Statement of Witness – Exhibit CP04

I, Colin Richard Packer, declare that the document attached comprises Exhibit CP04 referred to in my witness statement.

Signature

Dated the 9TH day of JULY 2021

calfordseaden

Repair and Maintenance Services, Building Installations

Appendix 8 (Part B)
Technical Specification

LAK00000527/2

ITT Document – Appendix 8B
Technical Specification

1 INTRODUCTION

1.1 Basis of Contents

Appendix 8B contains the requirements for Planned Maintenance, Planned and Reactive Repairs and Asset Collection for the various work types.

This Appendix should be read in conjunction with the other invitation to tender documentation and particularly Appendix 1: Introduction, Definitions and Brief and Appendix 8 Part A.

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2 REQUIREMENTS APPLICABLE TO ALL ELEMENTS OF THE SERVICE

2.1 Asset Information

The Service Provider is required to review and, if necessary, update the asset information lists during the first six months of the contract. It is anticipated that this will be done on the first planned maintenance visit for each asset. The Service Provider shall provide a report within six months of the contract commencement ("The Asset Verification Report") highlighting any inconsistencies found between the asset information provided by KCTMO and the assets on site.

The Asset Verification Report will set out details of:

- Manufacturer of system
- Type and number of components within this system
- Location of system
- Estimated age/estimated life/replacement cost

Following the provision of the Asset Verification Report the Service Provider shall inform KCTMO if it becomes aware of any changes to the assets on site (e.g. additional door entry systems or the removal of any asset). This shall be done by an update report issued each 3 months

2.2 The priority codes for repairs

For repairs the priority codes are:

- Emergency – attendance within 4 hours and completion within 24 hours
- Urgent – Completion within 48 hours
- Routine – Completion within 7 working days.

2.3 Repair Requests – general

It is anticipated that the majority of repair requests will be under the urgent and routine categories.

With any repair completed, the worksheet shall clearly identify the scope of the repair undertaken and will also identify KCTMO's asset reference/number. The time of arrival on site and time of departure are also required.

For repairs completed at the time of Planned Maintenance visits, the Service Provider shall have pre-authorisation to complete works up to a maximum value of £250 plus VAT (labour and material) per block or asset depending on the pricing structure. The cost of all such works shall be in accordance with the tendered rates and this threshold shall apply per Planned Maintenance Visit.

For Reactive Repairs, orders will be issued and these will identify the block, location and asset reference so that the scope of the repair is clearly defined.

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2.4 Certification following planned maintenance visits

Following each planned maintenance visit the Service Provider shall provide electronically a certificate to KCTMO to upload to the asset management system. The certificate shall be named in accordance with the naming convention specified by KCTMO and shall include the UPRN number of the property. The format of the certificate is to be agreed between the Service Provider and KCTMO during the Mobilisation Period. For certain areas of service (e.g. Electrical Installation Condition Reports) standard industry certificates will be used. For other areas a bespoke form shall be created. The purpose of this is to ensure that KCTMO has evidence which is easily obtainable to demonstrate to regulatory authorities that assets are being adequately maintained.

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3 EMERGENCY AND COMMUNAL LIGHTING

3.1 Planned Maintenance

The Service Provider shall be responsible for carrying out Planned Maintenance to emergency lighting systems (including battery and lamp replacement) in accordance with BS 5266–1:2011 and EN 50172:2004.

The Planned Maintenance of emergency lighting systems will include Planned Maintenance to any communal lighting in the same block if this is installed (and no separate charge will be made in respect of the Planned Maintenance of the communal lights in this situation).

The scope of the emergency lighting systems shall include:-

- Emergency light
- Switchgear
- Lamps
- Diffusers
- Batteries
- Control Gear
- Isolators
- Test Switches
- Gear Trays
- Central Batteries

The Planned Maintenance regime shall consist of activities in accordance with BS 5266 – 1:2011 and EN 50172:2004 at 6 monthly intervals.

For one of the 6 monthly visits (each year), a 3 hour discharge test shall be included.

Utilising the fitting identification system utilised by KCTMO, worksheets and reports shall clearly identify fittings tested and those found to be inoperative relating to the test undertaken.

Monthly testing of emergency lighting shall be completed by KCTMO.

The 3 hour discharge tests completed annually will coincide with the inspection visit for communal lighting systems.

The Planned Maintenance shall include internal and external cleaning of the luminaires where required.

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3.2 Repairs

The Service Provider shall provide a Reactive Repair service as part of the Contract and this shall include the following types of repairs:-

- Repair to defective emergency lighting fittings.
- Completion of repairs to emergency lighting when undertaking the Planned Maintenance visit.
- Instructed repairs such as replace fittings, gear trays, etc.

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4 FIRE SAFETY EQUIPMENT

4.1 Planned Maintenance

4.1.1 Fire Alarm Systems

The Service Provider shall carry out inspection and testing of the complete fire alarm system (including magnetic door closers, smoke detection, etc.) in accordance with BS 5839-6:2013 : Fire Detection and Fire Alarm Systems for buildings : Reference Section 26. The Service Provider shall include for visits to the property every six months to carry out the planned maintenance regime.

4.1.2 Portable Fire Extinguishers

The Service Provider shall be responsible for the servicing of all portable fire extinguishers in accordance with BS 5306-3: 2009, Sections 5 – 8 on an annual basis.

It shall be the responsibility of the Service Provider to carry out recharging of fire extinguishers as necessary due to the deterioration of existing medium/propellant and discharging as dictated by Annex A of this Standard.

Recharging of extinguishers shall be carried out in accordance with BS 5306-3 : 2009.

The Service Provider shall be responsible for labels and date marking of all extinguishers within each property with regards to inspection, testing and recharging as applicable. All tests, inspections, discharging and recharging shall be fully documented.

The Service Provider shall re-hang the extinguisher if this was mounted on the wall and it has either been detached or the wall fastening has become unstable.

The recharging of portable fire extinguishers due to vandalism or misuse or following use in the event of fire shall be categorised as chargeable works and shall be in addition to the fixed cost.

4.1.3 Fire Blankets

The Service Provider shall be responsible for the checking of the fire blankets on an annual basis.

Fire blankets shall be checked in terms of their location with regards to easy access and being readily available for use within the area of protection. The Service Provider shall fix a label the fire blanket which should then be signed and dated at each visit.

Fire blankets shall be inspected to ensure that adequate and secure fixings are maintained and that tapes are free from obstruction.

4.1.4 Dry and Wet Risers

The Service Provider shall include for 6 monthly inspections and report, together with an annual inspection and pressure testing of the equipment in accordance with BS 9990:2015.

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For both dry and wet risers, the inlets, landing valves, drain valves, door hinges and locking arrangements to the inlet and landing valve boxes should be inspected. Particular attention should be given to all valves, spindles, glands and washers to ensure that they are in satisfactory condition, so that all equipment is ready for immediate use.

For dry risers, the following tests should be carried out annually:-

- Static pressure test, as defined by 7.3.1.3 in BS 9990:2015

For wet risers, the following tests shall be completed annually:-

- Static pressure test, as defined in 7.3.1.3 of BS 9990:2015
- Flow and pressure test for main as detailed in 7.3.1.4 of BS 9990:2015
- Test on pumps as detailed in 7.3.1.5 of BS 9990:2015

In addition on an annual basis (which shall be at least 4 months subsequent to the 6 monthly inspection), the following checks should be carried out:-

- Internal cleanliness, condition and water level of storage tanks, including new operation of float valves and any water level alarms.
- Booster pumps and their associated mechanical and electrical equipment.
- Electrical supplies and equipment to prevent freezing.
- Operation of system monitoring and alarms.

Where pressure regulating valves are installed, the manufacturer's maintenance recommendations should be followed.

The Planned Maintenance Cost shall include for replacement as required of worn, damaged or missing washers, seals, caps and chains.

4.1.5 Hose Reels and Hoses

The Service Provider shall include for an annual inspection of the hose reel installation. This shall be in accordance with EN 671-3 : 2000 (reference Section 6.1), the inspection shall include for a thorough examination of the system and in particular shall include: -

- Check on operational valves.
- Inspection and test of hose reel.
- Check hose for any apparent wear or defects.

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4.1.6 **Hardwired Smoke Detection in Communal Areas**

For standalone smoke detection or linked smoke detection, the Service Provider shall include for an annual servicing and testing visit. All testing and checks shall be in accordance with British Standard requirements and test documentation will include reference to the identification system utilised by KCTMO in terms of individual detectors.

4.1.7 **Automatic Opening Vents (AOV's)**

The Service Provider shall include for 6 monthly servicing of AOV systems in accordance with manufacturer's instructions. The servicing shall include checking of interfaces with the fire alarm panel or AOV control system panel, together with checking and servicing of all AOV activators/mechanisms.

4.1.8 **Sprinklers**

The Service Provider shall carry out inspection and testing of the complete sprinkler system (including sprinklers, pipework, pipework supports, controls, valves, flow switches, pumps, water storage tanks, telephony systems, standby generator, etc.) in accordance with BS EN 12845 : 2009 – Reference Section 20 – Quarterly, Six Monthly and Yearly activities.

It should be noted that some of the sprinkler systems are in occupied homes and it will be the responsibility of the Service Provider to arrange access to undertake any necessary inspections.

4.2 **Repairs**

The Service Provider shall provide a repair service as part of the Contract and this shall include the following types of repairs:-

- Reactive repair service relating to defective fire safety equipment.
- Completion of repairs to fire safety equipment when undertaking the Planned Maintenance visit.
- Instructed repairs such as replacement detectors, AOV repairs, etc.

Where a fire alarm has activated due to a false alarm, the Service Provider will normally be instructed to attend on an 'emergency basis' to complete the necessary repair and to silence and reset the fire alarm system.

In the event of a property being left without suitable fire safety equipment cover, the Service Provider will immediately notify the Client's Representative (by phone and e-mail) so that suitable contingency measures can be agreed.

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5 FALL ARREST SYSTEM

5.1 Planned Maintenance

The Service Provider shall include for annual inspection and load testing of fall restraint/fall arrest cable systems. The annual Planned Maintenance shall be completed in accordance with CEN TS 16415 : 2013 and EN 795 : 2012.

The Service Provider shall include for full inspection and testing certification and additionally, following completion of the Planned Maintenance, weatherproof labelling shall be incorporated to identify: -

- Date and details of inspection and testing completed, together with Service Providers name or that of the specialist involved.
- In the event of the inspection or testing identifying that the system is not safe for use then suitable weatherproof labelling shall be incorporated to advise users.

In the event that the system is not safe to use, the Service Provider shall inform the Clients Representative and the site based representative (Estate Assistant).

