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**Consulting Engineers**  
London | Kent | East Sussex

## **WIVELSFIELD VILLAGE HALL**

### **EAST END EXTENSION**

## **ELECTRICAL SERVICES SPECIFICATION**

### **VOLUME 3 – ELECTRICAL TECHNICAL SPECIFICATION**





# WIVELSFIELD VILLAGE HALL EAST END EXTENSION ELECTRICAL SERVICES SPECIFICATION VOLUME 3 – ELECTRICAL TECHNICAL SPECIFICATION

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## 70-70-25/110 Earthing and bonding system

### System outline

#### 70-70-25/110 Earthing and bonding system

- **Description:** The Electrical Contractor shall provide a complete earthing system in full compliance with BS7671 the 18th Edition IEE Wiring Regulations, BS 7430 and the local Electricity Board PME requirements.

The Electrical Contractor shall bond all new services in accordance with BS 7671. This shall include, but not be limited to the following items:

- Incoming cold water supply (to be checked and installed if not in compliance with the above)
- Incoming gas supply (to be checked and installed if not in compliance with the above)

#### Circuit Protective Conductors

All circuits shall be provided with their own dedicated circuit protective conductor (CPC).

Supplementary circuit protective conductors shall be confirmed by the contractor and provided as indicated in the cable schedules. Where required these have been sized to meet the full cross-sectional area of the earth CPC.

Armoured cables shall have their steel wire armour glanded off at each end and connected to a suitable earth point from the gland termination point, and the associated CPC (fully sized) which acts as the safety functional earth is connected to the appropriate dedicated earth bar.

- **System performance:** [70-70-25/210 Design of earthing and bonding systems.](#)
- **Main incoming earth:** Existing.
- **Main earth electrode type:** Existing.
- **Main protective bonding conductors:** Existing.
- **Supplementary bonding conductors:** Existing bonding to remain, with new bonding added to suit the new extension.
- **Circuit protective conductors:** Core of cable.
- **Earth terminal type:** Existing.
- **Accessories:** [90-75-50/350 Earthing and bonding clamps.](#)
- **Electrical identification:** [90-90-55/390 Equipment labels and warning notices.](#)
- **Execution:** [70-70-25/620 Measurement of characteristics of existing installations;](#)  
[70-70-25/630 General installation;](#)  
[70-70-25/660 Installing earthing conductor;](#)  
[70-70-25/680 Installing supplementary bonding conductors;](#)  
and [70-70-25/720 Notices and labels.](#)
- **System completion:** [70-70-25/810 Inspection and testing](#) and [70-70-25/820 Documentation.](#)

## System performance

### 70-70-25/210 Design of earthing and bonding systems

- **Standards:** In accordance with [BS 7671](#) and [BS 7430](#).
- **Design:** Complete the design of the earthing and bonding systems.
- **Earthing conductor:** Size in accordance with [BS 7671](#), Regulation 543.1.4.
- **Main protective bonding conductors:**
  - **Connect the following to the main earthing terminal:** Water service pipes, gas installation pipes, other service pipes and ducting, central heating and air conditioning systems, exposed metallic structural parts of the building
  - **Size (minimum):** In accordance with [BS 7671](#), Regulation 544.1.1.
- **Supplementary bonding conductors:**
  - **Bond the following:** Contractor's choice.
  - **Size (minimum):** Minimum of 2.5 mm<sup>2</sup> if sheathed or where mechanical protection is provided, otherwise 4 mm<sup>2</sup>.
- **Circuit protective conductors:** Size in accordance with [BS 7671](#), Regulation 543.1.4.
- **Requirement:** Submit proposals including detailed design drawings, technical information, calculations and manufacturers' literature.

## Products

### 90-75-50/350 Earthing and bonding clamps

- **Manufacturer:** Contractor's choice.
- **Standard:** To [BS 951](#).

### 90-90-55/390 Equipment labels and warning notices

Shared by: [70-70-25/110 Earthing and bonding system](#); [70-70-45/110 Low voltage distribution system](#); [70-70-75/110 Hard wired low voltage small power system](#); and [70-80-35/110 Hard wired general lighting system](#).

- **Manufacturer:** Contractor's choice.
- **Material:** Face engraved rigid plastic laminate.
- **Label size:** Manufacturer's standard.
- **Colour:**
  - **Background:** White.
  - **Lettering:** Black.
- **Typography:**
  - **Font:** Manufacturer's standard.
  - **Size:** 5mm.

## Execution

### 70-70-25/620 Measurement of characteristics of existing installations

- **External earth fault loop impedance (Ze):** Direct measurement.
- **Earth fault loop impedance (Zs):** Direct measurement.
- **Results:** Submit.

### 70-70-25/630 General installation

- **Standards:** In accordance with [BS 7430](#) and [BS 7671](#).

### 70-70-25/660 Installing earthing conductor

- **Conductor location:** Install between the main incoming earth and the main earthing terminal in one continuous length.
- **Connection:** Make with compression lugs and phosphor bronze nuts and bolts and spring washers.
- **Earthing conductor route:** Contractor's choice.
- **Connection to earth electrodes:** Heavy duty copper alloy mechanical clamps.
- **Protection to earthing conductor:** Rigid conduit.

### 70-70-25/680 Installing supplementary bonding conductors

- **Earth connections:** Connect with compression lugs.

### 70-70-25/720 Notices and labels

- **Earth bars:** Describe each connection and label with 'SAFETY ELECTRICAL CONNECTION – DO NOT REMOVE'.
- **Earthing and main protective bonding connections:** Describe each connection and label with 'SAFETY ELECTRICAL CONNECTION – DO NOT REMOVE'.
- **Supplementary bonding connections:** Describe each connection and label with 'SAFETY ELECTRICAL CONNECTION – DO NOT REMOVE'.
- **Earth free locations:** For areas utilizing protection by earth-free local equipotential bonding label with 'THE PROTECTIVE BONDING CONDUCTORS ASSOCIATED WITH THE ELECTRICAL INSTALLATION IN THIS LOCATION MUST NOT BE CONNECTED TO EARTH – EQUIPMENT HAVING EXPOSED-CONDUCTIVE-PARTS CONNECTED TO EARTH MUST NOT BE BROUGHT INTO THIS LOCATION'.

## System completion

### 70-70-25/810 Inspection and testing

- **Standards:** In accordance with [BS 7430](#) and [BS 7671](#).
- **Notice before commencing tests (minimum):** 5 working days.
- **Continuity of protective conductors:**
  - **Parallel earth paths:** Isolate before testing.
  - **Equipment:** Continuity tester with short circuit current not less than 200 mA, and a no load d.c. or a.c. voltage between 4 V and 24 V.
- **External earth fault loop impedance (Ze):** Direct measurement.
- **Earth fault loop impedance (Zs):** Direct measurement.

### 70-70-25/820 Documentation

- **Operating and maintenance instructions:**
  - **Scope:** Submit for the system giving optimum settings for controls.
  - **Product information:** Include product description, date of purchase, performance characteristics, application (suitability for use), method of operation and control, and cleaning and maintenance requirements.
  - **Format:** Electronic and Paper copy.
  - **Number of copies:** Two.
- **Record drawings:**
  - **Content:** Location and arrangement of plant in plant rooms.
  - **Format:** A1 paper print drawing and Electronic drawing.
  - **Number of copies:** Two.



- **Submittal date:** At handover.

Ω End of system

## 70-70-40/110 Inspection and testing of new low voltage electrical installations or changes to an existing installation

### System outline

#### 70-70-40/110 Inspection and testing of new low voltage electrical installations or changes to an existing installation

- **Description:** Fully commission and test all aspects of the electrical services installations, in accordance with the requirements of the appropriate British standard and CIBSE commissioning codes. Notify the CA in writing when, the works or parts thereof are ready for commissioning and testing (providing pre-test results proving the system meets all requirements).

Issue the CA with list of remedial items to be completed. Make all specified tests to the satisfaction of the CA.

