600682
New Chantry Centre

Full Specification

11/02/2019

Table of Contents

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Specification

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50-10-05/120 Above ground wastewater drainage system with internal stacks

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System outline

50-10-05/120 Above ground wastewater drainage system with internal stacks

- **Description:** The Contractor shall supply and install the above ground drainage system in accordance with the requirements of the building and the relevant regulations and standards.

  The above ground system is to be connected to all the building's wastewater appliances as indicated on the architectural drawings and will run via branch pipework into the soil vent pipes also shown on the architectural drawings. The soil vent pipes shall drop vertically and connect to the below ground drainage system. The installation is to be inclusive of all pipework, fixtures, fittings, supports and ancillaries.

  The design and installation is to provide suitable access points for maintenance at each appliance connection point, on each soil vent pipe at each level, and at each change of direction, junction and offset.

  Where visible, any pipework and fittings are to be agreed by the architect.

  The system is to also manage the condensate, overflow and safety discharge drainage of all mechanical equipment within the plantroom and dwellings.

  The complete above ground drainage system shall be supplied by Polypipe Terrain or equal and approved.
- **System performance:** The works comprise the installation of new soil and waste pipes all as indicated on the architectural drawings.

  Relevant Codes of Practice & Regulations
  British Standard Code of Practice B.S. 5572 Sanitary Pipework, as last revised at date of Tender shall apply.

  All work is to comply with the Building Regulations and generally be carried out to the complete satisfaction of the Project Manager and the local Drainage Authority inspectorate. All waste runs over 3m in length to be 50mm diameter or as indicated on the mechanical drawings.

  All traps to comply with the sizes given in Table 1 in the Building Regulations Part H: 2002. Traps should be provided with a cleaning eye. Rodding points in the stacks should be above the spillover level of appliances.

  The Contractor shall give all notices legally required in the manner of the works.
- **System manufacturer:** Polypipe Terrain - Equal and approved.
- **Floor drainage:**

  Preparation to existing floors: To be defined.

  Floor channels and gullies: 90-05-20/306 Floor gullies.

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Covers and gratings: 90-05-20/308 Covers and gratings for floor gullies.

Supports:

Bedding: 45-55-20/340 Pre-blended concrete.

Backfill: 45-55-20/340 Pre-blended concrete.

Fixings: Submit proposals.

- **Sanitary pipework:**

Small diameter branch discharge pipework:

Traps: 90-10-60/410 Sanitary appliance traps.

Pipelines and fittings: 90-10-20/326 ABS above ground wastewater branch discharge pipelines;
90-10-20/336 Polypropylene above ground wastewater branch discharge pipelines;
and 90-10-20/354 Unplasticized polyvinyl chloride (PVC-U) above ground drainage pipelines.

Accessories for jointing: 45-75-90/412 PTFE thread sealing tape and Solvent welding cement.

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

Fixings: Contractor's design.

Large diameter branch discharge pipework:

Pipelines and fittings: 90-10-20/336 Polypropylene above ground wastewater branch discharge pipelines and 90-10-20/354 Unplasticized polyvinyl chloride (PVC-U) above ground drainage pipelines.

Accessories for jointing: Submit proposals.

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

Fixings: Contractor's design.

Insulation: 90-90-40/330 Mineral wool pipe section insulation type A.

Discharge stack pipework:

Pipelines and fittings: 90-10-20/336 Polypropylene above ground wastewater branch discharge pipelines and 90-10-20/354 Unplasticized polyvinyl chloride (PVC-U) above ground drainage pipelines.

Accessories for jointing: Submit proposals.

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

Fixings: Contractor's design.

Insulation: 90-90-40/330 Mineral wool pipe section insulation type A.

- **Ventilating pipework:**

Ventilating branch pipework:

Pipelines and fittings: 90-10-20/326 ABS above ground wastewater branch discharge pipelines;
90-10-20/336 Polypropylene above ground wastewater branch discharge pipelines;
and 90-10-20/354 Unplasticized polyvinyl chloride (PVC-U) above ground drainage pipelines.

Accessories for jointing: 45-75-90/412 PTFE thread sealing tape.

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

Fixings: Contractor's design.

Ventilating stack pipework:

Pipelines and fittings: 90-10-20/336 Polypropylene above ground wastewater branch discharge pipelines and 90-10-20/354 Unplasticized polyvinyl chloride (PVC-U) above ground drainage pipelines.

Accessories for jointing: Submit proposals.

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

Fixings: Contractor's design.

- **Prefabricated branch and stack pipework:**

  Pipelines and fittings: To be defined.

  Supports: To be defined.

  Fixings: To be defined.

  Insulation: To be defined.

- **Overflow pipework:**

  Pipelines and fittings: 90-10-20/326 ABS above ground wastewater branch discharge pipelines;
  90-10-20/336 Polypropylene above ground wastewater branch discharge pipelines;
  and 90-10-20/354 Unplasticized polyvinyl chloride (PVC-U) above ground drainage pipelines.

  Accessories for jointing: 45-75-90/412 PTFE thread sealing tape.

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

  Fixings: Contractor's design.

- **Pipework identification:** 90-90-55/430 Identifying pipework type A.
- **Fire stopping:**

  Floor penetrations: 90-10-60/405 Pipe sleeves type A;
  45-45-70/433 Flexible intumescent gap sealer;
  and 45-55-75/375 Intumescent foam fillers.

  Wall penetrations: 45-45-70/433 Flexible intumescent gap sealer;
  45-55-75/375 Intumescent foam fillers;
  and 90-10-60/405 Pipe sleeves type A.

- **System accessories:** Access fittings and 90-10-90/400 Air admittance valves.
- **Execution:** 50-10-05/610 Installing above ground wastewater drainage systems.
- **System completion:** 50-10-05/810 Testing above ground wastewater drainage systems generally and 50-10-05/860 Documentation.

Products

45-45-70/433 Flexible intumescent gap sealer

- **Manufacturer:** Contractor's choice.
- **Third party certification:** Manufacturer's standard.
- **Size:** Manufacturer's standard.

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45-55-20/340 Pre-blended concrete

- **Manufacturer:** Contractor's choice.
- **Shelf life of pre-blended concrete:** Manufacturer's standard.
- **Execution:**
  .

45-55-75/375 Intumescent foam fillers

- **Manufacturer:** Contractor's choice.
- **Material:** Manufacturer's standard.
- **Colour:** Natural.
- **Execution:** 45-55-75/610 Suitability of joints for sealant application and 45-55-75/620 Joint preparation for sealant application.

45-75-90/412 PTFE thread sealing tape

- **Manufacturer:** Contractor's choice.
- **Standards:** To BS 7786 and To BS EN 751-3.
- **Material:** Unsintered polytetrafluorethylene (PTFE) tape.
- **Thickness:** Manufacturer's standard.
- **Width:** Manufacturer's standard.

90-05-20/306 Floor gullies

- **Manufacturer:** Wade International Ltd.
- **Product reference:** Submit proposals.
- **Floor finish:** Manufacturer's standard.
- **Floor gullies:**
  - **Body:** Manufacturer's standard.
  - **Material:** Manufacturer's standard.
- **Outlet:** Type and direction to suit pipelines.
- **Integral accessories:** Manufacturer's standard.
- **Execution:** 90-05-20/620 Installing floor gullies.

90-05-20/308 Covers and gratings for floor gullies

- **Manufacturer:** Contractor's choice.
- **Cover type:** Manufacturer's standard.
- **Form:** Flat.
- **Loading:** Light wheeled traffic.
- **Material:** Manufacturer's standard.
- **Outlet:** Type and direction to suit pipelines.
- **Integral accessories:** Manufacturer's standard.
- **Execution:** 90-05-20/620 Installing floor gullies.

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90-10-20/326 ABS above ground wastewater branch discharge pipelines

- **Manufacturer:** Polypipe Terrain.
- **Standard:** To BS 5255 and To BS EN 1455-1, application area code B.
- **Third party product certification:** BSI Kitemark.
- **Jointing type:** Solvent weld.
- **Nominal sizes:** Manufacturer's standard.
- **Colour:** Grey and White where exposed to view.
- **Integral accessories:** Access fittings.

90-10-20/336 Polypropylene above ground wastewater branch discharge pipelines

- **Manufacturer:** Polypipe Terrain.
- **Standard:** To BS 5255 and To BS EN 1451-1, application area code B.
- **Third party product certification:** Manufacturer's standard.
- **Jointing type:** Manufacturer's standard.
- **Nominal sizes:** Manufacturer's standard.
- **Colour:** Grey and White where exposed to view.
- **Integral accessories:** Access fittings.

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

- **Manufacturer:** Submit proposals.
- **Pipe location:** External and Internal.
- **Arrangement:** Manufacturer's standard.
- **Form:** Manufacturer's standard.
- **Material:** Manufacturer's standard.
- **Finish:** To match pipelines.

90-10-20/354 Unplasticized polyvinyl chloride (PVC-U) above ground drainage pipelines

- **Manufacturer:** Polypipe Terrain.
- **Standard:** To BS 4514 and To BS EN 1329-1.
- **Third party product certification:** BSI Kitemark certified.
- **Nominal sizes:** Manufacturer's standard.
- **Colour:** Grey.
- **Integral accessories:** Manufacturer's standard.

90-10-60/405 Pipe sleeves type A

Shared by: 50-10-05/120 Above ground wastewater drainage system with internal stacks; 55-40-40/120 Cold water supply system; 55-40-40/150 Direct hot water storage supply system; and 60-45-40/110 Low temperature hot water heating system.

- **Manufacturer:** Submit proposals.
- **Material:** Manufacturer's standard.
- **Form:** Manufacturer's standard.

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90-10-60/410 Sanitary appliance traps

- **Manufacturer:** See architectural schedules.
- **Standard:** To BS EN 274-1, BS EN 274-2 and BS EN 274-3.
- **Third party product certification:** Manufacturer's standard.
- **Trap:** See architectural schedules.
- **Jointing:** Manufacturer's standard.
- **Material:** Manufacturer's standard.
- **Colour:** Manufacturer's standard.
- **Size:** Manufacturer's standard.
- **Depth of water seal (minimum):** Manufacturer's standard.
- **Integral accessories:** Manufacturer's standard.

90-10-90/400 Air admittance valves

- **Manufacturer:** Polypipe Terrain.
- **Standard:** To BS EN 12380.
- **Third party product certification:** Manufacturer's standard.
- **Material:** Manufacturer's standard.
- **Size:** 110 mm.
- **Jointing:** Manufacturer's standard.
- **Minimum air flow rate:** To BS EN 12056-2.

90-90-40/330 Mineral wool pipe section insulation type A

Shared by: 50-10-05/120 Above ground wastewater drainage system with internal stacks; 55-40-40/120 Cold water supply system; 55-40-40/150 Direct hot water storage supply system; and 90-90-40/480 Insulation for valves and flanges.

- **Manufacturer:** ROCKWOOL Ltd.
- **Product reference:** Contractor's choice.
- **Standard:** To BS 3958-4.
- **Recycled content:** 25% (minimum) to BS EN ISO 14021 and 50% (minimum) to BS EN ISO 14021.
- **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.
- **Finish:** Manufacturer's standard.
- **Insulation thickness (minimum):** To BS 5422, and Metropolitan Design Guide.
- **Accessories:**
  - **Vapour barrier:** 90-90-40/380 Vapour barrier.
  - **Protection:** 90-90-40/390 Protection.
  - **Insulation at loadbearing pipeline supports:** 90-90-40/485 Insulation at loadbearing pipeline supports.
  - **Insulation for valves and flanges:** 90-90-40/480 Insulation for valves and flanges.

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• **Execution:** 90-90-40/620 Installing canvas faced mineral insulation and 90-90-40/625 Installing foil faced mineral wool insulation on pipelines.		

