



Tower of London Education- The Reveller
Mechanical Workmanship and Materials Specification

P02

Specification Details

Client	Historic Royal Palaces
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Refurbishment of spaces at the Tower of London for educational purposes.

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Ss_50_30_04_97

Above-ground internal stack wastewater drainage systems

Systems

Ss_50_30_04_97 Above-ground internal stack wastewater drainage systems

1. **Description:** The foul drainage system serving the ground floor toilet areas, sinks and plant drainage connections shall be drained via gravity to the outflow connections located at ground floor as indicated on the above and below ground drainage drawings.

The above ground drainage system shall be installed in HDPE drain pipe.

Drainage pipework shall be fusion welded or clamped, as appropriate, in accordance with the manufacturer's instructions.

Each appliance shall be supplied with a trapped connection which shall be of the ventilating anti syphon type. All visible elements such as sanitary appliances and their associated drainage traps are specified by the architect.

Fan coil units are to be provided with 20mm diameter ABS plastic pipes, solvent welded, and shall connect to the SVP with a waterless trap.

Where required, condensate drains shall be pumped.

Access points, AAVs and rodding eyes shall be provided as required on the drain system to allow full access and rodding of the drains. All SVPs shall have an access point at the base of the drain and at top to allow full rodding of the SVP and associated below ground drain.

All pipework shall be concealed with maintenance/rodding access as per the requirements of BS EN 12056-2:2000.

All penetrations through slabs or fire compartments shall be provided with a fire collar around the drain pipe at the same rating as the fire compartment wall.

All drains to be sleeved at penetrations and shall be entirely sealed with acoustic sealant. Where drains rise through roofs the drain pipe shall be flashed to the roof to the Architects requirements and a roof cowl shall be provided.

All drains shall fall at the required rate and shall be supported with resilient hangers and supports to prevent noise transfer.

Waste traps serving sinks in kitchen areas, where noted, shall be supplied with dishwasher connection points suitable for connection flexible hoses.

Any unvented water heaters shall be provided with independent drainage connections to the nearest SVP for expansion relief and safety discharge in accordance with Approved Document Part G.

The drains shall be fully pressure tested and inspected to the requirements of Building Control.

The drainage system shall be fully compliant with the requirements for BS EN 12056-2:2000

2. **System manufacturer:** Geberit
3. **Floor drainage**
 - 3.1. **Floor channels and gullies:** [Pr_65_52_24_31 Floor gullies](#).
 - 3.2. **Covers and gratings:** [Pr_65_52_24_30 Floor gully covers and gratings](#).
 - 3.3. **Fixing:** As manufacturer's guidance

- 3.3.1.Bedding: Concrete.
- 3.3.2.Backfill: Concrete.
- 3.3.3.Securing: Stainless steel screws.
- 4. Sanitary pipework
 - 4.1. Small diameter branch discharge pipework
 - 4.1.1.Accessories for fixing: Stainless steel screws.
 - 4.1.2.Traps: [Pr_65_52_25_75 Sanitary appliance traps](#).
 - 4.1.3.Pipelines and fittings: Reference to missing clause Unplasticized polyvinyl chloride (PVC-U) drainage pipes and fittings type A. [Pr_65_52_03_52 Modified unplasticized polyvinyl chloride \(MUPVC\) above-ground wastewater pipes and fittings](#)
 - 4.1.4.Accessories for jointing: Solvent welding cement.
 - 4.1.5.Supports: [Pr_20_85_09_01 Above-ground drainage pipe brackets type A](#).
 - 4.2. Large diameter branch discharge pipework
 - 4.2.1.Accessories for fixing: Stainless steel screws.
 - 4.2.2.Pipelines and fittings: Unplasticized polyvinyl chloride (PVC-U) above ground drainage pipelines type B.
 - 4.2.3.Accessories for jointing: Solvent welding cement.
 - 4.2.4.Supports: [Pr_20_85_09_01 Above-ground drainage pipe brackets type A](#).
 - 4.3. Discharge stack pipework
 - 4.3.1.Accessories for fixing: Stainless steel screws.
 - 4.3.2.Pipelines and fittings: Reference to missing clause Unplasticized polyvinyl chloride (PVC-U) drainage pipes and fittings type A. High-density polyethylene (HDPE) above-ground drainage pipes and fittings Type A
 - 4.3.3.Accessories for jointing: Fusion Welding / Clamp connectors
 - 4.3.4.Supports: Brackets and clips for above ground drainage pipelines type B.
- 5. Overflow pipework
 - 5.1. Pipelines and fittings: [90-10-20/332 Copper above ground wastewater branch discharge pipelines](#). [Pr_65_52_03_02 Acrylonitrile butadiene styrene \(ABS\) above-ground wastewater pipes and fittings](#)
 - 5.2. Accessories for jointing: Soldered
 - 5.3. Supports: Brackets and clips for above ground drainage pipelines type C.
 - 5.4. Accessories for fixing: Stainless steel screws.
- 6. Pipework identification: [Pr_40_10_57_78 Self-adhesive colour pipe bands type A](#) and [Pr_40_10_57_51 Mechanical plant and equipment identification labels type C](#).
- 7. Fire-stopping
 - 7.1. Floor penetrations: Intumescent collars and [Pr_65_52_61_63 Pipe sleeves](#).
 - 7.2. Wall penetrations: Intumescent collars and Pipe sleeves type B.
- 8. System accessories: Access fittings;
[Pr_65_54_24_02 Air admittance valves](#);
[Pr_65_52_61_23 Discharge and ventilating stack terminations](#);
and [Pr_65_52_61_50 Masking plates](#).
- 9. Execution: [Ss_50_30_04/610 Installing above-ground wastewater drainage systems](#);
[Ss_50_30_04/612 Applying above-ground wastewater drainage internal pipework identification](#);
[Ss_50_30_04/614 Installing above-ground wastewater drainage discharge branch pipework](#);
[Ss_50_30_04/616 Installing above-ground wastewater drainage discharge stack pipework generally](#);
[Ss_50_30_04/620 Electrical continuity of above-ground wastewater drainage pipework](#);
and [Ss_50_30_04/622 Access to above-ground wastewater drainage systems for testing and maintenance](#).

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10. System completion: [Ss_50_30_04/820 Above-ground wastewater drainage system pipework airtightness test](#); [Ss_50_30_04/860 Operation and maintenance documentation](#)

Products

90-10-20/332 Copper above ground wastewater branch discharge pipelines

1. Manufacturer: Contractor's choice
2. Standard: To [BS EN 1057](#).
3. Grade: Half hard, R250 (up to and Including 42mm) and R290(>42mm).
4. Jointing type: Crimped fittings.
5. Dimensions:
 - 5.1. Outside diameter (nominal): As noted on the mechanical drawings. Generally 15mm to the tundish and 22mm from the tundish to drain.
6. Finish: Chrome-plated to [BS EN ISO 1456](#) for all exposed pipework and Plain for all concealed pipework.

Pr_20_85_09_01 Above-ground drainage pipe brackets type A

1. Manufacturer: Contractor's choice .
2. Pipe location: Internal.
3. Arrangement: Horizontal and Vertical.
4. Form: Anchor and guide brackets for low gradient internal pipes;
Hanging rail system;
Pipe clips;
and Stand off pipe clips.
5. Material: Brass;
Copper;
HDPE;
Plastics;
and Steel.
6. Finish: To match pipelines.
7. Fasteners: Coach screws.

Pr_40_10_57_51 Mechanical plant and equipment identification labels type C

Shared by: [Ss_65_40_33_51 Mechanical ventilation systems](#) and [Ss_60_60_70_94 Variable refrigerant flow systems](#)

1. Manufacturer: Contractor's choice
2. Material: Face engraved rigid plastic laminate.
3. Label size: Manufacturer's standard .
4. Colour
 - 4.1. Background: White.
 - 4.2. Lettering: Black.
5. Typography
 - 5.1. Font: Helvetica medium.
 - 5.2. Size: Manufacturer's standard .
6. Information to be included: Equipment name;
Equipment reference number;
and Service.

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7. Execution: [Pr_40_10_57/611 Installing mechanical plant and equipment identification.](#)

Pr_40_10_57_78 Self-adhesive colour pipe bands type A

Shared by: [Ss_55_70_38_20 Direct hot water storage supply systems](#)

1. Manufacturer: Contractor's choice
2. Standards: To [BS 1710](#).
3. Identification type: Adhesive colour bands.
4. Execution: [Pr_40_10_57/660 Installing identification on pipework.](#)

Pr_65_52_03_02 Acrylonitrile butadiene styrene (ABS) above-ground wastewater pipes and fittings

1. Description: Condensate drains serving mechanical plant
2. Manufacturer: Contractor's choice
3. Standard: To [BS EN 1455-1](#), application area code B.
4. Jointing type: Solvent-weld.
5. Nominal sizes: DN 32.
6. Colour: Grey. White where exposed to view.
7. Integral accessories: Access fittings.
8. Execution: [Pr_65_52_03/630 Fixing and jointing rainwater and above ground drainage pipes](#)

Pr_65_52_03_52 Modified unplasticized polyvinyl chloride (MUPVC) above-ground wastewater pipes and fittings

1. Description: Branch waste pipework to sanitary ware
2. Manufacturer: Contractor's choice
3. Material and standard: To [BS EN 1566-1](#), application area code B.
4. Jointing type: Solvent-weld.
5. Nominal sizes: DN 32. DN 40. DN 50.
6. Colour: White where exposed to view. Grey.
7. Integral accessories: Access fittings.
8. Execution: Reference to missing clause [Fixing and jointing rainwater and above ground drainage pipes Type B](#)

Pr_65_52_24_30 Floor gully covers and gratings

1. Manufacturer: As specified by the architect.
2. Cover type: Gratings.
3. Form: Flat.
4. Loading: Pedestrian.
5. Material: Stainless steel.
6. Outlet: Type and direction to suit pipelines.
7. Integral accessories: Strainer.
8. Execution: [Pr_65_52_24/620 Installing gullies.](#)

Pr_65_52_24_31 Floor gullies

1. Manufacturer: As specified by the architect
2. Floor finish: Stainless Steel

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3. Body
 - 3.1. Configuration: Manufacturer's standard .
 - 3.2. Material: Stainless steel.
 4. Outlet: Type and direction to suit pipelines.
 5. Integral accessories: Strainer.
 6. Execution: [Pr_65_52_24/620 Installing gullies](#).

Pr_65_52_25_75 Sanitary appliance traps

1. Manufacturer: Contractor's choice
2. Standard: To [BS EN 274-1](#), [BS EN 274-2](#) and [BS EN 274-3](#).
3. Third-party product certification: BSI Kitemark certified.
4. Trap: Anti-siphon bottle trap;
Shower trap;
Tubular P trap;
and Tubular S trap.
5. Jointing: Compression joint.
6. Material: Manufacturer's standard .
7. Colour: As branch discharge pipework.
8. Size: As branch discharge pipework.
9. Depth of water seal (minimum): Manufacturer's standard .
10. Integral accessories: Manufacturer's standard .

Pr_65_52_61_23 Discharge and ventilating stack terminations

1. Manufacturer: Contractor's choice .
2. Arrangement: Perforated cover or cage that does not restrict airflow.

Appearance to be approved by architect.
3. Material: To match drainage stack system.

Pr_65_52_61_50 Masking plates

1. Manufacturer: Contractor's choice .
2. Material
 - 2.1. All pipes except chromium-plated copper: Plastic.
 - 2.2. Chromium-plated copper pipes: Chromium plated.
3. Format: Split.

Pr_65_52_61_63 Pipe sleeves

1. Manufacturer: Hauff-Technik
2. Product reference: UFR Universal Wall Seal
3. Material: PVC-U

Pr_65_54_24_02 Air admittance valves

1. Manufacturer: Contractor's choice .
2. Standard: To [BS EN 12380](#).
3. Third-party certification: BBA Agrément certificate and BSI Kitemark certified.
4. Material: PVC-U.
5. Size: As noted on Drainage Drawings

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6. Jointing: Solvent weld.
 7. Minimum airflow rate: To [BS EN 12056-2](#).

Execution

Pr_40_10_57/611 Installing mechanical plant and equipment identification

1. Fixing: Fix with adhesive to equipment.
2. Position: On equipment.

Pr_40_10_57/660 Installing identification on pipework

1. Application of basic identification colour: Coloured bands as [BS 1710](#).
2. Information: Colour bands as [BS 1710](#).
3. Direction of flow: Indication arrow.

Pr_65_52_03/630 Fixing and jointing rainwater and above ground drainage pipes

1. Fixing
 - 1.1. Supports
 - 1.1.1. Stability: Fix securely.
 - 1.1.2. Fixing centres (nominal): 1.8 m.
 - 1.2. Pipework
 - 1.2.1. Alignment: Plumb and/ or true to line.
 - 1.2.2. Externally socketed pipes and fittings: Fix with socket ends forming inlet for each individual pipe.
2. Jointing
 - 2.1. Jointing differing pipework systems: Use adaptors intended for the purpose.
 - 2.2. Cut ends of pipes: Clean and square. Remove burrs and swarf. Chamfer ends of plastics pipes before inserting into ring seal sockets. Where metal pipes are to be used, recoat bare metal with appropriate primer and paint.
 - 2.3. Jointing or mating surfaces: Clean and, where necessary, use jointing lubricant immediately to allow safe and efficient jointing assembly.
 - 2.4. Unsealed joints: Wedge unsealed joints to cast pipes with timber or sheet lead cut-offs to centralize pipe joints and reduce rattling.
 - 2.5. Expansion joint pipe sockets: Fix rigidly to buildings. Elsewhere, provide brackets and fixings that allow pipes to slide.
 - 2.6. Solvent-welded pipelines: Install ring seal joints in all long runs of solvent-welded pipework, as movement joints.
3. Wall and floor penetrations: Penetrations through fabric to be sleeved and where applicable, suitably fire stopped.

