QODA

81a/b Bayham Street

Mechanical, Electrical and Public Health Services
Performance Specification – Contract Issue

20048.S03

QODA

Revision Summary

Issue	Document prepared			Document checked		
	Name	Signature	Date	Name	Signature	Date
Tender Issue	L. Sanders	L. Sanders	29/09/16	M. Voaden		29/09/2016
Contract Issue	L. Sanders	L. Sanders	12/10/16	M. Voaden		13/10/2016

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00-05-10 Project definition

101 The Project

- **Project reference:** 20048
- **Project title:** 81a/b Bayham Street
- **Project description:** Provide the Infrastructure to 6 New build apartments with ground floor retail unit.

  Key items to be included within this Tender, but not limited to the following:

  All sections of the preliminaries (General Conditions)
  All sections of the Performance Specification

  The Contractor shall allow for updating electrical loads and all infrastructure to suite the following :
  1) Final electrical Boiler and Hot water cylinder.
  2) All Local Authority requirements.

  All services Infrastructure, which includes:-
  1) All incoming services onto the development
  2) All metering and services distribution from ground to roof and/or entrance to each apartment.

00-05-15 Works terminology

110 Terminology

- **Meaning:** Terms, derived terms and synonyms used are as defined in this section or in the appropriate referenced document.

210 Description terminology

- **Attendance:** Includes
  The use of the Main Contractor's temporary roads, pavings and paths, standing scaffolding, standing power operated hoisting plant,
  The provision of temporary lighting of an equivalent brightness to the finished lighting brightness,
  The provision of water,
  The clearing away of rubbish and paying all charges in connection with its disposal, the provision of secure hard standing space for the sub-contractor's own offices, plant and material storage,
  The use of standing mess rooms, sanitary accommodation and welfare facilities and
  The provision of all Health and Safety facilities and all Fire Safety precautions, services, equipment, signage, facilities, Marshalls and the like necessary to comply with the relevant parts of the Joint Fire Code.
  Additional requirements should be described as 'Special attendance'.
- **Building Manual:** A document containing information of use to subsequent building owners, occupiers and users about the requirements and procedures for effective operation, maintenance, decommissioning and demolition of the building.
- **Construction Work:** Permanent work together with temporary work.
- **Contractor:** The party who undertakes to perform the services, supply goods or carry out work defined in a contract. Includes Main Contractor, Prime Contractor, Supplier, Service provider, Builder, Subcontractor, etc. as the context dictates, which may be defined terms in certain standard contract forms.
- **Contractor's choice:** Selection delegated to the Contractor, but liability to remain with the specifier.
- **Contractor's design:** Design to be carried out or completed by the Contractor, supported by appropriate contractual arrangements, to correspond with specified requirements.
- **Cost:** The amount paid or given by one party to another in exchange for goods, work or services.
- **Designer:** A person carrying out design on a project.
- **Deviation:** Difference between a specified dimension or position and the actual dimension or position.
- **Employer:** The party to the Contract for whom the goods, work or services are provided. Includes Client (in consultancy contracts and CDM Regulations), the Employer, Building owner or Purchaser (in construction contracts), the Developer (in development agreements and funding agreements), or the 'Main' contractor in contractor/ subcontractor agreements - which may be defined terms in certain standard contract forms
- **Estimate:** An approximate evaluation of either time or cost of part or the whole of a project.
- **Execute:** To complete a task fully and put into effect. To fix, apply, install or lay products securely, accurately, plumb and in alignment.
- **Existing:** Items retained in place to receive new work.
- **Fastener:** Device for mechanically attaching something to something else.
- **Manufacturer and Product reference:** Manufacturer - the body under whose name the particular product, component or system is marketed.
  Product reference - the proprietary brand name and/ or reference by which the particular product, component or system is identified.
  References are as specified in the manufacturer's technical literature current on the date specified.

- **Manufacturer's standard:** Where used in conjunction with a specified proprietary product, accessories to be those recommended by the product manufacturer.
- **Permanent Work:** Work to be constructed and completed in accordance with the Contract.
- **Price:** An indication of the amount required to be paid by one party to another in exchange for goods, work or services.
- **Product:** Material, both manufactured and naturally occurring, goods and accessories for permanent incorporation into the Works.
- **Requirements:** A description in outline or detailed form of the development, or a part of it, which one party requires another to design and/or build.
- **Schedule of rates:** The subdivision of product and execution prices by a pre-determined unit basis.
- **Schedule of Work:** The subdivision of work items by a pre-determined classification. Can form the basis of a pricing document where Bills of Quantities are not used.
- **Schematic:** A drawing of a system showing components, products, systems and their interconnections.
- **Site equipment:** The Contractor’s apparatus, appliances, machinery, vehicles or things of whatsoever nature required in or about the construction for the execution and completion of the Works and the remedying of defects.
  Includes Appliances, vehicles, consumables, tools, temporary work, scaffolding, cabins and other site facilities.
  Excludes: Temporary work, Employer’s products and equipment or anything intended to form or forming part of the permanent Works.
- **Specification:** Written description of requirements.
- **System:** Products, components, equipment, accessories, controls, supports and ancillary items, including installation, necessary for that section of the work to function.
- **Temporary work:** Incidental work to undertaken during construction but not intended to form part of the completed work.

310 Activity terminology

- **Advise:** See 'Communicate'.
- **Agree:** See 'Communicate'.
- **Approve:** Record conformance of work to specified criteria by giving formal or official sanction.
- **Communicate:** Includes advise, inform, agree, confirm, notify, seek or obtain information, consent or instructions, or make arrangements.
- **Confirm:** See 'Communicate'.
- **Ease:** Adjust moving parts of designated products, systems or work to achieve free movement and good fit in open and closed positions.
- **Fix:** Receive, unload, handle, store, protect, place and fasten in position; dispose of waste and surplus packaging; to include labour, materials and site equipment for that purpose.
- **Give notice:** Communicate in writing to the person administering the Contract at the address listed therein.
- **Inform:** See 'Communicate'.
- **Keep for recycling:** As 'keep for use' but relates to a naturally occurring material rather than a manufactured product.
- **Keep for reuse:** Do not damage designated products, systems or work. Clean off bedding and jointing materials. Stack neatly, adequately protect and store until required by the Employer or Purchaser, or for use in the Works as instructed.
- **Make good:** Execute local remedial work to designated work. Make secure, sound and neat.
- **Match existing:** Provide products and work of the same appearance and features as the original,

excluding ageing and weathering. Make joints between existing and new work as inconspicuous as possible.

- **Notify:** See 'Communicate'.
- **Quote:** Use 'Estimate'.
- **Recycle:** Collect, sort, process and convert discarded or recovered components into raw materials for use in the creation of new products.
- **Refix:** Fix previously removed products.
- **Remove:** Disconnect, dismantle as necessary and take out the designated products or work, together with associated accessories, fixings, supports, linings and bedding materials. Dispose of unwanted materials.
  Removal of a system includes this work.
- **Remediate:** Action or measures taken to lessen, clean-up, remove or mitigate the existence of hazardous materials existing on a property; in accordance with standards, specifications or requirements as may be required by statutes, rules, regulations or specification.
- **Repair:** Execute remedial work to designated products. Make secure, sound and neat. Excludes redecoration and replacement.
- **Replace:** Supply and fix new products matching those removed. Execute work to match the original new state of that removed.
- **Reuse:** Recover components to be fixed or used in the project or other buildings without the requirement for recycling.
- **Submit:** Deliver an item in a specified format to a specified person within a specified timeframe.
- **Submit proposals:** Submit information in response to specified requirements.
- **Supply and fix:** Supply of products, components or systems to be fixed, together with their fixing.

00-05-20 Project participants

110 Project participants

- **Type:** Building Services Engineers
- **Company:** QODA Consulting (London) Ltd
  - **Address:** Rex House (4th Floor), 4-12 Regent Street, London, SW1Y 4PE
  - **Telephone number:** +44 (0) 20 7394 2125
- **Contact:** Matthew Voaden
  - **Email:** matthew.voaden@qodaconsulting.com

110 A Project participants

- **Type:** Client
- **Company:** SPRUNT

110 B Project participants

- **Type:** Architect
- **Company:** SPRUNT
  - **Address:**
  - **Telephone number:**
- **Contact:**
  - **Email:**

00-05-70 Project location

110 Project location

- **Details:** 6 New build apartments with ground floor retail unit and passender lift
- **Address:**
  - **City:** Camden, London

00-30-70 Works Contract Procurement

110 Compliance with Tender rules

- **Compliance:** Failure to comply may result in Tenders being rejected at the sole discretion of the Employer.
- **Costs:** No liability is accepted for costs incurred in the preparation of a Tender.

190 Tender instructions

- **Qualifications:** Do not amend or alter documents without written instruction.
- **Confidentiality:** Do not reveal details of parts of the Tender or supporting documents (except for the necessary purposes of preparing that Tender) without the Employer's express written permission.

210 Pricing

- **Pricing:** Price and extend each item individually as instructed. Do not group items together.

220 Site visit

- **Nature of the site:** Ascertain before Tendering, including access thereto and local conditions and restrictions likely to affect the execution of the Work.

230 Return of Tender

- **Inability to tender:** Advise immediately if the work as defined in the Tender documents cannot be tendered.
  Define those parts, stating reasons for the inability to tender.

320 Error resolution

- **Arithmetical errors:** Tender price will prevail. An opportunity will be given to confirm the Tender or withdraw.
- **Technical errors:** The Tender is deemed to meet or exceed the requirements of the Tender documents. Amendment of the Tender to reflect this will not constitute a variation and no claim for additional costs will be accepted.
- **Corrections:** An endorsement will be added to the priced documents indicating that rates or prices (excluding preliminaries, contingencies, Prime cost and Provisional sums) inserted therein will be adjusted in the same proportion as the corrected total differs from that stated incorrectly.

Outline Specification

50-10-00 Above ground rainwater drainage systems

120 Internal gravity rainwater drainage system
Rainwater from the roofs shall be collected by a network of vertical pipework starting at the outlets at roof level and falling internal/External to the building. Rainwater drainage shall be provided to all roof areas including balconies and "green/brown" roofs as indicated on the Architects drawings.

Horizontal pipework shall be selected to ensure self-cleaning velocity is achieved.

All vertical rainwater pipework shall be in Cast Iron or HDPE (Geberit silent). For noise purposes insulation etc shall be installed to meet the acoustic engineer's requirements.

All vertical and horizontal rainwater pipework in the ground floor and high level commercial/retail areas shall be in cast iron pipework and fittings with mechanical joints.

Due to the limited service zone within the ground floor, all horizontal drainage shall be routed within the central core area or vertically through the retail area to the below ground drainage/outfall points, as indicated on the drawings. As the existing invert levels are being used all gravity drainage shall not be lower than the I.L given by the Civil engineer as part of the rainwater attenuation and outfall design.

All below slab/underground drainage shall be designed by the Civil engineer. All above ground drainage shall form part of the mechanical contractors design to the outfall provided by Civil engineer.

50-10-05 Above ground waste water drainage systems

120 Above ground waste water drainage system with internal stacks
Soil waste and ventilation pipes shall be provided throughout the building collecting the discharges from the sanitary fittings and wet areas. The residential stacks shall be installed within the apartments and shall be connected to the bathrooms and kitchen areas.

The system shall generally be single stack ventilated to atmosphere for all areas above Ground floor. Where necessary air admittance valves shall be fitted to stacks not terminating at roof level, this should be avoided unless agreed with the Client team in advance.

All vertical foul/waste drainage pipework shall be in Cast Iron or HDPE (Geberit silent). For noise purposes insulation etc shall be installed to meet the acoustic engineer's requirements.

All vertical and horizontal foul/waste drainage pipework in the ground floor and high level commercial/retail areas shall be in cast iron pipework and fittings with mechanical joints.

Roding access doors shall be provided at any change of direction and shall be provided on all vertical stacks at 1200 AFFL prior to connections to drain and above all floors.

Due to the limited service zone within the ground floor, all horizontal drainage shall be routed within the central core area or vertically through the retail area to the underground drainage/outfall points, as indicated on the drawings. As the existing invert levels are being used all gravity drainage shall not be lower than the I.L given by the Civil engineer.

All below slab/underground drainage shall be designed by the Civil engineer. All above ground drainage shall form part of the mechanical contractors design to the outfall provided by Civil engineer.

55-40-40 Hot & cold water supply systems

110 Incoming water supply
A new cold water main is required to be brought onto the site from the existing Water main. The water main shall serve the domestic water to the apartments and landlord areas, the retail unit shall a separate incoming water supply, as indicated on the drawings.

The incoming main shall be an unmetered bulk supply, which will feed the wholesome water tank supply before being metered by Thames Water for each dwelling and landlord connection.

It is intended that a new MDPE main should be brought into the building via the side access route below ground level into the service riser, where it shall serve the packaged cold water break tank and booster. From the packaged booster set the water distributes to above in the dedicated service riser.

The main will be sizes to meet the instantaneous demand of the building. If there is sufficient pressure from the town main then the packaged break tank and booster set can be designed out by the MEP sub-contractor.

130 Pumped cold water supply system
There is no storage requirement to the new development, however a booster and break tank shall be provided within the ground floor service riser, as indicated on the drawings.

The BCWS to each apartment shall be isolated at the main services riser (including landlord meter at ground floor). The BCWS will be connected to the package electric boiler and HWS Cylinder and have a tee serving the rest of the apartment sanitary ware, distributing at high level within the dwelling ceiling void.

Each apartment shall be separately metered, located in the dedicated service riser on a floor by floor basis. An individual landlord supply serving the ground floor shall also be provided.

The apartment boosted cold water pump set (if required) will be capable of providing a minimum 2.0 bar pressure at the highest most hydraulic remote fitting / Boiler. The cold water pump set shall be designed to provide a range of flow rates from a minimum flow to a single apartment to full diversified demand to all apartments simultaneously. The pump sets are selected with full variable speed pumps from 10-100%.

The packaged booster pump shall have a minimum of 4 stages, a non-return valve and isolation valve. Test points shall be fitted on the flow side of each pump to prove duties.

The packaged cold water booster unit shall be provided with two pumps to provide duty/standby arrangement.

A mains water by-pass arrangement shall be provided across the package booster pump set in the event of pump failure to ensure continued supply albeit a lower pressure to all apartments.

The cold water pump set shall be fitted with pressure vessels sized to satisfy low flow/night time conditions and to limit the number of pump starts. The cold water pump sets pressure vessels shall be sufficient in to satisfy the maximum simultaneous demand for water for 30 seconds. This will improve the pumps efficiency and reduce the pump set operation, prolonging the life of the pumps.

In the event of completed power failure the pump set shall be supplied complete with a Power restoration safety system which shall operate in the event of a main power supply fault or pump set failure. Upon re-instatement of

power the controller shall adjust the pump speed to ensure a slow fill/soft start. The controller will allow the cold water riser to be slowly refilled at a controlled rate, which will avoid surging, damage to system pipework and flooding. After the initial start-up or re-start from failure the lead pump shall be used to slow fill the system. The support pumps and two port control valve will be locked out and closed until the lead pump has filled the riser.

An automatic anti shock and surge anticipation valve located at the top of all boosted cold water riser will allow the discharge of air within the riser. The automatic air vent shall be fitted with a drain pipe which discharges to a local gully or drain point. Once the system is refilled the pump set shall switch to normal operation.

All cold water pipework shall be thermally insulated. All cold water pipework within un-heated spaces, shall have frost protection tape installed.

55-85-20 Dry riser systems

110 Dry riser system
A new dry riser system shall be provided to the development within the fire fighting core/stair case as indicated on the drawings.

Inlet boxes shall be provided at ground floor level adjacent to the block main entrance with outlets boxes on each floor landing, except at ground floor level.

60-45-90 Underfloor heating and cooling systems

110 Low temperature hot water underfloor heating
Heating and hot water services in each apartment shall be provided by packaged electric boiler and unvented hot water calorifier serving low temperature hot water underfloor heating system and manifold set.

65-10-75 Smoke extract and control systems

110 Smoke and heat exhaust ventilation system
The fire-fighting stair well will be provided with AOV's at the head of the stair, as required.

Essential power supplies will be provided to AOV (fail open).
All AOV's shall be fitted with rainwater sensors for auto closing, if required and not in fire-fighting mode.

65-10-95 Ventilation systems

180 Mechanical and whole building ventilation system
The fresh air intake for the MVHR unit shall be through a common vertical shaft down the core of the building. Active carbon filters shall be installed at the top of the shaft to reduce the NO2 levels to an acceptable level (refer to air quality report for full details).

Exhaust from the MVHR will be via façade louvers, as indicated on the Architectural elevations and roof drawings.

Each system shall supply filtered fresh air (though NO2 filter at roof level) to the habitable rooms and draw exhaust air from the bathrooms and kitchen areas. The MVHR shall be sized to match the requirements of the Building Regulations Part F, and shall be capable of achieving the required air change rate for both summer

overheating and rapid ventilation.

To achieve 4 ACH/hr for purge/rapid ventilation under Building Regulations Part F, a hybrid approach might also be required on some of the larger apartments. When the MVHR is in boost mode it will achieve 2 to 4 ACH depending on apartment size. Therefore any short fall can be overcome by using the open-able windows.All apartments shall be provided with mechanical whole house ventilation. The requirements are dependent on the criteria determined by specialist air quality and acoustic studies, carried out by others.

Please refer to condtion 13 planning condition submission for full detailed. As indicated on the Architectural roof plan and typical services apartment drawings.

The MVHR unit shall extract from wet rooms (i.e. bathrooms/WC/utility rooms/kitchens). Each system shall supply filtered fresh air to the habitable rooms and draw exhaust air from the bathrooms and kitchen. The systems shall be sized to match the requirements of the Building Regulations - Part F, and shall be capable of achieving a nominal air change rate.

Bathrooms/showers: Continuous Extract 8 l/s, Boost 15 l/s.
Kitchen: Continuous Extract 13 l/s, Boost 30 l/s adjacent to cooker hood.
General ventilation to whole dwelling: 0.3 l/s per m² floor area or 12 l/s per person.
The MVHR unit shall be mounted at high level within the dedicated services cupboard in each apartment.

Horizontal ducts within the apartment ceilings will be in self-extinguishing uPVC. Grilles will be ceiling mounted in each living room, bedroom, kitchen and bathroom. Attenuators (or acoustically lined plenum boxes) are provided in the inlet and exhaust ducts, as required by the acoustic engineer.

In the apartments equipped with whole house ventilation systems, the kitchen extract hoods (specified by the interior designer) shall discharge to atmosphere and not be linked to the MVHR system if they do not have the facility for recirculation. The contractor shall allow for an either/or solution as it will just require the ductwork to be reconfigured

70-50-45 Low voltage site connection systems

110 Incoming low voltage electricity supply
The Contractor shall design, procure, install and commission a new incoming low voltage electricity supply for the development.

The new Regional Electricity Company (REC) service to the site shall consist of an incoming TP&N service to main Ryefield Distribution Panel at Ground Level.

The supply shall serve individual meters for each residential apartment and Landlord Supply, located in the electrical meter room on located on the ground floor.

A separate feed shall supply Retail Unit on Ground Floor, as indicated on the drawings.

The Contractor shall be responsible for and include for all negotiations with UK Power Networks and any subsequent charges, in providing the Mains Electrical Supply.

The Contractor shall comply with all equipment, cabling, installation and space requirements as detailed by UK Power Networks.

The Contractor shall review the supply capacity required subject to the final design final requirements for mechanical plant selected.

The Contractor shall space plan the incoming electrical areas to ensure UK Power Networks requirements are achieved. The positions shown on outline design drawings are indicative only.

In addition to the details above the Contractor shall liaise with UK Power Networks to ensure all their requirements are met.

It is proposed that a new dedicated LV supply(s) is installed for the residential and retail elements of the development, subject to UKPN approval.

The Contractor shall be responsible for assessing the final loads of the service and that the final incoming service cupboard arrangements suits the required capacity of the incoming supply.

70-70-25 Earthing and bonding systems

110 Earthing and bonding system
The Contractor shall design, procure, install and commission a new earthing and bonding system.

70-70-45 Low voltage distribution systems

110 Low voltage distribution system
The Contractor shall design, procure, install and commission a new low voltage distribution system.

The sub-main distribution for the Residential apartments and landlords supply shall run from the Intake Ryefield Panel electrical meter cupboard at ground floor level.

The Landlord Switchgear shall consist of Non-Essential Panels, cubicle Form 4 Type 5, having front access complete with MCCBS, CT chamber to UKPN requirements, power factor correction and surge protection equipment.

The supplies to the Apartments shall be via Armoured sub-main cables to each apartment form the electrical meter room on the ground floor.
Armoured sub-main cables and sub meter shall also be installed to supply the Landlord:
- Passenger Lift,
- Essential loads including AOV and fire alarm,
- Landlord Lighting & Power Distribution Boards,
- Water Booster,

All primary and secondary cabling to life safety systems, as defined in BS9999, shall meet full fire rating requirements of BS 8519:2010 Life Safety and Fire Fighting Systems. All Automatic Transfer Switches shall include local sensors for change over and local phase failure relays to start generator as per requirements of BS8519.

70-70-75 Small power systems

110 Hard wired low voltage small power system
The Contractor shall design, procure, install and commission a new hard wired low voltage small power system.

The Small Power layout shall be based on drawings but final positions shall be subject to final architectural detail design layouts.

The small power installation shall comprise of, but not limited to the following areas:-

Switched fused connection units or isolators associated with all new mechanical plant installation.
Switched fused connection units and socket outlets associated with all apartment areas.
General landlord corridor RCD protected cleaner sockets.
Power supply to Fire alarm system
Power supply to TV aerial system distribution system
Power supply to Door Entry system
The Contractor shall provide for approval, calculations, design layout drawings and schedules prior to construction.
The Design Contractor shall provide switched 13A fused connection unit or isolators to local to each piece of mechanical equipment.

Accessories that are required in any wet areas or close to wash basin shall be IP rated. All circuits shall have RCD protection where required as per 17th Edition of IEE Wiring Regulations.

RCBO protected cleaners sockets will be provided in each stair area generally by lockable wall mounted sockets.

All socket outlet locations are indicatively shown on the drawings, the exact positions are to be coordinated on the contractor's installation drawings.

The installation drawings shall show all sockets set out to suit the current Architectural layout drawings. Unless otherwise stated final positions and quantities shall be agreed prior to installation.

70-80-25 External lighting systems

120 Amenity lighting system
The Contractor shall design, procure, install and commission an external lighting installation based on the drawings and final lighting scheme to be agreed with Architect

70-80-35 General lighting systems

110 Hard wired general lighting system
The Contractor shall design, procure, install and commission a new hard wired general lighting system and emergency lighting system throughout.

The system shall be based on the drawings

Lighting installation in all areas shall be provided in accordance with the current CIBSE Lighting Guides and local authority requirements.
The outline design drawings show only indicate lighting layouts, the final position, number and wattage of fittings is to be part of detailed design by Contractor.

The Contractor shall provide for approval, calculations, design layout drawings and schedules prior to construction.
Landlord Areas

Within the landlord areas a complete lighting system shall be provided throughout, wired back to local distribution boards. The lighting will consist of the following:-

Internal landlord entrance, corridor and stair luminaires shall be a combination recessed LED downlighters and energy efficient wall lighting. All luminaires to be controlled by PIR detectors suitably located along all landlord areas to give correct operation of all luminaires. The system shall have an adjustable time delay prior to switching

off luminaires. A manual override shall be provided within the electrical cupboard.

The lighting layouts shown on drawings are indicative only; the Contractor is responsible for the lighting design to ensure the required lux levels are achieved.

Arrangements shall comply with CIBSE Recommendations and Codes of Practice

o Main entrance - 200 lux at floor level.
o Stairs - 150 lux at stair tread.
o Corridors - 100 lux at floor level.

Where local switches are provided they shall be located adjacent to the door opening.

75-45-85 Telecommunications systems

110 Telecommunications system
The Contractor shall design, procure, install and commission a new Telecommunications system.

The system shall consist of incoming DP with cabling into sub DPs in the Retail Unit and Residential Riser as per drawings.

Landlord lines shall be provided for the lifts, fire alarm and door access control system.

75-45-90 Television and radio distribution systems

110 Television distribution system
The Contractor shall design, procure, install and commission a new Television system. The Contractor shall install all containment, power supplies and equipment required to provide a TV, radio aerial and satellite system to each apartment.

The Contractor shall run 2 signal cables from the electrical riser into each Apartment.

A full Terrestrial/Satellite TV and FM radio system will be designed and provided to serve each apartment within the premises. All cables, equipment and connections will be provided by a TV/Satellite specialist Contractor.

Each apartment will require the reception of 'the full range of terrestrial and satellite digital and Sky + HD channels available from the system provider.

The signal strength at each outlet shall be in accordance with transmission companies recommendations.

The head end equipment, amplifier etc., shall be self powering, wall fixed and mechanically protected.

Wiring shall be routed via the electrical riser, terminating in a common junction box. The cabling shall be installed by specialist contractor, containment and back boxes by the Electrical Contractor.

The system shall be designed to accommodate aerial sockets within each residential unit entrance hall, living area and all bedrooms.

A telephone outlet socket shall be provided adjacent to the satellite digital box outlet in each apartment.

The main distribution may be run on cable basket/tray installed on the main service routes on each level. Cables shall be enclosed in concealed PVC conduit routed through ceiling void and vertically down to each outlet.

Outlets to the television system shall be multi gang co-axial flush mounted outlet to match services provided, the same range of accessories as the general accessories. The telephone sockets positions shall be based on the drawings but final positions shall be subject to final architectural detail design layouts.

The Contractor shall include for liaison and attendance associated with the testing and commissioning by the Specialist Contractor. Upon completion of the system all necessary signal level tests, quality of picture and sound quality results will be fully documented and presented to the Project team for the Client's records.

The entire communication system shall be fully demonstrated to the Client's representatives upon final completion, the Specialist Contractor's shall be required to demonstrate the operation of all equipment that is required for the system and necessary equipment and time incurred will be deemed to be included within rates.