90-90-40/360 Phenolic foam insulation type A

- **Manufacturer:** Kingspan Insulation Ltd.
- **Product reference:** The Kooltherm Pipe Insulation System.
- **Standard:** To BS EN 13166.
- **Kooltherm pipe insulation thickness:** In accordance with Metropolitan Design Guide.
- **Pipe support inserts:**
  - **Thickness:** To be defined.
- **Form:** To be defined.
- **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.
- **Finish:** To be defined.
- **Insulation thickness (minimum):** To be defined.
- **Accessories:**
  - **Vapour barrier:** To be defined.
  - **Protection:** To be defined.
  - **Insulation at loadbearing pipeline supports:** To be defined.
  - **Insulation for valves and flanges:** To be defined.
  - **Items to be insulated:** To be defined.
- **Execution:** 90-90-40/640 Installing phenolic foam insulation on pipelines.

90-90-40/380 Vapour barrier

Shared by: 90-90-40/330 Mineral wool pipe section insulation type A; type B and type C.

- **Material:** Flexible sheet.
- **Vapour permeability:** To BS 5422, clause 5.6.
- **Execution:** 90-90-40/780 Installing vapour barriers.

90-90-40/390 Protection

Shared by: 90-90-40/330 Mineral wool pipe section insulation type A; type B and type C.

- **Manufacturer:** Contractor's choice.
- **Material:** Submit proposals.
- **Colour:** Self finish.
- **Execution:** To be defined.

90-90-40/480 Insulation for valves and flanges

Shared by: 90-90-40/330 Mineral wool pipe section insulation type A; type B and type C.

- **Material:** 90-90-40/330 Mineral wool pipe section insulation type A and 90-90-40/360 Phenolic foam insulation type A.
- **Form:** Submit proposals.

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- **Finish:** Submit proposals.
- **Execution:** 90-90-40/740 Installing at valves and flanges.

90-90-40/485 Insulation at loadbearing pipeline supports

Shared by: 90-90-40/330 Mineral wool pipe section insulation type A; type B and type C.

- **Pipelines carrying fluids at temperature up to 120°C:** Manufacturer's standard.
- **Pipelines carrying fluids at temperatures above 120°C:** Manufacturer's standard.
- **Pipelines carrying cold fluids:** Manufacturer's standard.
- **Execution:** To be defined.

90-90-55/430 Identifying pipework type A

Shared by: 50-10-05/120 Above ground wastewater drainage system with internal stacks; 55-40-40/120 Cold water supply system; 55-40-40/150 Direct hot water storage supply system; 60-45-40/110 Low temperature hot water heating system; and 60-45-95/110 Variable refrigerant flow system .

- **Manufacturer:** Contractor's choice.
- **Standards:** To BS 1710.
- **Identification type:** Adhesive colour bands.
- **Execution:** 90-90-55/660 Installing identification on pipework.

Execution

45-55-75/610 Suitability of joints for sealant application

- **Joint dimensions:** Within limits specified for the sealant.
- **Substrate quality:** Surfaces regular, undamaged and stable.
- **Joints not fit to receive sealant:** Submit proposals for rectification.

45-55-75/620 Joint preparation for sealant application

- **Surfaces to which sealant must adhere:** Remove temporary coatings, tapes, loosely adhering material, dust, oil, grease, surface water and contaminants that may affect bond.
- **Cleaning:** Use materials and methods recommended by sealant manufacturer.
- **Vulnerable surfaces adjacent to joints:** Mask and Do not stain or smear with primer or sealant.

50-10-05/610 Installing above ground wastewater drainage systems

- **Standards:** To BS EN 12056-2 and BS EN 12056-5.
- **Collection and distribution of wastewater:**
  - **General:** Quick, quiet and complete; self-cleansing in normal use, without blockage, crossflow, backfall, leakage, odours, noise nuisance or risk to health.
  - **Pressure fluctuations in pipework (maximum):** ±38 mm water gauge.
  - **Water seal retained in traps (minimum):** 25 mm.
- **Pipelines:** Plumb and/ or true to line.
  - **Routes:**

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Routes generally: The shortest practical, with as few bends as possible.

Routes not shown on drawings: Submit proposals.

- **Jointing:** Joint with materials, fittings and techniques intended for the purpose and that will make effective and durable connections.

- **Allowance for thermal and building movement:** Provide and maintain clearance as fixing and jointing proceeds.
- **Concealed or inaccessible surfaces:** Decorate before starting work specified in clauses from this section.
- **Electrolytic corrosion:** Avoid contact between dissimilar metals where corrosion may occur.
- **Protection:**
  - **Purpose made temporary caps:** Fit to prevent ingress of debris.
  - **Access covers, cleaning eyes and blanking plates:** Fit as the work proceeds.

90-05-20/620 Installing floor gullies

Shared by: 90-05-20/306 Floor gullies; and 90-05-20/308 Covers and gratings for floor gullies.

- **Alignment:** Grating flush with finished floor.
- **Bedding:** Concrete.

90-90-40/610 Installing insulation and protection products generally

Shared by: 90-90-40/620 Installing canvas faced mineral insulation; 90-90-40/625 Installing foil faced mineral wool insulation on pipelines; 90-90-40/630 Installing nitrile rubber insulation on pipelines; and 90-90-40/640 Installing phenolic foam insulation on pipelines.

- **Standard:** In accordance with BS 5970.
- **Timing:** Insulate after installed system has been fully tested and joints proved sound.
- **Insulation:** Do not enclose adjacent units together.
- **Clearance:** Maintain between pipes.
- **Finish:** Neatly finish joints, corners, edges and overlaps.

90-90-40/620 Installing canvas faced mineral insulation

Shared by: 90-90-40/330 Mineral wool pipe section insulation type A; type B and type C.

- **General requirements:** 90-90-40/610 Installing insulation and protection products generally.
- **Joints:** Close butt; secure canvas overlaps with adhesive.
- **At fittings:** Mitre. Secure with adhesive.
- **Sealant:** Apply two coats of class 0 polymer solution.

90-90-40/625 Installing foil faced mineral wool insulation on pipelines

Shared by: 90-90-40/330 Mineral wool pipe section insulation type A; type B and type C.

- **General requirements:** 90-90-40/610 Installing insulation and protection products generally.
- **Joints:** Close butt; seal with 50 mm wide class 0 tape on both longitudinal and circumferential joints.
- **At fittings:** Mitre. Secure with tape.
- **Vapour seal:** Tape exposed insulation membrane. Seal vapour barrier at pipe support with class 0 tape.

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90-90-40/640 Installing phenolic foam insulation on pipelines

Shared by: 90-90-40/360 Phenolic foam insulation type A; type B and type C.

- **General requirements:** 90-90-40/610 Installing insulation and protection products generally.
- **Joints:** Close butt, seal with 50 mm wide class 0 tape on both longitudinal and circumferential joints.
- **At fittings:** Mitre. Secure with tape.
- **Vapour seal:** Tape exposed insulation membrane. Seal vapour barrier at pipe support with class 0 tape.

90-90-40/740 Installing at valves and flanges

- **Application:** Do not obstruct removal of nuts and bolts, or operation of valves.

90-90-40/780 Installing vapour barriers

Shared by: 90-90-40/350 Nitrile rubber insulation; and 90-90-40/380 Vapour barrier.

- **Integrity:** Seal to maintain throughout.

90-90-55/660 Installing identification on pipework

Shared by: 90-90-55/430 Identifying pipework type A and type B.

- **Application of basic identification colour:** Coloured bands as BS 1710 clause 3.3.
- **Safety colour identification:** On or next to the colour bands.
- **Information:** Colour bands as BS 1710 appendix D.
- **Direction of flow:** Indication arrow and the word FLOW or the letter F and Indication arrow and the word RETURN or the letter R.

System completion

50-10-05/810 Testing above ground wastewater drainage systems generally

- **Dates for testing:**
  - **Notice:** Required.
  - **Period of notice (minimum):** 5 working days.
- **Preparation:**
  - **Pipework:** Securely fixed and free from obstruction and debris.
  - **Traps:** Fill with clean water.
- **Testing:**
  - **Water for testing:** Supply clean water, assistance and apparatus.
  - **Smoke for testing:** Do not use.
- **Records of tests:** Submit.

50-10-05/860 Documentation

- **Operating and maintenance instructions:**
  - **Scope:** Submit for the system giving optimum settings for controls.

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– **Product information:** Include product description, date of purchase, performance characteristics, application (suitability for use), method of operation and control, and cleaning and maintenance requirements. – **Format:** Paper copy. – **Number of copies:** Two. • **Record drawings:** – **Content:** Location, size and route of above ground services. – **Format:** A1 paper print and Electronic. – **Number of copies:** Three. • **Submittal date:** At handover. Ω End of system		

55-40-40/110 Incoming water supply

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System outline

55-40-40/110 Incoming water supply

- **Description:** Chantry Centre will be fed with Mains Water.

  The contractor shall arrange with the Water supplier the new water supply and meter to the building.

  The new Water meter shall be installed where shown on the drawings and according to the Water supplier requirements, Building Regulations and WRAS Water regulations.
- **System performance:** 55-40-40/210 Design and detailing hot and cold water systems.
- **Water company:** Essex & Suffolk Water.
- **Volume flow rate:** To be defined by contractor
- **Position of incoming mains water supply:** Incoming water mains is as defined in the site services drawing.
- **Valves:** 90-10-90/310 Copper alloy service stop valves and 90-10-90/318 Backflow prevention devices.
- **System completion:** 55-40-40/850 Water quality tests.

System performance

55-40-40/210 Design and detailing hot and cold water systems

Shared by: 55-40-40/110 Incoming water supply; 55-40-40/120 Cold water supply system; and 55-40-40/150 Direct hot water storage supply system.

- **Design:** Complete the design and detailing of the hot and cold water supply.
- **Standard:** To BS 8558 or BS EN 806-2 and in accordance with HSE publication L8: Legionnaires' disease. The control of Legionella bacteria in water systems. Approved Code of Practice and guidance on regulations.
- **Requirement:** Submit proposals including detailed design drawings, technical information, calculations and manufacturer’s literature.

Products

90-10-90/310 Copper alloy service stop valves

- **Manufacturer:** Crane, Hattersley or equal approved
- **Standard:** To BS 6675.
- **Pattern:** To be defined.
- **Material:** Bronze and Dezincification resistant brass (DZR) copper alloy.

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- **Connections:** Compression to BS EN 1254-2 and Pressure tight threaded joints to BS EN 10226-1.
- **Execution:** 90-10-90/610 Installation of valves generally.

90-10-90/318 Backflow prevention devices

Shared by: 55-40-40/110 Incoming water supply; and 55-40-40/120 Cold water supply system.

- **Manufacturer:** To be defined.
- **Standards:**
  - **Anti-pollution check valves:** To BS EN 13959.
  - **Hose union:** To BS EN 14454.
  - **In-line anti-vacuum valves:** To BS EN 14451.
- **Arrangement:** Manufacturer's standard.
- **Material:** Copper alloy.
- **Connections:** Compression to BS EN 1254-2 and Flanged to BS EN 1092-3.
- **Execution:** 90-10-90/610 Installation of valves generally.

Execution

90-10-90/610 Installation of valves generally

Shared by: 90-10-90/310 Copper alloy service stop valves; 90-10-90/318 Backflow prevention devices; 90-10-90/330 Ball valves; 90-10-90/370 Thermostatic mixing valves; 90-10-90/374 Draining taps; 90-10-90/380 Ball valves, manually operated; 90-10-90/640 Installation of thermostatic radiator valves; and 90-10-90/670 Installation of check valves.

- **Installation:** In accordance with BS 6683.
- **Position:** As drawings. Contractor's choice where unspecified.
- **Isolation and regulation valves:** Provide at equipment and on sub-circuits.
- **Access:** Locate valves so they can be readily operated and maintained. Locate next to equipment which is to be isolated.
- **Connection to pipework:** Fit with joints that suit the pipe material.

System completion

55-40-40/850 Water quality tests

Shared by: 55-40-40/110 Incoming water supply; 55-40-40/120 Cold water supply system; and 55-40-40/150 Direct hot water storage supply system.

