Section E1

Trade Preambles (Electrical Materials and Installation Standards)

Index

E1.01 General

Although the following are mentioned specifically this does not absolve the Contractor from his obligation to carry out the works in a neat and tidy manner. All works shall follow good accepted trade practice and be installed in full compliance with all relevant statutory regulations, Code of Practices, Supply Authority Regulations and BS7671: 2008 Requirements for Electrical Installations. All Codes of Practice and Regulations shall be the edition current at the date of issue of the Council's official order.

All materials shall be as described within the Tender Summary of this specification.

Where material is not specified the Contractor shall contact the Supervising Officer for his requirement.

Materials shall be of the best quality whether specifically named or not. The Supervising Officer shall, at his discretion, cause to have removed any material which, in his opinion does not satisfy the requirements of this specification.

All material shall be brand new on installation, undamaged and left in a clean condition.

The standard of work and installation methods shall comply in all aspects with the following clauses. Where standards are not specifically stated the installation shall comply in all aspects with the requirements of the Supervising Officer whose decision shall be final.

Regional Supply Company's Services

Under no circumstances will the Contractor be permitted to work on unmetered supplies or to open or otherwise tamper with the incoming service head, dwelling main fuses or meters without prior discussions and agreement with London Electricity PLC.

All arrangements relating to the attendance by the Regional Supply Company for disconnection, testing and reconnection shall be made by the Contractor.

The Contractor shall provide the Regional Supply Company with all certificates, including 'Application for Supply' forms, and pay all fees required by the Regional Supply Company in connection with the works, including disconnection and reconnection of supply.

Procedure for Working in Lift Motor Rooms

Access to lift motor rooms will only be permitted if work within the motor room is to be carried out.

Before **any** work is carried out in the lift motor room the following procedure **must** be carried out:-

1. A programme of works shall be submitted to the Lift Manager for his approval in writing.

2. The agreed programme for works and any other instructions issued by the Lift Manager shall be strictly adhered to.

The Contractor shall supply and install/deliver any notices which the Lift Manager deems necessary regarding the shutting down of any lift.

Before any employee of the Contractor enters a lift motor room he must be made aware of the following conditions which must be strictly adhered to:-

a. Dangers within the lift motor rooms, i.e. moving machinery, loose clothing etc.

b. Doors to be kept locked at all times when work is not being carried out.

c. No equipment or material to be stored in lift motor rooms.

d. The motor room shall be swept clean at regular periods during the day.

e. Only the material being used at the time shall be taken into the lift motor room and shall be stored in a neat and tidy manner.

f. No person shall enter the lift motor room while the lift is in service without the permission (which shall be given in writing) of the Supervising Engineer or the Lift Manager.

g. Where the Lift Manager agrees to the Contractor working in the lift motor room without isolating the lift machines and appropriate guards are fitted, at least two persons shall be present in the lift motor room while work is being carried out.

h. Hard hats will be worn at all times.

The Contractor shall notify the Lift Manager 24 hours before disconnecting/switching off the lift car light and alarm system.

Electrical Intake Cupboard

The electrical intake cupboard door shall be kept locked shut at all times when not working in the cupboard or immediately outside.

When working on circuits connected to the supply but have been switched off to allow work to be carried out the following procedure shall be followed:-

(i) Where the circuit protective device is a fuse, the fuse is to be removed and retained by the electrician for the period the work on that circuit is being carried out. A warning notice shall be placed over the distribution board.

If the protective device is a miniature circuit breaker, the MCB shall be locked off using a purposely manufactured locking device. A warning notice shall be placed over the distribution board.

(ii) When working remote from the intake cupboard the intake cupboard door shall be locked shut and the contractor shall fit his own padlock to the existing hasp and staple. The contractor shall remove the padlock prior to leaving site.

Under **no** circumstances is material to be stored inside the intake cupboard.

At the end of each day the intake cupboard shall be cleared of all redundant material. On completion of the works the cupboard shall be swept clean.

Door Entry and Aerial Supplies

At least 48 hours notice will be given to the Electrical Manager, the Housing Control Unit and all tenants in the block before disconnecting/switching of the supply to the door entry system and/or aerial supply.

Heating Services

At least 48 hours notice will be given to the Heating Manager and Housing Control Unit before disconnecting/switching off the supply to any fan unit or heating control unit.

Making Good

All plaster work cut away for the purpose of carrying out the works shall be made good with white plaster suitable for interior use.

All excess plaster shall be wiped clean from the surrounding area to leave a clean, neat finish.

The plaster, shall be finished flush with the surrounding area and be left smooth ready for decorating.

Where holes have been drilled to allow the installation of cables and conduits any surplus damage shall be made good to the full thickness of the floor level or wall thickness.

The making good shall be made using high quality sand and cement. Any water-proofing membrane shall be made good to the existing standard. All making good will be to the entire satisfaction of the Supervising Officer.

The use of expanded foam shall not be used without the consent of the Supervising Officer.

Disconnection of Landlords Supply

Before the supply to the landlords installation is disconnected the Contractor **must** notify the following persons:-

(i) Area Housing Manager
(ii) Heating, electrical and lift managers
(iii) Housing Control

Area Management require a minimum of 7 working days to allow letters to the residents to be typed and delivered.

Switchgear

All switchgear shall be fed from a suitable supply point. Suitable supply points include the following:-

(i) Supply Authority's meter
(ii) Bus-bar chamber,
(iii) 60A double pole connector blocks.

Under **no** circumstances is switchgear to be fed from the mains side of the main isolating switch of adjacent switchgear without permission from the Supervising Officer.

Junction Boxes

Junction boxes shall not be used without the Supervising Officer's permission.

Where the Supervising Officer's permission is given all junction boxes shall be installed in an easily accessible position.

All conductors, including circuit protective conductors, shall be enclosed in the junction box. The outer cable sheathing shall also be taken into the junction box.

Connector Terminal Blocks

All connector terminal blocks shall be of porcelain manufacture.

Compression-type Connectors

Compression-type connectors shall not be used without the expressed permission of the Supervising Officer.

Where permission is granted the connectors shall comply with BS.4579. The correct size crimpling tool shall be used care being taken to ensure all conductors are securely crimped. The crimped connection shall be fitted with a suitable sized heat-shrink sleeve.

Galvanised Steel Sleeves

Where armoured cable or mineral insulated cable passes through walls or floor levels a suitable sized galvanised steel sleeve shall be inserted to allow easy drawing in and out of the cable.

The sleeve ends shall be bushed with brass ring bushes and shall be of heavy gauge type.

The space between the top of the sleeve and the cable shall be sealed with an approved fire-resisting compound.

At ceiling level the sleeve shall be cut flush with the ceiling. At floor level the sleeve shall protrude above the floor as follows:-

(i) Where armoured cable or mineral insulated copper sheathed cable passes through the floor the sleeving shall extend at least 2m above the finished floor level. The sleeving shall be fixed to the wall by appropriate sized spacer bar saddles.

Dust Sheets and Cleaning Equipment

Where work is being carried out in resident's property, including communal areas of sheltered homes, dust sheets shall be used.

Dust sheets shall be laid to cover all floor coverings and furnishings.

Dust sheets shall be clean and of a type suitable for containing waste material and fine dust etc.

On completion of the works the Contractor shall remove all redundant material, rubbish and mess from site. The site shall be left clean and tidy.

The Contractor shall provide all cleaning equipment including dustpan and brush and vacuum cleaner. **Under no circumstances is the Contractor to use the Resident's cleaning equipment.**

E1.02 Harmonised Cable Core Colours

1. *Alteration or addition to an existing installation*

Single phase,

An alteration or addition made to a single-phase installation need not marked at the interface provided that:

(i) the old cables are correctly identified by the colour red for phase and black for neutral. And
(ii) the new cables are correctly identified by the colour brown for phase and blue for neutral.

Two or three phase installations,

Where an alteration or an addition is made to a two-or three phase installation wired in the old core colours with cable to the new core colours, unambiguous identification is required at the interface.
Cores shall be marked as follows:-

Example of conductor marking at the interface for additions and alterations to an a.c installation Identified with the old cable colours.

Function	Old conductor		New conductor	
	Colour	Marking	Marking	Colour
Phase 1 of a.c	Red	L1	L1	Brown
Phase 2 of a.c	Yellow	L2	L2	Black
Phase 3 of a.c	Blue	L3	L3	Grey
Neutral of a.c	Black	N	N	Blue
Protective conductor	Green & Yellow		Green & Yellow	

Three single core cables with insulation of the same colour may be used if identified at the terminals.

2. Switch wires in a new installation or alteration to an existing installation.

Where a two core cable with cores coloured brown and blue is used as a switch wire, both conductors being phase conductors, the blue conductors shall be marked brown or L at their terminals.

3. Intermediate and two way switch wires n a new installation or an alteration to an existing installation.

Where a three core cable with cores coloured brown, black and grey is used as a switch wire all three conductors being phase conductors, the black and grey conductors shall be marked brown or L at their terminals.

4. Changes to cable core colour identification,

Cables to BS 6004 (flat cable with bare cpc)

Cable type	Old core colours	New core colours
Single core+bare cpc	Red or Black	Brown or Blue
Two core+bare cpc	Red. Black	Brown. Blue
Alt two core+bare cpc	Red. Red	Brown. Brown
Three core+bare cpc	Red. Yellow. Blue	Brown. Black. Grey

Standard 600/1000V armoured cable BS 6346, BS 5467 or BS 6724

Cable type	Old core colours	New core colours
Single core	Red or Black	Brown or Blue
Two core	Red. Black	Brown . Blue
Three core	Red. Yellow. Blue	Brown. Black. Grey
Four core	Red. Yellow. Blue. Black	Brown. Black. Grey. Blue
Five core	Red. Yellow. Blue. Black. Green/Yellow	Brown. Black. Grey. Blue. Green/Yellow

Flexible cable to BS 6500.

Cable type	Old core colours	New core colours
Two core	Brown. Blue	No Change
Three core	Brown. Blue. Yellow/Green	No Change
Four core	Black. Blue Brown. Green/Yelow	Brown. Black. Grey. Green/Yellow
Five core	Black. Blue Brown. Black Green/Yelow	Brown. Black. Grey. Blue. Green/Yellow

E1.03 Cables and Flexible Cords

General

All cables and flexible cords shall be manufactured to the relevant British Standard and be BASEC approved. Only one make of each type of cable or flexible cords shall be used on this installation. If required the Contractor shall produce the maker's label indicating the cable reference and test details.

Cables and flexible cords shall be brand new on installation. On completion of the works they shall be lift in a clean and undamaged condition.

PVC Insulated Single Core Cable

PVC insulated single core cable shall comply with BS6004 specification for PVC – insulated cables etc. The insulation shall be general purpose polyvinyl chloride compound 450/750 volt grade. The conductors shall be of high conductivity copper and be stranded.

Cables shall be coloured brown, black, grey, blue, green/yellow as appropriate.

Cables drawn through any conduit shall not be taped together prior to drawing in.

PVC insulated cables shall not be installed where the ambient temperature has been 0ºC or lower for the previous 24 hours. Where it is likely that the ambient temperature is going to fall to zero or sub-zero temperatures, the Contractor shall ensure that all cables are stored in a suitable place to ensure all cables remain above 0ºC for the previous 24 hours prior to installing to enable works to proceed without unnecessary delay.

It is the Contractor's responsibility to anticipate low temperatures.

The ends of all stranded cable which are stripped to enter terminals etc., shall be twisted together, and if the terminal is large enough, doubled back in order to provide a larger area of contact with the terminal. Where more than one stranded cable enters a terminal all strands shall be twisted together and not doubled back.

Where a conductor enters a main switch, consumer unit or distribution board the ends of the conductors shall be binded with 0.85mm tinned copper wire. Sufficient wire shall be used to fill the terminal.

No reduction of the strands forming the conductors will be allowed at any terminal and all strands shall be efficiently secured by screws, nuts and washers or other approved means.

Where PVC insulated single core cables are to be drawn into conduits a minimum of two operatives shall be used, one for feeding/guiding the cables into the conduit system and the second for pulling through.

The cables shall be laid off from the cable drum from a purposely manufactured cable feeder. The cables shall enter the conduit system parallel with each other and without kinks etc.

Prior to drawing the cables into the conduit system a suitable lubricating, medium, e.g. French chalk, shall be applied to the conductors.

A circuit protective conductor shall be drawn into every outlet position.