The Electrical Contractor shall install un-switched connection units within the main riser to serve the multi-switch units at each floor level and at the head end at roof level.

75-60-05 Access control systems

110 Access control system
The Contractor shall design, procure, install and commission a new door entry system.

The door entry system shall be design, installed and commissioned by a specialist sub-contractor to the Contractor. The Contractor shall provide containment systems and power supplies in accordance with the specialist requirements.

All specialist hardware for the door entry system, such as the control panel, handsets, camera, door locks etc will be supplied and installed by the specialist sub-contractor. The Contractor shall include for liaising with the specialist in order to provide a fully operative access controlled audio / video entry system fit for purpose.

The door entry system shall provide each apartment within the building with a means of accepting a call from the main entrance control unit, talking and viewing the caller from the apartment and admitting entrance to the building, all without the need to leave the apartment.

The contractor is to supply and install a controlled entry system, which shall incorporate one entrance panel located at the main ground floor entrance. The system shall provide the following facilities throughout:

- Visitors to ring from the entrance panel to a selected dwelling and hold a private two-way conversation.
- Allow the occupant of the dwelling to be able to clearly view the visitor standing at the entrance door.
- Allow the occupant of the apartment to be able to operate an electric door release on the entrance door, with the admittance of an audible warning to indicate to the visitor that the lock has been activated.
- Allow for tradesman's entry, during a selected period, by providing a button on the control panel, controlled by an automatic summer winter seven-day digital time correction time clock with six on off times per day.
- In the event of a total power failure the lock release shall revert to fail-safe.
- The system shall be so arranged in order that extension buzzers or xenon beacons can be incorporated in the event that a tenant suffers from deafness.
- It will be the Contractor's responsibility to check all dwelling numbers etc. before the main panels are engraved
- The system shall be capable of self-cancelling after a specified time period, irrespective of whether a call has been answered or not.
- The system shall be wired so that no individual apartment, if faulty or vandalized, shall cause the system to malfunction, and the wiring shall be arranged that an individual apartment can be removed from service without having to gain access to the dwelling by use of plug in connectors.

- The system shall be able to activate the lock only when the handset has been activated. The lock release circuit will not operate if the handset has not been picked up. Only the lock at the call panel that the call has been generated shall be released.
- The Apartment Station shall incorporate an anti lock down circuit to stop residents jamming the handset lock release button down to allow access to the building by just calling that particular handset.
- Tenants shall gain entry through the main ground floor entrance by use of Proximity Access Control key fobs

75-65-30 Fire detection and alarm systems

110 Fire detection and alarm system
The Contractor shall design, procure, install and commission a new fire detection and alarm system.

The fire detection and alarm system shall be developed in accordance with approved inspector and fire officer requirements. The initial proposals subject to detail design developments are as follows:

Each apartment fire alarm system shall be provided with a minimum of 2no. smoke/heat detectors (4no. for duplex apartments) fed by mains power and battery back-up in the event of a powe failure.

The central fire alarm system shall designed to BS5839 Part 1, Category L5. It shall consist of smoke/heat detectors, sounders, manual call points and input/output interfaces. The coverage shall be to all common areas including entrance area, lift lobbies, lift shaft, staircase full landings, bin store and riser/plant areas. Upon activation of two common area detectors or an apartment detector and common area detector, the system shall trigger a building evacuation sounding alarms in all common areas.

Fire alarm interfaces shall be installed to control/monitor with the following systems:

- Retail Unit Interface for alarm and fault conditions
- Passenger Lift, to ground under a fire condition unless fire condition in ground floor lift lobby, then to park at first floor level.
- Access control system, escape door to fail open under a fire condition.
- AOV as detailed below.

The central building fire alarm system shall be linked to the natural smoke ventilation system. The system shall be configured in accordance with section 2.26 of ADB. On detection of smoke within a common corridor/lobby the vent on the fire floor and at the top of the staircase shall open simultaneously. The vents on all other storeys shall remain closed. The facility for manual operation of the system shall be provided for use by the fire brigade. This shall consist of yellow break glass units mounted at entrance and top storey to open the vent at the top of the staircase.

The Contractor shall allow for recessing of all control panels within the entrance reception area.

75-65-35 Gas detection and alarm systems

110 Fixed gas detection and alarm system type A

110 Fixed gas detection and alarm system type B

75-70-05 Assistance call systems

120 Emergency voice communication system
The Contractor shall design, procure, install and commission a new emergency voice communication system.

The system shall be suitable to provide communication with a combined Fire Telephone and Disable Refuge at locations shown on drawings subject to requirements of buidling control and fire officer. Units should be flush mounted.

75-75-05 Building monitoring and management systems

130 Water metering
The cold water is separately metered to each apartment, enabling tenants to be billed for their individual consumption.

Water meters are located within the riser, a bank of meters per floor serving each apartment, served from the boosted cold water system. A separate water meter shall be installed to serve the landlords supply.

All water meters shall be Thames water issue, with pulsed output.

75-75-50 Mechanical engineering services control and management systems

110 Water supply systems control
Local controls shall be provided to the water booster set.

All bath and showers shall be installed with thermostatic mixing valves (TMV3).

120 Heating systems control
Local control shall provided for the heating and hot water system within each apartment. It shall be installed with a wall mounted programmable controller in the services cupboard.

As a minimum the controller should include:-

- Programmable time controls (minimum of 2 two programmable settings)
- Variable temperature control

Water shall be distributed at 60°C. Dead legs shall be kept to the limitations recommended by the CIBSE and Health & Safety Guidance L8.

Hot water with a maximum draw-off temperature of 43°C shall be provided to the wash hand basins and achieved by Thermostatic mixing valves.

Thermostatic mixing valves (TMV3's) shall be provided to all WHB (Wash Hand Basins) and Showers.

The Contractor shall provide hot water services to all sanitary ware fittings as located on the drawings. Dead legs are to be minimised and trace heating shall be incorporated where appropriate. Pressure reducing valves and / or pressure booster sets shall be installed as appropriate to meet the individual appliance requirements. Double check valves shall be provided where appropriate to comply with local water authority byelaws.

Distribution services shall be insulated in accordance with the specification. Distribution pipework shall comprise copper tube to EN 1057-250. Individual isolation valves shall be provided on hot water outlets. Individual Ballofix

in-line valves shall be installed adjacent all sanitary ware fittings. Common isolation gate valves shall be installed at branch connections to groups of sanitary fittings when distributing off main distribution runs and at termination of the index run. Adequate valves shall be provided for circuit control, isolation and draining down of the installation.

Flexible tap connectors or hoses shall not be used on this site.

Contractor to submit full proposals for approval.

125 Cooling systems control

135 Air to air heat pump system control

155 Mechanical ventilation systems control type AOV
The AOV is interfaced with the central fire alarm system and opens on signal from the FA panel. At the fire entry point there shall be a fireman's override switch, which shall open or close the AOV if required.

In the event of a power failure the AOV shall "fail open".

155 Mechanical ventilation systems control type MOV

160 Mechanical extract systems control

170 Variable air volume air conditioning system control type A

170 Variable air volume air conditioning system control type B

175 Fan coil unit air conditioning system control

180 Smoke and heat control system, plant shutdown control

185 Smoke and heat control system, extract position control

75-85-45 Lightning protection systems

110 Lightning protection system
The Contractor shall design, procure, install and commission a new lightning protection system.

50-10-00 Above ground rainwater drainage systems

System outline

120 Internal gravity rainwater drainage system

- **Description:** Rainwater from the roofs shall be collected by a network of vertical pipework starting at the outlets at roof level and falling internal/External to the building. Rainwater drainage shall be provided to all roof areas including balconies and "green/brown" roofs as indicated on the Architects drawings.

  Horizontal pipework shall be selected to ensure self-cleaning velocity is achieved.

  All vertical rainwater pipework shall be in Cast Iron or HDPE (Geberit silent). For noise purposes insulation etc shall be installed to meet the acoustic engineer's requirements.

  All vertical and horizontal rainwater pipework in the ground floor and high level commercial/retail areas shall be in cast iron pipework and fittings with mechanical joints.

  Due to the limited service zone within the ground floor, all horizontal drainage shall be routed within the central core area or vertically through the retail area to the below ground drainage/outfall points, as indicated on the drawings. As the existing invert levels are being used all gravity drainage shall not be lower than the I.L given by the Civil engineer as part of the rainwater attenuation and outfall design.

  All below slab/underground drainage shall be designed by the Civil engineer. All above ground drainage shall form part of the mechanical contractors design to the outfall provided by Civil engineer.
- **System performance:** 50-10-00/210 Design of gravity rainwater drainage system.
- **System manufacturer:** Submit proposals.
- **Roof gutters:**
  - **Gutters:**

    Gutter types: Refer to Architectural Specification

    Jointing: Refer to Architectural Specification

    Electrical continuity: Required.

    Insulation: Refer to Architectural Specification
  - **Supports:**

    Fixings: Refer to Architectural Specification
- **Rainwater outlets:** Refer to Architectural Specification
- **Internal rainwater pipework:**
  - **Rainwater downpipes:**

    Downpipe types: 90-10-20/342 Cast iron above ground drainage pipelines to BS 416-1; 90-10-20/344 Cast iron above ground drainage pipelines to BS EN 877; and 90-10-20/348 High density polyethylene (HDPE) above ground drainage pipelines.

    Jointing: As recommended by pipework manufacturer.
  - **Supports:**

    Brackets and clips: 90-10-20/340 Brackets and clips for above ground drainage pipelines.

    Fixings: Contractor's design.
  - **Insulation:** 90-90-40/330 Mineral wool pipe section insulation.
  - **Warning pipes:** Required

- **System accessories:** 90-90-55/430 Identifying pipework and 90-10-60/405 Pipe sleeves type A.
- **Execution:** 50-10-00/610 Installation of rainwater drainage generally;
  50-10-00/634 Installing gravity rainwater outlets;
  50-10-00/660 Installing rainwater and drainage identification;
  and 50-10-00/662 Access for testing and maintenance of rainwater drainage system.
- **System completion:** 50-10-00/810 Testing rainwater drainage generally;
  50-10-00/812 Rainwater drainage internal pipework test – England, Wales, Ireland and Northern Ireland;
  50-10-00/818 Rainwater drainage gutter test;
  50-10-00/820 Rainwater drainage system maintenance instructions;
  50-10-00/822 Rainwater drainage system pre-handover checks;
  and 50-10-00/830 Documentation.

System performance

210 Design of gravity rainwater drainage system

Used by: 50-10-00/120 Internal gravity rainwater drainage system.

- **Design:** Complete the design of the rainwater drainage system.
- **Standards:** In accordance with E&W Building Regulations Approved Document H, H3, Section 1;
  In accordance with Ireland Building Regulations Technical Guidance Document H, Sub-section 1.5, clauses 1.5.1–1.5.2;
  In accordance with NI Building Regulations Technical Booklet N, Section 3, clauses 3.1–3.7;
  and To BS EN 12056-3, clauses 3–7, Annex A and National Annexes.
- **Design parameters:**
  - **Roof and gutter construction and finish:** Refer to Architectural Specification
  - **Design life of building:** Refer to Architectural Specification
  - **Design rate category:** Refer to Architectural Specification
  - **Available capacity of existing below ground drainage (maximum):** Submit proposals.
- **Requirements:** Submit proposals including detailed design drawings, technical information, calculations and manufacturers' literature.

Execution

610 Installation of rainwater drainage generally

Used by: 50-10-00/120 Internal gravity rainwater drainage system.

- **Collection and distribution of rainwater:** Complete, and without leakage or noise nuisance.
- **Electrolytic corrosion:** Avoid contact between dissimilar metals where corrosion may occur.
- **Plastics and galvanized steel pipes:** Do not bend.
- **Allowance for thermal and building movement:** Provide and maintain clearance as fixing and jointing proceeds.
- **Protection:** Fit purpose-made temporary caps to prevent ingress of debris. Fit access covers, cleaning eyes and blanking plates as the work proceeds.

634 Installing gravity rainwater outlets

Used by: 50-10-00/120 Internal gravity rainwater drainage system.

- **Fixing:** Secure. Fix before connecting pipework.
- **Method:** Grout into preformed holes and Screw to timber spacing blocks.

- **Junctions between outlets and pipework:** Accommodate movement in structure and pipework.

660 Installing rainwater and drainage identification

Used by: 50-10-00/120 Internal gravity rainwater drainage system.

- **Positions:** Junctions, both sides of slabs, bulkheads and wall penetrations.

662 Access for testing and maintenance of rainwater drainage system

Used by: 50-10-00/120 Internal gravity rainwater drainage system.

- **Requirement:** Install pipework and gutters with adequate clearance to permit testing, cleaning and maintenance, including painting where necessary.
- **Access fittings and rodding eyes:** Position so that they are not obstructed.

System completion

810 Testing rainwater drainage generally

Used by: 50-10-00/120 Internal gravity rainwater drainage system.

- **Dates for testing:** Give notice.
- **Period of notice (minimum):** Submit proposals.
- **Pipework:** Complete, and fix securely. Make free from defects, obstruction and debris before testing.
- **Testing:**
  - **Clean water:** Provide.
  - **Testing apparatus:** Provide.
  - **Smoke testing:** Do not use.

812 Rainwater drainage internal pipework test – England, Wales, Ireland and Northern Ireland

Used by: 50-10-00/120 Internal gravity rainwater drainage system.

- **Preparation:** Temporarily seal open ends of pipework with plugs.
- **Test apparatus:** Connect a 'U' tube water gauge and air pump to pipework via a plug.
- **Testing:** Pump air into pipework until gauge registers 38 mm.
- **Required performance:** After a period for temperature stabilization, maintain the pressure of 38 mm without loss for at least 3 minutes.

818 Rainwater drainage gutter test

Used by: 50-10-00/120 Internal gravity rainwater drainage system.

- **Preparation:** Temporarily block all outlets.
- **Testing:** Fill gutters to overflow level and after 5 minutes closely inspect for leakage.
- **Records of tests:** Submit.

820 Rainwater drainage system maintenance instructions

Used by: 50-10-00/120 Internal gravity rainwater drainage system.

- **Printed instructions:** Submit at completion.
- **Contents:** Recommended procedures for maintenance of the rainwater installation, including full details of recommended inspection, cleaning and repair procedures.

822 Rainwater drainage system pre-handover checks

Used by: 50-10-00/120 Internal gravity rainwater drainage system.

- **Construction rubbish, debris, swarf, temporary caps and fine dust which may enter the rainwater system:** Remove. Do not sweep or flush into the rainwater system.
- **Access covers, rodding eyes, outlet gratings and the like:** Secure complete with fixings.

830 Documentation

Used by: 50-10-00/120 Internal gravity rainwater drainage system.

- **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:** Two.
- **Record drawings:**
  - **Content:** Location and arrangement of plant in plant rooms;
    Location, size and route of drainage services;
    and Location of outlets.
  - **Format:** A1 paper print and Electronic.
  - **Number of copies:** Two.
- **Submittal date:** At handover.

50-10-05 Above ground waste water drainage systems

System outline

120 Above ground waste water drainage system with internal stacks

- **Description:** Soil waste and ventilation pipes shall be provided throughout the building collecting the discharges from the sanitary fittings and wet areas. The residential stacks shall be installed within the apartments and shall be connected to the bathrooms and kitchen areas.

  The system shall generally be single stack ventilated to atmosphere for all areas above Ground floor. Where necessary air admittance valves shall be fitted to stacks not terminating at roof level, this should be avoided unless agreed with the Client team in advance.

  All vertical foul/waste drainage pipework shall be in Cast Iron or HDPE (Geberit silent). For noise purposes insulation etc shall be installed to meet the acoustic engineer's requirements.

  All vertical and horizontal foul/waste drainage pipework in the ground floor and high level commercial/retail areas shall be in cast iron pipework and fittings with mechanical joints.

  Roding access doors shall be provided at any change of direction and shall be provided on all vertical stacks at 1200 AFFL prior to connections to drain and above all floors.

  Due to the limited service zone within the ground floor, all horizontal drainage shall be routed within the central core area or vertically through the retail area to the underground drainage/outfall points, as indicated on the drawings. As the existing invert levels are being used all gravity drainage shall not be lower than the I.L given by the Civil engineer.

  All below slab/underground drainage shall be designed by the Civil engineer. All above ground drainage shall form part of the mechanical contractors design to the outfall provided by Civil engineer.
- **System performance:** 50-10-05/210 Design of above ground wastewater drainage systems.
- **System manufacturer:** Submit proposals.
- **Floor drainage:**
  - **Preparation to existing floors:** Contractor's design.
  - **Floor channels and gullies:** Submit proposals.
  - **Covers and gratings:** Submit proposals.
  - **Supports:**

    Bedding: Contractor's design.

    Backfill: Contractor's design.

    Fixings: Contractor's design.
- **Sanitary pipework:**
  - **Small diameter branch discharge pipework:**

    Traps: As specified by the Interior designer

    Pipelines and fittings: Submit proposals.

    Accessories for jointing: Contractor's design.

    Supports: Submit proposals.

    Fixings: Contractor's design.

  - **Large diameter branch discharge pipework:**

    Pipelines and fittings: Submit proposals.

    Accessories for jointing: Contractor's design.

    Supports: 90-10-20/340 Brackets and clips for above ground drainage pipelines.

    Fixings: Contractor's design.

    Insulation: Contractor's design.
  - **Discharge stack pipework:**

    Pipelines and fittings: Submit proposals.

    Accessories for jointing: Contractor's design.

    Supports: 90-10-20/340 Brackets and clips for above ground drainage pipelines.

    Fixings: Contractor's design.

    Insulation: Contractor's design.
- **Ventilating pipework:**
  - **Ventilating branch pipework:**

    Pipelines and fittings: Submit proposals.

    Accessories for jointing: Contractor's design.

    Supports: 90-10-20/340 Brackets and clips for above ground drainage pipelines.

    Fixings: Contractor's design.
  - **Ventilating stack pipework:**

    Pipelines and fittings: Submit proposals.

    Accessories for jointing: Contractor's design.

    Supports: 90-10-20/340 Brackets and clips for above ground drainage pipelines.

    Fixings: Contractor's design.
- **Prefabricated branch and stack pipework:**
  - **Pipelines and fittings:** Submit proposals.
  - **Supports:** 90-10-20/340 Brackets and clips for above ground drainage pipelines.
  - **Fixings:** Contractor's design.
  - **Insulation:** Contractor's design.
- **Overflow pipework:**
  - **Pipelines and fittings:** Submit proposals.
  - **Accessories for jointing:** Contractor's design.
  - **Supports:** 90-10-20/340 Brackets and clips for above ground drainage pipelines.
  - **Fixings:** Contractor's design.
- **Pipework identification:** 90-90-55/430 Identifying pipework and 90-90-55/480 Mechanical plant and equipment identification labels generally.
- **Fire stopping:**
  - **Floor penetrations:** Contractor's design.
  - **Wall penetrations:** Contractor's design.
- **System accessories:** Contractor's design.
- **System completion:** 50-10-05/810 Testing above ground wastewater drainage systems generally; 50-10-05/820 Above ground wastewater drainage system pipework airtightness test; 50-10-05/830 Above ground wastewater drainage system siphonage and back pressure tests; 50-10-05/840 Above ground wastewater drainage system pre-handover checks; 50-10-05/850 Above ground wastewater drainage system submittals; and 50-10-05/860 Documentation.

System performance

210 Design of above ground wastewater drainage systems

Used by: 50-10-05/120 Above ground waste water drainage system with internal stacks.

- **Design:** Complete the design of the above ground wastewater drainage system.
- **Standards:** To BS EN 12056-1, BS EN 12056-2, relevant parts of BS EN 12056-4, BS EN 12056-5 and in accordance with BS EN 12056-2 National Annexes NA-NG.
- **System configuration:**
  - **Form:** Submit proposals.
  - **Configuration:** Contractor's choice.
- **Design discharges:**
  - **Design discharge types:** Domestic wastewater.
  - **Recycling requirements:** Greywater recycling.
- **Requirements:** Submit proposals including detailed design drawings, technical information, calculations and manufacturers' literature.

System completion

810 Testing above ground wastewater drainage systems generally

Used by: 50-10-05/120 Above ground waste water drainage system with internal stacks.

- **Dates for testing:**
  - **Notice:** Required.
  - **Period of notice (minimum):** 2 working days.
- **Preparation:**
  - **Pipework:** Securely fixed and free from obstruction and debris.
  - **Traps:** Fill with clean water.
- **Testing:**
  - **Water for testing:** Supply clean water, assistance and apparatus.
  - **Smoke for testing:** Do not use.
- **Records of tests:** Submit.

820 Above ground wastewater drainage system pipework airtightness test

Used by: 50-10-05/120 Above ground waste water drainage system with internal stacks.

- **Preparation:**
  - **Open ends of pipework:** Temporarily seal using plugs.
  - **Test apparatus:** Connect a 'U' tube water gauge and air pump to pipework via a plug or through trap of an appliance.
- **Testing:** Pump air into pipework until gauge registers 38 mm.
- **Required performance:** Maintain pressure of 38 mm without loss for at least 3 minutes.

830 Above ground wastewater drainage system siphonage and back pressure tests

Used by: 50-10-05/120 Above ground waste water drainage system with internal stacks.

- **Method:**
  - **WC pans:** Test by flushing.
  - **Other appliances:** Test by filling to overflow level, then removing the plug.
- **Number of tests:** Test each appliance three times. Recharge traps before each test.
- **Self siphonage testing:** Test each appliance individually.
- **Induced siphonage and back pressure testing:** Test by discharging the following appliances simultaneously on each stack.
  - **WCs:** [..]
  - **Washbasins:** [..]
  - **Sinks:** [..]

840 Above ground wastewater drainage system pre-handover checks

Used by: 50-10-05/120 Above ground waste water drainage system with internal stacks.

- **Temporary caps:** Remove.
- **Permanent blanking caps, access covers, rodding eyes, floor gratings and the like:** Secure complete with fixings.

850 Above ground wastewater drainage system submittals

Used by: 50-10-05/120 Above ground waste water drainage system with internal stacks.

- **Content:** Including manufacturers' drawings, technical information, calculations, literature, warranties and handling and maintenance instructions.
- **Timing:** Hand over at completion.

860 Documentation

Used by: 50-10-05/120 Above ground waste water drainage system with internal stacks.

- **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:** Two.
- **Record drawings:**
  - **Content:** Location and arrangement of plant in plant rooms;
    Location, size and route of above ground services;
    and Location of outlets.
  - **Format:** A1 paper print and Electronic.
  - **Number of copies:** Two.
- **Submittal date:** At handover.

55-40-40 Hot & cold water supply systems

System outline

110 Incoming water supply

- **Description:** A new cold water main is required to be brought onto the site from the existing Water main. The water main shall serve the domestic water to the apartments and landlord areas, the retail unit shall a separate incoming water supply, as indicated on the drawings.

  The incoming main shall be an unmetered bulk supply, which will feed the wholesome water tank supply before being metered by Thames Water for each dwelling and landlord connection.

  It is intended that a new MDPE main should be brought into the building via the side access route below ground level into the service riser, where it shall serve the packaged cold water break tank and booster. From the packaged booster set the water distributes to above in the dedicated service riser.

  The main will be sizes to meet the instantaneous demand of the building. If there is sufficient pressure from the town main then the packaged break tank and booster set can be designed out by the MEP sub-contractor.
- **System performance:** 55-40-40/210 Design and detailing hot and cold water systems.
- **Water company:** Thames Water
- **Volume flow rate:** Contractor's design.
- **Position of incoming mains water supply:** As indicated on the services layout.
- **Valves:** 90-10-90/314 Stop valves for potable water and 90-10-90/318 Backflow prevention devices.
- **System completion:** 55-40-40/850 Water quality tests type A.

130 Pumped cold water supply system

- **Description:** There is no storage requirement to the new development, however a booster and break tank shall be provided within the ground floor service riser, as indicated on the drawings.

  The BCWS to each apartment shall be isolated at the main services riser (including landlord meter at ground floor). The BCWS will be connected to the package electric boiler and HWS Cylinder and have a tee serving the rest of the apartment sanitary ware, distributing at high level within the dwelling ceiling void.

  Each apartment shall be separately metered, located in the dedicated service riser on a floor by floor basis. An individual landlord supply serving the ground floor shall also be provided.

  The apartment boosted cold water pump set (if required) will be capable of providing a minimum 2.0 bar pressure at the highest most hydraulic remote fitting / Boiler. The cold water pump set shall be designed to provide a range of flow rates from a minimum flow to a single apartment to full diversified demand to all apartments simultaneously. The pump sets are selected with full variable speed pumps from 10-100%.

  The packaged booster pump shall have a minimum of 4 stages, a non-return valve and isolation valve. Test points shall be fitted on the flow side of each pump to prove duties.

  The packaged cold water booster unit shall be provided with two pumps to provide duty/standby arrangement.

A mains water by-pass arrangement shall be provided across the package booster pump set in the event of pump failure to ensure continued supply albeit a lower pressure to all apartments.

The cold water pump set shall be fitted with pressure vessels sized to satisfy low flow/night time conditions and to limit the number of pump starts. The cold water pump sets pressure vessels shall be sufficient in to satisfy the maximum simultaneous demand for water for 30 seconds. This will improve the pumps efficiency and reduce the pump set operation, prolonging the life of the pumps.

In the event of completed power failure the pump set shall be supplied complete with a Power restoration safety system which shall operate in the event of a main power supply fault or pump set failure. Upon re-instatement of power the controller shall adjust the pump speed to ensure a slow fill/soft start. The controller will allow the cold water riser to be slowly refilled at a controlled rate, which will avoid surging, damage to system pipework and flooding. After the initial start-up or re-start from failure the lead pump shall be used to slow fill the system. The support pumps and two port control valve will be locked out and closed until the lead pump has filled the riser.

