the structural ceiling above using 20mm conduit on 6mm threaded rod.

2.49 Testing

Tests are to be conducted during the progress of the work; during and at the end of the maintenance period. These tests are to be as required by the Engineer or his accredited representative. In all instances electronic certified test record sheets are to be supplied to the Engineer.

Insulation, continuity and phasing tests of each length of main cable will be required after the cable is laid, jointed and made off.

On completion of the whole installation, inspect and test in accordance with Part 6 of BS 7671, Bye-laws, Factories Acts or the Electricity Supply Regulations, and such other tests asked for by the Engineer, will be required before the installation is put into service.

Where connections are provided to equipment supplied and fixed by others, and where no technical representative is available from the manufacturers, routine insulation, continuity, earth fault loop impedance and phasing tests are to be carried out before connecting the supplies.

Any faulty wiring and mechanical damage liable to affect the correct running or safety of the equipment is to be referred to the Engineer in writing. When such a report is made the Engineer's agreement must be obtained before the supply connections are made.

As each final circuit is installed the earth loop impedance is to be measured. If the value exceeds that allowed by Tables 41.2, 41.3 & 41.4 the Engineer is to be informed immediately.

The Contractor shall demonstrate to the satisfaction of the Engineer that the voltage at the most onerous position in the installed system does not fall below the limits required by BS 7671 under design load conditions.

When all inspections and test results are satisfactory, an Electrical Installation Certificate shall be given to the Engineer not later than the date of completion of the works and before acceptance of the installation. The certificate shall be given in the form laid down in BS 7671.

Installation and commissioning certificates for fire alarm systems shall be as laid down in BS 5839 - 2002 and in the case of emergency lighting installations as laid down in BS 5266-1 2005.

All certification shall be electronic in the Adobe Acrobat portable document format (PDF). PDF Files shall be named by Property and date.

The measured values of prospective short circuit current and earth fault loop impedance at the origin of the installations shall be recorded on the Electrical Installation Certificate.

The Electrical Contractor is to rectify any faults or defective work revealed by the tests and to retest the work, as many times as is necessary, at his own expense.

The Engineer will be at liberty to carry out such tests as he thinks fit, using his own apparatus or instruments. All tests are to be to the satisfaction of the Engineer.

Dates on which the tests will be carried out are to be agreed with the Engineer, so that the Engineer may be present to witness and direct them. A minimum of seven days notice is required.

The Contractor will be required to provide valid calibration certificates for all instruments used to carry out final testing.

2.50 Shock Notices/Rubber Matting

A notice, showing methods of artificial respiration in the event of electric shock, and the Electricity at Work Act 1989 are to be supplied and fixed adjacent to the main switch panel.

The floor area around the main switch panel shall be covered by means of 6mm thick rubber matting, rated at 11kV with a working voltage of 400V. The width of the rubber matting shall be 1000mm unless building constraints prevent.

The notices are to be printed on substantial rigid plastic and fixed by screws.

2.51 Fire Detection and Alarms

Fire detection and alarm equipment shall comply with BS 5446 and BS 5839 Parts 1(2002), 2, 3 and 4.

2.51.1 Fire Alarm Systems for Commercial Premises

The supply to the fire alarm panel shall be run as a separate circuit in fire rated cable. The main switch supplying the fire alarm panel shall be labelled 'FIRE ALARM SYSTEM DO NOT SWITCH OFF'.

The requirements relating to zoning of detectors and call points, circuiting and grouping of fire alarm devices, circuit monitoring, two-stage alarms, repeater indicator panels, operation of ancillary services and connections to a central fire alarm station shall be as indicated.

Each system shall operate at 24 volts d.c., unless otherwise indicated and shall be line monitored for open circuit and short circuit faults for both zone and sounder circuits.

All components in a system shall be compatible with each other and shall be based on the Apollo protocol.

Systems involving detectors shall be so designed that removal of one detector indicates a fault but does not render other detectors inoperative. Provision shall be included so that testing of individual detectors can be made without sounding an alarm or necessitating the complete system to be disabled to prevent an alarm.

Mounting heights shall be in accordance with Clause 2.47.

The fire alarm control and indicating equipment shall incorporate a switch to enable the audible alarm to be silenced. The switch shall be key operated unless otherwise indicated.

The switch shall not be accessible from the front panel and when in the 'alarm silence' mode shall cause a fault buzzer to sound, and indicator to illuminate on the front panel.

Zone alarm indicators shall each comprise two lamps connected in parallel and arrange so that the failure of either of the lamps is apparent during the course of a routine test.

Where MICC cables are used the control and indication equipment shall be fitted with surge suppressor as necessary.

The control and indicating equipment shall be contained in an enclosure suitable for surface or flush mounting as indicated. The manufacturer's standard finish shall be provided unless otherwise indicated.

The control panel shall incorporate auxiliary relays provided for the control of ventilating plant, automatic doors, signalling to lift to return to ground floor with door open, etc. The panel shall also include facilities for the transmission of alarm by digital communicator.

Generally the control indicating equipment shall conform to BS 5839 & BS EN54-2.

A correctly orientated plan of the premises showing the locations of fire zones and the various entrances, and operating instructions for the correct action in the event of a fire or fault indication, shall be positioned adjacent to each control and indicating equipment. They shall be in a durable form.

A log book in the SCC format (as Appendix B) shall be provided to enable records to be kept of inspections and tests of the system and of incidents, together with their cause and the action taken.

The layout of control and indicating equipment and of the plan of the premises shall be approved by the Engineer before manufacture proceeds.

The standby power supply shall comprise a secondary battery with automatic charger. Batteries shall be lead acid with sealed cells or nickel cadmium. The standby power supply shall have a duration of 24 hours quiescent operation followed by 1 hour alarm operation. The charger shall be capable of restoring the batteries from a discharged state to fully charged state in 24 hours. The power supply equipment shall conform to BS 5839 & BS EN54-4.

Suitable links shall be included so that the battery may be disconnected without interrupting the supply from the charger to the fire detection and alarm system.

Fire alarm bells shall have the operating mechanism contained within the dome; the dome shall be 200mm diameter unless otherwise indicated. They shall be suitable for fixing direct to circular conduit boxes.

For systems connected to a central monitoring station an isolation switch shall be installed which in operation temporarily disconnects the link to enable a full test of the system to be carried out.