PVC Insulated and Sheathed Multicore Cable

PVC insulated and sheathed multicore cables shall be manufactured to BS6004. The insulation shall be general purpose polyvinyl chloride compound 300/500 volt grade. The conductors shall be of high conductivity copper and be stranded.

Where PVC insulated and sheathed multicore cable is to be clipped to the surface the outer sheathing shall be coloured white.

All PVC-PVC cables installed in dwellings shall, where possible, be concealed in the floor and roof spaces. Where existing conduits drop from the voids to accessories or CCU, they shall be reused to ensure the continuity of the flush installation.

Where existing flushed conduit drops are reused they shall be effectively connected to the main earthing terminal.

Where an existing surface conduit system is being replaced by a surface mini-trunking installation extreme care is to be taken in removing the conduit system.

In instances where redundant conduit can be left without it interfering with the new trunking installation the following action will be taken:-

(i) If the conduit can be removed without causing any damage to the existing decorations or leaving a gap in the wallpaper then the conduit is to be removed.

(ii) If the conduit cannot be removed without causing damage to the existing decorations or leaving a gap in the wallpaper then the resident is to be advised of the situation and their wishes complied with.

Switch drops in particular can be relocated to drop down the side of the door frame rather than dropping down the face of the wall. Where switch drops are relocated the existing switch position shall be blanked off.

In non-accessible floor or roof spaces cables shall not be fixed. Cables run in floor spaces and roof voids shall be installed parallel with the timber joists or at right angles to them, diagonal runs will not be permitted. In loft spaces, cables running parallel with the joists shall be fixed to the sides of the joist. Cables clips shall be spaced at a distance of 200mm maximum.

Under **no** circumstances are cables to be clipped to the top of the joist.

Where cables are run at right angles to the joists the joists shall be either drilled to accommodate the cables, or where the cables are installed in the loft area a suitable size batten shall be fixed across the joists and the cables fixed to the side of the batten.

Where cables are run at right angles to the joists the following requirements shall be adhered to:-

(i) Holes shall be drilled in the neutral axis 50mm minimum from top and bottom of the joist.

(ii) Diameter of holes shall be not more than 0.25 x depth of joist, spaced at centres not less than 3 x diameter of the largest hole and located between 0.25 and 0.4 of span from support.

(iii) Holes are not to be drilled near knots or other defects in the same cross section which would significantly affect the strength of the timber.

Where cables are installed in a space to which thermal insulation is likely to be applied, e.g. a loft area, all cables are to be installed in such a manner so as not to bring them into contact with thermal insulation which may be existing or which may be installed some time in the future. Where there is no existing thermal insulation the Contractor shall allow for a minimum of 100mm.

In those circumstances where it is not possible to avoid installing a cable out of contact with the thermal insulation the relevant correction factors must be applied to that cable.

The Contractor shall also ensure that the holes are drilled cleanly and are free from splinters. The notching of joists will not be permitted.

At each accessory position where the outer sheathing of the cables has been removed, care must be taken to ensure that the cable sheath has entered fully into the enclosure.

A minimum of 1500mm of slack cable shall be left in the roof or floor void over each lighting point or switch drop position for the future remaking of connection.

All protective conductors, where the outer sheathing has been stripped back, shall be individually sleeved with green/yellow oversleeving. The sleeving shall extend from the outer sheathing to the termination point.

Where cables are to be installed on the surface, they shall be protected by means of plastic miniature trunking.

Jointing of cables will only be made in the terminals of accessories. The use of joint boxes or loose connections behind switches etc., will not be permitted.

Crimped connections shall not be used without permission from the Supervising Officer.

Mineral Insulated Copper Sheathed Cables

All mineral copper sheathed cables shall conform to BS6207 and be 'BASEC' approved.

All grades of mineral insulated cable used (500v light duty and 750v heavy duty) shall be of one manufacturing origin.

Accessories for mineral insulated cable, shall be manufactured by BS6081, and shall be of the same manufacturing origin as the cable used.

Mineral insulated copper sheathed cables shall be LSF sheathed and shall be coloured white where installed inside the building and black where installed on the exterior of the building.

All mineral insulated copper sheathed cables shall be of totally inorganic construction, free of additives and be constructed with a solid drawn, seamless copper sheath.

All cables shall be brand new on installation, and installed in accordance with the manufacturer's recommendations. **Conductor sizes smaller than 1.0mm² will not be accepted.**

All cables shall be terminated with screw type pots complete with earth tail.

The seal at each termination shall be appropriate to the installed environment. The following criteria shall be used:-

Temperatures up to 105ºC	-	standard seal with PVC sleeving
Temperatures from 105ºC to 150ºC		-medium temperature seal with silicone elastomer coated glass sleeving.

Pyro Mate Seals shall not be used.

Where cables are terminated in purpose manufactured MI boxes seals only will be required. Where cables terminate at trunking adaptable boxes and/or surface mounted metalclad accessory boxes internally threaded brass space ranger glands shall be used. The gland shall be secured by means of a brass male bush securely tightened to the box or trunking.

Before sealing the end of the cable each conductor shall be cleaned of excess insulation powder.

At **all** terminations a PVC shroud shall be fitted. Where the termination is exposed to the weather the gland shall be taped with an appropriate coloured weather-resistant PVC tape prior to installing the PVC shroud. The tape shall cover all exposed cable sheath and gland.

The fixing of mineral insulated cable shall be carried out by means of purpose manufactured PVC covered clips and fixed with appropriate sized black japanned screws.

The fixing intervals shall not exceed the values in the following table:-

SPACING TABLE

CONDUCTOR SIZE	MAX. SPACING OF FIXINGS	
MM²	Horizontal mm	Vertical mm
1.5 – 2.5	200	250
4 – 16	300	450

Where cables pass through walls or floors they shall be protected by means of an adequate sized galvanised steel sleeve as per Page 2/4.

In the case of walls the sleeve shall be installed flush with the finish wall surface.

Where cables rise from the floor level they shall be protected by class A galvanised conduit. The conduit shall be fixed by means of galvanised spacer-bar saddles. Where the cables continues up a wall the conduit shall terminate at a height of 2m and be bushed with a brass ring bush. The top of the conduit shall be sealed with a suitable weather proof sealant.

Where a change of direction in cables occur the radius of a right angle bend shall not be less than 6 times the diameter of the cable.

Armoured Cables

All armoured cables shall be PVC insulated, steel wire armoured PVC sheathed cables manufactured to BS6436. They shall consist of plain annealed copper conductors to BS6360 and shall be of the 600/1000 volt grade. The bedding shall be of extruded PVC conforming to BS6746 and the armouring shall be a single layer of galvanised steel wire, the whole cable being covered by a layer of extruded PVC which shall be coloured black unless otherwise stated.

Cables shall be terminated with standard terminating glands suitable for this type of cable and shall be of the same manufacture as the cable. All terminations shall be complete with PVC gland shrouds for interior terminations and PCP gland shrouds for exterior terminations.

PVC/SWA/PVC cables shall not be installed where the ambient temperature has been 0ºC or lower for the previous 24 hours.

Where it is likely that the ambient temperature is going to fall to zero and sub-zero temperatures the Contractor shall take steps to ensure that the temperature of the cable remains above 0ºC for the previous 24 hours prior to installing to enable works to proceed without unnecessary delays.

It is the Contractor's responsibility to anticipate low temperatures.

Unless specified elsewhere in this specification, the steel wire armour shall not be used as a circuit protective conductor. The armouring shall be bonded to the main earthing terminal via the metalclad switchgear, trunking, conduit etc.

A separate conductor, which is an integral part of the cable, shall e used as a circuit protective conductor.

Where PVC/SWA/PVC cables pass through walls or floor levels they shall be sleeved in accordance with Page 2/5.

Where a PVC/SWA/PVC cable is buried direct in the ground the following requirement shall be observed:-

(i) PVC/SW/PVC cables shall not be laid in ground prone to water logging without the consent of the Supervising Engineer.

(ii) Cables shall be buried at a minimum depth of 650mm to the top of the cable where that cable passes across grassed areas and pathways and 1000mm to the top of the cable duct where that cable passes across a road.

(iii) Cables passing across grassed areas and pathways shall be installed in a suitably sized PVC duct. All sharp objects including stones, bricks etc., shall be removed from the trench before the cable is laid.

(iv) Cables passing across roadways shall be installed in a 100mm salt-glazed earthenware duct. The duct shall exceed the road crossing by 2m on both sides. Care shall be taken to avoid damaging the cable sheath when drawing in through the duct.

(v) The trench shall be back-filled as soon as possible after the cable has been laid to avoid possible damage to the cable.

(vi) A purposely manufactured marking tape marked with the words CAUTION – ELECTRIC CABLE BELOW shall be installed 300mm below the ground surface. The tape shall follow the full length of the cable run.

The fixing of PVC/SWA/PVC cables shall be carried out by means of purpose manufactured clips moulded in black polythene and fixed with black japanned screws.

The fixing intervals shall not exceed 400mm in the horizontal plane and 450mm in the vertical plane. When right angles are introduced into the run, fixings shall be placed at a distance no greater than 200mm each side of the bend.

PVC/SWA/PVC cables shall be terminated with Type C glands to BS6121. The gland shall be complete with gland earth tag washer, nut, bolt and washers.

BS951 earthing clamps shall not, under **any** circumstances be used as a means of connecting the armouring to earth.

Flexible Cords

All flexible cords shall be manufactured to BS6500 and be BASEC approved. The insulation shall be heat resisting PVC 300/500 volt grade for all general use and EPR Insulated, CSP sheathed 300/500 volt grade for use with all heating appliances including immersion heaters. The conductors shall be of high conductivity copper and stranded.

Each core of the flexible cord shall be coloured in accordance with Table 51B of BS7671: 2008 Requirements for Electrical Installations.

E1.04 Cable Identification

General

All cables and conductors shall be identified by means of tapes, sleeves or discs to allow identification of their function.

Switch Lines and Strapper Wires

All switch lines and strapper wires shall be sleeved with brown sleeving. The sleeving shall extend up to the point where the outer sheathing has been stripped back. In the case of single core cables all switch lines and strapper wires shall be coloured red throughout the entire length of the cable.

Protective Conductors

All single core protective conductors shall have sheathing coloured green and yellow. The bare protective conductor in a multicore cable shall be sleeved with green and yellow sleeving.

Where the protective conductor in a 3-core PVC/SWA/PVC cable is used it shall be sleeved with green/yellow sleeving. In all instances the sleeving shall cover the full length of exposed conductor.

MICC Cable

The phase conductor of every MICC cable shall be sleeved with red sleeving which shall extend the whole length of the conductor from pot to the termination point.

Where existing MICC cable is being 'picked up' and the phase conductor has not been sleeved then the contractor shall sleeve that conductor.

3-Phase Installations

Where three phase work is involved all cables shall be marked with appropriate colour phase tape at each termination point and every 300mm throughout its accessible length. The width of the marking shall be at least 25mm wide.

Equipotential Bonding Conductors

On all landlords installations the earthing conductor and all equipotential bonding conductors shall be labelled with an engraved label to indicate the function of that conductor.

The lettering shall be a minimum of 4mm high and shall be coloured black on a white background.

The labels shall be attached to the relevant protective conductor within 300mm of the main earth terminal bar by the use of nylon cable ties.

E1.05 Conduit System - Steel

General

All steel conduits shall be black stove enamelled to Class 2 finish or galvanised class 4 finish where specified elsewhere in this specification.

Conduits shall be heavy gauge welded and screwed and be manufactured to BS4568: Part 1 up to 32mm and BS31 for larger sizes.

Accessories (General)

All conduits accessories (except screwed couplers) shall be of malleable iron, cast iron or pressed steel construction to BS4568: Part 2 and the use of aluminium or alloy type accessories will not be permitted. The accessories used shall be of the same finish as the conduit to which it is connected. All accessories shall be complete with adequate size earthing terminals.

B.S. Circular Boxes

BS circular boxes shall be of malleable iron or pressed steel with screwed side entry spouts and be designed for use with spacer bar saddles. The boxes shall be of the large and small type as necessary, complete with heavy gauge covers and water proofing gasket secured by two brass screws.

Adaptable Boxes

Adaptable boxes shall be manufactured of cast iron or heavy gauge pressed steel and of the sizes specified. They shall be complete with cast iron or heavy gauge pressed steel box covers secured with four or more M4 brass screws. Heavy gauge pressed steel shall be used for all flush work internally and cast iron for all surface work internally and for flush work externally.

Screwed Couplers

Screwed couplers shall be of malleable cast iron or steel to BSI 4568: Part 1.