An automatic anti shock and surge anticipation valve located at the top of all boosted cold water riser will allow the discharge of air within the riser. The automatic air vent shall be fitted with a drain pipe which discharges to a local gully or drain point. Once the system is refilled the pump set shall switch to normal operation.

All cold water pipework shall be thermally insulated. All cold water pipework within un-heated spaces, shall have frost protection tape installed.

- **System performance:** 55-40-40/210 Design and detailing hot and cold water systems.
- **Arrangement:** Submit proposals.
- **Water meters:** 90-65-55/470 Water meters.
- **Cold water boosting:**
  - **Pressure booster sets:** 90-10-70/390 Pressure booster sets.
  - **Method:**
- **Pumps:** Submit proposals.
- **Storage tank or cistern:** 90-10-95/310 Glass fibre reinforced tanks and cisterns.
- **Water treatment plant:** 90-15-95/400 Magnetic water conditioners.
- **Pipelines:**
  - **Below ground:** As detailed by Thames Water
  - **Above ground:** Submit proposals.
- **Pipeline accessories:**
  - **Expansion devices:** Contractor's design.
  - **Gauges:** 90-10-60/370 Pressure gauges.
  - **Accessories:** 90-10-60/395 Masking plates; 90-10-60/400 Pipeline strainers; 90-10-60/405 Pipe sleeves type B; and 90-10-60/420 Tundishes.
- **Valves:**
  - **Float valves:** Contractor's design.
  - **Isolating valves:** Contractor's design.
  - **Check valves:** Contractor's design.
  - **Regulating valves:** Contractor's design.
  - **Draining devices:** Submit proposals.
  - **Accessories:** 90-10-90/318 Backflow prevention devices and 90-10-90/360 Test points.

- **Thermal insulation:**
  - **Pipelines:** 90-90-40/330 Mineral wool pipe section insulation.
  - **Tanks:** 90-90-40/340 Mineral wool slabs insulation and 90-90-40/360 Phenolic foam insulation.
- **Vibration isolation:** Contractor's design.
- **Outlets:** As specified by the interior designer
- **Drinking water outlets:** As shown and specified by the interior designer
- **Flush control devices:** As shown and specified by the interior designer
- **Water coolers:** Contractor's design.
- **Controls:** 75-75-50/202 Boost fixed time.
- **Accessories:** 90-90-60/390 Services supports type A;
  90-10-85/310 Electrical resistance surface trace heating;
  90-90-60/380 Roof equipment support systems;
  90-90-60/390 Services supports type B;
  ;
  and .
- **Plant and equipment identification:** 90-90-55/430 Identifying pipework;
  90-90-55/480 Mechanical plant and equipment identification labels generally;
  and 90-90-55/440 Warning marker tapes buried services.
- **System completion:** 55-40-40/850 Water quality tests type A;
  55-40-40/810 Commissioning of hot and cold water supply systems;
  55-40-40/820 Inspection and test records;
  55-40-40/830 Demonstrations;
  55-40-40/840 Documentation;
  55-40-40/850 Water quality tests type B;
  55-40-40/860 Spares;
  55-40-40/870 Operating tools;
  and 55-40-40/880 Maintenance.

System performance

210 Design and detailing hot and cold water systems

Shared by: 55-40-40/110 Incoming water supply; and 55-40-40/130 Pumped cold water supply system.

- **Design:** Complete the design and detailing of the hot and cold water supply.
- **Standard:** To BS 8558 or BS EN 806-2 and in accordance with HSE publication 'The control of legionella bacteria in water systems. Approved code of practice and guidance'.
- **Requirement:** Submit proposals including detailed design drawings, technical information, calculations and manufacturer's literature.

System completion

810 Commissioning of hot and cold water supply systems

Used by: 55-40-40/130 Pumped cold water supply system.

- **Pre-commissioning:** In accordance with BSRIA BG 2/2010 and CIBSE Commissioning Code W.
- **Commissioning:** In accordance with BS EN 806-4, BSRIA BG 2/2010 and CIBSE Commissioning Code W.
- **Notice (minimum):** 48 h.
- **Equipment:** Check and adjust operation of equipment, controls and safety devices.

- **Outlets:** Check operation of outlets for satisfactory rate of flow and temperature.

820 Inspection and test records

Used by: 55-40-40/130 Pumped cold water supply system.

- **Reports:**
  - **Construction phase:** System design is commissionable;
    Post-installation;
    System cleanliness;
    and System commissionable.
- **Records for water systems:** In accordance with BSRIA BG 2/2010.
- **Record sheets:**
  - **Submission:** On completion.
  - **Number of copies:** Three.

830 Demonstrations

Used by: 55-40-40/130 Pumped cold water supply system.

- **Running of plant:**
  - **Operation:** Run, maintain and supervise the installations under normal working conditions.
  - **Duration:** One week.
- **Instruction:** Instruct and demonstrate the purpose, function and operation of the installations.

840 Documentation

Used by: 55-40-40/130 Pumped cold water supply system.

- **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:** Two.
- **Record drawings:**
  - **Content:** Location and arrangement of plant in plant rooms;
    Location, size and route of hot and cold water services;
    Location, route and depth of underground services;
    Location and identification of regulating, isolation and control valves;
    and Location of outlets.
  - **Format:** A1 paper print and Electronic.
  - **Number of copies:** Two.
- **Submittal date:** At handover.
- **Wholesome water consumption notice:** Submit within five days.

850 Water quality tests type A

Shared by: 55-40-40/110 Incoming water supply; and 55-40-40/130 Pumped cold water supply system.

- **Standard:** To BS EN 806-4.
- **Samples:**
  - **Sample points:** Submit proposals.

  - **Samples for analysis:** Submit samples for bacteriological analysis.
- **Water temperature:** Record at each sampling point at the time of taking the sample.
- **Test results:**
  - **Record:** Details of all analyses.
  - **Submit:** On completion.
  - **Number of copies:** One.

850 Water quality tests type B

Used by: 55-40-40/130 Pumped cold water supply system.

- **Standard:** To BS EN 806-4.
- **Samples:**
  - **Sample points:** Main supply to site;
    Hot water storage cylinder;
    and Cold water storage cistern.
  - **Samples for analysis:** Submit samples for bacteriological analysis.
- **Water temperature:** Record at each sampling point at the time of taking the sample.
- **Test results:**
  - **Record:** Details of all analyses.
  - **Submit:** On completion.
  - **Number of copies:** One.

860 Spares

Used by: 55-40-40/130 Pumped cold water supply system.

- **Pipeline ancillaries:**
  - **Keys:** Two of each type.
  - **Hose unions:** Two of each type.
- **Pumps:**
  - **Belts and pulleys:** Two of each type.

870 Operating tools

Used by: 55-40-40/130 Pumped cold water supply system.

- **Tools:** Supply tools for operation, maintenance and cleaning purposes.
- **Keys:** Supply keys for valves and vents.

880 Maintenance

Used by: 55-40-40/130 Pumped cold water supply system.

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

55-85-20 Dry riser systems

System outline

110 Dry riser system

- **Description:** A new dry riser system shall be provided to the development within the fire fighting core/stair case as indicated on the drawings.

  Inlet boxes shall be provided at ground floor level adjacent to the block main entrance with outlets boxes on each floor landing, except at ground floor level.
- **System performance:** 55-85-20/210 Design of dry riser systems.
- **Inlets:** 90-35-95/345 Inlet breechings and boxes.
- **Pipelines:** 90-10-65/415 Steel pipelines.
- **Pipeline ancillaries:** 90-90-60/390 Services supports type A and 90-90-60/390 Services supports type B.
- **Outlets:** 90-35-95/350 Landing valves and boxes for dry risers.
- **System accessories:** Submit proposals.
- **Plant and equipment identification:** 90-90-55/480 Mechanical plant and equipment identification labels generally.
- **Execution:** 55-85-20/620 Installing dry riser systems and 55-85-20/630 Installing identification for dry riser.
- **System completion:** 55-85-20/810 Flushing;
  55-85-20/820 Testing;
  55-85-20/830 Setting to work;
  55-85-20/840 Inspection and test records;
  55-85-20/850 Documentation;
  55-85-20/860 Operating tools;
  and 55-85-20/870 Servicing and maintenance.

System performance

210 Design of dry riser systems

Used by: 55-85-20/110 Dry riser system.

- **Standards:** In accordance with CIBSE E and BS 9990.
- **Design:** Complete the design of the dry riser system.
- **Bore of main riser:** 100 mm.
- **Requirement:** Submit proposals including detailed design drawings, technical information, calculations and manufacturers' literature.

Execution

620 Installing dry riser systems

Used by: 55-85-20/110 Dry riser system.

- **Standard:**

630 Installing identification for dry riser

Used by: 55-85-20/110 Dry riser system.

- **Drain valve identification:** Provide notice stating 'Dry riser drain valve'.

System completion

810 Flushing

Used by: 55-85-20/110 Dry riser system.

- **Operation:** Fill the system with water and discharge it via the topmost outlet. Flush out debris.

820 Testing

Used by: 55-85-20/110 Dry riser system.

- **Testing:** In accordance with BS 9990.
- **Notice before testing (minimum):** Three days.
- **Static pressure test:** Charge the system with water to a pressure of 1000 kPa. Maintain for 15 minutes. During this period, inspect the system to check that no water leaks at joints or landing valves. Submit test results.
- **Flow test:** After static pressure test, pass water through the system under pressure and record flow gauge readings. Submit test results.

830 Setting to work

Used by: 55-85-20/110 Dry riser system.

- **Operation:** Check operation of non-return valves.
- **Make ready:** Drain system and leave ready for use.

840 Inspection and test records

Used by: 55-85-20/110 Dry riser system.

- **Reports:**
- **Record sheets:**
  - **Submission:**
  - **Number of copies:**

850 Documentation

Used by: 55-85-20/110 Dry riser system.

- **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:**
- **Record drawings:**
  - **Content:**
  - **Format:**

  - **Number of copies:**
- **Submittal date:** At handover.

860 Operating tools

Used by: 55-85-20/110 Dry riser system.

- **Tools:** Supply tools for operation, maintenance and cleaning purposes.
- **Keys:**
  - **Type:** Supply keys for padlocks and air release valves.
  - **Quantity:**

870 Servicing and maintenance

Used by: 55-85-20/110 Dry riser system.

- **Requirement:**

60-45-90 Underfloor heating and cooling systems

System outline

110 Low temperature hot water underfloor heating

- **Description:** Heating and hot water services in each apartment shall be provided by packaged electric boiler and unvented hot water calorifier serving low temperature hot water underfloor heating system and manifold set.
- **System performance:** 60-45-90/210 Design of underfloor heating and cooling systems;
  60-45-90/220 Basic design temperatures;
  60-45-90/230 Thermal insulation of building fabric - specified U-values;
  60-45-90/250 System operating parameters;
  60-45-90/255 Control strategy;
  60-45-90/260 Chemical treatment for underfloor systems;
  and 60-45-90/270 Floor construction.
- **System manufacturer:** Submit proposals.
  Refer to QODA Manufacturer schedule
- **Standards:** To BS EN 1264-1 and BSRIA Guide BG 4/2011.
- **Heat source:** Low temperature hot water heating system.
  Combined electric boiler and unvented HWS calorifier
- **Pumps:** Integral with manifold.
  Refer to QODA Manufacturer schedule
- **Pipes:**
  - **Distribution:** 90-10-65/310 Copper pipelines
  - **Underfloor:** 90-10-65/350 Cross linked polyethylene (PE-X) pipelines.
  - **Insulation:** 90-90-40/360 Phenolic foam insulation.
- **Pipeline accessories:**
- **Valves:** 90-10-90/330 Ball valves;
  90-10-90/342 Copper alloy gate valves;
  90-10-60/390 Manifold for underfloor heating and cooling;
  90-10-90/370 Thermostatic mixing valves;
  and 90-10-90/374 Draining taps.
- **Water treatment:** 90-15-95/335 Bacteria and biofouling inhibitors for closed circuit systems.
- **Accessories:**
- **Controls:**
  - **Controllers:** Contractor's design.
  - **Control valves:** Part of manifold.
  - **Sensors:** 90-65-50/400 Flow in pipe sensors;
    90-65-50/430 Water temperature sensors;
    and Underfloor temperature sensors.
- **Floor components:** Contractor's design.
- **Execution:** 60-45-90/620 Installing underfloor systems;
  60-45-90/640 Hydraulic pressure testing of underfloor systems;
  and 60-45-90/650 Flushing underfloor systems.
- **System completion:** 60-45-90/810 Commissioning water systems;
  60-45-90/860 Documentation;

60-45-90/870 Operating tools;
and 60-45-90/880 Servicing and maintenance.

System performance

210 Design of underfloor heating and cooling systems

Used by: 60-45-90/110 Low temperature hot water underfloor heating.

- **Design:** Complete the design of the underfloor heating and cooling systems.
- **Method:** In accordance with CIBSE AM 11.
- **Requirement:** Submit proposals including detailed design drawings, technical information, calculations and manufacturers' literature.
- **Computer calculations:**
  - **Submittals:** U-values and heat loss calculations for each room;
    Pump sizing calculations;
    and Pipe sizing calculations.
  - **Format:** HEVACOMP.

220 Basic design temperatures

Used by: 60-45-90/110 Low temperature hot water underfloor heating.

- **Design temperatures:** 21°C.
- **External air temperature:** -4°C.
- **Air changes per hour:** 4AC/hr

230 Thermal insulation of building fabric - specified U-values

Used by: 60-45-90/110 Low temperature hot water underfloor heating.

- **Building fabric element:** Submit proposals.
- **U-value (maximum):** Submit proposals.
- **Admittance:** Submit proposals.

250 System operating parameters

Used by: 60-45-90/110 Low temperature hot water underfloor heating.

- **Design flow temperature:**
  - **Heating:** Submit proposals.
  - **Cooling:**
- **Temperature difference across water circuit:**
  - **Heating:** 20°C.
  - **Cooling:**
- **Water velocity:** Nominal 1 m/s.
- **Maximum floor surface temperature:** 27°C for timber floors and 29°C for continuously occupied areas.

255 Control strategy

Used by: 60-45-90/110 Low temperature hot water underfloor heating.

- **Strategy:** Control space temperature using air and water sensors via controllers to operate valves, pumps and heating or cooling sources;
  Provide weather compensation control;

Provide optimum start control;
and Provide frost protection.

- **Controllers:** Zone.
- **Temperature sensors:** Outside air and Underfloor.
- **Water temperature controllers:** Variable.
- **Valves:** Differential pressure bypass valve;
  Flow manifold with regulating valves;
  Return manifold with control valves;
  and Thermostatic mixing valves.

260 Chemical treatment for underfloor systems

Used by: 60-45-90/110 Low temperature hot water underfloor heating.

- **Treatment:** In accordance with BSRIA BG 50/2013: Water treatment for closed heating and cooling systems.

270 Floor construction

Used by: 60-45-90/110 Low temperature hot water underfloor heating.

- **Floor type:** Timber suspended floor.
- **Insulation:** Submit proposals.
- **Screed:** Submit proposals.

Execution

620 Installing underfloor systems

Used by: 60-45-90/110 Low temperature hot water underfloor heating.

- **Standard:** To BS EN 1264-4.
- **Fixing of manifold:** Locate with access for regulation and maintenance and away from areas sensitive to noise.
- **Fixing of pipes:**
  - **Floating floors:**
  - **Timber suspended floors:** Submit proposals.
  - **Raised access floors:**

640 Hydraulic pressure testing of underfloor systems

Used by: 60-45-90/110 Low temperature hot water underfloor heating.

- **Testing:** In accordance with HVCA TR/6 and Hydraulic testing in accordance with BS EN 14336, Appendix B.
- **Notice (minimum):** 5 working days.
- **Pressure:** 1.5 times working pressure.
- **Duration of test:** 1 h.

650 Flushing underfloor systems

Used by: 60-45-90/110 Low temperature hot water underfloor heating.

- **Preliminary checks:** Thoroughly inspect pipework. Complete pressure tests before cleaning.
- **Flushing:** In accordance with BSRIA BG 29/2012.

- **Waste products:** Neutralize, and dispose of to drain. Preferably direct to manhole.

System completion

810 Commissioning water systems

Used by: 60-45-90/110 Low temperature hot water underfloor heating.

- **Pre-commissioning:** In accordance with BSRIA BG 2/2010 and Commissioning Code: Water distribution systems.
- **Commissioning:** In accordance with BSRIA BG 2/2010 and Commissioning Code: Water distribution systems.
- **Variable flow systems:** In accordance with CIBSE KS09 Commissioning variable flow pipework systems.
- **Notice (minimum):** One week.

860 Documentation

Used by: 60-45-90/110 Low temperature hot water underfloor heating.

- **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:** Two.
- **Record drawings:**
  - **Content:** Location, size and route of mechanical services.
  - **Format:** A1 paper print and Electronic.
  - **Number of copies:** Two.
- **Submittal date:** At handover.

870 Operating tools

Used by: 60-45-90/110 Low temperature hot water underfloor heating.

- **Tools:** Supply tools for operation, maintenance and cleaning purposes.
- **Keys:** Supply keys for valves and vents.

880 Servicing and maintenance

Used by: 60-45-90/110 Low temperature hot water underfloor heating.

- **Requirement:** Undertake for 12 months after completion.

65-10-75 Smoke extract and control systems

System outline

110 Smoke and heat exhaust ventilation system

- **Description:** The fire-fighting stair well will be provided with AOV's at the head of the stair, as required.

  Essential power supplies will be provided to AOV (fail open).
  All AOV's shall be fitted with rainwater sensors for auto closing, if required and not in fire-fighting mode.
- **System performance:** 65-10-75/210 Design of smoke and heat exhaust control systems.
- **Smoke barriers:** 90-45-80/320 Standard active smoke barriers.
- **External air intake terminals:**
- **Filters:**
- **External exhaust terminals:** - MOV provided in the façade at each level.
- **Controls:**
  - **Control panel:** 90-45-80/370 Smoke and heat exhaust control panels.
  - **Activation:**
  - **Strategy:**
    .
  - **Fan control:**
  - **Auxiliary power:**
  - **Control wiring:**
- **Identification of ductwork and equipment:** 90-90-55/480 Mechanical plant and equipment identification labels generally.
- **Execution:** 65-10-75/640 Installing smoke and heat exhaust control panels and 65-10-75/620 Installing smoke and heat exhaust ventilation systems.
- **System completion:** 65-10-75/810 Testing;
  65-10-75/820 Commissioning of air distribution systems;
  65-10-75/830 Inspection and test records;
  65-10-75/840 Demonstrations;
  65-10-75/850 Documentation;
  65-10-75/860 Spares and consumables;
  and 65-10-75/870 Maintenance.

System performance

210 Design of smoke and heat exhaust control systems

Used by: 65-10-75/110 Smoke and heat exhaust ventilation system.

- **Design:** Complete the design of the smoke and heat exhaust ventilation system.
- **Requirement:** Submit proposals including detailed design drawings, technical information, calculations and manufacturers' literature.

Execution

620 Installing smoke and heat exhaust ventilation systems

Used by: 65-10-75/110 Smoke and heat exhaust ventilation system.

- **Standard:** In accordance with BS 7346-4.

640 Installing smoke and heat exhaust control panels

Used by: 65-10-75/110 Smoke and heat exhaust ventilation system.

- **Position:** Main entrance.
- **Connection to sensors:** Required.

System completion

810 Testing

Used by: 65-10-75/110 Smoke and heat exhaust ventilation system.

- **Acceptance testing:** In accordance with BS EN 12101-6.

820 Commissioning of air distribution systems

Used by: 65-10-75/110 Smoke and heat exhaust ventilation system.

- **Pre-commissioning:** In accordance with BSRIA BG 49/2015 and CIBSE Commissioning Code A.
- **Commissioning:** In accordance with BSRIA BG 49/2015 and CIBSE Commissioning Code A.
- **Notice (minimum):** 48 h.

830 Inspection and test records

Used by: 65-10-75/110 Smoke and heat exhaust ventilation system.

- **Record sheets:**
  - **Submission:** On completion.
  - **Number of copies:** Three.

840 Demonstrations

Used by: 65-10-75/110 Smoke and heat exhaust ventilation system.

- **Running of plant:**
  - **Operation:** Run, maintain and supervise the installations under normal working conditions.
  - **Duration:** One week.
- **Instruction:** Instruct and demonstrate the purpose, function and operation of the installations.

850 Documentation

Used by: 65-10-75/110 Smoke and heat exhaust ventilation system.

- **Operating and maintenance instructions:**
  - **Scope:** Submit for the system as a whole 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:** Two.
- **Record drawings:**
  - **Content:** Location and arrangement of plant in plant rooms;
    Location, size and route of ductwork;
    Location and identification of regulating dampers and fire dampers;
    and Location of outlets.
  - **Format:** A1 paper print and Electronic.
  - **Number of copies:** Two.
- **Submittal date:** At handover.

860 Spares and consumables

Used by: 65-10-75/110 Smoke and heat exhaust ventilation system.

- **Filters:**
  - **Retaining clips and rubber gaskets:** Two sets for each type of filter.
  - **Filter media:**
- **Detectors:** Supply two of each type.

870 Maintenance

Used by: 65-10-75/110 Smoke and heat exhaust ventilation system.

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

65-10-95 Ventilation systems

System outline

180 Mechanical and whole building ventilation system

- **Description:** The fresh air intake for the MVHR unit shall be through a common vertical shaft down the core of the building. Active carbon filters shall be installed at the top of the shaft to reduce the NO2 levels to an acceptable level (refer to air quality report for full details).

  Exhaust from the MVHR will be via façade louvers, as indicated on the Architectural elevations and roof drawings.

  Each system shall supply filtered fresh air (though NO2 filter at roof level) to the habitable rooms and draw exhaust air from the bathrooms and kitchen areas. The MVHR shall be sized to match the requirements of the Building Regulations Part F, and shall be capable of achieving the required air change rate for both summer overheating and rapid ventilation.

  To achieve 4 ACH/hr for purge/rapid ventilation under Building Regulations Part F, a hybrid approach might also be required on some of the larger apartments. When the MVHR is in boost mode it will achieve 2 to 4 ACH depending on apartment size. Therefore any short fall can be overcome by using the open-able windows.All apartments shall be provided with mechanical whole house ventilation. The requirements are dependent on the criteria determined by specialist air quality and acoustic studies, carried out by others.

  Please refer to condtion 13 planning condition submission for full detailed. As indicated on the Architectural roof plan and typical services apartment drawings.

  The MVHR unit shall extract from wet rooms (i.e. bathrooms/WC/utility rooms/kitchens). Each system shall supply filtered fresh air to the habitable rooms and draw exhaust air from the bathrooms and kitchen. The systems shall be sized to match the requirements of the Building Regulations - Part F, and shall be capable of achieving a nominal air change rate.

  Bathrooms/showers: Continuous Extract 8 l/s, Boost 15 l/s.
  Kitchen: Continuous Extract 13 l/s, Boost 30 l/s adjacent to cooker hood.
  General ventilation to whole dwelling: 0.3 l/s per m² floor area or 12 l/s per person.
  The MVHR unit shall be mounted at high level within the dedicated services cupboard in each apartment.

  Horizontal ducts within the apartment ceilings will be in self-extinguishing uPVC. Grilles will be ceiling mounted in each living room, bedroom, kitchen and bathroom. Attenuators (or acoustically lined plenum boxes) are provided in the inlet and exhaust ducts, as required by the acoustic engineer.

  In the apartments equipped with whole house ventilation systems, the kitchen extract hoods (specified by the interior designer) shall discharge to atmosphere and not be linked to the MVHR system if they do not have the facility for recirculation. The contractor shall allow for an either/or solution as it will just require the ductwork to be reconfigured
- **System performance:** 65-10-95/215 Design of domestic ventilation.
- **External air intake:** 90-45-20/385 External wall grilles and 90-45-20/430 Roof slope terminals.
- **Room extract air terminal devices:** 90-45-20/325 Domestic air diffusers and grilles and 90-45-20/395 Cooker and range hoods.
- **Fan:** 90-45-30/420 Whole dwelling fan units.

- **Ductwork:** 90-45-25/380 Domestic rigid ductwork and fittings and 90-45-25/430 Flexible ductwork.
- **Accessories:** In-line filter units and 90-45-45/360 Passive heat exchangers.
- **Room supply air terminals:** 90-45-20/325 Domestic air diffusers and grilles.
- **External exhaust air terminals:** 90-45-20/385 External wall grilles and 90-45-20/430 Roof slope terminals.
- **Controls:** Fan controller units;
  ;
  and 90-65-50/410 Humidity sensors.
- **Execution:** 65-10-95/660 Installing residential ventilation systems.
- **System completion:** 65-10-95/815 Commissioning of domestic ventilation systems and 65-10-95/855 Operating and maintaining domestic ventilation systems.

System performance

215 Design of domestic ventilation

Used by: 65-10-95/180 Mechanical and whole building ventilation system.

- **Design:** Complete the design of the ventilation system.
- **Ventilation rate (minimum):** Submit proposals.
  In Compliance with Building Regulations Part F, as detailed above.
- **Requirements:** Submit proposals including detailed design drawings, technical information, calculations and manufacturers' literature.

Execution

660 Installing residential ventilation systems

Used by: 65-10-95/180 Mechanical and whole building ventilation system.

- **Standard:** In accordance with BS EN 14134.

System completion

815 Commissioning of domestic ventilation systems

Used by: 65-10-95/180 Mechanical and whole building ventilation system.

- **Standard:** In accordance with BS EN 14134.
- **Method:** Balance airflow using methods recommended by the system manufacturer.
- **Performance:** Submit proposals.
- **Operation:** Examine ductwork for leakage. Test the operation of fans, equipment, controls and sensors. Verify correct operation. Submit report.

855 Operating and maintaining domestic ventilation systems

Used by: 65-10-95/180 Mechanical and whole building ventilation system.

- **Instructions:** Submit copies of manufacturers' operating and maintenance instructions for equipment and controls.
- **Tools:** Supply tools for operation, maintenance and cleaning purposes, including keys for valves and vents.