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

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• **Test results:** – **Record:** Details of all analyses. – **Submit:** On completion. – **Number of copies:** Electronic.		
Ω End of system		

55-40-40/120 Cold water supply system

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System outline

55-40-40/120 Cold water supply system

- **Description:** The new Chantry Centre will be supplied with Mains Cold Water. Cold water to the building and plantroom shall be provided from new water meter as shown on the drawings.

  The contractor shall connect the new water meter with all water outlets and plantrooms with new copper pipework (Table X) according to the drawings and specification report.

  The existing boilers are pressurised with a MIkrofill pressurisation Unit and expansion vessel.

  Gas Fired Water heater will be fed with Mains Cold Water and pressurised with an unvented kit. The contractor shall connect the new Gas Fire condensing boilers to the new Mains Cold water system with new copper pipework as shown on the drawings. A pressure reducing valve shall be installed in the system as indicated on the drawings. The contractor shall connect both Primary and Secondary HTG Sides to the new pressurisation and expansion as shown on the drawings.

  The contractor shall connect all outlets and appliances with copper pipework as indicated on the drawings. New isolation valves shall be installed as indicated on the drawings.

  The Contractor shall include for a thorough cleaning, flushing, sterilising and testing the new hot and cold domestic water systems installations in their entirety in accordance with BS EN 806 and leave in working order, free from any solder or other debris. Submit samples for laboratory testing for water quality and micro biological activity. Repeat the cleaning, flushing and sterilising until microbiological activity levels are acceptable, as dictated by laboratory's standard valves, and in accordance with HSE Approved Code of Practice Document L8.

  A provisional sum of £2000 shall be made for addressing any shortfall/defect in the new Mains Water Distribution and CWDS.
- **System performance:** 55-40-40/210 Design and detailing hot and cold water systems.
- **Arrangement:** Mains.
- **Water meters:** 90-65-55/470 Water meters.
- **Storage tank or cistern:** To be defined.
- **Water treatment plant:** Aquabion Water conditioner
- **Pipelines:**
  - **Below ground:** 90-10-65/365 Polyethylene (PE) pipelines for water supply.
  - **Above ground:** 90-10-65/310 Copper pipelines.
- **Pipeline accessories:**
  - **Expansion devices:** Submit proposals.
  - **Gauges:** 90-10-60/370 Pressure gauges.

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– **Accessories:** 90-10-60/405 Pipe sleeves type A; 90-10-60/420 Tundishes; and 90-10-60/405 Pipe sleeves type B. – **Pipeline supports:** 90-90-60/405 Pipe clips. • **Valves:** – **Float valves:** To be defined. – **Isolating valves:** 90-10-90/330 Ball valves. – **Check valves:** 90-10-90/348 Cast iron check valves and 90-10-90/352 Copper alloy check valves. – **Regulating valves:** To be defined. – **Mixing valves:** 90-10-90/370 Thermostatic mixing valves. – **Draining devices:** 90-10-90/374 Draining taps. – **Accessories:** 90-10-90/318 Backflow prevention devices. • **Thermal insulation:** – **Pipelines:** 90-90-40/330 Mineral wool pipe section insulation type A. – **Tanks:** To be defined. • **Vibration isolation:** 90-90-95/330 Spring isolators and 90-90-95/320 Compression isolators. • **Outlets:** 45-35-70/345 Taps and water supply fittings for sinks; 45-35-70/355 Urinal flushing valves; 45-35-70/371 Taps and water supply fittings for wash basins and troughs; 45-35-70/389 WC flushing valves; and 45-35-70/400 Drinking fountain packages. • **Drinking water outlets:** To be defined. • **Flush control devices:** 90-15-35/470 Flush control devices. • **Water coolers:** 90-15-35/480 Cooled water dispenser. • **Controls:** 75-75-50/110 Water supply systems control. • **Accessories:** To be defined. • **Plant and equipment identification:** 90-90-55/430 Identifying pipework type A; 90-90-55/480 Mechanical plant and equipment identification labels; 90-90-55/490 Valve charts and schematics; and 90-90-55/495 Valve identification labels. • **Execution:** 55-40-40/620 Installing hot and cold water systems generally; 55-40-40/650 Hydraulic pressure testing of hot and cold water supply systems; 55-40-40/660 Flushing hot and cold water systems; 55-40-40/670 Disinfection of hot and cold water systems; and 55-40-40/610 Removing hot and cold water systems. • **System completion:** 55-40-40/850 Water quality tests; 55-40-40/810 Commissioning of hot and cold water supply systems; 55-40-40/820 Inspection and test records; 55-40-40/830 Demonstrations; and 55-40-40/840 Documentation.		

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System performance

55-40-40/210 Design and detailing hot and cold water systems

Shared by: 55-40-40/110 Incoming water supply; 55-40-40/120 Cold water supply system; and 55-40-40/150 Direct hot water storage supply system.

- **Design:** Complete the design and detailing of the hot and cold water supply.
- **Standard:** To BS 8558 or BS EN 806-2 and in accordance with HSE publication L8: Legionnaires' disease. The control of Legionella bacteria in water systems. Approved Code of Practice and guidance on regulations.
- **Requirement:** Submit proposals including detailed design drawings, technical information, calculations and manufacturer's literature.

Products

45-35-70/345 Taps and water supply fittings for sinks

Shared by: 55-40-40/120 Cold water supply system; and 55-40-40/150 Direct hot water storage supply system.

- **Manufacturer:** To be defined.
- **Standards:** To BS 7942;
  To BS EN 200;
  To BS EN 817;
  To BS EN 1111;
  To BS EN 1286;
  To BS EN 1287;
  and To BS EN 15091.
- **Third party certification:** Water Regulations Advisory Scheme (WRAS) approved.
- **Form:** Thermostatic mixer taps.
- **Materials:**
  - **Body:** Brass.
  - **Finish and colour:** To be defined.
- **Flow rate (maximum):** 6 L/ min at 3 bar.
- **Water supply temperature (maximum):** To be defined.
- **Integral accessories:** To be defined.

45-35-70/355 Urinal flushing valves

- **Manufacturer:** To be defined.
- **Standard:** To BS EN 12541.
- **Third party certification:** Water Regulations Advisory Scheme (WRAS)approved.
- **Operating control:** To be defined.
- **Flush volume:** To be defined.
- **Materials:**
  - **Body:** Brass.

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– **Finish and colour:** To be defined. • **Size:** DN 15 (½ in). • **Integral accessories:** Proximity sensor control.		
45-35-70/371 Taps and water supply fittings for wash basins and troughs **Shared by:** 55-40-40/120 Cold water supply system; and 55-40-40/150 Direct hot water storage supply system. • **Manufacturer:** To be defined. • **Standards:** To BS EN 200; To BS EN 817; To BS EN 1111; To BS EN 1286; To BS EN 1287; and To BS EN 15091. • **Third party certification:** Water Regulations Advisory Scheme (WRAS) approved. • **Form:** To be defined. • **Materials:** – **Body:** Brass. – **Finish and colour:** Chrome plated. • **Flow rate (maximum):** To be defined. • **Water supply temperature (maximum):** 43°C. • **Integral accessories:** Proximity sensor control.		
45-35-70/389 WC flushing valves • **Manufacturer:** To be defined. • **Third party certification:** Water Regulations Advisory Scheme (WRAS) approved. • **Form:** To be defined. • **Materials:** – **Body:** To be defined. – **Finish and colour:** To be defined. • **Operation:** To be defined. • **Integral accessories:** Proximity sensor control.		
45-35-70/400 Drinking fountain packages • **Manufacturer:** To be defined. • **Form:** – **Unit:** To be defined. – **Water supply:** Chilled, filtered supply to jet. – **Wastes:** Integral DN 32 (1¼ in) waste. • **Materials:** – **Body:** To be defined. – **Waste:** Chrome plated brass. • **Flow rate:** To be defined. • **Integral accessories:** Bottle filler.		

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90-10-60/370 Pressure gauges

Shared by: 55-40-40/120 Cold water supply system; 55-40-40/150 Direct hot water storage supply system; and 60-45-40/110 Low temperature hot water heating system.

- **Manufacturer:** To be defined.
- **Standard:** To BS EN 837-1.
- **Diameter:** To be defined.
- **Scale subdivisions:** To be defined.
- **Material:** To be defined.
- **Connections:** To be defined.
- **Execution:** To be defined.

90-10-60/405 Pipe sleeves type A

Shared by: 50-10-05/120 Above ground wastewater drainage system with internal stacks; 55-40-40/120 Cold water supply system; 55-40-40/150 Direct hot water storage supply system; and 60-45-40/110 Low temperature hot water heating system.

- **Manufacturer:** Submit proposals.
- **Material:** Manufacturer's standard.
- **Form:** Manufacturer's standard.

90-10-60/405 Pipe sleeves type B

Shared by: 55-40-40/120 Cold water supply system; 55-40-40/150 Direct hot water storage supply system; and 60-45-40/110 Low temperature hot water heating system.

- **Manufacturer:** Submit proposals.
- **Material:** Manufacturer's standard.
- **Form:** Manufacturer's standard.

90-10-60/420 Tundishes

Shared by: 55-40-40/120 Cold water supply system; 55-40-40/150 Direct hot water storage supply system; and 60-45-40/110 Low temperature hot water heating system.

- **Manufacturer:** To be defined.
- **Material:** To be defined.
- **Connections:** Diameter to suit drain line.

90-10-65/310 Copper pipelines

Shared by: 55-40-40/120 Cold water supply system; and 55-40-40/150 Direct hot water storage supply system.

- **General requirements:** 90-10-65/320 Copper pipeline jointing materials and 90-10-65/315 Copper pipeline fittings.
- **Manufacturer:** To be defined.
- **Standard:** To BS EN 1057.
- **Grade:** R250.
- **Finish:** Manufacturer's standard.

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• **Execution:** 90-10-65/700 Installing buried pipelines; 90-10-65/705 Protection of buried pipelines; and 90-10-65/630 Installing copper pipelines.		
90-10-65/315 Copper pipeline fittings		
• **Manufacturer:** To be defined. • **Standards:** – **Capillary:** To be defined. – **Compression:** To BS EN 1254-2, type A. – **Flanges:** To BS EN 1092-3 – **Press fittings:** To be defined.		
90-10-65/320 Copper pipeline jointing materials		
• **Manufacturer:** To be defined. • **Standards:** – **Lead free solder for capillary fittings:** To BS EN ISO 9453. – **Brazing filling:** To BS EN ISO 17672. – **Flange jointing rings:** To BS EN 1514-4.		
90-10-65/365 Polyethylene (PE) pipelines for water supply		
• **General requirements:** 90-10-65/380 Jointing materials for plastics tubes. • **Manufacturer:** To be defined. • **Standards:** – **Pipes:** To BS EN 12201-2; To BS ISO 4427-2, PE 40; To BS ISO 4427-2, PE 63; To BS ISO 4427-2, PE 80; and TO BS ISO 4427-2, PE 100. – **Fittings:** To BS EN 12201-3; To BS ISO 4427-3, PE 40; To BS ISO 4427-3, PE 63; To BS ISO 4427-3, PE 80; and To BS ISO 4427-3, PE 100. • **Colour:** To be defined. • **Execution:** 90-10-65/700 Installing buried pipelines; 90-10-65/705 Protection of buried pipelines; and 90-10-65/645 Installing plastics pipelines.		
90-10-65/380 Jointing materials for plastics tubes		
• **Manufacturer:** To be defined. • **Standards:** – **Compression:** To BS EN 1254-3. – **Electrofusion:** To BS EN 12201-3. – **Socket and spigot:** To BS EN 12201-3. – **Solvent cement:** To BS EN 14814.		

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– **Elastomeric ring seal:** To BS EN 681-1.		

90-10-90/318 Backflow prevention devices

Shared by: 55-40-40/110 Incoming water supply; and 55-40-40/120 Cold water supply system.