Pr_65_52_24/620 Installing gullies

1. Alignment: Grating flush with finished floor.
2. Bedding
 - 2.1. Bedding: Concrete.

Ss_50_30_04/610 Installing above-ground wastewater drainage systems

1. Standards: To [BS EN 12056-2](#) and [BS EN 12056-5](#).
2. Collection and distribution of wastewater

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- 2.1. **General:** Quick, quiet and complete; self-cleansing in normal use, without blockage, crossflow, backfall, leakage, odours, noise nuisance or risk to health.
 - 2.2. **Pressure fluctuations in pipework (maximum):** ± 38 mm water gauge.
 - 2.3. **Water seal retained in traps (minimum):** 25 mm.
 3. **Pipelines:** Plumb and/ or true to line.
 - 3.1. **Routes**
 - 3.1.1. **Routes generally:** The shortest practical, with as few bends as possible.
 - 3.1.2. **Routes not shown on drawings:** Submit proposals .
 - 3.2. **Joining:** Joint with materials, fittings and techniques intended for the purpose and that will make effective and durable connections.
 4. **Allowance for thermal and building movement:** Provide and maintain clearance as fixing and jointing proceeds.
 5. **Concealed or inaccessible surfaces:** Decorate before starting work specified in clauses from this section.
 6. **Electrolytic corrosion:** Avoid contact between dissimilar metals where corrosion may occur.
 7. **Protection**
 - 7.1. **Purpose made temporary caps:** Fit to prevent ingress of debris.
 - 7.2. **Access covers, cleaning eyes and blanking plates:** Fit as the work proceeds.

Ss_50_30_04/612 Applying above-ground wastewater drainage internal pipework identification

1. **Standard:** To [BS 1710](#).
2. **Method:** Integral lettering on pipe wall, self-adhesive bands or identification clips.
3. **Form**
 - 3.1. **Wastewater system without recycling**
 - 3.1.1. **Definition:** All wastewater from sanitary appliances and sinks.
 - 3.1.2. **Direction of flow:** White arrow on black background.
 - 3.1.3. **Wording:** White lettering 'FOUL DRAINAGE' on a black background.
 - 3.2. **Blackwater in system with recycling**
 - 3.2.1. **Definition:** Containing faecal matter or urine.
 - 3.2.2. **Direction of flow:** White arrow on black background.
 - 3.2.3. **Wording:** White lettering 'FOUL DRAINAGE' on a black background.
 - 3.3. **Greywater in system with recycling**
 - 3.3.1. **Definition:** As defined in [BS EN 12056-1](#), clause 3.1.
 - 3.3.2. **Direction of flow:** Black arrow on light grey background.
 - 3.3.3. **Wording:** Black lettering 'GREYWATER' on a light grey background.

Ss_50_30_04/614 Installing above-ground wastewater drainage discharge branch pipework

1. **Pipework**
 - 1.1. **Alignment:** Fix securely plumb and/ or true to line.
 - 1.2. **Branches and low gradient sections:** Fix with uniform and adequate falls to drain efficiently.
 - 1.3. **Socketed pipes and fittings:** Fix with sockets facing upstream.
 - 1.4. **Additional supports:** Provide as necessary to support junctions and changes in direction.
2. **Wall and floor penetrations**
 - 2.1. **Isolating pipework:** Isolate pipework from structure, e.g. with pipe sleeves.

2.2. Masking plates: Fix at penetrations if visible in the finished work.

Ss_50_30_04/616 Installing above-ground wastewater drainage discharge stack pipework generally

1. Pipework
 - 1.1. Alignment: Fix securely plumb and true to line.
 - 1.2. Externally socketed pipes and fittings: Fix with sockets facing upstream.
 - 1.3. Vertical pipes: Provide a loadbearing support not less than every storey level. Locate at or close below socket collar or coupling. Tighten fixings as work proceeds so that every storey is self-supporting.
 - 1.4. Additional supports: Provide as necessary to support junctions and changes in direction.
2. Wall and floor penetrations
 - 2.1. Isolating pipework: Isolate pipework from structure, e.g. with pipe sleeves.
 - 2.2. Masking plates: Fix at penetrations if visible in the finished work.
3. Expansion joint sockets: Fix rigidly to the building.
4. Fixings: Allow the pipe to slide.

Ss_50_30_04/620 Electrical continuity of above-ground wastewater drainage pipework

1. Joints in metal pipes with flexible couplings: Make with clips (or suitable standard pipe couplings) supplied for earth bonding by pipework manufacturer to ensure electrical continuity.

Ss_50_30_04/622 Access to above-ground wastewater drainage systems for testing and maintenance

1. General: Install pipework with adequate clearance to permit testing, cleaning and maintenance, including painting where necessary.
2. Access fittings and rodding eyes: Position to avoid obstruction.

System completion

Ss_50_30_04/820 Above-ground wastewater drainage system pipework airtightness test

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

Ss_50_30_04/860 Operation and maintenance documentation

1. Operating and maintenance instructions
 - 1.1. Scope: Submit for the system, giving optimum settings for controls.
 - 1.2. Product information: Include product description, date of purchase, performance characteristics, application (suitability for use), method of operation and control, and cleaning and maintenance requirements.
 - 1.3. Format: Paper copy. USB Memory Stick
 - 1.4. Number of copies: Two
2. Record drawings

- 2.1. **Content:** Location, size and route of above-ground services.
 - 2.2. **Format:** PDF format. A1 paper print.
 - 2.3. **Number of copies:** Two.
 - 3. **Submittal date:** Draft set for approval 4 weeks prior to handover. Final set at handover.
- Ω End of System

Ss_55_70_38_20

Direct hot water storage supply systems

Systems

Ss_55_70_38_20 Direct hot water storage supply systems

1. **Description:** Hot water shall be supplied by 2No types of water heater as described below:

The main WC area shall be served by a heat pump hot water cylinder located in the plant cupboard accessed from the community room.

The hot water calorifiers shall be a packaged unit, and shall consist of a integrated air to water heat pump supplying an indirect coil as well as integral electric immersion heaters for boost heating.

A hot water return loop shall be provided to limit system dead legs and ensure the quick delivery of hot water to all outlets within the WC area.

A DHWS return pump shall supply the calorifier and again commissioning sets will allow the commissioning engineer to balance the return. The DHWS return pump shall be fully suitable for potable water, shall be inverter speed controlled and shall be set to ramp up and down to achieve a 55 deg C return temperature.

A full DHWS return system shall be installed with dead legs limited to 2m.

The calorifiers will be supplied with feet, PTRV, AVV, temperature and altitude gauges. The calorifier shall be fully insulated and clad by the manufacturer.

The calorifier shall be manufactured entirely to the requirements of BS 853.

The sink areas in the office, quiet and community rooms, the cleaners store and moat arches shall be served by individual unvented electric storage water heaters located beneath each sink.

The WC areas in the moat arches shall be served by individual instantaneous electric water heaters.

The hot water heaters shall be supplied with factory fitted temperature and pressure relief valves and externally adjustable thermostat which shall be lockable.

The hot water system shall be piped in stainless steel or copper. The pipework shall be distributed in the ceiling voids. The isolation and pressure reducing valves will be positioned sympathetically away from front of house ceilings and shall be fully accessible.

Access doors and hatches shall be provided where required to allow access to valves etc. The contractor shall be responsible for positioning the hatch and carrying out the necessary coordination. The specific access hatch types will be agreed with the Architect before installation.

Flow limiting devices at each appliance shall ensure the correct flowrate is delivered at all times.

The DHWS return pump, calorifier temperature sensors shall be motored and controlled by the BMS.

All pipework shall be coordinated and installed to ensure it is entirely hidden from view. Where necessary boxings will be provided but the water installation must be coordinated and installed to minimise the size and number of the boxings.

Where exposed pipework is unavoidable by other means and only in back of house areas,

exposed pipework shall be installed in chrome plated or stainless steel pipe. Brackets supports and fittings shall be either chrome plated or stainless steel to match.

All internal pipework shall be fully insulated to the requirements of BS 5422:2009. The valves and uninsulated items of plant shall have removable valve bags with the same insulation value as the pipe insulation. This shall include valves located in ceiling voids, boxings etc.

The installation shall be fully compliant with the requirements of the Local Water Byelaws, Water Regulations Guide, BS EN 806-2: 2005 Part 2 and BS 8558:2011.

The water installation shall be fully sterilised to the requirements of BS6700 and BS EN 13280 2001.

All water installations shall comply with the requirements of HSE ACoP L8.

The LTHW heating pipework shall be installed to provide offsets to allow natural expansion and avoid the requirement for expansion bellows etc.

A Watguard Series 7 leak detection system shall be installed underneath all associated pipework and linked to the leak detection panel in the plantroom. This shall alert the BMS.

2. Storage unit: [Pr_60_60_96_37 Heat pump water heaters](#); [Pr_60_60_96_28 Electric storage water heaters](#)
3. Electric immersion heater: Reference to missing clause Immersion heaters
4. System: Unvented.
5. Capacity: 300 litre, 10 litre and Instantaneous
6. Pumps: [Pr_65_53_86_11 Canned rotor pumps](#)
7. Pipework: [Pr_65_52_63_17 Copper pipes](#); [Pr_65_52_63_18 Copper pipe fittings](#)
8. Pipe accessories
 - 8.1. Accessories: [Pr_65_52_61_91 Tundishes](#); [Pr_65_52_61_63 Pipe sleeves](#)
 - 8.2. Pipe supports: [Pr_20_29_14_65 Pipe clips](#)
9. Valves
 - 9.1. Isolating valves: [Pr_65_54_95_06 Ball valves](#)
 - 9.2. Check valves: [Pr_65_54_95_14 Copper alloy check valves](#)
 - 9.3. Regulating valves: [Pr_65_54_95_26 Double regulating valves](#)
 - 9.4. Mixing valves: Reference to missing clause Thermostatic mixing valves Type A
 - 9.5. Draining devices: [Pr_65_54_95_27 Draining taps Type A](#)
 - 9.6. Accessories: [Pr_65_54_93_87 Test points type A](#)
10. Fire-stopping: Individual services penetrations fire-stopping systems.
11. Thermal insulation
 - 11.1. Pipework: [Pr_80_77_76_54 Mineral wool pipe section insulation Type A](#); [Pr_80_77_76_62 Phenolic foam insulation type B](#)
 - 11.2. Cylinders: [Pr_80_77_76_62 Phenolic foam insulation type B](#)
12. Vibration isolation: [Pr_80_77_94_74 Rubber bellows](#)
13. Outlets: Reference to missing clause Janitorial sinks; Reference to missing clause Washbasin thermostatic water supply sets; Reference to missing clause Sink taps
14. Controls: Reference to missing clause Water supply control systems
15. Plant and equipment identification: [Pr_40_10_57_78 Self-adhesive colour pipe bands type A](#)
16. Execution: [Ss_55_70_38/620 Installing hot and cold water systems generally](#); [Ss_55_70_38/650 Hydraulic pressure testing of hot and cold water supply systems](#); [Ss_55_70_38/660 Flushing hot and cold water systems](#); [Ss_55_70_38/670 Disinfection of hot and cold water systems](#); [Ss_55_70_38/630 Installing unvented hot water storage discharge pipes](#)

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17. System completion: [Ss_55_70_38/810 Commissioning of hot and cold water supply systems](#);
[Ss_55_70_38/820 Inspection and test records](#); [Ss_55_70_38/850 Water quality tests](#)

Products

90-90-95/310 Mountings generally

Shared by: [Pr_80_77_94_42 Isolation hangers type B](#)

1. Criteria: Ensure that vibration generated by the engineering services is not transmitted to pipework, ductwork, the building and supporting structure.
2. Overload capacity (minimum): 50%.
3. Colour code: Identify for load and deflection rating.
4. Marking: Label with load capacity.

Pr_20_29_14_65 Pipe clips

1. Description: Domestic water pipe supports
2. Manufacturer: Contractor's choice
3. Clip type: Insulated. Two-piece.
4. Material: Aluminium. Brass. Bronze.
5. Lining: EDPM
6. Execution: [Pr_20_29_14/620 Installing pipe supports](#)

See [Pr_40_10_57_78 Self-adhesive colour pipe bands type A](#) in [Ss_50_30_04_97 Above-ground internal stack wastewater drainage systems](#)

Pr_60_60_96_28 Electric storage water heaters

1. Description: Electric water heaters serving sink positions
2. Manufacturer: [Zip Water](#)
3. Contact details
 - 3.1. Address: Trafalgar House
Rash's Green
Dereham
Norfolk
NR19 1JG
 - 3.2. Telephone: [+44 \(0\)345 6 005 005](#)
 - 3.3. Web: <https://specify.zipwater.co.uk/>
 - 3.4. Email: lewis.brown@zipwater.co.uk
4. Product reference: [Unvented Water Heaters \(Aquapoint AP3/10/OB\)](#)
5. Third party certification: WRAS-approved.
6. Arrangement: Single or multiple outlets.
7. Capacity: 5 L.
8. Rating: 2kW at 230 V.
9. Casing finish: Impact resistant white plastic.
10. Controls: Adjustable thermostat.
11. Electrical: To be wired to a double pole switched fused spur with a minimum break capacity of 13 amps. Installation must comply with current IEE regulations. Supplied with one metre of pre-wired cable.
12. Mounting: Under sink
13. Dimensions: 350 x 265 x 480 mm.