70-50-45 Low voltage site connection systems

System outline

110 Incoming low voltage electricity supply

- **Description:** The Contractor shall design, procure, install and commission a new incoming low voltage electricity supply for the development.

  The new Regional Electricity Company (REC) service to the site shall consist of an incoming TP&N service to main Ryefield Distribution Panel at Ground Level.

  The supply shall serve individual meters for each residential apartment and Landlord Supply, located in the electrical meter room on located on the ground floor.

  A separate feed shall supply Retail Unit on Ground Floor, as indicated on the drawings.

  The Contractor shall be responsible for and include for all negotiations with UK Power Networks and any subsequent charges, in providing the Mains Electrical Supply.

  The Contractor shall comply with all equipment, cabling, installation and space requirements as detailed by UK Power Networks.

  The Contractor shall review the supply capacity required subject to the final design final requirements for mechanical plant selected.

  The Contractor shall space plan the incoming electrical areas to ensure UK Power Networks requirements are achieved. The positions shown on outline design drawings are indicative only.

  In addition to the details above the Contractor shall liaise with UK Power Networks to ensure all their requirements are met.

  It is proposed that a new dedicated LV supply(s) is installed for the residential and retail elements of the development, subject to UKPN approval.

  The Contractor shall be responsible for assessing the final loads of the service and that the final incoming service cupboard arrangements suits the required capacity of the incoming supply.
- **System performance:** 70-50-45/210 Design of incoming low voltage electricity supply.
- **Nature of current:** Alternating.
- **Phase:** Three phase 4 wire.
- **Voltage:** 400 V.
- **Electricity distributor:** UK Power Networks.
- **Electricity supplier:** EDF Energy, subject to confirmation from Client.
- **Metering:** Single meter.
- **Execution:** 70-50-45/630 Management of electricity distributor.
- **System completion:** 70-50-45/830 Documentation.

System performance

210 Design of incoming low voltage electricity supply

Used by: 70-50-45/110 Incoming low voltage electricity supply.

- **Standards:** In accordance with BS 7671 and the Electricity Distributor's guidelines.
- **Design:** Complete the design of the low voltage supply.
- **Requirement:** Submit detailed design drawings showing equipment positions and routes, technical information and calculations.
- **Evidence of agreement with Electricity Distributor:** Submit.

Execution

630 Management of electricity distributor

Used by: 70-50-45/110 Incoming low voltage electricity supply.

- **Establishing the supply:** Manage and liaise with the Electricity Distributor to establish an incoming electricity supply.
- **Evidence of liaison:** Submit.

System completion

830 Documentation

Used by: 70-50-45/110 Incoming low voltage electricity supply.

- **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:** Three.
- **Record drawings:**
  - **Content:** For all low voltage distribution circuits, the cable origin at the site boundary, route to service cut out, method of installation, depth of trench, details of ducts including sizes and position of cable joints.
  - **Drawing format:** Electronic drawing.
  - **Number of copies:** Three.
- **Submittal date:** At handover.

70-70-25 Earthing and bonding systems

System outline

110 Earthing and bonding system

- **Description:** The Contractor shall design, procure, install and commission a new earthing and bonding system.
- **System performance:** 70-70-25/210 Design of earthing and bonding systems; 70-70-25/220 Electricity distributor's requirements; 70-70-25/230 Equipotential bonding in buildings with information technology equipment; and 70-70-25/240 Functional earthing design.
- **Main incoming earth:** Establish with the Electricity Distributor.
- **Main equipotential bonding:**
  - **Connect the following to the main earthing terminal:** Submit proposals.
  - **Cable type:** Submit proposals.
  - **Size:** To BS 7671, Regulation 544.1.1.
- **Supplementary equipotential bonding:**
  - **Bond the following:** Submit proposals.
  - **Cable type:** Submit proposals.
  - **Size:** Minimum of 2.5 mm² if sheathed or where mechanical protection is provided, otherwise 4 mm².
- **Circuit protective conductors:**
  - **Conductor type:** Submit proposals.
  - **Size:** To BS 7671, Regulation 543.1.3.
- **Earth terminal:** 90-75-50/310 Earth bars.
- **Accessories:** 90-75-50/350 Earthing and bonding clamps and 90-65-55/385 Residual current monitoring devices.
- **Electrical identification:** 90-90-55/390 Equipment labels and warning notices.
- **Execution:** 70-70-25/630 General installation; 70-70-25/640 Installing earth conductor joints and connections; 70-70-25/660 Installing main earthing conductor; 70-70-25/670 Installing main equipotential bonding conductors; 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

210 Design of earthing and bonding systems

Used by: 70-70-25/110 Earthing and bonding system.

- **Standards:** To BS 7671 and in accordance with BS 7430.
- **Design:** Complete the design of the earthing and bonding systems.
- **Size of main earthing conductor:** To BS 7671, Regulation 543.1.3.

- **Requirement:** Submit proposals including detailed design drawings, technical information, calculations and manufacturers' literature.

220 Electricity distributor's requirements

Used by: 70-70-25/110 Earthing and bonding system.

- **Evidence of compliance:** Submit, in accordance with the requirements of the Electricity Distributor.

Execution

630 General installation

Used by: 70-70-25/110 Earthing and bonding system.

- **Standards:** To BS 7671 and in accordance with BS 7430.

640 Installing earth conductor joints and connections

Used by: 70-70-25/110 Earthing and bonding system.

- **Number of joints:** Minimize.
- **Contact surfaces:** Clean. Coat with corrosion inhibitor.
- **Bimetallic joints:** Do not cross-contaminate.
- **Protection to Joints and connections subject to moisture:**
  - **Type of protection:** Heat shrink clear sheathing.
- **Connections to test points:** Clamp.
- **Protective cable terminations:** Compression lugs with phosphor bronze nuts, bolts and washers.

660 Installing main earthing conductor

Used by: 70-70-25/110 Earthing and bonding system.

- **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.

670 Installing main equipotential bonding conductors

Used by: 70-70-25/110 Earthing and bonding system.

- **Separate and continuous connections:** Install between each service and the main earth terminal.
- **Bonding conductor routes:** Submit proposals.
- **Bonding connections at main earth terminal:** Connect with compression lugs and phosphor bronze nuts and bolts and spring washers.

680 Installing supplementary bonding conductors

Used by: 70-70-25/110 Earthing and bonding system.

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

720 Notices and labels

Used by: 70-70-25/110 Earthing and bonding system.

- **Earth bars:** Describe each connection and label with 'SAFETY ELECTRICAL CONNECTION – DO NOT REMOVE'.

- **Main earthing and bonding connections:** Describe each connection and label with 'SAFETY ELECTRICAL CONNECTION – DO NOT REMOVE'.
- **Telecommunications functional earth connections:** Label with 'TELECOMMS EARTH – DO NOT REMOVE'.

System completion

810 Inspection and testing

Used by: 70-70-25/110 Earthing and bonding system.

- **Standards:** To BS 7671 and in accordance with BS 7430.
- **Notice before commencing tests (minimum):** 72 h.
- **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:** Direct measurement.
- **Earth fault loop impedance:**
  - **Method:** Submit proposals.
  - **Measurement locations:** Origin, switchgear, fixed equipment and outlets, and circuit extremities.

820 Documentation

Used by: 70-70-25/110 Earthing and bonding system.

- **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:** Three.
- **Record drawings:**
  - **Content:** Submit proposals.
  - **Format:** A1 paper print drawing and Electronic drawing.
  - **Number of copies:** Three.
- **Submittal date:** At handover.

70-70-45 Low voltage distribution systems

System outline

110 Low voltage distribution system

- **Description:** The Contractor shall design, procure, install and commission a new low voltage distribution system.

  The sub-main distribution for the Residential apartments and landlords supply shall run from the Intake Ryefield Panel electrical meter cupboard at ground floor level.

  The Landlord Switchgear shall consist of Non-Essential Panels, cubicle Form 4 Type 5, having front access complete with MCCBS, CT chamber to UKPN requirements, power factor correction and surge protection equipment.

  The supplies to the Apartments shall be via Armoured sub-main cables to each apartment form the electrical meter room on the ground floor.
  Armoured sub-main cables and sub meter shall also be installed to supply the Landlord:
  - Passenger Lift,
  - Essential loads including AOV and fire alarm,
  - Landlord Lighting & Power Distribution Boards,
  - Water Booster,

  All primary and secondary cabling to life safety systems, as defined in BS9999, shall meet full fire rating requirements of BS 8519:2010 Life Safety and Fire Fighting Systems. All Automatic Transfer Switches shall include local sensors for change over and local phase failure relays to start generator as per requirements of BS8519.
- **System Performance:** 70-70-45/210 Design of low voltage distribution systems;
  70-70-45/215 Low voltage distribution circuit cables generally;
  70-70-45/220 Selection of conduit, trunking and ducting;
  70-70-45/225 Grading study;
  70-70-45/230 Input power supply characteristics;
  and 70-70-45/245 Performance of power factor correction equipment.
- **Connection to low voltage supply:** Contractor's design.
- **Switchgear:** 70-70-45/510 Custom built cubicle switchboards and 90-50-45/410 Distribution boards and consumer units.
- **Distribution circuit cabling:**
  - **Types:** 90-55-15/354 Thermosetting insulated and LSZH sheathed armoured cables.
- **Containment:** 90-55-10/335 Cable trays type A.
- **Rewireable installation:** Required.
- **Concealed installation:** Required.
- **Electrical identification:** 90-90-55/320 Electrical shock treatment signs;
  90-90-55/390 Equipment labels and warning notices;
  and 90-90-55/395 Electrical diagrams generally.
- **Execution:** 70-70-45/625 Installing low voltage distribution systems.
- **System Completion:** 70-70-45/820 Documentation.

System performance

210 Design of low voltage distribution systems

Used by: 70-70-45/110 Low voltage distribution system.

- **System designer:** Submit proposals.
- **Design:** Complete the design of the low voltage distribution system.
- **Standard:** In accordance with BS 7671.
- **Provision of low voltage distribution:** Provide electrical supplies to equipment requiring power.
- **Spare capacity throughout the low voltage distribution system:** 20% of current carrying capacity.
- **Requirement:** Submit proposals including detailed design drawings, technical information, calculations and manufacturers' literature.

215 Low voltage distribution circuit cables generally

Used by: 70-70-45/110 Low voltage distribution system.

- **Standard:** In accordance with BS 7671.
- **Proposed selection of low voltage distribution cables:** Submit drawings, technical information, calculations and manufacturer's literature.
- **Cable sizes not stated:** Submit.
- **Format:** Amtech.

220 Selection of conduit, trunking and ducting

Used by: 70-70-45/110 Low voltage distribution system.

- **Standard:** In accordance with BS 7671.
- **Requirement:** Submit proposals including detailed design drawings, technical information, calculations and manufacturers' literature.
- **Conduit, trunking and ducting sizes not stated:** Submit.

225 Grading study

Used by: 70-70-45/110 Low voltage distribution system.

- **Scope:** Complete for the low voltage distribution system (including existing, if any).
- **Fault calculations:** Include fault impedance and short circuit fault current analysis.
- **Protective devices:** Coordinate the selection and adjustment of protective device settings to achieve discrimination throughout the fault level range. Grade so that a fault on any outgoing branch circuit is cleared by the switching device installed in the faulted branch circuit without affecting the other outgoing branch circuits. Demonstrate discrimination using time-current coordination curves with single line diagrams, in the study report.
- **Manufacturers' details and recommended settings:** Include in study report.
- **Study report:**
  - **Format:** Amtech or equal.
  - **Number of copies:** One.

230 Input power supply characteristics

Used by: 70-70-45/110 Low voltage distribution system.

- **Supply impedance:** To be obtained from UK Power Networks.

- **Earthing type:** TN-C-S.
- **Nominal voltage:** Three phase 400 V a.c. ±10%.
- **Nominal frequency:** 50 Hz.
- **Type of protective device in the input supply circuit:** To be obtained from UK Power Networks.

245 Performance of power factor correction equipment

Used by: 70-70-45/110 Low voltage distribution system.

- **Power factor when corrected:** 0.95 lagging.
- **Capacitor bank size and number of stages:** Submit proposals.
- **Power factor equipment sizing calculations:** Submit.

Custom made products

510 Custom built cubicle switchboards

Used by: 70-70-45/110 Low voltage distribution system.

- **General requirements:** 70-70-45/520 Factory inspections and 70-70-45/515 Proposals for custom built cubicle switchboards.
- **Manufacturer:** Submit proposals.
- **Standard:** To BS EN 60439-1.
- **Type tests:** ASTA certified.
- **Rated operational voltage (Ue):** 415 V a.c.
- **Enclosure:**
  - **Ingress protection (minimum):** To BS EN 60529, IP31.
  - **Mechanical protection (minimum):** To BS EN 62262, IK10.
  - **Material:** Steel.
  - **Finish:** Externally polyester powder coated.
    Internal partitions, zinc coated.
  - **Doors and panels:**

    Form: Right angle return construction with rounded edges and corners, concealed hinges and internal gaskets.

    Swing: Submit proposals.

    Locking mechanisms: Door-interlocked operating handles.

    Hardware: Corrosion-resistant lever type handles with latching mechanism.

    Locks: Cylinder. Standardize key type.

    Fixing of removable panels: Captive, corrosion resistant bolts.

    Lifting bolts: Integral within reinforced top frame.
- **Phase sequence:** Set-out phase sequence for phases L1, L2, and L3, from left-to-right, top-to-bottom, and back-to-front when viewed from the front of the assembly.
- **Fuseholders:** Mount such that fuses can be withdrawn towards the operator and away from live parts.
- **Internal separation:**
  - **Form:** 4 type 5.
- **Incoming device:** 90-60-30/310 Air circuit breakers.
- **Busbar and connections:**
  - **Rated operational current (Ie):** 1250 A.

  - **Rated short-time withstand current (Icw) for 1 s:** 50 kA.
  - **Supports:** Insulated.
  - **Identification:** Provide 25 mm wide colour bands to busbars at 500 mm intervals with a minimum of one band in each compartment.
  - **Future extensions:** Pre-drill busbars for future extensions and extend busbar droppers into spare functional unit locations.
- **Outgoing devices:**
  - **Type:** 90-60-30/320 Moulded case circuit breakers.
  - **Quantity:** As Circuit schedules.
- **Spare ways:** 20%.
- **Terminals:** Suitable for the connection of copper conductors.
- **Stays:** Fit to outdoor assemblies.
- **Cable entry:** top and/or bottom entry.
- **Gland plate gaskets:** Match the assembly's degree of ingress protection.
- **Single core cables:** Use non-ferrous plates.
- **Internal cable zones:** Sufficient to allow cabling to be neatly routed and terminated.
- **Anti-condensation heater and thermostat:** Not required.
- **Full length internal copper earth bar:** Submit proposals.
- **Heights of components (from finished floor level to underside of component):**
  - **Equipment requiring operation or maintenance:** 500–1600 mm.
  - **Instruments:** 1200–2000 mm.
  - **Emergency switching devices:** 800–1600 mm.
- **Mounting arrangement for Electricity Distributor's metering equipment:** Integral within cubicle switchboard.
- **Accessories:** 90-50-45/460 Automatic transfer switching equipment (TSE);
  90-65-55/320 Digital metering equipment;
  90-50-75/320 Low voltage safety matting;
  90-75-75/310 Padlocks and keys;
  and 90-75-75/320 Padlock and key cabinets.
- **Execution:** 90-50-45/665 Installing switchgear generally.

515 Proposals for custom built cubicle switchboards

Used by: 70-70-45/510 Custom built cubicle switchboards.

- **Content:**
  - **Include the following:** Overall dimensions.
    Degree of ingress protection.
    Protection against electric shock.
    Form of internal separation and details of busbar and terminal shrouding.
    Mounting and fixing details.
    Builder's work requirements and plinth details.
    Fault level and rated short circuit characteristics.
    Functional unit details.
    Details of internal and external paint systems and colour finishes.
    Door swings.
    Access panel details.
    Schedule of labels.
    Dimensioned general arrangement drawings, plans, elevations and sections.
    Shipping sections.

Gland plate details.
Routing of cabling within assembly.
Busbar arrangements, links and supports.
Internal controls, instrument and meter wiring diagrams.

- **Timing of submittal:** Prior to fabrication.

520 Factory inspections

Used by: 70-70-45/510 Custom built cubicle switchboards.

- **Notice before inspection and testing:** 7 d.
- **Equipment for inspection and testing:** Customized cubicle switchboards.
- **Factory inspections:**
  - **Fabrication:** Inspection not required.
  - **Assembly completed, busbars exposed and functional units assembled:** Inspection not required.
  - **Factory testing of assembly:** Inspection required.

Execution

625 Installing low voltage distribution systems

Used by: 70-70-45/110 Low voltage distribution system.

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

System completion

820 Documentation

Used by: 70-70-45/110 Low voltage distribution system.

- **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:** Three.
- **Record drawings:**
  - **Content:** Whether cables are run on surface, concealed in walls, floors, above suspended ceilings or within roof spaces;
    Location, route and depth of underground cables;
    Location of LV switchgear including distribution boards;
    Routes of trunking, conduit, cable tray and cable ladders;
    and Schematic drawings showing all low voltage distribution circuits: the cable origin, circuit designation, cable type, size, number of cores, size and type of overcurrent protective device.
  - **Drawing format:** A1 paper print drawing and Electronic drawing.
  - **Number of copies:** Three.
- **Submittal date:** At handover.

70-70-75 Small power systems

System outline

110 Hard wired low voltage small power system

- **Description:** The Contractor shall design, procure, install and commission a new hard wired low voltage small power system.

  The Small Power layout shall be based on drawings but final positions shall be subject to final architectural detail design layouts.

  The small power installation shall comprise of, but not limited to the following areas:-

  Switched fused connection units or isolators associated with all new mechanical plant installation.
  Switched fused connection units and socket outlets associated with all apartment areas.
  General landlord corridor RCD protected cleaner sockets.
  Power supply to Fire alarm system
  Power supply to TV aerial system distribution system
  Power supply to Door Entry system
  The Contractor shall provide for approval, calculations, design layout drawings and schedules prior to construction.
  The Design Contractor shall provide switched 13A fused connection unit or isolators to local to each piece of mechanical equipment.

  Accessories that are required in any wet areas or close to wash basin shall be IP rated. All circuits shall have RCD protection where required as per 17th Edition of IEE Wiring Regulations.

  RCBO protected cleaners sockets will be provided in each stair area generally by lockable wall mounted sockets.

  All socket outlet locations are indicatively shown on the drawings, the exact positions are to be coordinated on the contractor's installation drawings.

  The installation drawings shall show all sockets set out to suit the current Architectural layout drawings. Unless otherwise stated final positions and quantities shall be agreed 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 70-70-75/220 Selection of conduit, trunking and ducting generally.
- **Origin of supply:** 70-70-45/110 Low voltage distribution system.
- **Final circuit cabling:**
  - **Types:** 90-55-15/351 Thermosetting insulated cables
- **Cable accessories:** 90-55-10/310 Cable cleats and 90-55-10/315 Cable ties.
- **Containment:** Submit proposals.
- **Containment accessories:** Submit proposals.
- **Rewireable installation:** Required.
- **Concealed installation:** Required.
- **Final connections:** Required.

- **Partial installation:** Required.
- **Outlets:** 90-60-25/315 Electrical accessories.
- **Electrical identification:** 90-90-55/390 Equipment labels and warning notices and 90-90-55/395 Electrical diagrams generally.
- **Execution:** 70-70-75/620 Small power installation;
  70-70-75/630 Installing cabling to socket outlets;
  and 70-70-75/640 Installing final connections to fixed equipment.
- **System completion:** 70-70-75/820 Documentation.

System performance

210 Design of low voltage small power systems

Used by: 70-70-75/110 Hard wired low voltage small power system.

- **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 IET Guidance Note 1.
- **Spare capacity throughout the small power system:** 20%.
- **Requirement:** Submit proposals including detailed design drawings, technical information, calculations and manufacturers' literature.

215 Low voltage small power cables generally

Used by: 70-70-75/110 Hard wired low voltage small power system.

- **Standard:** To BS 7671.
- **Proposed selection of low voltage cables:** Submit drawings, technical information, calculations and manufacturers' literature.
- **Conductor sizes (minimum):**
  - **Power final circuits:** 2.5 mm².
- **Cable sizes not stated:** Submit.
- **Format:** Amtech.

220 Selection of conduit, trunking and ducting generally

Used by: 70-70-75/110 Hard wired low voltage small power system.

- **Standard:** To BS 7671.
- **Requirement:** Submit proposals including detailed design drawings, technical information, calculations and manufacturers' literature.
- **Conduit, trunking and ducting sizes not stated:** Submit.

Execution

620 Small power installation

Used by: 70-70-75/110 Hard wired low voltage small power system.

- **Standard:** To BS 7671.

630 Installing cabling to socket outlets

Used by: 70-70-75/110 Hard wired low voltage small power system.

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

System completion

820 Documentation

Used by: 70-70-75/110 Hard wired low voltage small power system.

- **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:** Three.
- **Record drawings:**
  - **Content:** Location of LV switchgear including distribution boards;
    Routes of trunking, conduit, cable tray and cable ladders;
    and Location of all electrical outlets, including isolators, starters, control equipment and electrical accessories Schematic drawings showing all low voltage final circuits, the cable origin, circuit designation, cable type, size, number of cores, size and type of overcurrent protective device..
  - **Format:** A1 paper print drawing and Electronic drawing.
  - **Number of copies:** Three.
- **Submittal date:** At handover.

70-80-25 External lighting systems

System outline

120 Amenity lighting system

- **Description:** The Contractor shall design, procure, install and commission an external lighting installation based on the drawings and final lighting scheme to be agreed with Architect
- **System Performance:** 70-80-25/220 Amenity lighting design.
- **System manufacturer:** Submit proposals.
- **Electrical supply:** Landlord's distribution board in Ground Floor Switchroom.
- **Final circuit cabling:**
  - **Type:** 90-55-15/354 Thermosetting insulated and LSZH sheathed armoured cables.
- **Containment:** 90-55-10/380 Rigid conduit type B and Ducted.
- **Rewireable installation:** Required.
- **Concealed installation:** Required.
- **Trenches, pipeways and pits:** Required.
- **Luminaire supports:**
  - **Type:** Submit proposals.
  - **Painting:** Submit proposals.
- **Luminaires:** Submit proposals based on Landscape Architect's proposal drawinds.
- **Controls:**
  - **Types:** 90-65-05/430 Photoelectric control units and 90-65-25/380 Time switches.
  - **Configuration:** Group.
- **System accessories:** 90-50-45/392 Electrical cut outs and 90-50-45/394 Enclosures
- **Electrical identification:** 90-90-55/390 Equipment labels and warning notices.
- **Execution:** 70-80-25/620 Installing roadway and amenity lighting systems generally.
- **System Completion:** 70-80-25/810 Inspection and testing;
  70-80-25/812 Commissioning;
  and 70-80-25/820 Documentation.

System performance

220 Amenity lighting design

Used by: 70-80-25/120 Amenity lighting system.

- **Design:** Complete the design of the amenity lighting system.
- **Standards:** In accordance with CIBSELighting Guide LG6;
  In accordance with ILE Guidance notes for the reduction of obtrusive light GN01;
  To BS 5489-1;
  and Lighting against Crime - a guide for crime reduction proffesionals..
- **Lighting class:** Submit proposals.
- **Average power density energy consumption (maximum):** Submit proposals.
- **Initial circuit luminous efficacy (minimum):** To meet requirement of Part L of Approved Documents for external lighting

- **Proposals:**
  - **Submit the following information:** Maintenance factor calculations.Schedule of design and calculated maintained average illuminance values.Schedule of design and calculated uniformity values.

Execution

620 Installing roadway and amenity lighting systems generally

Used by: 70-80-25/120 Amenity lighting system.

- **Standard:** To BS 7671.

System completion

810 Inspection and testing

Used by: 70-80-25/120 Amenity lighting system.

- **Standard:** To BS 7671;
  CIBSE LG6 External Lighting Code;
  and The SLL Code for Lighting.
- **Notice before commencing tests (minimum):** 72 h.
- **Certificates:**
  - **Number of copies:** Three.

812 Commissioning

Used by: 70-80-25/120 Amenity lighting system.

- **Setting for control devices:** Submit proposals.
- **Operation of control devices:** Verify.
- **Orientation of adjustable luminaires:** Adjust to give optimum performance.

820 Documentation

Used by: 70-80-25/120 Amenity lighting system.

- **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 & electronic copies.
  - **Number of copies:** Three.
- **Record drawings:**
  - **Content:** General arrangement drawings showing the location of columns, electrical cut outs, enclosures for remote control gear, luminaires, timeswitches, daylight sensors and cable distribution cabinets.
  - **Format:** A1 paper print drawing and Electronic drawing.
  - **Number of copies:** Three.
- **Submittal date:** At handover.

70-80-35 General lighting systems

System outline

110 Hard wired general lighting system

- **Description:** The Contractor shall design, procure, install and commission a new hard wired general lighting system and emergency lighting system throughout.

  The system shall be based on the drawings

  Lighting installation in all areas shall be provided in accordance with the current CIBSE Lighting Guides and local authority requirements.
  The outline design drawings show only indicate lighting layouts, the final position, number and wattage of fittings is to be part of detailed design by Contractor.

  The Contractor shall provide for approval, calculations, design layout drawings and schedules prior to construction.
  Landlord Areas

  Within the landlord areas a complete lighting system shall be provided throughout, wired back to local distribution boards. The lighting will consist of the following:-

  Internal landlord entrance, corridor and stair luminaires shall be a combination recessed LED downlighters and energy efficient wall lighting. All luminaires to be controlled by PIR detectors suitably located along all landlord areas to give correct operation of all luminaires. The system shall have an adjustable time delay prior to switching off luminaires. A manual override shall be provided within the electrical cupboard.

  The lighting layouts shown on drawings are indicative only; the Contractor is responsible for the lighting design to ensure the required lux levels are achieved.