Should the tests fail to demonstrate that the plant and equipment are properly installed and functioning correctly, investigate the cause of the failure. Should this be due to incorrect or faulty work by the Contractor, or his suppliers, then without delay carry out such remedial measure and adjustments as may be necessary and repeat the commissioning and testing procedure to the satisfaction of the CA.

In the event of commissioning tests and inspections failing to meet the required standards, pay all abortive costs so arising incurred by the CA, or other parties. These shall be in accordance with the appropriate Professional Fee Scale.

Where portions of the work are commissioned and tested separately, upon completion demonstrate to the CA that all the several portions are capable of proper simultaneous operation in accordance with the requirements of the Contract.

For the purposes of commissioning and testing of the installation provide all necessary skilled and unskilled labour and all necessary calibrated instruments and testing equipment.

- **General requirements:**
  - **Electrical test engineer:** Electrical installation contractor.
  - **Approval:** [National Inspection Council for Electrical Installation Contracting \(NICEIC\)](#).
  - **Evidence of approval:** Submit.
  - **Test equipment calibration:** UKAS approved.
- **Execution:** [70-70-40/610 Test equipment calibration](#) and [70-70-40/620 Inspection and testing electrical installations generally](#).
- **System completion:** [70-70-40/860 Electrical installation certificates](#).

### Execution

#### 70-70-40/610 Test equipment calibration

- **Test equipment calibration:** UKAS approved.

#### 70-70-40/620 Inspection and testing electrical installations generally

- **Standards:** In accordance with [BS 7671](#) and [IETGuidance Note 3](#).
- **Notice before commencing tests (minimum):** 5 working days.
- **Installed equipment standards:** Verify and confirm compliance with the relevant equipment standards.

Verify and confirm that all parts of the fixed installation are selected and erected correctly.

Verify and confirm that the fixed installation is free from visible damage or otherwise defective.

- **Electronic devices:** Isolate to prevent damage during testing.
- **Continuity of protective conductors:**
  - **Parallel earth paths:** Isolate before testing.
  - **Equipment:** Continuity tester with short circuit current of at least 200 mA, and a no load d.c. or a.c. voltage between 4 V and 24 V.
- **Insulation resistance (minimum):**
  - **SELV and PELV circuits:** 1 megohm when tested at 250 V d.c.
  - **Other circuits less than or equal to 500 V (excluding SELV and PELV):** 2 megohm when tested at 500 V d.c.
- **External earth fault loop impedance (Ze):** Direct measurement.
- **Connection of test equipment to existing switchgear:** Submit proposals.
- **Earth fault loop impedance (Zs):** By direct measurement.
- **Measurement locations:** Origin, switchgear, fixed equipment and outlets, circuit extremities.
- **Prospective fault current:**
  - **Method:** Direct measurement.
  - **Location:** Origin, and at points where protective devices are required to operate under fault conditions.
- **Phase sequence:** Verify.
- **Cable containment:** Measure electrical continuity and insulating properties of containment. Submit results.

## System completion

### 70-70-40/860 Electrical installation certificates

- **Standard:** In accordance with [BS 7671](#), Appendix 6.
- **Format:** Electronic, type written results.
- **Test equipment identity:** Record on test certificates.
- **Certificates of calibration:** Submit for each test instrument.
- **Schedule of test results:** Submit two copies.

Ω End of system

## 70-70-45/110 Low voltage distribution system

### System outline

#### 70-70-45/110 Low voltage distribution system

- **Description:** The contractor shall, supply, install, test and commission a completed low voltage distribution system as described below.

The existing distribution boards within the property have been recently replaced. The intention is that there should be sufficient spare ways to connect the new local circuits to these boards.

For the kitchen a new supplementary board ref DB1 shall be provided. All the existing small power supplies shall be disconnected from the existing main electrical boards, and reconnected to DB1, a 63A single phase distribution board, incorporating RCBOs on each circuit.. A new contactor shall control the power input to DB1 and be linked to a series of knock off buttons, and to a fire alarm interface, to disable all the power to the kitchen in the event of an emergency.

The power supply to the new electric oven and hob requires a 3 phase supply. This shall be wired from the existing main boards, via a new 3 phase contactor similarly interconnected to the knock off buttons and fire alarm interface.

The distribution wiring shall be as follows:-

- Lighting to be supplied by twin and earth cable with LSZH sheath throughout the building.
- Power to be supplied by twin and earth cable with LSZH sheath throughout the building.
- Power to the new oven and hob shall be wired in SWA three phase cable with a separate earth cable, from the main DB to the local 3 phase isolator. Final connection from the isolator shall be wired in single cables contained within flexible metallic conduit.

The contractor is responsible for the final design, coordination, calculations, supply, installation, testing and commissioning of the complete systems as described. All specifications are to be read in conjunction with preliminaries/general conditions, relevant drawings and schedules of equipment.

The contractor shall ensure the installation complies with the relevant European, and British standards and requirements.

The contractor shall submit all drawings, technical information, calculations, and equipment selections/manufacturers literature for approval by the client/design team prior to installation.

- **System performance:** [70-70-45/215 Low voltage distribution circuit cables generally.](#)
- **Connection to low voltage supply:** Submit proposals.
- **Switchgear:** [90-50-45/410 Distribution boards.](#)
- **Distribution circuit cabling:** [90-55-15/341 PVC insulated and sheathed cables.](#)
- **Cable accessories:** [90-55-10/315 Cable ties.](#)
- **Rewireable installation:** Required.
- **Concealed installation:** Required.
- **Monitoring and metering:** Existing.
- **Electrical identification:** [90-90-55/390 Equipment labels and warning notices.](#)

- **Execution:** [70-70-45/625 Installing low voltage distribution systems](#) and [70-70-45/610 Removing low voltage distribution systems](#).
- **System completion:** [70-70-45/810 Inspecting, testing and commissioning of switchgear generally](#); [70-70-45/820 Documentation](#); and [70-70-45/840 Maintenance](#).

## System performance

### 70-70-45/215 Low voltage distribution circuit cables generally

- **Proposed selection of low voltage distribution cables:** Submit drawings, technical information, calculations and manufacturers' literature.
- **Conductor sizes (minimum):** 16 mm<sup>2</sup>.
- **Cable sizes not stated:** Submit.
- **Format:** Pro design.

## Products

### 90-50-45/410 Distribution boards

- **Manufacturer:** Hager
- **Standards:** To [BS EN 61439-1](#) and [BS EN 61439-3](#).
- **Third party certification:** [ASTA Type test certification](#).
- **Rated operational voltage (Ue):** Manufacturer's standard.
- **Incoming device:** [90-50-45/450 Switch-disconnectors](#).
- **Outgoing devices:**
  - **Type:** [90-60-30/330 Miniature circuit breakers](#) and [90-60-30/350 Residual current circuit breakers with integral overcurrent protection](#).
  - **Quantity:** As Circuit schedules.
- **Busbars and connections:**
  - **Type:** Fully shrouded.
  - **Rated operational current (Ie):** 125 A.
  - **Rated short-time withstand current (Icw) for 1 s:** 25 kA.
- **Neutral and earth bars:** Individual terminal for each outgoing circuit.
- **Neutral terminations:** Match current carrying capacity of phase conductor.
- **Spare ways:** As Circuit schedules.
- **Enclosure:**
  - **Ingress protection (minimum):** To [BS EN 60529](#), IP31.
  - **Material:** Steel.
  - **Finish:** Manufacturer's standard.
  - **Colour:** Manufacturer's standard.
  - **Locking mechanism:** Cylinder locks with a standard key type.
- **Accessories:** Manufacturer's standard.
- **Execution:** [90-50-45/665 Installing switchgear generally](#).

### 90-50-45/450 Switch-disconnectors

- **Manufacturer:** Hager
- **Standards:** To [BS EN 60947-1](#) and [BS EN 60947-3](#).

- **Third party certification:** [ASTA Type test certification](#).
- **Rated operational voltage (Ue):** 250 V.
- **Rated operational current (In):** 125 A.
- **Rated operational frequency:** 50 Hz.
- **Switch arrangement:** DP.
- **Rated short-time withstand current (Icw) for 1 s:** Manufacturer's standard.
- **Terminals:** Suitable for the connection of copper conductors.
- **Mechanical interlocking:** Manufacturer's standard.
- **Execution:** [90-50-45/665 Installing switchgear generally](#).