The testing and inspection shall include the fall arrest cable systems together with constant force posts.

All testing, inspection certification shall be satisfactory to fulfil the requirements of the Provision Use of Work Equipment Regulations (PUWER) 1998. The Service Provider shall also provide a separate cost for a LOLER (Lifting Operations and Lifting Equipment Regulations) thorough examination and report. If this is required then this shall be subject to a specific Order from the Client's Representative.

5.2 Repairs

The Service Provider shall be responsible for undertaking repairs, although the requirement is likely to be minimal.

Notwithstanding this, Service Provider shall provide a repair service as part of the Contract and this may include the following types of repair:-

- Completion of repairs to all restraint/fall arrest cable systems when undertaking the annual Planned Maintenance Visit.
- Instructed repairs for fall restraint/fall arrest cable systems.

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6 LIGHTNING PROTECTION

6.1 Planned Maintenance

The Service Provider shall be responsible for carrying out Planned Maintenance to lightning protection systems.

Testing shall be carried out on an annual basis and the testing regime and certification shall be in accordance with BS 6651: 1999 or BS EN 62305 depending on the date the system was installed.

Following completion of the testing and inspection, certification shall be provided as set out in Part A of this Appendix.

6.2 Repairs

The repair requirements relating to lightning protection equipment are likely to be minimal as backlog requirements were completed during 2014/15.

Notwithstanding this, the Service Provider shall provide a repair service as part of the Contract and this may include the following types of repair:-

- Reactive Repair Service relating to defective or damaged lightning protection systems.
- Completion of repairs to lightning protection systems when undertaking the annual Planned Maintenance visit.
- Instructed repairs for lightning protection systems.

7 COMMUNAL LIGHTING

7.1 Planned Maintenance

Communal lighting will be subject to annual Planned Maintenance Inspection which is to be carried out at the same time as the emergency lighting Planned Maintenance Visit which includes the 3 hour discharge test. The scope to be covered by the Planned Maintenance Visit is to include inspection, cleaning and testing of component parts as applicable and this would include:-

- Control gear
- Isolation switches
- Photocells/PIR's
- Switchgear including ballasts and chokes
- Lamps
- Lamp diffusers
- Time clocks
- Distribution board schedules.

The visit will include a full operational check and also for cleaning externally of light fitting diffusers.

As required, time clocks and PIR's should be adjusted and where there are defective fittings or lamps, these shall be identified utilising the fitting identification system utilised by KCTMO and details shall be recorded on the work sheet.

The annual inspection shall also include for communal electrical installations a 'routine check' as set out in IET Guidance Note 3 for Inspection and Testing.

The Planned Maintenance shall include cleaning internally and externally of the luminaire if required.

7.2 Repairs

The Service Provider shall provide a repair service as part of the Contract and this shall include the following types of repairs:-

- Reactive Repair Service relating to defective communal lighting.
- Completion of repairs to communal lighting when undertaking the Planned Maintenance visit.
- Instructed repairs such as replacement fittings, etc.

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In relation to lamp replacements, the quality of lamp is an essential element in terms of lamp life and all lamps utilised shall be of Osram manufacture or an equal and approved equivalent agreed with the Client's Representative. Any such alternative will be subject to confirmation through the Contract arrangements in terms of an instruction.

The lamp replacements shall be on a 'like for like' basis unless otherwise detailed on the order.

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8 ESTATE LIGHTING

8.1 Planned Maintenance

No Planned Maintenance is included in the scope of the Contract at this stage, albeit as a contingency measure, a cost shall be incorporated within Appendix 7 for annual Planned Maintenance. Should this be included, this will cover:-

- Column and Block Mounted Lighting
- Columns
- Column Winch Systems
- Control Gear
- Isolators
- Photocells/VIR's
- Time clocks
- Switchgear
- Lamps
- Lamp Diffusers

The annual inspection would include inspection, testing and cleaning as appropriate of the component part and all necessary high level access equipment would be included and reporting on the Planned Maintenance would include reference to KCTMO's fitting identification system.

Appendix 7 also requests a cost for the upgrade of column lights to LED lamps as KCTMO is considering undertaking this work in the future.

8.2 Asset/Condition Information

Asset/condition information is not required for this element of works other than when fittings are replaced suitable labelling shall be included for the fitting identification system utilised by KCTMO.

8.3 Repairs

The Service Provider shall provide a repair service as part of the Contract and this shall include the following types of repairs:-

- Reactive Repair Service relating to defective communal lighting.
- Completion of repairs to communal lighting when undertaking the Planned Maintenance visit.
- Instructed repairs such as replacement fittings, etc.

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In relation to lamp replacements, the quality of lamp is an essential element in terms of lamp life and all lamps utilised shall be of Osram manufacture or an equal and approved equivalent agreed with the Client's Representative. Any such alternative would be subject to confirmation through the Contract arrangements in terms of an instruction.

The lamp replacement shall be on a "like for like" basis unless other detailed on the order.

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9 POWERED GATES AND BARRIERS

9.1 Planned Maintenance

The Service Provider shall be responsible for carrying out 6 monthly Planned Maintenance for all powered gates and barriers. In terms of the scope of equipment covered, this shall include:-

- Powered arms
- Sensors
- Loops
- Hinges/Brackets
- Fire Switches
- Fob Readers/Access Controls
- Controls
- Push Buttons
- Mag Locks
- Operating Mechanisms
- Remote Controls

The Planned Maintenance activities shall be in accordance with manufacturer's recommendations and shall include as a minimum:-

a) Checking of all safety devices.

b) Checking of safety notices.

c) Checking of gate operation and controls.

d) Checking of operation and condition of operating mechanisms and controls.

Subject to instruction by the Client's Representative, the Service Provider may be required to complete a detailed Risk Assessment based on:-

- EN 12453: 2000
- HSE Safety Notice FODWSW 1 – 2010
- HSE Safety Notice – FOD 7 – 2010

The Service Provider's Representative undertaking the Risk Assessment should be able to demonstrate suitable experience and knowledge relating to this area of work.

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9.2 **Repairs**

The Service Provider shall provide a repair service as part of the Contract and this shall include the following types of repairs:-

- Reactive Repair Service relating to defective powered gates/barriers.
- Completion of repairs to gate/barriers when undertaking the Planned Maintenance Visit.
- Instructed repairs to powered gates/barriers.

Where gates/barriers cannot be repaired at the time of the first visit, the Service Provider's operative shall obtain confirmation from the site based representative on whether the gates/barriers shall be left open/closed.

10 DOOR ENTRY/ACCESS CONTROLS

10.1 **Planned Maintenance**

The Service Provider shall undertake an annual Planned Maintenance Visit for door entry/access control equipment. This shall include associated equipment including main entrance and secondary doors and the scope is inclusive of:-

- Door Entry Control Equipment
- Magnetic and Electric Locks
- Audio and Video Equipment
- Key Fob Panels
- Door Entry Handsets
- Power Supplies for Door Entry Systems
- Door Closers
- Door Panels, Hinges, Handles and Fixtures
- Main Entrance Doors

The scope of the Planned Maintenance Visit shall include:-

a) Check operation of call facility to Flats.

b) Check operation of "Trades" button (if fitted).

c) Check operation of "Fireman" switch (if fitted).

d) Check fob functionality (if provided).

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e) Check general condition, secureness fixings, etc.

f) Check access control fobs.

The checking of the voice link and door release facility shall be for a minimum of 25% of the Flats (with the assistance of Residents).

Associated work with the Planned Maintenance Visit shall include for checking the function of the door release with the exit push button and the fireman's switch. Locks should be adjusted and lubricated as necessary.

The Planned Maintenance shall also include a visual check of any surface run trunking/cabling, etc., relating to the door entry system.

10.2 **Repairs**

The Service Provider shall provide a repair service as part of the Contract and this shall include the following types of repairs:-

- Reactive Repair Service relating to defective door entry/access control systems.
- Completion of repairs to door entry/access control equipment when undertaking the Planned Maintenance Visit.
- Instructed repairs such as replacement handset, etc.

It is anticipated that there will be a high volume of Reactive Repair Requests and these will generally be under the categories of urgent and emergency.

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11 CCTV

11.1 Planned Maintenance

The Service Provider shall include for a single annual Planned Maintenance Visit for CCTV Equipment. This shall as a minimum be 10 months after the previous PM visit. The scope of the CCTV installations shall include:-

- CCTV Cameras
- Camera Control Units
- Camera Switches and Matrixes
- Multiplexers
- Monitors
- VCR's (Video Cassette Recorders)
- DVR's (Digital Video Recorders)
- Power Supply Units to CCTV's
- Microwave Links

The scope of the Planned Maintenance Visit activities shall include as a minimum:-

a) Monitors for CCTV – Check picture quality.

b) VCR's and DVR's for CCTV System – Check operation of system in accordance with manufacturer's instructions. Check access to sample recordings. Liaise with KCTMO's on-site Representative concerning operation and any problems.

c) Power unit for CCTV – Check unit is located in safe environment and in good order. Check electrical connections.

d) Multiplexers, camera switches and matrixes for CCTV systems – Check operation in accordance with manufacturer's instructions.

e) CCTV cameras – Fixed and Pan Tilt Zoom (PTZ) – Inspect camera housing and clean, check PTZ operation in accordance with manufacturer's instructions. Liaise with KCTMO's on-site Representative concerning operation, coverage, etc.

f) Monitors for CCTV – Check picture quality and liaise with KCTMO's on-site Representative concerning any operational problem.

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11.2 **Repairs**

The Service Provider shall provide a repair service as part of the Contract and this shall include the following types of repair:-

- Reactive Repair Service relating to defective CCTV.
- Completion of repairs to CCTV when undertaking the Planned Maintenance Visit.
- Instructed repairs such as replacement/additional cameras.

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12 PORTABLE APPLIANCE TESTING

12.1 Planned Maintenance

The Service Provider shall include for annual portable and transportable appliance testing subject to instructions from the Client's Representative.

This requirement is likely to be required for properties such as Sheltered Housing Schemes, Communal Halls, and KCTMO's offices and access will be through a site based representative of KCTMO.

The Service Provide will be responsible for preparing a full inventory of portable appliances which are the responsibility of KCTMO and this shall include:-

- Type of equipment – Microwave, lamp, fridge, etc.
- Identification details – Make, manufacture, etc.
- Location

All portable and transportable appliances shall be subject to combined inspection and testing.

The Service Provider shall include for labelling of all equipment testing and any equipment found to be unsafe, shall be suitably labelled and KCTMO's on-site Representative advised.

Testing and Documentation shall be as detailed in the IET Code of Practice for In-service Inspection and Testing of Electrical Equipment.