Electronic alarm sounder shall provide a continuous sound at least 65 dBA or 5 dBA above any background noise likely to last for longer than 30 seconds. Different sounding alarm must not be mixed in one system.

Other types of sounders shall be as indicated.

Audible fire alarm devices should conform to BS 5839 & BS EN54-3.

Fire alarm beacons shall have a flash intensity of 0.7 Joules and a flash time of 60/minute. Colour shall be red.

Manual call points shall conform to the requirements of BS 5839 & BS EN 54-11, shall be red in colour, surface or semi recessed as required, be of the frangible cover type, with a protective film of plastic and shall be provided with test facilities by means of a special key.

Call point covers, where specified, shall be STI 'Stopper'.

Automatic detectors shall be of the type as indicated. They shall be either ionisation with dual chamber configuration or optical smoke type operating on the light scattering principle, conforming to the requirements of BS 5839 & BS EN 54-12.

Heat detectors shall conform to the requirements of BS 5839 & BS EN 54-5 and either be combined rate of rise/fixed temperature (Grade 1) fixed temperature 60°C (Grade 2) or fixed temperature 75°C (Grade 3) as specified.

All fire detectors shall include visual indication of operation; where detectors are located out of normal view the indicator shall be mounted separately in the location as indicated. The visual indication shall be a light emitting diode.

Fire detectors shall be suitable for fixing direct to circular conduit boxes via a quick release base.

The wiring installation shall comply with the relevant sections of this specification.

Cables shall be looped between equipment, and junction boxes kept to a minimum as far as practicable. Junction boxes shall be identified by a label inscribed 'FIRE ALARM CONNECTIONS'.

Where future extensions are indicated the control and indicator equipment and the standby power supply shall have adequate capacity for their operation; zone identification shall be left blank unless otherwise indicated. The plan of the premises shall not show the future extensions.

2.51.2 Fire Alarm System for Dwellings

Fire Alarm System for dwellings shall generally conform to the requirements to BS 5839 – Part 6, 2004. Self contained smoke detectors shall be generally AICO EI 161 TL Ionisation type, or AICO EI 166 TL Optical type, where installed in close proximity to Kitchens or other areas likely to cause spurious operation only the AICO EI 156 TL Optical type will be installed. In two storey properties two in number shall be fitted located generally in the hallway (AICO EI 166 TL Optical type) and landing (AICO EI 166 TL Ionisation type) and interlinked. Live supply derived from local lighting circuit.

2.52 Emergency Lighting

Emergency lighting systems shall be of the category (maintained or non-maintained), duration and nominal operating voltages, power by generator or secondary batteries or have self-contained luminaires, as indicated.

Emergency lighting equipment shall comply with BS EN 60598-1 and Industry Standard ICEL:1001 and shall be marked with the ICEL certification label.

Emergency lighting systems shall be designed and installed in accordance with BS 5266-1 2005.

Self-contained luminaires shall be fed via key switch to facilitate testing. The key switch shall be connected to the live and neutral supplies to the emergency luminaire and mounted with the other light switches in the room.

Where possible key switches shall be wired such that it is possible to test the emergency luminaires without disabling the general lighting, however due to the complexities of lighting control systems this may not be possible.

The key switches shall be engraved 'EL test'.

Centrally powered systems shall comply with the remaining clauses of this Section.

Batteries shall comprise nickel cadmium cells.

Batteries shall be contained in an enclosure or rack mounted as indicated. Where batteries are not in an enclosure, undulating covers shall be provided over all cell terminals and interconnections. All leads shall be insulated.

A log book in SCC format (as Appendix C) shall be provided to enable records to be kept of inspections and tests of the system and of incidents, together with their cause and the action taken.

Batteries shall be maintained in good condition on site with all necessary precautions being taken to prevent deterioration; they shall be handed over, at the completion of the Works, fully charged.

With each group of batteries a syringe type hydrometer, a container of distilled water and a plastic jug shall be provided.

All the control equipment including mains failure relays, contactors, battery charger, inverter (where required), protection fuses, control switches and indicators shall be contained in an enclosure.

Battery-chargers shall be capable of recharging the batteries after they have been discharged for the specified duration of the system so that within 14h, or other period where indicated, the batteries can again support the load for the specified duration period: this requirement shall be achieved without exceeding the maximum design charging characteristic of the batteries.

Instruments shall provide indication of battery voltage, trickle charge and boost charge currents; indication shall be provided of battery charger functioning and battery charger failure. Other instruments and alarms and provision for remote display of alarms shall be provided as indicated.

Simulation of mains failure shall be by means of tamper-proof switch operated by a removable key.

The wiring installation shall comply with the relevant sections of this specification. The type and size of cables shall be 2H1.5 MICC unless otherwise indicated.

Wiring shall not be drawn into the same conduit, trunking compartment or ducting compartment as cables of other Band 1 circuits. The cores of emergency lighting circuits shall not be contained within the same multicore cable, flexible cable or flexible cord as cores of any other circuits.

Standard luminaires which have been adapted to incorporate an emergency lighting facility shall be re-engineered to the requirements of ICEL 1004.

2.53 Electromagnetic Compatibility (EMC)

To reduce electromagnetic interference (EMI) mains voltage and signal cables following parallel routes shall have minimum separation as detailed in the following table in accordance with BS 6701: 2004. See also section 2.54.

MINIMUM SEPARATIONS IN MM FOR ALL TYPES OF INTERFERENCE			
Cable Type	Distance (mm)		
	Without divider or non-metallic divider	Aluminium divider	Steel divider
Unscreened power and unscreened IT cable	200	100	50
Unscreened power and screened IT cable	50	20	5
Screened power and unscreened IT cable	30	10	2
Screened power and screened IT cable	0	0	0

2.54 Network Cabling

Horizontal cabling shall meet the minimum standards set out in EIA/TIA 568A. CAT5e 4 pair UTP cabling terminated using RJ45 connections shall be used at both the outlet and patch panel and is to be installed complete with a minimum 10-year manufacturer installation warranty. Each circuit will not exceed a maximum of 90 metres in length. The bend radius of the cabling will not exceed 4 times the cable diameter or 25mm internal radius. A 1.5m patch lead and a 3m workstation lead will be supplied with every outlet.