### 90-55-10/315 Cable ties

Shared by: [70-70-45/110 Low voltage distribution system](#); and [70-70-75/110 Hard wired low voltage small power system](#).

- **Manufacturer:** Contractor's choice.
- **Standard:** To [BS EN 62275](#).
- **Format:** Wrap around self-locking non-releasable.
- **Material:** Steel composite.
- **Loop tensile strength (minimum):** Manufacturer's standard.
- **Contribution to fire:** Non-flame propagating.
- **Environmental influences:**
  - **Non-metallic and composite components:** Resistant to ultraviolet light.
  - **Metallic and composite components:** Resistant to corrosion.

### 90-55-15/341 PVC insulated and sheathed cables

Shared by: [70-70-45/110 Low voltage distribution system](#); [70-70-75/110 Hard wired low voltage small power system](#); and [70-80-35/110 Hard wired general lighting system](#).

- **Manufacturer:** Contractor's choice.
- **Standard:** To [BS 6004](#).
- **Third party certification:** British Approvals Service for Cables ([BASEC](#)) certified.
- **Cable type:** 6243Y.
- **Size:** Refer to distribution board schedule.
- **Sheath colour:** Grey.
- **Execution:** [90-55-15/635 Installing low voltage cables type A](#).

### 90-60-30/330 Miniature circuit breakers

- **Manufacturer:** Hager
- **Standards:** To [BS EN 60947-1](#) and [BS EN 60947-2](#).
- **Third party certification:** [ASTA Type test certification](#).
- **Rated operational current (In):** As Circuit schedules.
- **Rated operational voltage (Ue):** 230 V a.c.
- **Rated frequency:** 50 Hz.
- **Number of poles:** One.
- **Rated short-circuit capacity (Icn):** 10 kA.
- **Tripping characteristic:** Type C.

- **Mounting method:** DIN rail.

### 90-60-30/350 Residual current circuit breakers with integral overcurrent protection

- **Manufacturer:** Hager
- **Standards:** To [BS EN 61009-1](#).
- **Operating characteristic:** A.
- **Tripping characteristic:** Type C.
- **Rated operational current (In):** As Circuit schedules.
- **Rated operational voltage (Ue):** 230 V a.c.
- **Rated frequency:** 50 Hz.
- **Number of poles:** Two.
- **Rated short-circuit capacity (Icn):** 10 kA.
- **Rated residual operating current:** 30 mA.
- **Time delay:** Manufacturer's standard.
- **Mounting method:** DIN rail.

### 90-90-55/390 Equipment labels and warning notices

Shared by: [70-70-25/110 Earthing and bonding system](#); [70-70-45/110 Low voltage distribution system](#); [70-70-75/110 Hard wired low voltage small power system](#); and [70-80-35/110 Hard wired general lighting system](#).

- **Manufacturer:** Contractor's choice.
- **Material:** Face engraved rigid plastic laminate.
- **Label size:** Manufacturer's standard.
- **Colour:**
  - **Background:** White.
  - **Lettering:** Black.
- **Typography:**
  - **Font:** Manufacturer's standard.
  - **Size:** 5mm.

## Execution

### 70-70-45/610 Removing low voltage distribution systems

- **Scope:** Complete installation.

### 70-70-45/625 Installing low voltage distribution systems

- **Standard:** In accordance with [BS 7671](#).
- **Layout:** Position cabling and equipment to provide safe and easy access for operation and maintenance.

### 90-50-45/665 Installing switchgear generally

Shared by: [90-50-45/410 Distribution boards](#); and [90-50-45/450 Switch-disconnectors](#).

- **General requirements:** [90-50-45/675 Labelling switchgear](#).
- **Switchgear cubicles:** Arrange in modular form to facilitate future extension.
- **Fixing equipment:**
  - **Generally:** Fix independently of wiring installation with zinc electroplated fasteners.
  - **Indoor equipment:** Fix using internal lugs.

- **Outdoor equipment:** Fix using external lugs.
- **Orientation:** Accurate and square to vertical and horizontal axes. Align adjacent items of switchgear on the same horizontal axis.
- **Extension boxes:** Provide where necessary.
- **Gland plates:** Non-ferrous for single core cables.
- **Identification:**
  - **Neutral and earth bar terminals:** Label with the outgoing circuit reference.
  - **Cable terminations:** Label with circuit reference, with push-on plastics markers.

### 90-50-45/675 Labelling switchgear

- **Switchgear terminals:** To [BS EN 60445](#).
- **Anti-condensation heaters:** Provide caution notices advising against accidental switching off.
- **Standby power:** Provide danger warning notices stating that assemblies may be energized from more than one source.
- **Indicator lamps:** Label each lamp describing its function.
- **Fuses, terminal blocks and other assembly components:** Label describing their purpose.
- **Spare fuses:** Label, describe their rating and associated outgoing ways.

### 90-55-15/635 Installing low voltage cables type A

Shared by: [90-55-15/341 PVC insulated and sheathed cables](#); and [90-55-15/665 Installing flexible cables](#).

- **Standard:** In accordance with [BS 7671](#).
- **Timing:** Do not start internal cabling until building enclosure provides permanently dry conditions.
- **Preparation:** Store cables above 5°C for 24 hours before installation.  
Clear cable path of debris.
- **Installation temperature (minimum):** 5°C.
- **Cables:** Install in one length. Dress cables flat, free from twists, kinks and strain.
- **Cable pulling:** Do not overstress. Prevent kinks and twisting of the cable.
- **Cable protection:** Cables passing through walls and floors to be sleeved with conduit or pipeduct to a minimum of 300 mm. Bush at both ends. Ensure that appropriate fire stopping materials are used to maintain the original fire integrity of the wall or floor around the penetration.
- **Concealed cable runs to wall accessories:** Run vertically from the accessory.
- **Distance from other services running parallel (minimum):** 150 mm. Position cables below heating pipes.
- **Jointing and termination:**
  - **Final circuit cables:** At electrical accessories only.
  - **Core connections:** Using compression lugs to equipment without integral clamping terminals.
  - **Terminating cables when not using glands:** Take sheathing of cables into accessory boxes and equipment and protect against abrasion with grommets.

### System completion

#### 70-70-45/810 Inspecting, testing and commissioning of switchgear generally

- **Standard:** In accordance with [BS 7671](#).
- **Notice before testing and commissioning:** 7 days.
- **Switches and circuit breakers:** Clean to remove all visible traces of dust.
- **Protective devices settings:** Configure to match the grading study.

- **Switchboard monitoring:** Continuous for 30 minutes following first energizing.
- **Additional inspecting and testing:** Check levelling and alignment of assembly.  
 Check operation of instruments and metering devices.  
 Check and adjust tightness of busbar connections and supports.  
 Check tightness of bolted connections.  
 Check busbar joints with duct or resistance measurements.  
 Check earth connections at compartments, switches and earth electrodes.  
 Check clearance of live parts from direct contact.  
 Check polarity and phase sequence of protective devices.  
 Check operation of protective devices using secondary and primary current injection.  
 Manually operate protective devices.  
 Carry out earth fault protection simulation tests.  
 Check functional operation of circuit breakers.  
 Check operation of switch tripping devices.
- **Testing and commissioning results:** Submit two copies.
- **Certificates of calibration for meters and instruments:** Submit.

#### 70-70-45/820 Documentation

- **Operating and maintenance instructions:**
  - **Scope:** Submit for the system giving optimum settings for controls.
  - **Product information:** Include product description, date of purchase, performance characteristics, application (suitability for use), method of operation and control, and cleaning and maintenance requirements.
  - **Format:** Paper copy and Electronic copy.
  - **Number of copies:** Two.
- **Record drawings:**
  - **Content:** Whether cables are run on surface, concealed in walls, floors, above suspended ceilings or within roof spaces;  
 Location of LV switchgear including distribution boards;  
 and Routes of trunking, conduit, cable tray and cable ladders.
  - **Drawing format:** A1 paper print drawing and Electronic drawing.
  - **Number of copies:** Two.
- **Submittal date:** At handover.