- **Manufacturer:** To be defined.
- **Standards:**
  - **Anti-pollution check valves:** To BS EN 13959.
  - **Hose union:** To BS EN 14454.
  - **In-line anti-vacuum valves:** To BS EN 14451.
- **Arrangement:** Manufacturer's standard.
- **Material:** Copper alloy.
- **Connections:** Compression to BS EN 1254-2 and Flanged to BS EN 1092-3.
- **Execution:** 90-10-90/610 Installation of valves generally.

90-10-90/330 Ball valves

Shared by: 55-40-40/120 Cold water supply system; 55-40-40/150 Direct hot water storage supply system; and 60-45-40/110 Low temperature hot water heating system.

- **Manufacturer:** Crane, Hattersley or equal approved
- **Material:** Brass copper alloy and Bronze.
- **Connections:** Compression to BS EN 1254-2 and Press-fit.
- **Finish:** Manufacturer's standard.
- **Execution:** 90-10-90/610 Installation of valves generally.

90-10-90/348 Cast iron check valves

- **Manufacturer:** To be defined.
- **Standard:** To BS EN 16767.
- **Third party certification:** Manufacturer's standard.
- **Arrangement:**
  - **Type:** To be defined.
  - **Body pattern:** To be defined.
  - **Body ends:** To be defined.
- **Temperature (maximum):** To be defined.
- **Pressure rating:** To be defined.
- **Fluid:** To be defined.
- **Mounting:** To be defined.
- **Iron type:** To be defined.
- **Dimensions:** To be defined.
- **Auxiliary connections:** Manufacturer's standard.
- **Execution:** 90-10-90/670 Installation of check valves.

90-10-90/352 Copper alloy check valves

- **Manufacturer:** To be defined.
- **Standard:** To BS 5154.

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• **Third party certification:** To be defined.
• **Lift type:**
  – **Design:** To be defined.
  – **Body pattern:** To be defined.
• **Swing type:** To be defined.
• **Series:** To be defined.
• **Material:** Copper alloy.
• **Connections:** Compression to BS EN 1254-2.
• **Operation:** To be defined.
• **Options:** To be defined.
• **Execution:** 90-10-90/670 Installation of check valves.		

90-10-90/370 Thermostatic mixing valves **Shared by:** 55-40-40/120 Cold water supply system; and 55-40-40/150 Direct hot water storage supply system. • **Manufacturer:** Thorne, equal or approved • **Standard:** To BS EN 1111. • **Arrangement:** To be defined. • **Connections:** Threaded to BS EN ISO 228-1. • **Execution:** 90-10-90/610 Installation of valves generally.		
90-10-90/374 Draining taps **Shared by:** 55-40-40/120 Cold water supply system; 55-40-40/150 Direct hot water storage supply system; and 60-45-40/110 Low temperature hot water heating system. • **Manufacturer:** To be defined. • **Standard:** To BS 2879. • **Size:** To be defined. • **Arrangement:** To be defined. • **Material:** Copper alloy. • **Connections:** Threaded joints to BS EN 10226-1. • **Accessories:** Lever pattern key. • **Execution:** 90-10-90/610 Installation of valves generally.		

90-15-35/470 Flush control devices
• **Manufacturer:** To be defined.
• **Standards:**
  – **General:** To BS EN 12541.
  – **Electrical safety:** To BS EN 60335-1 and BS EN 60335-2-84.
• **Third party certification:** Water Regulations Advisory Scheme (WRAS) approved.
• **Flush volume:** To be defined.
• **Flush rate:** To be defined.
• **Operation:** To be defined.		

- **Controller:** Manufacturer's standard.

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90-15-35/480 Cooled water dispenser

- **Manufacturer:** To be defined.
- **Third party certification:** WRAS approved.
- **Arrangement:** To be defined.
- **Flow rate:** To be defined.
- **Temperature of delivered water:** To be defined.
- **Water inlet:** To be defined.
- **Power supply:** To be defined.

90-65-55/470 Water meters

- **Manufacturer:** Submit proposals.
- **Standards:** To BS EN ISO 4064-1 and BS EN ISO 4064-4.
- **Third party certification:** To be defined.
- **Format:** To be defined.
- **Environmental classification:** To be defined.
- **Flow rate:**
  - **Permanent flow rate:** To be defined.
  - **Flow ratio:** To be defined.
- **Accuracy class:** To be defined.
- **Temperature class:** To be defined.
- **Power supply:** To be defined.
- **Connections:** To be defined.
- **Indicating device:** To be defined.
- **Features:** To be defined.
- **Accessories:** To be defined.
- **Execution:** 90-65-55/670 Installing water meters.

90-90-40/330 Mineral wool pipe section insulation type A

Shared by: 50-10-05/120 Above ground wastewater drainage system with internal stacks; 55-40-40/120 Cold water supply system; 55-40-40/150 Direct hot water storage supply system; and 90-90-40/480 Insulation for valves and flanges.

- **Manufacturer:** ROCKWOOL Ltd.
- **Product reference:** Contractor's choice.
- **Standard:** To BS 3958-4.
- **Recycled content:** 25% (minimum) to BS EN ISO 14021 and 50% (minimum) to BS EN ISO 14021.
- **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.

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- **Finish:** Manufacturer's standard.
- **Insulation thickness (minimum):** To BS 5422, and Metropolitan Design Guide.
- **Accessories:**
  - **Vapour barrier:** 90-90-40/380 Vapour barrier.
  - **Protection:** 90-90-40/390 Protection.
  - **Insulation at loadbearing pipeline supports:** 90-90-40/485 Insulation at loadbearing pipeline supports.
  - **Insulation for valves and flanges:** 90-90-40/480 Insulation for valves and flanges.
- **Execution:** 90-90-40/620 Installing canvas faced mineral insulation and 90-90-40/625 Installing foil faced mineral wool insulation on pipelines.

90-90-40/360 Phenolic foam insulation type A

- **Manufacturer:** Kingspan Insulation Ltd.
- **Product reference:** The Kooltherm Pipe Insulation System.
- **Standard:** To BS EN 13166.
- **Kooltherm pipe insulation thickness:** In accordance with Metropolitan Design Guide.
- **Pipe support inserts:**
  - **Thickness:** To be defined.
- **Form:** To be defined.
- **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.
- **Finish:** To be defined.
- **Insulation thickness (minimum):** To be defined.
- **Accessories:**
  - **Vapour barrier:** To be defined.
  - **Protection:** To be defined.
  - **Insulation at loadbearing pipeline supports:** To be defined.
  - **Insulation for valves and flanges:** To be defined.
  - **Items to be insulated:** To be defined.
- **Execution:** 90-90-40/640 Installing phenolic foam insulation on pipelines.

90-90-40/380 Vapour barrier

Shared by: 90-90-40/330 Mineral wool pipe section insulation type A; type B and type C.

- **Material:** Flexible sheet.
- **Vapour permeability:** To BS 5422, clause 5.6.
- **Execution:** 90-90-40/780 Installing vapour barriers.

90-90-40/390 Protection

Shared by: 90-90-40/330 Mineral wool pipe section insulation type A; type B and type C.

- **Manufacturer:** Contractor's choice.
- **Material:** Submit proposals.

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• **Colour:** Self finish. • **Execution:** To be defined.		
90-90-40/480 Insulation for valves and flanges **Shared by:** 90-90-40/330 Mineral wool pipe section insulation type A; type B and type C. • **Material:** 90-90-40/330 Mineral wool pipe section insulation type A and 90-90-40/360 Phenolic foam insulation type A. • **Form:** Submit proposals. • **Finish:** Submit proposals. • **Execution:** 90-90-40/740 Installing at valves and flanges.		
90-90-40/485 Insulation at loadbearing pipeline supports **Shared by:** 90-90-40/330 Mineral wool pipe section insulation type A; type B and type C. • **Pipelines carrying fluids at temperature up to 120°C:** Manufacturer's standard. • **Pipelines carrying fluids at temperatures above 120°C:** Manufacturer's standard. • **Pipelines carrying cold fluids:** Manufacturer's standard. • **Execution:** To be defined.		
90-90-55/430 Identifying pipework type A **Shared by:** 50-10-05/120 Above ground wastewater drainage system with internal stacks; 55-40-40/120 Cold water supply system; 55-40-40/150 Direct hot water storage supply system; 60-45-40/110 Low temperature hot water heating system; and 60-45-95/110 Variable refrigerant flow system . • **Manufacturer:** Contractor's choice. • **Standards:** To BS 1710. • **Identification type:** Adhesive colour bands. • **Execution:** 90-90-55/660 Installing identification on pipework.		
90-90-55/480 Mechanical plant and equipment identification labels **Shared by:** 55-40-40/120 Cold water supply system; 55-40-40/150 Direct hot water storage supply system; 55-60-55/120 Natural gas supply system; 60-45-40/110 Low temperature hot water heating system; 60-45-95/110 Variable refrigerant flow system; 65-10-95/130 Mechanical supply ventilation system; and 65-10-95/140 Mechanical extract ventilation system. • **Manufacturer:** To be defined. • **Material:** Engraved anodized aluminium and Face engraved rigid plastic laminate. • **Label size:** To be defined. • **Colour:** **Background:** To be defined. – **Lettering:** To be defined. • **Typography:** **Font:** To be defined. **Size:** To be defined. • **Information to be included:** Equipment name;		

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Equipment reference number; and Service. • **Execution:** 90-90-55/610 Installing mechanical plant and equipment identification.		
90-90-55/490 Valve charts and schematics **Shared by:** 55-40-40/120 Cold water supply system; 55-40-40/150 Direct hot water storage supply system; 55-60-55/120 Natural gas supply system; 60-45-40/110 Low temperature hot water heating system; and 60-45-95/110 Variable refrigerant flow system. • **Manufacturer:** To be defined. • **Material:** Engraved plastics laminate. • **Information to be included:** Location and identification of pipework regulating, isolating and control valves. • **Execution:** 90-90-55/620 Installing valve charts and schematics.		
90-90-55/495 Valve identification labels **Shared by:** 55-40-40/120 Cold water supply system; 55-40-40/150 Direct hot water storage supply system; 55-60-55/120 Natural gas supply system; 60-45-40/110 Low temperature hot water heating system; and 60-45-95/110 Variable refrigerant flow system. • **Manufacturer:** To be defined. • **Material:** Engraved anodized aluminium. • **Label size:** To be defined. • **Colour:** – **Background:** To be defined. – **Lettering:** To be defined. • **Typography:** – **Font:** To be defined. – **Size:** To be defined. • **Information:** Purpose and reference number. • **Execution:** 90-90-55/630 Installing valve identification labels.		
90-90-60/405 Pipe clips **Shared by:** 55-40-40/120 Cold water supply system; 55-40-40/150 Direct hot water storage supply system; 55-60-55/120 Natural gas supply system; and 60-45-40/110 Low temperature hot water heating system. • **Manufacturer:** To be defined. • **Clip type:** Manufacturer's standard. • **Material:** Stainless steel. • **Execution:** 90-90-60/620 Installing pipeline supports.		
90-90-95/320 Compression isolators **Shared by:** 55-40-40/120 Cold water supply system; 55-40-40/150 Direct hot water storage supply system; 65-10-95/130 Mechanical supply ventilation system; and 65-10-95/140 Mechanical extract ventilation system. • **Manufacturer:** To be defined. • **Compression isolators type:** To be defined.		

- **Colour code:** To be defined.
- **Load:** To be defined.
- **Deflection:** To be defined.

90-90-95/330 Spring isolators

Shared by: 55-40-40/120 Cold water supply system; 55-40-40/150 Direct hot water storage supply system; 65-10-95/130 Mechanical supply ventilation system; and 65-10-95/140 Mechanical extract ventilation system.

- **Manufacturer:** To be defined.
- **Spring isolators type:** To be defined.
- **Colour code:** To be defined.
- **Load:** To be defined.
- **Deflection:** To be defined.