Vertical cabling shall meet the minimum standards set out in TIA/EIA 568A. 62.5/125 Multimode fibre optic is to be used for building backbone cabling, terminated using ST11 connections will be used for both patch panels. Each

circuit will not exceed a maximum of 2km in length. The bend radius of the cabling will not exceed 6 times the cable diameter or 50mm internal radius. EN 50174 for installation of fibre optic cabling is to be observed and attention is drawn to the safety aspect for both the installation and testing of fibre optic cabling.

The cabling is to be contained or supported using a suitably selected trunking or cable tray for the entire length of each cable run, and will be installed in accordance with BS 7671, for segregation of data cables in a separate compartment to all other electrical circuits as defined by BS 6701: 2004, Telecommunications equipment and telecommunication cabling – Specification for installation, operation and maintenance.

Testing is to be carried out for each circuit as follows:

- CAT5e cabling to be tested with a suitable 100 mbps cable tester, providing an individual certification for each cable (to be supplied for viewing in electronic format).
- 62.5/125 Multimode fibre optic cabling is to be OTDR tested at 850 and 1300 um providing an individual certification for each core (to be supplied for viewing in electronic format).

The labelling of each cable with an individual identification No is to be provided at each outlet port and a wrap around cable label within 100mm of each termination. The numbering system will be based on the cabinet ref, floor No and outlet No.

The wiring cabinets wall mounted or floor standing shall be a minimum 12u internal capacity with 19 inch mounting bars with 500mm depth, supplied adequate cable management and a six way 13 amp PDU, the cabinet shall be earthed to the building's main earth point using 16mm yellow/green earth cable.

2.55 Bonding within Bathrooms of Domestic Dwellings

2.55.1 New Installations/Alterations

Main Bonding – if any domestic dwelling is found to be without 'MAIN' bonding it shall be carried out in accordance with BS 7671

2.55.2 Electrical Installation Condition Report

Absence of main bonding to the premise shall be classed as Cat 1.

2.56 Lightning Protection System

Lightning Protection System shall be designed and installed in accordance with BS EN 62305 and shall be carried out by a specialist contractor. A Lightning Protection Risk Assessment is to be carried out in accordance with BS EN 62305 and from the outcome a lightning protection system shall be designed and installed and or adapt the existing system to incorporate the lightning protection system to the requirements of the latest edition of BS EN 62305-01.

The lightning protection system shall comprise an air termination network connected to down conductors which in turn shall be connected to an earth termination network.

A suitable air termination network shall comprise either a network mesh fitted to all parts of the roof or the cladding of a metal roof may be used.

Down conductor may be either separate strip/rod conductors, reinforcing bar or structural steel stanchions.

Separate strip down conductors shall be covered in pvc of colour to match the building fabric.

Earth termination network shall be either deep driven earth electrodes (rods), earth plate electrodes, radial strip electrodes or reinforcing bar incorporated as part of the foundation.

All lightning protector systems shall incorporate test inspection pits at each earth electrode position. All bi-metallic connectors shall be visible, accessible and available for test purposes.

2.57 Intruder Alarm Systems

Intruder alarm systems are to be installed in accordance with the requirements of BS 4737, NACOSS, ACPO and DD243 and shall be carried out by a NACOSS appointed specialist contractor. The systems shall comprise dual technology detectors and the control panel shall send confirmed alarms by using sequential verification.

2.58 CCTV Systems

CCTV systems are to be installed to the NACOSS Code of Practice by a NACOSS compliant contractor.

2.59 Time Switches

Time switches shall be BEAB approved, easy to set and adjust and incorporate battery reserve in the event of loss of supply.

Class change systems shall be controlled by a Danfoss Randall 7 Day 1-15S (pulsed output) programmer.

2.60 Nurse Call Systems

Nurse call systems shall generally be wire-free, incorporate full battery back up and be resettable only at point of call.

APPENDIX A

SOUTHAMPTON CITY COUNCIL

PLANNED MAINTENANCE

LOG BOOK E

LOCATION:

TITLE: SMALL POWER & LIGHTING

REF:

CONTENTS

SECTION	DESCRIPTION
1.	PLANNED MAINTENANCE TECHNICAL INSTRUCTION
2.	RISK ASSESSMENT
3.	PLANT RECORD – SHEETS A
4.	MAINTENANCE FREQUENCY – SHEETS B
5.	RECORD – SHEETS C
6.	REPORT – SHEETS D

SOUTHAMPTON CITY COUNCIL PLANNED MAINTENANCE SYSTEM – TECHNICAL INSTRUCTION No. 3

Introduction

The need for planned systems of maintenance and risk assessments has never been greater. Legislation, standards and health and safety requirements, now means that Facilities Managers must have documented systems of maintenance in place to be able to demonstrate compliance with these requirements.

The essentials of a planned maintenance system is a record log book which has up to date schedules of plant, descriptions of maintenance requirements, a recording and reporting system as well as means to acknowledge all relevant events.

Log Book Sheets

This log book shall contain the following:-

- A Contents page
- This Technical Instruction
- Hazard Analysis – Risk Assessment
- Plant Record Sheets
- Maintenance Frequency Sheets
- Record Sheets
- Report Sheets

Plant Record Sheets A.

Plant record sheets contain a schedule of plant systems and equipment that shall be the subject of the regular maintenance. The record sheets also indicate the location of each item of plant, and when it will be tested in the testing schedule.

Maintenance Frequency Sheets B.

The maintenance frequency sheets provide a detailed account of maintenance requirements and the frequency with which events are to take place. These sheets are cross referenced to the Plant Record Sheets.

Record Sheets C.

Record sheets provide a precise description of maintenance requirements as detailed in the Maintenance Frequency Sheets, together with columns for the appointed contractor to record and indicate that maintenance items have been carried out. A record sheet exists for each frequency of maintenance i.e. weekly, monthly, quarterly and annually.

Report Sheets D.

Report sheets are used to report all readings and 'not satisfactory' recordings as described and indicated in the Record Sheet.

The Maintenance System

The log book shall be collected by the person authorised to work on or carry out testing. Entries shall be made in the appropriate log sheets. Maintenance shall be carried out as detailed in the log book maintenance frequency sheet.

Any defects shall be reported to the appropriate personnel and all defects in Report Sheet D.