#### 70-70-45/840 Maintenance

- **Servicing and maintenance:** Undertake.
- **Duration:** Until 12 months after Practical Completion.

Ω End of system

## 70-70-75/110 Hard wired low voltage small power system

### System outline

#### 70-70-75/110 Hard wired low voltage small power system

- **Description:** The small power installation within the building shall comprise of socket outlets within each of the rooms and specific power supplies to items of equipment throughout the building.

The circuits shall be wired in ring or radial circuits and fed from RCBO protected distribution boards.

Refer to layout drawings for location of supplies.

The cabling within the building shall be carried out in flat twin and earth cable with LSZH sheath.

The contractor is responsible for the final coordination, supply, installation, testing and commissioning of the complete systems as described. All specifications are to be read in conjunction with preliminaries/general conditions, relevant drawings and schedules of equipment.

The contractor shall ensure the installation complies with the relevant European, and British standards and requirements.

The contractor shall submit all drawings, technical information, calculations, and equipment selections/manufacturers literature for approval by the client/design team prior to installation.

- **System performance:** [70-70-75/210 Design of low voltage small power systems](#); [70-70-75/215 Low voltage small power cables generally](#); and [70-70-75/230 Multi-gang power outlets](#).
- **Connection to low voltage supply:** Existing.
- **Final circuit cabling:** [90-55-15/341 PVC insulated and sheathed cables](#).
- **Cable accessories:** [90-55-10/315 Cable ties](#).
- **Rewireable installation:** Required.
- **Concealed installation:** Required.
- **Final connections:** [90-55-15/388 Ordinary duty heat resistant PVC insulated and sheathed flexible cables](#).
- **Partial installation:** Required.
- **Electrical accessories and outlets:** [90-60-25/335 Fused connection units](#) and [90-60-25/345 Standard socket outlets](#).
- **Controls and starters:** Specified in the mechanical specification.
- **Electrical identification:** [90-90-55/390 Equipment labels and warning notices](#).
- **Execution:** [70-70-75/610 Removing small power systems](#); [70-70-75/620 Small power installation](#); and [70-70-75/630 Installing cabling to socket outlets](#).
- **System completion:** [70-70-75/820 Documentation](#) and [70-70-75/840 Maintenance](#).

### System performance

#### 70-70-75/210 Design of low voltage small power systems

- **Provision of small power:** For fixed and portable equipment requiring power.
- **Design:** Complete for the low voltage small power systems.
- **Standards:** In accordance with [BS 7671](#).

- **Diversity:** In accordance with [IETGuidance Note 1](#).
- **Spare capacity throughout the small power system:** 20%.
- **Requirement:** Submit proposals including detailed design drawings, technical information, calculations and manufacturers' literature.

#### 70-70-75/215 Low voltage small power cables generally

- **Standard:** In accordance with [BS 7671](#).
- **Proposed selection of low voltage cables:** Submit drawings, technical information, calculations and manufacturers' literature.
- **Conductor sizes (minimum):** 2.5 mm<sup>2</sup>.
- **Format:** Pro Design.

#### 70-70-75/230 Multi-gang power outlets

##### Products

#### 90-55-10/315 Cable ties

Shared by: [70-70-45/110 Low voltage distribution system](#); and [70-70-75/110 Hard wired low voltage small power system](#).

- **Manufacturer:** Contractor's choice.
- **Standard:** To [BS EN 62275](#).
- **Format:** Wrap around self-locking non-releasable.
- **Material:** Steel composite.
- **Loop tensile strength (minimum):** Manufacturer's standard.
- **Contribution to fire:** Non-flame propagating.
- **Environmental influences:**
  - **Non-metallic and composite components:** Resistant to ultraviolet light.
  - **Metallic and composite components:** Resistant to corrosion.

#### 90-55-15/341 PVC insulated and sheathed cables

Shared by: [70-70-45/110 Low voltage distribution system](#); [70-70-75/110 Hard wired low voltage small power system](#); and [70-80-35/110 Hard wired general lighting system](#).

- **Manufacturer:** Contractor's choice.
- **Standard:** To [BS 6004](#).
- **Third party certification:** British Approvals Service for Cables ([BASEC](#)) certified.
- **Cable type:** 6243Y.
- **Size:** Refer to distribution board schedule.
- **Sheath colour:** Grey.
- **Execution:** [90-55-15/635 Installing low voltage cables type A](#).

#### 90-55-15/388 Ordinary duty heat resistant PVC insulated and sheathed flexible cables

Shared by: [70-70-75/110 Hard wired low voltage small power system](#); and [70-80-35/110 Hard wired general lighting system](#).

- **Manufacturer:** Contractor's choice.
- **Standards:** To [BS EN 50525-1](#) and [BS EN 50525-2-11](#).
- **Third party certification:** British Approvals Service for Cables ([BASEC](#)) certified.

- **Cable type:** Refer to Tender Drawings, Schematics and Distribution Board Schedules for details.
- **Size:** Manufacturer's standard.
- **Sheath colour:** White.
- **Execution:** [90-55-15/665 Installing flexible cables.](#)

#### 90-60-25/335 Fused connection units

- **Manufacturer:** Wandsworth and MK.
- **Standard:** To [BS 1363-4.](#)
- **Control:**
  - **Type:** Double pole, switched.
  - **Indicator lamp:** Not required.
- **Mounting:** Flush.
- **Flex outlet:** Manufacturer's standard.
- **Cable termination:** Screwed.
- **Fuse carrier access:** Manufacturer's standard.
- **Plate:**
  - **Material:** Manufacturer's standard.
  - **Finish:** Manufacturer's standard.
- **Insert colour:** White.
- **Execution:** [90-60-25/610 Installing electrical accessories.](#)

#### 90-60-25/345 Standard socket outlets

- **Manufacturer:** Wandsworth and MK.
- **Standard:** To [BS 1363-2.](#)
- **Arrangement:** Twin. Note some outlet to have integral USB outlets.
- **Control:**
  - **Type:** Double pole, switched.
  - **Switch position:** Outboard.
  - **Indicator lamp:** Not required.
  - **Interlock:** Three-pin equal pressure.
- **Mounting:** Flush.
- **Cable termination:** Screwed.
- **Plate:**
  - **Material:** Manufacturer's standard.
  - **Finish:** Manufacturer's standard.
- **Insert colour:** White.
- **Execution:** [90-60-25/610 Installing electrical accessories.](#)

#### 90-90-55/390 Equipment labels and warning notices

Shared by: [70-70-25/110 Earthing and bonding system](#); [70-70-45/110 Low voltage distribution system](#); [70-70-75/110 Hard wired low voltage small power system](#); and [70-80-35/110 Hard wired general lighting system.](#)

- **Manufacturer:** Contractor's choice.
- **Material:** Face engraved rigid plastic laminate.
- **Label size:** Manufacturer's standard.

- **Colour:**
  - **Background:** White.
  - **Lettering:** Black.
- **Typography:**
  - **Font:** Manufacturer's standard.
  - **Size:** 5mm.

## Execution

### 70-70-75/610 Removing small power systems

- **Scope:** Complete installation.

### 70-70-75/620 Small power installation

- **Standard:** In accordance with [BS 7671](#).

### 70-70-75/630 Installing cabling to socket outlets

- **General:** Wire socket outlets in ring final circuits without spurs where hard wiring is employed.

### 90-55-15/635 Installing low voltage cables type A

Shared by: [90-55-15/341 PVC insulated and sheathed cables](#); and [90-55-15/665 Installing flexible cables](#).