  Arrangements shall comply with CIBSE Recommendations and Codes of Practice

  o Main entrance - 200 lux at floor level.
  o Stairs - 150 lux at stair tread.
  o Corridors - 100 lux at floor level.

  Where local switches are provided they shall be located adjacent to the door opening.

- **System Performance:** 70-80-35/210 Design of general lighting systems;
  70-80-35/215 Design of emergency lighting systems;
  70-80-35/220 Escape route lighting;
  and 70-80-35/280 Conduit, trunking and ducting generally.
- **Final circuit cabling:**
  - **Type:** 90-55-15/351 Thermosetting insulated cables.
- **Containment:** 90-55-10/335 Cable trays type A.
- **Containment accessories:** 90-55-10/470 Intumescent linear gap seals.
- **Rewireable installation:** Required.
- **Concealed installation:** Required.

- **Luminaire types:** 90-60-50/410 Combined emergency luminaires and 90-60-50/405 General purpose luminaires.
- **Connections to luminaires:** 90-60-50/365 Bayonet lampholders and 90-60-25/425 Ceiling roses.
- **Lighting controls:** 90-65-05/405 Central controllers;
  90-60-25/330 Dimmer switches and controls;
  90-65-05/420 Extra-low voltage occupancy detectors;
  and 90-60-25/325 Light switches.
- **Electrical identification:** 90-90-55/395 Electrical diagrams generally.
- **Execution:** 70-80-35/630 Installing general lighting systems;
  70-80-35/640 Installing emergency lighting systems;
  70-80-35/690 Assembling ceiling roses, flex and lampholders;
  and 70-80-35/720 Labelling of lighting controls.
- **System Completion:** 70-80-35/810 Testing and commissioning of general lighting systems;
  70-80-35/812 Testing and commissioning emergency lighting systems;
  70-80-35/820 Documentation relating to general lighting;
  and 70-80-35/822 Documentation relating to emergency lighting.

System performance

210 Design of general lighting systems

Used by: 70-80-35/110 Hard wired general lighting system.

- **Design:** The Contractor shall design, procure, install and commission the lighting system based on PTAL Interior design architects. Any change to proposed fittings shall be agreed with PTAL. The Contractor shall be responsible for ensuring the proposed Ilight Control System is compatible with PTAL selected light fittings.
- **Standard:** To BS EN 12464-1 and In accordance with SLL code for lighting.
- **Average power density energy consumption (maximum):** To meet Part L requirement of Approved Documents for percentage of energy efficient fittings and efficacy.
- **Initial circuit luminous efficacy (minimum):** 45 lm/W.
- **Proposals:**
  - **Submit the following information:** Room surface reflectance values.Schedule of design and calculated maintained average illuminance values.

215 Design of emergency lighting systems

Used by: 70-80-35/110 Hard wired general lighting system.

- **Design:** Complete the design of the emergency lighting and signage systems.
- **Standards:** To BS EN 1838, BS EN 50172 and in accordance with BS 5266-1. accordance with BS 5266-2.
- **Proposals:**
  - **Submit the following information:** Luminaire layout drawings;
    Lamp and luminaire technical information;
    and Schedule of design and calculated uniformity values.
- **Emergency supply source:** self-contained.
- **Mode of operation:** A maintained emergency luminaire - defined as a luminaire in which the emergency lighting lamps are energized at all times when normal or emergency lighting is required.
- **Duration of emergency mode:** 180 minutes.

220 Escape route lighting

Used by: 70-80-35/110 Hard wired general lighting system.

- **Position:** Submit proposals.
- **Minimum horizontal illuminance at floor level on centre line of escape route (lx):** 1.
- **Uniformity ratio (maximum: minimum illuminance):** Less than 40:1 along the centre line of the escape route.
- **Disability glare:** In accordance with BS EN 1838, table 1.

280 Conduit, trunking and ducting generally

Used by: 70-80-35/110 Hard wired general lighting system.

- **Standard:** To BS 7671.
- **Requirement:** Submit proposals including detailed design drawings, technical information, calculations and manufacturers' literature.
- **Conduit, trunking and ducting sizes not stated:** Submit.

Execution

630 Installing general lighting systems

Used by: 70-80-35/110 Hard wired general lighting system.

- **Standard:** To BS 7671 and in accordance with CIBSE Commissioning Code L.
- **Commissioning method statement:** Submit prior to commissioning.
- **Luminaire layout:** Submit proposals.
- **Switches and controls:**
  - **Location:** Ilight control panel and switch panels for Apartments

    Switch within risers for entrance area.

    PIR sensors for Car Park

    Manual switches for Plant Room and Electrical Switch Room
  - **Staircases:** PIR sensors
- **Rooms smaller than 4 m²:** Restrict lighting circuits to one electrical phase.

640 Installing emergency lighting systems

Used by: 70-80-35/110 Hard wired general lighting system.

- **Standards:** To BS 7671 and in accordance with BS 5266-1.
- **Permanent electrical supplies to self contained emergency luminaires:** Derive from the closest general lighting circuit.
- **Switches and controls:**
  - **Location:** Key switches within electrical riser

720 Labelling of lighting controls

Used by: 70-80-35/110 Hard wired general lighting system.

- **Equipment and sensor identification labels:** Provide.
- **Output circuits:** Label.

System completion

810 Testing and commissioning of general lighting systems

Used by: 70-80-35/110 Hard wired general lighting system.

- **Commissioning:** In accordance with CIBSE Commissioning Code L.
- **Test results:** Submit two copies of system commissioning completion certificate.
- **Certificates of calibration for meters and instruments:** Submit.

812 Testing and commissioning emergency lighting systems

Used by: 70-80-35/110 Hard wired general lighting system.

- **Commissioning:** In accordance with BS 5266-1, Annex F.
- **Results:** Submit two copies of emergency lighting completion certificates, F1, F2, F3, and F4 and Submit two copies of emergency lighting completion certificate G2.
- **Certificates of calibration for meters and instruments:** Submit.

820 Documentation relating to general lighting

Used by: 70-80-35/110 Hard wired general lighting system.

- **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:** Three.
- **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 infra red detectors, and daylight sensors.
  - **Format:** A1 paper print drawing and Electronic drawing.
  - **Number of copies:** Three.
- **Submittal date:** At handover

822 Documentation relating to emergency lighting

Used by: 70-80-35/110 Hard wired general lighting system.

- **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:** Three.
- **Record drawings:**
  - **Content:** General arrangement drawings showing the location of emergency luminaires, lighting

circuit distribution boxes, master and slave distribution boxes, switch modules, manual and automatic emergency lighting test panels.

- **Format:** A1 paper print drawing and Electronic drawing.
- **Number of copies:** Three.

- **Submittal date:** At handover.
- **Log book:**
  - **Submit including the following information:** As per BS 5266

75-45-85 Telecommunications systems

System outline

110 Telecommunications system

- **Description:** The Contractor shall design, procure, install and commission a new Telecommunications system.

  The system shall consist of incoming DP with cabling into sub DPs in the Retail Unit and Residential Riser as per drawings.

  Landlord lines shall be provided for the lifts, fire alarm and door access control system.
- **System performance:** 75-45-85/210 Design of telecommunications systems and 75-45-85/240 Telecommunications outlets.
- **System manufacturer:** Submit proposals.
- **Method of operation:** Analogue.
- **Connection to public telephone network:** Required.
- **Cable type:** 90-55-15/368 Copper voice cables.
- **Cabling topology:**
- **Containment:**
  - **Type:** 90-55-10/335 Cable trays type A.
  - **Rewireable installation:** Required.
  - **Concealed installation:** Required.
  - **Draw wires:** Provide in conduit drops.
- **Telecommunications outlets:** 90-60-25/450 Telecommunication outlets.
- **Execution:** 75-45-85/615 Installing telecommunications equipment and telecommunications cabling generally;
  75-45-85/620 Connection to the public telephone network;
  75-45-85/660 Installing copper voice cabling;
  and 75-45-85/665 Installing functional earth cabling.
- **System completion:** 75-45-85/810 Testing and inspection of telecommunications systems and 75-45-85/820 Documentation.

System performance

210 Design of telecommunications systems

Used by: 75-45-85/110 Telecommunications system.

- **Design:** Complete the design of the telecommunications system.
- **Standards:** To BS 6701 and BS EN 50174-1.
- **Drawings, technical information, calculations and manufacturers' literature:** Submit proposals.
  - **Submit, including the following:** Cabinet general arrangement drawings.
    Cabling topology schematics.
    Distribution point layout drawings.

240 Telecommunications outlets

Used by: 75-45-85/110 Telecommunications system.

- **Telecommunications outlets:** To match electrical accessories.

Execution

615 Installing telecommunications equipment and telecommunications cabling generally

Used by: 75-45-85/110 Telecommunications system.

- **Standards:** To BS 6701 and BS 7671.
- **Type of installation:** Flush.
- **Equipment:** Provide electricity supplies to equipment requiring power.
- **Labelling:**
  - **Equipment:** Label with unique identifier.

    Type: Face engraved rigid plastic laminate.
  - **Cables:**

    Type: Wrap-around machine-printed label with cable identifier.

    Location: Submit proposals.
  - **Outlets:**

    Type: Submit proposals.

620 Connection to the public telephone network

Used by: 75-45-85/110 Telecommunications system.

- **Public telephone network:** Submit proposals.

660 Installing copper voice cabling

Used by: 75-45-85/110 Telecommunications system.

- **Standards:** To BS BS 6701, BS 7671, BS EN 50174-2, BS EN 50174-3 and TIA 568-B.1.
- **Routes and arrangement:** Submit proposals.
- **Segregation:** Segregate from other cabling. Where installed in trunking, locate in a dedicated telecommunications compartment.
- **Timing:** Do not start internal cabling until building enclosure provides permanently dry conditions.
- **Cables:** Install in one length.
- **Cable pulling:** Submit proposals.
- **Orientation:** Dress cables flat, free from twists, kinks and strain..
- **Cable binders:**
  - **Type:** Submit proposals.
  - **Spacing (maximum):**

    Horizontal cabling: 2 m.

    Vertical cabling: 1 m.
- **Jointing:** At equipment and terminal fittings only.
- **External cabling:** Submit proposals.

665 Installing functional earth cabling

Used by: 75-45-85/110 Telecommunications system.

- **Standards:** To BS 6701 and BS 7671.
- **Routes and arrangement:** Submit proposals.

System completion

810 Testing and inspection of telecommunications systems

Used by: 75-45-85/110 Telecommunications system.

- **Standard:** To BS 6701.
- **Testing and inspection agent:** Submit proposals.
- **Notice before commencing tests (minimum):** 72 h.
- **Inspection of cabling:** Inspect cables for kinks, bends, snags and compression and deformation damage.
- **Interconnections with other systems:** Verify.
- **Equipment calibration for performance testing:** Submit evidence.
- **Results:** Submit schedule of equipment and outlets, including total number of extensions, and a master directory (with a list of features available to each extension, and arrangement of hunt groups).

820 Documentation

Used by: 75-45-85/110 Telecommunications system.

- **Standard:** To BS EN 50174-1.
- **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:** Three.
- **Record drawings:**
  - **Content:** For all telecommunications cabling, the cable origin, circuit designation, route, conductor material and c.s.a, insulation type and colour, number of cores per cable, number of cables in ducts, on tray or ladder.
    Location of PABX, distribution panels, outlets, terminal devices, payphones, and operator consoles.
  - **Format:** A1 paper print drawing and Electronic drawing.
  - **Number of copies:** Three.
- **Submittal date:** At handover.
- **Cable schedules:**
  - **Location:** Submit proposals.
  - **Format:** Submit proposals.
  - **Size:** A4.
  - **Contents:** Submit proposals.
- **Cabling topology schematics:**
  - **Location:** Submit proposals.
  - **Format:** Submit proposals.

75-45-90 Television and radio distribution systems

System outline

110 Television distribution system

- **Description:** The Contractor shall design, procure, install and commission a new Television system. The Contractor shall install all containment, power supplies and equipment required to provide a TV, radio aerial and satellite system to each apartment.

  The Contractor shall run 2 signal cables from the electrical riser into each Apartment.

  A full Terrestrial/Satellite TV and FM radio system will be designed and provided to serve each apartment within the premises. All cables, equipment and connections will be provided by a TV/Satellite specialist Contractor.

  Each apartment will require the reception of 'the full range of terrestrial and satellite digital and Sky + HD channels available from the system provider.

  The signal strength at each outlet shall be in accordance with transmission companies recommendations.

  The head end equipment, amplifier etc., shall be self powering, wall fixed and mechanically protected.

  Wiring shall be routed via the electrical riser, terminating in a common junction box. The cabling shall be installed by specialist contractor, containment and back boxes by the Electrical Contractor.

  The system shall be designed to accommodate aerial sockets within each residential unit entrance hall, living area and all bedrooms.

  A telephone outlet socket shall be provided adjacent to the satellite digital box outlet in each apartment.

  The main distribution may be run on cable basket/tray installed on the main service routes on each level. Cables shall be enclosed in concealed PVC conduit routed through ceiling void and vertically down to each outlet.

  Outlets to the television system shall be multi gang co-axial flush mounted outlet to match services provided, the same range of accessories as the general accessories. The telephone sockets positions shall be based on the drawings but final positions shall be subject to final architectural detail design layouts.

  The Contractor shall include for liaison and attendance associated with the testing and commissioning by the Specialist Contractor. Upon completion of the system all necessary signal level tests, quality of picture and sound quality results will be fully documented and presented to the Project team for the Client's records.

  The entire communication system shall be fully demonstrated to the Client's representatives upon final completion, the Specialist Contractor's shall be required to demonstrate the operation of all equipment that is required for the system and necessary equipment and time incurred will be deemed to be included within rates.

  The Electrical Contractor shall install un-switched connection units within the main riser to serve the multi-switch units at each floor level and at the head end at roof level.
- **System performance:** 75-45-90/210 Design of television and radio distribution systems.

- **System manufacturer:** Submit proposals.
- **Arrangement:** IRS.
- **Input signals:** Frequency modulated (FM) radio (VHF);
  Digital audio broadcasting (DAB);
  Digital terrestrial television (DTT);
  and Satellite services (Astra/ Eutelstat).
- **Antennae:** 90-70-75/330 DAB antennae;
  90-70-75/320 FM antennae;
  90-70-75/340 Satellite dishes;
  and 90-70-75/310 UHF antennae.
- **Distribution equipment:** 90-70-10/460 Masthead amplifiers;
  90-70-10/465 Multiswitches;
  and 90-70-10/475 Splitters.
- **Outlets:** 90-60-25/445 Television outlets.
- **System accessories:** Brackets and Masts.
- **Cable type:** 90-55-15/367 Coaxial cables.
- **Containment:** 90-55-10/335 Cable trays type A.
- **Rewireable installation:** Required.
- **Concealed installation:** Required.
- **Execution:** 75-45-90/620 Installing antennae;
  75-45-90/630 Installing cabling;
  75-45-90/640 Installing amplifiers;
  75-45-90/650 Installing outlet plates;
  and 75-45-90/660 Connection to lightning protection system.
- **System completion:** 75-45-90/820 Documentation.

System performance

210 Design of television and radio distribution systems

Used by: 75-45-90/110 Television distribution system.

- **Design:** Complete the design of the television and radio distribution system.
- **Standards:** To BS 7671, BS EN 60728-11, the requirements of the Digital Television Group (DTG) guide ' Installing digital television MATV and IRS', and Confederation of Aerial Industries (CAI) 'Code of practice for the installation of terrestrial and satellite TV reception systems'.
- **Requirement:** Submit proposals including detailed design drawings, technical information, calculations and manufacturers' literature.
- **System designer:** Member of the Confederation of Aerial Industries (CAI).
- **Qualifications of designer:** Member of the Confederation of Aerial Industries (CAI).

Execution

620 Installing antennae

Used by: 75-45-90/110 Television distribution system.

- **Installation:** In accordance with the CAI Code of practice for the installation of terrestrial and satellite TV reception systems.
- **Position:** Submit proposals.

- **Mounting:** Roof mounted on concrete base.
- **Planning permission:** Obtain from local authority and submit evidence.

630 Installing cabling

Used by: 75-45-90/110 Television distribution system.

- **Standard:** To BS 7671.
- **Installation:** In accordance with the CAI 'Code of practice for the installation of terrestrial and satellite TV reception systems'.
- **Route:** Submit proposals.
- **Timing:** Do not start internal cabling until building enclosure provides permanently dry conditions.
- **Cables:** Install in one length.
- **Cable pulling:** Submit proposals.
- **Bending radius (minimum):** 10 times outside diameter of cable.
- **Cable fixing:** Do not staple.
- **Cables passing through walls:** Sleeve with conduit or pipeduct. Bush at both ends.
- **Jointing:** At equipment and terminal fittings only.

640 Installing amplifiers

Used by: 75-45-90/110 Television distribution system.

- **Position:** With electrical riser.

650 Installing outlet plates

Used by: 75-45-90/110 Television distribution system.

- **Mounting:** Recessed.
- **Height (finished floor level to underside of equipment):** 450 mm.
- **Depth of backboxes (minimum):** 35 mm.

660 Connection to lightning protection system

Used by: 75-45-90/110 Television distribution system.

- **Connection:** In accordance with the CAI 'Code of practice for the installation of terrestrial and satellite TV reception systems'.

System completion

820 Documentation

Used by: 75-45-90/110 Television distribution system.

- **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 and electronic copies.
  - **Number of copies:** Three.
- **Record drawings:**

  - **Content:** Location and route of cables between antennae and cable outlets.
    Location of diplexers, equalizers, launch and masthead amplifiers, multiswitches and splitters.
  - **Format:** A1 paper print drawing and Electronic drawing.
  - **Number of copies:** Three.
- **Submittal date:** At handover.

75-60-05 Access control systems

System outline

110 Access control system

- **Description:** The Contractor shall design, procure, install and commission a new door entry system.

  The door entry system shall be design, installed and commissioned by a specialist sub-contractor to the Contractor. The Contractor shall provide containment systems and power supplies in accordance with the specialist requirements.

  All specialist hardware for the door entry system, such as the control panel, handsets, camera, door locks etc will be supplied and installed by the specialist sub-contractor. The Contractor shall include for liaising with the specialist in order to provide a fully operative access controlled audio / video entry system fit for purpose.

  The door entry system shall provide each apartment within the building with a means of accepting a call from the main entrance control unit, talking and viewing the caller from the apartment and admitting entrance to the building, all without the need to leave the apartment.

  The contractor is to supply and install a controlled entry system, which shall incorporate one entrance panel located at the main ground floor entrance. The system shall provide the following facilities throughout:

  - Visitors to ring from the entrance panel to a selected dwelling and hold a private two-way conversation.
  - Allow the occupant of the dwelling to be able to clearly view the visitor standing at the entrance door.
  - Allow the occupant of the apartment to be able to operate an electric door release on the entrance door, with the admittance of an audible warning to indicate to the visitor that the lock has been activated.
  - Allow for tradesman's entry, during a selected period, by providing a button on the control panel, controlled by an automatic summer winter seven-day digital time correction time clock with six on off times per day.
  - In the event of a total power failure the lock release shall revert to fail-safe.
  - The system shall be so arranged in order that extension buzzers or xenon beacons can be incorporated in the event that a tenant suffers from deafness.
  - It will be the Contractor's responsibility to check all dwelling numbers etc. before the main panels are engraved
  - The system shall be capable of self-cancelling after a specified time period, irrespective of whether a call has been answered or not.
  - The system shall be wired so that no individual apartment, if faulty or vandalized, shall cause the system to malfunction, and the wiring shall be arranged that an individual apartment can be removed from service without having to gain access to the dwelling by use of plug in connectors.
  - The system shall be able to activate the lock only when the handset has been activated. The lock release circuit will not operate if the handset has not been picked up. Only the lock at the call panel that the call has been generated shall be released.
  - The Apartment Station shall incorporate an anti lock down circuit to stop residents jamming the handset lock release button down to allow access to the building by just calling that particular handset.
  - Tenants shall gain entry through the main ground floor entrance by use of Proximity Access Control key fobs

- **System performance:** 75-60-05/210 Design of access control and audio intercom systems and 75-60-05/230 Connection to fire detection and alarm systems.

- **System manufacturer:** A Gold member of National Security Inspectorate.
- **Standards:** To BS EN 50133-1 and in accordance with BS EN 50133-7.
- **Operation in the event of mains failure:** Access points open.
- **Tokens:** 90-75-05/330 Proximity cards.
- **Readers:** 90-75-05/360 Proximity readers.
- **Standby battery supply (minimum):** 24 h.
- **Locking mechanisms:** 90-75-05/400 Electric strikes and faceplates.
- **Controls:** 90-75-05/430 Access control system controllers and 90-75-05/440 Door controllers.
- **System accessories:** 90-75-05/480 Emergency break glass units and 90-75-05/470 Request to exit buttons .
- **Cable type:** LSF insulated cables for interconnecting wiring.
- **Containment:** 90-55-10/380 Rigid conduit type B and 90-55-10/410 Cable trunking and cable ducting systems.
- **Rewireable installation:** Required.
- **Concealed installation:** Required.
- **Execution:** 75-60-05/620 Installing access control systems and 75-60-05/630 Equipment labelling and system diagrams.
- **System completion:** 75-60-05/820 Documentation.

System performance

210 Design of access control and audio intercom systems

Used by: 75-60-05/110 Access control system.

- **Design:** Complete the design of the access control system and Complete the design of the audio intercom system.
- **Requirement:** Submit proposals including detailed design drawings, technical information, calculations and manufacturers' literature.

230 Connection to fire detection and alarm systems

Used by: 75-60-05/110 Access control system.

- **Operation in the event of a fire signal:** To release locks on escape route.

Execution

620 Installing access control systems

Used by: 75-60-05/110 Access control system.

- **Standard:** To BS EN 50133-1 and in accordance with BS EN 50133-7.
- **Location of the access controller:** Contractor's choice.

630 Equipment labelling and system diagrams

Used by: 75-60-05/110 Access control system.

- **Access points and door controllers:** Label with a unique identification code.
- **System diagram:** Provide showing the location and identity of all system equipment.
- **Position:** Next to the access system controller.

System completion

820 Documentation

Used by: 75-60-05/110 Access control system.

- **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:** Three.
- **Record drawings:**
  - **Content:** For all access control cabling, the cable origin, circuit designation, route from controller to access control point, conductor material and c.s.a, insulation type and colour, number of cores per cable, number of cables in ducts, on tray or ladder.
  - **Format:** A1 paper print drawing and Electronic drawing.
  - **Number of copies:** Three.
- **Submittal date:** At handover.

75-65-30 Fire detection and alarm systems

System outline

110 Fire detection and alarm system

- **Description:** The Contractor shall design, procure, install and commission a new fire detection and alarm system.

  The fire detection and alarm system shall be developed in accordance with approved inspector and fire officer requirements. The initial proposals subject to detail design developments are as follows:

  Each apartment fire alarm system shall be provided with a minimum of 2no. smoke/heat detectors (4no. for duplex apartments) fed by mains power and battery back-up in the event of a powe failure.

  The central fire alarm system shall designed to BS5839 Part 1, Category L5. It shall consist of smoke/heat detectors, sounders, manual call points and input/output interfaces. The coverage shall be to all common areas including entrance area, lift lobbies, lift shaft, staircase full landings, bin store and riser/plant areas. Upon activation of two common area detectors or an apartment detector and common area detector, the system shall trigger a building evacuation sounding alarms in all common areas.

  Fire alarm interfaces shall be installed to control/monitor with the following systems:

  - Retail Unit Interface for alarm and fault conditions
  - Passenger Lift, to ground under a fire condition unless fire condition in ground floor lift lobby, then to park at first floor level.
  - Access control system, escape door to fail open under a fire condition.
  - AOV as detailed below.

  The central building fire alarm system shall be linked to the natural smoke ventilation system. The system shall be configured in accordance with section 2.26 of ADB. On detection of smoke within a common corridor/lobby the vent on the fire floor and at the top of the staircase shall open simultaneously. The vents on all other storeys shall remain closed. The facility for manual operation of the system shall be provided for use by the fire brigade. This shall consist of yellow break glass units mounted at entrance and top storey to open the vent at the top of the staircase.

  The Contractor shall allow for recessing of all control panels within the entrance reception area.
- **System performance:** 75-65-30/210 Design of fire detection and alarm systems;
  75-65-30/235 System category L5;
  75-65-30/260 Integration with other alarm and security systems;
  75-65-30/265 Interfaces to equipment;
  and 75-65-30/280 External alarm signalling.
- **System manufacturer:** LPCB LPS 1014 certified.
- **Format:** Automatic analogue addressable.
- **Category:** In accordance with BS 5839-1, L5.
- **Detection devices:**
- **Equipment interconnectivity:** 90-55-15/342 Fire resistant, insulated and sheathed cables.
- **Cable containment:** 90-55-10/335 Cable trays type B.
- **Rewireable installation:** Required.
- **Concealed installation:** Required.

- **Internal alarms:**
  - **Primary:** 90-75-30/360 Sounders.
  - **Secondary:** 90-75-30/415 Visual alarm signal devices.
- **External alarms:** To alarm receiving centre (ARC).
- **Controls:** 90-75-30/380 Fire detection and alarm control and indicating equipment (CIE) and 90-75-30/385 Fire detection and fire alarm power supply equipment.
- **System completion:** 75-65-30/805 System information;
  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 generally;
  75-65-30/812 Testing actuation, integration and interfacing with alarm and security systems;
  75-65-30/820 Documentation;
  75-65-30/830 Spares and consumables;
  75-65-30/850 Verification certificate;
  and 75-65-30/860 Acceptance certificate.

System performance

210 Design of fire detection and alarm systems

Used by: 75-65-30/110 Fire detection and alarm system.

- **System designer:** Submit proposals.
- **Standards:** Complete the design of the fire detection and alarm system in accordance with BS 5839-1.
- **Requirement:** Submit proposals including detailed design drawings, technical information, calculations and manufacturers' literature.
- **System design certificate:** Submit with design proposals.