Pr_60_60_96_37 Heat pump water heaters

1. Description: Heat pump hot water cylinder serving WC area
2. Manufacturer: Modutherm
3. Standards
 - 3.1. Safety and environmental: To [BS EN 378-1](#) and [BS EN 378-2](#).
 - 3.2. Performance testing: To [BS ISO 19967-1](#).
 - 3.3. Electrical safety: To [BS EN 60335-2-40](#).
4. Type of heat pump: Air source.
5. Capacity: 300 litre
6. Coefficient of performance (minimum): 4
7. Accessories: Immersion heater.

Pr_65_52_61_63 Pipe sleeves

1. Description: Where piped services pass through walls
2. Manufacturer: Contractor's choice
3. Material: Metal or Plastic

Pr_65_52_61_91 Tundishes

1. Description: Safety discharges serving water heaters
2. Manufacturer: Contractor's choice
3. Material: Copper sheet.
4. Connections: Diameter to suit drain line.

Pr_65_52_63_17 Copper pipes

1. Description: Domestic Water Pipework
2. Manufacturer: Contractor's choice
3. Standard: To [BS EN 1057](#).
4. Grade: R250.
5. Finish: Plain. Chrome-plated to [BS EN ISO 1456](#).
6. Pipe ends: Square, plain.
7. Execution: [Pr_65_52_63/630 Installing copper pipework](#)

Pr_65_52_63_18 Copper pipe fittings

1. Description: Domestic Water Pipework
2. Manufacturer: Contractor's choice
3. Standards
 - 3.1. Capillary: To [BS EN 1254-1](#), end feed.
 - 3.2. Compression: To [BS EN 1254-2](#), Type A.
 - 3.3. Press fittings: To [BS EN 1254-7](#)

Pr_65_53_86_11 Canned rotor pumps

1. Description: Domestic Hot Water Return pump
2. Manufacturer: Lowara
3. Arrangement: Single.
4. Material

- 4.1. Impeller: Bronze.
- 4.2. Housing: Bronze.
- 5. Duties
 - 5.1. Operation: Duty.
 - 5.2. Flow rate: Refer to Mechanical Schedules
 - 5.3. Resistance: Refer to Mechanical Schedules
 - 5.4. Motor
 - 5.4.1. Nominal voltage: Single phase 230 V a.c.
 - 5.4.2. Frequency: 50 Hz.
- 6. Speed control: Variable.
- 7. Connections: Threaded.
- 8. Accessories: Positive closure non-return device.
- 9. Execution: [Pr_65_53_86/610 Installation of pumps generally](#)

Pr_65_54_93_87 Test points type A

- 1. Manufacturer: Contractor's choice .
- 2. Arrangement: Self sealing.
- 3. Material: Manufacturer's standard .
- 4. Connections: 6 mm (¼ inch) standard length.

Pr_65_54_95_06 Ball valves

- 1. Description: Isolation valves generally
- 2. Manufacturer: [Crane Fluid Systems](#)
- 3. Contact details
 - 3.1. Address: Crane House
Epsilon Terrace
West Road
Ipswich
Suffolk
IP3 9FJ
 - 3.2. Telephone: [+44 \(0\)1473 277300](tel:+44(0)1473277300)
 - 3.3. Web: <https://www.cranefs.com>
 - 3.4. Email: enquiries@cranefs.com
- 4. Product reference: [D171A Ball Valve \(D171A DN25\)](#)
- 5. Material: DZR Brass; Steel; PVC; EPDM; Aluminium.
- 6. Connections:
- 7. Finish: Hex-Nut (steel plated); Lever (Steel Dacromet Plated); Sleeve (maroon PVC); Ball (chrome plated); Extension stern outer (aluminium); Extension stern inner (steel plated).
- 8. Standards: BS EN 12164; BS EN 12165; to BS EN 10226-2 (ISO 7-1).
- 9. Third-party certification: WRAS approved.
- 10. Inlets/outlets diameter: DN15. DN25. DN32
- 11. Dimensions: 80.5 x 116 mm.
- 12. Weight: 0.511 kg.
- 13. Operator: Lever.
- 14. PressureRange: Temperature: -10 to +100°C: 25 bar, Temperature: +120°C: 21.8 bar.
- 15. Execution:

Pr_65_54_95_14 Copper alloy check valves

1. Description: Domestic water check valves
2. Manufacturer: Contractor's choice
3. Standard: To [BS 5154](#).
4. Lift type
 - 4.1. Design: Piston.
 - 4.2. Body pattern: Straight.
5. Swing type: Horizontal.
6. Material: Copper alloy.
7. Connections: Compression to [BS EN 1254-2](#).
8. Execution: [Pr_65_54_95/610 Installation of valves generally](#)

Pr_65_54_95_26 Double regulating valves

1. Description: Hot water return balancing valve
2. Manufacturer: [Crane Fluid Systems](#)
3. Contact details
 - 3.1. Address: Crane House
Epsilon Terrace
West Road
Ipswich
Suffolk
IP3 9FJ
 - 3.2. Telephone: [+44 \(0\)1473 277300](tel:+44(0)1473277300)
 - 3.3. Web: <https://www.cranefs.com>
 - 3.4. Email: enquiries@cranefs.com
4. Product reference: [D931 Fixed Orifice Double Regulating Valve \(DN15 \)](#)
5. Standard: To BS 7350:1990, BS EN 10226-2 (ISO 7-1), BS 2779 (ISO 228) and BS EN 1254/2.
6. Arrangement: Globe.
7. Material: Bronze BS EN 1982 CC491K, DZR Copper Alloy BS EN 12164/5 CW602N, EPDM Rubber and Plastic.
8. Connections: Compression to BS EN 1254-2.
9. Inlets/outlets diameter: 15 mm.
10. Dimensions: 87 x 105 mm.
11. Weight: 0.61 kg.
12. Approvals: Water Regulations Advisory Scheme (WRAS).
13. PressureRange: Temperature (Threaded): -10 to +100°C: 25 bar, Temperature (Threaded): +110°C: 23.4 bar, Temperature (Threaded): 120°C: 21.8 bar. Temperature (Compression): -10 to +30°C:16 bar, Temperature (Compression): +65°C: 10 bar, Temperature (Compression): +120°C: 5 bar. WRAS approved -10 to +85°C.
14. Flow capacity: 1.87 Kv and 2.2 Kvs.
15. Execution: [Pr_65_54_95/610 Installation of valves generally](#)

Pr_65_54_95_27 Draining taps Type A

1. Description: Drain cocks situated at low level and adjacent to appliances
2. Manufacturer: [Crane Fluid Systems](#)
3. Contact details

- 3.1. Address: Crane House
Epsilon Terrace
West Road
Ipswich
Suffolk
IP3 9FJ
- 3.2. Telephone: +44 (0)1473 277300
- 3.3. Web: <https://www.cranefs.com>
- 3.4. Email: enquiries@cranefs.com
4. Product reference: D340 Drain Taps (DN15)
5. Standard: To BS EN 10226-2, BS EN 12165, BS EN 12164 and BS 2879.
6. Size: DN15.
7. Arrangement: Type 2.
8. Material: DZR Brass BS EN 12165 CW602N, Brass BS EN 12164 CW614N, EP80 (EPDM-WRAS Approved) and EP70 (EPDM-WRAS Approved).
9. Connections: Threaded joints to BS EN 10226-2 (taper).
10. Length: 53.5 mm.
11. Weight: 0.13 kg.
12. OperationTemperatureRange: 0 to +110°C.
13. Pressure: 16 BAR.
14. Operator: Lockshield.
15. Approvals: WRAS approved.
16. Execution:

Pr_80_77_76_54 Mineral wool pipe section insulation Type A

1. Description: Domestic water pipework insulation
2. Manufacturer: [ROCKWOOL Ltd](#)
3. Contact details
 - 3.1. Address: ROCKWOOL Ltd
Wern Tarw
Pencoed
Bridgend
United Kingdom
CF35 6NY
 - 3.2. Telephone: +44 (0)1656 862621
 - 3.3. Web: <https://www.rockwool.com/uk/>
 - 3.4. Email: customersupportcentre@rockwool.com
4. Product reference: [RockLap H&V Pipe Section \(30 mm\)](#)
5. Standard: To BS EN 14303, ISO 14001.
6. Thermal conductivity: 0.033–0.034 W/m·K.
7. Finish: Aluminium foil faced.
8. Reaction to fire classification: A2-s1,d0.
9. Insulation thickness (minimum): 30 mm.
10. Execution: Installing foil faced mineral wool insulation on pipelines.
11. Specific heat: 0.84 kJ/kg·K (nominal) at 20°C.
12. Density: 120 kg/m³.
13. Length: 1000 mm.

14. Execution: [Pr_80_77_76/625 Installing foil-faced mineral wool insulation on pipelines](#)

15. Verification

Pr_80_77_76_62 Phenolic foam insulation type B

Shared by: [Ss_65_40_33_51 Mechanical ventilation systems](#)

1. Manufacturer: Isover
2. Product reference: Glasswool & ULTIMATE faced sections
3. Standard: To [BS EN 13166](#).
4. Form: Duct slab. Duct wrap.
5. Thermal conductivity: 0.018 W/m·K at 0°C.
0.018 W/m·K at 10°C.
0.023 W/m·K at 50°C.
0.025 W/m·K at 75°C.
6. Finish: Aluminium.
7. Insulation thickness (minimum): To [BS 5422](#).
8. Items to be insulated:
9. Execution: [Pr_80_77_76/640 Installing phenolic foam insulation on pipelines](#) and
[Pr_80_77_76/755 Installing at non-loadbearing pipelines supports](#).

Pr_80_77_94_74 Rubber bellows

1. General requirements: [90-90-95/310 Mountings generally](#) .
2. Manufacturer: Contractor's choice .
3. Rubber bellows type: Tied. Untied.
4. Connections: Malleable iron unions.
5. Execution: [Pr_80_77_94/620 Installation of flexible hoses and rubber bellows](#).

Execution

Pr_20_29_14/620 Installing pipe supports

1. Position
 - 1.1. In plant rooms: Pipe clip, sling rod, washer and nuts.
 - 1.2. Distribution corridors and risers: Pipe clip, sling rod, washer and nuts.

See [Pr_40_10_57/660 Installing identification on pipework](#) in [Ss_50_30_04_97 Above-ground internal stack wastewater drainage systems](#)

Pr_65_52_63/610 Pipework installation generally

1. Standard: [BESA Technical Report TR/20/4 Hot water service](#). [BESA Technical Report TR/20/5 Cold water service](#).
2. Dissimilar metals: Prevent electrolytic corrosion.

Pr_65_52_63/615 Installing pipe fittings

1. Fabricated junctions and fittings: Same material as main pipework
2. Demountable joints: At connections to equipment
3. Mechanical couplings: At connections to equipment

Pr_65_52_63/630 Installing copper pipework

1. General requirements: [Pr_65_52_63/610 Pipework installation generally](#); [Pr_65_52_63/615 Installing pipe fittings](#); [Pr_65_52_63/690 Spacing of pipework](#); [Pr_65_52_63/710 General inspection and testing](#)
2. Standard: In accordance with [CDA publication 88 Copper tube in buildings](#).
3. Jointing method
 - 3.1. Permanently concealed joints:
 - Capillary, up to 67 mm for pressure up to 600 kPa and 110°C.
 - Press-fit.
 - 3.2. Accessible joints:
 - Capillary, up to 67 mm for pressure up to 600 kPa and 110°C.
 - Press-fit.

Pr_65_52_63/690 Spacing of pipework

1. Minimum clearance between insulated pipework and
 - 1.1. Wall finish: 25mm
 - 1.2. Ceiling finish or soffit: 50mm
 - 1.3. Floor: 150mm
 - 1.4. Electrical services: 150mm
 - 1.5. Adjacent services: 100mm
 - 1.6. Uninsulated pipework: 75mm
 - 1.7. Adjacent insulated pipework: 25mm
2. Minimum clearance between uninsulated pipework and
 - 2.1. Wall finish: 25mm
 - 2.2. Ceiling finish or soffit: 50mm
 - 2.3. Floor: 150mm
 - 2.4. Electrical services: 150mm
 - 2.5. Adjacent services: 100mm
 - 2.6. Adjacent uninsulated pipework: 25mm

Pr_65_52_63/710 General inspection and testing

1. Inspection of joints
 - 1.1. Joints: Before pressure testing a number of fittings should be cut out to check the quality of the joints. 2–4 joints should be examined.
 - 1.2. Number of joints: Two.
2. Safety precautions: In accordance with [HSE Guidance Notes: General Series \(GS\) GS 4](#).

Pr_65_53_86/610 Installation of pumps generally

1. Pipeline connections: Arrange to prevent transmission of pipeline forces to pump casing.
2. Pressure gauge tappings: Provide in flow and return pipeline connections and in common suction and delivery pipeline.
3. Brackets: Support pipeline mounted pumps on purpose made brackets lined with vibration absorbent material.
4. Alignment: Align and balance to minimize vibration.
5. Belt tension: Correctly tension drive belts.
6. Access: Provide adequate space for service and maintenance.