- **Standard:** In accordance with [BS 7671](#).
- **Timing:** Do not start internal cabling until building enclosure provides permanently dry conditions.
- **Preparation:** Store cables above 5°C for 24 hours before installation.  
Clear cable path of debris.
- **Installation temperature (minimum):** 5°C.
- **Cables:** Install in one length. Dress cables flat, free from twists, kinks and strain.
- **Cable pulling:** Do not overstress. Prevent kinks and twisting of the cable.
- **Cable protection:** Cables passing through walls and floors to be sleeved with conduit or pipeduct to a minimum of 300 mm. Bush at both ends. Ensure that appropriate fire stopping materials are used to maintain the original fire integrity of the wall or floor around the penetration.
- **Concealed cable runs to wall accessories:** Run vertically from the accessory.
- **Distance from other services running parallel (minimum):** 150 mm. Position cables below heating pipes.
- **Jointing and termination:**
  - **Final circuit cables:** At electrical accessories only.
  - **Core connections:** Using compression lugs to equipment without integral clamping terminals.
  - **Terminating cables when not using glands:** Take sheathing of cables into accessory boxes and equipment and protect against abrasion with grommets.

### 90-55-15/665 Installing flexible cables

- **General requirements:** [90-55-15/635 Installing low voltage cables type A](#).
- **Cables:** Grip securely at connections. Where cord grips do not form an integral part of the accessory or equipment, provide separate proprietary cord grips.

### 90-60-25/610 Installing electrical accessories

Shared by: [90-60-25/325 Light switches](#); [90-60-25/335 Fused connection units](#); and [90-60-25/345 Standard socket outlets](#).

- **Standard:** In accordance with [BS 7671](#).
- **Accessory faceplates:** Free from any traces of plaster, grout, paint or similar.
- **Positioning:** Coordinate with other wall or ceiling mounted equipment.
- **Alignment:** Align adjacent accessories on the same vertical or horizontal axis.
- **Fixing:** Fix securely, plumb and level to vertical and horizontal axes.
- **Mounting heights:**
  - **Generally:** Measure from finished floor level to centre line of accessory.
  - **Light switches:** 1200mm from FFL.
  - **Socket outlets:** Refer to drawing and schedule of mounting heights.
  - **Fan isolators:** Adjacent to fan.
  - **Cooker control units:** Refer to drawing and schedule of mounting heights.
  - **Cooker connection units:** Refer to drawing and schedule of mounting heights.
  - **Telecommunications and data outlets:** Refer to drawing and schedule of mounting heights.
- **Separation distance between adjacent accessories (minimum):** 20 mm.

## System completion

### 70-70-75/820 Documentation

- **Operating and maintenance instructions:**
  - **Scope:** Submit for the system giving optimum settings for controls.
  - **Product information:** Include product description, date of purchase, performance characteristics, application (suitability for use), method of operation and control, and cleaning and maintenance requirements.
  - **Format:** Paper copy and Electronic.
  - **Number of copies:** Two.
- **Record drawings:**
  - **Content:** For all low voltage final circuits, the cable origin, circuit designation, route, loading, conductor material and c.s.a, insulation type and colour, number of cores per cable, number of cables in trunking and conduit.
  - **Format:** A1 paper print drawing and Electronic drawing.
  - **Number of copies:** Two.
- **Submittal date:** At handover.

### 70-70-75/840 Maintenance

- **Servicing and maintenance:** Submit proposals.
- **Duration:** Until 12 months after Practical Completion.

## Ω End of system

## 70-80-35/110 Hard wired general lighting system

### System outline

#### 70-80-35/110 Hard wired general lighting system

- **Description:** The lighting within the building shall comprise of LED downlights, LED bulkheads, LED curved profile linear and Modern LED pendant sets. These shall all be manually switched. The cabling within the houses shall be carried out in flat twin and earth cable with LSZH sheath.

The contractor is responsible for the final, coordination, supply, installation, testing and commissioning of the complete systems as described. All specifications are to be read in conjunction with preliminaries/general conditions, relevant drawings and schedules of equipment.

The contractor shall ensure the installation complies with the relevant European, and British standards and requirements.

The contractor shall submit all drawings, technical information, calculations, and equipment selections/manufacturers literature for approval by the client/design team prior to installation.

- **System performance:** [70-80-35/210 Design of general lighting systems](#); [70-80-35/250 Luminaire and lamp maintenance properties](#); and [70-80-35/270 Lighting cables generally](#).
- **Final circuit cabling:** [90-55-15/341 PVC insulated and sheathed cables](#).
- **Rewireable installation:** Required.
- **Concealed installation:** Required.
- **Luminaire types:** As Crofton Design Schedules.
- **Lamp types:** [90-60-50/336 Self-ballasted LED lamps](#).
- **Connections to luminaires:** [90-55-15/388 Ordinary duty heat resistant PVC insulated and sheathed flexible cables](#).
- **Lighting controls:** [90-60-25/325 Light switches](#).
- **Electrical identification:** [90-90-55/390 Equipment labels and warning notices](#).
- **Execution:** [70-80-35/610 Removing lighting systems](#); [70-80-35/630 Installing general lighting systems](#); and [70-80-35/720 Labelling of lighting controls](#).
- **System completion:** [70-80-35/810 Testing and commissioning of general lighting systems](#); [70-80-35/820 Documentation relating to general lighting](#); and [70-80-35/840 Maintenance](#).

### System performance

#### 70-80-35/210 Design of general lighting systems

- **Design:** Complete commissioning checklist in accordance with [Commissioning Code L](#), Appendix LA2.
- **Standard:** To [BS EN 12464-1](#).
- **Design calculations:** Using a recognised lighting package (Relux/Dialux etc).

#### 70-80-35/250 Luminaire and lamp maintenance properties

- **Lamp replacement method:** Spot replacement.
- **Room surface cleaning interval:** 0.5 y.

## 70-80-35/270 Lighting cables generally

- **Standard:** In accordance with [BS 7671](#).
- **Requirement:** Submit proposals, including detailed design drawings, technical information, calculations and manufacturers' literature.
- **Conductor sizes (minimum):**
  - **Lighting circuits:** 1.5 mm<sup>2</sup>.
  - **Final connection:** 0.75 mm<sup>2</sup>.
- **Cable sizes not stated:** Submit.

## Products

### 90-55-15/341 PVC insulated and sheathed cables

Shared by: [70-70-45/110 Low voltage distribution system](#); [70-70-75/110 Hard wired low voltage small power system](#); and [70-80-35/110 Hard wired general lighting system](#).

- **Manufacturer:** Contractor's choice.
- **Standard:** To [BS 6004](#).
- **Third party certification:** British Approvals Service for Cables ([BASEC](#)) certified.
- **Cable type:** 6243Y.
- **Size:** Refer to distribution board schedule.
- **Sheath colour:** Grey.
- **Execution:** [90-55-15/635 Installing low voltage cables type A](#).

### 90-55-15/388 Ordinary duty heat resistant PVC insulated and sheathed flexible cables

Shared by: [70-70-75/110 Hard wired low voltage small power system](#); and [70-80-35/110 Hard wired general lighting system](#).

- **Manufacturer:** Contractor's choice.
- **Standards:** To [BS EN 50525-1](#) and [BS EN 50525-2-11](#).
- **Third party certification:** British Approvals Service for Cables ([BASEC](#)) certified.
- **Cable type:** Refer to Tender Drawings, Schematics and Distribution Board Schedules for details.
- **Size:** Manufacturer's standard.
- **Sheath colour:** White.
- **Execution:** [90-55-15/665 Installing flexible cables](#).

### 90-60-25/325 Light switches

- **Manufacturer:** Wandsworth and MK.
- **Standard:** To [BS EN 60669-1](#).
- **Current rating:** 6 A.
- **Actuating method:** Rocker bar switch.
- **Mounting:** Flush.
- **Ingress protection (minimum):** To [BS EN 60529](#), IP 20.
- **Cable termination:** Screwed.
- **Plate:**
  - **Material:** Manufacturer's standard.
  - **Finish:** Manufacturer's standard.
- **Insert colour:** Manufacturer's standard.

- **Execution:** [90-60-25/610 Installing electrical accessories;](#)  
[90-60-25/630 Grid switch plates;](#)  
and [90-60-25/640 Installing light switches.](#)

#### 90-60-50/336 Self-ballasted LED lamps

- **Manufacturer:** Submit proposals.
- **Standards:** To [BS EN 62560](#) and [BS EN 62612](#).
- **Third party certification:** [BSIKitemark](#) approved.
- **Cap type:** GU10.
- **Wattage:** As luminaire schedule.
- **Colour temperature:** 3000 K.
- **Colour rendering index (Ra):** >90.
- **Rated life (minimum):** Manufacturer's standard.
- **Initial lumens (minimum):** Manufacturer's standard.
- **Rated lamp efficacy (minimum):** Manufacturer's standard.
- **Energy efficiency label:** A++.
- **Dimmable:** Yes.