12.2 Asset/Condition Information

There are no requirements in terms of asset/condition information other than the details previously identified in Section 12.1 and, on an annual basis, provision of a list of all items tested.

12.3 Repairs

The Service Provider shall provide a repair service as part of the Contract and this shall include for repairs identified as part of the portable appliance testing.

Repairs requested shall be limited to repairs to the plugs and wiring and shall be limited to £50 per appliance.

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13 ELECTRICAL TESTING AND REMEDIAL WORKS

13.1 Electrical Inspection and Condition Reports

When instructed by the Client's Representative, the Service Provider will undertake the completion of Electrical Installation Condition Reports (EICR's) for both communal areas and individual dwellings. It is likely that the scope of such works will be based on circa 20% of communal areas/dwellings being completed for each financial year to fulfil the 5 yearly requirements in terms of completion of EICR's.

Completion of EICR's shall be in accordance with BS 7671

It is anticipated that the completion of EICR's will result in either "satisfactory or unsatisfactory" reports and in the event of an "unsatisfactory" report, suitable certification shall be provided in terms of completion of any code C1 or C2 remedial works.

13.2 Repairs

The Service Provider shall include for the completion of repairs/remedial works as identified when completing Electrical Installation Condition Reports.

The types of repairs may include: -

- Repair works up to a maximum value of £1,000 plus VAT.
- Emergency re-wires.

It should be noted that more major works or planned works may be implemented through separate Contract arrangements.

When completing the EICR's, the Service Provider shall have pre-authorisation to complete works up to a maximum value of £250 plus VAT (labour and materials). The cost of all such works shall be in accordance with the tendered rates and this threshold shall apply per EICR (dwellings or communal).

Where works are required of a higher value, details shall be forwarded to the Client's Representative identifying the scope of works required and also the cost based on the tendered rates. As previously noted, works may be instructed through these Contract arrangements or alternatively may form part of Capital Works Programme.

Works shall be in accordance with:

Attachment A : KCTMO Standard for Electric Works Generally

Attachment B : Electrical Standard Specification.

All repairs and works completed shall be in accordance with these requirements.

Completed works shall be covered by electrical certification for:

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- Testing – EICR (Electrical Installation Condition Report)
- Repairs – EIC (Electrical Installation Certificate), Minor Works Certificate or Part P Certificate. All repair works shall be covered by at least one of these Certificates.

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14 KEY MANAGEMENT

14.1 Keys for Block Main Entrance Doors

The Service Provider shall include for a full management service relating to keys for communal main entrance doors, plant rooms, riser cupboards, etc.

The KCTMO utilises 7 series ASSA locks for communal entrance doors.

For communal entrance doors, the key management service will include, following an Instruction/Order from KCTMO, the provision of replacement keys to one of the KCTMO's Offices at:-

- World's Estate (Residents can collect 24 hours a day).
- Blantyre Estate (Residents can collect between 9.00 am and 5.00pm).
- The Network Hub (Kensal Road) (Residents can collect 24 hours a day).

If an order includes a replacement or additional key as an 'emergency' this shall be provided between 9.00 am and 4.00 pm on a Working Day, keys should be provided at the reception of the appropriate office as selected by the resident (see above) within 4 working hours and this shall be included within an envelope with the Resident's name and address. The KCTMO personnel on reception will retain the keys until the resident collects these and shall obtain any necessary payment and receipt from the resident. The payment will reflect the fact the key is required urgently.

If a resident requests a replacement or additional key as a standard delivery this shall be provided within 3 Working Days at the reception of the appropriate office as selected by the resident (see above) this shall be included within an envelope with the Resident's name and address. The KCTMO personnel on reception will retain the keys until the resident collects these and shall obtain any necessary payment and receipt from the resident. The payment will reflect the fact the key is required on a standard delivery.

14.2 Keys Required by Third Parties (Plant Rooms, Riser Cupboards, etc.)

The Service Provider shall include for a full management service relating to keys for communal areas and this shall include the managing calls from third parties, purchase of keys, cutting, obtaining a key deposit, provision and arranging for the return of the key when no longer required. Gerder keys are utilised for areas such as electrical intakes, lift machine rooms, tank rooms, etc.

If a third party requires a key to a communal area or plant room (such as a Gerder Key, Communal Access Fob or Fire Brigade Key) the Service Provider shall provide this subject to the Client Representative confirming their entitlement. The Service Provider shall arrange for the key to be available for collection from an office within the Borough (either their own office or an office of a Specialist) or may, as an additional service, arrange for the key or fob to be delivered to the third party subject to the third party paying for this service. The Service Provider shall obtain a deposit of £100 per key and shall retain this until the key is returned. The Service Provider shall keep records of who keys have been issued to and the deposits paid (for more detail please see Part A of this Appendix).

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KCTMO holds a stock of keys at its offices at the Hub, Kensal Road. The Service Provider shall arrange to collect these keys and prepare a full inventory. KCTMO will transfer these keys to the Service Provider free of cost. At the end of the Contract the Service Provider shall arrange for any keys remaining from the stock originally held by KCTMO to be either transferred to the new Service Provider or returned to KCTMO and shall provide an updated inventory showing all keys held at the date of the cessation of the Contract.

14.3 Main Entrance Door Locks

The Service Provider shall also provide a locksmith service whereby if there is a mechanical problem with a lock this can be attended to within a 4 hour period. If a barrel or communal lock is changed, each property within the Block shall be provided with two new communal keys. To cater for Residents not being at home, the wording of a suitable letter (including Spanish, Arabic and French translations) is to be agreed with the Client Representative so that this can be provided when replacement keys are provided.

14.4 Fob Management

KCTMO shall provide to the successful Service Provider all existing hardware and software used for programming of fobs.

The Service Provider shall be responsible for management and record keeping for fob programming based on orders issued.

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ATTACHMENT A

KCTMO SPECIFICATION OF MATERIALS AND WORKMANSHIP

ELECTRIC WORKS

LAK00000527/27

ATTACHMENT A : RE-WIRE – MINIMUM STANDARDS

KCTMO STANDARD FOR ELECTRICAL WORKS GENERALLY

Electrical Works – Generally

All components and installations shall comply with the recommendations and requirements of the BS 7671 17th Edition 3rd Amendment of the IEE Regulations published by the Institution of Electrical Engineers and Part P & Part M of the Building Regulations.

Builders Work

Include for all cutting away and making good, lifting and replacing floorboards, cutting chases and making good, noggins for switch boxes etc., and forming holes. The Service Provider shall include for the drilling of holes for fixing rawl-plugs, rawl- bolts and other similar fixings.

Wiring

The installation of final sub-circuits shall be carried out with flat two core and earth PVC insulated and sheathed cables of approved manufacture and complying with BS 6004: 1975.

They shall be run in the roof spaces, floor voids and behind plastered walls. Where cables are to be concealed in plastered walls all chasing and making good is to be carried out by the Service Provider, with plaster finished flush to surrounding walls and left in a tidy condition all to general builder's finish. **Lightweight bonding is not to be used for making good**.

Where the cables are to be concealed in plastered walls, they shall be protected with heavy gauge steel conduits with Class 2 protection. The ends shall be bushed to prevent abrasion of the cables.

Where the cables cross-timber joists, they shall be run through holes drilled as near as possible to the neutral axis of the joists. These holes shall not be nearer than 600mm to the end of any joist. They shall be drilled horizontally and shall be in line to facilitate the drawing and withdrawing of the cables. No joist shall be notched.

Where the cables run parallel to the joists they shall not be fixed but only supported clear of the ceiling to facilitate the withdrawing of any cable necessary.

All cables shall be at least 225mm from any hot water pipes. The Service Provider will be responsible for checking the runs of all hot water pipes before installing any cables.

Where it is necessary for cables to cross hot water pipes, the Service Provider shall ensure that the pipes are insulated for 300mm on either side of the crossing with Amorflex insulation. The crossing shall be made at right angles.

Sufficient slack shall be left on all cables to facilitate minor alterations and maintenance.

KCTMO STANDARD FOR ELECTRICAL WORKS GENERALLY

Circuits

The lighting circuits in the dwellings shall be wired with the "loop in" system with connections being made at the ceiling roses and batten holders which shall be of the three terminal and earth terminal type. Carry out all sleeving as necessary in accordance with the IEE Regulations.

Not more than three cables shall be terminated at a ceiling rose or batten holder, i.e., the live and neutral looped feed and neutral and the live and switch line from the switch.

Socket outlets in the dwelling shall be of the 13A pattern and shall be connected to 30A ring circuits.

RCBO's are to be used as a preference.

All fused spurs are to be permanently marked (Dymo strip or similar will not be acceptable). MCB's are to be permanently marked with self-adhesive pre-printed labels (hand written or similar details will not be acceptable).

Prior to the handover of each individual unit, the Service Provider shall inspect the completed electrical installation and ensure that all duct covers; floorboards etc., adjacent to the installation are securely fixed and then test the electrical installation. The tests shall be carried out in accordance with the recommendations contained in the IEE Regulations, Approved Document P of the Building Regulations and passed to the Client Representative a NICEIC Certificate of Completion.

Electrical Test

Where instructed by the Client Representative, allow for carrying out a standard periodic inspection and test of the existing electrical installation and identify any potential risks, faults or areas where the installation does not meet current IEE electrical regulations.

Consumer Unit

All new consumer units installed to comply with BS7671 3rd Amendment.

All new consumer units installed are to include for a Service Providers switch or similar form of isolation.

Where a new consumer unit is installed and cable has to be routed through hall area, cable will be neatly run in pvc conduit including all joints, mitres, fixings, fittings, etc, cables will not be chased in, to avoid need to redecorate the hallway.

KCTMO STANDARD FOR ELECTRICAL WORKS GENERALLY

Where required by agreement with the Client Representative remove existing fuse to sub-circuit and upgrade with a new individual micro circuit breaker (MCB)

Where instructed by the Client Representative supply and fix softwood frame and plywood boxing to electric meter / MCB's with hinged access door and SAA finish cupboard knob with concealed fixing and an adjustable roller bolt mortice catch.

New consumer units shall be from the WYLEX range (or equivalent) –
Contact details: WYLEX LTD, Lichfield Road, Brownhills, West Midlands, WS8 6JZ
Tel: [redacted] Web: www.electrium.co.uk

Where existing consumer unit is located within a meter cupboard or similar, and requires replacement, where possible use Skeleton Unit

Rewiring - Kitchen

Allow for rewiring the kitchen on a separate ring back to the fuse board / MCB with all new cables to be chased into the wall which shall be protected with heavy gauge steel conduits with Class 2 protection, or in pvc-u mini-trunking, subject to approval by the Client Representative. Where it is not possible to chase the area above worktop to socket level due to structural constraints, a layer of 10mm MDF on 50x25mm s.w. battens are to be fixed to 450mm (tile height) above worktop to run cable and recess electrical back boxes.