280 External alarm signalling

Used by: 75-65-30/110 Fire detection and alarm system.

- **Objective:** To link to Alarm Centre

System completion

805 System information

Used by: 75-65-30/110 Fire detection and alarm system.

- **Device list:** Before commissioning Submit proposals, including proposed device, zone and group names.
- **Zone diagram:** Before commissioning Submit proposals.

806 Device identification and testing

Used by: 75-65-30/110 Fire detection and alarm system.

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

807 Standby battery testing

Used by: 75-65-30/110 Fire detection and alarm system.

- **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.

808 System soak testing

Used by: 75-65-30/110 Fire detection and alarm system.

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

809 Measurement of sound pressure levels

Used by: 75-65-30/110 Fire detection and alarm system.

- **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 electronic layout drawing showing location of measurements with results.

810 Testing and commissioning generally

Used by: 75-65-30/110 Fire detection and alarm system.

- **Standard:** In accordance with BS 5839-1.
- **System commissioning agent:** System manufacturer.
- **Notice before commencing tests (minimum):** Two weeks.

812 Testing actuation, integration and interfacing with alarm and security systems

Used by: 75-65-30/110 Fire detection and alarm system.

- **Connections with other systems and equipment:** Verify and demonstrate operation of the systems and equipment under fire and fault conditions.

820 Documentation

Used by: 75-65-30/110 Fire detection and alarm system.

- **Standard:** As required by BS 5839.
- **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 and Electronic copy.
  - **Number of copies:** Three.
- **Log book:** 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, visual alarm signal devices, short circuit isolators, end of line devices, remote indicators, interface units connecting to other equipment.
  - **Drawing format:** A1 paper print drawing and Electronic drawing.
  - **Number of copies:** Three.
- **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.

830 Spares and consumables

Used by: 75-65-30/110 Fire detection and alarm system.

- **Supply the following spares:**
  - **Frangible elements for manual call points:** Six.
  - **Detectors:** Two of each type.
- **Printer ink and paper roll:** Replace immediately before handover.

850 Verification certificate

Used by: 75-65-30/110 Fire detection and alarm system.

- **Verification certificate:** Submit three copies in accordance with BS 5839-1 Annex G.5.

860 Acceptance certificate

Used by: 75-65-30/110 Fire detection and alarm system.

- **Acceptance certificate:** Submit three copies in accordance with BS 5839-1 Annex G.4.

75-65-35 Gas detection and alarm systems

System outline

110 Fixed gas detection and alarm system type A

- **System performance:** 75-65-35/210 Design of gas detection and alarm systems type A; 75-65-35/220 Sensitivity type A; 75-65-35/230 Integration with other alarm systems type A; 75-65-35/240 Interfaces to equipment type A; and 75-65-35/250 Interface isolation for testing purposes type A.
- **System manufacturer:** Submit proposals.
- **Type of protection:** Personnel and Plant and equipment.
- **Control panel:** 90-75-45/310 Fixed gas detector control panels type A.
- **Cable type:** Contractor's design.
- **Containment:** Contractor's design.
- **Rewireable installation:** Required.
- **Concealed installation:** Required.
- **Detectors:** 90-75-45/450 Gas detection and alarm detectors type A.
- **Alarm indication:** 90-70-95/310 Electronic sounders type A and 90-70-95/320 Visual alarm signal devices type A.
- **Execution:** 75-65-35/630 Installation generally type A; 75-65-35/640 Installing gas leak detectors sensors type A; 75-65-35/650 Installing fixed gas detector control panels type A; and 75-65-35/670 Labelling.
- **System completion:** 75-65-35/810 Testing and commissioning gas detection and alarm systems type A; 75-65-35/815 Calibration certificates; 75-65-35/820 Documentation type A; 75-65-35/830 Spares and consumables type A; and 75-65-35/840 Servicing and maintenance type A.

110 Fixed gas detection and alarm system type B

- **System performance:** 75-65-35/210 Design of gas detection and alarm systems type B; 75-65-35/220 Sensitivity type B; 75-65-35/230 Integration with other alarm systems type B; 75-65-35/240 Interfaces to equipment type B; and 75-65-35/250 Interface isolation for testing purposes type B.
- **System manufacturer:** Submit proposals.
- **Type of protection:** Personnel and Plant and equipment.
- **Control panel:** 90-75-45/310 Fixed gas detector control panels type B.
- **Cable type:** Contractor's design.
- **Containment:** Contractor's design.
- **Rewireable installation:** Required.
- **Concealed installation:** Required.
- **Detectors:** 90-75-45/450 Gas detection and alarm detectors type B.

- **Alarm indication:** 90-70-95/310 Electronic sounders type B and 90-70-95/320 Visual alarm signal devices type B.
- **Execution:** 75-65-35/630 Installation generally type B;
  75-65-35/640 Installing gas leak detectors sensors type B;
  75-65-35/650 Installing fixed gas detector control panels type B;
  and 75-65-35/670 Labelling.
- **System completion:** 75-65-35/810 Testing and commissioning gas detection and alarm systems type B;
  75-65-35/815 Calibration certificates;
  75-65-35/820 Documentation type B;
  75-65-35/830 Spares and consumables type B;
  and 75-65-35/840 Servicing and maintenance type B.

System performance

210 Design of gas detection and alarm systems type A

Used by: 75-65-35/110 Fixed gas detection and alarm system type A.

- **Design:** Complete the design of the gas detection and alarm system in accordance with BS EN 60079-29-2.
- **Requirement:** Submit proposals including detailed design drawings, technical information, calculations and manufacturers' literature.

210 Design of gas detection and alarm systems type B

Used by: 75-65-35/110 Fixed gas detection and alarm system type B.

- **Design:** Complete the design of the gas detection and alarm system in accordance with BS EN 60079-29-2.
- **Requirement:** Submit proposals including detailed design drawings, technical information, calculations and manufacturers' literature.

220 Sensitivity type A

Used by: 75-65-35/110 Fixed gas detection and alarm system type A.

- **Lower alarm:** 10% of the lower explosion limit (max).
- **Higher alarm:** 25% of the lower explosion limit (max).

220 Sensitivity type B

Used by: 75-65-35/110 Fixed gas detection and alarm system type B.

- **Lower alarm:** 10% of the lower explosion limit (max).
- **Higher alarm:** 25% of the lower explosion limit (max).

230 Integration with other alarm systems type A

Used by: 75-65-35/110 Fixed gas detection and alarm system type A.

- **Objectives:** Submit proposals.
- **Systems to be integrated:** Fire detection and alarm systems.

230 Integration with other alarm systems type B

Used by: 75-65-35/110 Fixed gas detection and alarm system type B.

- **Objectives:** Submit proposals.
- **Systems to be integrated:** Fire detection and alarm systems.

240 Interfaces to equipment type A

Used by: 75-65-35/110 Fixed gas detection and alarm system type A.

- **Interfaces to equipment not forming part of the gas detection and alarm system:** Design system to interact with the equipment in the event of a fire or fault signal.
- **Equipment and mode of operation:** In the event of detection the refrigerant system will shut down (pump down gas if available) and trigger and alarm to notify the occupant.

240 Interfaces to equipment type B

Used by: 75-65-35/110 Fixed gas detection and alarm system type B.

- **Interfaces to equipment not forming part of the gas detection and alarm system:** Design system to interact with the equipment in the event of a fire or fault signal.
- **Equipment and mode of operation:** In the event of detection the refrigerant system will shut down (pump down gas if available) and trigger and alarm to notify the occupant.

250 Interface isolation for testing purposes type A

Used by: 75-65-35/110 Fixed gas detection and alarm system type A.

- **Isolation of systems and equipment:** Design system so that the actuation, integration and interfacing can be isolated during gas detection and alarm system testing.
- **Means of isolation:** Single isolate key switch.

250 Interface isolation for testing purposes type B

Used by: 75-65-35/110 Fixed gas detection and alarm system type B.

- **Isolation of systems and equipment:** Design system so that the actuation, integration and interfacing can be isolated during gas detection and alarm system testing.
- **Means of isolation:** Single isolate key switch.

Execution

630 Installation generally type A

Used by: 75-65-35/110 Fixed gas detection and alarm system type A.

- **Installation:** To BS EN 60079-29-2.
- **Power supplies:** Submit proposals.
- **Final connection accessory type:** Unswitched fused connection unit.

630 Installation generally type B

Used by: 75-65-35/110 Fixed gas detection and alarm system type B.

- **Installation:** To BS EN 60079-29-2.
- **Power supplies:** Submit proposals.
- **Final connection accessory type:** Unswitched fused connection unit.

640 Installing gas leak detectors sensors type A

Used by: 75-65-35/110 Fixed gas detection and alarm system type A.

- **Position:** Adjacent to likely sources of hazard, at the perimeter of plant and away from mechanical or water damage.
- **Mounting heights:**

  - **Sensors for gases lighter than air:** Above area of potential leak.
  - **Sensors for gases heavier than air:** At floor level, in inspection pits or in ducts into which heavy gas may flow.
- **Sampling line length:** Submit proposals.
- **Cable connections:** Minimize cable length between control panel and sensor.
- **Access:** Install equipment in accessible locations to allow for regular calibration, maintenance and electrical safety inspection.

640 Installing gas leak detectors sensors type B

Used by: 75-65-35/110 Fixed gas detection and alarm system type B.

- **Position:** Adjacent to likely sources of hazard, at the perimeter of plant and away from mechanical or water damage.
- **Mounting heights:**
  - **Sensors for gases lighter than air:** Above area of potential leak.
  - **Sensors for gases heavier than air:** At floor level, in inspection pits or in ducts into which heavy gas may flow.
- **Sampling line length:** Submit proposals.
- **Cable connections:** Minimize cable length between control panel and sensor.
- **Access:** Install equipment in accessible locations to allow for regular calibration, maintenance and electrical safety inspection.

650 Installing fixed gas detector control panels type A

Used by: 75-65-35/110 Fixed gas detection and alarm system type A.

- **Position:** Submit proposals.
- **Access:** Install equipment in accessible locations to allow for regular calibration, maintenance and electrical safety inspection.

650 Installing fixed gas detector control panels type B

Used by: 75-65-35/110 Fixed gas detection and alarm system type B.

- **Position:** Submit proposals.
- **Access:** Install equipment in accessible locations to allow for regular calibration, maintenance and electrical safety inspection.

670 Labelling

Shared by: 75-65-35/110 Fixed gas detection and alarm system type A and type B.

- **Sensor identification:** Label with a unique reference.
- **Alarm devices:** Label with function.

System completion

810 Testing and commissioning gas detection and alarm systems type A

Used by: 75-65-35/110 Fixed gas detection and alarm system type A.

- **Standard:** To BS EN 60079-29-2.
- **Notice before commencing tests (minimum):** 24 h.
- **Sensor list:** Before commissioning submit proposed sensor and zone names.

- **Schedule of tests and method statement:** Submit.
- **Sensor calibration:** As manufacturers' instructions.
- **Sensor testing:** Verify the operation of each device.
- **Alarm signalling:** Verify operation
- **Connections with other systems and equipment:** Verify and demonstrate operation of the systems and equipment under pre-alarm and alarm conditions.
- **Audible signal sound level:** Measure.
- **Battery back up testing:** Required.
- **Mains power supply:** Isolate.
- **Quiescent mode:** Measure current supplied by standby source when gas detection and alarm system is operating in the quiescent mode.
- **Results:** Submit.

810 Testing and commissioning gas detection and alarm systems type B

Used by: 75-65-35/110 Fixed gas detection and alarm system type B.

- **Standard:** To BS EN 60079-29-2.
- **Notice before commencing tests (minimum):** 24 h.
- **Sensor list:** Before commissioning submit proposed sensor and zone names.
- **Schedule of tests and method statement:** Submit.
- **Sensor calibration:** As manufacturers' instructions.
- **Sensor testing:** Verify the operation of each device.
- **Alarm signalling:** Verify operation
- **Connections with other systems and equipment:** Verify and demonstrate operation of the systems and equipment under pre-alarm and alarm conditions.
- **Audible signal sound level:** Measure.
- **Battery back up testing:** Required.
- **Mains power supply:** Isolate.
- **Quiescent mode:** Measure current supplied by standby source when gas detection and alarm system is operating in the quiescent mode.
- **Results:** Submit.

815 Calibration certificates

Shared by: 75-65-35/110 Fixed gas detection and alarm system type A and type B.

- **Certificates of calibration for meters and instruments:** Submit.

820 Documentation type A

Used by: 75-65-35/110 Fixed gas detection and alarm system type A.

- **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:** Two.
- **Record drawings:**

  - **Content:** Locations of all equipment;
    Location and routes of all cables;
    and Schematic diagram of wiring and pipework connections.
  - **Format:** A1 paper print drawing and Electronic drawing.
  - **Number of copies:** Two.
- **Submittal date:** At handover.
- **Modifications to existing gas detection and alarm systems:**
  - **Modification certificate:** Submit.
  - **Existing operation and maintenance manuals and record drawings:** Update.

820 Documentation type B

Used by: 75-65-35/110 Fixed gas detection and alarm system type B.

- **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:** Two.
- **Record drawings:**
  - **Content:** Locations of all equipment;
    Location and routes of all cables;
    and Schematic diagram of wiring and pipework connections.
  - **Format:** A1 paper print drawing and Electronic drawing.
  - **Number of copies:** Two.
- **Submittal date:** At handover.
- **Modifications to existing gas detection and alarm systems:**
  - **Modification certificate:** Submit.
  - **Existing operation and maintenance manuals and record drawings:** Update.

830 Spares and consumables type A

Used by: 75-65-35/110 Fixed gas detection and alarm system type A.

- **Supply the following spares:**
  - **Sensors:** Two of each type.
- **Supply the following consumables:** Submit proposals.

830 Spares and consumables type B

Used by: 75-65-35/110 Fixed gas detection and alarm system type B.

- **Supply the following spares:**
  - **Sensors:** Two of each type.
- **Supply the following consumables:** Submit proposals.

840 Servicing and maintenance type A

Used by: 75-65-35/110 Fixed gas detection and alarm system type A.

- **Requirement:** Submit proposals.
- **Duration:** Undertake for 12 months after completion.

840 Servicing and maintenance type B

Used by: 75-65-35/110 Fixed gas detection and alarm system type B.

- **Requirement:** Submit proposals.
- **Duration:** Undertake for 12 months after completion.

75-70-05 Assistance call systems

System outline

120 Emergency voice communication system

- **Description:** The Contractor shall design, procure, install and commission a new emergency voice communication system.

  The system shall be suitable to provide communication with a combined Fire Telephone and Disable Refuge at locations shown on drawings subject to requirements of buidling control and fire officer. Units should be flush mounted.
- **System Performance:** 75-70-05/220 Design of emergency voice communication systems.
- **System manufacturer:** Submit proposals.
- **Operating voltage:** Extra low voltage to BS 7671.
- **Zones:** Contractor's design.
- **Equipment interconnectivity:** Wired.
- **Call actuator:** 90-70-05/340 Disabled refuge outstations and Fire Telephones.
- **Disabled refuge master station:** 90-70-05/370 Disabled refuge master station.
- **Alarm indication:** Contractor's design.
- **Power supply unit:** 90-70-05/390 Power supply units.
- **Circuit monitoring:** Open circuit and short circuit.
- **Cabling:**
  - **Type:** Contractor's design.
- **Containment:** Contractor's design.
- **Rewireable installation:** Required.
- **Concealed installation:** Required.
- **System accessories:** 90-70-05/420 Portable communicators.
- **Execution:** 75-70-05/640 Installing emergency voice communication systems.
- **System completion:** 75-70-05/810 Testing and commissioning assistance call systems generally; 75-70-05/835 Documentation for emergency voice communication systems; 75-70-05/850 Verification certificate; and 75-70-05/860 Acceptance certificate.

System performance

220 Design of emergency voice communication systems

Used by: 75-70-05/120 Emergency voice communication system.

- **System designer:** Submit proposals.
- **Design:** Complete the design of the emergency voice communication system in accordance with BS 5839-9.
- **Requirement:** Submit proposals including detailed design drawings, technical information, calculations and manufacturers' literature.
- **Communication strategy:** Initiated from the outstation.

- **System design certificate:** Submit with design proposals.

Execution

640 Installing emergency voice communication systems

Used by: 75-70-05/120 Emergency voice communication system.

- **Standard:** To BS 7671 and in accordance with BS 5839-9.
- **Wiring arrangement:** Single loop.

System completion

810 Testing and commissioning assistance call systems generally

Used by: 75-70-05/120 Emergency voice communication system.

- **Standards:**
- **Notice before commencing commissioning:** 7 d.
- **System commissioning agent:** Contractor.
- **Controls:** Verify operation.
- **Alarm signalling:** Verify operation.
- **Results:** Submit.

835 Documentation for emergency voice communication systems

Used by: 75-70-05/120 Emergency voice communication system.

- **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:** Three.
- **Record drawings:**
  - **Content:** General arrangement drawings showing the location of all outstations, master stations, sounders, visual alarm signal devices and power supply units and Schematic diagram showing all control cabling, the cable origin, route from power supply units to master stations and outstations, sounders, visual alarm signal 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.
  - **Format:** Electronic drawings.
  - **Number of copies:** Three.
- **Submittal date:** At handover.
- **Test certificates:**
  - **Design certificate:** Submit two copies in accordance with BS 5839-9 Annex C.1.
  - **Installation certificate:** Submit two copies in accordance with BS 5839-9 Annex C.2.
  - **Commissioning certificate:** Submit two copies in accordance with BS 5839-9 Annex C.3.

850 Verification certificate

Used by: 75-70-05/120 Emergency voice communication system.

- **System verification agent:** Submit proposals.
- **Verification certificate:** Submit two copies in accordance with BS 5839-9 Annex C.5.

860 Acceptance certificate

Used by: 75-70-05/120 Emergency voice communication system.

- **Acceptance certificate:** Submit two copies in accordance with BS 5839-9 Annex C.4.

75-75-05 Building monitoring and management systems

System outline

130 Water metering

- **Description:** The cold water is separately metered to each apartment, enabling tenants to be billed for their individual consumption.

  Water meters are located within the riser, a bank of meters per floor serving each apartment, served from the boosted cold water system. A separate water meter shall be installed to serve the landlords supply.

  All water meters shall be Thames water issue, with pulsed output.
- **System Performance:** 75-75-05/210 Design and 75-75-05/215 Meter data.
- **Number and location of meters:** 6No meters (5No. Apartments + 1No. Landlord).
  All meters are located in the basement services riser.
- **Monitoring period:** Half hourly.
- **Reporting:** Stored.

System performance

210 Design

Used by: 75-75-05/130 Water metering.

- **Design:** Complete the design of the building monitoring and management system.
- **Standards:**
  - **Communications network:** To BS EN 50174-1.
  - **Communications protocol:** To BS EN ISO 16484-5.
  - **Documentation of plant and application specific functions:** To BS EN ISO 16484-3.
- **Requirements:** Submit proposal including detailed design drawings, technical information, calculations and manufacturers' literature.
- **Requirement:** Submit proposals including detailed design drawings, technical information, calculations and manufacturers' literature.

215 Meter data

Used by: 75-75-05/130 Water metering.

- **Software functions:** Thames Water Free issue meter with Pulsed output.

75-75-50 Mechanical engineering services control and management systems

System outline

110 Water supply systems control

- **Description:** Local controls shall be provided to the water booster set.

  All bath and showers shall be installed with thermostatic mixing valves (TMV3).
- **System performance:** 75-75-50/201 Design.
- **Start and stop control:** 75-75-50/203 Domestic hot water demand;
  75-75-50/205 Hand off auto switch;
  and 75-75-50/211 Pump overrun.
- **Pressurization control strategies:** 75-75-50/228 Pump pressurization unit control strategy.
- **Distribution control strategies:** 75-75-50/232 Domestic hot water non-storage calorifier control strategy.
- **Pumps control strategies:** 75-75-50/236 Multiple speed pumps control strategy.
- **Additional functions:** 75-75-50/295 Data logging.
- **Equipment:** 90-65-50/320 Alarms and 90-65-50/340 Control panels.
- **Sensors:** 90-65-50/400 Flow in pipe sensors;
  90-65-50/420 Pressure sensors;
  and 90-65-50/430 Water temperature sensors.
- **System completion:** 75-75-50/810 Inspection and testing;
  75-75-50/820 Start up and commissioning;
  75-75-50/830 Commissioning of automatic control systems;
  75-75-50/840 Spares;
  75-75-50/850 Keys;
  75-75-50/860 Documentation;
  and 75-75-50/870 Servicing and maintenance.

120 Heating systems control

- **Description:** Local control shall provided for the heating and hot water system within each apartment. It shall be installed with a wall mounted programmable controller in the services cupboard.

  As a minimum the controller should include:-

  • Programmable time controls (minimum of 2 two programmable settings)
  • Variable temperature control

  Water shall be distributed at 60°C. Dead legs shall be kept to the limitations recommended by the CIBSE and Health & Safety Guidance L8.

  Hot water with a maximum draw-off temperature of 43°C shall be provided to the wash hand basins and achieved by Thermostatic mixing valves.

  Thermostatic mixing valves (TMV3's) shall be provided to all WHB (Wash Hand Basins) and Showers.

  The Contractor shall provide hot water services to all sanitary ware fittings as located on the drawings.

Dead legs are to be minimised and trace heating shall be incorporated where appropriate. Pressure reducing valves and / or pressure booster sets shall be installed as appropriate to meet the individual appliance requirements. Double check valves shall be provided where appropriate to comply with local water authority byelaws.

Distribution services shall be insulated in accordance with the specification. Distribution pipework shall comprise copper tube to EN 1057-250. Individual isolation valves shall be provided on hot water outlets. Individual Ballofix in-line valves shall be installed adjacent all sanitary ware fittings. Common isolation gate valves shall be installed at branch connections to groups of sanitary fittings when distributing off main distribution runs and at termination of the index run. Adequate valves shall be provided for circuit control, isolation and draining down of the installation.

Flexible tap connectors or hoses shall not be used on this site.

Contractor to submit full proposals for approval.

- **System performance:** 75-75-50/201 Design and 75-75-50/212 Time control.
- **Start and stop control:** 75-75-50/203 Domestic hot water demand;
  75-75-50/205 Hand off auto switch;
  75-75-50/211 Pump overrun;
  75-75-50/206 Low inside air temperature interlock for building fabric and contents protection;
  75-75-50/207 Low temperature interlock signals for plant protection;
  and 75-75-50/210 Optimum start and stop heating.
- **Heating plant control strategies:** Submit proposals.
- **Pumps:**
  - **Equipment:** Submit proposals.
  - **Primary pumps control strategies:** Submit proposals.
  - **Secondary pumps control strategies:** Submit proposals.
- **Pressurization system control strategies:** Submit proposals.
- **Water distribution control strategies:** Submit proposals.
- **Outlet control strategies:** Submit proposals.
- **Additional functions:** Submit proposals.
- **Equipment:** Submit proposals.
- **Sensors:** Submit proposals.
- **System completion:** 75-75-50/810 Inspection and testing;
  75-75-50/820 Start up and commissioning;
  75-75-50/830 Commissioning of automatic control systems;
  75-75-50/840 Spares;
  75-75-50/850 Keys;
  75-75-50/860 Documentation;
  and 75-75-50/870 Servicing and maintenance.

125 Cooling systems control

- **System performance:** Refer to Heating Systems Control (75-75-50/120)

135 Air to air heat pump system control

- **System performance:** Refer to Heating Systems Control (75-75-50/120)

155 Mechanical ventilation systems control type AOV

- **Description:** The AOV is interfaced with the central fire alarm system and opens on signal from the FA panel. At the fire entry point there shall be a fireman's override switch, which shall open or close the

AOV if required.

In the event of a power failure the AOV shall "fail open".

- **System performance:** To meet building control and fire officers requirements, Colt to supply and install a fully conpliant system.

155 Mechanical ventilation systems control type MOV

- **System performance:** To meet building control and fire officers requirements, Colt to supply and install a fully conpliant system.

160 Mechanical extract systems control

- **Description:**
- **System performance:**
- **Objectives:**
- **Start and stop control:**
- **Extract fan control strategies:**
- **Additional functions:**
- **Equipment:**
- **Sensors:**
- **Execution:**
- **System completion:**

170 Variable air volume air conditioning system control type A

- **System performance:** Refer to Heating Systems Control (75-75-50/120)

170 Variable air volume air conditioning system control type B

- **System performance:** Refer to Heating Systems Control (75-75-50/120)
- **Objectives:**
- **Start and stop control:**
- **Damper control strategies:**
- **Heating coils control strategies:**
- **Heat recovery devices control strategies:**
- **Cooling coil control strategies:**
- **Dehumidification control strategies:**
- **Supply fan control strategies:**
- **Humidifier control strategies:**
- **Extract fan control strategies:**
- **Terminal units control strategies:**
- **Filter control strategies:**
- **Supply air temperature control strategies:**
- **Additional functions:**
- **Equipment:**
- **Sensors:**
- **Execution:**
- **System completion:**

175 Fan coil unit air conditioning system control

- **System performance:** Refer to Heating Systems Control (75-75-50/120)

180 Smoke and heat control system, plant shutdown control

- **Description:**
- **System performance:**
- **Objectives:**
- **Operation:** On receipt of fire alarm signal control all plant to shutdown.
- **Firemans' override switch:**
  - **Operation:** Operate relative fan and open relative damper for switch position.
  - **Switch position:**
- **Variable speed fans:**
- **Additional functions:**
- **Equipment:**
- **Sensors:**
- **Execution:**
- **System completion:**

185 Smoke and heat control system, extract position control

- **Description:**
- **System performance:**
- **Objectives:**
- **Operation:** On receipt of fire alarm signal enable extract fan and open exhaust air damper.
- **Firemans' override switch:**
  - **Operation:** Operate relative fan and open relative damper for switch position.
  - **Switch position:**
- **Variable speed fans:**
- **Additional functions:**
- **Equipment:**
- **Sensors:**
- **Execution:**
- **System completion:**

System performance

201 Design

Shared by: 75-75-50/110 Water supply systems control; and 75-75-50/120 Heating systems control.