7. Identification plate

7.1. Format: Engraved

7.2. Details: Pump reference, Pump duty

Pr_65_54_95/610 Installation of valves generally

Shared by: [Pr_65_54_95_94 Verifiable backflow prevention devices](#) , [Pr_65_54_95_20 Copper alloy underground stop valves](#) , [Pr_65_54_95_19 Copper alloy stop valves](#) and [Pr_65_54_95_18 Copper alloy service stop valves](#)

1. Installation: In accordance with [BS 6683](#).
2. Position: As detailed on mechanical drawings and schematics
3. Isolation and regulation valves: Provide at equipment and on sub-circuits.
4. Access: Locate valves so they can be readily operated and maintained. Locate next to equipment which is to be isolated.
5. Connection to pipework: Fit with joints that suit the pipe material.

Pr_80_77_76/610 Installing insulation and protection products generally

Shared by: [Pr_80_77_76_53 Mineral wool duct slab insulation](#)

1. Standard: In accordance with [BS 5970](#).
2. Timing: Insulate after installed system has been fully tested and joints proved sound.
3. Insulation: Do not enclose adjacent units together.
4. Clearance: Maintain between pipes.
5. Finish: Neatly finish joints, corners, edges and overlaps.

Pr_80_77_76/625 Installing foil-faced mineral wool insulation on pipelines

1. Joints: To BS5970
2. At fittings: To BS5970
3. Vapour seal: To BS5970

Pr_80_77_76/640 Installing phenolic foam insulation on pipelines

1. General requirements: [Pr_80_77_76/610 Installing insulation and protection products generally](#) .
2. Joints: Close butt, seal with 50 mm wide class 0 tape on both longitudinal and circumferential joints.
3. At fittings: Mitre. Secure with tape.
4. Vapour seal: Tape exposed insulation membrane. Seal vapour barrier at pipe support with class 0 tape.

Pr_80_77_76/755 Installing at non-loadbearing pipelines supports

1. Insulation: Carry through pipe support.

Pr_80_77_94/620 Installation of flexible hoses and rubber bellows

1. Position: Close to the source of vibration.

Ss_55_70_38/620 Installing hot and cold water systems generally

1. Standard: To [BS 8558](#) and [BS EN 806-4](#).
2. Performance: Free from leaks and the audible effects of expansion, vibration and water hammer.
3. Fixing of equipment, components and accessories: Fix securely, parallel or perpendicular to the structure of the building.

-
4. **Preparation:** Immediately before installing tanks and cisterns on a floor or platform, clear the surface completely of debris and projections.
 5. **Corrosion resistance:** In locations where moisture is present or may occur, avoid contact between dissimilar metals by use of suitable washers, gaskets, and the like.

Ss_55_70_38/630 Installing unvented hot water storage discharge pipes

1. **Fall (minimum):** 1 in 80
2. **Discharge**
 - 2.1. **Method:** Via an air break and tundish.
 - 2.2. **Size:** Greater than or equal to the diameter of the outlet of the safety device.
 - 2.3. **Tundish discharge:** At least one diameter larger than the outlet diameter of the safety device.
 - 2.4. **Discharge point:** Nearest SVP

Ss_55_70_38/650 Hydraulic pressure testing of hot and cold water supply systems

1. **Standard:** To [BS 8558](#) and [BS EN 806-4](#).
2. **Notice (minimum):** 1 week.
3. **Pressure:** 680 kPa.
4. **Duration of test:** 1 h.

Ss_55_70_38/660 Flushing hot and cold water systems

1. **Standard:** To [BS EN 806-4](#).
2. **Water analysis:** Analyse water samples before treatment.
3. **Preliminary checks:** Thoroughly inspect pipework. Complete pressure tests before cleaning or chemical treatment.
4. **Waste products :** Neutralize, and dispose of to drain. Preferably direct to manhole.

Ss_55_70_38/670 Disinfection of hot and cold water systems

1. **Standard:** To [BS EN 806-4](#).
2. **Samples for analysis:** Provide after flushing.

System completion

Ss_55_70_38/810 Commissioning of hot and cold water supply systems

1. **Pre-commissioning:** In accordance with [BSRIA 2/89.3](#) and [CIBSE Commissioning Code W](#).
2. **Commissioning:** In accordance with [BS EN 806-4](#), [BSRIA 2/89.3](#) and [CIBSE Commissioning Code W](#).
3. **Notice (minimum):** One week.
4. **Equipment:** Check and adjust operation of equipment, controls and safety devices.
5. **Outlets:** Check operation of outlets for satisfactory rate of flow and temperature.

Ss_55_70_38/820 Inspection and test records

1. **Construction phase reports:** System design is commissionable;
Post-installation;
System cleanliness;
and System commissionable.
2. **Records for water systems:** In accordance with [BSRIA 2/89.3](#).

3. Record sheets

- 3.1. Submission: On completion.
- 3.2. Number of copies: Three.

Ss_55_70_38/850 Water quality tests

Shared by: [Ss_55_70_38_40 Incoming water supply systems](#)

- 1. Standard: To [BS EN 806-4](#).
- 2. Samples
 - 2.1. Sample points: Main supply to site;
 - 2.2. Samples for analysis: Submit samples for bacteriological analysis.
- 3. Water temperature: Record at each sampling point at the time of taking the sample.
- 4. Test results
 - 4.1. Record: Details of all analyses.
 - 4.2. Submit: On commencement of the works and again on completion.
 - 4.3. Number of copies: One.

Ω End of System

Ss_55_70_38_40 **Incoming water supply systems**

Systems

Ss_55_70_38_40 Incoming water supply systems

1. **Description:** The existing 28mm incoming main rising from below shall be tested prior to commencement to verify the achieved flow and pressure. If insufficient flow rate is available, the main shall be traced back to source and upgraded to 35mm.

The water main shall rise in position to high level and route across the building at high level to serve all areas of sanitary appliances as well as the cold feeds to the HBC boxes associated with the heating/cooling system.

The main stop cock will be located where the main rises through the ground floor.

A water guard pulsed output water meter with shut off valve - connected to the BMS and the leak detection system shall be installed after the main stopcock.

The contractor shall ensure that all services routed in below slab ducts are laid in accordance with the structural engineers requirements.

The installation shall be fully compliant with the requirements of the Water Regulations Guide, BS EN 806-2: 2005 Part 2 and BS 8558:2011.

The mains water installation shall be fully sterilised to the requirements of BS6700

2. **System performance:** Reference to missing clause Design and detailing hot and cold water systems
3. **Water company:** Thames Water
4. **Position of incoming mains water supply:** Refer to Mechanical Drawings
5. **Valves:** [Pr_65_54_95_18 Copper alloy service stop valves](#); [Pr_65_54_95_19 Copper alloy stop valves](#); [Pr_65_54_95_20 Copper alloy underground stop valves](#); and [Pr_65_54_95_94 Verifiable backflow prevention devices](#).
6. **Backflow prevention devices:** Reference to missing clause Verifiable backflow prevention devices type B; [Pr_65_54_95_05 Backflow prevention check valves](#)
7. **System completion:** [Ss_55_70_38/850 Water quality tests](#).

Products

90-10-90/305 Connections for accessories type A

1. **Capillary:** To [BS EN 1254-1](#).
2. **Compression for copper tubes:** To [BS EN 1254-2](#).
3. **Compression for plastics pipes:** To [BS EN 1254-3](#).
4. **Threaded:**
 - 4.1. Where pressure-tight joints are made on the threads: To BS 21 or [BS EN 10226-1](#).
 - 4.2. Where pressure-tight joints are not made on the threads: To [BS EN ISO 228-1](#).

Pr_65_54_95_05 Backflow prevention check valves

1. **Description:** Backflow prevention devices installed to suit the requirements of the domestic water schematic.
2. **Manufacturer:** Contractor's choice

-
3. Standard: To [BS EN 13959](#).
 4. Family and type: EC – verifiable double-check valve.
 5. Connections: Capillary or compression to [BS EN 1254-1](#), [BS EN 1254-2](#), [BS EN 1254-3](#) or [BS EN 1254-4](#).
 6. Execution: [Pr_65_54_95/615 Installation of backflow prevention devices](#); Reference to missing clause Installation of valves generally type B

Pr_65_54_95_18 Copper alloy service stop valves

Shared by: [Ss_75_50_50_96 Water leak detection and alarm systems](#)

1. General requirements: [90-10-90/305 Connections for accessories type A](#) .
2. Manufacturer: Contractor's choice .
3. Standard: To [BS 1010-2](#).
4. Pattern: Straight pattern.
5. Material: Dezincification resistant brass (DZR) copper alloy.
6. Connections: Capillary.
7. Execution: [Pr_65_54_95/610 Installation of valves generally](#) and [90-10-90/670 Valve tests](#).

Pr_65_54_95_19 Copper alloy stop valves

1. General requirements: [90-10-90/305 Connections for accessories type A](#) .
2. Manufacturer: Contractor's choice .
3. Standard: To [BS EN 1213](#).
4. Arrangement: Straight.
5. Material: Copper alloy.
6. Connections: Capillary.
7. Execution: [Pr_65_54_95/610 Installation of valves generally](#) and [90-10-90/670 Valve tests](#).

Pr_65_54_95_20 Copper alloy underground stop valves

1. General requirements: [90-10-90/305 Connections for accessories type A](#) .
2. Manufacturer: Contractor's choice .
3. Standard: To [BS 5433](#).
4. Connections: Threaded and Union ends.
5. Execution: [Pr_65_54_95/610 Installation of valves generally](#) and [90-10-90/670 Valve tests](#).

Pr_65_54_95_94 Verifiable backflow prevention devices

1. General requirements: [90-10-90/305 Connections for accessories type A](#) .
2. Manufacturer: Altecnic
3. Standard: To [BS EN 12729](#).
 - 3.1. Anti-pollution check valves: To [BS EN 13959](#).
 - 3.2. Check valves: To [BS 6282-1](#).
 - 3.3. Combined check and anti-vacuum valves: To [BS 6282-4](#).
 - 3.4. Hose union: To [BS EN 14454](#).
 - 3.5. In-line anti-vacuum valves: To [BS EN 14451](#).
 - 3.6. Terminal anti-vacuum valves: To [BS 6282-2](#).
4. Family and type: Manufacturer's standard .
5. Material: Copper alloy.

6. Connections: Compression.
7. Execution: [Pr_65_54_95/610 Installation of valves generally](#) and [90-10-90/670 Valve tests](#).

Execution

90-10-90/670 Valve tests

1. Standard: To [BS EN 12266-1](#).

See [Pr_65_54_95/610 Installation of valves generally](#) in [Ss_55_70_38_20 Direct hot water storage supply systems](#)

Pr_65_54_95/615 Installation of backflow prevention devices

1. Standard: In accordance with [Water Regs UK](#) guidelines.
2. Type BA: In accordance with [Water Regs UK](#) 'Approved Installation Method: Type BA Device – Verifiable backflow preventer with reduced pressure zone (RPZ valve). Requirements for installation, commissioning and compliance testing of Type BA devices (RPZ valves)'.

System completion

See [Ss_55_70_38/850 Water quality tests](#) in [Ss_55_70_38_20 Direct hot water storage supply systems](#)

Ω End of System

Ss_60_40_37_26

Electric heating systems

Systems

Ss_60_40_37_26 Electric heating systems

1. Description: Electric resistance heaters serving Moat Arches and Reveller Circulation spaces
2. Heat emitters: [Pr_70_60_36_74 Room heaters](#)
3. Controls
 - 3.1. Type: External to appliance, separately controlled.
 - 3.2. Connectivity: Wired.
 - 3.3. Type of controller: Thermostat and timed control.
 - 3.4. Features: Automatic on/ off timer. Frost protection mode. Manual override facility. Program retention during power failure by battery back-up.
4. Execution: [Ss_60_40_37/640 Installing electric heating systems](#)
5. System completion: [Ss_60_40_37/845 Demonstration of heating systems](#)

Products

Pr_70_60_36_74 Room heaters

1. Description: Electric finned tube heater
2. Manufacturer: Zehnder
3. Product reference: Flow Form
4. Standards: To [BS EN IEC 60335-1](#) and [BS EN 60335-2-30](#).
5. Room heaters type: Tubular.
6. Output: Refer to Mechanical Schedules
7. Finish: As defined by the architect
8. Accessories: Separate Heatmiser Neostat controller
9. Execution: [Pr_70_60_36/611 Installing heat emitters generally](#)

Execution

Pr_70_60_36/611 Installing heat emitters generally

1. Fixing: Install as per manufacturer's instructions

Ss_60_40_37/640 Installing electric heating systems

1. Standard: In accordance with manufacturer's installation guidance.

System completion

Ss_60_40_37/845 Demonstration of heating systems

1. Running of plant
 - 1.1. Operation: Run, maintain and supervise the installations under normal working conditions.
 - 1.2. Duration: 72 hours continuous operation
2. Instruction: Instruct and demonstrate the purpose, function and operation of the installations.

Ω End of System

Ss_60_60_70_94

Variable refrigerant flow systems

Systems

Ss_60_60_70_94 Variable refrigerant flow systems

1. **Description:** The Contractor shall design, supply, install, test and commission a new heat pump heating and cooling system to serve the areas within The Reveller noted on the drawings and schedules.

The heating and cooling shall be provided via a Mitsubishi City-Multi HVRF ducted fan coil installation with externally mounted, air cooled condenser.

The condenser shall be mounted within an external enclosure and be mounted on a free standing frame at least 500mm high. The condenser discharge shall be vertically ducted to the top of the external enclosure and shall be RAL finished to match the colour of the enclosure.

Full details of the equipment are shown on the Mechanical schedules and drawings.