PVC conduit to include all joints, mitres, fixings, fittings, etc. Please note that complete redecoration of properties is not included in these works so care must be taken not to damage existing finishes and accordingly the Service Provider will be expected to make good damaged decorations.

KCTMO STANDARD FOR ELECTRICAL WORKS GENERALLY

The Service Provider is to include for the following fittings;

- 4 x Twin switched sockets located 150mm above worktop level
- Cooker circuit from fuse board / MCB with a 40 amp (10mm cable) supply. Include for a cooker control panel at worktop level and outlet plate adjacent to the appliance
- The Service Provider shall wire the boiler on a separate circuit running from the MCB. The circuit shall be terminated at the boiler in DP switch with neon indicator and flex outlet. The boiler shall be connected to the flex outlet with 1.0mm^2 heat resisting PVC flexible cables.
- Switched fused spur to extract fan.
- Switched fused spur located 150mm above worktop level to washing machine and fridge and/or additional appliances with single non-switched sockets beneath to be linked to the spur above. Switched fused spurs to be engraved with appliance identification.
- Ignition circuit to cooker recess.
- Double switched socket at 450 mm above floor level where directed by the Client Representative

Earth Bonding to be included.

Rewiring - Bathroom

Allow for rewiring the bathroom on the new / existing ring main with all new cables to be chased into the wall which shall be protected with heavy gauge steel conduits with Class 2 protection. The Service Provider is to include for the following fittings;

- Switched fused spur to extract fan.
- Earth Bonding to be included.
- Where tenants have an existing electric shower, this will be refitted where compliant with current legislation, with new electrical supply installed as electrical specification. Shower attachment hose clip to be affixed to comply with current water byelaws.

Rewiring – Property (excluding kitchen & bathroom)

Where identified in the Electrical pre testing and agreed with the Client Representative, allow for rewiring the property on separate rings, excluding the kitchen and bathroom which are included in the above items, on individual sub-circuits in accordance with good practice, the 17th edition 3rd Amendment of the IEE Regulations and Approved Document M of the Building Regulations.

Wiring is to be chased and concealed wherever practical which shall include drawing through existing conduits, partitions or ceilings, lifting floorboards, removing skirtings and duct panels, etc. Otherwise, neatly surface run in PVC conduit including all joints, mitres, fixings, fittings, etc. Please note that complete redecoration of properties is not included in these works so care must be taken not to damage existing finishes and accordingly the Service Provider will be expected to make good damaged decorations.

KCTMO STANDARD FOR ELECTRICAL WORKS GENERALLY

The Service Provider is to allow for the following fittings;

- Hallway – 1 x Double switched sockets
- Living Room – 4 x Double switched sockets (with 2 x doubles in assumed TV position)
- Dining Room – 3 x Double switched sockets
- Double Bedrooms – 4 x Double switched sockets
- Single Bedrooms – 3 x Double switched sockets
- Bed Sitting Rooms – 5 x Double switched sockets
- Supplies to pump / immersion heater / cylinder / boiler controls / etc.
- Earth Bonding throughout

Existing Electrical Circuits – Additional Double Socket

Allow for extending existing electrical ring circuit to provide an additional double-switched socket **in positions indicated by the Client Representative.**

Wiring is to be chased and concealed wherever practical which shall include drawing through existing conduits, partitions or ceilings, lifting floorboards, removing skirtings and duct panels, etc. Otherwise, neatly surface run in PVC conduit including all joints, mitres, fixings, fittings, etc. Please note that complete redecoration of properties is not included in these works so care must be taken not to damage existing finishes and accordingly the Service Provider will be expected to make good damaged decorations.

Mains Smoke Alarm

Provide and securely fix a mains powered with rechargeable lithium battery backup smoke detector alarm to the hallway which, to avoid false alarms, shall not be fixed directly adjacent to the kitchen door. Where more than one smoke detector is installed, on additional floors to the property, these should be linked. Radio bases only to be used where instructed by the Client Representative.

AICO EI 161 Ionisation smoke detector as above.

Mains Heat Alarm

Provide and securely fix a mains powered with rechargeable lithium battery backup heat detector alarm to the kitchen which, to avoid false alarms, shall not be fixed directly above the cooker. Heat alarms are to be linked to the smoke alarms Radio bases only to be used where instructed by the Client Representative.

AICO EI 164 RC.

Lighting Circuits - Existing

Supply and fix to existing lighting circuits the following fittings;

To kitchen install 1200mm Low Power Factor (LPF) fitting with diffuser and 38w fluorescent tube light.

KCTMO STANDARD FOR ELECTRICAL WORKS GENERALLY

To bathroom install an ASD or similar approved fully enclosed IP44 Rated circular light fitting, manufactured in shatterproof polycarbonate, with opal diffuser and 16w low energy bulb.

To bathroom install pull cord ceiling switch.

Lighting Circuits

Allow for rewiring the lighting circuits to the property on separate radial as necessary, which shall include for the replacement of all existing fittings, in accordance with good practice and 17th edition of the IEE Regulations.

Wiring is to be chased and concealed wherever practical which shall include drawing through existing conduits, partitions or ceilings, lifting floorboards, removing skirtings and duct panels, etc. Otherwise, neatly surface run in PVC conduit including all joints, mitres, fixings, fittings, etc. Please note that complete redecoration of properties is not included in these works so care must be taken not to damage existing finishes and accordingly the Service Provider will be expected to make good damaged decorations.

Where an internal hallway is 2way switched as existing or is in excess of 3m in length, provide 2way switching to each end of the corridor. Where a property has an internal staircase provide 2way switching to each landing in a suitable location.

The Service Provider is to allow for the following fittings;

- To kitchen install 1200mm Low Power Factor (LPF) fitting with diffuser and 38w fluorescent tube light.
- To bathroom install an ASD or similar approved fully enclosed IP44 Rated circular light fitting, manufactured in shatterproof polycarbonate, with opal diffuser and 16w low energy bulb.
- New pendants with lamp holders to bed and living rooms complete with 11w low energy bulb
- New bayonet batten holder fittings to separate toilets, cupboards, utility rooms, etc. complete with 11w low energy bulb
- New single and double switching to all rooms (except bathroom)
- To bathroom install pull chord ceiling switch.

Extract Fans

Fused spurs for extract fans are included under prior items.

Cut neat openings of approx. 100mm in wall formed with diamond core drill.

Cut neat openings of approx. 150mm in wall formed with diamond core drill.

Cut neat openings of approx. 150mm in glazing panes, nominal 4mm thick float glass.

KCTMO STANDARD FOR ELECTRICAL WORKS GENERALLY

Supply and install the following fans, all in accordance with manufacturer's instructions.

To bathroom wall –100mm extract fan with thermo-activated internal shutters, humidity control, integral adjustable timer, complete with aluminium flexible ducting and wall grille pack. Timer overrun set to 20 minutes. Suitable for installation in Zones 1 & 2

To bathroom wall - Low Voltage Axial Fan - Integral humidity sensor, integral adjustable timer, automatic backdraft shutter, & remote transformer. Suitable for installation Zones 1 & 2.

Bathroom High Rise or Extended Duct Runs - Centrifugal Fan - Integral humidity sensor, timer, backdraft shutter & pull cord. Suitable for installation Zones 1 & 2

To bathroom window – window kits are available for all above fans where there is no wall space available.

To kitchen wall – Wall mounted Axial Fan - integral humidity sensor, timer, pull cord, & automatic backdraft shutter. Suitable for installation in Zones 1&2.

To kitchen wall - High Rise or Extended Duct Runs - Centrifugal Fan - Integral humidity sensor, timer, butterfly backdraft shutter & pull cord. Suitable for installation Zones 1 & 2

Separate WC - Axial Fan - Integral overrun timer & automatic backdraft shutters. Suitable for installation Zones 1 & 2

Separate WC - Internal WC without access to external wall - Fan (will run up to 6m with flexible ducting including one 90 degree bend)

To kitchen/ bathroom windows– window kits are available for all above fans where there is no wall space available. The Service Provider is to confirm window installation with the Client Representative in advance of installation to ensure Listed Building, Conservation Area, Planning Permission breaches do not occur.

Earthing & Bonding

The electrical installation shall be earthed to conform to the 17th Edition 3rd Amendment of the IEE Regulations.

KCTMO STANDARD FOR ELECTRICAL REWIRING TO HOUSES AND FLATS

INTRODUCTION

This guide on standards for electrical services in houses and flats is for the Service Provider.

This guide sets out the minimum standard of requirements and workmanship that is expected on any electrical domestic rewire project.

SCOPE OF WORKS

The scope of works will contain some or all of the following:

- Carefully remove and set aside all residents electrical equipment attached to the electrical installation.
- Disconnect and remove the existing electrical installation.
- Provide temporary electrical connections as may be necessary to allow the resident to cook, light the premises and operate radio and television, except for short periods during normal working hours as agreed with the resident.
- Advise the residents of the expected time scales involved .
- Carefully reposition and/or remove and protect the residents' belongings from damage and dust and reinstate as found on completion.
- Supply, install and connect new electrical installation as specified.
- Supply and install combined mains battery smoke detector as specified.
- Supply and install electric heating system as specified.
- Reinstate residents' electrical equipment and make good damage to building fabric.
- Supply and install all main and supplementary earthing and bonding.

ELECTRICAL WORKS

For the purpose of specification and tender, it should be assumed that all the rewiring works would be carried out with the residents in occupation. Under no circumstances must residents be left without adequate lighting, power or hot water except as agreed with the residents to facilitate the progress of the work. It is also expected that the Service Provider will tell the resident an approximate time the work will take.

Before disconnecting or removing any part of the existing electrical installation the Service Provider shall advise the resident of the process involved in rewiring works. The Service Provider will also advise the resident which items of furniture and other articles will need to be moved and his intentions with regard to the periods of time when the electrical supplies will be off.

The Service Provider shall carefully remove and set aside in the safe keeping of the resident all attachments to the existing installation which are likely to impede his work e.g. lighting fittings and electrical appliances. All lighting fittings shall be cleaned and refitted when the new installation is complete unless the Service Provider considers that the condition of the fitting is unsatisfactory and would render the electrical installation unsafe or if the fittings do not comply with current regulations.

If the resident wishes the fitting to be repaired or replaced this shall be the subject of a direct settlement between the resident and the Service Provider without any cost to the Client.