Execution

55-40-40/610 Removing hot and cold water systems

Shared by: 55-40-40/120 Cold water supply system; and 55-40-40/150 Direct hot water storage supply system.

- **Scope:** Remove all existing hot and cold water services.

55-40-40/620 Installing hot and cold water systems generally

Shared by: 55-40-40/120 Cold water supply system; and 55-40-40/150 Direct hot water storage supply system.

- **Standard:** To BS 8558 and BS EN 806-4.
- **Performance:** Free from leaks and the audible effects of expansion, vibration and water hammer.
- **Fixing of equipment, components and accessories:** Fix securely, parallel or perpendicular to the structure of the building.
- **Preparation:** Immediately before installing tanks and cisterns on a floor or platform, clear the surface completely of debris and projections.
- **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.

55-40-40/650 Hydraulic pressure testing of hot and cold water supply systems

Shared by: 55-40-40/120 Cold water supply system; and 55-40-40/150 Direct hot water storage supply system.

- **Standard:** To BS 8558 and BS EN 806-4.
- **Notice (minimum):** 48 h.
- **Pressure:** 2 times working pressure.
- **Duration of test:** 1h

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55-40-40/660 Flushing hot and cold water systems

Shared by: 55-40-40/120 Cold water supply system; and 55-40-40/150 Direct hot water storage supply system.

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

55-40-40/670 Disinfection of hot and cold water systems

Shared by: 55-40-40/120 Cold water supply system; and 55-40-40/150 Direct hot water storage supply system.

- **Standard:** To BS EN 806-4.
- **Samples for analysis:** Provide after disinfection and flushing.

90-10-65/610 Pipelines installation generally

Shared by: 90-10-65/630 Installing copper pipelines; 90-10-65/645 Installing plastics pipelines; 90-10-65/665 Installing refrigerant pipework; and 90-10-65/680 Installing steel pipelines.

- **Standard:** BESATechnical Report TR/20/9 Natural gas.
- **Dissimilar metals:** Prevent electrolytic corrosion.

90-10-65/615 Installing pipeline fittings

Shared by: 90-10-65/630 Installing copper pipelines; 90-10-65/645 Installing plastics pipelines; and 90-10-65/680 Installing steel pipelines.

- **Bushes:** To be defined.
- **Fabricated junctions and fittings:** To be defined.
- **Demountable joints:** To be defined.

90-10-65/620 Installing anchors generally

Shared by: 90-10-65/630 Installing copper pipelines; 90-10-65/645 Installing plastics pipelines; and 90-10-65/680 Installing steel pipelines.

- **Purpose:** To resist axial stress transmitted by flexure of horizontal and vertical pipe runs, and loading on vertical pipes.
- **Fixings:** Provide associated backing plates, nuts, washers and bolts for attachment to, or building into building structure.
- **Fixing to building structure:** Bolted.
- **Building structure:** To be defined.

90-10-65/625 Installing slide guides

Shared by: 90-10-65/630 Installing copper pipelines; and 90-10-65/680 Installing steel pipelines.

- **Expansion and contraction:** Direct movement from pipe anchor points towards loops, bellows or flexible inserts.
- **Thrust:** Linear relative to the axis of pipe.
- **Friction:** To be defined.

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90-10-65/630 Installing copper pipelines

- **General requirements:** 90-10-65/690 Spacing of pipelines; 90-10-65/625 Installing slide guides; 90-10-65/615 Installing pipeline fittings; 90-10-65/610 Pipelines installation generally; 90-10-65/710 General inspection and testing; and 90-10-65/620 Installing anchors generally.
- **Standard:** In accordance with CDA publications 88 Copper tube in buildings.
- **Jointing method:**
  - **Permanently concealed joints:** To be defined.
  - **Accessible joints:** To be defined.
- **Expansion loops:** To be defined.
- **Anchor:**
  - **Method:** To be defined.
  - **Pipe restraints:** To be defined.

90-10-65/645 Installing plastics pipelines

- **General requirements:** 90-10-65/690 Spacing of pipelines; 90-10-65/615 Installing pipeline fittings; 90-10-65/610 Pipelines installation generally; 90-10-65/710 General inspection and testing; and 90-10-65/620 Installing anchors generally.
- **Pipeline material:** To be defined.
- **Jointing method:** To be defined.
- **Anchor:** To be defined.

90-10-65/690 Spacing of pipelines

Shared by: 90-10-65/630 Installing copper pipelines; 90-10-65/645 Installing plastics pipelines; and 90-10-65/680 Installing steel pipelines.

- **Minimum clearance between insulated pipelines and:**
  - **Wall finish:** To be defined.
  - **Ceiling finish or soffit:** To be defined.
  - **Floor:** To be defined.
  - **Electrical services:** To be defined.
  - **Adjacent services:** To be defined.
  - **Uninsulated pipeline:** To be defined.
  - **Another insulated pipeline:** To be defined.
- **Minimum clearance between uninsulated pipelines and:**
  - **Wall finish:** To be defined.
  - **Ceiling finish or soffit:** To be defined.
  - **Floor:** To be defined.
  - **Electrical services:** To be defined.
  - **Adjacent services:** To be defined.
  - **Another uninsulated pipeline:** To be defined.

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90-10-65/700 Installing buried pipelines

Shared by: 90-10-65/310 Copper pipelines; 90-10-65/365 Polyethylene (PE) pipelines for water supply; and 90-10-65/415 Steel pipelines type A.

- **Depth of cover:** To be defined.
- **Set out:** To be defined.
- **Concealment:** Do not lay under surfaced footpaths or drives.
- **Trench excavations:** To be defined.
- **Installation:** Thoroughly clean lengths of pipe internally before laying. Temporarily cap until jointing takes place. After laying and jointing keep leading end capped.
- **Thrust blocks:** Install at changes of direction and blank ends.
- **Backfilling:** To be defined.

90-10-65/705 Protection of buried pipelines

Shared by: 90-10-65/310 Copper pipelines; 90-10-65/365 Polyethylene (PE) pipelines for water supply; and 90-10-65/415 Steel pipelines type A.

- **Earth cover (minimum):**
  - **Water pipework:** To be defined.
  - **Fuel oil and gas:** To be defined.
  - **Under roadways:** To be defined.
- **Protection:** To be defined.
- **Application:** To be defined.
- **Marker tape:** Required.

90-10-65/710 General inspection and testing

Shared by: 90-10-65/630 Installing copper pipelines; 90-10-65/645 Installing plastics pipelines; and 90-10-65/680 Installing steel pipelines.

- **Inspection of joints:**
  - **Joints:** To be defined.
  - **Number of joints:** To be defined.
- **Safety precautions:** In accordance with HSEGS 4.

90-10-90/610 Installation of valves generally

Shared by: 90-10-90/310 Copper alloy service stop valves; 90-10-90/318 Backflow prevention devices; 90-10-90/330 Ball valves; 90-10-90/370 Thermostatic mixing valves; 90-10-90/374 Draining taps; 90-10-90/380 Ball valves, manually operated; 90-10-90/640 Installation of thermostatic radiator valves; and 90-10-90/670 Installation of check valves.

- **Installation:** In accordance with BS 6683.
- **Position:** As drawings. Contractor's choice where unspecified.
- **Isolation and regulation valves:** Provide at equipment and on sub-circuits.
- **Access:** Locate valves so they can be readily operated and maintained. Locate next to equipment which is to be isolated.
- **Connection to pipework:** Fit with joints that suit the pipe material.

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90-10-90/670 Installation of check valves

Shared by: 90-10-90/348 Cast iron check valves; and 90-10-90/352 Copper alloy check valves.

- **General requirements:** 90-10-90/610 Installation of valves generally.
- **Lift type:** Install in direction of flow as indicated on the body.
- **Disc type:** With spring, fit in any plane. Without spring, fit in vertical plane with flow from bottom to top.
- **Wafer type:** Install between flanges. Fit in horizontal plane or vertical upward flow.
- **Split disc:** Install between flanges. Fit in horizontal plane or vertical upward flow.

90-65-55/670 Installing water meters

- **Standards:** To BS EN ISO 4064-5.

90-90-40/610 Installing insulation and protection products generally

Shared by: 90-90-40/620 Installing canvas faced mineral insulation; 90-90-40/625 Installing foil faced mineral wool insulation on pipelines; 90-90-40/630 Installing nitrile rubber insulation on pipelines; and 90-90-40/640 Installing phenolic foam insulation on pipelines.

- **Standard:** In accordance with BS 5970.
- **Timing:** Insulate after installed system has been fully tested and joints proved sound.
- **Insulation:** Do not enclose adjacent units together.
- **Clearance:** Maintain between pipes.
- **Finish:** Neatly finish joints, corners, edges and overlaps.

90-90-40/620 Installing canvas faced mineral insulation

Shared by: 90-90-40/330 Mineral wool pipe section insulation type A; type B and type C.

- **General requirements:** 90-90-40/610 Installing insulation and protection products generally.
- **Joints:** Close butt; secure canvas overlaps with adhesive.
- **At fittings:** Mitre. Secure with adhesive.
- **Sealant:** Apply two coats of class 0 polymer solution.

90-90-40/625 Installing foil faced mineral wool insulation on pipelines

Shared by: 90-90-40/330 Mineral wool pipe section insulation type A; type B and type C.

- **General requirements:** 90-90-40/610 Installing insulation and protection products generally.
- **Joints:** Close butt; seal with 50 mm wide class 0 tape on both longitudinal and circumferential joints.
- **At fittings:** Mitre. Secure with tape.
- **Vapour seal:** Tape exposed insulation membrane. Seal vapour barrier at pipe support with class 0 tape.

90-90-40/640 Installing phenolic foam insulation on pipelines

Shared by: 90-90-40/360 Phenolic foam insulation type A; type B and type C.

- **General requirements:** 90-90-40/610 Installing insulation and protection products generally.
- **Joints:** Close butt, seal with 50 mm wide class 0 tape on both longitudinal and circumferential joints.

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• **At fittings:** Mitre. Secure with tape. • **Vapour seal:** Tape exposed insulation membrane. Seal vapour barrier at pipe support with class 0 tape.		
90-90-40/740 Installing at valves and flanges • **Application:** Do not obstruct removal of nuts and bolts, or operation of valves.		
90-90-40/780 Installing vapour barriers **Shared by:** 90-90-40/350 Nitrile rubber insulation; and 90-90-40/380 Vapour barrier. • **Integrity:** Seal to maintain throughout.		
90-90-55/610 Installing mechanical plant and equipment identification • **Fixing:** Fix with adhesive to equipment. • **Position:** On equipment and On wall adjacent equipment.		
90-90-55/620 Installing valve charts and schematics • **Fixing:** To be defined. • **Position:** Plant room.		
90-90-55/630 Installing valve identification labels • **Fixing:** Secure with metal chain.		
90-90-55/660 Installing identification on pipework **Shared by:** 90-90-55/430 Identifying pipework type A and type B. • **Application of basic identification colour:** Coloured bands as BS 1710 clause 3.3. • **Safety colour identification:** On or next to the colour bands. • **Information:** Colour bands as BS 1710 appendix D. • **Direction of flow:** Indication arrow and the word FLOW or the letter F and Indication arrow and the word RETURN or the letter R.		
90-90-60/620 Installing pipeline supports • **Position:** – **In plant rooms:** To be defined. – **Distribution corridors and risers:** To be defined. – **Surface mountings:** Split ring, spacer nipple and backplate.		
System completion		
55-40-40/810 Commissioning of hot and cold water supply systems **Shared by:** 55-40-40/120 Cold water supply system; and 55-40-40/150 Direct hot water storage supply system. • **Pre-commissioning:** In accordance with BSRIABG 2/2010 and CIBSECommissioning Code W.		

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- **Commissioning:** In accordance with BS EN 806-4, BSRIABG 2/2010 and CIBSE Commissioning Code W.
- **Notice (minimum):** 48 h.
- **Equipment:** Check and adjust operation of equipment, controls and safety devices.
- **Outlets:** Check operation of outlets for satisfactory rate of flow and temperature.