Safety

The Contractor shall ensure that all work carried out is in accordance with all relevant and accepted safety procedures to prevent all risks to himself, other contractors, councillors, authority staff or the general public. All work shall be carried out in accordance with relevant Acts of Parliament, Regulations, British Standards, or Health & Safety requirements, and with due regard to the enclosed Risk Assessment.

Consumables

The Contractor shall be responsible for supplying all tools and test equipment required to carry out the necessary works including all means of barriers/protection required for the safety of the workmen and public.

Shut Down of Plant and Systems

The Contractor shall be responsible for all liaison with Building Design Services to ensure that the maintenance is carried out at convenient times.

The Contractor shall be deemed to have included all labour for the maintenance duties irrespective of whether the duties can be carried out in normal working hours or whether they need to be carried out at night or at weekend. The Authorising or Contracts Engineer shall, at the beginning of the contract, provide the Contractor with an indication of what duties can only be carried out outside normal working hours.

Work Authorisation Document

The Contractor shall not carry out any work activity which is classed as hazardous or which could activate the fire alarm system without an organised work document. Work documents shall be arranged between the Contractor and the Client; it is not the responsibility of Building Design Services. No works must be undertaken until the Contractor has a signed Work Authorisation Document in his possession.

Use of Other Contractors

Building Design Services will not give any guarantee to solely use the planned maintenance contractor for reactive or repair maintenance, and will use other contractors to expedite works in accordance with the Council's standing orders to ensure value for money.

Quotation for Planned Maintenance

As part of the tender procedure the Contractor shall provide a lump sum quotation for the services described. In addition the Contractor shall provide a schedule of hourly labour and daywork rates to cover all call out eventualities.

Payments

Payment of planned maintenance services shall be claimed by the Contractor at quarterly intervals with the final claim submitted 3 weeks prior to the contract completion.

SOUTHAMPTON CITY COUNCIL

Building Design Services

Hazard Analysis Risk Assessment

Date

Manager

Project ***Small Power and Lighting***

Completion Date

Persons Associated

Location of Work

Description of Work ***Routine testing and maintenance of small power and lighting***

Hazards and Precautions

Authorities Consulted, actions taken

Date/Signed

Electrical isolation of mechanical plant

Electrocution

Disposal of Waste Material

Emergency Procedures i.e. Alarms

Escape Route, Lighting

Access to high level equipment

Fire precautions

Interaction with other groups

Chemical storage and use of agents

Hazard Analysis

Electrical isolation of mechanical plant

Contractor to identify Location of plant for electrical isolation and work in accordance with the IEE regulations current edition

Electrocution

The contractor should be aware of the treatment of electric shock

Disposal of Waste Materials

The contractor shall give details of the disposal of waste e.g. system batteries that are to be changed . Such disposals shall be carried out in accordance with the relevant legislation.

Emergency Procedures i.e. Alarms, Escape route, Lighting

The contractor shall be instructed in the procedure for fire evacuation and security

Access to reach high level equipment

The contractor will require the use of ladders for work carried out on high level equipment.

Any ladders used shall be provided by the contractor. Special attention shall be paid to safety when working on fittings on stairways, access ramps , and over glass display cases.

In such cases it will be necessary for two men to work together.

Fire precautions

The contractor shall be aware of the positions of fire fighting appliances

Out of hours access

Routine testing and maintenance procedures should not normally require out of hours access. However, if it becomes necessary ,Museum personnel will arrange access and will be in attendance.

Interaction with other groups

All relevant parties shall be informed of all routine testing and maintenance functions.

Chemicals storage and use of agents

The contractor shall detail the agents to be used and where they will be stored.

LOG BOOK No. E... SOUTHAMPTON CITY COUNCIL

LOCATION:

TITLE: SMALL POWER & LIGHTING

PLANT RECORD SHEET Sheet A

ITEM No.	PLANT AND EQUIPMENT DESCRIPTION	LOCATION	INST. DATE

LOG BOOK No. E**SOUTHAMPTON CITY COUNCIL**

LOCATION:

TITLE: PLANNED ELECTRICAL MAINTENANCE

MAINTENANCE FREQUENCY SHEET Sheet B: PAGE 2

PLANT ITEM	JOB NO.	MAINTENANCE DESCRIPTION	M	6 M	Q	Y
		ACTION				
CLEANLINESS	2	CLEAN FITTINGS WHERE NECESSARY				#
FLUORESCENT TUBES	3	REPLACE AS REQUIRED				#
		NOTE				
		CARE SHOULD BE TAKEN IN HANDLING AS BROKEN TUBES/LAMPS CAN BE DANGEROUS				
		DISPOSAL OF TUBES/LAMPS SHOULD BE IN ACCORDANCE WITH APPROPRIATE LEGISLATION.				
SECURITY OF FITTINGS	4	CHECK SECURITY OF FIXINGS AND SUSPENSIONS				#
		NOTE				
		RENEW OR REFIX AS NECESSARY				#
CABLE CONNS	5	CHECK EXTERNALLY/INTERNALLY FOR SECURITY AND SIGNS OF ARCHING OR OVERHEATING				#
		NOTE				
		TIGHTEN OR SECURE AS NECESSARY				
FLEXIBLE LEADS AND CONNS	6	CHECK FOR DETERIORATION RENEW IF NECESSARY				#
DIFFUSER & REFLECTORS	7	CLEAN AND CORRECTLY ADJUST BEFORE REASSEMBLY				#
LAMP CONTROL GEAR	8	CHECK OPERATION AND COMPATIBILITY WITH LAMP				#
SWITCHES	9	CHECK OPERATION. NOTE REPLACE IF FAULTY				#

NOTES:

MAKE SURE OF SAFETY PRIOR TO COMMENCEMENT OF ANY WORK
W=WEEKLY M=MONTHLY Q=QUARTERLY Y=YEARLY

LOG BOOK No. E... SOUTHAMPTON CITY COUNCIL

LOCATION:

TITLE: ELECTRICAL PLANNED MAINTENANCE

RECORD SHEET

Sheet C: PAGE 5

YEARLY MAINTENANCE RECORD			N	D	N	D	N	D	N	D	N	D	N	D	N	D	N	D	N	D	
			A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
JOB NO.	JOB DESCRIPTION	ITEM NO.	S	N/S	S	N/S	S	N/S	S	N/S	S	N/S	S	N/S	S	N/S	S	N/S	S	N/S	
			E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
15	CABLE INSULATION CHECK CONDITION AND FOR SIGNS OF DETERIORATION OR OVERHEATING																				
16	FUSE CARRIERS AND MCB's CHECK OPERATION AND RATING																				

ALWAYS CONSIDER SAFETY FIRST
 For detailed job descriptions see maintenance sheets B.
 For details of plant see plant record sheets A.