The condensing unit shall route refrigerant pipework to the 2No HBC boxes as indicated on the drawings. Pipework from the HBC boxes to the fan coil units shall convey water and be to Mitsubishi's guidelines.

The system has been provisionally designed however full design (including pipework sizes and exact routes), installation, testing and commissioning shall be by a specialist refrigeration contractor.

The FCU's shall be arranged within the ceiling and wall voids to suit the architecture as shown on the mechanical layout drawings. They shall be coordinated with the structure and architectural finishes to ensure access to the units is always feasible.

The contractor shall ensure the distribution of the refrigerant is fully coordinated with other services, structural penetrations and architecture to maintain a minimal ceiling and wall voids without compromising air flow to the FCU's, maintenance access to all services and plant replacement.

Generally, the FCU's will be wall & ceiling mounted and ducted to grilles. Wherever possible these will be located within an accessible panel section to allow for easy access for maintenance.

Each FCU shall be provided with a return air temperature sensor on a suitably sized lead to allow flexibility to locate the sensor in the optimum location.

All FCU's shall be selected to provide the desired output at low speed only, and all secondary ductwork to/from the FCUs and associated plenums shall be acoustically lined and provided with attenuators as indicated on the drawings and schedules. All plenums shall be provided full length.

Each FCU shall be individually addressable by the FCU control system with a central control panel positioned alongside the HBC box in the WC area.

Each FCU shall be provided with an integral condensate pumps where a gravity connection to drain cannot be made, but for the avoidance of doubt gravity is preferred.

Since there is refrigerant flowing in the pipework between the outdoor unit and FCU's, refrigerant grade copper pipe must be used.

The complete installation shall incorporate Mitsubishi AE-200E central controller and interfaced with the BMS installation via a Bacnet interface.

The Contractor shall be responsible for determining if a leak detection system will be required as part of the tendering process as this is dependent on the amount of refrigerant within the system.

2. System performance: [Ss_60_60_70/210 Design of variable refrigerant flow systems](#).
3. Compressor: Electric driven compressors.
4. System: Three pipe heat recovery system with simultaneous heating & cooling to indoor ducted fan coil units.
5. Pipelines: [Pr_65_52_63_20 Copper refrigerant pipelines type A](#).
6. Thermal insulation: Armaflex internal and Ventureclad insulation external refrigerant pipework
7. Outlets: [Pr_70_65_03_94 Variable refrigerant flow units](#).
8. Controls: Mitsubishi AE-200E central controller and interfaced with the BMS installation via a Bacnet interface.
9. Plant and equipment identification: Identifying pipework type B;
[Pr_40_10_57_51 Mechanical plant and equipment identification labels type C](#);
and [Pr_40_10_57_93 Valve charts and schematics type A](#).
10. Execution: [Ss_60_60_70/620 Installing variable refrigerant flow systems generally](#).
11. System completion: [Ss_60_60_70/810 Commissioning of refrigerating systems](#);
[Ss_60_60_70/820 Performance testing](#);
[Ss_60_60_70/830 Inspection and test records](#);
[Ss_60_60_70/840 Demonstrations](#);
and [Ss_60_60_70/850 Documentation](#).

System performance

Ss_60_60_70/210 Design of variable refrigerant flow systems

1. Design: Complete the design of the variable refrigerant flow system.
2. Requirement: Submit proposals including detailed design drawings, technical information, calculations and manufacturers' literature.

Products

See [Pr_40_10_57_51 Mechanical plant and equipment identification labels type C](#) in
[Ss_50_30_04_97 Above-ground internal stack wastewater drainage systems](#)

Pr_40_10_57_93 Valve charts and schematics type A

1. Manufacturer: Submit proposals .
2. Material: Paper print, encapsulated.
3. Information to be included: Location and identification of pipework regulating, isolating and control valves.
4. Execution: [Pr_40_10_57/620 Installing valve charts and schematics type A](#).

Pr_65_52_63_20 Copper refrigerant pipelines type A

1. Manufacturer: Contractor's choice
2. Standard: To [BS EN 378-2](#).
3. Pipelines: To [BS EN 12735-1](#).
4. Execution: [Pr_65_52_63/665 Installing refrigerant pipework](#).

Pr_70_65_03_94 Variable refrigerant flow units

1. Manufacturer: Mitsubishi Electric Hybrid VRF
2. Standards: To [BS EN 378-1](#) and [BS EN 378-2](#).
3. Arrangement: Concealed duct.

-
4. Output cooling: Refer to Schedules
 5. Output heating: Refer to Schedules
 6. Accessories: Refer to Schedules

Execution

See [Pr_40_10_57/611](#) Installing mechanical plant and equipment identification in [Ss_50_30_04_97](#)
Above-ground internal stack wastewater drainage systems

Pr_40_10_57/620 Installing valve charts and schematics type A

1. Fixing: Plug and screw to wall.
2. Position: HBC Cupboard adjacent to WC

Pr_65_52_63/665 Installing refrigerant pipework

1. General requirements: Pipelines installation generally type B .
2. Standards: To [BS EN 378-3](#) and [BS EN 378-4](#).

Ss_60_60_70/620 Installing variable refrigerant flow systems generally

1. Standards: To [BS EN 378-3](#) and [BS EN 378-4](#).
2. Fixing of equipment, components and accessories: Fix securely on purpose-made bases or supports.
3. External units: Protect from high winds. Prevent snow, leaves and debris from blocking air flow.
4. Access: Provide for inspection and servicing of heat pumps and ancillary equipment.
5. Refrigerant lines: Short and straight.
6. Location of outdoor units: Away from windows and adjacent buildings.

System completion

Ss_60_60_70/810 Commissioning of refrigerating systems

1. Pre-commissioning: In accordance with [CIBSE Commissioning code R](#).
2. Commissioning: In accordance with [CIBSE Commissioning code R](#).
3. Notice (minimum): 1 week.

Ss_60_60_70/820 Performance testing

1. General: Demonstrate the performance of the installations.
2. **Environmental tests:** Carry out environmental testing. If necessary, use artificial loads to simulate operating conditions.
3. Reports: Submit on completion.

Ss_60_60_70/830 Inspection and test records

1. **Construction phase reports:** System design is commissionable;
Post-installation;
System cleanliness;
and System commissionable.
2. Records for air systems: In accordance with [BSRIA 3/89.3](#).
3. Record sheets
 - 3.1. Record sheets: .
 - 3.2. Submission: On completion.
 - 3.3. Number of copies: Three.

Ss_60_60_70/840 Demonstrations

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

Ss_60_60_70/850 Documentation

1. Operating and maintenance instructions
 - 1.1. Scope: Submit for the system giving optimum settings for controls.
 - 1.2. Product information: Include product description, date of purchase, performance characteristics, application (suitability for use), method of operation and control, and cleaning and maintenance requirements.
 - 1.3. Format: Paper copy.
 - 1.4. Number of copies: Two.
2. Record drawings
 - 2.1. Contents: Location and arrangement of plant in plant rooms;
Location, size and route of mechanical services;
Location and identification of pipework regulating, isolation and control valves;
and Location of outlets.
 - 2.2. Format: A1 paper print drawing and Electronic drawing.
 - 2.3. Number of copies: Two.
3. Submittal date: At handover.

Ω End of System

Ss_65_40_33_51 Mechanical ventilation systems

Systems

Ss_65_40_33_51 Mechanical ventilation systems

1. **Description:** The main spaces (Office, Quiet Room, Community Room and Studio) shall be served by individual, dedicated heat recovery air handling units for supply and extract ventilation.

The WC area and cleaners store shall be served by a single mechanical extract fan.

The moat arches shall be served by individual inline extract fans where these spaces have WCs or Sinks as indicated on the mechanical services drawings.

The heat recovery air handling units shall incorporate a counter flow heat exchanger, supply & extract fans and filters.

The air handling units shall operate on time clock control with the ventilation rates varied under the dictates of room air quality sensors. The units shall be fully interfaced with the BMS for monitoring and control via Bacnet.

The Reveller WC extract fan shall operate under timeclock control.

The Moat Arch extract fans shall operate under local PIR control.

Outside air shall be drawn into The Reveller by the AHUs and exhausted to outside from an intake louvre located on the western elevation and exhausted via an exhausted louvre also located on the western elevation.

Ductwork serving all fan systems is generally distributed at high level on each floor to grilles located within the spaces.

The grille types have been coordinated with the architect and where swirl grilles are specified these are to be manufactured by Brooke Air and be their linear slots.

All grilles are to be provided with full-length plenums with appropriate duct connection. No flexible ductwork is to be installed without prior written confirmation by the Engineer. All secondary FCU ductwork is to be acoustically lined.

Attenuators must be provided in the locations shown on the drawings and as per the schedules in order to achieve the noise ratings in each space.

The fresh air intake and exhaust ducts shall be fully insulated and vapour sealed with PID covered in black Ventureclad.

The ductwork shall be suitably mounted on resilient hangers and insulated to the requirements of BS5442:2009 & BS5970:2012.

Fire dampers shall be fitted into the ductwork where it passes through fire compartments. The dampers shall be mounted in the manufacturers frame to suit the compartment wall type or riser and installed secured and supported entirely to the manufacturer's recommendations. Proprietary intumescent fire collars shall be fitted to plastic ductwork within the size limits of the certified intumescent collar.

Access hatches shall be provided to allow maintenance access to the fire damper. The fire dampers shall be suitably fire stopped at the compartment wall penetrations and risers. Fire dampers shall be suitably restrained to the manufacturer's recommendations.

The risers shall be backfilled around fire dampers, pipework and cables with Corofil coated panels and Corofil Firestop at each floor level. All fire stopping shall be certificated by the specialist installer.

Where penetrating non compartment walls the ductwork shall be sleeved and acoustically sealed.

Each grille or diffuser shall have a vcd to allow the air volume to be commissioned.

Access hatches shall be provided where required to the Architects requirements to allow the vcds, valves and fire dampers to be accessed for commissioning. During coordination and production of working drawings the contractor shall layout the plant, ductwork and pipework to reduce, where possible, the number of access hatches necessary to access the plant and equipment.

The entire ventilation system shall be commissioned and seasonally commissioned by a reputable and reliable commissioning engineer, The commissioning engineer shall adjust the ventilation system to ensure that the flow rates are within 5% of design at each grille.

2. Location of plant: As per ventilation drawings
3. Route of distribution: As per ventilation drawings
4. Type of system: Single duct, constant volume.
5. External air intake: [Pr_30_59_48_98 Wood louvre panel units](#)
6. Air filters: [Pr_65_57_02_66 Panel air filters](#)
7. Heat recovery: Counterflow Heat Exchanger
8. Air-handling units: As per schedule
9. Supply fans: As per schedule
10. Acoustic treatment: [Pr_65_67_78_12 Circular attenuators](#) and [Pr_65_67_78_72 Rectangular attenuators](#).
11. Air ductwork and accessories
 - 11.1. Ductwork: [Pr_65_65_25_72 Rectangular sheet metal ductwork and fittings](#);
[Pr_65_65_25_14 Circular sheet metal ductwork and fittings](#).
 - 11.2. Accessories: [Pr_65_65_23_20 Duct access panels](#);
[Pr_65_65_25_32 Flexible ductwork](#);

[90-45-25/410 Bird guards](#);

[and Pr_65_65_24_29 Fire and smoke dampers](#).
12. Thermal insulation on supply air ductwork: [Pr_80_77_76_53 Mineral wool duct slab insulation](#) and [Pr_80_77_76_62 Phenolic foam insulation type B](#).
13. Vibration isolation mountings: [Pr_80_77_94_42 Isolation hangers type B](#).
14. Room supply air terminal devices: [Pr_70_65_04_03 Air grilles](#).
15. Accessories: [Pr_80_77_27_15 Channel supports type B](#).
16. Controls: as per controls specification
17. Identification of ductwork and equipment: [Pr_40_10_57_51 Mechanical plant and equipment identification labels type C](#) and [90-90-55/420 Identifying ductwork](#).
18. Testing: [Pr_65_65_25/785 Air leakage testing of medium-pressure ductwork](#)
19. Execution: [Ss_65_40_33/630 Installing ductwork on air-handling units](#).
20. System completion: [Ss_65_40_33/870 Maintenance](#);
[Ss_65_40_33/840 Demonstrations](#);
[Ss_65_40_33/850 Documentation for ventilation systems](#);
[Ss_65_40_33/810 Commissioning of air distribution systems](#);
[Ss_65_40_33/860 Spares and consumables](#);
and [Ss_65_40_33/830 Inspection and test records](#).

Products

90-45-25/410 Bird guards

1. Manufacturer: Contractor's choice .
2. Material: Black PVC coated 12 mm square mesh steel wire. Wire gauge at least 1 mm.

90-90-55/420 Identifying ductwork

1. Manufacturer: Contractor's choice
2. Standard: To [HVCA DW/144](#) appendix B.
3. Identification type: Self-adhesive plastics or transfers.
4. Execution: [Pr_40_10_57/650 Installing ductwork identification](#).