On completion of the new installation and as part of the testing procedure the Service Provider shall arrange with the resident for all the residents portable electrical equipment/appliances to be plugged into the new electrical system to ensure that each item operates satisfactorily and without tripping the RCD.

If the RCD does trip, or if the equipment or flexible lead or plug top is observed by the Constructors to be unsafe the resident shall be advised not to use the equipment/appliance and the details of his observations recorded on the "Electrical Installation Certificate".

The Service Provider shall allow for repairing or replacing faulty leads and plugs tops and in every case ensures that the correct size fuse is fitted to suit the kilowatt rating of the equipment/appliance.

All costs of repairs to the residents' appliances shall be the residents' responsibility and any such work undertaken by the Service Providers shall be at no cost to the Client.

The Service Provider shall liaise with the resident and make all necessary provision to ensure that essential electrical facilities are available overnight and during agreed periods during normal working hours.

Stripping out of the existing electrical installation shall be carried out with care and due consideration for the resident. Where extensive damage is likely to occur to the fabric and decoration the engineer/consultant and resident must be advised before the works commence.

KCTMO STANDARD FOR ELECTRICAL REWIRING TO HOUSES AND FLATS

Due allowance must be made in the specification and tender for "making good" the fabric and finishes (i.e. touching up painted and emulsioned surfaces).

As existing switches and sockets may be relocated and additional wiring accessories installed, the resident's attention will have to be drawn to the effect that will have on the decorative finishes.

All making good to the fabric and finishes must be carried out by qualified tradesman and ***not*** by the electricians.

The installation shall be carried out and tested in accordance with current BS7671 "Requirements for electrical Installations", issued by the Institute of Electrical Engineers and British Standards.

The general requirements of the new electrical installation in each domestic unit is that it shall be executed and carried out in a neat and workmanlike manner with all new wiring contained in surface mounted mini trunking.

All new surface cable trunking shall be high impact UPVC as specified and shall be routed and located to be as inconspicuous as possible. The general agreement of trunking in each type of flat must be agreed and approved by the engineer/consultant before work commences.

The cutting of trunking shall be neat and clean and sawn ends shall be cleaned off with sandpaper. Purpose made fittings shall be used at all changes in direction and no gaps shall be left between sections.

The trunking shall be secured using round-headed sherardised screws.

Power outlets shall be wired as ring circuits and lighting circuits shall be wired as radial circuits.

HEAT / SMOKE ALARM INSTALLATION

The smoke alarm installation will comply strictly in accordance with BS EN14604: 2005 and BS5839; Part 6 :2004

The Heat alarm installation will comply strictly in accordance with BS 5446: Part 2 2003 Class A1, BS5839; Part 6 :2004 and BS5588 Grade D.

Where residents are disabled or have special needs these must be taken into account and the installed system must meet their special needs.

The recommended alarms to be used and installed are mains powered alarms with rechargeable lithium cells.

Hard wired smoke alarms will be wired into an existing lighting circuit and not on their own dedicated supply.

The use of Radio linked alarm units are to be fitted only with the permission of the Client Representative.

KCTMO STANDARD FOR ELECTRICAL REWIRING TO HOUSES AND FLATS

EQUIPOTENTIAL BONDING INSTALLATION DETAIL

Main and supplementary bonding conductors shall be provided in accordance with the recommendations of the current Edition of BS7671.

Every earth and bonding conductor, including copper tape, composite cable or flexible cord, shall be protected by PVC or heat resisting insulation and shall be identified by the colour green/yellow. Mechanical protection shall be provided by steel conduit or PVC mini trunking.

Bonding conductors and termination points shall be located as inconspicuously as possible

Connections to pipes of gas and water shall be made with purpose made clamps. A metal label in accordance to BS951 marked with

"SAFETY ELECTRICAL CONNECTION – DO NOT REMOVE"

shall be permanently fixed on the main earthing terminal and the bonding connections to gas and water services.

RESIDENTS INFORMATION BOOKLET

The Service Provider shall issue to each resident on completion and provide spare copies to the Clients Office, an information booklet to provide the following information:

1. The Client Representatives name and telephone number.

2. General precautions to be taken when using electrical equipment.

    - What action to take when an MCB or RCD unit trips.

    - Precautions to be taken when fitting plug tops and the importance of fitting correct size fuses.

3. How to replace a fluorescent lamp in a fluorescent fitting. What to ask for when purchasing a new lamp. Importance of cleaning the diffuser.

4. Details of smoke detectors and alarm, i.e. alarm source indication, audible and visual alarms etc.

5. First Aid action in the event of electric shock.

This booklet must be prepared in a professional manner by a professional printer in colour on a folded A4 glossy card. The cover shall display the Client's logo.

FURNITURE, FITMENTS AND CLEANING REQUIREMENTS

The Service Provider shall supply clean dustsheets and shall carefully protect furniture, floors and fitments in all places where work is in progress, and shall carefully recover furniture and moveable fittings as necessary and replace them at completion.

KCTMO STANDARD FOR ELECTRICAL REWIRING TO HOUSES AND FLATS

The Service Provider shall arrange with residents for any necessary handling and moving of the latter's personal effects, pictures, ornaments, furnishings, window boxes and small objects and shall allow in his Tender for any expense in consequence.

At the end of each day and at the completion of the works the Service Provider shall thoroughly clean all areas in which work has been carried out. For this purpose the Service Provider shall include for each group of electricians to be supplied with a small industrial type vacuum cleaning,

The Service Provider shall be responsible for settling any dispute, which may arise between the resident and their operatives howsoever arising.

FACILITIES FOR RESIDENTS

In any occupied dwelling in which a lift is installed and operating, the Service Provider shall give at least 24 hours' notice to all occupiers of any intended disruption to the electrical supply.

The Service Provider will be required to ensure that the following facilities are available during normal working hours in respect of occupied dwellings:

1. Toilet facilities in conditions of privacy.
2. A kitchen sink and hot and cold water supply.
3. Permanent or temporary cooking facilities.
4. Electrical power and lighting.
5. Use of gas fire or temporary electric unit heater.

Should one or more of these facilities not be available during working hours due to the re-wiring works, the Service Provider shall give the residents and engineer sufficient notice to enable them to make alternative arrangements.

AREA OF OPERATIONS

All reasonable means shall be used to avoid inconveniencing adjoining owners or occupiers. No operatives employed on the works shall be allowed to trespass upon adjoining properties. If the execution of the Works requires that operatives must enter upon adjoining property, the Service Provider who shall see that these instructions are carried out shall first obtain the necessary permission.

The Service Provider whether by himself or otherwise shall not obstruct any public way or do anything which may amount to a nuisance or annoyance and shall not interfere with any right-of-way or light to adjoining property. Any notice received by him as a result of the foregoing shall at once be communicated to the Client Representative.

INSTALLATION CLAUSES KCTMO STANDARD FOR ELECTRICAL REWIRING TO HOUSES AND FLATS

METER CONNECTIONS

Provision shall be made at each service position for connection to the distribution networks supply with tails of Double PVC insulated and sheathed cable of suitable conductor size – 25mm^2 for a 100A service or 16mm^2 for 60A service.

A Service Providers switch or similar form of isolation shall be installed

Each section of the installation is to be earthed; such earthing is to be in strict accordance with the BS7671 and any special requirements of the Distribution network.

The consumer's earthing terminal, required by BS7671, shall be bonded to all exposed and extraneous conductive parts on the premises in accordance with BS7671.

TESTING

The Service Provider shall carry out the tests prescribed in the BS7671 at the appropriate stages of installation and the results recorded.

The Service Providers shall give notice to the Utility suppler to arrange as necessary and appropriate for providing a temporary supply if necessary.

When the tests have been proved satisfactory the Service Provider shall make all necessary arrangements for the connection of the permanent supply to the installation.

The Service Provider shall comply with the requirements of the Chosen Utility Supplier in all respects and pay all connection charges.

Upon satisfactory completion of the tests the following Certificates ***MUST*** be submitted to the Client's Representative.

- NICEIC - Electrical Installation Certificate
- All inspection schedules and test Schedules must be included
- All documentation and certification to be printed using appropriate computer software. Hand written documents not accepted, unless authorised by the Principle Electrical Engineer.
- Approved Document P of the Building Regulations Notification.

The Service Provider shall also supply and install A4 layout and schematic of the Consumer Unit in each resident Consumer Unit with circuit and MCB/RCD details. A bound copy of all the schematics shall also be handed to the engineer for onwards transmission to the Client Representative.

KCTMO STANDARD FOR ELECTRICAL REWIRING TO HOUSES AND FLATS

CONSUMER CONTROL GEAR (CCU)

Main Control

The Main Consumer Control Switchgear shall be a surface mounted moulded/metal enclosure Consumer's Unit complying with the latest BS5486

The unit shall be a dual split load unit containing MCB's complete with RCD's and contain an appropriate number of ways, including at least two spare ways (Blanks) and shall be fitted with Type B Miniature Circuit Breakers of the ratings specified.

The Service Provider shall fit miniature Circuit Breakers or RCD's of the following ratings, however external influences may affect the final sizing:

- For each lighting circuit 6A
- For the immersion heater circuit (3kW) 16A
- For each socket outlet circuit 32A
- For the cooker circuit Refer to cooker specification
- For the electric shower (if specified) Refer to Shower specification
- For the door bell circuit 6A
- For the security lighting circuit 6A
- For other circuits (as appropriate)

The circuit identification labels supplied with the Consumer Unit, and any written way labels, must be fixed to give clear, permanent and legible indication of the circuits connected to each way.

The Service Provider is to leave any operating instructions and to fit any adhesive labels supplied, in a prominent place.

The Service Provider to liaise with the electrical service provider when replacing consumer units for re- sealing the meter and pay all costs associated within these works.

Off Peak Consumer Unit

Where the dual tariff system of supply is used it may be necessary to provide a separate consumer unit for the off-peak circuits. This consumer unit should be of the same manufacturers range as the main control and with each circuit afforded the same level of protection and clearly labelled "Off-Peak Consumer Unit" with circuit description labels.

CABLES

Cable Type

All cables for fixed wiring shall be 300/500v grade, PVC insulated, Low smoke and Fume (6242BH and 6243 BH)

When PVC or steel conduit is specified, single core PVC insulated cables can be used (6491B).

KCTMO STANDARD FOR ELECTRICAL REWIRING TO HOUSES AND FLATS

Cable Sizes

Attention is drawn to the need to de-rate cables installed in conduit or trunking; or when run in thermal insulation. Preferably cables should be fixed in position where they will not be covered by thermal insulation.