Bushes & Locknuts

Bushes shall be of heavy gauge **best quality brass** with long machine threads and of hexagonal construction. No ring bushes shall be used. Locknuts shall be of steel drop forged or a heavy stamping of hexagonal or circular construction.

Saddles

Saddles shall be of suitable material and gauge for the use with heavy gauge conduit. The base of the saddle shall be fixed by means of countersunk screws and the saddle top by means of two M4 brass screws.

Inspection and 'Draw-in Boxes

Inspection and 'draw – in' boxes shall be either circular boxes or adaptable boxes as described above, depending on the location and number of conduits and cables involved.

Installation of Heavy Gauge Conduit

The whole of the conduit installation shall be completely installed prior to any wiring being carried out.

Conduit shall be selected and erected in compliance with the BS7671: 2008 Requirement for Electrical Installations and Guidance Note No.1 'Selection and Erection'.

All conduit shall be of galvanised finish unless otherwise specified.

The conduit system shall be mechanically continuous throughout so that the cables are fully protected and the system watertight. Provision shall be made for draining any condensed moisture. Conduits smaller than 20mm will NOT be permitted.

During the progress of the work, all conduit ends left open shall be fitted with suitable plugs.

If considered necessary by the Supervising Officer, the Contractor shall, in his presence, draw through each conduit dry swabs of rag to remove all moisture and rubble that may be contained therein before any cables are drawn in the conduits by the Contractor.

Normal or half manufactured bends, or solid or inspection tees or elbow WILL NOT be allowed. Where conduit is required to change direction it shall be turned by means of easy bends or sets made cold without altering the section or opening joints. Sets and bends are to be made without indentation, and the bore must be full and free throughout. The inner radius of any bends shall not be less than 2.5 times the outside diameter of the conduit.

The inside surface and the ends of the conduit and all fittings used in connection therewith shall be smooth, free from burrs and all other defects.

All heavy gauge steel conduit threads shall be clean and free from rust and cut only with a tallow lubricant. All screw-cutting tallow shall be carefully wiped off before jointing up. All exposed threads shall immediately be painted with an approved metallic paint, and the whole of the conduit system shall be electrically continuous throughout its length.

Where screwed conduits are connected by means of a coupling or to the threaded insert of any terminating box the ends of the conduit shall butt and no exposed threads shall be visible after erection other than at running joints, and where such joints are used shall be fitted and fully tightened.

Running joints shall not be used without the expressed permission of the Supervising Officer unless it is absolutely unavoidable and the waiting for the Supervising Officer's permission will hold up the works. Where running joints are made a lock nut shall be fitted and the whole joint shall be locked tight.

All exposed threads shall immediately be painted with an approved metallic paint, and the whole of the conduit system shall be electrically continuous throughout its length.

Draw – In Boxes

Draw-in boxes shall be installed as follows:-

(i) On straight runs of conduit without bends – every 6m.

(ii) Where bends in conduit runs do not exceed 20º - every 6m.

(iii) Where bends in conduit runs exceed 20º, but are under 45º - every 4m (maximum of two such bends).

(iv) Not more than two 90º bends will be permitted in any length of conduit run without a 'draw-in' box.

Bends greater than 90º will not be permitted.

Notwithstanding the above, draw-in boxes shall be installed at all important changes of directions and as many as are necessary to allow for easy draw-in or out of any one or all of the cables in the conduit.

Adaptable boxes shall be used at all times where more than three conduits are involved or where conduit is being installed for the Supply Authority's boards sub-mains.

All lids for draw-in boxes etc., whether of the circular or adaptable type shall be fixed by means of two or four M4 round headed brass screws as required.

All lighting point boxes shall be complete with an earth terminal and where extension rings are used they shall be fitted on the inside of the ring.

Painting

Where the finish of steel conduit or conduit accessories, run on the surface of the walls or ceilings has been damaged during or after erection the affected parts shall be 'touched up' with a coat of galvanised paint, except that all vice marks and exposed threads shall be coated prior to the paint being applied with a coat of a zinc based paint.

Conduit Terminations

Where a heavy gauge steel conduit terminates at a main switch, consumer unit, distribution board sub-switch or other metal clad accessory, a screwed socket shall be employed and electrical contact made with the metal case with an internal hexagonal brass bush screwed into the socket from inside the case and the two locked together. Flanged sockets shall only be used when specified by the Supervising Officer.

Fixings and Installation

Where conduits are run on the surface of the walls and ceilings they shall fixed thereto by means of heavy gauge spacer bar saddles.

The saddles shall be fixed by means of appropriate size c/s wood screws fixed securely into the appropriate wall plug fixing: the following distance centre shall not be exceeded:-

20mm and 25mm conduit	1m
32mm and larger	1.2m

In addition, at bends and sets, the conduit shall be supported and fixed by saddles at distances not greater than 225mm at either side of bend or set.

All adaptable or other boxes installed internally shall be fixed by means of two appropriate sized c/s wood screws into wall plug fixings where appropriate and all boxes installed externally shall be undrilled, be supplied with a watertight gasket and be fixed on either side of the box by means of a saddle not more than 225mm from the box.

Shot fired fixings, nails and other improvisions shall not be used for securing conduit and accessories.

Where conduits are run on the surface of the walls they shall be plumbed where run vertically, and be installed with a spirit level where run horizontally.

Rooms Containing a Bath or Shower

Steel conduits shall not be installed in rooms containing a bath or shower.

Existing Conduit Systems

Where existing conduits are to be reused care must be taken to ensure that rust has not eroded the conduit to the extent that the wall thickness has been reduced. Where the original installation consists of slip conduits, other than those sections buried in the walls to switch positions, fuse boards etc. THE CONDUIT SYSTEM WILL NOT BE USED.

Where existing conduits are being reused green/yellow PVC insulated protective conductors shall be drawn in. The protective conductor shall be of a size equal to the phase conductor.

The number of cables drawn into any length of conduit shall comply with the recommendations given in the IEE guidance notes No. 1 'Selection and Erection'.

The Contractor shall ensure that all reused conduit systems are efficiently earthed.

E1.06 Conduit Systems – Plastic

General

All plastic conduit shall be manufactured to meet the relevant requirements of BS4607 and BS6099. It shall be circular in cross section and shall be installed in accordance with the manufacturer's recommendations.

The colour of the conduit shall be as follows:-

(i) White for interior use.

(ii) Black for exterior use.

Only heavy gauge conduit shall be used.

Accessories

Accessories shall be of the same manufacture and colour as the conduit. All accessories shall be complete with earth terminal which shall be fixed to the box.

Fixing of Conduit

All horizontal runs shall be fixed at no more than 900mm and all vertical runs fixed at no more than 1200mm. Saddles shall be installed 200mm either side of any bend, double set and the like and be positioned to give equal intervals between saddles. Shot fired fixings, nails and other improvisions shall not be used for securing conduit and accessories.

'Draw-in Boxes'

Draw-in boxes shall be installed as follows:-

(i) On straight runs of conduit without bends – every 6m.

(ii) Where bends in conduit runs do not exceed 20º - every 6m.

(iii) Where bends in conduit runs exceed 20º, but are under 45º - every 4m (maximum of two such bends).

(iv) Immediately before and after two 90º bends.

Bends greater than 90º will not be permitted.

E1.07 Conduit Systems

General

Notwithstanding the above, draw-in boxes shall be installed at all important changes of directions and as many as are necessary to allow for easy drawing in or out of any one or all of the cables in the conduit.

Adaptable boxes shall be used at all times where more than three conduits are involved.

All lids for 'draw-in' boxes etc. whether of the circular or adaptable type shall be fixed by means of two or four M4 round headed brass screws.

All lighting boxes and pattresses shall be complete with an earth terminal.

Bending

All bends, double sets and the like shall be bend cold using the correct type of bending spring. The bend shall be of a smooth finish and shall not be less than 2.5 times the outside diameter of the conduit. In very cold weather the conduit shall be warmed prior to bending and it shall be the Contractor's responsibility to anticipate low temperatures so as to prevent any hold up of the works.

All joints shall be made via purposely manufactured coupling and be cemented with the appropriate sealing cement supplied by the manufacturer, i.e. permanent sealant for standard joints and semi-permanent mastic sealing compound for all expansion joints.

The ends of the conduit shall sit as far inside the coupling as possible. In straight runs of 4m or more an expansion coupling shall be fitted and installed in complete compliance with the manufacturers recommendations.

Flexible Conduits

Flexible conduits shall be of the size specified and constructed of single leaded steel bitumen in fused paper lined with PVC outer covering. The flexible conduit shall be terminated with purpose made glands of the same manufacture.

A separate protective conductor shall be drawn in.

Unless specified elsewhere in this specification flexible conduits shall only be installed as a final connection between the fixed wiring installation and a non-portable appliance or piece of equipment.

Existing Conduit Systems

Before any existing conduit system is reused an inspection of the entire length of run shall be made to ascertain the conduit and accessories are in good condition and have been installed in accordance with the manufacturers recommendations.

Where any fittings are missing (e.g. expansion couplers, box lids etc) the Contractor shall install replacements.

Where an existing conduit system is to be reused it shall be the Contractors responsibility to ensure that system complies fully with the requirements laid out in this specification.

The number of cables drawn into any length of conduit shall comply with the recommendations given in the IEE Guidance Notes No. 1 'Selection and Erection'.

E1.08 Cable Trunking - Steel

All trunking and accessories shall be manufactured from galvanised sheet steel to BS2989 or from zinc coated sheet steel to BS1449 finished stove grey enamel.

Where the section of trunking is cut or the finish is damaged the surfaces shall be rendered free from burrs and touched up with matching paint to give the same standard of protection as the rest of the trunking.

Steel cable trunking shall not be used for containing meter tail on a TT system.

Drilling Holes and Cutting Slots

All holes shall be cut by using a suitably sized purposely manufactured cutter. The edges of the hole shall be rendered free from burrs. All lubricating grease or oil shall be wiped from the surrounding sections of the trunking.

All slots shall be cut neatly with the use of a jig-saw. The slot shall be filed square and rendered free from burrs and swarf. The edges shall be filed smooth and purposely manufactured neoprene sleeving fixed along the full length of the slot.

Where the trunking is to be slotted to accommodate cables, the slot shall not be larger than the covering item of equipment.

Fixings

The trunking shall be fixed at intervals of not more than 1m. The exception to these intervals shall be where change of direction and coupling of trunking occurs at which positions the fixing will be placed 100mm each side of the trunking accessories.

Trunking Accessories

Trunking shall be supplied with all necessary purpose manufactured ties, angles, intersections, end caps, end plates etc. The manufacture and finish shall be the same as the trunking used. External earth clamps and internal cable retainers shall be installed in accordance with manufacturer's recommendations.

E1.09 Cable Trunking

Steel Trunking

Steel trunking shall be electrically and mechanically continuous throughout and supplied with copper links between each length, tees and elbows, to ensure earth continuity in compliance with BS7871: 1992 Requirements for Electrical Installations.

Cable Capacity in Trunking

The number of cables installed in any section of trunking shall be such that a spacing factor of 45% shall not be exceeded.

Cable Trunking – Steel

Trunking shall be sized in accordance with IEE Guidance Notes No. 1 'Selection and Erection' Appendix A.

The trunking lid shall be fixed with the following minimum number of fixings:-

(i)	Length of lidding 2.5m	-	6 No.
(ii)	Length of lidding up to 2.5m	-	4 No.

E1.10 Miniature Plastic Trunking

Trunking Associated with Distribution Boards

Where trunking is installed for the interconnection of conduits, distributions boards, time switches, etc it shall be of the same grade and protection as that previously stated.

Where the trunking is to be slotted to accommodate cables, the slot shall not be larger than the covering item of equipment. The edges of the slot shall be filed smooth and be protected in full by means of purposely manufactured neoprene sleeving. The fixing of the lid shall be as previously stated and not less than four fixings will be used in any one length of lid.

Bathrooms and Shower Rooms

Steel trunking shall not be installed in rooms containing a bath or shower.

Existing Installation

Existing miniature trunking shall not be reused without the permission of the Supervising Officer.

Where permission is given to reuse existing trunking, the Contractor shall ensure that all damaged trunking, (including lidding) is replaced, all relevant accessories are present or are supplies and fitted and the trunking is fixed in accordance with page 2/14 (fixings) of this specification.

Where the Contractor reuses existing trunking he shall take full responsibility and take over all obligations relating to the trunking system.

New Installation

General

Where cables are to be installed on the surface they shall be protected by white miniature plastic trunking.

The trunking shall be installed strictly to the manufacturer's recommendations.