See [90-90-95/310 Mountings generally](#) in [Ss_55_70_38_20 Direct hot water storage supply systems](#)

Pr_30_59_48_98 Wood louvre panel units

1. Description: Air intake and exhaust louvres to architects specification serving AHU intake/exhaust and general extract exhaust
2. Manufacturer: Architects Selection
3. Size (l x w x d): As per architects elevation drawings
4. Finish: As per architects details
5. Air intake and exhaust performance
 - 5.1. Application: Exhaust. Intake.
6. Weather performance

See [Pr_40_10_57_51 Mechanical plant and equipment identification labels type C](#) in [Ss_50_30_04_97 Above-ground internal stack wastewater drainage systems](#)

Pr_65_57_02_66 Panel air filters

1. Description: MVHR / FCU Filters
2. Manufacturer: Contractor's choice
3. Standards
 - 3.1. Performance: To [BS EN ISO 16890-1](#).
 - 3.2. Testing: To [Eurovent 4/11: Energy efficiency classification of air filters for general ventilation purposes](#).
4. Filter type: Disposable – synthetic media panel.
5. Filter class: ISO coarse.
6. Conditions: Ambient.
7. Flammability: Surface of filters to be non-flammable in accordance with [BS 9999](#).
8. Casing: Rigid.
9. Filter mounting frames
 - 9.1. Material: Galvanized steel.
10. Execution: [Pr_65_57_02/640 Installing filters generally](#)

Pr_65_65_23_20 Duct access panels

1. Manufacturer: Submit proposals .
2. Material: Galvanized sheet steel.

Pr_65_65_24_29 Fire and smoke dampers

1. Standard
 - 1.1. Fire dampers: To [BS EN 15650](#).
 - 1.2. Test: To [BS EN 1366-2](#).
2. Arrangement: Folding curtain blades out of air stream.
3. Classification: ES120.
4. Material: Zinc-coated steel.
5. Accessories: External visual indication of fire damper blade position.
6. Fusible links
 - 6.1. Fusing temperature: 72°C.
7. Execution: [Pr_65_65_24/725 Installing fire and smoke control dampers type A](#) and [Pr_65_65_24/750 Access to dampers for resetting and maintenance](#).

Pr_65_65_25_14 Circular sheet metal ductwork and fittings

1. Standards: To [HVCA DW/144](#), [BS EN 1506](#) and [BS EN 12237](#).
2. Classification: Class A.
3. Air leakage testing: [Pr_65_65_25/785 Air leakage testing of medium-pressure ductwork](#) and [Pr_65_65_25/790 Air leakage testing of plant items](#).
4. Material: Zinc coated steel.
5. Construction: Spirally wound.
6. Regulating dampers
 - 6.1. Standard: As [HVCA DW/144](#).
 - 6.2. Balancing type: Single skin multi-blade damper.
 - 6.3. Operation: Manual.
 - 6.4. Material: To match ductwork.
7. Flexible joint connections: Fit on fan inlets and outlets and at building expansion joints.
8. Hangers and supports:
 - 8.1. Standard: [Pr_80_77_27_15 Channel supports type B](#).
 - 8.2. Strength requirements: To [BS EN 12236](#).
9. Access openings
 - 9.1. Purpose: Inspection;
Cleaning;
and Maintenance.
 - 9.2. Sizes: To [HVCA DW/144](#), Appendix D and To [BS EN 12097](#).
10. Execution: [Pr_65_65_25/610 Air ductwork generally](#);
[Pr_65_65_25/640 Installing sheet metal ductwork](#);
[Pr_65_65_25/740 Installing control equipment and instruments in metal ductwork](#);
[Pr_65_65_25/700 Test holes in ductwork](#);
[Pr_65_65_25/720 Weatherproofing ductwork penetrations](#);
[90-45-25/760 Ductwork cleanliness](#);
[90-45-25/770 Verification of cleanliness of ventilation systems](#);
and [90-45-25/655 Installing ductwork supports](#).

Pr_65_65_25_32 Flexible ductwork

1. Manufacturer: Contractor's choice
2. Standard: To [B&ES DW/144](#) and To BSRIA [BG 43/2013](#).
3. Flexible ductwork: Acoustic.

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4. Material: Aluminium and polyester laminate encapsulating high tensile steel wire helix.

Pr_65_65_25_72 Rectangular sheet metal ductwork and fittings

1. Standards: To B&ES [DW/144](#), [BS EN 1505](#) and [BS EN 1507](#).
2. Classification: Class A.
3. Material: Zinc coated steel to [BS EN 10346](#) grade DX51D+Z140.
4. Regulating dampers
 - 4.1. Standard: To B&ES [DW/144](#).
 - 4.2. Regulating function: Balancing and Control.
 - 4.3. Damper type: Opposed blade.
 - 4.4. Operation: Manual.
 - 4.5. Material: Zinc coated steel.
5. Access openings
 - 5.1. Purpose: Maintenance.
 - 5.2. Sizes: To [BS EN 12097](#).
6. Execution: [Pr_65_65_25/720 Weatherproofing ductwork penetrations](#).

Pr_65_67_78_12 Circular attenuators

1. Manufacturer: Matched attenuators as indicated on the drawings and schedules.
2. Performance standards : To [BS EN ISO 7235](#) and [BS EN ISO 11691](#).
3. Casing material: Metal.
4. Lining material: Inert, fire proof, inorganic and non- hygroscopic.
5. Markings: Show direction of air flow on silencer.

Pr_65_67_78_72 Rectangular attenuators

1. Manufacturer: Matched attenuators as indicated on the drawings and schedules.
2. Application: Extract. Supply.
3. Performance standards: To [BS EN ISO 7235](#) and [BS EN ISO 11691](#).
4. Casing material: Metal.
5. Lining material: Inert, fire proof, inorganic and non-hygroscopic.
6. Markings: Show direction of air flow on silencer.

Pr_70_65_04_03 Air grilles

1. Manufacturer: Refer to Mechanical Schedules for details
2. Standards
 - 2.1. Mixed flow applications: To [BS EN 12238](#).
 - 2.2. Displacement flow applications: To [BS EN 12239](#).
 - 2.3. Sound power levels: To [BS EN ISO 5135](#).
3. Application: Extract. Supply.
4. Core velocity (maximum): 3 m/s.
5. Shape: Linear.
6. Grille type: Adjustable single deflection.
7. Position: Ceiling. Wall.
8. Material: Aluminium.
9. Finish: To be agreed with Architect prior to ordering.

10. Accessories: [Pr_70_65_04_04 Air plenum boxes Type A](#)

11. Execution: [Pr_70_65_04/650 Installing grilles](#).

Pr_70_65_04_04 Air plenum boxes Type A

1. Manufacturer: Contractor's choice
2. Configuration: Single plenum box.
3. Construction: Sturdy and rigid with circular inlet spigots of 65 mm minimum length.
4. Fixing: Incorporate means for fixing to, or suspending from, building or other construction.

Pr_80_77_27_15 Channel supports type B

1. Manufacturer: Submit proposals . Contractor Design.
2. Support type: Submit proposals .

Pr_80_77_76_53 Mineral wool duct slab insulation

1. Manufacturer: ROCKWOOL Ltd
2. Product reference: Ductslab
3. Standard: To [BS 3958-5](#).
4. Form: Flexible slabs. Rigid slabs. Semi-rigid slabs.
5. Thermal conductivity: 0.032 W/m·K at 0°C.
0.034 W/m·K at 10°C.
0.037 W/m·K at 50°C.
0.040 W/m·K at 75°C.
0.044 W/m·K at 100°C.
6. Finish: Aluminium foil-faced.
7. Insulation thickness (minimum): To [BS 5422](#).
8. Items to be insulated: Removable access covers.
9. Execution: [Pr_80_77_76/665 Installing foil-faced mineral wool lamella insulation on ductwork](#).

See [Pr_80_77_76_62 Phenolic foam insulation type B](#) in [Ss_55_70_38_20 Direct hot water storage supply systems](#)

Pr_80_77_94_42 Isolation hangers type B

1. General requirements: [90-90-95/310 Mountings generally](#) .
2. Manufacturer: Contractor's choice .
3. Isolation hangers type: Spring and neoprene rubber.
4. Colour code: Manufacturer's standard .
5. Drop rod misalignment capability: 15%.

Execution

90-45-25/655 Installing ductwork supports

1. Standard: In accordance with [HVCA DW/144](#).

90-45-25/760 Ductwork cleanliness

1. Cleaning: In accordance with [HVCA TR/19](#).
2. Level of protection: PD1.

90-45-25/770 Verification of cleanliness of ventilation systems

1. Verification: In accordance with [HVCA TR/19](#).
2. Method: Vacuum test.
3. Completion report:
 - 3.1. Format: Electronic and Paper copy.
 - 3.2. Submit: At handover.
 - 3.3. Number of copies: Two

See [Pr_40_10_57/611 Installing mechanical plant and equipment identification](#) in [Ss_50_30_04_97 Above-ground internal stack wastewater drainage systems](#)

Pr_40_10_57/650 Installing ductwork identification

1. Standard: In accordance with B&ES [DW/144](#).
2. Position: Locate where visible.
3. Direction of flow: Equilateral triangle, 150 mm length of side, with one apex pointing in the direction of flow.
4. Information: Air being conveyed, direction of flow, destination of the air.

Pr_65_57_02/640 Installing filters generally

1. Mounting: Install according to directional arrows where provided.
2. Inspection: Check new filter integrity. Check filter orientation arrows.

Pr_65_65_24/725 Installing fire and smoke control dampers type A

1. Standard: In accordance with ASFP [Fire dampers \(European standards\) E \(integrity\) and ES \(integrity and leakage\) classified \(Grey book\)](#) and In accordance with [HVCA DW/145](#).

Pr_65_65_24/750 Access to dampers for resetting and maintenance

1. Position: Provide access to damper mechanisms on fire dampers; smoke dampers; combined smoke and fire dampers, and volume control dampers through access doors, suspended ceilings, etc. Where more than one fire damper is installed in a frame provide access to all fire dampers.
2. Fire links: Provide access for replacement.

Pr_65_65_25/610 Air ductwork generally

1. Cut edges on ductwork, flanges and supports: Smooth and burr free.

Pr_65_65_25/640 Installing sheet metal ductwork

1. Standard: To [BESADW/144](#).
2. Hangers and supports: Strength requirements to [BS EN 12236](#).
3. Installing flexible joint connections: Install fully stretched to minimize pressure drop.

Pr_65_65_25/700 Test holes in ductwork

1. Position: In accordance with [CIBSE Commissioning Code Series A](#) and [BESADW/144](#).

Pr_65_65_25/720 Weatherproofing ductwork penetrations

1. Roof penetrations: Submit proposals .
2. Wall penetrations: Submit proposals .

Pr_65_65_25/740 Installing control equipment and instruments in metal ductwork

1. General: Fit sensors, damper motors and other control equipment.
2. Connections: Connect control equipment and instruments.

Pr_65_65_25/785 Air leakage testing of medium-pressure ductwork

1. Standard: To [HVCA DW/144](#).
2. Extent: Random testing of 10% maximum of the ductwork system.
3. Test pressure: To [HVCA DW/144](#).
4. Documentation: Details of calculations used to arrive at the allowable loss for the section to be tested.
5. Report
 - 5.1. Format: Electronic and Paper copy.
 - 5.2. Submit: At handover.
 - 5.3. Number of copies: Two

Pr_65_65_25/790 Air leakage testing of plant items

1. Standard: To [HVCA DW/144](#).
2. Procedure: Include in-line plant with certificate of conformity for pressure class and air leakage classification for system under test.
3. Report
 - 3.1. Format: Electronic and Paper copy.
 - 3.2. Submit: At handover.
 - 3.3. Number of copies: Two

Pr_70_65_04/610 Installing air terminal devices

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

Pr_70_65_04/650 Installing grilles

1. General requirements: [Pr_70_65_04/610 Installing air terminal devices](#) .
2. Method: Fixing straight to ductwork. To be installed in a manor that the ductwork and ductwork associated hangers, support the grille.

See [Pr_80_77_76/610 Installing insulation and protection products generally](#) in [Ss_55_70_38_20 Direct hot water storage supply systems](#)

See [Pr_80_77_76/640 Installing phenolic foam insulation on pipelines](#) in [Ss_55_70_38_20 Direct hot water storage supply systems](#)

Pr_80_77_76/665 Installing foil-faced mineral wool lamella insulation on ductwork

1. General requirements: [Pr_80_77_76/610 Installing insulation and protection products generally](#) .

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2. Fixing to underside of ducting: Self adhesive stick pins.
 3. Seals: Seal using 100 mm wide class 0 foil tape.

See [Pr_80_77_76/755 Installing at non-loadbearing pipelines supports](#) in [Ss_55_70_38_20 Direct hot water storage supply systems](#)

Ss_65_40_33/630 Installing ductwork on air-handling units

1. Air discharge: Connect ductwork to allow air to straighten as it leaves the air handling unit.

System completion

Ss_65_40_33/810 Commissioning of air distribution systems

1. Pre-commissioning: In accordance with [BSRIA 3/89.3](#) and CIBSE Commissioning code [A](#).
2. Commissioning: In accordance with [BSRIA 3/89.3](#) and [CIBSE Commissioning Code A](#).
3. Notice (minimum): 48 h.

Ss_65_40_33/830 Inspection and test records

1. Reports:
2. Construction phase reports: System design is commissionable;
Post-installation;
System cleanliness;
and System commissionable.
3. Records for air systems: In accordance with [BSRIA 3/89.3](#).
4. Record sheets
 - 4.1. Submission: On completion.
 - 4.2. Number of copies: Three.

Ss_65_40_33/840 Demonstrations

1. Running of plant
 - 1.1. Operation: Run, maintain and supervise the installations under normal working conditions.
 - 1.2. Duration: Two weeks.
2. Instruction: Instruct and demonstrate the purpose, function and operation of the installations.