The following minimum conductor sizes are permissible commensurate with other circuit characteristics:

Lighting Circuits	-	1.5mm^2	
Ring Mains Circuits	-	2.5mm^2	
Immersion Heater	-	2.5mm^2	
Cooker	-	10.0mm^2	
Electric Shower	-	10.0mm^2	
Door Bell (feeding transformer)	-	1.5mm^2	
Smoke Detectors	-	1.5mm^2	
Main Earth Connection	-	16.0mm^2	
Equipotential Bonding	-	10.0mm^2	
Supplementary Bonding	-	4.0mm^2	(unprotected)
	-	2.5mm^2	(protected core)

Service Provider sizes for **all** circuits shall be determined to suit the current demand, and compensating factors applicable to ambient temperature, thermal insulation voltage ,grouping in conduit, type of protective device, etc.

Cable Runs

Wooden Joists - Cable should be fixed to the side of wooden floor joists with suitable size plastic clips. Cables passing through joists should do so through holes not larger than laid down in the building regulations. Refer to part P of the building regulations in all cases.

Roof Spaces - In roof spaces cables should not be run under water tanks or thermal insulation; or on top of joists where they may be liable to mechanical damage. All cables will be clipped and NOT left floating across the joists.

On Wall and Ceiling Surfaces - Cables run on wall and ceiling surfaces shall be protected against mechanical damage by high impact PVC or steel conduit, or mini trunking.

Terminations - All cables shall be terminated within enclosures. Joints may only be made in cables using fixed based connector units and with the engineers express permission. Entries into steel boxes shall be fitted with rubber or PVC grommets. Screwed steel conduit shall be terminated with a suitable brass bush and steel coupling to the metal box. An earth lead, suitably sleeved, shall connect each accessory to the earth terminal in the box. With insulated wall switches the bonding conductor shall terminate within the box.

CIRCUITS

Lighting Circuits

Lighting and switch points shall be wired to the position indicated and connected to a 6A way in the consumer unit.

KCTMO STANDARD FOR ELECTRICAL REWIRING TO HOUSES AND FLATS

Unless the area of the dwelling is less than 60m^2, at least two final lighting sub-circuits shall be provided. For houses, two final lighting circuits will be provided – one downstairs and one upstairs.

Lighting Switches

Lighting switches shall be to BS3676 and, other than those specified for bathrooms or garages, shall be rocker operated 20A (induction level) AC type. Two-way (and possibly intermediate) switching shall be provided where required but certainly for control of stairway lighting points.

In bathrooms a cord operated 10/20A AC switch mounted on to a moulded pattress shall be fitted. The cord shall be adjusted so that the 'acorn' is positioned 1,200mm above floor level.

To support ceiling mounted cord operated switches, wood bearers are, if necessary, to be suitably fixed by the electrical Service Provider between joists to take the switch fixing screws.

At every lighting switch position the earth continuity conductor of the final circuit shall, in accordance with Wiring Regulations, be connected to an earthing terminal. Where metal back boxes or switch plates are used a green/yellow fly lead shall be used to connect the back box to the switch plate.

POWER CIRCUITS

Socket Outlet Circuits

Socket outlets, to BS1363, shall be fed by ring circuits each covering an area not greater than 100m^2, with both ends of each ring being connected to a 32A way in the consumer unit. Spurs from the ring circuits may be used where appropriate, provided that they comply with Wiring Regulations.

Mounting heights of Single Socket (un-switched) fed from fused spurs will be mounted at a height of 200mm from floor level. This is for White Goods only.

Kitchen Socket Outlets

All Socket outlets will be mounted at 150mm centre of box above work tops.

Cooker Control Unit with Integral Socket Outlet

A cooker control unit to BS4177 and incorporating a 13A DP switch socket outlet shall be fitted in the position(s) separately advised at a height of 150 mm above the working surface and to the side of the cooker position. At least 300mm from the edge of the cooker.

This unit shall be with neon indicators and shall be mounted in a flush / surface box.

In the case of split level cookers where either the oven or hob is installed in excess of 2 metres from the cooker control unit, a separate adjacent means of isolation must be installed for each appliance.

KCTMO STANDARD FOR ELECTRICAL REWIRING TO HOUSES AND FLATS

Cooker Outlet Plate

From the cooker control unit a flush black enamelled steel or hard PVC conduit shall be run to a 1-gang flush steel box mounted 200mm above floor level and fitted with a cable outlet.

The cable outlet plate shall be white (with terminals) for 10mm^2 cable.

Water Heater Circuit

A water heater control shall be wired on a separate circuit and connected to a 16A MCB in a consumer unit.

i) When an off-peak immersion heater is to be supplied, the connection to the heater shall be via a 15 amp unswitched socket-outlet with heat resisting flexible cable – and clearly labelled "OFF-PEAK".

ii) When the on-peak immersion heater control is to be located in the kitchen it shall be a 20 amp double pole switch with neon indicator – as detailed below. In the airing cupboard the connection to the heater shall be via a 15 amp unswitched socket with heat resisting flexible cable.

Water Heater/Control

A 3kW immersion heater incorporating a thermostat shall be fed from a 20A double pole switch with neon indicator and integral cord grip mounted as near as practicable to the water heater. The flexible connection to the water heater shall be made with a 2.5mm^2 heater resisting flexible cord manufactured to BS6500.

Gas Central Heating

The supply shall be taken from the nearest ring circuit via a fused connection unit adjacent to the boiler and final connection shall be made using heat resistant flexible cable.

Storage Heaters

Where these are installed they shall be fed from a separate "off-peak" consumer unit with each storage heater being connected to an MCB of appropriate current rating.

Heaters up to 4kW loading shall each be controlled by a 4-gang flush mounted Rockergrid unit incorporating two 20 amp double pole switches and two cord outlets units. The plate shall be suitably engraved at each switch position to indicate its function.

Heaters above 4kW shall be controlled by a 32 amp double pole switch with cord outlet facility, mounted adjacent to a 20 amp double pole switch with cord outlet facility, suitably engraved as above.

The final connection to the heaters shall be with the appropriate size heat resistant flexible cable.

KCTMO STANDARD FOR ELECTRICAL REWIRING TO HOUSES AND FLATS

Combined Storage and Convector Heaters

The off-peak storage section shall be fed from a separate MCB way in the consumer unit via a 20A double pole switch; the on-peak section shall be fed from the ring via a fused connection unit and suitably engraved to indicate its function.

The final connections to the heaters shall be with the appropriate size heat resistant flexible cable.

Panel/Convector Heaters

They shall be fed from an appropriate circuit connected to a way in the consumer unit using a 32A MCB and controlled from a 13A switched fused connection unit with neon indicator which should be located as near as possible to the heater. The flexible connection to the heater shall be made with heat resistant flexible cable of suitable rating manufactured to BS6500. Heaters above 4kW may require a slave connection for operation

Fan Heaters

Fan heaters shall be wired from an appropriate ring main circuit via an unswitched fused spur unit, adjacent to the fan.

TELEVISION AERIAL CIRCUIT

A PVC high impact type conduit shall be run vertically from the roof space to a flush steel box mounted at 400mm above fixed floor level in the position indicated on the drawing. The conduit shall not be less than 20mm diameter.

A low loss coaxial cable shall be run from the roof space to the coaxial socket. Sufficient coaxial cable shall be left in the roof space to allow connection to the aerial which will be installed by a specialist Constructor.

If an aerial network system is to be installed by the special Constructor a coaxial socket must be installed.

EXTRACT FAN

In accordance with Part F Building Regulations Approved Documents Current Edition, extract fans shall be fitted in all kitchens, bathrooms and WC's.

The Service Provider is to ascertain whether the extract fans are to be controlled via the light switch (incorporating a time over-run feature once the light has been turned-off), or some other means of control.

The fans are to be supplied and installed by the Service Provider, the ducting to be done by others. The Service Provider is to co-ordinate this work with the builders.

Each fan shall be fed from an adjacent unswitched fused connection unit, engraved "Extract Fan". Final connection to the fan shall be via suitable flexible cable.

KCTMO STANDARD FOR ELECTRICAL REWIRING TO HOUSES AND FLATS

Number of Socket Outlets

The Service Provider shall install the number of required twin socket outlets in each room. The recommended Client Standard number of twin socket outlets per room is as given below:

ROOM	NUMBER OF TWIN SOCKETS
Kitchen	4
Living Room	4
Dining Room	3
Double Bedroom	4
Single Bedroom	3
Bed Sitting Room	5
Hall	1

LIST OF PREFERRED SUPPLIERS/MANUFACTURERS

1.	Consumer Control Unit	Wylex split units
2.	Wiring Accessories	MK, Crabtree
3.	Cables	Delta, BICC
4.	Steel Trunking	Legrand, Barton
5.	Cable Tray	Legrand
6.	PVC Trunking and Mini Trunking	Marshal Tufflex, MK
7.	Fluorescent Luminaries for Kitchen	Thorn
8.	Mains Powered Smoke Detector with Battery Backup	Aico
9.	Electric Storage Heaters	Dimplex, Creda
10.	Extract Fans – Kitchen and Bathroom	Vent Axia, Expelair
11.	Electric Water Heater	Heatrae Saida
12.	Economy 7 Controller	Horstmann Timers & Controls Ltd

KCTMO STANDARD FOR ECIR TESTING TO HOUSES AND FLATS

Where required a periodic inspection of the installation will need to be carried out in line with the current wiring regulations BS7671 3rd Amendment this is to ascertain the condition of the current installation and if any remedial works are needed.

KCTMO STANDARD FOR EICR TESTING TO HOUSES AND FLATS

The inspection should be in line with section 621 of BS7671 17th edition 3rd Amendment and a NICEIC Electrical Installation Condition Report produced and handed over to the Client Representative. 100% of all observable outlets shall be tested. Any damage, deterioration, defects, dangerous conditions and non-compliance with the regulations which may give rise to danger, together with any significant limitations of the inspection and testing, including their reasons, shall be recorded on this report. Any dangerous conditions should be isolated and made safe at the time of the inspection, this should be immediately reported to the Client Representative for further instruction.' For the avoidance of doubt if a C1 departure is recorded it shall be made safe at the point of test.

ATTACHMENT B

STANDARD MATERIAL AND WORKMANSHIP CLAUSES

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ATTACHMENT B : STANDARD MATERIAL AND WORKMANSHIP CLAUSES

1. GENERAL

The Electrical Engineering Services Standard Material & Workmanship Clauses shall be applicable to all works, unless otherwise stated. Where discrepancies arise between these the order of precedence shall be as follows:-

- Appendix 8B, Section 2.