The Contractor shall agree all trunking runs with the resident prior to installation.

The miniature plastic trunking shall be installed as inconspicuously as possible, use being made of the tops of skirting, cupboards etc. Where the trunking is installed vertically the runs shall be made close to door frames, in the corner of the rooms or close to windows. High level horizontal runs shall be installed as close as possible to the ceiling.

Each run of trunking shall be assembled level, and all rough cut edges are to be finished smooth and square. All changes of direction, tees, terminations etc shall be as manufactured accessories.

Where trunking passed through walls, a section of trunking 50mm longer than the depth of the wall shall be glued into position to provide an enclosed wireway. Prior to wiring, the hole shall be made good to the finished surface of the wall.

Trunking shall be installed in full length sections and the making up of short lengths will not, under any circumstances be allowed.

Where mini-trunking is run to a flush box a purposely manufactured pattress shall be installed over the flush box. The pattress shall have correct size knockouts to accept the trunking.

Trunking sizes shall remain consistent throughout the run. Mixing of differing sizes of trunking will only be permitted when dictated by the number of cables to be contained and with the Supervising Officer's agreement.

Where mini-trunking is run from a surface mounted consumer unit a suitable sized length of UPVC maxi-trunking or a suitably sized adaptable box shall be installed to allow the cables divert from the consumer unit to the mini-trunking.

Cable Capacity in Trunking

The number of cables installed in any section of trunking shall be such that a spacing factor of 45% is not exceeded.

Trunking shall be sized in accordance with IEE Guidance Notes No.1 'Selection and Erection' Appendix A.

Drilling Holes and Cutting Slots

All holes shall be cut by using a suitably sized purposely manufactured hole cutter. The edges of the hole shall be rendered free from burrs. All lubricating grease or oil shall be wiped from the surrounding sections of the trunking.

Drilling Holes and Cutting Slots

All slots shall be cut neatly with the use of a hacksaw. The slot shall be square and rendered free from burrs.

Where the trunking is to be slotted to accommodate cables the slot shall not be larger than the covering item of equipment.

Fixings

Trunking shall be fixed by means of round head screws spaced not greater than 300mm, passing through holes drilled into the trunking.

Where a change in direction occurs fixings shall be installed within 100mm of either side of the change.

E1.11 Labels and Charts

Individual Dwellings

Where an accessory is installed and its function is not obvious it shall be engraved to indicate its function e.g. bathroom heater points, extractor fan and immersion heaters. The lettering shall be coloured red on a white background and be 3.5mm in height.

At the point of connection of every protective conductor to an earth electrode or extraneous conductive part a permanent label shall be fixed, durably marked with letter not less than 4.75mm high containing the words 'SAFETY ELECTRICAL CONNECTION – DO NOT REMOVE'. The lettering shall be black on a white background.

At the consumer unit position the following labels shall be fitted:-

(i) RED 'TEST QUARTERLY'. The wording and dimensions shall be in accordance with Regulation 514-12-02.

(ii) Consumer unit operating instructions as published by the consumer unit manufacturer.

(iii) Circuit list chart. The layout shall be as indicated at the rear of this specification.

(iv) Notice – Periodic inspection and testing. The wording and dimensions shall be in accordance with Regulation 514-12-01.

Landlord's Supplies

All switchgear, distribution boards, bus-bar chambers etc shall be fitted with a label to indicate its function.

All labels shall be of the engraved type on 3mm traffolite. The lettering shall be coloured red on a white background and shall be a minimum of 5mm high.

All labels shall be securely fixed with brass fixings. All switchgear, distribution boards and bus-bar chambers shall be marked with an appropriate label which shall be fixed by brass nuts, bolts and washers to the front cover. All other labels, (i.e. for roof lighting, air flow indicators, etc) shall be fixed to a position immediately adjacent to the switch by the use of 25mm x 6 brass round head screws driven into appropriate sized wallplug fixings. Under no circumstances shall labels be fixed to the trunking lid.

All 3-phase equipment shall be marked with a self adhesive label bearing the words: 'DANGER – 415 VOLTS' and a self adhesive label showing a black 'lightning stroke' on a yellow background. The label shall be a minimum size of 75 x 75mm.

Treatment for Electric Shock Chart

A plastic chart showing treatment for electric shock shall be installed at every intake position and at the main switchgear position in each fan/tank room.

The chart shall be as recommended by St. John's Ambulance Brigade and/or the Red Cross.

The chart shall be fixed by 4 No. 25mm x 8 brass round head screws. Brass washers shall be installed between screws and chart.

The chart shall be fixed to the inside of the intake cupboard door. In fan/tank rooms the chart shall be fixed adjacent to the main switchgear position.

The requirements for the supply and installation of these charts do not apply to individual dwellings.

Intake Cupboard Doors

All intake cupboards doors and 'Riser' cupboards shall be identified by means of a traffolite label.

The label shall be 3mm thick and fixed with security screws.

The label shall be engraved with the following:-

'ELECTRICAL INTAKE CUPBOARD'
DANGER 415 VOLTS

NO UNAUTHORISED ACCESS

Immediately beneath the traffolite label a semi-rigid plastic, self-adhesive label with the words DANGER 415 VOLTS and a lightning stroke between the words shall be installed.

The self-adhesive label shall be at least 200 x 150mm and shall have black characters on a yellow background.

Beneath the lightning stroke label a semi-rigid plastic self adhesive label with the words 'KEEP LOCKED SHUT' shall be installed the lettering to be white on a blue background.

The self adhesive label shall be 100 x 100mm

Labelling

All electrical equipment installed within each electrical intake cupboard shall be identified and marked with engraved traffolite labels.

The wording format for these labels shall be agreed with the Supervising Officer prior to ordering the labels. Minimum size labels shall be 80 x 80mm.

All labels shall be securely fixed with appropriate sized brass fixings. Switchgear, distribution boards and bus-bar chambers shall be marked with an appropriate label which shall be fixed by brass nuts, bolts and washers to the front cover. All other labels (i.e. for roof lighting air flow indicators, etc). shall be fixed to a position immediately adjacent to the switch by the use of appropriately sized No. 8 brass round head screws. Under no circumstances shall labels be fixed to the trunking lid.

All 3-phase equipment shall be marked with a label bearing the words 'DANGER – 415 VOLTS'. The lettering shall be 5mm high, white lettering on a red background.

E1.12 Circuit List Charts

Domestic Individual Dwellings

A circuit list chart shall be supplied and fitted adjacent to every consumer unit on completion of the works. It shall take the form as indicated at the rear of this specification.

Circuit list charts shall be TYPED and enclosed in a transparent plastic envelope.

It shall be fixed to:

(a) inside of door to mantel unit with a suitable adhesive.

Or

(b) fixed immediately adjacent to the consumer unit in all other cases by 2No. 25mm x 8 brass round head screws driven into appropriate sized wall plug fixings.

Under no circumstances will the circuit list chart be fixed to the Supply Authority's service head and/or meter boards.

Where there is doubt as to the position of where to fix the circuit list, the Supervising Officer shall be informed and he will give instruction where to install the chart.

Landlord's Installation

A circuit list chart shall be supplied and fitted adjacent to every distribution boards on completion of the works. It shall take the form as indicated at the rear of this specification.

Circuit list charts shall be engraved on 3mm traffolite. The lettering shall be black on white background.

The letter characters of the heading shall be 5mm high. All other letter characters shall be 4mm high.

The circuit list chart shall be fixed in a prominent position immediately adjacent to or beneath the consumer unit or distribution board. It shall be fixed with the use of 4 No. appropriate sized wall fixings.

Where it is not possible to install the circuit list chart adjacent to the distribution board the circuit list chart shall be fixed to the nearest position to that distribution board.

E1.13 Earthing and Equipotential Bonding

General

Earthing and equipotential bonding shall be carried out in accordance with BS7871: 1992 Requirements for Electrical Installation, 'Guide to the Connection of Customers to Protective Multiple Earthed Networks' – published by London Electricity , and the following requirement:-

Main Earth Terminal

A main earth terminal block shall be installed to a position adjacent to the supply authority's cut-out.

The terminal block shall be of sufficient size to contain all relevant protective conductors. Each protective conductor shall terminate in a separate terminal. The earthing conductor shall be terminated in the terminal nearest to the supply authority's cut-out.

The Contractor shall leave sufficient length of appropriate size earthing conductor for the supply authority to make connection to their means of earth where this facility is offered. An indelible label shall be fixed immediately above the main earthing terminal with the words **'SAFETY ELECTRICAL CONNECTION – DO NOT REMOVE'** in legible type not les than 3.75mm high. The label shall be fixed by the used of appropriate sized brass roundhead screws driven into appropriate sized brass roundhead screws driven into appropriate wall fixing plugs.

Earthing Clamps

Earthing clamps shall comply with BS 951 and be of tinned copper strip of sufficient length to circle the pipe. The strip shall be so arranged that the tightening of the fixing screw shall be locked tight by the use of the locking nut provided on the clamp.

Prior to installing any earthing clamp the pipe shall be cleaned of dirt, grease, paint etc.

Where protective conductors loop in and out of the earthing clamp the conductor shall be unbroken. The final termination shall be made by an appropriate sized crimped lug.

Earth Labels

A permanent durably marked label with the words '**SAFETY ELECTRICAL CONNECTIONS – DO NOT REMOVE'** to BS951 shall be fixed to the point of connection of every bonding conductor. The label shall be fixed to the earth clamp by clamping it with a locking nut taking care that the level cannot come into contact with the copper pipework.

Earth Terminals

All accessory boxes and surface switch pattresses shall be provided with an earthing terminal which shall be fixed to the rear of the box.

Where surface pattresses are installed over flush circular conduit boxes the circuit protective conductors shall be brought into the pattress and terminated in the earth terminal provided in the pattress or accessory as appropriate.

Earthing Conductor

The earthing conductor shall be sized as follows unless otherwise specified:-

(i) 10 mm² - Where meter tails are 10mm²
(ii) 16mm² - Where meter tails are 16mm², 25mm² or 35mm²
(iii) 25mm² - Where meter tails are 50mm²

E1.14 Individual Domestic Dwellings

Where earthing and bonding is require to be carried out in domestic dwellings the aforementioned shall be carried out in general and the following requirements shall be carried out in particular:-

Main Equipotential Bonding

1. A 8-way earthing terminal block shall be installed adjacent to the supply authority's service cut-out.

2. Main equipotential bonding conductors shall be taken to the following positions:-

   (i) Incoming water supply pipe
   (ii) Gas Service pipe
   (ii) Flow and return pipes of central heating fed from a **district central** boiler system or individual wet systems

3. Earthing clamps shall be installed on the consumer side of the gas meter and the consumer side of the main water stop-cock.

4. Earthing clamps shall be installed within 600mm of the gas meter stopcock.

5. The conductors shall be run either separately or looped to each position. Where the latter method is used the conductors shall be looped through the earthing clamp unbroken. The minimum amount of insulation shall be removed. The final connection shall be made with a suitable sized compression lug.

6. Where the gas installation pipe extends into the dwellings and is simultaneously accessible to other metalwork connected to the main earthing terminal it shall be insulated by an appropriate insulating tape.

The cross-sectional area of the conductors shall be as follows:

(i) 10 mm² - all 60A supplies and the supply is not PME.

(ii) 16mm² - all 100A supplies **or** where the supply is PME.

Main equipotential bonding conductors shall be installed in MMT2 miniature trunking.

Where more than one water or gas service pipe passes through an individual swelling each service pipe shall be connected to the main earthing terminal.

Supplementary Equipotential Bonding

All supplementary equipotential bonding conductors shall be 4mm² unless otherwise specified by the Supervising Engineer.

Supplementary bonding conductors shall connect all simultaneously accessible exposed and extraneous conductive parts in accordance with London Borough of Greenwich 'Sketch of Earthing' and Bonding for Individual Dwellings'.

Supplementary bonding conductors shall be connected to either the main earthing terminal or to the nearest main equipotential bonding conductor. Where the connection is made to the main equipotential bonding conductor that connection shall be the final connection and shall be made via a suitable crimped lug.

Each conductor shall be individually lugged and not bunched in a single lug.

All supplementary bonding conductors shall be installed in a neat and tidy manner. The conductors shall be of an 'easy' length i.e. not taunt and not excessively long. Where exposed, lengths of bonding conductor exceeds 300mm that conductor shall be installed in 16x 16mm mini-trunking.

The resistance of the supplementary bonding conductor between simultaneously accessible exposed-conductive parts and extraneous-conductive parts shall not exceed 0.2 ohm.