55-40-40/820 Inspection and test records

Shared by: 55-40-40/120 Cold water supply system; and 55-40-40/150 Direct hot water storage supply system.

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

55-40-40/830 Demonstrations

Shared by: 55-40-40/120 Cold water supply system; and 55-40-40/150 Direct hot water storage supply system.

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

55-40-40/840 Documentation

Shared by: 55-40-40/120 Cold water supply system; and 55-40-40/150 Direct hot water storage supply system.

- **Operating and maintenance instructions:**
  - **Scope:** Submit for the system giving optimum settings for controls.
  - **Product information:** Include product description, date of purchase, performance characteristics, application (suitability for use), method of operation and control, and cleaning and maintenance requirements.
  - **Format:** Paper copy.
  - **Number of copies:** Three.
- **Record drawings:**
  - **Content:** Location and arrangement of plant in plant rooms;
    Location, size and route of hot and cold water services;
    Location, route and depth of underground services;
    Location and identification of regulating, isolation and control valves;
    and Location of outlets.
  - **Format:** A1 paper print and Electronic.
  - **Number of copies:** Three.
- **Submittal date:** At handover.

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• **Wholesome water consumption notice:** Submit within 30 days.		

55-40-40/850 Water quality tests

Shared by: 55-40-40/110 Incoming water supply; 55-40-40/120 Cold water supply system; and 55-40-40/150 Direct hot water storage supply system.

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

Ω End of system

55-40-40/150 Direct hot water storage supply system

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System outline

55-40-40/150 Direct hot water storage supply system

- **Description:**
  Hot Water will be fed from an new dedicated condensing gas fired water heater, that shall be installed in the plantroom and connected to the gas and cold water distribution.

  The contractor shall:
  1. Strip out the existing domestic water services in the entire building.
  2. Install new gas fired condensing water heater, Unvented kit, recirculation pump, flue and fittings with new copper pipework connecting the new installation to the existing HWS F&R pipework as shown on the drawings.
  3. The new system shall be connected to the new MWCS as shown on the drawings. The contractor shall complete the gas fired water heater with the unvented kit ans install it according to manufacturer instructions.
  4. The new system shall be commissioned by the the water heater manufacturer (or approved agent) and the system shall be set to work.
  5.The contractor shall provide thorough flushing, cleaning, sterilisation and laboratory sampling will be required to the entire domestic hot and cold water systems.
  6. Connect new water outlets to hot and cold water distribution with new copper pipework (old Table X). The contractor shall install new isolation valves and Thermostatic Regulating Valves (Crane, Hattersley or equal approved) as indicated on the drawings and this specification report.

  New flue arrangements shall be installed for the new condensing gas fired water heater, to terminate horizontally in external wall to atmosphere as indicated on the drawings. The contractor shall employ a flue specialist for the design and installation of the new flues. A trapped condensate drain shall be installed to the water heater flue riser in accordance with the manufacturer's recommendations.

  The complete installation shall comply in every respect with the requirements of the Clean Air Act and BS 6644. Installation of the flue systems shall be completed with a suitable sealant and pressure tested. All flue supports and anchors to be provided. Ensure flues are connected to lighting protection systems.

  The Contractor shall install new plant, pipework and fittings for hot and cold water services, as shown on the drawings, all in accordance with Water Supply Fittings Regulations 1999.

  The Contractor shall include for a thorough cleaning, flushing, sterilising and testing the new and existing hot and cold domestic water systems installations in their entirety in accordance with BS EN 806 and leave in working order, free from any solder or other debris. Submit samples for laboratory testing for water quality and micro biological activity. Repeat the cleaning, flushing and sterilising until microbiological activity levels are acceptable, as dictated by laboratory's standard valves, and in accordance with HSE Approved Code of Practice Document L8.

  All Domestic Hot Water Services Flow and Return pipework shall be installed with Thermal insulation to minimise heat loss. Isolation valves shall be fitted to all pipework branches.

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Thermostatic Regulating valves shall be fitted to hot water return branches to allow commissioning and flow measurement.

The contractor shall commission the entire system in accordance to WRAS and Building Regulations.

A provisional sum of £1500 shall be made to address any issues in the new distribution system.

- **System performance:** 55-40-40/210 Design and detailing hot and cold water systems.
- **Storage unit:** 90-15-35/450 Storage water heaters, gas fired.
- **Electric immersion heater:** To be defined.
- **Flues:** Balanced flues.
- **System:** Unvented.
- **Capacity:** Refer to mechanical schedules
- **Pumps:** 90-10-70/340 Canned rotor pumps type A.
- **Pipelines:** 90-10-65/310 Copper pipelines.
- **Pipeline accessories:**
  - **Expansion devices:** 90-10-60/320 Angular expansion compensators and 90-10-60/325 Axial expansion compensators.
  - **Gauges:** 90-10-60/370 Pressure gauges and 90-10-60/380 Temperature gauges.
  - **Accessories:** 90-10-60/405 Pipe sleeves type A;
    90-10-60/405 Pipe sleeves type B;
    and 90-10-60/420 Tundishes.
  - **Pipeline supports:** 90-90-60/405 Pipe clips.
- **Valves:**
  - **Isolating valves:** 90-10-90/330 Ball valves.
  - **Check valves:** To be defined.
  - **Regulating valves:** Thermostatic regulating valves (Crane, Hattersley or equal approved)
  - **Mixing valves:** 90-10-90/370 Thermostatic mixing valves.
  - **Draining devices:** 90-10-90/374 Draining taps.
  - **Accessories:** 90-10-90/360 Test points.
- **Thermal insulation:**
  - **Pipelines:** 90-90-40/330 Mineral wool pipe section insulation type A and 90-90-40/330 Mineral wool pipe section insulation type B.
  - **Cylinders:** To be defined.
- **Vibration isolation:** 90-90-95/320 Compression isolators and 90-90-95/330 Spring isolators.
- **Outlets:** 45-35-70/345 Taps and water supply fittings for sinks and 45-35-70/371 Taps and water supply fittings for wash basins and troughs.
- **Controls:** 75-75-50/110 Water supply systems control.
- **Accessories:** To be defined.
- **Plant and equipment identification:** 90-90-55/430 Identifying pipework type A;
  90-90-55/480 Mechanical plant and equipment identification labels;
  90-90-55/490 Valve charts and schematics;
  and 90-90-55/495 Valve identification labels.

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• **Execution:** 55-40-40/610 Removing hot and cold water systems; 55-40-40/620 Installing hot and cold water systems generally; 55-40-40/650 Hydraulic pressure testing of hot and cold water supply systems; 55-40-40/660 Flushing hot and cold water systems; and 55-40-40/670 Disinfection of hot and cold water systems. • **System completion:** 55-40-40/810 Commissioning of hot and cold water supply systems; 55-40-40/820 Inspection and test records; 55-40-40/830 Demonstrations; 55-40-40/840 Documentation; and 55-40-40/850 Water quality tests.		

System performance

55-40-40/210 Design and detailing hot and cold water systems

Shared by: 55-40-40/110 Incoming water supply; 55-40-40/120 Cold water supply system; and 55-40-40/150 Direct hot water storage supply system.

- **Design:** Complete the design and detailing of the hot and cold water supply.
- **Standard:** To BS 8558 or BS EN 806-2 and in accordance with HSE publication L8: Legionnaires' disease. The control of Legionella bacteria in water systems. Approved Code of Practice and guidance on regulations.
- **Requirement:** Submit proposals including detailed design drawings, technical information, calculations and manufacturer's literature.

Products

45-35-70/345 Taps and water supply fittings for sinks

Shared by: 55-40-40/120 Cold water supply system; and 55-40-40/150 Direct hot water storage supply system.

- **Manufacturer:** To be defined.
- **Standards:** To BS 7942;
  To BS EN 200;
  To BS EN 817;
  To BS EN 1111;
  To BS EN 1286;
  To BS EN 1287;
  and To BS EN 15091.
- **Third party certification:** Water Regulations Advisory Scheme (WRAS) approved.
- **Form:** Thermostatic mixer taps.
- **Materials:**
  - **Body:** Brass.
  - **Finish and colour:** To be defined.
- **Flow rate (maximum):** 6 L/ min at 3 bar.
- **Water supply temperature (maximum):** To be defined.
- **Integral accessories:** To be defined.

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45-35-70/371 Taps and water supply fittings for wash basins and troughs

Shared by: 55-40-40/120 Cold water supply system; and 55-40-40/150 Direct hot water storage supply system.

- **Manufacturer:** To be defined.
- **Standards:** To BS EN 200;
  To BS EN 817;
  To BS EN 1111;
  To BS EN 1286;
  To BS EN 1287;
  and To BS EN 15091.
- **Third party certification:** Water Regulations Advisory Scheme (WRAS) approved.
- **Form:** To be defined.
- **Materials:**
  - **Body:** Brass.
  - **Finish and colour:** Chrome plated.
- **Flow rate (maximum):** To be defined.
- **Water supply temperature (maximum):** 43°C.
- **Integral accessories:** Proximity sensor control.

90-10-60/320 Angular expansion compensators

Shared by: 55-40-40/150 Direct hot water storage supply system; and 60-45-40/110 Low temperature hot water heating system.

- **Manufacturer:** To be defined.
- **Format:** To be defined.
- **Material:**
  - **Bellows:** To be defined.
  - **Inner sleeve:** To be defined.
- **Connections:** Flanged.
- **Execution:** To be defined.

90-10-60/325 Axial expansion compensators

Shared by: 55-40-40/150 Direct hot water storage supply system; and 60-45-40/110 Low temperature hot water heating system.

- **Manufacturer:** To be defined.
- **Arrangement:** To be defined.
- **Material:**
  - **Bellows:** To be defined.
  - **Inner sleeve:** To be defined.
- **Connections:** To be defined.
- **Execution:** To be defined.

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90-10-60/370 Pressure gauges

Shared by: 55-40-40/120 Cold water supply system; 55-40-40/150 Direct hot water storage supply system; and 60-45-40/110 Low temperature hot water heating system.

- **Manufacturer:** To be defined.
- **Standard:** To BS EN 837-1.
- **Diameter:** To be defined.
- **Scale subdivisions:** To be defined.
- **Material:** To be defined.
- **Connections:** To be defined.
- **Execution:** To be defined.

90-10-60/380 Temperature gauges

Shared by: 55-40-40/150 Direct hot water storage supply system; and 60-45-40/110 Low temperature hot water heating system.

- **Manufacturer:** To be defined.
- **Standard:** To BS EN 13190.
- **Format:** Manufacturer's standard.
- **Diameter:** To be defined.
- **Case:** Brass.
- **Connections:** To be defined.
- **Integral accessories:** 100 mm immersion length pocket.

90-10-60/405 Pipe sleeves type A

Shared by: 50-10-05/120 Above ground wastewater drainage system with internal stacks; 55-40-40/120 Cold water supply system; 55-40-40/150 Direct hot water storage supply system; and 60-45-40/110 Low temperature hot water heating system.

- **Manufacturer:** Submit proposals.
- **Material:** Manufacturer's standard.
- **Form:** Manufacturer's standard.

90-10-60/405 Pipe sleeves type B

Shared by: 55-40-40/120 Cold water supply system; 55-40-40/150 Direct hot water storage supply system; and 60-45-40/110 Low temperature hot water heating system.

- **Manufacturer:** Submit proposals.
- **Material:** Manufacturer's standard.
- **Form:** Manufacturer's standard.

90-10-60/420 Tundishes

Shared by: 55-40-40/120 Cold water supply system; 55-40-40/150 Direct hot water storage supply system; and 60-45-40/110 Low temperature hot water heating system.

- **Manufacturer:** To be defined.
- **Material:** To be defined.
- **Connections:** Diameter to suit drain line.

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90-10-65/310 Copper pipelines

Shared by: 55-40-40/120 Cold water supply system; and 55-40-40/150 Direct hot water storage supply system.