#### 90-90-55/390 Equipment labels and warning notices

Shared by: [70-70-25/110 Earthing and bonding system;](#) [70-70-45/110 Low voltage distribution system;](#) [70-70-75/110 Hard wired low voltage small power system;](#) and [70-80-35/110 Hard wired general lighting system.](#)

- **Manufacturer:** Contractor's choice.
- **Material:** Face engraved rigid plastic laminate.
- **Label size:** Manufacturer's standard.
- **Colour:**
  - **Background:** White.
  - **Lettering:** Black.
- **Typography:**
  - **Font:** Manufacturer's standard.
  - **Size:** 5mm.

### Execution

#### 70-80-35/610 Removing lighting systems

- **Scope:** Complete installation.
- **Disposal of batteries:** In accordance with manufacturer's recommended procedures.

#### 70-80-35/630 Installing general lighting systems

- **Standard:** In accordance with [BS 7671](#) and [CIBSE Commissioning Code L](#).
- **Commissioning method statement:** Submit prior to commissioning.
- **Luminaire layout:** To tie in with the lighting drawings.
- **Connection of luminaire supporting couplers:**
  - **General luminaires:** White plug with white cover.
- **Switches and controls:**
  - **Location:** As shown on electrical layout drawings.
  - **Staircases:** Two-way switching at top and bottom landings with intermediate at full landings.

- **Rooms smaller than 4 m<sup>2</sup>:** Restrict lighting circuits to one electrical phase.

### 70-80-35/720 Labelling of lighting controls

- **Equipment and sensor identification labels:** Provide.
- **Lighting controls:** Label each component describing its purpose.
- **Output circuits:** Label each cable at point of connection to lighting distribution boxes, master distribution boxes and lighting control modules.

### 90-55-15/635 Installing low voltage cables type A

Shared by: [90-55-15/341 PVC insulated and sheathed cables](#); and [90-55-15/665 Installing flexible cables](#).

- **Standard:** In accordance with [BS 7671](#).
- **Timing:** Do not start internal cabling until building enclosure provides permanently dry conditions.
- **Preparation:** Store cables above 5°C for 24 hours before installation.  
Clear cable path of debris.
- **Installation temperature (minimum):** 5°C.
- **Cables:** Install in one length. Dress cables flat, free from twists, kinks and strain.
- **Cable pulling:** Do not overstress. Prevent kinks and twisting of the cable.
- **Cable protection:** Cables passing through walls and floors to be sleeved with conduit or pipeduct to a minimum of 300 mm. Bush at both ends. Ensure that appropriate fire stopping materials are used to maintain the original fire integrity of the wall or floor around the penetration.
- **Concealed cable runs to wall accessories:** Run vertically from the accessory.
- **Distance from other services running parallel (minimum):** 150 mm. Position cables below heating pipes.
- **Jointing and termination:**
  - **Final circuit cables:** At electrical accessories only.
  - **Core connections:** Using compression lugs to equipment without integral clamping terminals.
  - **Terminating cables when not using glands:** Take sheathing of cables into accessory boxes and equipment and protect against abrasion with grommets.

### 90-55-15/665 Installing flexible cables

- **General requirements:** [90-55-15/635 Installing low voltage cables type A](#).
- **Cables:** Grip securely at connections. Where cord grips do not form an integral part of the accessory or equipment, provide separate proprietary cord grips.

### 90-60-25/610 Installing electrical accessories

Shared by: [90-60-25/325 Light switches](#); [90-60-25/335 Fused connection units](#); and [90-60-25/345 Standard socket outlets](#).

- **Standard:** In accordance with [BS 7671](#).
- **Accessory faceplates:** Free from any traces of plaster, grout, paint or similar.
- **Positioning:** Coordinate with other wall or ceiling mounted equipment.
- **Alignment:** Align adjacent accessories on the same vertical or horizontal axis.
- **Fixing:** Fix securely, plumb and level to vertical and horizontal axes.
- **Mounting heights:**
  - **Generally:** Measure from finished floor level to centre line of accessory.
  - **Light switches:** 1200mm from FFL.
  - **Socket outlets:** Refer to drawing and schedule of mounting heights.

- **Fan isolators:** Adjacent to fan.
- **Cooker control units:** Refer to drawing and schedule of mounting heights.
- **Cooker connection units:** Refer to drawing and schedule of mounting heights.
- **Telecommunications and data outlets:** Refer to drawing and schedule of mounting heights.
- **Separation distance between adjacent accessories (minimum):** 20 mm.

#### 90-60-25/630 Grid switch plates

- **Spare modules:** Provide blank inserts.

#### 90-60-25/640 Installing light switches

- **Multigang switches:** Connect so that there is a logical relationship with luminaire positions.
- **Unused switch spaces:** Fit with blanks.
- **Segregation:** Internally segregate each phase with phase barriers. Include warning plates.

### System completion

#### 70-80-35/810 Testing and commissioning of general lighting systems

- **Standards:** In accordance with [BS 7671](#) and [CIBSE Commissioning Code L](#).
- **Test results:** Submit two copies of system commissioning completion certificate.
- **Certificates of calibration for meters and instruments:** Submit.

#### 70-80-35/820 Documentation relating to general lighting

- **Operating and maintenance instructions:**
  - **Scope:** Submit for the system giving optimum settings for controls.
  - **Product information:** Include product description, date of purchase, performance characteristics, application (suitability for use), method of operation and control, and cleaning and maintenance requirements.
  - **Format:** Paper copy and Electronic.
  - **Number of copies:** Two.
- **Record drawings:**
  - **Content:** General arrangement drawings showing the location of luminaires, lighting circuit distribution boxes, master and slave distribution boxes, switch modules, manual and automatic switches and controls including timeswitches, passive infrared detectors, and daylight sensors.
  - **Format:** A1 paper print drawing and Electronic drawing.
  - **Number of copies:** Two.
- **Submittal date:** At handover

#### 70-80-35/840 Maintenance

- **Servicing and maintenance:** Undertake.
- **Duration:** Until 12 months after completion.

Ω End of system

## 75-65-30/110 Fire detection and alarm systems in non-domestic premises

### System outline

#### 75-65-30/110 Fire detection and alarm systems in non-domestic premises

- **Description:** The fire alarm installation shall be provided in accordance with BS 5839-1 to L2 category. .

An intelligent analogue addressable fire alarm system shall be provided to cover the whole of the area being developed. The area of the existing main hall and spaces beyond are not included at this stage but the new panel shall have the capability of expansion to accommodate the whole building in the future.

The new fire alarm panel shall be located in the main entrance lobby as

.

The specialist will produce 'Cause and Effect' matrix with the contractor to ensure its co-ordinated with the kitchen power shut down facility.

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The contractor will allow for the following fire alarm devices:

- Fully Addressable open protocol Fire alarm panels by Advance located at main entrance.
- Appolo devices
- Fire Alarm Interface panel to kitchen.
- FP rated cabling
- metallic clips
- Cable basket or tray

All fire alarm systems will be open protocol, the panel should be capable of indicating fire and fault conditions and actioning the event. The system shall be provided with a standby supply from batteries rated to maintain the system in operation for 24 hours followed by half an hour in alarm mode.

- **System performance:** L2
- **System manufacturer:**
- **System type:** Addressable.
- **Detection devices:**
  - **Atmosphere:** Normal.
  - **Types:** [90-75-30/330 Manual call points](#);  
[90-75-30/345 Point heat detectors](#);  
and [90-75-30/350 Point smoke detectors](#).
- **Equipment interconnectivity:** [90-55-15/330 Fire resistant screened \(LSHF\) cables](#).
- **Cable containment:** [90-55-10/325 Cable baskets](#);  
[90-55-10/335 Cable trays](#);  
and [90-55-10/410 Cable trunking and cable ducting for wall and ceiling mounting](#).
- **Concealed installation:** Required.