Kitchen Sink Units

Where an earth tag is inaccessible or has not been fitted to the sink unit, the Contractor shall drill a suitable size hole in the side lip of the sink unit. The hole shall be as near to the rear of the sink unit as possible. A brass round head nut, bolt and locking washer shall be fitted to enable connection of the supplementary bonding conductor.

Bath Tubs

Where a cast iron or pressed steel bathtub is installed and there is no means of earthing the tub due to lack of earth tab or insulating inserts between feet and tub the Contractor shall notify the Supervising Officer for his decision.

E1.15 Landlord's Supply

Where earthing and bonding is required to be carried out on the landlord's installation the aforementioned shall be carried out in general and the following requirements shall be carried out in particular:-

Main Equipotential Bonding

1. A suitably sized earthing terminal block shall be installed to a position and adjacent to the supply authority's service cut-out.

2. Main equipotential bonding conductors shall be taken to the following positions:-

   (i) All incoming water supply pipes.

   (ii) All gas services pipes (consumer side).
   Note: before carrying out any bonding to the main gas service pipes the gas supply authority shall be consulted and their permission to bond their pipework obtained in writing.

   (iii) All flow and return pipes of central heating fed from a **district central boiler system.**

3. Earth clamps shall be installed within 600mm of the gas meter and main stopcock.

4. The conductors shall be run either separately or looped to each position. Where the latter method is used the conductors shall be looped through the earthing clamp unbroken. The final connection shall be made with a suitable sized compression lug.

   The cross-sectional area of the conductors shall be as follows:-

   (i) 10mm² - all supplies up to 100A and the **supply is not PME**.

   (ii) 16mm² - all supplies up to 100A and the **supply is PME.**

   (iii) 25mm² - all 200A supplies.

(iv) 35mm² - all 300A supplies.

(v) 50mm² - all 400A supplies.

5. Earth clamps are to be BS951 with the label attached reading 'SAFETY ELECTRICAL CONNECTION - DO NOT REMOVE'. The clamps shall be capable of accept in 2 No. 16mm² conductors.

All supplementary equipotential bonding conductors shall be 4mm² unless otherwise specified by the Supervising Engineer.

Supplementary bonding conductors shall connect all simultaneously accessible exposed and extraneous conductive parts where those parts are not electrically connected to the main equipotential bonding by permanent and reliable metal-to-metal joints of negligible impedance.

Supplementary bonding conductors shall be connected to either the main earthing terminal or to the nearest main equipotential bonding conductor. Where the connection is made to the main equipotential bonding conductor that connection shall be the final connection and shall be made via a suitable crimped lug.

All supplementary bonding conductors shall be installed in a neat and tidy manner. The conductors shall be of an 'easy' length i.e. not taunt and not excessively long. Where exposed lengths of bonding conductor exceeds 300mm that conductor shall be installed in 16 x 16mm mini-trunking.

The resistance of the supplementary bonding conductor between simultaneously accessible exposed-conductive parts and extraneous-conductive parts shall not exceed 0.2 ohm.

Circuit Protective Conductors (CPC)

Each circuit shall be wired complete with a CPC. The CPC shall be installed to every accessory point and terminated at the appropriate terminal.

Where a ring circuit is installed the CPC shall be run in the form of a ring and shall follow the same route as the circuit conductors.

On single core cable installations, the CPC shall be of the same current rating as the line conductor.

The CPC associated with the current carrying conductors terminating at a lighting point, or power outlet, shall be connected to the terminal on the accessory and not the terminal in the box. An earthing 'fly-lead' shall be installed between the earth terminal on the accessory and the earth terminal in the box. The 'fly-lead' shall be 2.5mm² in size.

On multi-core and CPC installations where more than one CPC enters an accessory or switchgear, each CPC shall be sleeved individually.

All bare CPC's shall be sleeved with a protective insulating sleeve. The insulating sleeve shall be coloured green and yellow. One of the colours shall cover at least 30% and at least most 70% of the surface while the other colour covers the remainder of the surface.

E1.16 Earth Electrodes

General

Where an earthing facility has not been provided by the Supply Authority an earth electrode will be installed. The electrode will take the form of the 'rod' type unless otherwise specified.

Rods shall be of the type made by molecular bonding 99.99% pure electrolytic copper onto a low carbon steel core. The radial thickness of the copper should be not less than 0.25mm. The steel core shall have a tensile strength of 600N/mm² and be of a quality not less than grade 43A of BS4360.

Couplings shall be made from silicon bronze alloy, grade CS101 to BS2874.

Earth electrodes shall be installed in a purposely manufactured inspection pit which in turn shall be sunk into the ground and bedded in concrete.

Earthing Conductor - Exterior Installation

The earthing conductor shall be installed in 200mm heavy gauge galvanised conduit to class 4 and terminated at the inspection pit by means of a male brass bush. The conduit is to extend a minimum of 500mm above the soil level and fixed to the surface of the wall by means of heavy gauge distance saddles. The end of the conduit shall be bushed with a male brass bush and sealed with a suitable plastic compound.

Earthing Conductor - Interior Installation

The earthing conductor shall be installed in 20mm UPVC circular white conduit. The conduit shall terminate at a position adjacent to the electrode connection. The conduit shall be fixed to the surface of the wall by means of spacer bar saddles fixed at distances not greater than that indicated on Page 2/13 (fixing of conduit).

Earth Label

A durable label reading **'SAFETY ELECTRICAL CONNECTION - DO NOT REMOVE'** shall be installed on the earthing conductor at the electrode position. The lid of the inspection pit shall be marked with the words **'EARTH ELECTRODE - DO NOT COVER'**. where an earth electrode is installed outside the building boundary line then an engrave label shall be installed at the CCU position giving the **EXACT** position of the earth electrode(s).

Electrode Installation

The electrode should be installed below the 'frost line' and more than one electrode shall be installed if necessary.

Testing Earth Electrode

The resistance of the electrode(s) shall be measured by a method at least equivalent to that laid out in the IEE Guidance Notes No. 3 'Inspection and Testing'. The resistance of the electrode(s) shall be such that the product of the rated residual operating current of the residual current device in amperes and the earth fault loop impedance

in ohms does not exceed 50 and in any event the maximum earth loop impedance external to the installation shall not be greater than 220 ohms.

E1.17 Temporary Supplies

General

Temporary supplies shall be installed to maintain all essential lighting and power (including heating).

Where it is found necessary to maintain supplies for the purposes of temporary lighting and power, including heating, the contractor shall make his own arrangements and pay all costs including installation of builders supply and consumption of electricity.

On no account shall the Contractor use unmetered supplies nor will the Council be responsible for arranging for supplies or the costs incurred.

Under **NO** circumstances shall any temporary supply be obtained from the lift motor room without the consent of the lift manager. Only in exceptional circumstances will a supply from the landlords installation be permitted.

Standards

All temporary installations shall be installed in **full** compliance with BS7671: 2008 Requirements for Electrical Installations and BS7375 Code of Practice for 'Distribution of Electricity on Construction and Building Sites'.

Occupied Dwellings

During the process of rewiring, supply to the cooker and fridge/freezer shall be maintained at all times. During the winter months supply to the central heating system shall also be maintained at all times.

In occupied dwellings all lighting, power, cooking, heating and water heating shall be reinstated at the end of each day. Under no circumstances will the resident be left without such facilities overnight.

Landlord's Installation

Where it is necessary to provide lighting and power to enable works to be carried out the Contractor shall supply and install all necessary wiring and equipment.

The Contractor shall arrange with the local supply authority for a builders supply. The Contractor shall pay all costs for the installation of this supply, provide all necessary documentation, and pay all costs for the consumption of electricity.

Temporary electrical supplies shall not be taken from the landlords supply or a street lighting column without the consent of the Supervising Officer, which shall be given in writing.

Where a temporary supply is to be installed the following requirements shall be applied:-

1. Responsible Person

The Contractor shall nominate a competent person who shall assume responsibility for the temporary installation. He shall be responsible for the installation, maintenance and removal of the temporary installation. The nominated competent person shall be one of the following:-

- a professionally qualified electrical engineer
- a member of the Electrical Contractors Association
- the qualifying manager of an approved contractor of the NICEIC

2. Label at Main Isolator Position

At the main isolator position for the temporary supply, an indelible label shall be fixed indicating the name of the person responsible for the installation, the telephone number he can be contacted on and the name of the main contractor.

3. Isolation and Protective Devices

Suitable means of isolation and protection against excess currents and short circuit currents shall be provided. the means of isolation shall be securely fixed, labelled and clearly accessible. No terminations shall be left exposed. All exposed cables shall be neatly fixed clear of any switchgear.

4. Protection against Indirect Contact

A residual current device having a rated residual operating current not exceeding 30mA shall be installed at the origin of the temporary supply. The earthing arrangements and the residual operating current shall be so co-ordinated that the product of the earth fault loop impedance (Zs) and the residual operating current (I n) does not exceed 25.

5. Cable Type

The following cable types shall be used:-

(i) Site accommodation - PVC insulated steel wire armoured PVC sheathed cable to BS6346.

(ii) Lighting - VR insulated PCP sheathed 300/500 V cable to BS6007.

(iii) Power - PVC insulated and low temperature PVC sheathed to BS6746.

6. Documentation

A log book for the installation shall be kept on site.

Prior to energising the system a test and inspection shall be carried out in accordance with Part 7 of BS7871: 1992 Requirements for Electrical Installations. After correcting any defects highlighted by the inspection and testing, a completion and an inspection certificate shall be issued and kept in the log book.

A further inspection and test shall be carried out at a maximum of 3-monthly intervals, each time a new inspection certificate shall be issued.

Any damage suffered by the installation between testing and inspection shall be rectified and the action taken shall be recorded in the log book.

Site Equipment

All electrical equipment brought onto the site shall be tested and inspected to ensure they are safe.

All equipment shall be indelibly marked with the following information:-

(i) Identification mark

(ii) Date equipment was last inspected/tested

(iii) Date for next inspection/testing

The information required the clause, shall be entered in the site log book.

Any item of equipment which does not bear the information required in the above clause, shall not be allowed on the site.

Voltages

The following voltages shall not be exceeded:-

(i) 50 volts, 1-phase, centre point earthed - Portable head lamps in damp and confined areas.

(ii) 110 volts, 1-phase, centre point earthed - Portable hand lamps for general use, portable hand held tools and local lighting up to 2kW.

(iii) 110 volts, 3-phase, star point earthed - small mobile plant up to 3.75kW.

(iv) 230 volts, 1-phase - fixed flood lighting.

(v) 400 volts, 3-phase - fixed and moveable equipment above 3.75kW.

Overhead Wiring

Overhead wiring shall be avoided at all times.

Where the installation of overhead wiring is unavoidable the span shall be kept as short as possible.

Where a 240/110V transformer unit is being used the transformer shall be sited in the electrical intake cupboard adjacent to its point of supply. The 240V lead shall be kept as short as possible.

The maximum lengths of span and minimum heights above ground for overhead wiring between two points shall be as the following table.

Minimum Height of Span above Ground

Type of System of Span	Maximum Length	At Road Crossings	In Positions Accessible to Vehicular Traffic	In Position Inaccessible to Vehicular Traffic	
PVC Sheathed Cables without intermediate support.		3m	5.8m	5.2m	3.5m
PVC Sheathed Cables in heavy gauge steel conduit not less than 20mm diameter and not jointed in its span.		3m	5.8m	5.2m	3m
PVC Sheathed Cables No limit Supported by a Catenary Wire.		5.8m	5.2m	3.5m	3.5m

The height of span above the ground are **minimum** heights. The Contractor shall confirm with the Supervising Officer the height of the span prior to carrying out any work.

Where a cable is supported by a catenary wire that cable shall be fixed to the catenary wire with purposely manufactured cable ties.

Cables shall be fixed to the catenary wire at distances no greater than that indicated in Table 2A, below

Table 2A

MAXIMUM SPACING OF CABLE TIES

Cable CSA	Nor-armoured rubber or PVC Sheathed Cables	Armoured Cables
1.5mm²	300mm	350mm
2.5mm²	300mm	350mm
4.0mm²	300mm	350mm
6.0mm²	300mm	350mm
10.0mm²	340mm	400mm
16.0mm²	350mm	400mm

Temporary Lighting

All temporary lighting installations shall be 110V rated fed from an isolating transformer centre tapped to earth.

Lamp holders shall be selected to ensure that 110V and 240V lamps cannot be inadvertently interchanged.