Ss_65_40_33/850 Documentation for ventilation systems

1. Operating and maintenance instructions
 - 1.1. Scope: Submit for the system as a whole giving optimum settings for controls.
 - 1.2. Product information: Include product description, date of purchase, performance characteristics, application (suitability for use), method of operation and control, and cleaning and maintenance requirements.
 - 1.3. Format: Paper copy.
 - 1.4. Number of copies: Two.
2. Record drawings
 - 2.1. 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.
 - 2.2. Format: A1 paper print and Electronic.
 - 2.3. Number of copies: Two.
3. Submittal date: At handover.

Ss_65_40_33/860 Spares and consumables

1. Spares:
 - 1.1. Detectors: Supply two of each type.
 - 1.2. Filters: Supply two of each type.
2. Filters
 - 2.1. Filter media: Supply one replacement for every type of filter.
 - 2.2. Retaining clips and rubber gaskets: Two sets for each type of filter.
 - 2.3. Cleaning solution: Supply coating solution for one complete cleaning of metal plate filters.
3. Detectors: Supply two of each type.
4. Air terminal device keys: Supply a set for adjusting each size and type of grille and diffuser.

Ss_65_40_33/870 Maintenance

1. Servicing and maintenance: Undertake for 12 months after completion.

Ω End of System

Ss_65_80_05_30

Fan coil unit air conditioning systems

Systems

Ss_65_80_05_30 Fan coil unit air conditioning systems

1. Description: Mitsubishi City Multi HVRF fan coil units to provide heating and comfort cooling as described in section Ss_60_60_70_94.
2. System performance: [Ss_65_80_05/210 Design of air conditioning systems](#)
3. Type of system: HVRF Heat Recovery
4. Air filters: Panel air filters
5. Silencers and acoustic treatment: [Pr_65_67_78_72 Rectangular attenuators Type A](#)
6. Air ductwork and accessories
 - 6.1. Ductwork: [Pr_65_65_25_72 Rectangular sheet metal ductwork and fittings Type A](#)
 - 6.2. Accessories: [Pr_65_65_25_32 Flexible ductwork Type A](#)
7. Fire-stopping: Individual services penetrations fire-stopping system.
8. Thermal insulation on supply air ductwork: Phenolic foam insulation type C
9. Vibration isolation mountings: Compression isolators; Spring isolators Type A; [Pr_80_77_94_42 Isolation hangers type C](#)
10. Room supply air terminals: [Pr_70_65_04_48 Linear air diffusers](#)
11. Condensate pipelines: [Pr_65_52_63_89 Unplasticized polyvinyl chloride \(PVC-U\) pipes](#)
12. Controls: [Ss_75_70_52_29 Fan coil unit air conditioning control systems](#)
13. Identification of ductwork and equipment: [Pr_40_10_57_79 Self-adhesive plastics ductwork labels and transfers](#)
14. Testing: Cooling performance, air flow rates at terminals and overall noise level to be proven.
15. System completion: [Ss_65_80_05/810 Commissioning of air distribution systems](#)

Ss_75_70_52_29 Fan coil unit air conditioning control systems

1. Description: Fan coil units shall be controlled by the central Mitsubishi AE200 controller which in turn is linked to the BMS to accept room set points and time clock control.

System performance

Ss_65_80_05/210 Design of air conditioning systems

1. Design: Complete the design of the air conditioning systems.
2. Standard: Performance to [BS EN 16798-3](#).
3. Requirement: Submit proposals including detailed design drawings, technical information, calculations and manufacturers' literature.

Products

Pr_40_10_57_79 Self-adhesive plastics ductwork labels and transfers

1. Description: To identify ductwork function and direction of air flow.
2. Manufacturer: Contractor's choice
3. Standard: To [BS 1710](#).
4. Identification type: Self-adhesive plastics or transfers.
5. Execution: [Pr_40_10_57/650 Installing ductwork identification Type B](#)

Pr_65_52_63_89 Unplasticized polyvinyl chloride (PVC-U) pipes

1. Description: FCU Condensate pipework
2. Manufacturer: Contractor's choice
3. Standards
 - 3.1. Pipe: To [BS EN ISO 1452-2](#).
 - 3.2. Fittings: To [BS EN ISO 1452-3](#).
4. Colour: Cream.
5. Execution: [Pr_65_52_63/645 Installing plastics pipework type B](#)
6. Verification

Pr_65_65_25_32 Flexible ductwork Type A

1. Description: Permissible for final connections between FCU and supply plenum. Max 300mm length, installed taught and without bends.
2. Manufacturer: Contractor's choice
3. Standard: To [BESA DW/144](#).
4. Flexible ductwork: Acoustic. Insulated metallic.
5. Material: Aluminium and polyester laminate encapsulating high tensile steel wire helix.

Pr_65_65_25_72 Rectangular sheet metal ductwork and fittings Type A

1. Manufacturer: Contractor's choice
2. Standards: To [BESA DW/144](#), [BS EN 1505](#) and [BS EN 1507](#).
3. Classification: Class A.
4. Material: Aluminium.
5. Regulating dampers
 - 5.1. Standard: To [BESA DW/144](#).
 - 5.2. Regulating function: Balancing.
 - 5.3. Damper type: Opposed blade.
 - 5.4. Operation: Manual.
 - 5.5. Material: To match ductwork.
6. Access openings
 - 6.1. Purpose: Inspection. Cleaning. Maintenance.
 - 6.2. Sizes: To [BS EN 12097](#).
7. Execution: [Pr_65_65_25/610 Air ductwork generally Type A](#)

Pr_65_67_78_72 Rectangular attenuators Type A

1. Description: Acoustic attenuators as listed in the mechanical schedules
2. Manufacturer: Environmental Equipment Corporation Ltd
3. Application: Extract. Supply.
4. Performance standards: To [BS EN ISO 7235](#) and [BS EN ISO 11691](#).
5. Duty
 - 5.1. Insertion loss: Refer to schedules
 - 5.2. Air volume: Refer to schedules
 - 5.3. Permissible pressure loss: Refer to schedules
6. Casing material: Metal.
7. Lining material: Inert, fire proof, inorganic and non-hygroscopic.

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8. **Markings:** Show direction of air flow on silencer.

Pr_70_65_04_04 Air plenum boxes

1. **Manufacturer:** Contractor's choice
2. **Configuration:** Single plenum box.
3. **Construction:** Sturdy and rigid with circular inlet spigots of 65 mm minimum length.
4. **Fixing:** Incorporate means for fixing to, or suspending from, building or other construction.

Pr_70_65_04_48 Linear air diffusers

1. **Manufacturer:** As Mechanical Schedules
2. **Standards**
 - 2.1. Mixed flow applications: To [BS EN 12238](#).
 - 2.2. Sound power levels: To [BS EN ISO 5135](#).
3. **Application:** Supply. Extract.
4. **Diffuser:** Rectangular linear. Slot.
5. **Position:** Ceiling. Wall.
6. **Accessories:** [Pr_70_65_04_04 Air plenum boxes](#)
7. **Execution:** [Pr_70_65_04/660 Installing linear and slot diffusers](#)

Pr_80_77_94_42 Isolation hangers type C

1. **Manufacturer:** Contractor's choice
2. **Isolation hangers type:** Spring and neoprene rubber.
3. **Drop rod misalignment capability:** 15%.

Execution

Pr_40_10_57/650 Installing ductwork identification Type B

1. **Standard:** In accordance with [BS 1710](#).
2. **Method:** Securely fix labels.
3. **Information:** Air being conveyed, direction of flow, destination of the air.

Pr_65_52_63/610 Pipework installation generally type C

1. **Standard:** [BESA Technical Report TR/20/7 Condenser and cooling water](#).
2. **Dissimilar metals:** Prevent electrolytic corrosion.

Pr_65_52_63/645 Installing plastics pipework type B

1. **General requirements:** [Pr_65_52_63/610 Pipework installation generally type C](#)
2. **Pipe material:** Acrylonitrile butadiene styrene.
3. **Joining method:** Solvent.

Pr_65_65_25/610 Air ductwork generally Type A

1. **Cut edges on ductwork, flanges and supports:** Smooth and burr-free.

Pr_70_65_04/610 Installing air terminal devices Type B

1. **General:** Do not distort air terminal devices. Fix securely.
2. **Air leakage:** Prevent. Seal joints with self adhesive foam strip or equivalent.

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3. **Appearance:** Finish visible edge joints neatly. Do not leave sharp edges and protruding screws.
 4. **Operation:** Fit so that moving parts operate correctly and removable cores can be taken out and replaced.
 5. **High level and ceiling applications:** On removable cores, provide safety wires with quick release ends.

Pr_70_65_04/660 Installing linear and slot diffusers

1. General requirements: [Pr_70_65_04/610 Installing air terminal devices Type B](#)
2. Method: Bracket from plenum box.

System completion

Ss_65_80_05/810 Commissioning of air distribution systems

1. Pre-commissioning: In accordance with [BSRIA BG 49/2015](#) and [CIBSE Commissioning Code A](#).
2. Commissioning: In accordance with [BSRIA BG 49/2015](#) and [CIBSE Commissioning Code A](#).
3. Notice (minimum): One week.

Ω End of System

Ss_75_50_50_96

Water leak detection and alarm systems

Systems

Ss_75_50_50_96 Water leak detection and alarm systems

1. **Description:** The contractor shall supply and install a water guard type leak detection system on the incoming water main to detect unusual flows.

The leak detection system shall be linked to solenoid valves which shall also be PIR activated to prevent leaks or taps being maliciously left running.

The water control system shall fully comply with the requirements of the targeted BREEAM credits and the contractor shall review the BREEAM tracker at tender stage to ensure that all requirements are included.

2. **System performance:** [Ss_75_50_50/210 Design of liquid presence, leak detection and alarm systems](#)
3. **System manufacturer:** Contractor's choice
4. **Control panel:** [Pr_75_50_18_47 Liquid leak detection control panels](#)
5. **Metering equipment:** [Pr_80_51_51_97 Water meters](#)
6. **Containment:** [Pr_65_70_11_71 Rigid conduit](#)
7. **Concealed installation:** Required.
8. **Isolating valve:** [Pr_65_54_95_18 Copper alloy service stop valves](#)
9. **Alarm indication:** [Pr_70_75_94_28 Electronic sounders](#)
10. **System accessories:** Automatic shut-off valves. SMS text messaging unit.
11. **Execution:** [Ss_75_50_50/665 Installing pulsed output water meters for leak detection and alarm systems](#); [Ss_75_50_50/680 Installing sounders for liquid presence, leak detection and alarm systems](#)
12. **System completion:** [Ss_75_50_50/810 Testing and commissioning of liquid presence, leak detection and alarm systems](#)

System performance

Ss_75_50_50/210 Design of liquid presence, leak detection and alarm systems

1. **Design:** Complete the design of the liquid presence detection and alarm system.
2. **Standard:** To [BS EN 13160-1](#).
3. **Liquid to be detected:** Water.
4. **Areas to be protected:** All mains water supply between the building and the site boundary.
5. **Zone diagram:** Submit for liquid presence detection and alarm system.
6. **Verification**
 - 6.1. **Submittals:** Submit proposals including detailed design drawings, technical information, calculations and manufacturers' literature.

Products

See [90-10-90/305 Connections for accessories type A](#) in [Ss_55_70_38_40 Incoming water supply systems](#)

See [Pr_65_54_95_18 Copper alloy service stop valves](#) in [Ss_55_70_38_40 Incoming water supply systems](#)

Pr_65_70_11_71 Rigid conduit

1. Manufacturer: [Marshall-Tufflex Ltd](#)
2. Contact details
 - 2.1. Address: 55-65 Castleham Road
St. Leonards-on-Sea
East Sussex
TN38 9NU
 - 2.2. Telephone: [+44 \(0\)1424 856600](tel:+44(0)1424856600)
 - 2.3. Web: <https://www.marshall-tufflex.com>
 - 2.4. Email: sales@marshall-tufflex.com
3. Standards: To [BS EN 61386-1](#) and [BS EN IEC 61386-21](#).
4. Resistance to external influences
 - 4.1. Protection against ingress of solid objects (minimum): To [BS EN 60529](#), IP3X.
 - 4.2. Protection against ingress of water (minimum): To [BS EN 60529](#), IPX0.

Pr_70_75_94_28 Electronic sounders

1. Description: Leak Detection Sounders, installed in cupboards adjacent to WC
2. Manufacturer: Contractor's choice
3. Ingress protection (minimum): To [BS EN 60529](#), IP 44.
4. Colour: White.
5. Directional output at 1 m (minimum): 65 dB(A). 100 dB(A).
6. Flashing beacon: Integral.
7. Mounting: Surface.

Pr_75_50_18_47 Liquid leak detection control panels

1. Manufacturer: Contractor's choice
2. Standards: To [BS EN 61010-1](#).
3. Nominal voltage: 230 V a.c.
4. Nominal frequency: 50 Hz.
5. Number of zones: Two.
6. Controls
 - 6.1. Display type: LEDs.
 - 6.2. Display the following information: Internal leak detected.
 - 6.3. Audible indication: On-board tone generator.
 - 6.4. Outputs: Valve shut-off. Voltage-free alarm contacts.
7. Features: Fully programmable to detect different leakage rates over set time periods. Integral timer with facility for out-of-hours shut-off, and shut-off following detection of excessive consumption.
8. Communications: BMMS connection.
9. Properties

Pr_80_51_51_97 Water meters

1. Manufacturer: Contractor's choice
2. Standards: To [BS EN ISO 4064-1](#) and [BS EN ISO 4064-4](#).
3. Third-party certification: [WRAS](#)-approved.
4. Format: In-line meters.