- **Design:** Complete the design of the mechanical engineering services controls and monitoring system.
- **Submit including the following information:** Operation statements, point schedules, control logic diagrams, network topology schematics, panel diagrams and fascia drawings, method statements for testing and commissioning, method statements for witness testing and graphics.

202 Boost fixed time

Used by: 55-40-40/130 Pumped cold water supply system.

- **Boost operation:**
  - **Signal:** Set from calendar in winter season and pre-set time on time clock.
  - **Boost period and time:** December, January and February, 2 h.
  - **Termination:** Normal operation of plant and When zone reaches heating set point temperature.

203 Domestic hot water demand

Shared by: 75-75-50/110 Water supply systems control; and 75-75-50/120 Heating systems control.

- **Demand for hot water:**
  - **Operation:** Start valves, pumps and heat generator plant when signal received.
  - **Demand signal:** Temperature below storage set point and Time control.

205 Hand off auto switch

Shared by: 75-75-50/110 Water supply systems control; and 75-75-50/120 Heating systems control.

- **Operation:**
  - **Hand:** Plant operates as normal regardless of sensors and controllers but satisfying safety features and interlocks.
  - **Off:** Plant prevented from operating regardless of sensors and controllers. Position plant for shutdown.
  - **Auto:** Plant dependent on sensors and controllers.

206 Low inside air temperature interlock for building fabric and contents protection

Used by: 75-75-50/120 Heating systems control.

- **Low inside air temperature signal:**
  - **Operation:** Start all heating plant serving zone registering condition.
  - **Activation set point:** 10°C.
  - **Termination set point:** 14°C.
- **Priority:** Independent of low outside temperature and low primary heating return water conditions.

207 Low temperature interlock signals for plant protection

Used by: 75-75-50/120 Heating systems control.

- **Low outside air temperature condition:**
  - **Operation:** When activated start duty primary and secondary circuit heating and cooling pumps. Open primary and secondary heating circuit valves to allow water to circulate through circuits unless plant is in operating mode.
  - **Activation set point:** Below 3°C.
  - **Termination set point:** Activation set point plus 2°C.
- **Low primary heating return water temperature condition:**
  - **Operation:** When activated start heat source and primary and secondary heating pumps if not already enabled.
  - **Activation set point:** Below 8°C.
  - **Termination set point:** Normal plant operation.

210 Optimum start and stop heating

Used by: 75-75-50/120 Heating systems control.

- **Start:**
  - **Optimum start time:** Following learning period, achieve temperature set point within +/- 15 minutes of start of occupancy.
  - **Zone heating set point:** 19°C.
  - **Maximum preheat time:** 2hours

211 Pump overrun

Shared by: 75-75-50/110 Water supply systems control; and 75-75-50/120 Heating systems control.

- **Operation:** Activate when heating plant has been operating, distributing to primary and secondary circuits.
- **Period:** 5m.

212 Time control

Used by: 75-75-50/120 Heating systems control.

- **Time clock:** Automatically change between GMT and British summer time and allow for leap years and Provide clock and calendar programmed with periods of normal operation.
- **Extension of plant operation:**
  - **Action:** Allow manual override, for normal operation, activated by push button switch.
  - **Period:** 1 hr.
- **Winter mode:**
  - **Time period:** Between 1 October and 30 April.
  - **Outside temperature:** Above 17°C for at least 30 minutes.

228 Pump pressurization unit control strategy

Used by: 75-75-50/110 Water supply systems control.

- **Spill valve:**
  - **Operation:** The packaged pressurization unit controls operate a spill valve when the pressure sensor, positioned in the water pipeline, detects primary water pressure above pre-set level.
  - **Pre-set level:** 750 kPa.
- **Pressurization pumps:**
  - **Operation:** The packaged pressurization unit controls operate the pressurization pumps when the pressure sensor detects pressure drops below the set point until the pressure set point is achieved.
  - **Set point:** 720 kPa.
- **High pressure switch:** When activated disable boiler and close fuel valve. Allow primary and secondary pumps to continue for run on period.
- **Low pressure switch:**
  - **Operation:** When activated disable boiler and close fuel valve, disable primary and secondary pumps. Raise a low pressure alarm. Hard wire interlocks.
  - **Reset:** Manual.

232 Domestic hot water non-storage calorifier control strategy

Used by: 75-75-50/110 Water supply systems control.

- **Medium:** Water, using three port diverting valve and isolating valve.
- **Control valve:**
  - **Non-operation:** Open bypass port of control valve, close isolating valve and disable secondary pump.
  - **Operation:** When demand is signalled, operate secondary pump, open isolating valve and modulate control valve to maintain secondary flow temperature at set point.
  - **Set point:** 60°C.
- **Alarm:**
  - **Operation:** Raise an alarm when domestic hot water secondary flow water temperature falls below specified temperature during operating period.
  - **Specified temperature:** 60°C.
- **High limit thermostat:**
  - **Operation:** When calorifier water temperature is above the high temperature set point, close the control valve and shut isolating valve. Start secondary pump overrun. Raise alarm.
  - **Set point:** 90°C.
  - **Overrun period:** 5 minutes.
- **Secondary circuit pump failure:** Set control valve to bypass and shut isolating valve.
- **Stratification pump:** Submit proposals.

236 Multiple speed pumps control strategy

Used by: 75-75-50/110 Water supply systems control.

- **Arrangement:** Duty and standby.
- **Plant shut down:**
  - **Operation:** Turn pumps off and fully close valves serving loads.
  - **Long shutdown period:** Run pumps for 5 minutes on a daily basis when shut down is longer than 2 days.
- **Running of plant:**
  - **Operation:** Run pumps on receipt of signal. Step up or down the pump speed to obtain the differential pressure set point.
  - **Minimum deviation:** 10 kPa.
  - **Sustained period:** 1 minute.
- **Duty and standby:**
  - **Change lead pump:** Daily.
- **Prove flow:**
  - **Operation:** Use a flow measurement device to prove flow. Start standby pump and raise alarm if flow is not proved in specified time.
  - **Specified time:** 15 s.
  - **Failure:** If flow is not proved after standby pump start, raise alarm.
  - **Reset:** Manual.

System completion

810 Inspection and testing

Shared by: 75-75-50/110 Water supply systems control; and 75-75-50/120 Heating systems control.

- **Standard:** To BS 7671.

- **Notice before commencing tests (minimum):** 24 h.
- **Certificates:**
  - **Number of copies:** Submit one.
- **Test equipment identity:** Record on test certificates.
- **Certificates of calibration:** Submit for each test instrument.
- **Control panel test certificates:**
  - **Number of copies:** Submit one.

820 Start up and commissioning

Shared by: 75-75-50/110 Water supply systems control; and 75-75-50/120 Heating systems control.

- **Standard:** In accordance with BCIA Start up and commissioning guide.

830 Commissioning of automatic control systems

Shared by: 75-75-50/110 Water supply systems control; and 75-75-50/120 Heating systems control.

- **Pre-commissioning:** In accordance with Commissioning Code C.
- **Commissioning:** In accordance with Commissioning Code C.
- **Notice (minimum):** 48 h.

840 Spares

Shared by: 75-75-50/110 Water supply systems control; and 75-75-50/120 Heating systems control.

- **Spare fuses:**
  - **Position:** Mount within each control panel.
  - **Number:** Two of each type used.
- **Spare devices:**
  - **Number:** Two of each type used.
- **Spare lamps:**
  - **Position:** Mount within control panel.
  - **Number:** Two of each type and colour used.

850 Keys

Shared by: 75-75-50/110 Water supply systems control; and 75-75-50/120 Heating systems control.

- **Control panel door keys:** Supply.
- **Number:** Two of each type used.

860 Documentation

Shared by: 75-75-50/110 Water supply systems control; and 75-75-50/120 Heating systems control.

- **Operating and maintenance instructions:**
  - **Scope:** Submit 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:** Two.
- **Record drawings:**

  - **Content:** For all controls cabling, the cable origin, circuit designation, route, conductor material and insulation type and colour, number of cores per cable, number of cables in ducts, on tray or ladder and Location of control panels, equipment and repeater panels.
  - **Format:** A1 paper print and Electronic.
  - **Number of copies:** Two.
- **Cable schedules:**
  - **Location:** Contractor's choice.
  - **Format:** Contractor's choice.
  - **Size:** Contractor's choice.
  - **Contents:** Contractor's choice.
- **Submittal date:** At handover.

870 Servicing and maintenance

Shared by: 75-75-50/110 Water supply systems control; and 75-75-50/120 Heating systems control.

- **Requirement:** Undertake until 12 months after completion.

75-85-45 Lightning protection systems

System outline

110 Lightning protection system

- **Description:** The Contractor shall design, procure, install and commission a new lightning protection system.
- **System performance:** 75-85-45/210 Design of lightning protection systems.
- **System manufacturer:** A member of the Association of Technical Lightning and Access Specialists.
- **External LPS type:** Attached to the structure.
- **Internal LPS:** Required.
- **Air termination system:** Submit proposals.
- **Down conductors:**
  - **Type:** Submit proposals.
  - **Lateral connections:** Submit proposals.
- **Earth termination system:** 90-75-50/330 Earth rods.
- **Accessories:** Submit proposals.
- **Electrical identification:** 90-90-55/310 Electrical identification and notices generally.
- **Execution:** 75-85-45/630 Installing lightning protection systems;
  75-85-45/650 Installing test joints;
  75-85-45/660 Bonding;
  75-85-45/670 Dissimilar metals;
  and 75-85-45/680 Installing notices and labels.
- **System completion:** 75-85-45/820 Documentation.

System performance

210 Design of lightning protection systems

Used by: 75-85-45/110 Lightning protection system.

- **Design:** Complete the design of the lightning protection system.
- **Standards:** To BS EN 62305-1, BS EN 62305-2, BS EN 62305-3 and BS EN 62305-4.
- **Coverage of LPS:** External.
- **Requirement:** Submit proposals including detailed design drawings, technical information, calculations and manufacturers' literature.

Execution

630 Installing lightning protection systems

Used by: 75-85-45/110 Lightning protection system.

- **Installation:** In accordance with BS EN 62305-3.
- **Substructure:** When used as the earth terminal network measure its resistance to earth during the construction period.

- **Results:** Submit.

650 Installing test joints

Used by: 75-85-45/110 Lightning protection system.

- **Position:** Within earth rod inspection pit.
- **Labelling:** Provide a plate indicating the position, number and type of earth electrodes above each test point.

660 Bonding

Used by: 75-85-45/110 Lightning protection system.

- **Standards:** To BS EN 62305-3 and BS EN 62305-4.
- **Bond the following to the lightning protection system:** Antennae;
  Base of a down conductor to the main switchgear earthing terminal;
  Base of down conductor to base of vertical steelwork in lift shaft;
  Metal flue pipe;
  Shields of incoming services;
  and Vertical steelwork in lift shaft to structural steelwork of building at eaves and ground levels.
- **Bonding conductor sizes:** To BS EN 62305-4.
- **Location of bonds:** Contractor's choice.

670 Dissimilar metals

Used by: 75-85-45/110 Lightning protection system.

- **Connecting dissimilar metals:** Prevent electrolytic action.

680 Installing notices and labels

Used by: 75-85-45/110 Lightning protection system.

- **Position:** Contractor's choice.

System completion

820 Documentation

Used by: 75-85-45/110 Lightning protection system.

- **Inspection guide:**
  - **Submit including the following information:** The general status of the LPMS.
    Any deviation(s) from the technical documentation.
    The result of any measurements performed.
- **Record drawings:**
  - **Content:** General arrangement drawings showing the location of all air terminals, tapes, earth rods, plates and electrodes, test joints, and plates, route of protective bonding conductors from the lightning protection system to other services and to the main earthing terminal.
  - **Format:** A1 paper print drawing and electronic drawing.
  - **Number of copies:** Three.
- **Submittal date:** At handover.

90-10-20 Drainage and rainwater pipelines

Products

340 Brackets and clips for above ground drainage pipelines

Shared by: 50-10-00/120 Internal gravity rainwater drainage system; and 50-10-05/120 Above ground waste water drainage system with internal stacks.

90-10-65 Pipelines

Products

415 Steel pipelines

Used by: 55-85-20/110 Dry riser system.

- **General requirements:** 90-10-65/425 Steel pipeline jointing materials and 90-10-65/420 Steel pipeline fittings.
- **Manufacturer:** Contractor's choice.
- **Standard:**
  - **Up to 150mm:** To BS EN 10255, medium weight and To BS EN 10255, heavy weight.
- **Finish:** Manufacturer's standard.
- **Options:** Manufacturer's standard.
- **Execution:** 90-10-65/680 Installing steel pipelines and 90-10-65/685 Welding steel pipelines.

420 Steel pipeline fittings

Used by: 90-10-65/415 Steel pipelines.

- **Manufacturer:** Contractor's choice.
- **Standards:**
  - **Malleable:** To BS 143 and 1256.
  - **Flanged:** To BS EN 1092-1.
  - **Welded:** To BS EN 10253-1 and BS EN 10253-2.
  - **Wrought:** To BS EN 10241.
  - **Press fit fittings:**
  - **Mechanical couplings:** Manufacturer's standard.

425 Steel pipeline jointing materials

Used by: 90-10-65/415 Steel pipelines.

- **Manufacturer:** Contractor's choice.
- **Standards:**
  - **Jointing compound:** To BS 6956-5.
  - **PTFE tape:** To BS EN 751-3.
  - **Flange jointing rings:** To BS EN 1514-4.
  - **Elastomeric gaskets:** To BS EN 681-1.
  - **Welding rods:**

    Gas welding: To BS EN 12536.

    Arc welding: To BS EN ISO 636.

Execution

610 Pipelines installation generally

Used by: 90-10-65/680 Installing steel pipelines.

- **Standard:** Contractor's choice.
- **Dissimilar metals:** Prevent electrolytic corrosion.

615 Installing pipeline fittings

Used by: 90-10-65/680 Installing steel pipelines.

- **Bushes:** Use only at radiators.
- **Fabricated junctions and fittings:** Same material as the main pipeline.
- **Demountable joints:** Regularly spaced along pipeline runs and at items of equipment.

680 Installing steel pipelines

Used by: 90-10-65/415 Steel pipelines.

- **General requirements:** 90-10-65/690 Spacing of pipelines;
  90-10-65/615 Installing pipeline fittings;
  90-10-65/610 Pipelines installation generally;
  and 90-10-65/710 General inspection and testing.
- **Permanently concealed joints:** Welded.
- **Accessible joints:** Screwed, up to and including 50 mm;
  Press fit fittings;
  Mechanical grooved, 50–300 mm;
  and Welded and flanged, 65 mm and over.
- **Anchor:**
  - **Pipe restraints:** Carbon steel overstraps or heavy U-bolts welded to pipes.
  - **Method:** Two slip on flanges welded to pipes, bolted together through a carbon steel channel section.
- **Expansion loops:**

685 Welding steel pipelines

Used by: 90-10-65/415 Steel pipelines.

- **Standard:** In accordance with HVCA TR/5.
- **Welder identification:** Mark each weld to identify operative and Use weld mapping.
- **Non-destructive examination:** Visual examination, to BS EN ISO 17637.
- **Completed welds:** Wire brush and protect from corrosion.

690 Spacing of pipelines

Used by: 90-10-65/680 Installing steel pipelines.

- **Minimum clearance between insulated pipelines and:**
  - **Wall finish:** 25 mm.
  - **Ceiling finish or soffit:** 100 mm.
  - **Floor:** 150 mm.
  - **Electrical services:** 150 mm.
  - **Adjacent services:** 100 mm.
  - **Uninsulated pipeline:** 75 mm.
  - **Another insulated pipeline:** 25 mm.
- **Minimum clearance between uninsulated pipelines and:**
  - **Wall finish:** 25 mm.
  - **Ceiling finish or soffit:** 100 mm.

- **Floor:** 150 mm.
- **Electrical services:** 150 mm.
- **Adjacent services:** 150 mm.
- **Another uninsulated pipeline:** 25 mm.

710 General inspection and testing

Used by: 90-10-65/680 Installing steel pipelines.

- **Inspection of joints:**
  - **Joints:** Submit proposals.
  - **Number of joints:** Submit proposals.
- **Safety precautions:** In accordance with HSE GS 4.

90-10-70 Pumps and pressurisation units

Products

310 Pump selection

Used by: 90-10-70/390 Pressure booster sets.

- **General:** Select pump at or near the most efficient part of the performance curve for required duty.

320 Pumps generally

Used by: 90-10-70/390 Pressure booster sets.

- **General safety standard:** To BS EN 809.
- **Electrical safety:** To BS EN 60335-2-51.
- **Dynamic balance:** To BS ISO 21940-21.
- **Test standards:** To BS EN ISO 9906 and in accordance with BS EN ISO 5198.
- **Belts and pulleys:** To BS 3790.
- **Rotodynamic pumps:** To BS EN 16297-1 and BS EN 16644.
- **Connections:**
  - **Flanged, copper alloy and composite:** To BS EN 1092-3.
  - **Flanged, cast iron:** To BS EN 1092-2.
  - **Threaded:** To BS EN 10226-1.

390 Pressure booster sets

Used by: 55-40-40/130 Pumped cold water supply system.

- **General requirements:** 90-10-70/310 Pump selection and 90-10-70/320 Pumps generally.

90-35-95 Water fire fighting products

Products

345 Inlet breechings and boxes

Used by: 55-85-20/110 Dry riser system.

- **Manufacturer:** Submit proposals.
- **Standard:** To BS 5041-3.
- **Arrangement:** Two way.
- **Integral accessories:** Instantaneous inlet coupling, cap and chain, drain valve, non return valve.
- **Execution:** 90-35-95/640 Installing inlet breechings.

Execution

640 Installing inlet breechings

Used by: 90-35-95/345 Inlet breechings and boxes.

- **Position:** Within 18 m of, and within sight of, access road. Provide unrestricted access.
- **Length of connecting pipework between the inlet and the vertical run of the main riser:** Minimize.
- **Fall:** Towards the drain valve.
- **Inlet box mounting height:** Lower edge 400–600 mm above ground level.
- **Inlet boxes:** Identify using permanent signage.

90-45-20 Air terminal devices

Products

370 External louvres type C

- **Manufacturer:** Colt International Ltd.
- **Product reference:** AOV to Architects requirements
- **Execution:**

370 External louvres type D

- **Manufacturer:** Colt International Ltd.
- **Product reference:** MOV to Architectural requirements
- **Execution:**

Execution

610 Installing air terminal devices

Shared by: 90-45-20/395 Cooker and range hoods; 90-45-20/620 Installing circular and rectangular diffusers; 90-45-20/650 Installing grilles; and 90-45-20/675 Installing roof terminals.

- **General:** Do not distort air terminal devices. Fix securely.
- **Air leakage:** Prevent. Seal joints with self adhesive foam strip or equivalent.
- **Appearance:** Finish visible edge joints neatly. Do not leave sharp edges and protruding screws.
- **Operation:** Fit so that moving parts operate correctly and removable cores can be taken out and replaced.
- **High level and ceiling applications:** On removable cores, provide safety wires with quick release ends.

620 Installing circular and rectangular diffusers

Used by: 90-45-20/325 Domestic air diffusers and grilles.

- **General requirements:** 90-45-20/610 Installing air terminal devices.
- **Method:** Submit proposals.

650 Installing grilles

Shared by: 90-45-20/325 Domestic air diffusers and grilles; and 90-45-20/385 External wall grilles.

- **General requirements:** 90-45-20/610 Installing air terminal devices.
- **Method:** Submit proposals.

675 Installing roof terminals

Used by: 90-45-20/430 Roof slope terminals.

- **General requirements:** 90-45-20/610 Installing air terminal devices.
- **Ridge units:** Secure to ridge board or to fixing battens.
- **Slope units:** Form penetrations, seal and securely fix as recommended by manufacturer.
- **Connections:** Seal to terminations of duct.

90-45-25 Ductwork

Execution

655 Installing domestic rigid ductwork

Used by: 90-45-25/380 Domestic rigid ductwork and fittings.

- **Joints:** Seal to provide a robust airtight installation.
- **Support:** Do not distort ductwork or reduce cross-sectional area. Do not strain joints.
- **Falls:** Away from fans, dampers and other in-line accessories.
- **Sleeves:** Locate where ducts pass through building fabric. Bed solidly to the surrounding construction. Leave a gap of 10–20 mm between sleeve and duct and fill completely.
- **Condensate drainage:**
  - **Access:** Provide for cleaning.
  - **Outlet:** Submit proposals.

90-45-30 Fans

Execution

650 Installing domestic fan units

Used by: 90-45-30/420 Whole dwelling fan units.

- **Mounting:**
  - **Propeller ceiling sweep fans:** Blades should be at least 2.5 m from floor level, 750 mm from ceiling or roof, and 1–2 diameters away from walls and Check for any conflict with lighting installations.
  - **Fan units:** Contractor's choice.
  - **Multipoint and whole dwelling fan units:** Secure through anti-vibration mountings to 600 x 900 x 18 mm plywood base fixed to ceiling joists.
- **Fixings:**
  - **Propeller ceiling sweep fans:** Contractor's choice.

90-45-80 Smoke and heat exhaust products

Products

320 Standard active smoke barriers

Used by: 65-10-75/110 Smoke and heat exhaust ventilation system.

- **Manufacturer:** Submit proposals.
- **Standard:** To BS EN 12101-1.
- **Category:** As required by Building Control
- **Classification categories:** As required by Building Control
- **Material:** Submit proposals.
- **Execution:** 90-45-80/610 Installing smoke barriers.

Execution

610 Installing smoke barriers

Used by: 90-45-80/320 Standard active smoke barriers.

- **Standard:** In accordance with BS EN 12101-1.

90-50-45 Low voltage switchgear

Execution

665 Installing switchgear generally

Used by: 70-70-45/510 Custom built cubicle switchboards.

- **General requirements:** 90-50-45/675 Labelling switchgear.
- **Switchgear cubicles:** Arrange in modular form to facilitate future extension.
- **Clearance (minimum):**
  - **Front access switchgear:** 1000 mm in front of switchgear.
  - **Rear access switchgear:** 1000 mm in front of and behind switchgear.
- **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.
- **Interconnection of close coupled switchgear:**
  - **Cable type:** Copper busbar links.
  - **Containment:** Submit proposals.
- **Identification:**
  - **Neutral and earth bar terminals:** Label with the outgoing circuit reference.
  - **Cable terminations:** Label with circuit reference, with push-on plastics markers.

675 Labelling switchgear

Used by: 90-50-45/665 Installing switchgear generally.

- **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 Cables

Products

351 Thermosetting insulated 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:** Submit proposals.
- **Standard:** To BS 7211.
- **Third party certification:** British Approvals Service for Cables (BASEC) certified.
- **Rigid thermosetting insulated single core cables (LSZH singles, H07Z):**
  - **Construction:** To table 3a.
- **Thermosetting insulated and sheathed single core cables (LSZH/ LSZH singles):**
  - **Construction:** To table 5.
- **Thermosetting insulated and sheathed cables with circuit protective conductor (LSZH/ LSZH with CPC):**
  - **Construction:** To table 7.
- **Execution:** 90-55-15/635 Installing low voltage cables and 90-55-15/645 Low voltage cables concealed in walls and partitions.

Execution

635 Installing low voltage cables

Used by: 90-55-15/351 Thermosetting insulated cables.

- **Standard:** To 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.
- **Cable pulling:** Do not overstress. Prevent kinks and twisting of the cable.
- **Cables passing through walls:** Sleeve with conduit or pipeduct. Bush at both ends.
- **Cables surrounded or covered by insulation:** Derate.
- **Jointing and termination:**
  - **Final circuit cables:** At electrical accessories only.
- **Mechanical protection:** Provide anti vandal capping to surface run cables to 2 m above finished ground level.

645 Low voltage cables concealed in walls and partitions

Used by: 90-55-15/351 Thermosetting insulated cables.

- **Position:** In a zone within 150 mm of wall perimeter (except at the floor); and run vertically or horizontally from these zones, or from floor level, to switches, accessories, etc and At least 50 mm from the surface.
- **Protection:** Submit proposals.

90-65-50 Mechanical services controls, sensors and detectors

Products

450 Manual control switches

Used by: 65-10-75/110 Smoke and heat exhaust ventilation system.

- **Manufacturer:** Submit proposals.
- **Standard:** To BS EN 60947-5-1.
- **Operation:** Key operated switch.
- **Execution:** 90-65-50/605 Installing control components.

Execution

605 Installing control components

Used by: 90-65-50/450 Manual control switches.

- **Position:** Submit proposals.
- **Insulation:** Submit details of proposed insulation method where control components are on insulated pipelines.
- **Supports:** Do not strain components.
- **Access:** Adequate for operation and maintenance.

650 Installing sensors generally

Used by: 90-65-50/665 Installing humidity sensors.

- **Standard:** In accordance with BCIA Guide: Control sensor installation.
- **Screening:** Screen from direct sunlight.
- **Immersion:** Immerse the sensor adequately in the medium.
- **Immersion pockets:** Provide for pipe sensors. Fill with thermal conductive compound.
- **Cable:** Flexible. Allow sufficient spare cable to allow for removal of sensor.
- **Stratification:** Install more than one sensor or an averaging sensor if necessary.
- **Positions of sensors:** Contractor's choice.

665 Installing humidity sensors

Used by: 90-65-50/410 Humidity sensors.

- **General requirements:** 90-65-50/650 Installing sensors generally.
- **Room sensors:**
  - **Height:** 1.5 m above floor.
  - **Position:** Away from corners and doors;
    Away from heat sources and draughts;
    Away from direct solar radiation;
    Not on external walls;
    and In the area controlled.
- **Duct sensors:**
  - **Position:** Beyond the spray distance of humidifiers.