If ES lamp holders are used they shall be fitted with shrouds or skirts.

Lamp holders fitted with pin contacts intended to be pressed into PVC or heat-resisting elastomer sheath shall not be used unless the lamp holder is shrouded in insulating material and **permanently** moulded or bonded to the cable sheath.

Plugs, Socket Outlets and Couplers

Plugs, socket outlets and couplers shall comply with BS4343. They shall be 110V rated.

Colour identification of the accessories shall be as follows:-

Operating Voltage	Colour
25V	Violet
50V	White
110V	Yellow
220-240V	Blue
380-415V	Red

Design of Temporary Installation

The temporary installation shall be designed to comply in full with BS7871: 1992 Requirements for Electrical Installations and BS7375 Code of Practice for 'Distribution of Electricity on Construction Sites'.

The Contractor shall supply the Supervising Officer with a set of design details, including all relevant calculations, of the temporary installation.

The design details shall include the following information:-

(i) Maximum demand in amperes.

(ii) Number and type of live conductors.

(iii) Type of earthing arrangement.

(iv) Prospective short-circuit current at the origin of the installation.

(v) Cable and equipment sizing calculations.

All design details shall be kept on site in the installation log book.

Connecting Temporary Supply

If the supply to the landlords installation is to be switched off to allow connection of the temporary supply the following persons **must** be notified:-

(a) District Housing Manager.

(b) Heating, Lift, Electrical and Security Managers.

(c) Housing Control.

The Contractor shall supply, deliver/fit all notices required by any of the persons mentioned in the above clause informing the resident of the action being taken.

Scaffolding

Bonding

Where lighting and similar small power circuits are installed on or adjacent to scaffolding, that scaffolding shall be bonded to the protective conductors of those circuits. This measure is effected by connecting the scaffolding to the main earthing terminal.

Where it is impractical to bond the scaffolding to the main earthing terminal, and only with the Supervision Officer's permission, the scaffolding may be bonded to a locally installed earth electrode.

The main equipotential bonding conductor shall be 25mm².

If scaffolding is erected next to a building which has a lightning protection system installed, the scaffolding shall be bonded both at the highest point next to the building and at or near ground level to the down conductor of the protection system.

E1.18 Testing and Inspection

General

On completion of a rewire or alteration or addition to any existing installation or the installation of a temporary supply, the Contractor shall inspect and test his work and any part of the existing installation which is directly affected by the rewire, addition or alteration.

Where an alteration to an existing circuit is carried out (e.g. spurring off from a ring circuit to supply an extractor fan) the Contractor shall carry out **all** tests relevant to that circuit. (In case of a ring circuit test shall be conductor continuity, insulation resistance and polarity.) The circuit must be earthed correctly.

Every inspection and testing shall be carried out in accordance with Section 7 of BS7671: 2008 Requirement for Electrical Installations IEE Guidance Notes No 3 'Inspection and Testing' and the clauses contained within this specification.

On completion of **any** electrical work the Contractor shall supply the Supervising Officer with the relevant certificates as required by on, Page 2/29 of this specification.

Test Instruments

Test instruments shall be suitable for the test being carried out.

Test instrument s shall be calibrated annually. The calibration shall be traceable back to a recognised National Standard.

Instrument accuracy at the time of testing shall comply in all respects with IEE Guidance Notes Number 3 – Section 16 'Test Instrument Requirement and Precautions'.

Inspection

Every installation shall, during erection and on completion be inspected to verify that the requirement s of this specification have been met.

The inspection shall be carried out prior to any test being carried out.

Particular attention shall be paid to the following points:-

(i) Connections of cables and conductors

(ii) Selection and identification of cables and conductors.

(iii) Routing of cables and trunking.

(iv) Isolation and switching.

(v) Means of protection against direct contact.

(vi) Means of protection against indirect contact.

(vii) Means of protection against mechanical damage and thermal stresses.

(viii) Presence of circuit list(s), CCU split-load operating instructions and RCD 'Test Regularly' label.

(ix) Fixings and supports for cables, conduit and trunking.

(x) External influences.

(xi) Protective devices.

(xii) All equipment is as indicated in this specification, is clean and in an undamaged condition.

(xiii) All external decorations have been made good and left in a clean and tidy condition.

Testing

Every installation shall, during erection and on competition, be tested to verify that the requirement of this specification have met. The person carrying out the inspection and testing of the installation shall be competent to carry out such duties. They shall have knowledge of the IEE Wiring Regulation BS 7671 2008 and the requirement laid out in the specification.

The testing shall be carried out after the relevant inspection has been completed to ensure danger does not arise.

Testing shall be carried out in the following sequence:-

(i) Continuity of protective conductors.

(ii) Continuity of ring final circuit conductors.

(iii) Insulation resistance.

(iv) Polarity.

(v) Earth fault loop impedance.

(vi) Earth electrode resistance.

(vii) Operation of residual current operated devices.

(viii) Functional test.

E1.19 Test Values

Insulation Resistance

Insulation resistance when measured between live conductors and CPC, and between live conductors of each individual circuit shall not be less than 100 megohms.

Continuity of Protective Conductors and Equipotential Bonding

Every protective conductor shall be separately tested to verify that it is electrically sound and correctly connected.

The maximum reading obtained anywhere in the installation shall not exceed 0.5 ohms.

Earth Loop Impedance

An earth loop impedance test shall be made on every circuit. The values obtained shall not exceed the following:-

		Type 2 MCB	**Type B MCB**
(a)	for 5 amp circuits	4.6 ohms	-
(b)	for 6 amp circuits	3.8 ohms	5.3 ohms
(c)	for 15 amp circuits	1.5 ohms	-
(d)	for 16 amp circuits	1.4 ohms	2.0 ohms
(e)	for 20 amp circuits	1.1 ohms	1.6 ohms
(f)	for 30 amp circuits	0.7 ohms	-
(g)	for 32 amp circuits	0.7 ohms	1.0 ohms
(h)	for 45 amp circuits	0.45 ohms	0.7 ohms

Minor Alterations

Where the works consists of minor alterations, the circuit to which the alterations has been made shall be tested to ensure compliance with BS 7671 – 2008. The tests shall generally be limited to the point of the alterations. For example, if a lamp holder is changed the following tests shall be carried out:-

(i) Earth continuity to the ceiling rose at which the lamp holder is connected.

(ii) Insulation resistance.

(iii) Polarity of switch feeding lamp holder.

(iv) Earth-fault loop impedance at ceiling rose.

It should be noted that the test of item (i), (iii) and (iv) above are restricted to the point at which the lamp holder was changed.

If a consumer unit or skeleton unit is changed the whole installation shall be tested. It is to be appreciated that these tests are carried out with the purpose of checking over. The testing shall be limited to those test necessary to establish that there are no cross-feeding, polarity is correct, the insulation on the cables have not been damaged and the earthing and equipotential bonding has not been compromised.

Certification

On completion of the works, and after all defects picker-up through inspection and testing have been rectified, the following documents as appropriate, shall be supplied to the Supervising Officer:-

(i) Forms of Completion and Inspection Certificate.

(ii) Periodic Inspection Report for an Electrical Installation.

(iii) Minor Works Certificate and

(iv) Installation Schedule and test results.

The above form shall be as issued by the National Council for Electrical Installation Contracting (NICEIC) or the Electrical Contractors Associations (ECA).

information required by each form shall be typed in. Handwritten forms will not be accepted.

A copy of the Forms of Completion and Inspection Certificate shall be sent to London Electricity PLC to allow the supply to be connected.

The requirement of the clause below shall apply to all additions or alterations to an existing installation.

On completion of rewiring an individual dwelling the Contractor shall supply the Supervising Officer with the relevant certificates at the same time he returns the keys. In the case of occupied dwellings the certificate shall be submitted within two (2) working days of completion of the works.

E1.20 Generally

Generally the quality of the work shall be to the satisfaction of the Contract Administrator.

Standards and British Standard Codes of Practice

AII British Standards and British Standard Codes of practice used in

this Specification refer to the current metric version of such standards or codes except where (1) metric standards or codes have not yet been introduced or (2) specific reference is made in the item description to the imperial version of such standards or codes.

Tests

The prices generally shall be deemed to include for all testing specifically referred to in these Preambles.

E1.21 Provisional and Prime Costs Sums

Definitions

Attendance

Attendance on Sub-contractors shall be deemed to include allowing the use of standing scaffolding, mess rooms, sanitary accommodation and welfare facilities unloading and providing space for storage of plant and materials providing light and water for their work; clearing away rubbish and allowing free use of plant, tools and provision of protective covering.

In addition all items of attendance shall be deemed to include arranging with Local Authorities, Public Undertakings, Sub-contractors and Suppliers as to time for commencement of their work on the obtaining from them their particulars of holes, mortises, phases, recesses, fixings and the like and supplying them with all dimensions and other information for the proper execution of the Works.

Where work is to be executed by the Local Authority at least five weeks notice in writing shall be given to the requisite department before they are required to commence on site.

Demolitions and Alterations

Old Materials

Old materials specifically required to be reused in the work are described as “storing to be reused" and this description shall be deemed to include loading, moving storing and protecting.

Old materials specifically required to remain the property of the Employer are described as "Storing to remain the property of the Employer" and this description hall be deemed to include for deposition on site where directed by the Contract Administrator.

Pricing on Site

The Contractor shall be deemed to have visited the site and ascertained the full extent and nature of the alterations.

Clearing Away

The prices generally shall be deemed to include for clearing away olf materials arising from demolitions and alterations.

Shoring and Strutting

The prices generally shall be deemed to include for shoring and scaffolding incidental to demolitions and alterations and making good all work disturbed thereby.

Generally

Recommended Methods

Treatments of basements, removal of underground storage tanks and use of materials and plant and advice upon statutory requirements and safety precautions to comply with the relevant clauses of the following documents.-

BSCP 94- Demolition

Partly Demolished Structures

Prevent access of unauthorised persons to partly demolished structures; leave safe at close of each day's work.

Illuminate and protect dangerous openings and the like as necessary.

Dust

Reduce dust by periodically spraying demolition works with water.

Supervision

Site staff responsible for supervision and control of demolitions and alterations shall be experienced in this type of work.

Plant and Equipment

All demolition plant and equipment shall be:

1) of suitable types and standards for location and type of work
2) in the charge of competent operators
3) maintained in good working condition.

Burning

Burning on site of materials arising from demolitions will not be permitted.

Materials

Making for Making Good

Materials used for making good shall be compatible and of equal quality, strength and performance to those incorporated in that part of the structure, finishing, etc, which is being made good.

Workmanship

Survey

Before starting work carry out a thorough survey and examination of buildings, structures or part of structures to be demolished or altered.

Services

Locate and mark the position of services affected by demolition or alteration work.

Drain or disconnect services before removing fittings or marking alterations to the services.

Clearing Away

Clear away debris periodically, prevent debris from overloading any part of the structure.

Protection

Protect parts of the existing building which are to be retained. Cut away and strip out with care to reduce the mount of making good to a minimum.

Joinery

Definitions

Fixing with Screws

The term fixing with screws shall be deemed to include for sinking screw heads to facilitate filling with approved stopper.

Plugging

The term plugging shall mean the provision and fixing of light plastic proprietary plugs or hardwood.

Selected

The term 'selected' shall be deemed to include keeping the material so described clean for staining, polishing or any other similar finish.

Generally

Code of Practice

Doors and windows, including frames and linings to BSCP 151.

Timber flooring to BSCP 210.

Preservative treatments for external joinery to requirements laid down in B.R.E. Technical Note No.24.

Timber described as 'pressure impregnated' shall be treated with an organic solvent type preservative by Double Vacuum treatment method.

Materials

Timber Generally

Exposed surfaces of timber; to BS 1186, Part 1, Class 1.

Concealed or semi-concealed surfaces of timber; to BS 186, Part 1.

Moisture Content

(i) Timber for External Joinery Components

Moisture content of timber shall be 17% at time of manufacture.

(ii) Timber for Internal Joinery Components

Moisture content of timber shall be 12% at time of manufacture and fixing.

(iii) Timber Floor Boarding

Moisture content of timber shall be not more than 12% and not less than 9% at time of laying.

(iv) Plywood Blackboard and Laminboard

Moisture content of sheets used externally shall be 17% + or -2% at time of fixing. Moisture content of sheets used internally shall be 10% + or -2% at time of fixing .

Softwood

Softwood species to BS 1186, Part 1, Appendix A.

Softwood tongued and grooved floor boards; to BS 1297, excluding Clause S (Moisture content)

Hardwood

Hardwood species to BS 1186, Part 1, Appendix B.