2. COMPLIANCE WITH REGULATIONS AND CODES OF PRACTICE

The works shall be carried out in accordance with all relevant statutory requirements, the current edition of BS 7671 JANUARY 2008 incorporating Amendment 3: 2015 - Requirements for Electrical Installations (complete with Amendments and Guidance Notes), the requirements of the Regional Electricity Company, British Standard Codes of Practice, Approved Documents of the Building Regulations and recognised trade association and professional institution practices. BS 7671 JANUARY 2008 shall henceforth be referred to as the Wiring Regulations (current edition).

All regulations, standards etc., referred to shall be deemed to incorporate all current amendments and guidance notes in force.

Where applicable, the recommendations of the Building Services Research and Information Association (BSRIA) shall be complied with.

3. MATERIALS AND WORKMANSHIP

All materials used shall be new and unused, and shall both before installation and on completion, be free from rust, scale, deformation or discolouration and be of the type and manufacture specified. They shall conform with the requirements of any appropriate British Standard Specification and be CE marked.

All materials shall be selected to withstand the external influences they will be subjected to, be compatible with their surroundings and be capable of being maintained.
No materials generally known to be deleterious shall be used.

Any materials which show deterioration due to neglect in storage or installation will not be accepted.

The specific instructions of original equipment manufacturers shall be adhered to in every respect.

Workmanship shall conform to the standard of first class engineering practice.

Equipment shall be erected plumb and true with fixings capable of sustaining a minimum weight of 40kg or three times the weight of the item, whichever is the greater. No item shall rely on one fixing only.

4. INSTALLATION DRAWINGS AND BUILDERS WORK DETAILS

Installation Drawings, Shop Drawings, and Builders Work Details shall be produced by the Service Provider as required for the works, and/or if called for by the Client's Representative.

These shall be submitted for examination prior to any works taking place.

5. IDENTIFICATION LABELS AND NOTICES

Where instructed, each item of switchgear (including MCCBs), control gear, distribution equipment and joints shall be labelled or engraved unless there is no possible confusion over its purpose.

Every item of equipment or enclosure within which 400V exists shall have a black on yellow label (to BS 5378) label reading "DANGER - 400 volts". Where separate enclosures (within 2m of each other) house terminations having 400V between them, each item shall have a black on yellow label affixed internally reading "DANGER - 400 volts between adjacent equipment".

Each distribution board shall have its protective devices sequentially numbered. Single phase boards shall be numbered commencing at 1. Three phase boards shall be numbered using the notation 1R, 1Y, 1B, 2R, 2Y etc.

Distribution equipment shall be equipped with a typewritten distribution schedule installed within a clear PVC pocket fitted to the inside of the hinged lid.

6. MAIN SWITCHGEAR

Main switchgear shall generally comprise either HRC fusegear or moulded case circuit breaker panels mounted directly on to brick or block walls, and interconnected with steel cable trunking.

All switchgear shall be complete with locking-off facilities to enable secure isolation.

7. CABLES

7.1. Generally

The types of cables to be installed shall be detailed in the particular documents. Cables shall not be installed under tension, they shall be installed parallel or at right angles to walls and floors, under no circumstances shall diagonal runs be permitted. The fixing centres, bending radii and identification of conductors shall accord with the **Wiring Regulations (latest edition)**. Proprietary fixing clips shall be used.

Cables with reduced neutrals shall not be installed unless detailed elsewhere.

Cables shall not be installed when the ambient temperature is below $0^{o}C$. Joints shall not be permitted unless by prior agreement with the Client's Representative.

Unless otherwise stated the minimum size of cable used shall be $1.5mm^{2}$.

In all cases cables shall have BASEC approval, unless an approval system is not in force for the particular cable type.

Cables and their enclosures passing through fire barriers (i.e. walls and floors) shall be internally and externally sealed against the propagation of fire. Small holes shall be sealed with a PVE foam aerosol, larger holes and trunking etc. shall be sealed with proprietary intumescent blanket material.

7.2. Electromagnetic Compatibility (EMC)

Low voltage cable installations shall not cause damage, interference or malfunctions of other systems.

To reduce electromagnetic interference (EMI), mains voltage and signal cables following parallel routes shall have minimum separation as detailed in the following table unless otherwise specified.

MINIMUM SEPARATIONS IN mm FOR ALL TYPES OF INTERFERENCE

	MAINS VOLTAGE CABLES (SOURCE)				
SIGNAL CABLES (RECEPTOR)	Twin & Earth	Earthed Conduit	Earthed Trunking	Steel Wire Armoured	MICC
Twin PVC Sheathed	145	145	120	105	15
Unscreened Twisted Pair	65	25	25	15	15
Screened Twisted Pair	20	15	15	15	15
Aluminium Foil Screened	80	30	35	25	15
Steel Wire Armoured	15	15	15	15	15
MICC	15	15	15	15	15
Coaxial	20	20	15	20	15

Acknowledgement is made to the ECA for the use of the above table.

Unless specifically stated single core cables shall not be installed (with the one exception of short 'tails' at meter connections). Lighting circuits shall employ 2 and 3 core cables using the '3 plate' method.

Where single and 3 phase circuits installed in conduit or trunking comprise separate unsheathed cables, the cables for each separate circuit shall be taped together to minimise EMI.

Where screened cable is specified, unless otherwise detailed, its screen shall be earthed at the supply end only and insulated at the remote end.

7.3. **Underground Cables**

Underground cables or ducts shall be installed at a minimum depth of 450mm, on a bed, and with a cover, of sifted soil or sand. A continuous length of proprietary yellow marker tape labelled "CAUTION ELECTRIC CABLE BELOW" shall be installed over the complete length of the cable at 200mm below ground level.

Where ducts are specified they shall be from the 'Rigiduct' range of twin walled, high density polyethylene ducting, as manufactured by B&H (Leics) Limited (or equivalent). Underground ducting shall be in accordance with the National Colour Coding System for buried services as follows:

Colour	Service
Black	LV Electricity
Red	HV Electricity
Blue	Water
Yellow	Gas
Grey/White	Communication and Alarms
Green	Cable and Closed Circuit Television

Where underground cables surface they shall be in an area where damage is unlikely, or they shall be enclosed in conduit, or covered with capping for a height of 1.8m. Cable ducts terminating in a building shall be sealed to prevent entry of vermin etc.

As an alternative to excavation, and where specified, ducts may be installed by the thrust-boring technique. In this case the ducts shall have the words "DANGER ELECTRICITY CABLE" printed on them.

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

Where cables cross other services they shall be installed within ducts.

Where supplementary protective conductors are specified they shall be installed immediately BELOW the main cable.

Reinstatement shall be equal to the existing surrounds and shall include re-tarmacing or re-turfing.

7.4. Multicore Armoured Cables

Unless otherwise detailed these cables shall comprise:-

1. PVC insulation, Single Wire Armour and PVC sheath (PVC/SWA/PVC) to BS 6346. for conductors up to $10mm^2$

2. Thermosetting insulation (XLPE), Single Wire Armour and PVC sheath to BS 5467, for conductors of $16mm^2$ and above

or

3. XLPE insulated, Single Wire Armoured, Low Smoke and Fume (LSF) sheathed to BS 6724

and

4. Conductors shall be copper (cu) unless aluminium (al) is specified.

The cables shall be 600/1000V grade, with the armouring used for earthing purposes unless otherwise detailed. The termination of the armouring shall generally be by a mechanical cable gland to BS 6121, a proprietary earth tag washer (fixed with brass nut and bolt), and a PVC or LSF shroud.

The gland shall be either dry indoor, weatherproof or flameproof as required for the environment.

If armoured cables are recessed into wet plastered walls termination shall be made without using a cable gland, the armouring being terminated directly onto an earth terminal. Alternatively an additional cable core shall be used for the protective conductor.

In non-industrial interiors where groups of wiring cables enter distribution boards in cable trunking, the armoured cables shall take the same route. The armour shall be terminated with an earthing clamp to BS 951, and connected to an equivalent size copper tail.

Terminations for copper conductors connecting to stud terminals shall be with crimped lug terminations. Terminations for aluminium conductors shall be crimped, lug type for stud terminals, and pin type for tunnel terminals, or alternatively aluminium to copper tail connectors shall be used. The 'swaging' method of termination shall NOT be used. All crimping shall be with proprietary crimping tools and dies.

The treatment of aluminium conductors and armouring shall be as follows. Mating surfaces shall be cleaned bright with wire wool then coated with a proprietary jointing compound. This shall be carried out immediately prior to crimping to prevent surface oxidisation.

7.5. Mineral Insulated Cables

Mineral Insulated cables (MI) shall be to BS 6207. They shall have copper conductors and sheath, be light or heavy duty, with or without PVC or LSF oversheath as specified. Fittings shall be to BS 6081.

Cables shall be installed exactly in accordance with the manufacturer's instructions using proprietary tools. The cable shall generally be terminated using an earth tail seal and gland. Where termination boxes will not accept a male gland and locknut, a female pattern gland and male bush shall be used (steel conduit couplers shall not be permitted). Where proprietary MICC cable wiring accessories are specified, glands shall not be installed, and earth tail pots are not essential.

For flameproof applications cables shall be heavy duty and BASEEFA approved flameproof glands and 'increased safety' seals shall be used.

Cable cores shall have identification ferrules affixed.

7.6. PVC Insulated and Sheathed (Non-Armoured) Cables

Unless otherwise detailed these cables shall comprise:-

1. Flat 2 or 3 core cables with circuit protective conductor to BS 6004 Table 5. (6242Y or 6243Y).
2. Flat 2 core cables (with or without CPC) 1.5 or 2.5 mm^2 with stranded conductors to BS 6004 Table 6. (6242Y)
3. Single core, flat 2 or 3 core cables without CPC to BS 6004 Table 4. (6181Y, 6192Y or 6193Y).
4. Circular twin, 3 or 4 core cables to BS 6004 Table 3 (6182Y, 6183Y or 6184Y).
5. Circular twin, 3 or 4 core cables with CPC and heavy duty sheath (e.g. 'Hituf').

All cables shall be 300/500V grade with copper conductors. Unless otherwise stated all cables shall be multicore and complete with an integral circuit protective conductor. Single core cables shall NOT be in general use. Due to EMI problems, they shall be restricted to short lengths used for interconnecting switchgear and metering equipment.

These cables shall not be installed surface clipped unless otherwise detailed. They shall be installed within cavities of ceilings, floors and partitions (but not in the cavities of external walls). Where cables drop from the ceiling (or rise form the floor) to wall mounted points, or are cast into concrete, they shall be completely enclosed within conduit or trunking. The conduit (or trunking) may be surface or recessed as specified in the particular document, and shall comply with the respective standard clauses.