- **General requirements:** 90-10-65/320 Copper pipeline jointing materials and 90-10-65/315 Copper pipeline fittings.
- **Manufacturer:** To be defined.
- **Standard:** To BS EN 1057.
- **Grade:** R250.
- **Finish:** Manufacturer's standard.
- **Execution:** 90-10-65/700 Installing buried pipelines; 90-10-65/705 Protection of buried pipelines; and 90-10-65/630 Installing copper pipelines.

90-10-65/315 Copper pipeline fittings

- **Manufacturer:** To be defined.
- **Standards:**
  - **Capillary:** To be defined.
  - **Compression:** To BS EN 1254-2, type A.
  - **Flanges:** To BS EN 1092-3
  - **Press fittings:** To be defined.

90-10-65/320 Copper pipeline jointing materials

- **Manufacturer:** To be defined.
- **Standards:**
  - **Lead free solder for capillary fittings:** To BS EN ISO 9453.
  - **Brazing filling:** To BS EN ISO 17672.
  - **Flange jointing rings:** To BS EN 1514-4.

90-10-70/320 Pumps generally

Shared by: 90-10-70/340 Canned rotor pumps type A and type B.

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

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90-10-70/340 Canned rotor pumps type A

- **General requirements:** 90-10-70/320 Pumps generally.
- **Manufacturer:** Grundfos
- **Arrangement:** To be defined.
- **Material:**
  - **Impeller:** To be defined.
  - **Housing:** To be defined.
- **Duties:**
  - **Operation:** To be defined.
  - **Flow rate:** Refer to mechanical schedules
  - **Resistance:** Refer to mechanical schedules
  - **Motor:**

    Nominal voltage: Refer to mechanical schedules

    Frequency: 50 Hz.
- **Speed control:** Manufacturer's standard.
- **Connections:** To be defined.
- **Accessories:** Blanking plate and gasket.
- **Execution:** 90-10-70/610 Installation of pumps generally and 90-10-70/640 Commissioning preparation.

90-10-90/330 Ball valves

Shared by: 55-40-40/120 Cold water supply system; 55-40-40/150 Direct hot water storage supply system; and 60-45-40/110 Low temperature hot water heating system.

- **Manufacturer:** Crane, Hattersley or equal approved
- **Material:** Brass copper alloy and Bronze.
- **Connections:** Compression to BS EN 1254-2 and Press-fit.
- **Finish:** Manufacturer's standard.
- **Execution:** 90-10-90/610 Installation of valves generally.

90-10-90/360 Test points

Shared by: 55-40-40/150 Direct hot water storage supply system; and 60-45-40/110 Low temperature hot water heating system.

- **Manufacturer:** To be defined.
- **Arrangement:** To be defined.
- **Material:** To be defined.
- **Connections:** To be defined.

90-10-90/370 Thermostatic mixing valves

Shared by: 55-40-40/120 Cold water supply system; and 55-40-40/150 Direct hot water storage supply system.

- **Manufacturer:** Thorne, equal or approved
- **Standard:** To BS EN 1111.

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- **Arrangement:** To be defined.
- **Connections:** Threaded to BS EN ISO 228-1.
- **Execution:** 90-10-90/610 Installation of valves generally.

90-10-90/374 Draining taps

Shared by: 55-40-40/120 Cold water supply system; 55-40-40/150 Direct hot water storage supply system; and 60-45-40/110 Low temperature hot water heating system.

- **Manufacturer:** To be defined.
- **Standard:** To BS 2879.
- **Size:** To be defined.
- **Arrangement:** To be defined.
- **Material:** Copper alloy.
- **Connections:** Threaded joints to BS EN 10226-1.
- **Accessories:** Lever pattern key.
- **Execution:** 90-10-90/610 Installation of valves generally.

90-15-35/450 Storage water heaters, gas fired

- **Manufacturer:** Andrews
- **Standard:** To BS EN 89.
- **Performance:** To BS EN 13203-1 and BS EN 13203-2.
- **Arrangement:** Refer to mechanical schedules
- **Capacity:** Refer to mechanical schedules
- **Rating:** Refer to mechanical schedules
- **Flow rate:** Refer to mechanical schedules
- **Fuel:** Gas.
- **Casing finish:** Refer to mechanical schedules
- **Controls:** Refer to mechanical schedules
- **Flues and chimneys:** Integral balanced flue.
- **Accessories:** Manufacturer's standard.
- **Execution:** 90-15-35/610 Installing gas fired water heaters and 90-15-35/620 Installing balanced flue terminals.

90-90-40/330 Mineral wool pipe section insulation type A

Shared by: 50-10-05/120 Above ground wastewater drainage system with internal stacks; 55-40-40/120 Cold water supply system; 55-40-40/150 Direct hot water storage supply system; and 90-90-40/480 Insulation for valves and flanges.

- **Manufacturer:** ROCKWOOL Ltd.
- **Product reference:** Contractor's choice.
- **Standard:** To BS 3958-4.
- **Recycled content:** 25% (minimum) to BS EN ISO 14021 and 50% (minimum) to BS EN ISO 14021.
- **Thermal conductivity:** 0.032 W/m·K at 0°C.
  0.034 W/m·K at 10°C.

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0.037 W/m·K at 50°C.
0.040 W/m·K at 75°C.
0.044 W/m·K at 100°C.

- **Finish:** Manufacturer's standard.
- **Insulation thickness (minimum):** To BS 5422, and Metropolitan Design Guide.
- **Accessories:**
  - **Vapour barrier:** 90-90-40/380 Vapour barrier.
  - **Protection:** 90-90-40/390 Protection.
  - **Insulation at loadbearing pipeline supports:** 90-90-40/485 Insulation at loadbearing pipeline supports.
  - **Insulation for valves and flanges:** 90-90-40/480 Insulation for valves and flanges.
- **Execution:** 90-90-40/620 Installing canvas faced mineral insulation and 90-90-40/625 Installing foil faced mineral wool insulation on pipelines.

90-90-40/330 Mineral wool pipe section insulation type B

- **Manufacturer:** ROCKWOOL Ltd.
- **Product reference:** Contractor's choice.
- **Standard:** To BS 3958-4.
- **Recycled content:** 25% (minimum) to BS EN ISO 14021 and 50% (minimum) to BS EN ISO 14021.
- **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.
- **Finish:** Manufacturer's standard.
- **Insulation thickness (minimum):** To BS 5422, and Metropolitan Design Guide.
- **Accessories:**
  - **Vapour barrier:** 90-90-40/380 Vapour barrier.
  - **Protection:** 90-90-40/390 Protection.
  - **Insulation at loadbearing pipeline supports:** 90-90-40/485 Insulation at loadbearing pipeline supports.
  - **Insulation for valves and flanges:** 90-90-40/480 Insulation for valves and flanges.
- **Execution:** 90-90-40/620 Installing canvas faced mineral insulation and 90-90-40/625 Installing foil faced mineral wool insulation on pipelines.

90-90-40/360 Phenolic foam insulation type A

- **Manufacturer:** Kingspan Insulation Ltd.
- **Product reference:** The Kooltherm Pipe Insulation System.
- **Standard:** To BS EN 13166.
- **Kooltherm pipe insulation thickness:** In accordance with Metropolitan Design Guide.
- **Pipe support inserts:**
  - **Thickness:** To be defined.
- **Form:** To be defined.

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• **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. • **Finish:** To be defined. • **Insulation thickness (minimum):** To be defined. • **Accessories:** – **Vapour barrier:** To be defined. – **Protection:** To be defined. – **Insulation at loadbearing pipeline supports:** To be defined. – **Insulation for valves and flanges:** To be defined. – **Items to be insulated:** To be defined. • **Execution:** 90-90-40/640 Installing phenolic foam insulation on pipelines.		

90-90-40/380 Vapour barrier

Shared by: 90-90-40/330 Mineral wool pipe section insulation type A; type B and type C.

- **Material:** Flexible sheet.
- **Vapour permeability:** To BS 5422, clause 5.6.
- **Execution:** 90-90-40/780 Installing vapour barriers.

90-90-40/390 Protection

Shared by: 90-90-40/330 Mineral wool pipe section insulation type A; type B and type C.

- **Manufacturer:** Contractor's choice.
- **Material:** Submit proposals.
- **Colour:** Self finish.
- **Execution:** To be defined.

90-90-40/480 Insulation for valves and flanges

Shared by: 90-90-40/330 Mineral wool pipe section insulation type A; type B and type C.

- **Material:** 90-90-40/330 Mineral wool pipe section insulation type A and 90-90-40/360 Phenolic foam insulation type A.
- **Form:** Submit proposals.
- **Finish:** Submit proposals.
- **Execution:** 90-90-40/740 Installing at valves and flanges.

90-90-40/485 Insulation at loadbearing pipeline supports

Shared by: 90-90-40/330 Mineral wool pipe section insulation type A; type B and type C.

- **Pipelines carrying fluids at temperature up to 120°C:** Manufacturer's standard.
- **Pipelines carrying fluids at temperatures above 120°C:** Manufacturer's standard.
- **Pipelines carrying cold fluids:** Manufacturer's standard.
- **Execution:** To be defined.

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90-90-55/430 Identifying pipework type A

Shared by: 50-10-05/120 Above ground wastewater drainage system with internal stacks; 55-40-40/120 Cold water supply system; 55-40-40/150 Direct hot water storage supply system; 60-45-40/110 Low temperature hot water heating system; and 60-45-95/110 Variable refrigerant flow system .

- **Manufacturer:** Contractor's choice.
- **Standards:** To BS 1710.
- **Identification type:** Adhesive colour bands.
- **Execution:** 90-90-55/660 Installing identification on pipework.

90-90-55/480 Mechanical plant and equipment identification labels

Shared by: 55-40-40/120 Cold water supply system; 55-40-40/150 Direct hot water storage supply system; 55-60-55/120 Natural gas supply system; 60-45-40/110 Low temperature hot water heating system; 60-45-95/110 Variable refrigerant flow system; 65-10-95/130 Mechanical supply ventilation system; and 65-10-95/140 Mechanical extract ventilation system.

- **Manufacturer:** To be defined.
- **Material:** Engraved anodized aluminium and Face engraved rigid plastic laminate.
- **Label size:** To be defined.
- **Colour:**
  - **Background:** To be defined.
  - **Lettering:** To be defined.
- **Typography:**
  - **Font:** To be defined.
  - **Size:** To be defined.
- **Information to be included:** Equipment name;
  Equipment reference number;
  and Service.
- **Execution:** 90-90-55/610 Installing mechanical plant and equipment identification.

90-90-55/490 Valve charts and schematics

Shared by: 55-40-40/120 Cold water supply system; 55-40-40/150 Direct hot water storage supply system; 55-60-55/120 Natural gas supply system; 60-45-40/110 Low temperature hot water heating system; and 60-45-95/110 Variable refrigerant flow system.

- **Manufacturer:** To be defined.
- **Material:** Engraved plastics laminate.
- **Information to be included:** Location and identification of pipework regulating, isolating and control valves.
- **Execution:** 90-90-55/620 Installing valve charts and schematics.

90-90-55/495 Valve identification labels

Shared by: 55-40-40/120 Cold water supply system; 55-40-40/150 Direct hot water storage supply system; 55-60-55/120 Natural gas supply system; 60-45-40/110 Low temperature hot water heating system; and 60-45-95/110 Variable refrigerant flow system.

- **Manufacturer:** To be defined.

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• **Material:** Engraved anodized aluminium.
• **Label size:** To be defined.
• **Colour:**
  – **Background:** To be defined.
  – **Lettering:** To be defined.
• **Typography:**
  – **Font:** To be defined.
  – **Size:** To be defined.
• **Information:** Purpose and reference number.
• **Execution:** 90-90-55/630 Installing valve identification labels.		