Nomenclature

Nomenclature of commercial timbers; to BS 881 and 589.

Adhesives

(i) For External Applications

Synthetic resin gap filling adhesives; to BS 1204, Part 1, Type WBP.

(ii) For Internal Applications

Synthetic resin gap-filling adhesives; to BS 1204, Part 1, Type MR.

Cold-setting case-in adhesives; to BS 1444.

Chipboard

Medium density wood chipboard to BS 2604, Part 2, density. 480-640 KG/CM.

High density wood chipboard to BS 2604, Part 2, density

over 640 KG/CM.

Nails

To BS 1202, Part 1.

Screws

To BS 1210, Part 1.

Screw Cups

To BS 1494, Part 2.

Coach Screws

To BS 1494, Part 2.

Bolts

To BS 4190.

Ironmongery

Performance of locks and latches to BS 2088.

Dimensions of locks and latches to BS 455 unless specified otherwise.

Performance and dimensions of lock and latch furniture to - BS 4951.

Hinges to BS 1227, Part 1A unless specified otherwise.

Door bolts to BS 1288 unless specified otherwise.

Storage of Materials

Do not deliver to Site any components which cannot be immediately unloaded into suitable conditions of storage.

Unload, handle and store components in accordance with the manufacturer's recommendations.

Store components in conditions suitable for specified moisture content, avoid prolonged exposure to direct sunlight and ensure good ventilation.

Stack components on bearers on level dry floors under cover. When stacking stagger components or separate with spacers to prevent damage by and to projecting ironmongery, beads, etc.

Stack doors horizontally on not less than three level bearers at not more than 1000 mm.

Protection

(i) Avoid distortion of components during transit, handling and storage.

(ii) Retain protective coverings in position.

Transport and store plywood, blackboard and laminboard sheets flat with sufficient support to prevent bowing and warping. Prevent damage to edges and corners. Protect from weather and keep off ground.

Protect faces of veneered panels, retaining protective coverings for as long as possible, including during fixing.

Transport and store particle boards flat with sufficient support to prevent bowing and warping. prevent damage to edges and corners. Protect from weather and keep off round.
Transport and store fibre building boards flat with sufficient support to prevent bowing or sliding. Prevent damage to edges and corners. Protect from weather and off ground. Cut any steel binding as soon as practicable but retain other packaging.

Workmanship

Joinery Generally

Do not modify profiles of sections from those shown on drawings without prior approval.

Make to BS 1186, Part 2.

Arises to be pencil rounded.

Punch all nail heads below timber surfaces which will be visible in completed work.

Countersink strew heads not less than 2 mm below timber surfaces which will be visible in completed work.

Countersink screw heads 6 mm below timber surface which re to be clear finished. Glue in grain matched pellets not less than 6 mm thick and cut from matching timber. Finish off with face.

Double tenon lock rails.

Protection: prevent damage to arises and glazing beads. Retain any protective coverings in place for as long as practicable, but remove on completion.

Moisture content: during fixings and thereafter to practical completion maintain conditions of temperature and humidity suitable for specified moisture contents of timber components.

Panels for Solid Screen

10 mm "Trespa" external cladding, reference AO7.1.1 bedded in clear silicone and backed with softwood packings screwed with "twinfast" woodscrews at maximum.

225 mm centres, and with 10 mm "Trespa-Volkern" set back 4 mm from rear of screen

Secret Head Screws

All screws exposed to view (except on glazing beads) shall be secret head type, "snake eye" pattern, with matching cups.

Fixing Door and Window Frames

Ensure that frames are primed or sealed as specified before fixing.

Frames must not carry any structural loads unless specifically designed to do so.
Keep opening lights closed and secured during all operations until fixed. Retain any clamping devices in position.

Pack opening lights between light and frame to maintain correct clearances.

Remove horns before fixing.

Position and maintain frames and linings plumb, level and square.

Avoid displacement of damp-proof courses and ensure that hey are positioned correctly in relation to frame.

Pin damp-proof courses to frame when building in.

Support and brace frames as necessary to prevent distortion during erection of adjacent structure.

Distortion

1. Do not distort frames when driving wedges or other packing, or when tightening fixings.

2. Ensure adequate clearances for opening parts. If necessary adjust packings and fixings to eliminate binding.

3. Do not cut, plane or sand frames to remedy distortion.

Fixing Door and Window Frames: Fastenings

Pivot windows; position fixing point adjacent to pivots.

Door frames; ensure that al least one fixing is adjacent to each hanging point.

Fix cramps to back of jambs with two screws.

Fix dowels into bottom of all door frame posts to a depth of at least 75mm with tight push fit and bed in mortar into floor.

Fix jambs at approximately 150mm from bottom edge and head and at 600mm maximum centres.

Fix head, cills and thresholds at centre when over 1200 mm

and up to 1800 mm long.

Fix heads, cills and thresholds at 600 mm centre when over 1800 mm long.

Fix loose thresholds 150 mm from each end.

Hanging Doors

Maintain and if necessary adjust for specified clearances between door and surround when hanging.

When hanging doors allow for dropping.

Plane and sand unfinished doors equally on opposite edges when adjusting clearances.

Reseal edges as originally specified if sanded, planed or cut during fixings.

Ensure that bottom edges of doors are sealed as specified before hanging.

Fixing Plywood, Blockboard and Laminboard Sheets to Continuous Surfaces

Keep sheets dry. Do not fix to damp surfaces. Do not fix internal linings before building is weathertight.

Protect surface of sheets from dirt, stains and damage

Fixing Plywood, Blockboard and Laminboard Sheets to Battens, Frames or Joints

Keep sheets dry. Do not fix to damp supports. Do not fix internal linings before building is weathertight.

Ensure provision of supports for all edges of sheets, including noggins to support cross joints.

(i) Nailing

Fix sheets at 150 mm centres along supported edges and 300 mm centres along intermediate supports.

(2) Drive nails in at an angle and punch heads below surface.

ii) Screwing

(1) Fix sheets with countersunk screws at 150 mm centres along supported edges and 300 mm centres along intermediate supports.

(2) Countersink screw heads not less than 2 mm below timber surfaces which will be visible in completed work.

Stagger joints of sheets to partitions on opposite faces.

Cover Trims and Miscellaneous Sections

Wherever possible trims shall be in unjointed lengths

between angles or ends of runs. Where running joints are unavoidable, obtain approval of location and method of jointing.

Angle joints; mitre unless otherwise specified.

Fix proprietary trims and sections in accordance with their manufacturer's recommendations.

Fix timber trims and sections securely to prevent pulling away, deflection or other movement during use.

Fixing Ironmongery

Ironmongery generally; assemble and fix in accordance with manufacturer's recommendations. Use fastenings with matching finish supplied by ironmongery manufacturer.

Fix locks and latches with forends let in flush with edge of door.

Let in striking plates flush. When positioning allow for dropping of door.

Prevent damage to surfaces of ironmongery and surrounding surfaces which will be visible in completed work.
Completion; check and adjust all ironmongery, lubricate all moving parts as necessary to ensure correct functioning.

Glazing

Definitions

Hacking Out Old Glass

Prices for hacking out old glass shall include for well priming rebates.

Glazing with Beads

Prices for glazing with beads shall include for taking off loosely pinned beads and refixing.

Glazing to Lead Cames

Price for glazing to lead cames shall include brushing in a cement of thin metallic putty.

Generally

Code of Practice

Glazing and fixing of glass for buildings shall be to BSCP 152

Materials

Glass

All glass shall be of accurate size with clean undamaged d surfaces which are not disfigured.

Keep dry and clean during delivery and storage.

Clear sheet glass to BS 952, Ordinary glazing quality, O.Q

Clear float and polished plate glass to BS 952, glazing quality, G.G.

Rough cast glass to BS 952.

Square pattern wired rough cast glass to BS 952. Wires to be straight both ways to approval.

Square pattern wired ground and polished glass to BS 952. Wires to be straight both ways to approval.

Parallel wired, ground and polished glass to BS 952.

Diamond pattern wired, ground and polished glass to BS 52.

Laminated glass shall be formed with 2 No sheets of 3 mm transparent float glass bonded to and separated by 0.8 m layer of polyvinyl butyl P.V.B. making a nominal thickness of 7 mm.

Distance Pieces and Location Blocks

Distance pieces and location blocks shall be of plasticized PVC:-

1) Thickness equal to specified space between glass and rebate, bead or cleat.
2) Depth to give not less than 6 mm cover of sealant.

Setting Blocks

Setting blocks of lead, sealed hardwood, rigid nylon or PVC. Do not, use' UPVC when glazing heavy panes of glass, solar control glasses or sealed double glazing units.

Glazing Compounds

Check with manufacturers that compounds, sealants and paints to .be used together are compatible.

Linseed oil putty to BS 544.

Metal casement putty shall be of an approved type:

1) Recommended by the manufacturer for the particular application.

2) With setting properties and unpainted life to suit the construction industry.

Workmanship

Working of Glass

Edge treatment to BS 952, Section 5.

Preparation for Glazing

All rebates and grooves shall be clean, dry and unobstructed at time of priming, sealing and glazing.

Painted timber surrounds; ensure that suitable priming paint has been applied to rebates before glazing with linseed oil putty.

Painted timber surrounds; ensure that rebates have been sealed with primer and at least one undercoat before glazing with metal casement putty, flexible or on-setting compound.

Clear finish timber surrounds; ensure that rebates have been sealed with undiluted exterior varnish before glazing with metal casement putty, flexible or on-setting compound.

Ensure that timber beads are sealed to match timber surround.

Fixing Glass - Generally

All external glazing shall be wind and watertight on completion.

Edge clearance shall be equal all round each pane and not less than 3 mm for single glazing.

Use setting and location blocks for all panes exceeding .2 sq metres. Locate as recommended by window manufacturer but never more than 75 mm from corner of surround.

Ensure that no voids or spaces are left in back or bedding compounds.

Strip surplus backing or bedding compound:-

1) To top and side edges, flush with top of rebate, bead or groove.

2) To bottom edges, at an angle to avoid collection of water.

Pre-glazing of components will not be permitted.

Putty Fronting of Glass

Timber surrounds; secure glass with glaziers sprigs or cleats not more than 440 mm apart.

Back putty; of regular thickness, not less than 2 mm.

Fronting; form neat triangular fillet, stopping 2 mm short of sight line. lightly brush surface to seal putty to glass.

Bead Fixing of Glass

Locate setting and location blocks as in BSCP 152, Figure 1.

Use distance pieces in all external bead fixing except here strips or channels are specified, to give beds of regular thickness, not less than 3 mm, on each side of glass.

Locate distance pieces:

1) Opposite each other on each side of glass.
2) Not more than 300 mm apart, adjacent to fixing points of beads, with first pair on each edge not more than 75 mm from corner.
3) So as not to coincide with setting and location of blocks.

Mastic preformed tape must not be compressed to less than mm thick. Use distance pieces as necessary.

External glazing:

Bed outside beads to rebate in compound. outside beads dry to rebate. inside beads dry to rebate.

Internal glazing:

Bed beads dry to rebate and to glazing tape.

Pass internal dry glazing tapes round edge and trim off flush on both sides.

Secure timber beads by rust-proofed panel pins not more t an 200 mm apart and not more than 7 mm from each corner. Refer also to Specification Part No.4 (Section B) or details of those beads required to be screw fixed.

Protecting and Cleaning Off Finished Work

Remove all smears and excess compound and sealant. Leave clean inside and out and free from scratches.

Remove all mortar, plaster or concrete spillage whilst wet .

Linseed oil putty and conventional metal casement putty hall be sealed as soon as sufficiently hard and in any case within the times recommended by their manufacturers.

Protection of putty; sealing to be paint or varnish according to the finish specified, and either:

1) The full final finish, suitably protected until completion and cleaned down and made good as necessary, or

2) Two additional coats applied locally to the compound with the full specified finish.

Putty fronting; leave all opening lights in closed position until putty has set sufficiently to prevent displacement of glass.

Replace all glass and fixing materials broken or damaged before practical completion and re-decorate.

E1.22 Painting and Decorating

Definitions

Cutting Out and Repairing Cracks etc.

Materials compatible with the existing surfaces shall be used for facing up and for repairing cracks and such terms shall be deemed to include rubbing down the repaired surface and sizing, priming or sealing as appropriate having regard to the subsequent treatment .

Generally

Code of Practice

Preparation of old surfaces to BSCP 231, Section 9.

Preparation of new surfaces to BSCP 231, Section 6.