  - **Air velocity (maximum) at sensor:** 10 m/s.
- **Interconnection:** To central control panel.
- **Cable type:** 90-55-15/345 PVC insulated cables.
- **Cable containment:** 90-55-10/360 Flexible conduit.

90-70-95 Visual and audible displays and indicators

Products

310 Electronic sounders type A

Used by: 75-65-35/110 Fixed gas detection and alarm system type A.

- **Manufacturer:** Submit proposals.
- **Ingress protection (minimum):** To BS EN 60529, IP 44.
- **Colour:** Submit proposals.
- **Directional output at 1 m (minimum):** Submit proposals.
- **Flashing beacon:** Integral.
- **Mounting:** Recessed.
- **Power supply:** From detection and alarm system control panel.
- **Execution:** 90-70-95/610 Installing sounders type A.

320 Visual alarm signal devices type A

Used by: 75-65-35/110 Fixed gas detection and alarm system type A.

- **Manufacturer:** Submit proposals.
- **Ingress protection (minimum):** To BS EN 60529, IP 44.
- **Format:** LED and Xenon beacon.
- **Lens colour:** Manufacturer's standard.
- **Execution:** 90-70-95/620 Installing visual alarm signal devices type A.

Execution

610 Installing sounders type A

Used by: 90-70-95/310 Electronic sounders type A.

- **Position:** In control room.
- **Mounting height generally (above finished floor level):** Flush ceiling mounted

610 Installing sounders type B

Used by: 90-70-95/310 Electronic sounders type B.

- **Position:** In control room.
- **Mounting height generally (above finished floor level):** Flush ceiling mounted

620 Installing visual alarm signal devices type A

Used by: 90-70-95/320 Visual alarm signal devices type A.

- **Position:** In control room.
- **Mounting height generally (above finished floor level):** Flush ceiling mounted

620 Installing visual alarm signal devices type B

Used by: 90-70-95/320 Visual alarm signal devices type B.

- **Position:** In control room.
- **Mounting height generally (above finished floor level):** Flush ceiling mounted

90-75-45 Leak detection products

Products

310 Fixed gas detector control panels type A

Used by: 75-65-35/110 Fixed gas detection and alarm system type A.

- **Manufacturer:** Submit proposals.
- **Standards:** To BS EN 50270, BS EN 60079-0 and BS EN 60079-1.
- **Ingress protection (minimum):** To BS EN 60529, IP44.
- **Nominal voltage:** Manufacturer's standard.
- **Nominal frequency:** 50 Hz.
- **Controls:**
  - **Display:**

    Type: Integral backlit alphanumeric LCD display.

    Display the following information: Alarm status indicator and Power 'On' LED.

    Outputs: Manufacturer's standard.
- **Alarm outputs:**
  - **Sound pressure level (minimum):** 90 dB at 1m.
- **Mounting:** Submit proposals.

450 Gas detection and alarm detectors type A

Used by: 75-65-35/110 Fixed gas detection and alarm system type A.

- **Manufacturer:** Submit proposals.
- **Format:** Submit proposals.

90-90-55 Notices, identification and labels

Products

430 Identifying pipework

Shared by: 50-10-00/120 Internal gravity rainwater drainage system; 50-10-05/120 Above ground waste water drainage system with internal stacks; and 55-40-40/130 Pumped cold water supply system.

- **Standards:** To BS 1710.

480 Mechanical plant and equipment identification labels generally

Shared by: 50-10-05/120 Above ground waste water drainage system with internal stacks; 55-40-40/130 Pumped cold water supply system; 55-85-20/110 Dry riser system; and 65-10-75/110 Smoke and heat exhaust ventilation system.

- **Manufacturer:** Contractor's choice.
- **Material:** Submit proposals.
- **Label size:** Submit proposals.
- **Colour:**
  - **Background:** Submit proposals.
  - **Lettering:** Submit proposals.
- **Typography:**
  - **Font:** Submit proposals.
  - **Size:** Submit proposals.
- **Information to be included:** Submit proposals.
- **Execution:** 90-90-55/610 Installing plant and equipment identification generally.

Execution

610 Installing plant and equipment identification generally

Used by: 90-90-55/480 Mechanical plant and equipment identification labels generally.

- **Fixing:** Contractor's choice.
- **Position:** Contractor's choice.

90-90-60 Plant and equipment supports

Products

390 Services supports type A

Shared by: 55-40-40/130 Pumped cold water supply system; and 55-85-20/110 Dry riser system.

- **Manufacturer:** Submit proposals.
- **Support type:** Contractor's choice.

Contractor decision report

Contractor's choice		
Parent system	**Clause**	**Clause item**
Lightning protection system	75-85-45/660 Bonding	• Location of bonds
Above ground waste water drainage system with internal stacks	50-10-05/210 Design of above ground wastewater drainage systems	• System configuration - Configuration
Heating systems control and Water supply systems control	75-75-50/860 Documentation	• Cable schedules - Location • Cable schedules - Format • Cable schedules - Size • Cable schedules - Contents
Access control system	75-60-05/620 Installing access control systems	• Location of the access controller
Mechanical and whole building ventilation system	90-45-30/650 Installing domestic fan units	• Mounting - Fan units • Fixings - Propeller ceiling sweep fans
Lightning protection system	75-85-45/680 Installing notices and labels	• Position
Car park ventilation system and Pumped cold water supply system and Mechanical supply ventilation system and Indirect hot water storage supply system and Dry riser system and Smoke and heat exhaust ventilation system and Above ground waste water drainage system with internal stacks and Low temperature hot water heating system and Kitchen extract ventilation system	90-90-55/610 Installing plant and equipment identification generally	• Fixing • Position
Mechanical and whole building ventilation system	90-65-50/650 Installing sensors generally	• Positions of sensors
Smoke and heat exhaust ventilation system and Above ground waste water drainage system with internal stacks and Pumped cold water supply system and Dry riser system	90-90-55/480 Mechanical plant and equipment identification labels generally	• Manufacturer
Dry riser system and Low temperature hot water heating system	90-10-65/610 Pipelines installation generally	• Standard

Pumped cold water supply system and Dry riser system and Mechanical supply ventilation system and Low temperature hot water heating system	90-90-60/390 Services supports type A	• Support type
Dry riser system and Low temperature hot water heating system	90-10-65/420 Steel pipeline fittings	• Manufacturer
Dry riser system and Low temperature hot water heating system	90-10-65/425 Steel pipeline jointing materials	• Manufacturer
Low temperature hot water heating system and Dry riser system	90-10-65/415 Steel pipelines	• Manufacturer

Submit proposals

Parent system	Clause	Clause item
Above ground waste water drainage system with internal stacks	50-10-05/120 System Outline	• System manufacturer • Floor drainage - Floor channels and gullies • Floor drainage - Covers and gratings • Sanitary pipework - Small diameter branch discharge pipework - Pipelines and fittings • Sanitary pipework - Small diameter branch discharge pipework - Supports • Sanitary pipework - Large diameter branch discharge pipework - Pipelines and fittings • Sanitary pipework - Discharge stack pipework - Pipelines and fittings • Ventilating pipework - Ventilating branch pipework - Pipelines and fittings • Ventilating pipework - Ventilating stack pipework - Pipelines and fittings • Prefabricated branch and stack pipework - Pipelines and fittings • Overflow pipework - Pipelines and fittings
Amenity lighting system	70-80-25/220 Amenity lighting design	• Lighting class • Average power density energy consumption (maximum)

Amenity lighting system	70-80-25/120 System Outline	• System manufacturer • Luminaire supports - Type • Luminaire supports - Painting
Amenity lighting system	70-80-25/812 Commissioning	• Setting for control devices
Mechanical and whole building ventilation system	65-10-95/815 Commissioning of domestic ventilation systems	• Performance
Hard wired general lighting system	70-80-35/280 Conduit, trunking and ducting generally	• Requirement
Telecommunications system	75-45-85/620 Connection to the public telephone network	• Public telephone network
Low voltage distribution system	70-70-45/510 Custom built cubicle switchboards	• Manufacturer • Enclosure - Doors and panels - Swing • Full length internal copper earth bar
Water metering	75-75-05/210 Design	• Requirement
Above ground waste water drainage system with internal stacks	50-10-05/210 Design of above ground wastewater drainage systems	• System configuration - Form
Mechanical and whole building ventilation system	65-10-95/215 Design of domestic ventilation	• Ventilation rate (minimum) • Requirements
Emergency voice communication system	75-70-05/220 Design of emergency voice communication systems	• System designer • Requirement
Fire detection and alarm system	75-65-30/210 Design of fire detection and alarm systems	• System designer
Internal gravity rainwater drainage system	50-10-00/210 Design of gravity rainwater drainage system	• Design parameters - Available capacity of existing below ground drainage (maximum)
Low voltage distribution system	70-70-45/210 Design of low voltage distribution systems	• System designer • Requirement
Telecommunications system	75-45-85/210 Design of telecommunications systems	• Drawings, technical information, calculations and manufacturers' literature
Low temperature hot water underfloor heating	60-45-90/210 Design of underfloor heating and cooling systems	• Requirement
Telecommunications system	75-45-85/820 Documentation	• Cable schedules - Location • Cable schedules - Contents • Cabling topology schematics - Location • Cabling topology schematics - Format
Earthing and bonding system	70-70-25/820 Documentation	• Record drawings - Content
Water supply systems control	75-75-50/232 Domestic hot water non-storage calorifier control strategy	• Stratification pump
Dry riser system	55-85-20/110 System Outline	• System accessories

Earthing and bonding system	70-70-25/110 System Outline	• Main equipotential bonding - Connect the following to the main earthing terminal • Main equipotential bonding - Cable type • Supplementary equipotential bonding - Bond the following • Supplementary equipotential bonding - Cable type • Circuit protective conductors - Conductor type
Fixed gas detection and alarm system type A	90-70-95/310 Electronic sounders type A	• Manufacturer • Colour • Directional output at 1 m (minimum)
Emergency voice communication system	75-70-05/120 System Outline	• System manufacturer
Hard wired general lighting system	70-80-35/220 Escape route lighting	• Position
Fixed gas detection and alarm system type B	75-65-35/110 System Outline	• System manufacturer
Fixed gas detection and alarm system type A	75-65-35/110 System Outline	• System manufacturer
Fixed gas detection and alarm system type A	90-75-45/310 Fixed gas detector control panels type A	• Manufacturer • Mounting
Low temperature hot water underfloor heating	60-45-90/270 Floor construction	• Insulation • Screed
Fixed gas detection and alarm system type A	90-75-45/450 Gas detection and alarm detectors type A	• Manufacturer • Format
Low temperature hot water heating system and Dry riser system	90-10-65/710 General inspection and testing	• Inspection of joints - Joints • Inspection of joints - Number of joints
Hard wired low voltage small power system	70-70-75/110 System Outline	• Containment • Containment accessories

Heating systems control	75-75-50/120 System Outline	• Heating plant control strategies • Pumps - Equipment • Pumps - Primary pumps control strategies • Pumps - Secondary pumps control strategies • Pressurization system control strategies • Water distribution control strategies • Outlet control strategies • Additional functions • Equipment • Sensors
Dry riser system	90-35-95/345 Inlet breechings and boxes	• Manufacturer
Earthing and bonding system	70-70-25/810 Inspection and testing	• Earth fault loop impedance - Method
Fixed gas detection and alarm system type B	75-65-35/630 Installation generally type B	• Power supplies
Fixed gas detection and alarm system type A	75-65-35/630 Installation generally type A	• Power supplies
Television distribution system	75-45-90/620 Installing antennae	• Position
Television distribution system	75-45-90/630 Installing cabling	• Route
Mechanical and whole building ventilation system	90-45-20/620 Installing circular and rectangular diffusers	• Method
Smoke and heat exhaust ventilation system	90-65-50/605 Installing control components	• Position
Telecommunications system	75-45-85/660 Installing copper voice cabling	• Routes and arrangement • Cable binders - Type • External cabling
Mechanical and whole building ventilation system	90-45-25/655 Installing domestic rigid ductwork	• Condensate drainage - Outlet
Fixed gas detection and alarm system type A	75-65-35/650 Installing fixed gas detector control panels type A	• Position
Fixed gas detection and alarm system type B	75-65-35/650 Installing fixed gas detector control panels type B	• Position
Telecommunications system	75-45-85/665 Installing functional earth cabling	• Routes and arrangement
Fixed gas detection and alarm system type B	75-65-35/640 Installing gas leak detectors sensors type B	• Sampling line length
Fixed gas detection and alarm system type A	75-65-35/640 Installing gas leak detectors sensors type A	• Sampling line length
Hard wired general lighting system	70-80-35/630 Installing general lighting systems	• Luminaire layout
Mechanical and whole building ventilation system	90-45-20/650 Installing grilles	• Method

Earthing and bonding system	70-70-25/670 Installing main equipotential bonding conductors	• Bonding conductor routes
Low voltage distribution system	90-50-45/665 Installing switchgear generally	• Interconnection of close coupled switchgear - Containment
Telecommunications system	75-45-85/615 Installing telecommunications equipment and telecommunications cabling generally	• Labelling - Cables - Location • Labelling - Outlets - Type
Low temperature hot water underfloor heating	60-45-90/620 Installing underfloor systems	• Fixing of pipes - Timber suspended floors
Fixed gas detection and alarm system type A	75-65-35/230 Integration with other alarm systems type A	• Objectives
Fixed gas detection and alarm system type B	75-65-35/230 Integration with other alarm systems type B	• Objectives
Fixed gas detection and alarm system type B	75-65-35/240 Interfaces to equipment type B	• Equipment and mode of operation
Fixed gas detection and alarm system type A	75-65-35/240 Interfaces to equipment type A	• Equipment and mode of operation
Internal gravity rainwater drainage system	50-10-00/120 System Outline	• System manufacturer
Lightning protection system	75-85-45/110 System Outline	• Air termination system • Down conductors - Type • Down conductors - Lateral connections • Accessories
Low temperature hot water underfloor heating	60-45-90/110 System Outline	• System manufacturer
Hard wired low voltage small power system and Hard wired general lighting system	90-55-15/645 Low voltage cables concealed in walls and partitions	• Protection
Smoke and heat exhaust ventilation system	90-65-50/450 Manual control switches	• Manufacturer
Smoke and heat exhaust ventilation system and Above ground waste water drainage system with internal stacks and Pumped cold water supply system and Dry riser system	90-90-55/480 Mechanical plant and equipment identification labels generally	• Material • Label size • Colour - Background • Colour - Lettering • Typography - Font • Typography - Size • Information to be included
Low voltage distribution system	70-70-45/245 Performance of power factor correction equipment	• Capacitor bank size and number of stages
Pumped cold water supply system	55-40-40/130 System Outline	• Arrangement • Pumps • Pipelines - Above ground • Valves - Draining devices
Low voltage distribution system	70-70-45/220 Selection of conduit, trunking and ducting	• Requirement

Pumped cold water supply system and Dry riser system and Mechanical supply ventilation system and Low temperature hot water heating system	90-90-60/390 Services supports type A	• Manufacturer
Fixed gas detection and alarm system type B	75-65-35/840 Servicing and maintenance type B	• Requirement
Fixed gas detection and alarm system type A	75-65-35/840 Servicing and maintenance type A	• Requirement
Fixed gas detection and alarm system type A	75-65-35/830 Spares and consumables type A	• Supply the following consumables
Fixed gas detection and alarm system type B	75-65-35/830 Spares and consumables type B	• Supply the following consumables
Smoke and heat exhaust ventilation system	90-45-80/320 Standard active smoke barriers	• Manufacturer • Material
Low temperature hot water underfloor heating	60-45-90/250 System operating parameters	• Design flow temperature - Heating
Fire detection and alarm system	75-65-30/808 System soak testing	• Period
Telecommunications system	75-45-85/110 System Outline	• System manufacturer
Television distribution system	75-45-90/110 System Outline	• System manufacturer
Telecommunications system	75-45-85/810 Testing and inspection of telecommunications systems	• Testing and inspection agent
Internal gravity rainwater drainage system	50-10-00/810 Testing rainwater drainage generally	• Period of notice (minimum)
Low temperature hot water underfloor heating	60-45-90/230 Thermal insulation of building fabric - specified U-values	• Building fabric element • U-value (maximum) • Admittance
Hard wired low voltage small power system and Hard wired general lighting system	90-55-15/351 Thermosetting insulated cables	• Manufacturer
Emergency voice communication system	75-70-05/850 Verification certificate	• System verification agent
Fixed gas detection and alarm system type A	90-70-95/320 Visual alarm signal devices type A	• Manufacturer
Pumped cold water supply system and Incoming water supply	55-40-40/850 Water quality tests type A	• Samples - Sample points
Contractor's design		
Parent system	**Clause**	**Clause item**

Above ground waste water drainage system with internal stacks	50-10-05/120 System Outline	• Floor drainage - Preparation to existing floors • Floor drainage - Supports - Bedding • Floor drainage - Supports - Backfill • Floor drainage - Supports - Fixings • Sanitary pipework - Small diameter branch discharge pipework - Accessories for jointing • Sanitary pipework - Small diameter branch discharge pipework - Fixings • Sanitary pipework - Large diameter branch discharge pipework - Accessories for jointing • Sanitary pipework - Large diameter branch discharge pipework - Fixings • Sanitary pipework - Large diameter branch discharge pipework - Insulation • Sanitary pipework - Discharge stack pipework - Accessories for jointing • Sanitary pipework - Discharge stack pipework - Fixings • Sanitary pipework - Discharge stack pipework - Insulation • Ventilating pipework - Ventilating branch pipework - Accessories for jointing • Ventilating pipework - Ventilating branch pipework - Fixings • Ventilating pipework - Ventilating stack pipework - Accessories for jointing • Ventilating pipework - Ventilating stack pipework - Fixings • Prefabricated branch and stack pipework - Fixings • Prefabricated branch and stack pipework - Insulation • Overflow pipework - Accessories for jointing • Overflow pipework - Fixings • Fire stopping - Floor penetrations • Fire stopping - Wall penetrations • System accessories

Emergency voice communication system	75-70-05/120 System Outline	• Zones • Alarm indication • Cabling - Type • Containment
Fixed gas detection and alarm system type B	75-65-35/110 System Outline	• Cable type • Containment
Fixed gas detection and alarm system type A	75-65-35/110 System Outline	• Cable type • Containment
Incoming water supply	55-40-40/110 System Outline	• Volume flow rate
Internal gravity rainwater drainage system	50-10-00/120 System Outline	• Internal rainwater pipework - Supports - Fixings
Low temperature hot water underfloor heating	60-45-90/110 System Outline	• Controls - Controllers • Floor components
Low voltage distribution system	70-70-45/110 System Outline	• Connection to low voltage supply
Pumped cold water supply system	55-40-40/130 System Outline	• Pipeline accessories - Expansion devices • Valves - Float valves • Valves - Isolating valves • Valves - Check valves • Valves - Regulating valves • Vibration isolation • Water coolers

Manufacturer report

A Gold member of National Security Inspectorate1.		
Parent system	**Clause**	**Product reference**
-	75-60-05/110 Access control system	
A member of the Association of Technical Lightning and Access Specialists1.		
Parent system	**Clause**	**Product reference**
-	75-85-45/110 Lightning protection system	
Colt International Ltd.		
Parent system	**Clause**	**Product reference**
	90-45-20/370 External louvres type C	AOV to Architects requirements
	90-45-20/370 External louvres type D	MOV to Architectural requirements
LPCB LPS 10143LPCB certified.		
Parent system	**Clause**	**Product reference**
-	75-65-30/110 Fire detection and alarm system	

APPENDIX A
M&E Approved Manufacturer

ITEMS	MANUFACTURER	WEBSITE	CONTACT	E-MAIL	TELE/MOBILE
Grilles and Diffusers	Gilberts (Blackpool) Limited	www.gilbertsblackpool.com		info@gilbertsblackpool.com	01253 766911
	Trox UK	www.troxuk.co.uk		info@troxuk.co.uk	01842 754 545
	Schako Air Distribution	www.schako.co.uk	Richard Booth	richardbooth@schako.uk.com	07949 081 464
	dba Air Solutions Ltd	-	Alan Beal	alanbeal@dbaairsolutions.com	07836 286 288
Water Booster sets	Grundfos Pumps Limited	www.grundfos.com	Barry Groves	bgroves@grundfos.com	07976 517 155
	Armstrong pumps	www.armstrongpumps.com	Clive Donaldson	cdonaldson@armstrongpumps.com	07957 610 719
	WILO (UK) Ltd	www.wilo.co.uk			01283 523 0000
	Aqua Tech Pressmain	www.aquatechpressmain.co.uk	Rob Cracknell	rcc@aqpm.co.uk	07584 472 420
Valves	Hattersley Valves	www.hattersley.com			
	Oventrop UK Ltd	www.oventrop.co.uk	Chris Doherty	chrisdoherty@oventrop.co.uk	07899 793 537
Attenuators	Caise Acoustics Limited	www.caise.co.uk	Mike Dunkley	miked@caice.co.uk	07973 736 312
Inertia Bases	Caise Acoustics Limited	www.caise.co.uk	Mike Dunkley	miked@caice.co.uk	07973 736 312
Controls	Trend Controls System	www.trendcontrols.com/uk			01403 226 931
Over Door Heater	Thermoscreen Limited	www.thermoscreens.com/en		sales@thermoscreens.com	024 7638 4646
	Enviortec Ltd	www.envirotec.co.uk			01494 525 342
	Biddle Air Systems Ltd	www.biddle-air-co.uk	Ian Stirling	Ian.stirling@biddle-air.co.uk	07977 981 112
Water Conditioner	Hydrotec (UK) Limited	www.hydrotec.co.uk	Cheryl Louis-Taylor		07712 135 460

ITEMS	MANUFACTURER	WEBSITE	CONTACT	E-MAIL	TELE/MOBILE
Dirt & Air Seperation	Spirotech UK Ltd	www.spirotech.co.uk	Martin Wilkinson		0773 065 9290
	ENWA Water Treatment	www.enwa.co.uk		sales@enwa.co.uk	01530 830 354
Supply / Extract Fans / MVHR Units	NuAire Limited	www.nuairegroup.com	Andrew Nash	Andrew.nash@nuaire.co.uk	07767 298 244
	Vent Axia Ltd	www.vent-axia.com		sales@vent-axia.com	0844 856 0590
Kitchen Extract Fans	NuAire Limited	www.nuairegroup.com	Andrew Nash	Andrew.nash@nuaire.co.uk	07767 298 244
	Vent Axia Ltd	www.vent-axia.com		sales@vent-axia.com	0844 856 0590
Under-Floor Heating	WMS Underfloor Heating	www.wms-uk.com			
	Warmafloor (GB) Ltd	www.warmafloor.co.uk	Phil Beal	Philip.beal@btconnect.com	07808 205 362
Electric Boiler and Hot Water Storage Calorifiers	Heatrae Sadia	www.heatraesadia.com			0344 871 1535
Smoke Control Systems	COLT International Ltd	www.coltinfo.co.uk	Simon Bedford	simon.bedford@uk.coltgroup.com	07767 230410
	Novenco UK Ltd	www.novenco.co.uk	Arjan de Voogd	ajv@novencogroup.com	07794 462 391

APPENDIX B
Outline Equipment Schedules

List of Incoming Services (MEP)

Service	Approx. Total Duty	Comments
Water - Residential	2l/s	
Water – Retail	0.5l/s	
Fire Main	None – Dry riser only	
Foul and Surface Water	Refer to Civil Engineer	
Electrical - Residential	200amp LV Supply	
Electrical - Retail	100amp LV Supply	
Telecoms - Residential	Incoming BT	
Telecoms – Retail	Incoming BT	
Television	Terrestrial aerial and SKY Dish	

List of Equipment (Mechanical)

No.	Equipment	Approx. Duty (each)	Approx. Total Duty	Location/Area Served	Comments
6	Electic Boilers	6kW	Per apartment	Service Cupboard	6kW heating Element
6	MVHR (Whole House Ventilation)	n/a	105l/s max. (per apartment)	Service Cupboard	Sized for 4ACH Purge Vent
1	AOV (Automatic Opening Air Vent) Window				See Fire Engineers report
See Boiler	HWS Storage (elec)	180l	Per apartment	Service Cupboard	Packaged with Elec Boiler
1	Cold Water Booster Sets	600-1000l	Duty/standy pumps	Ground Floor Riser/Plantroom	Packaged Breaktank and Cold Water Booster Set
1	Water conditioners	2l/s	Electric Water Conditioner	Ground Floor Riser/Plantroom	
1	Active Carbon Filter	700l/s		Roof	Refer to planning condition 13

List of Equipment (Electrical)

No.	Equipment	Approx. Duty (each)	Approx. Total Duty	Location	Comments
1	Ryefield Panel		200amp	Ground Floor Electircal Intake Room	
7	Electrical Meters			Ground Floor Meter Cupboard	
1	Fire Alarm Panel			Ground Floor Lobby	

Mechanical, Electrical, Public Health Notes:

1. Any change to the equipment and incoming services listed shall be at the risk of the contractor and therefore at no extra cost to the contract.
2. All equipment listed is notionally sized prior to detailed design by contractor.
3. All equipment is taken from the Preferred Manufacturers list – See appendix 1.
4. Only large items of Equipment are listed, not all equipment required for the development is listed as it forms part of the design development by the contractor.
5. Where no number is given for items of plant this will be developed by the contractor to suit the final requirements of the development.
6. All Equipment shall be selected in compliance with the Acoustic Engineer, Fire Engineer and specialist specification/Report.

QODA Consulting

London Office

4th Floor, Rex House
4-12 Regent Street, London
SW1Y 4PE

Phone: 0207 394 2125

Oxfordshire Office

1 Ram Court, Wicklesham Lodge
Faringdon, Oxfordshire
SN7 7PN

Phone: 01367 245960

Birmingham Office

21-23 Birmingham Road,
Sutton Coldfield, Birmingham
B72 1QA

Phone: 0121 227 8570

Website: www.qodaconsulting.com
Email: enquiries@qodaconsulting.com