For cables installed in accordance with these methods glands/clamps are not generally required.

7.7. Fire Resistant Silicone Rubber Insulated Aluminium Foil and LSF Sheathed Cable complete with CPC

Fire Resistant Cables shall comply with BS 6387 and BS 7629, and have a BASEC Certificate of Approval. They shall be multicore cables having copper conductors.

The methods of installation shall be exactly in accordance with the requirements for non-armoured PVC insulated and sheathed cables. For the prevention of mutual detrimental influence these cables shall be regarded (i.e. segregated) in accordance with the requirements for mineral insulated cables, for EMC separation the table in this specification is applicable.

Cables shall be installed exactly in accordance with the manufacturer's requirements. For terminations where space is limited, such as a circular conduit box, the conduit box shall be fitted with an extension ring sufficiently deep to avoid the cores being forced against the box.
Cable glands shall be installed in all cases other than where cables are enclosed within conduit or trunking.

Where the cable is reliant on its clipping to retain its integrity in the event of a fire, fire resisting (i.e. metallic) clips shall be used.

7.8. Special Cables for Extra-Low Voltage Applications

These cables shall include telecommunication, bell, call, sound distribution, data transmission, alarm, radio and television cables. The methods of installation shall be exactly in accordance with the requirements for non-armoured PVC insulated and sheathed cables, unless otherwise detailed.

In some cases these cables will be installed by others (e.g. British Telecom). Conduits provided for these cables shall be left with a draw wire installed.

7.9. Single Core PVC and LSF Insulated Cables

These cables shall be 300/500V grade, have solid or stranded copper conductors and be in accordance with BS 6004 Table 1(a), (6491X and 6491B).

They shall be installed completely enclosed within conduit and/or trunking.

All wiring systems comprising single core PVC insulated cables shall have a separate circuit protective conductor installed unless otherwise specified. The size of the CPC shall be specified within the particular documents, and installed irrespective of the type of conduit systems. If not so specified the CPC shall comply with table 54G of the **Wiring Regulations (latest edition).**

The spacing factor shall be in accordance with the **Wiring Regulations (latest edition).**

8. CONDUIT, CABLE TRUNKING AND CABLE TRAY SYSTEMS

8.1. Generally

The types of conduit or cable trunking to be installed shall be as instructed. Conduit and trunking shall be installed vertical or horizontal and parallel to walls. Diagonal runs may be permitted in floors, ceilings and in some special circumstances such as a cooker final connection, subject to the approval of the Client's Representative and where steel conduit is used. Recessed conduit shall not be installed in walls less than 100mm thick without prior instructions from the Client's Representative.

The fixing centres for conduits and cable trunking shall not exceed **HALF** the distances tabulated in the **Wiring Regulations (latest edition**). Each conduit/accessory box shall be fixed independently of the conduit system. Bending radii of conduit shall be not less than the values stipulated in the **Wiring Regulations (latest edition).**

Conduit and trunking systems shall be either continuous, for the installation of unsheathed cables, or isolated sections for the protection and enclosure of sheathed or armoured cables. In both instances metallic conduit/trunking shall be bonded to the earthing terminal, but shall not in itself be used as a protective conductor, a separate CPC shall be installed. This requirement shall not apply to isolated lengths of conduit used as communication and data wireways etc.

The use of inspection pattern conduit fittings shall not be permitted, all fittings shall comprise circular, square or rectangular boxes.

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Where groups of cables enter distribution boards, or to alleviate multiple conduit runs, trunking shall be installed, steel or PVC, to be compatible with the wiring system in use.

Where surface conduit or trunking is installed all the installation components shall be suitable for the type of wiring, including the provision of surface patresses where these are required.

8.2. Circular Steel Conduit

Steel conduit shall be of metric dimensions to BS 4568. The sizes used shall be 20, 25 and 32mm. Steel conduit shall be heavy gauge welded, generally finished stove enamelled black (Class 2). For external applications, within boiler rooms, ducts and other damp situations, conduit shall be hot dipped galvanised (Class 4). For flameproof applications solid drawn conduit shall be installed. All conduit accessories shall match the type of conduit used.

Where steel conduit is installed surface mounted, screwed accessories shall be used, any exposed thread lengths shall be treated with a compatible paint. Where steel conduit is recessed, 'pinch-grip' accessories may be used.
Fixing of surface steel conduit shall be with distance saddles, and recessed conduit with pipe hooks (crampets). No other methods shall be used unless with the prior consent of the Client's Representative.

The terminations of steel conduit into enclosures and boxes not fitted with spouts shall be with a coupler and male bush.

8.3. Circular PVC Conduit

PVC conduit shall be to BS 4607 and BS 6099. The size used shall be 20mm and 25mm, and the conduit shall be of the super high impact heavy gauge grade. The colour shall generally be white, unless black is specified, and all accessories shall match the conduit.

The fixing of surface PVC conduit shall generally be by spacer bar saddles, recessed conduit shall be secured with pipe hooks (crampets), and connections made with proprietary solvent cement. Where bends are required proprietary bending springs shall be used. In straight runs exceeding 6m an expansion coupling shall be installed.

8.4. Steel Cable Trunking

Steel cable trunking shall be to BS 4678 where applicable. It may comprise square, rectangular, floor, skirting or bench trunking as specified. It shall generally comprise standard gauge finished stove enamelled dark grey, but for installations within boiler rooms and other damp situations trunking shall be hot dip galvanised pattern.

For each change of direction, and at every joint or 'T', the trunking manufacturers accessories shall be used unless by prior arrangement with the Client's Representative. Unless otherwise detailed bends and 'T's shall be radius pattern, and any reducers bellmouth pattern.

8.5. **PVC or GRP Trunking**

PVC cable trunking shall be to BS 4678 where applicable. It may comprise square, rectangular, mini, cornice, and architrave, dado, skirting, and floor or bench trunking as specified. The finish shall generally be white. Where PVC trunking has been cut, the burrs are to be smoothed off and levelled.

For each change of direction and at each joint or 'T' the respective trunking manufacturer's accessories shall be installed. Where situations require butt or mitre joints the prior approval of the Client's Representative shall be obtained.

8.6. **PVC Screeded Floor Ducting**

This shall be as specified complete with the manufacturers proprietary accessories and installed exactly in accordance with the manufacturers requirements.

Each length of trunking shall be covered with an overlapping (100mm each side) expanded metal mesh prior to screeding. This metal mesh shall be earthed to an adjacent service box by a fixed earth terminal (brass nut and bolt), and a similar nut and bolt fixed through the metal mesh.

The precise location of outlets shall be confirmed with the Client's Representative prior to screeding.

8.7. **Cable Tray or Basket**

Unless detailed otherwise, internal cable tray shall be heavy duty return flange pattern of 1.5mm gauge minimum. It shall be hot dip galvanised steel to BS 729, and installed complete with the manufacturer's accessories.

Cable basket shall be installed complete with the manufacturers accessories and installed exactly in accordance with the manufacturers requirements.

8.8. **Cable Ladder**

This shall be alloy or GRP as specified, complete with the manufacturer's accessories and installed exactly in accordance with manufacturers requirements.

9. **FLEXIBLE TERMINATIONS**

Flexible terminations shall be as detailed in the Particular Specification and shall generally be one of the following methods.

1. PVC insulated cables shall be installed within PVC sheathed flexible metallic conduit.

2. PVC insulated cables shall be installed within corrugated flexible PVC conduit.

3. PVC insulated and sheathed flexible cords to BS 6500 shall be used.

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Method (1) shall only be used where the wiring is enclosed within steel conduit, and method (2) where PVC conduit or trunking has been installed. In either case the manufacturer's proprietary adapters shall be used.

Where method (3) is employed the cable shall be secured by means of a nylon compression gland (unless a plug and socket or proprietary flex outlet accessory is specified).

The minimum sizes of flexible cords used shall be as follows:-

Up to 5A	0.75mm^2	(24/0.2)
Up to 10A	1.0mm^2	(32/0.2)
Up to 13A	1.25mm^2	(40/0.2)
Up to 15A	1.5mm^2	(30/0.25)
Up to 20A	2.5mm^2	(50/0.25)
Up to 25A	4.0mm^2	(56/0.3)

10. CABLE ASSURANCE

General

All cables provided shall be manufactured and tested in accordance with the British Standard (manufacturing standard) appropriate to the cable type being used. Every length of cable shall have the correct British Standard (or European Standard) number marked and be manufactured in the UK.

All cable sizes should be from the same manufacturer.

All cables should be finished in Low Smoke Zero Halogen (LSZH) materials to reduce fire hazard as far as possible and where indicated.

All cables shall be BASEC approved and/or LPCB certified.

All cables and accessories shall be manufactured to Quality Management Systems which comply with BSEN ISO 9001.

Cable Identification

All SWA or AWA cables to BS: 5467, BS: 6724 shall be embossed on the outer sheath. Inkjet marking is not acceptable to comply with these manufacturing standards. All other cables should be embossed, indented or legibly inkjet marked according to the relevant manufacturing standard. BS: 7846 cables include an option to inkjet printing (as well as emboss/indent).

All cables shall be marked for audit and traceability purposes with the manufacturers name, the manufacturing standard reference, third party approval (e.g. BASEC, HAR), the correct number of cores and cross sectional area of the conductors and the correct voltage rating. The manufacturers specific traceability information shall be clearly marked on the reel, drum or packaging material.

Audit and Traceability

Delivery notes and cable orders placed shall tally with and be in compliance with the specification and shall reflect the actual cable supplied.

Copies of third party product compliance certification, covering the cable product supplied (e.g. BASEC or LPCB) shall be presented in the O&M manuals to satisfy the requirements of the CDM Regulations.

Copies of third party fire performance certification (e.g. BASEC or LPCB), covering all the critical life safety and firefighting circuits, outlined in the specification, shall be presented in the O&M manuals and to satisfy the requirements of the CDM Regulations.

The manufacturer shall be able to prove traceability of the cable product within their quality systems.

The design and/or Client's Representative retains the right to remove cable product from the site, whether installed or otherwise, in order that it may be evaluated and independently verified, as to its performance and compliance, that it satisfactorily meets the requirements of the specification. This shall be provided at no cost to the design engineer and/or Client's Representative. Any cable product found to be non-compliant through material defect or found to have an electrical performance characteristic outside those limits set out by the appropriate manufacturing standard for that cable shall be replaced, and the building structure made good, without cost to the design engineer or the Client.

11. CABLE SUPPORT

Where cables are installed utilising cable supports the Service Provider shall utilise fire resistant cable supports. In particular, this relates to the latest Wiring Regulation requirements relating to cabling above doors, means of escape, etc.