5. Indicating device: Type 1 - analogue.
6. Features: Pulsed output for remote monitoring.

Execution

See [90-10-90/670 Valve tests](#) in [Ss_55_70_38_40 Incoming water supply systems](#)

See [Pr_65_54_95/610 Installation of valves generally](#) in [Ss_55_70_38_20 Direct hot water storage supply systems](#)

Ss_75_50_50/665 Installing pulsed output water meters for leak detection and alarm systems

1. Position: On consumer's side of building stopcock.
2. Connection to programmable control units: Required.

Ss_75_50_50/680 Installing sounders for liquid presence, leak detection and alarm systems

1. Standard: In accordance with [BS 7671](#), as amended by [BS 7671 Corrigendum](#) and [BS 7671 Amendment 3](#).
2. Position: In plant cupboard adjacent to WC
3. Circuit wiring: Interconnect internal and external sounders with alarm output in programmable control unit.

System completion

Ss_75_50_50/810 Testing and commissioning of liquid presence, leak detection and alarm systems

1. Notice before commencing tests (minimum): Seven days.
2. Sensor list: Before commissioning, submit proposed sensor and zone names.
3. Schedule of tests and method statement: Submit.
4. Sensor calibration: As manufacturers' instructions.
5. Sensor testing: Verify operation of each device.
6. Alarm signalling: Verify operation.
7. Connections with other systems and equipment: Verify and demonstrate operation of the systems and equipment under leak and alarm conditions.
8. Audible signal sound level: Measure.
9. Battery backup testing
 - 9.1. Mains power supply: Isolate.
 - 9.2. Quiescent mode: Measure current supplied by standby source when liquid presence or leak detection and alarm system is operating in the quiescent mode.
10. Results: Submit.
11. Certificates of calibration for meters and instruments: Submit.

Ω End of System

Ss_75_70_54_10

Building monitoring and management systems

Systems

Ss_75_70_54_10 Building monitoring and management systems

1. **Description:** The contractor shall liaise with HRP and Harley Haddow to develop a suitable BMS specification to control The Reveller and Moat Arches. It is assumed that the system will be TREND based and will integrate fully into the wider TOL Building Control System.

HVRF Heating and Cooling

Provide time, temperature and fan speed control as well as fault monitoring linked to a central controller located within the Reveller such as a AE200 panel.

Hot Water Heating

Provide timeclock control and fault monitoring.

Leak Detection

Provide critical alarms.

Supply and Extract Ventilation

Provide time, air quality and flow rate control as well as fault monitoring to the AHUs.

The Reveller WC extract fan shall be provided with time and flow rate control.

The arches extract fans shall be locally controlled only.

The BMS scheme including DESOPS and Points Schedule shall be submitted in advance to HRP and Harley Haddow for review and approval prior to installation.

2. **System performance:** [Ss_75_70_54/210 Design](#);
[Ss_75_70_54/215 Meter data](#);
Water supply systems monitoring and management;
Gas supply systems monitoring and management;
Heating systems monitoring and management;
Ventilation systems monitoring and management;
and Display and information systems monitoring and management.
3. **Water supply systems linked to BMMS:** Cold water inc leak detection.
Instantaneous hot water.
4. **Heating systems linked to BMMS:** Hybrid VRF System
5. **Cooling systems linked to BMMS:** Hybrid VRF System
6. **Ventilation systems linked to BMMS:** Mechanical supply and Mechanical extract.
7. **Detection and alarm systems linked to BMMS:** Fire detection and alarm system and Water leak detection and alarm system.
8. **Display and information systems linked to BMMS:** Contractor's design .
9. **Communications network type:** Wired local area network.
10. **Equipment:** [Pr_80_77_28_49 Low-voltage switchgear enclosures](#) and [Pr_75_50_20_29 Field controllers](#).
11. **Computer components:** See Above
12. **Execution:** [Ss_75_70_54/620 Installation of building monitoring and management systems](#);
[Ss_75_70_54/630 Installation of field controllers](#);
[Ss_75_70_54/640 Installation of cables](#);
and [Ss_75_70_54/650 Installation of sensors](#).

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13. System completion: [Ss_75_70_54/810 Inspection and testing](#);
[Ss_75_70_54/820 Commissioning](#);
and [Ss_75_70_54/830 Documentation](#).

System performance

Ss_75_70_54/210 Design

1. Design: Complete the design of the building management system to the performance requirements of the specification.
2. Standards
 - 2.1. Communications network: To [BS EN 50174-1](#).
 - 2.2. Communications protocol: To [BS EN ISO 16484-5](#).
 - 2.3. Documentation of plant and application specific functions: To [BS EN ISO 16484-3](#).
3. Requirements: Submit proposal including detailed design drawings, technical information, calculations and manufacturers' literature.
4. Requirement: Submit proposals including detailed design drawings, technical information, calculations and manufacturers' literature.

Ss_75_70_54/215 Meter data

1. Software functions: Acceptance of data from other sources;
Automatic production of routine reports;
Historical analysis of energy consumptions;
Immediate warning of exceptions, such as parameters exceeding preset limits;
Instant access on demand to data from individual meters;
Retrieval, checking and collation of metered data;
and Review of data in flexible format, allowing comparison between different time periods and meter locations.

Products

Pr_75_50_20_29 Field controllers

1. Manufacturer: Polar Bear Zentium
2. Standard: To BSRIA [Application Guide 9/2001](#).
3. Network communications options: BACnet MS/TP.
4. Port arrangement: Submit proposals .
5. Controller inputs, sensors and devices: As data point schedule.
6. Controller outputs, actuators and switching devices: As data point schedule.
7. User interfaces: Access password protected programmable LCD with back light.
8. Accessories: Keypad/ display unit.
9. Execution: [Pr_75_50_20/606 Installing control components](#).

Pr_80_77_28_49 Low-voltage switchgear enclosures

1. Manufacturer: Submit proposals .
2. Standard: To [BS EN 62208](#).
3. Ingress protection (minimum): To [BS EN 60529](#), IP65.
4. Impact protection (minimum): Manufacturer's standard .
5. Dimensions
 - 5.1. Length: Submit proposals .
 - 5.2. Width: Submit proposals .

- 5.3. Height: Submit proposals .
- 6. Material: Sheet steel.
- 7. Finish: Epoxy powder coated.
- 8. Access: Hinged door.
- 9. Handles: Required.
- 10. Internal mounting plate: Submit proposals .
- 11. Cable gland plate: Removable.
- 12. Mounting: Surface mounted.
- 13. Arrangement: Floor or Wall.
- 14. EMC shielding performance (minimum): To [BS EN 61000-5-7](#), EMxxxxxx.
- 15. Service conditions: Normal.
- 16. Hardware: Cylinder lock and handle. Standardize key type.
- 17. Labelling: Describe controlgear purpose.

Execution

Pr_75_50_20/606 Installing control components

- 1. Position:
- 2. Insulation: Submit details of proposed insulation method where control components are on insulated pipelines.
- 3. Supports: Do not strain components.
- 4. Access: Adequate for operation and maintenance.

Ss_75_70_54/620 Installation of building monitoring and management systems

- 1. General: Install in accordance with [BSRIA AG 9/2001](#).

Ss_75_70_54/630 Installation of field controllers

- 1. Clearance (minimum)
 - 1.1. Front access: 1000 mm in front of field controller.
 - 1.2. Mounting height: 1000 mm from finished floor level.
- 2. Fixing equipment: Fix independently of wiring installation, with zinc electroplated fasteners and Fix on DIN rail mounted within enclosure.

Ss_75_70_54/640 Installation of cables

- 1. Timing: Do not start internal cabling until building enclosure provides permanently dry conditions.
- 2. Cables: Install in one uninterrupted run.
- 3. Arrangement: Position vertically and horizontally in line with equipment served, and parallel with building lines. Provide drip loop to prevent water entering equipment.
- 4. Orientation: Dress cables flat, free from twists, kinks and strain.
- 5. Cable pulling
 - 5.1. Cable: Do not overstress.
 - 5.2. Installation method: Submit proposals .
- 6. Jointing: At equipment and terminal fittings only.
- 7. Cables routes generally: Submit proposals .
- 8. Cables from other systems

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- 8.1. Segregation: Segregate and cross at right angles.
 - 8.2. Distance from steam and low temperature hot water systems running parallel: 500 mm minimum.
 - 9. Cable terminations: Support cable within 150 mm of termination.
 - 10. Balanced twisted-pair cabling
 - 10.1. Maximum untwist at terminations: 12 mm.

Ss_75_70_54/650 Installation of sensors

- 1. General: Install in accordance with [BCIA Sensor Installation](#).

System completion

Ss_75_70_54/810 Inspection and testing

- 1. Standard: To [BS 7671](#).
- 2. Notice before commencing tests (minimum): 24 h.
- 3. Certificates
 - 3.1. Submission: On completion.
 - 3.2. Number of copies: 2.
- 4. Test equipment identity: Record on test certificates.
- 5. Certificates of calibration: Submit for each test instrument.
- 6. Control panel test certificates
 - 6.1. Submission: On completion.
 - 6.2. Number of copies: 2.

Ss_75_70_54/820 Commissioning

- 1. General: Commission in accordance with [BSRIA AG 9/2001](#) and [BCIA Start up and commissioning guide](#).

Ss_75_70_54/830 Documentation

- 1. Operation and maintenance instructions
 - 1.1. Scope: Submit giving optimum settings for controls.
 - 1.2. Product information: Include product description, date of purchase, performance characteristics, application (suitability for use), method of operation and control, and cleaning and maintenance requirements.
 - 1.3. Format: Paper copy.
 - 1.4. Number of copies: Two.
- 2. Record drawings
 - 2.1. 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.
 - 2.2. Format: A1 paper print and Electronic.
 - 2.3. Number of copies: Two.
- 3. Cable schedules
 - 3.1. Location: Submit proposals .
 - 3.2. Format:
 - 3.3. Size: Submit proposals .
 - 3.4. Contents: Submit proposals .

4. Submittal date: At handover.

Ω End of System

Pr_65_52_03_37

High-density polyethylene (HDPE) above-ground drainage pipes and fittings

Products

Pr_65_52_03_37 High-density polyethylene (HDPE) above-ground drainage pipes and fittings

1. Description: Foul Drainage above ground
2. Manufacturer: [Geberit Sales Ltd](#)
3. Contact details
 - 3.1. Address: Geberit House
Edgehill Drive
Warwick
Warwickshire
United Kingdom
CV34 6NH
 - 3.2. Telephone: [+44 \(0\)1926 516800](#)
 - 3.3. Web: [www.geberit.co.uk](#)
 - 3.4. Email: enquiries@geberit.co.uk
4. Product reference: [HDPE Pipework](#)
5. Pipe diameter: 110 mm
6. Bracketry: Resilient Hangers
7. Jointing: Electroweld coupling Ring-seal jointing
8. Execution: [Pr_65_52_03/630 Fixing and jointing rainwater and above ground drainage pipes](#)

Execution

Pr_65_52_03/630 Fixing and jointing rainwater and above ground drainage pipes

Shared by: [Pr_65_52_03_52 Modified unplasticized polyvinyl chloride \(MUPVC\) above-ground wastewater pipes and fittings Type A](#)

1. Fixing
 - 1.1. Supports
 - 1.1.1.Stability: Fix securely.
 - 1.1.2.Fixing centres (nominal): At least at every storey level. Tighten fixings as work proceeds so that every storey is self-supporting.
 - 1.2. Pipework
 - 1.2.1.Alignment: Plumb and/ or true to line.
 - 1.2.2.Externally socketed pipes and fittings: Fix with socket ends forming inlet for each individual pipe.
2. Jointing
 - 2.1. Jointing differing pipework systems: Use adaptors intended for the purpose.
 - 2.2. Cut ends of pipes: Clean and square. Remove burrs and swarf. Chamfer ends of plastics pipes before inserting into ring seal sockets. Where metal pipes are to be used, recoat bare metal with appropriate primer and paint.

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- 2.3. **Jointing or mating surfaces:** Clean and, where necessary, use jointing lubricant immediately to allow safe and efficient jointing assembly.
 - 2.4. **Unsealed joints:** Wedge unsealed joints to cast pipes with timber or sheet lead cut-offs to centralize pipe joints and reduce rattling.
 - 2.5. **Expansion joint pipe sockets:** Fix rigidly to buildings. Elsewhere, provide brackets and fixings that allow pipes to slide.
 - 2.6. **Solvent-welded pipelines:** Install ring seal joints in all long runs of solvent-welded pipework, as movement joints.
3. **Wall and floor penetrations:** Provide appropriate sleeves and fire collars

Ω End of Product

Pr_65_52_03_52

Modified unplasticized polyvinyl chloride (MUPVC) above-ground wastewater pipes and fittings Type A

Products

Pr_65_52_03_52 Modified unplasticized polyvinyl chloride (MUPVC) above-ground wastewater pipes and fittings Type A

1. Description: Above ground drainage branch fittings
2. Manufacturer: Contractor's choice
3. Material and standard: To [BS EN 1566-1](#), application area code B.
4. Jointing type: Solvent-weld.
5. Nominal sizes: DN 32. DN 40. DN 50.
6. Colour: Grey. White where exposed to view.
7. Integral accessories: Access fittings.
8. Execution: [Pr_65_52_03/630 Fixing and jointing rainwater and above ground drainage pipes](#)

Execution

See [Pr_65_52_03/630 Fixing and jointing rainwater and above ground drainage pipes](#) in
[Pr_65_52_03_37 High-density polyethylene \(HDPE\) above-ground drainage pipes and fittings](#)

Ω End of Product