APPENDIX B

SOUTHAMPTON CITY COUNCIL

PLANNED MAINTENANCE

LOG BOOK E

LOCATION:

TITLE: FIRE ALARM SYSTEM

REF:

CONTENTS

SECTION	DESCRIPTION
1.	PLANNED MAINTENANCE TECHNICAL INSTRUCTION
2.	RISK ASSESSMENT
3.	PLANT RECORD – SHEETS A
4.	MAINTENANCE FREQUENCY – SHEETS B
5.	RECORD – SHEETS C
6.	REPORT – SHEETS D
7.	EVENTS – SHEET E
8.	OPERATIONS – SHEET F
9.	WEEKLY TESTING SCHEDULE

SOUTHAMPTON CITY COUNCIL PLANNED MAINTENANCE SYSTEM – TECHNICAL INSTRUCTION

Introduction

The need for planned systems of maintenance and risk assessments has never been greater. Legislation, standards and health and safety requirements, now means that Facilities Managers must have documented systems of maintenance in place to be able to demonstrate compliance with these requirements.

The essentials of a planned maintenance system is a record log book which has up to date schedules of plant, descriptions of maintenance requirements, a recording and reporting system as well as means to acknowledge all relevant events.

Log Book Sheets

This log book shall contain the following:-

- A Contents page
- This Technical Instruction
- Hazard Analysis – Risk Assessment
- Plant Record Sheets
- Maintenance Frequency Sheets
- Record Sheets
- Events Log Sheet
- Operations Log Sheet
- Weekly Testing Schedule

Plant Record Sheets A.

Plant record sheets contain a schedule of plant systems and equipment that shall be the subject of the regular maintenance. The record sheets also indicate the location of each item of plant, and when it will be tested in the testing schedule.

Maintenance Frequency Sheets B.

The maintenance frequency sheets provide a detailed account of maintenance requirements and the frequency with which events are to take place. These sheets are cross referenced to the Plant Record Sheets.

Record Sheets C.

Record sheets provide a precise description of maintenance requirements as detailed in the Maintenance Frequency Sheets, together with columns for the appointed contractor to record and indicate that maintenance items have been carried out. A record sheet exists for each frequency of maintenance i.e. weekly, monthly, quarterly and annually.

Report Sheets D.

Report sheets are used to report all readings and 'not satisfactory' recordings as described and indicated in the Record Sheet.

Events Log Sheet E.

Events Log Sheets provide a means of recording all incidents during the operational life of the fire alarm system. Entries should be made to record such events as false alarms or system detector faults. Routine testing details should also be entered.

Operations Log Sheet F.

Entries in this sheet are to be made whenever there is to be a change of status of any loop, sector, time zone or the like. The time and duration of any change of status must be shown, and a clear indication made when the status is returned to normal, by highlighting a completed row.

The Maintenance System

The log book shall be left in a place of safety adjacent to the fire alarm panel. It is to be readily accessible by any person authorised to work on or carry out testing of the fire alarm, to enable entries to be made in the appropriate log sheets. Maintenance shall be carried out as detailed in the log book maintenance frequency sheet.

When a system has more than 52 manual call points installed, more than one shall be tested weekly to ensure that they are tested in a period not exceeding a year. The testing schedule will give details of which call points shall be tested and when. In such cases it will be necessary to disable the alarm sounders, to enable more than one call point to be activated without causing repeated sounding of the alarm. On completion of the testing, the sounders shall be re-enabled and then the alarm sounded to ensure their operation. Thus the alarm shall only be sounded once while operating more than one manual call point.

All defects shall be reported to the appropriate personnel and all events entered in Events Log Sheet E, defects in Report Sheet D, and disablements in Operations Log Sheet F.

Safety

The Contractor shall ensure that all work carried out is in accordance with all relevant and accepted safety procedures to prevent all risks to himself, other contractors, councillors, authority staff or the general public. All work shall be carried out in accordance with relevant Acts of Parliament, Regulations, British Standards, or Health & Safety requirements, and with due regard to the enclosed Risk Assessment.

Consumables

The Contractor shall be responsible for supplying all tools and test equipment required to carry out the necessary works including all means of barriers/protection required for the safety of the workmen and public.

Shut Down of Plant and Systems

The Contractor shall be responsible for all liaison with Building Design Services to ensure that the maintenance is carried out at convenient times.

The Contractor shall be deemed to have included all labour for the maintenance duties irrespective of whether the duties can be carried out in normal working hours or whether they need to be carried out at night or at weekend. The Authorising or Contracts Engineer shall, at the beginning of the contract, provide the Contractor with an indication of what duties can only be carried out outside normal working hours.

Work Authorisation Document

The Contractor shall not carry out any work activity which is classed as hazardous or which could activate the fire alarm system without an organised work document. Work documents shall be arranged between the Contractor and the Client; it is not the responsibility of Building Design Services. No works must be undertaken until the Contractor has a signed Work Authorisation Document in his possession.

SOUTHAMPTON CITY COUNCIL

Building Design Services

Hazard Analysis Risk Assessment No 2

Date

Manager

Project **Fire Alarm Testing**

Completion Date

Persons Associated

Location of Work

Description of Work **Routine testing and maintenance to fire panels
its associated detectors and manual call points**

Hazards and Precautions

*Authorities Consulted, Date/Signed
actions taken*

Electrical isolation of mechanical plant

Electrocution

Disposal of Waste Material

Emergency Procedures i.e. Alarms

Escape Route, Lighting

Access to high level alarm sounders and smoke detectors

Fire precautions

Interaction with other groups

Hazard Analysis

Electrical isolation of mechanical plant

Contractor to identify Location of plant for electrical isolation and work in accordance with BS 7671 and all amendments.

Electrocution

The contractor should be aware of the treatment of electric shock.