Painting to BSCP 231, Section 7.

Materials

Approved Suppliers

Coating materials shall be supplied by one of the following :

Akzo Coatings plc (Sikkens)
35 Milton Park
Abingdon
Oxfordshire
OX14 4SB

Imperial Chemical Industries Limited
Decorative Products Department
Wexham Road
Slough, Bucks

International Paints Limited
Henrietta House
Henrietta Place
London W1A 1AD

Sigma Coatings Limited
Castle Mills
Buckingham, Bucks MKl8 lED

Filling Stopping and Cleaning Materials

Paint strippers, abrasive papers and blocks, cleaning agents, etching solutions, mould inhibitors, rust inhibitors, size, stopping, knotting, fillers and other commodities; types recommended by the decorative coating manufacturer for the surfaces being prepared.

White spirit to BS 245

Glue size to BS 3357, Type A

Glue size to BS 3357, Type B

Gold size to BS 311.

Knotting to BS 1336

Low lead priming paint to BS 5368.

Stopping for woodwork to receive clear finish; tinted to match surrounding woodwork, to approval.

Stopping for internal woodwork, plywood, hardboard and fibreboard - linseed oil putty to BS 544 tinted to match the colour of the undercoat.

Stopping for external woodwork; white lead paste and old size well mixed.

Costing Materials

All brands of paints, distempers and other coating materials to approval.

Coating materials shall be delivered in sealed containers. Clearly labelled with the following information:-

1) Type of materials.

2) Brand name, if any.

3) Intended use.

4) Manufacturer's batch numbers.

Batch deliveries of coating materials shall be dated for use in order of delivery.

Paints other than water based and-bituminous paints shall be delivered in containers of not more than 5 litre capacity.

Priming coats, undercoats' and finishing coats for any one surface must be obtained from the same manufacturer:

Lead Content

All paints and primers shall be lead free; to be free of all lead pigments and other lead compounds including driers.

Storage of Materials

Store painting materials in a clean, dry area protected from extreme temperatures.

Storage of Materials

Store painting materials in a clean, dry area protected from extreme temperatures.

Workmanship

Preparation of Surface Generally for Painting

Prepare surfaces in accordance with decorative coating manufacturer's recommendations.

Use paint strippers, cleaning agents, etching solutions, mould inhibitors, size, stopping, knotting and fillers in accordance with their manufacturer's recommendations

Ensure that all holes, cracks, defective joints and other defects in surfaces to be prepared and coated have been made good.

Ensure that pre-primed surfaces have been properly prepared and that primer is of suitable type, firmly adhering and in good condition.

Before decorating allow surfaces to dry thoroughly.

Brush down all surfaces immediately before decorating to remove dust, dirt and loose material.

Before applying coatings, prepare representative areas of ach type of surface, to approval.

Preparation of Woodwork and Plywood Surface for Painting

Ensure that at time of decorating timber has a moisture content appropriate to its use in the building.

Ensure that large and dead knots are removed and made good with sound timber. Rub down before priming.

Ensure that surfaces have a smooth, even finish with arises rounded to 1.5 mm radius.

Ensure that nail and screw heads are countersunk sufficiently to hold stopping.

Stopping for painting; after priming. Stop nail holes and similar depressions with stopping pressed well in to remove trapped air. Finish off flush with surface.

Remove resinous exudations and apply knotting to resinous pore and all knots and allow to dry.

Wash down with white spirit immediately before priming hardwoods containing an excess of natural oil.

Filling for painting; after stopping and sealing, fill pore and grain irregularities with filler to match the colour of the timber. Remove surplus and rub down to leave a smooth, even surface.

Pre-primed surfaces; ensure that any areas of defective primer are removed and patch primed. Remove dirt and grease from satisfactorily primed surfaces and rub down lightly.

Preparation of Hardwood Joinery Surfaces for Application of Microporous Wood Finish

Ensure that surfaces have a smooth, even finish with arises rounded to not more than 3 mm radius (maximum).

Ensure that pin heads are countersunk sufficiently to hold colour matched brummer. Ensure that screw heads and fame fixings are countersunk and covered with flush pelleting.

Ensure that all joinery is finely sanded and then given 1 No cost of Sikkens “HLS” finish followed by 2 No coats of Sikkens “Filter 7” finish, colour 077 “Deal”. This is in addition to the base coat of Sikkens “HLS” applied in the workshop prior to delivery of the joinery to site.

Preparation of Iron and Steel Surface for Painting

Manual cleaning; scrape or wire brush surfaces to remove rust and loose scale, welding slag and spatter. Clean out crevices, quirks, contact face crevices. Remove oil, grease and dirt using white sprit, naptha or steam.

Flame cleaning preparation: remove all rust, mill-scale, dirt and grease by oxyacetylene flaming and wire brushing or scraping. Take all necessary safety precautions. During flame cleaning. Apply primer while metal is still arm.

Chemical cleaning; remove oil, grease, dirt, rust and ill-scale by an approved chemical process. Rinse off leaning materials.

Pre-primed surfaces; ensure that defective primer, rust and loose scale are removed back to bare metal and patch primer. Remove dirt and grease from satisfactorily rimed surfaces and rub down lightly.

Preparation of Non-Ferrous Metal Surfaces for Painting

(i) Copper Surfaces:

Wash with white spirit to remove dirt and grease. Etch with fine abrasive papr and white spirit.

(ii) Lead-Tin Surfaces:

Wash with white spirit to remove dirt and grease. Rinse with clean hot water

Etch swab with a solution of five parts concentrated hydrochloric acid in ninety-five parts methlyated spirit until a crystalline pattern is seen (within about 10 seconds). Rinse with clean hot water.

(iii) Galvanised and Zinc Coated Surfaces

Wash with white spirit to remove dirt and grease. If metal coating is defective obtain instructions before proceeding.

Preparation of Previously Painted and Papered Surface for Painting

Where existing wallpaper is to be stripped, wash down with soap and water or detergent solution to remove paper residues, paste or size. Cut out cracks and make good imperfections by filling and rubbing smooth. Rinse with clean water.

Ensure that existing wallpaper which is to be retained is in good condition and well adhered to substrate. Rub down with damp cloth to remove dirt and grease. Size or seal to reduce porosity.

(i) Painted timber Surfaces:

Strip completely or burn off existing paint. Rub down smooth and prepare timber as for new work.

Wash down with detergent solution to remove grease and dirt and rub down with abrasive paper or block while still wet. Rinse down and allow to dry, Carefully scrape back or burn off loose and defective material to a firm edge. Prepare bare timber as for new work.

Scrape back clear finished timber surfaces to an even colour to receive clear finish.

(ii) Painted Metal Surfaces:

Wash down with detergent solution to remove grease. Carefully scrape off and/or wire brush loose and defective material to a firm edge and to a firm paint base. Chip, scrape or wire brush corroded surfaces back to base metal.

Do not damage galvanising or zinc coating.

Wash down painted concrete, brick or rendered surfaces with detergent solution to remove grease and dirt. Carefully scrape back loose and defective material to a firm edge. Cut out cracks and make good imperfections by filling and rubbing smooth. Rinse with clean water.

(iii) Painted Plaster Surfaces:

Wash down with detergent solution to remove grease and dirt. Carefully scrape back loose and defective material to a firm edge. Cut out cracks and make good imperfections by filling and rubbing smooth. Rinse with clean water.

Painting Generally

Carry out decoration in colours to BS 4800 as selected by Contract Administrator.

Permit paint manufacturers to:

1) Inspect the work in progress.
2) Take samples of their products from site if requested.

Obtain approval of representative sample areas of each type of coating before carrying out the remainder of the work.

Cleanliness

(1) Keep all brushes, tools and equipment in a clean condition.

(2) Keep all surfaces clean and free from dust during coating and drying.

(3) Provide a suitable receptacle for liquids, slop washings etc.

Preparation of Coating Materials

Prepare coating materials as recommended by their manufacturers.

Strain through fine gauze any coating materials showing bittiness in application.

Do not intermix different coating materials.

Stir coating materials to attain an even consistency before use unless otherwise recommended by manufactures.

Application of Coating Materials

Apply coatings in accordance with their manufacturer's recommendations to clean, dry surfaces in dry atmospheric conditions and after any previous coats have hardened.

(i) Do Not Apply Coatings:

(1) To surfaces affected by damp or frost.
(2) When ambient temperature is below 4 degrees Celsius.
(3) When heat is likely to cause blistering or wrinkling.

Do not apply consecutive coats of the same colour except white.

(ii) Priming Generally:

(1) Apply priming coats by brush unless other methods are specifically permitted.

(2) Work primer into surface, joints, angles and end grain.

(3) Ensure that priming coats are of adequate thickness and suit surface porosity.

(4) Ensure that any primed surfaces which have deteriorated on site or in transit are touched up or re-primed.

(iii) Priming Joinery

Prime all joinery surfaces before components leave joinery shop.

Prime all joinery components on site immediately after they have been approved.

Where timber has been treated with preservative, check with preservative manufacturer that coating materials are compatible with the preservative.

(iv) Priming Metal

Prime metal surfaces on same day as they have been cleaned.

Prime flame cleaned iron and steel surfaces while still hand warm.

Allow wash or etch priming coats to harden before applying subsequent priming coats. -

Apply undercoats in a wet, even film over all surfaces, voiding brush marks, sags, runs and other defects.

(v) Finishing Coats:

Apply in a wet, even film over all surfaces, avoiding brush marks, sags, runs and other defects.

Where two hard gloss finishing coats are specified, apply second coat within 48 hours of first coat.

Prime and paint bottom edges of doors before hanging.

vi) Glazing:

Apply coatings to rebates and beads before glazing.

Prime and paint or seal glazing compound.

Extend painting adjacent to glazing across putty and on to glass up to sight line.

Rub down all priming and undercoats to a smooth surface with abrasive paper and remove all dust before applying next coat.

Cut in neatly and cleanly. Do not splash or mark adjacent surfaces.

(vii) Brush Painting:

(1) Apply all paints by brush unless otherwise specified.

(2) Layoff all areas evenly and ensure that finished surfaces are free from brush marks,

(viii) Roller Painting Will Not Be Permitted

(ix) Spray Painting

Spray painting will not be permitted.

Protection

Protect freshly applied surface coatings from damage.

Exhibit wet paint signs and provide protective barriers where necessary.

Protect surfaces adjacent to those being coated.

Remove ironmongery from surfaces to be coated and replace on completion.

E1.23 Metalwork

Mild Steel shall comply with **BS 4260**

All ferrous metal to be painted on site shall be thoroughly cleaned to remove all scale and rust and left free from grease, oil and dirt. Make good all defects which would otherwise show after the application of decorative coatings, and finish the surface smooth and free of burrs.

E1.24 Welding

Thoroughly clean all surfaces to be welded. Ensure an accurate fit using clamps and jigs where practicable. Make joints with parent and filler metal fully bonded throughout with no inclusions, holes or cracks.

Butt welds which will be visible in completed work shall e finished smooth and flush with adjacent surfaces.

The techniques and materials employed in welding shall be selected with due regard to the character of the work and the metals being connected.

Section 3

Trade Preambles

Collection Page

Page 3/1	£
Page 3/2	£
Page 3/3	£
Page 3/4	£
Page 3/5	£
Page 3/6	£
Page 3/7	£
Page 3/8	£
Page 3/9	£
Page 3/10	£
Page 3/11	£
Page 3/12	£
Page 3/13	£
Page 3/14	£
Page 3/15	£
Page 3/16	£
Page 3/17	£
Page 3/18	£
Page 3/19	£
Page 3/20	£
Page 3/21	£
Page 3/22	£
Page 3/23	£
Page 3/24	£
Page 3/25	£
Page 3/26	£
Page 3/27	£
Page 3/28	£
Page 3/29	£
Page 3/30	£
Page 3/31	£
Page 3/32	£
Page 3/33	£
Page 3/34	£
Page 3/35	£

Page 3/36	£
Page 3/37	£
Page 3/38	£
Page 3/39	£
Page 3/40	£
Page 3/41	£
Page 3/42	£
Page 3/43	£
Page 3/44	£
Page 3/45	£
Page 3/46	£
Page 3/47	£
Page 3/48	£
Page 3/49	£
Page 3/50	£
Page 3/51	£
Page 3/52	£
Page 3/53	£
Page 3/54	£
Page 3/55	£
Page 3/56	£
Page 3/57	£
Page 3/58	£
Page 3/59	£
Page 3/60	£
Page 3/61	£
Total to Collection	**£**