- **Internal alarms:**
  - **Primary:** [90-75-30/360 Sounders type A.](#)
  - **Secondary:** [90-75-30/415 Visual alarm devices type A.](#)
- **External alarms:** [90-75-30/360 Sounders type B](#) and [90-75-30/415 Visual alarm devices type B.](#)
- **Controls:** [90-75-30/380 Fire detection and alarm control and indicating equipment \(CIE\).](#)
- **Execution:** [75-65-30/610 Installing fire detection and alarm systems in non-domestic premises.](#)
- **System completion:** [75-65-30/806 Device identification and testing;](#)  
[75-65-30/807 Standby battery testing;](#)  
[75-65-30/808 System soak testing;](#)  
[75-65-30/809 Measurement of sound pressure levels;](#)  
[75-65-30/810 Testing and commissioning fire detection and alarm systems in non-domestic premises;](#)  
[75-65-30/820 Documentation for fire detection and alarm systems in non-domestic premises;](#)  
and [75-65-30/850 Verification certificate for fire detection and alarm systems in non-domestic premises.](#)

## Products

### 90-55-10/325 Cable baskets

- **Standard:** To [BS EN 61537.](#)
- **Material:** Steel
- **Coating material:** Hot dip galvanized.
- **Sizes:**
  - **Width:** Contractor to ascertain
- **Execution:** [90-55-10/630 Installing cable basket.](#)

### 90-55-10/335 Cable trays

- **Standard:** To [BS EN 61537.](#)
- **Material:** steel
- **Resistance against flame propagation:** Non-flame propagating.
- **Electrical properties:**
  - **Continuity characteristics:** With electrical continuity.
  - **Conductivity characteristics:** With electrical conductive system component.
- **Coating material:** Hot dip galvanized.
- **Width:** Contractor to ascertain
- **Execution:** [90-55-10/620 Installing cable tray and cable ladder.](#)

### 90-55-10/410 Cable trunking and cable ducting for wall and ceiling mounting

- **Standards:** To [BS EN 50085-1](#) and [BS EN 50085-2-1.](#)
- **Resistance to flame propagation:** Non-flame propagating.
- **Electrical properties:** With electrical continuity characteristics.
- **Sizes:** Contractor to ascertain
- **Accessories and fittings:**
  - **Generally:** Factory made by the cable trunking or ducting manufacturer and of the same material type and finish as the cable trunking or ducting.
- **Execution:** [90-55-10/740 Installing trunking generally.](#)

### 90-55-15/330 Fire resistant screened (LSHF) cables

- **Standard:** To [BS 7629-1](#).
- **Third party certification:** Loss Prevention Certification Board ([LPCB](#)) certified.
- **Size:** Contractor to ascertain
- **Fire resistance category:** STANDARD 60.
- **Execution:** [90-55-15/635 Installing low voltage cables type B](#);  
[90-55-15/660 Installing low voltage cables in conduit and trunking](#);  
and [90-55-15/735 Cable installation on channel cable supports, cable tray, cable ladder and cable basket](#).

### 90-75-30/330 Manual call points

- **Standard:** To [BS EN 54-11](#);  
To [BS EN 54-17](#);  
and To [BS EN 54-25](#).
- **Third party certification:** [LPCB](#) approved.
- **Designation:** Type A.
- **Frangible element:** Non-resettable.
- **Integral red visual indicator:** Required.
- **Execution:** [90-75-30/630 Installing manual call points](#).

### 90-75-30/345 Point heat detectors

- **Manufacturer:** Apollo
- **Standard:** To [BS EN 54-5](#);  
To [BS EN 54-17](#);  
and To [BS EN 54-25](#).
- **Third party certification:** [LPCB](#) approved.
- **Execution:** [90-75-30/620 Installing point detectors type A](#).

### 90-75-30/350 Point smoke detectors

- **Manufacturer:** Apollo
- **Standard:** To [BS EN 54-7](#);  
To [BS EN 54-17](#);  
and To [BS EN 54-25](#).
- **Third party certification:** [LPCB](#) approved.
- **Detector type:** Manufacturer's standard.
- **Execution:** [90-75-30/620 Installing point detectors type B](#).

### 90-75-30/360 Sounders type A

- **Manufacturer:** Apollo
- **Standard:** To [BS EN 54-3](#);  
To [BS EN 54-17](#);  
To [BS EN 54-23](#);  
and To [BS EN 54-25](#).
- **Third party certification:** [LPCB](#) approved.
- **Sounder type:** Electronic sounder.
- **Sound patterns:** In accordance with [BS 5839-1](#).
- **Execution:** [90-75-30/640 Installing sounders](#).

## 90-75-30/380 Fire detection and alarm control and indicating equipment (CIE)

- **Manufacturer:** Advanced Electronics
- **Standard:** To [BS EN 54-2](#) and To [BS EN 54-25](#).
- **Third party certification:** [LPCB](#) approved.
- **Standby power supply:**
  - **Standard:** To [BS EN 54-4](#).
  - **Capacity:** Rechargeable battery sufficient to maintain the system in operation for a minimum of 24 hours and to provide an 'Evacuate' signal in all alarm zones for a further 30 minutes.
- **Main display:** Manufacturer's standard.
- **Zone indication:** Manufacturer's standard.
- **Installed capacity:** Submit proposals.
- **Printer:** Manufacturer's standard.
- **Indications:** Manufacturer's standard.
- **Controls:** Manufacturer's standard.
- **Outputs:** Manufacturer's standard.
- **Input device:** Manufacturer's standard.
- **Features:** Manufacturer's standard.
- **Enclosure:**
  - **Ingress protection (minimum):** Manufacturer's standard.
  - **Material:** Manufacturer's standard.
  - **Finish:** Manufacturer's standard.
  - **Colour:** Manufacturer's standard.
  - **Mounting:** Semi-recessed.
- **Execution:** [90-75-30/610 Installing main control and indicating equipment \(CIE\)](#).

## 90-75-30/415 Visual alarm devices type A

- **Manufacturer:** Apollo
- **Standard:** To [BS EN 54-23](#) and To [BS EN 54-25](#).
- **Device type:** Xenon beacon.
- **Enclosure protection:** Manufacturer's standard.
- **Category:** Ceiling mounted
- **Body colour:** Manufacturer's standard.
- **Lens colour:** Manufacturer's standard.
- **Execution:** [90-75-30/650 Installing visual alarm devices](#).

## Execution

### 75-65-30/610 Installing fire detection and alarm systems in non-domestic premises

- **Standard:** In accordance with [BS 5839-1](#).

### 90-55-10/620 Installing cable tray and cable ladder

- **Standards:** In accordance with [BS 7671](#) and [IETGuidance Note 1](#).
- **Preparation:**
  - **Burrs and sharp edges:** Make smooth.
  - **Cutting:** Minimize and make good edges. Cuts to cable tray to be square along an unperforated line.

- **Treatment of cut surface:** Extend 25 mm beyond the cut. Match finish of cable supports.
- **Access:** Provide space around cable ladder and tray to permit access for installing and maintaining cables.
- **Joints and expansion couplers:**
  - **Position:** Locate between the bracket support and the quarter point.
  - **Number of joints:** Minimize.
  - **Lengths of cable ladder and tray:** Maximize.
  - **Ends:** Blank with end plates.
- **Changes of size and direction:** Manufacturer’s accessories of the same material type, pattern, finish and thickness as cable supports.
- **Fire barriers:** Provide where required to maintain fire performance of fabric.
- **Protective covers:** Provide to cables requiring mechanical protection.
- **Support:**
  - **Fixing arrangement:**
  - **Clearance from building fabric (minimum):** 20 mm.
- **Components:** Avoid contact between dissimilar metals.
- **Routing of cable ladder and tray:** Submit drawings showing the proposed routes of cable ladder and cable tray.