Disposal of Waste Materials

The contractor shall give details of the disposal of waste e.g. system batteries that are to be changed . Such disposals shall be carried out in accordance with COSHH regulations.

Emergency Procedures i.e. Alarms, Escape route, Lighting

The contractor shall be instructed in the procedure for fire evacuation and security.

Access to reach high level equipment

The contractor shall provide suitable access equipment required for works carried out on high level equipment.

Special attention shall be paid to safety when working in areas of high risk such as stairways, access ramps, and over glass display cases.

In such cases it will be necessary for two men to work together.

Fire precautions

The contractor shall be aware of the positions of fire fighting appliances.

Out of hours access

Routine testing and maintenance procedures should not normally require out of hours access. However, if it becomes necessary, the contractor will liaise with the building manager to arrange access and for the building operators to be in attendance.

Interaction with other groups

All relevant parties shall be informed of all routine testing and maintenance functions.

LOG BOOK No. E... SOUTHAMPTON CITY COUNCIL

LOCATION:

TITLE: FIRE ALARM

PLANT RECORD SHEET Sheet A

ITEM No.	PLANT AND EQUIPMENT DESCRIPTION	LOCATION	INST. DATE

LOG BOOK No. E...**SOUTHAMPTON CITY COUNCIL****LOCATION:****TITLE: FIRE ALARMS****MAINTENANCE FREQUENCY SHEET Sheet B:**

PLANT ITEM	JOB NO.	MAINTENANCE DESCRIPTION	M	Q	Y
		ALL TESTING TO BE IN ACCORDANCE WITH BS 5839 PART 1			
		ENTER ALL EVENTS IN EVENTS LOG SHEET E			
CONDITION	1	CHECK CONDITION OF CONTROL PANEL FOR ANY DETERIORATION OR DAMAGE. ENTER ANY FAULTS INDICATIONS IN EVENTS LOG E.	#		
OPERATION	2	TRIGGER MANUAL OPERATING POINT TO SOUND THE ALARM. NOTE: REFER TO THE TESTING SCHEDULE FOR LOCATIONS OF THOSE TO BE TESTED. DISABLE SOUNDERS AS DETAILED IN THE TECHNICAL INSTRUCTION.	#		
	2A	VISUALLY INSPECT SYSTEM BATTERIES AND CONNECTIONS. CHECK FOR SIGNS OF DETERIORATION OR DAMAGE.	#		
	3	TRIGGER MANUAL OPERATING POINT TO SOUND THE ALARM. NOTE: REFER TO THE TESTING SCHEDULE FOR LOCATIONS OF THOSE TO BE TESTED. DISABLE SOUNDERS AS DETAILED IN THE TECHNICAL INSTRUCTION.		#	
	3A	EXAMINE BATTERIES AND THEIR CONNECTIONS. CHECK THAT TERMINAL VOLTAGE IS ABOVE THAT SPECIFIED BY THE MANUFACTURER. ENTER MEASUREMENTS ON REPORT SHEET D		#	
	3B	TEST OPERATION OF PANEL ANCILLARY FUNCTIONS AND INTERFACED UNITS.		#	
	3C	CHECK OPERATION OF PRINTER AND ITS PAPER SUPPLY.			#
	4	TRIGGER MANUAL OPERATING POINT TO SOUND THE ALARM. NOTE: REFER TO THE TESTING SCHEDULE FOR LOCATIONS OF THOSE TO BE TESTED. DISABLE SOUNDERS AS DETAILED IN THE TECHNICAL INSTRUCTION.			#
	4A	TEST ALL ANCILLARY FUNCTIONS AND INTERFACED UNITS.			
	4B	TEST BATTERY TERMINAL VOLTAGE ON LOAD. ENTER MEASUREMENTS ON REPORT SHEET D.			#
ASSET	5	KEEP ASSET REGISTER UP TO DATE AND ENSURE THAT ALL WORK IS IN ACCORDANCE WITH HEALTH AND SAFETY POLICY.			#

NOTES: MAKE SURE OF SAFETY PRIOR TO COMMENCEMENT OF ANY WORK
W = WEEKLY Q = QUARTERLY Y = YEARLY

LOG BOOK No. E... SOUTHAMPTON CITY COUNCIL

LOCATION:

TITLE: FIRE ALARMS

RECORD SHEET Sheet C

YEARLY MAINTENANCE RECORD			N A M E	D A T E	N A M E	D A T E	N A M E	D A T E	N A M E	D A T E	N A M E	D A T E	N A M E	D A T E	N A M E	D A T E	N A M E	D A T E	N A M E	D A T E
JOB NO.	JOB DESCRIPTION	ITEM NO.	S	N/S	S	N/S	S	N/S	S	N/S	S	N/S	S	N/S	S	N/S	S	N/S	S	N/S
1	CHECK PANEL STATUS IS NORMAL. ENTER ANY FAULTS IN EVENTS LOG SHEET E																			

ALWAYS CONSIDER SAFETY FIRST
 For detailed job descriptions see maintenance sheets B.
 For details of plant see plant record sheets A.

LOG BOOK No. E... SOUTHAMPTON CITY COUNCIL

LOCATION:

TITLE: FIRE ALARMS

RECORD SHEET Sheet C

YEARLY MAINTENANCE RECORD			N A M E	D A T E	N A M E	D A T E	N A M E	D A T E	N A M E	D A T E	N A M E	D A T E	N A M E	D A T E	N A M E	D A T E	N A M E	D A T E	N A M E	D A T E	
			S	N/S	S	N/S	S	N/S	S	N/S	S	N/S	S	N/S	S	N/S	S	N/S	S	N/S	S
JOB NO.	JOB DESCRIPTION	ITEM NO.																			
2	TRIGGER MANUAL OPERATING POINT OR DETECTOR TO SOUND FIRE ALARM NOTE: DISABLE ALL INTERFACED SYSTEMS AND ENTER IN EVENTS LOG SHEET E																				
ALWAYS CONSIDER SAFETY FIRST For detailed job descriptions see maintenance sheets B. For details of plant see plant record sheets A.																					

LOG BOOK No. E... SOUTHAMPTON CITY COUNCIL

LOCATION:

TITLE: FIRE ALARMS

RECORD SHEET

Sheet C

YEARLY MAINTENANCE RECORD			N	D	N	D	N	D	N	D	N	D	N	D	N	D	N	D	N	D		
			A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
			M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	
			E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	
JOB NO.	JOB DESCRIPTION	ITEM NO.	S	N/S	S	N/S	S	N/S	S	N/S	S	N/S	S	N/S	S	N/S	S	N/S	S	N/S	S	N/S
3	EST FIRE ALARM TRIGGER MANUAL OPERATING POINT TO SOUND THE ALARM NOTE: REFER TO TESTING SCHEDULE FOR DETAILS																					

ALWAYS CONSIDER SAFETY FIRST
For detailed job descriptions see maintenance sheets B.
For details of plant see plant record sheets A.

LOG BOOK No. E... SOUTHAMPTON CITY COUNCIL

LOCATION:

TITLE: FIRE ALARMS

RECORD SHEET

Sheet C

YEARLY MAINTENANCE RECORD			N	D	N	D	N	D	N	D	N	D	N	D	N	D	N	D	N	D	N	D		
			A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
			M	T	M	T	M	T	M	T	M	T	M	T	M	T	M	T	M	T	M	T		
			E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E		
JOB NO.	JOB DESCRIPTION	ITEM NO.	S	N/S	S	N/S	S	N/S	S	N/S	S	N/S	S	N/S	S	N/S	S	N/S	S	N/S	S	N/S		
3A	EXAMINE BATTERIES AND THEIR CONNECTIONS CHECK TERMINAL VOLTAGE IS AS SPECIFIED BY THE MANUFACTURER ENTER MEASUREMENTS IN REPORT SHEET D.																							
3B	TEST OPERATION OF INTERFACED EQUIPMENT TEST PANEL ANCILLARY FUNCTIONS.																							
3C	CHECK PANEL PRINTER CHECK PAPER SUPPLY																							
ALWAYS CONSIDER SAFETY FIRST For detailed job descriptions see maintenance sheets B. For details of plant see plant record sheets A.																								

LOG BOOK No. E... SOUTHAMPTON CITY COUNCIL**LOCATION:****TITLE: FIRE ALARMS****EVENTS LOG SHEET E**

ITEM NO.	EVENT	REMARKS	DATE
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			

LOG BOOK No. E... SOUTHAMPTON CITY COUNCIL

LOCATION:

TITLE: FIRE ALARMS

OPERATIONS LOG SHEET SHEET F

NO.	TIME/OPERATION	LOOP	OUTSTN/LOCATION	DATE	
				ON	OFF

APPENDIX C

SOUTHAMPTON CITY COUNCIL

PLANNED MAINTENANCE

LOG BOOK E

LOCATION:

TITLE: EMERGENCY LIGHTING TESTING & MAINTENANCE

REF:

CONTENTS

SECTION	DESCRIPTION
1.	PLANNED MAINTENANCE TECHNICAL INSTRUCTION
2.	RISK ASSESSMENT
3.	PLANT RECORD – SHEETS A
4.	MAINTENANCE FREQUENCY – SHEETS B
5.	RECORD – SHEETS C
6.	REPORT – SHEETS D
7.	TEST CERTIFICATES

SOUTHAMPTON CITY COUNCIL PLANNED MAINTENANCE SYSTEM – TECHNICAL INSTRUCTION

Introduction

The need for planned systems of maintenance and risk assessments has never been greater. Legislation, standards and health and safety requirements, now means that facilities managers must have documented systems of maintenance in place to be able to demonstrate compliance with these requirements. The essentials of a planned maintenance system is a record log book which has up to date schedules of plant, descriptions of maintenance requirements, a recording and reporting system as well as means to acknowledge all relevant events.

Log Book Sheets

This log book shall contain the following:-

- This Technical Instruction
- Plant Record Sheets
- Maintenance Frequency Sheets
- Record Sheets
- Report Sheets
- Work Permit Example
- Fire Alarm Information Sheet
- Other Relevant Maintenance Information

Plant Record Sheets A.

Plant record sheets contain a schedule of plant systems and equipment that shall be the subject of the regular maintenance. The record sheets also indicate the location of each item of plant.

Maintenance Frequency Sheets B.

The maintenance frequency sheets provide a detailed account of maintenance requirements and the frequency with which events are to take place. These sheets are cross referenced to the Plant Record Sheets.

Record Sheets C.

Record sheets provide a precise description of maintenance requirements as detailed in the Maintenance Frequency Sheets, together with columns for the appointed contractor to record and indicate that maintenance items have been carried out. A record sheet exists for each frequency of maintenance i.e. weekly (C/W), monthly (C/M), quarterly (C/Q) and annually (C/A).

Report Sheets D.

Report sheets are used to report all readings and 'not satisfactory' recordings as described and indicated in the Record Sheets. The Report Sheet becomes the record of all relevant events.

The Maintenance System

At the beginning of the contract, the Log Book is issued to the appointed contractor who is then responsible for the safe-keeping and update of the Log Book. Maintenance shall be carried out as defined in the Log Book and on completion of the monthly, quarterly, and annual maintenance, the Report Sheet shall be completed, photocopied and returned to the Council's Authorising or Contracts Engineer within seven days. The complete Log Book shall be returned to the Council after the last maintenance procedures have been completed, but in any event, a minimum of 3 weeks prior to the end of the contract.

Log Books remain the property of Southampton City Council at all times and shall be produced for inspection by the contractor within 7 days of a request.

In addition, any plant alterations, additional equipment or related items of plant, including where maintenance is recommended by the contractor, shall be added to the Log Book on both Report and other Sheets.

All queries and clarifications should be addressed to the Council's Authorising or Contracts Engineer.

Competence of the Contractor's Staff

It is Council policy to only employ contractors who can satisfactorily demonstrate an adequate level of competence.

All electrical work shall only be carried out by registered electricians and the contractor must have full membership of NICEIC or the ECA.

All work associated with gas appliances and pipework must only be carried out by a competent gas fitter and the contractor shall be a fully registered CORGI member.

Work carried out on refrigeration units shall be carried out by competent persons trained in the safe handling of refrigerants.

Safety

The Contractor shall ensure that all work carried out is in accordance with all relevant and accepted safety procedures to prevent all risks to himself, other contractors, councillors, authority staff or the general public. All work shall be carried out in accordance with relevant Acts of Parliament, Regulations, British Standards, or Health & Safety requirements.