#### 90-55-10/630 Installing cable basket

- **Standards:** In accordance with [BS 7671](#) and [IETGuidance Note 1](#).
- **Joints:** Cut adjacent cross basket wires. Make smooth any burrs or edges.
- **Accessories:** Form on site and connect with basket manufacturer’s coupling components.
- **Fire barriers:** Provide where required to maintain fire performance of fabric.
- **Support:**
  - **Fixing arrangement:**
  - **Clearance from building fabric (minimum):** 20 mm.
- **Components:** Avoid contact between dissimilar metals.
- **Routing of cable basket:** Submit drawings showing the proposed routes.

#### 90-55-10/740 Installing trunking generally

- **Changes of direction:** Manufacturer’s bends and tees.
- **Joints:**
  - **Generally:** Manufacturer’s jointing fittings. Maintain rigidity of trunking across joint.
  - **Number of joints:** Minimize.
  - **Lengths of trunking:** Maximize.
  - **Open ends:** Blank using manufacturer’s removable end caps.
  - **Metal edging:** Protect with PVC edging strip.
  - **Electrical continuity:** Maintain at each joint with a copper link fitted on the outside of the trunking.
- **Connections to conduit, boxes, equipment and accessories:** Screwed couplings, adaptors, connectors and glands, with rubber bushes at open ends.
- **Connections to trunking covers:** Minimize.
- **Electrical continuity of covers:** Electrically continuous with the trunking or provide protective conductors.
- **Access:** Provide space around trunking to permit access for installing and maintaining cables. Set out access with covers on a continuous face to allow cabling to be laid in throughout its entire length.

- **Trunking passing through building fabric openings:** Provide fixed trunking covers. Extend covers 50 mm from both sides of the opening.
- **Cable retaining straps:** Required except when trunking cover is on top.

### 90-55-15/635 Installing low voltage cables type B

- **Standard:** In accordance with [BS 7671](#).
- **Timing:** Do not start internal cabling until building enclosure provides permanently dry conditions.
- **Preparation:** Store cables above 5°C for 24 hours before installation.  
Clear cable path of debris.
- **Installation temperature (minimum):** 5°C.
- **Cables:** Install in one length. Dress cables flat, free from twists, kinks and strain.
- **Cable pulling:** Do not overstress. Prevent kinks and twisting of the cable.
- **Cable protection:** Cables passing through walls and floors to be sleeved with conduit or pipeduct to a minimum of 300 mm. Bush at both ends. Ensure that appropriate fire stopping materials are used to maintain the original fire integrity of the wall or floor around the penetration.
- **Concealed cable runs to wall accessories:** Run vertically from the accessory.
- **Exposed cable runs:**
  - **Distance from other services running parallel (minimum):** 150 mm. Position cables below heating pipes.
- **Jointing and termination:**
  - **Final circuit cables:** At electrical accessories only.
  - **Core connections:** Using compression lugs to equipment without integral clamping terminals.
  - **Terminating cables when not using glands:** Take sheathing of cables into accessory boxes and equipment and protect against abrasion with grommets.

### 90-55-15/660 Installing low voltage cables in conduit and trunking

- **Cable installation:** Orderly and capable of being withdrawn.
- **Single core wiring:** Arrange using the loop-in method.
- **Cables within trunking:** Tie at 2 m intervals for cables of the same circuit reference. Label ties with circuit reference number at 10 m intervals.
- **Cables in vertical conduit:** Provide cable clamps in accessible conduit boxes at 5 m intervals.
- **Extra low voltage cables:** Install within a separate partition from low voltage cables where installed in multi compartment trunking.

### 90-55-15/735 Cable installation on channel cable supports, cable tray, cable ladder and cable basket

- **Cabling:** Install when cable supports are complete.
- **Position:** Place single and multicore cables side by side.
- **Fastening:**
  - **Fastenings generally:** Secure cables, do not indent sheaths. Position to enable any submain cable to be individually removed.
  - **Submain cables <95 mm<sup>2</sup>:**
  - **Submain cables >95 mm<sup>2</sup>:**
  - **Final circuit cabling:** Cable ties at 250 mm (maximum) spacing.
  - **Extra low voltage, communications and fibre optic cabling:** Cable ties at 250 mm (maximum) spacing.

### 90-75-30/610 Installing main control and indicating equipment (CIE)

- **Position:**
- **Power supply:** Derive from a dedicated circuit from the main switchboard and connect to CIE via unswitched fused connection units.

### 90-75-30/620 Installing point detectors type A

### 90-75-30/620 Installing point detectors type B

### 90-75-30/630 Installing manual call points

- **Test key:** Locate to allow easy test operation.
- **Labelling:**
  - **Type:** Face engraved rigid plastic laminate.
  - **Background:** White.
  - **Lettering:** Red, identifying the manual call point address.

### 90-75-30/640 Installing sounders

- **Circuit wiring:**
- **Protective cage:**

## System completion

### 75-65-30/806 Device identification and testing

- **Device identification:** Label devices with a unique address corresponding to that used by the CIE. Label non-addressable devices with a unique reference corresponding to that shown on the record drawings.
- **Device testing:** Verify the operation of each device. Submit a schedule of devices, including the device test methods and results.

### 75-65-30/807 Standby battery testing

- **Mains power supply:** Isolate.
- **Quiescent mode:** Measure current supplied by standby source when fire detection and alarm system is operating in the quiescent mode. Submit results.
- **Alarm mode:** Measure current supplied by standby source when fire detection and alarm system is operating in the alarm mode. Submit results.

### 75-65-30/808 System soak testing

- **Soak test:** Undertake when construction works are complete, but before handover.
- **Period:** Submit proposals.
- **Re-test after remedial works:** Required.

### 75-65-30/809 Measurement of sound pressure levels

- **Sound pressure levels:** Measure throughout the building.
- **Test instrument:**
  - **Standard:** To [BS EN 61672-1](#).
  - **Setting:** Slow response, weighting A.
- **Doors:** Close before measuring sound pressure levels.
- **Results:** Submit room schedule with results.

### 75-65-30/810 Testing and commissioning fire detection and alarm systems in non-domestic premises

- **Standard:** In accordance with [BS 5839-1](#).
- **System commissioning agent:** Contractors Specialist

### 75-65-30/820 Documentation for fire detection and alarm systems in non-domestic premises

- **Standard:** In accordance with [BS 5839-1](#).
- **Operating and maintenance instructions:**
  - **Scope:** Submit for the system giving optimum settings for controls.
  - **Product information:** Include product description, date of purchase, performance characteristics, application (suitability for use), method of operation and control, and cleaning and maintenance requirements.
  - **Format:** Paper copy.
  - **Number of copies:**
- **Logbook:** Submit one copy in accordance with [BS 5839-1](#) Annex F.
- **Record drawings:**
  - **Content:** General arrangement drawings showing the location of all control and indicating equipment, manual call points, detectors, radio transmitters and aerials, sounders, visual alarm signal devices, short circuit isolators, end of line devices, remote indicators, interface units connecting to other equipment, and automatic door hold open devices and Schematic diagram showing all control cabling, the cable origin, device addresses, route from control and indicating equipment to manual call points, detectors, radio transmitters and aerials, sounders, visual alarm signal devices, short circuit isolators, end of line devices, remote indicators, interface units connecting to other equipment, and automatic door hold open devices. Include conductor material and c.s.a, insulation type and colour, number of cores per cable, number of cables in ducts, on tray or ladder.
  - **Drawing format:** Electronic drawing. Auto CAD
  - **Submittal date:** At handover.
- **Fire evacuation plan:** Submit electronic colour CAD layout.
- **Certification:**
  - **Design certificate:** Submit two copies in accordance with [BS 5839-1](#) Annex G.1.
  - **Installation certificate:** Submit two copies in accordance with [BS 5839-1](#) Annex G.2.
  - **Commissioning certificate:** Submit two copies in accordance with [BS 5839-1](#) Annex G.3.

### 75-65-30/850 Verification certificate for fire detection and alarm systems in non-domestic premises

- **System verification agent:** Contractor's specialist
- **Verification certificate:** Submit two copies in accordance with [BS 5839-1](#), Annex G.5.

Ω End of system