Consumables

The Contractor shall include for all regular consumable items such as filters (in some buildings filters may be free issue to the contractor), belts, gland packing, gaskets electrodes, grease, oil and all tools and equipment required to safely access and carry out the maintenance.

Where the contractor finds the need for other items of equipment to be replaced or further maintenance is required, additional to the specified requirements, this shall not be undertaken without specific instruction of the Authorising or Contracts Engineer or his representative.

Note: All equipment and materials replaced shall be removed from site unless requested by the CA.

Shut Down of Plant and Systems

The Contractor shall be responsible for all liaison with Building Design Services to ensure that the maintenance is carried out at convenient times.

The Contractor shall be deemed to have included all labour for the maintenance duties irrespective of whether the duties can be carried out in normal working hours or whether the duties can be carried out in normal working hours or whether they need to be done at night or weekends. The Authorising or Contracts Engineer shall, at the beginning of the contract, provide the Contractor with an indication of what duties can only be carried out outside normal working hours.

Work Permits

The Contractor shall not carry out any work activity which is classed as hazardous or which could activate the fire alarm system without an authorised work Permit. Work Permits shall be arranged by the Council's Authorising Engineer and where applicable no work shall commence until the contractor has received and signed the permit and has obtained a Security pass. The Contractor's attention is drawn to the additional information relating to the fire alarm system enclosed with this instruction together with a sample copy of a Work Permit.

Use of Other Contractors

The Council will not give any guarantee to solely use the planned maintenance contractor for reactive or repair maintenance, and will use other contractors to expedite works in accordance with the Council's standing orders to ensure value for money.

Quotation for Planned Maintenance

As part of the tender procedure the Contractor shall provide a lump sum quotation for the services described. In addition the Contractor shall provide a schedule of hourly labour and daywork rates to cover all call out eventualities.

Payments

Payment of planned maintenance services shall be claimed in accordance with the contract.

SOUTHAMPTON CITY COUNCIL

Building Design Services

Hazard Analysis Risk Assessment

Date

Manager

Project ***Log Book Inspection/Testing & Maintenance***

Completion Date

Persons Associated

Location of Work

Description of Work ***Routine testing and maintenance of the log book systems***

Hazards and Precautions

Authorities Consulted, Date/Signed actions taken

Electrical isolation of mechanical plant

Electrocution

Disposal of Waste Material

Emergency Procedures i.e. Alarms

Escape Route, Lighting

Access to high level equipment

Fire precautions

Interaction with other groups

Chemical storage and use of agents

LOG BOOK No. E... SOUTHAMPTON CITY COUNCIL

LOCATION:

TITLE: EMERGENCY LIGHTING AND FIRE ALARM

PLANT RECORD SHEET Sheet A

ITEM No.	PLANT AND EQUIPMENT DESCRIPTION	LOCATION	INST. DATE

LOCATION:

TITLE: EMERGENCY LIGHTING

MAINTENANCE FREQUENCY SHEET Sheet B: PAGE 2

PLANT ITEM	JOB NO.	MAINTENANCE DESCRIPTION	M	6 M	Q	Y
TESTING	1	TO BE CARRIED OUT MONTHLY IN ACCORDANCE WITH BS 5266 PT.1 1988. ALL TESTS SHALL BE LOGGED AS PER APPENDIX C OF BS 5266.	#			
		NOTE: CLIENTS OPERATORS SHOULD BE TRAINED TO CARRY OUT MONTHLY TASKS.				
	1A	TEST FOR ONE HOUR. NOTE: IF LUMINAIRE IS RATED FOR DURATION OF ONE HOUR, TEST SIMULATING FAILURE SHOULD BE OF 15 MINS DURATION		#		
	1B	TEST FOR THREE HOURS. NOTE: THE ONCE PER YEAR TEST IS FOR THE FULL DURATION OF THE BATTERY AND IS BEST CARRIED OUT WHEN THERE IS LEAST RISK TO PERSONS IN THE BUILDING, I.E. LATE ON FRIDAY AS THE BATTERY PACKS REQUIRE A 24 HOUR CHARGE TO PROVIDE THE THREE HOUR EMERGENCY LIGHT				#
OPERATION	2	CHECK OPERATION. IF FAILURE IS SUSPECTED REPLACE LAMP. NOTE: IF FAULT IS NOT WITH THE LAMP, CHECK THAT THE MAINS L.E.D. IS ON WITH THE MAINS SUPPLY RESTORED. IF NOT REPORT TO CLIENT.	#			
BATTERY	3	CHECK CONDITION AND EXPECTED LIFE. RENEW IF NECESSARY. NOTE: BATTERY LIFE IS NORMALLY FIVE YEARS. BATTERIES SHOULD BE DISPOSED OF IN ACCORDANCE WITH COSHH REGULATIONS.				#
ASSET REGISTER	4	KEEP ASSET REGISTER UP TO DATE. ENSURE THAT ALL WORK IS IN ACCORDANCE WITH HEALTH AND SAFETY POLICY. NOTIFY CLIENT OF ANY DEFECTS.				#

NOTES: MAKE SURE OF SAFETY PRIOR TO COMMENCEMENT OF ANY WORK
W=WEEKLY M=MONTHLY Q=QUARTERLY Y=YEARLY

LOG BOOK No. E... SOUTHAMPTON CITY COUNCIL

LOCATION:

TITLE: EMERGENCY LIGHTING

RECORD SHEET

Sheet C

YEARLY MAINTENANCE RECORD			N	D	N	D	N	D	N	D	N	D	N	D	N	D	N	D	N	D	N	D			
			A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	
			M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M			
			E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E			
JOB NO.	JOB DESCRIPTION	ITEM NO.	S	N/S	S	N/S	S	N/S	S	N/S	S	N/S	S	N/S	S	N/S	S	N/S	S	N/S	S	N/S			
1A	TEST FOR 1 HOUR.																								
1B	TEST FOR 3 HOURS.																								
3	BATTERY: CHECK CONDITION AND DATE OF EXPECTED LIFE. RENEW IF NECESSARY.																								
ALWAYS CONSIDER SAFETY FIRST For detailed job descriptions see maintenance sheets B. For details of plant see plant record sheets A.																									