90-90-60/405 Pipe clips **Shared by:** 55-40-40/120 Cold water supply system; 55-40-40/150 Direct hot water storage supply system; 55-60-55/120 Natural gas supply system; and 60-45-40/110 Low temperature hot water heating system. • **Manufacturer:** To be defined. • **Clip type:** Manufacturer's standard. • **Material:** Stainless steel. • **Execution:** 90-90-60/620 Installing pipeline supports.		
90-90-95/320 Compression isolators **Shared by:** 55-40-40/120 Cold water supply system; 55-40-40/150 Direct hot water storage supply system; 65-10-95/130 Mechanical supply ventilation system; and 65-10-95/140 Mechanical extract ventilation system. • **Manufacturer:** To be defined. • **Compression isolators type:** To be defined. • **Colour code:** To be defined. • **Load:** To be defined. • **Deflection:** To be defined.		
90-90-95/330 Spring isolators **Shared by:** 55-40-40/120 Cold water supply system; 55-40-40/150 Direct hot water storage supply system; 65-10-95/130 Mechanical supply ventilation system; and 65-10-95/140 Mechanical extract ventilation system. • **Manufacturer:** To be defined. • **Spring isolators type:** To be defined. • **Colour code:** To be defined. • **Load:** To be defined. • **Deflection:** To be defined.		

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Execution

55-40-40/610 Removing hot and cold water systems

Shared by: 55-40-40/120 Cold water supply system; and 55-40-40/150 Direct hot water storage supply system.

- **Scope:** Remove all existing hot and cold water services.

55-40-40/620 Installing hot and cold water systems generally

Shared by: 55-40-40/120 Cold water supply system; and 55-40-40/150 Direct hot water storage supply system.

- **Standard:** To BS 8558 and BS EN 806-4.
- **Performance:** Free from leaks and the audible effects of expansion, vibration and water hammer.
- **Fixing of equipment, components and accessories:** Fix securely, parallel or perpendicular to the structure of the building.
- **Preparation:** Immediately before installing tanks and cisterns on a floor or platform, clear the surface completely of debris and projections.
- **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.

55-40-40/650 Hydraulic pressure testing of hot and cold water supply systems

Shared by: 55-40-40/120 Cold water supply system; and 55-40-40/150 Direct hot water storage supply system.

- **Standard:** To BS 8558 and BS EN 806-4.
- **Notice (minimum):** 48 h.
- **Pressure:** 2 times working pressure.
- **Duration of test:** 1h

55-40-40/660 Flushing hot and cold water systems

Shared by: 55-40-40/120 Cold water supply system; and 55-40-40/150 Direct hot water storage supply system.

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

55-40-40/670 Disinfection of hot and cold water systems

Shared by: 55-40-40/120 Cold water supply system; and 55-40-40/150 Direct hot water storage supply system.

- **Standard:** To BS EN 806-4.
- **Samples for analysis:** Provide after disinfection and flushing.

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90-10-65/610 Pipelines installation generally

Shared by: 90-10-65/630 Installing copper pipelines; 90-10-65/645 Installing plastics pipelines; 90-10-65/665 Installing refrigerant pipework; and 90-10-65/680 Installing steel pipelines.

- **Standard:** BESATechnical Report TR/20/9 Natural gas.
- **Dissimilar metals:** Prevent electrolytic corrosion.

90-10-65/615 Installing pipeline fittings

Shared by: 90-10-65/630 Installing copper pipelines; 90-10-65/645 Installing plastics pipelines; and 90-10-65/680 Installing steel pipelines.

- **Bushes:** To be defined.
- **Fabricated junctions and fittings:** To be defined.
- **Demountable joints:** To be defined.

90-10-65/620 Installing anchors generally

Shared by: 90-10-65/630 Installing copper pipelines; 90-10-65/645 Installing plastics pipelines; and 90-10-65/680 Installing steel pipelines.

- **Purpose:** To resist axial stress transmitted by flexure of horizontal and vertical pipe runs, and loading on vertical pipes.
- **Fixings:** Provide associated backing plates, nuts, washers and bolts for attachment to, or building into building structure.
- **Fixing to building structure:** Bolted.
- **Building structure:** To be defined.

90-10-65/625 Installing slide guides

Shared by: 90-10-65/630 Installing copper pipelines; and 90-10-65/680 Installing steel pipelines.

- **Expansion and contraction:** Direct movement from pipe anchor points towards loops, bellows or flexible inserts.
- **Thrust:** Linear relative to the axis of pipe.
- **Friction:** To be defined.

90-10-65/630 Installing copper pipelines

- **General requirements:** 90-10-65/690 Spacing of pipelines;
  90-10-65/625 Installing slide guides;
  90-10-65/615 Installing pipeline fittings;
  90-10-65/610 Pipelines installation generally;
  90-10-65/710 General inspection and testing;
  and 90-10-65/620 Installing anchors generally.
- **Standard:** In accordance with CDA publications 88 Copper tube in buildings.
- **Jointing method:**
  - **Permanently concealed joints:** To be defined.
  - **Accessible joints:** To be defined.
- **Expansion loops:** To be defined.
- **Anchor:**
  Method: To be defined.

- **Pipe restraints:** To be defined.

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90-10-65/690 Spacing of pipelines

Shared by: 90-10-65/630 Installing copper pipelines; 90-10-65/645 Installing plastics pipelines; and 90-10-65/680 Installing steel pipelines.

- **Minimum clearance between insulated pipelines and:**
  - **Wall finish:** To be defined.
  - **Ceiling finish or soffit:** To be defined.
  - **Floor:** To be defined.
  - **Electrical services:** To be defined.
  - **Adjacent services:** To be defined.
  - **Uninsulated pipeline:** To be defined.
  - **Another insulated pipeline:** To be defined.
- **Minimum clearance between uninsulated pipelines and:**
  - **Wall finish:** To be defined.
  - **Ceiling finish or soffit:** To be defined.
  - **Floor:** To be defined.
  - **Electrical services:** To be defined.
  - **Adjacent services:** To be defined.
  - **Another uninsulated pipeline:** To be defined.

90-10-65/700 Installing buried pipelines

Shared by: 90-10-65/310 Copper pipelines; 90-10-65/365 Polyethylene (PE) pipelines for water supply; and 90-10-65/415 Steel pipelines type A.

- **Depth of cover:** To be defined.
- **Set out:** To be defined.
- **Concealment:** Do not lay under surfaced footpaths or drives.
- **Trench excavations:** To be defined.
- **Installation:** Thoroughly clean lengths of pipe internally before laying. Temporarily cap until jointing takes place. After laying and jointing keep leading end capped.
- **Thrust blocks:** Install at changes of direction and blank ends.
- **Backfilling:** To be defined.

90-10-65/705 Protection of buried pipelines

Shared by: 90-10-65/310 Copper pipelines; 90-10-65/365 Polyethylene (PE) pipelines for water supply; and 90-10-65/415 Steel pipelines type A.

- **Earth cover (minimum):**
  - **Water pipework:** To be defined.
  - **Fuel oil and gas:** To be defined.
  - **Under roadways:** To be defined.
- **Protection:** To be defined.
- **Application:** To be defined.
- **Marker tape:** Required.

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90-10-65/710 General inspection and testing

Shared by: 90-10-65/630 Installing copper pipelines; 90-10-65/645 Installing plastics pipelines; and 90-10-65/680 Installing steel pipelines.

- **Inspection of joints:**
  - **Joints:** To be defined.
  - **Number of joints:** To be defined.
- **Safety precautions:** In accordance with HSEGS 4.

90-10-70/610 Installation of pumps generally

Shared by: 90-10-70/340 Canned rotor pumps type A and type B.

- **Pipeline connections:** Arrange to prevent transmission of pipeline forces to pump casing.
- **Pressure gauge tappings:** Provide in flow and return pipeline connections and in common suction and delivery pipeline.
- **Brackets:** Support pipeline mounted pumps on purpose made brackets lined with vibration absorbent material.
- **Alignment:** Align and balance to minimize vibration.
- **Belt tension:** Correctly tension drive belts.
- **Access:** Provide adequate space for service and maintenance.
- **Identification plate:**
  - **Format:** Submit proposals.
  - **Details:** To be defined.

90-10-70/640 Commissioning preparation

Shared by: 90-10-70/340 Canned rotor pumps type A and type B.

- **In-line pumps:** Change impeller if necessary.
- **Belt driven pumps:** Change belt and pulley if necessary.

90-10-90/610 Installation of valves generally

Shared by: 90-10-90/310 Copper alloy service stop valves; 90-10-90/318 Backflow prevention devices; 90-10-90/330 Ball valves; 90-10-90/370 Thermostatic mixing valves; 90-10-90/374 Draining taps; 90-10-90/380 Ball valves, manually operated; 90-10-90/640 Installation of thermostatic radiator valves; and 90-10-90/670 Installation of check valves.

- **Installation:** In accordance with BS 6683.
- **Position:** As drawings. Contractor's choice where unspecified.
- **Isolation and regulation valves:** Provide at equipment and on sub-circuits.
- **Access:** Locate valves so they can be readily operated and maintained. Locate next to equipment which is to be isolated.
- **Connection to pipework:** Fit with joints that suit the pipe material.

90-15-35/610 Installing gas fired water heaters

- **Standard:** In accordance with BS 5546.
- **Label:** Attach, to advise users not to use the water heater for more than 5 minutes continuously.

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• **Flueless water heaters:** Do not connect to taps outside the space where the heater is installed.		
90-15-35/620 Installing balanced flue terminals		
• **Opening in external wall:** Submit proposals. • **Flue guard:** Required.		
90-90-40/610 Installing insulation and protection products generally		
Shared by: 90-90-40/620 Installing canvas faced mineral insulation; 90-90-40/625 Installing foil faced mineral wool insulation on pipelines; 90-90-40/630 Installing nitrile rubber insulation on pipelines; and 90-90-40/640 Installing phenolic foam insulation on pipelines. • **Standard:** In accordance with BS 5970. • **Timing:** Insulate after installed system has been fully tested and joints proved sound. • **Insulation:** Do not enclose adjacent units together. • **Clearance:** Maintain between pipes. • **Finish:** Neatly finish joints, corners, edges and overlaps.		
90-90-40/620 Installing canvas faced mineral insulation		
Shared by: 90-90-40/330 Mineral wool pipe section insulation type A; type B and type C. • **General requirements:** 90-90-40/610 Installing insulation and protection products generally. • **Joints:** Close butt; secure canvas overlaps with adhesive. • **At fittings:** Mitre. Secure with adhesive. • **Sealant:** Apply two coats of class 0 polymer solution.		
90-90-40/625 Installing foil faced mineral wool insulation on pipelines		
Shared by: 90-90-40/330 Mineral wool pipe section insulation type A; type B and type C. • **General requirements:** 90-90-40/610 Installing insulation and protection products generally. • **Joints:** Close butt; seal with 50 mm wide class 0 tape on both longitudinal and circumferential joints. • **At fittings:** Mitre. Secure with tape. • **Vapour seal:** Tape exposed insulation membrane. Seal vapour barrier at pipe support with class 0 tape.		
90-90-40/640 Installing phenolic foam insulation on pipelines		
Shared by: 90-90-40/360 Phenolic foam insulation type A; type B and type C. • **General requirements:** 90-90-40/610 Installing insulation and protection products generally. • **Joints:** Close butt, seal with 50 mm wide class 0 tape on both longitudinal and circumferential joints. • **At fittings:** Mitre. Secure with tape. • **Vapour seal:** Tape exposed insulation membrane. Seal vapour barrier at pipe support with class 0 tape.		
90-90-40/740 Installing at valves and flanges		
• **Application:** Do not obstruct removal of nuts and bolts, or operation of valves.		

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90-90-40/780 Installing vapour barriers

Shared by: 90-90-40/350 Nitrile rubber insulation; and 90-90-40/380 Vapour barrier.

- **Integrity:** Seal to maintain throughout.

90-90-55/610 Installing mechanical plant and equipment identification

- **Fixing:** Fix with adhesive to equipment.
- **Position:** On equipment and On wall adjacent equipment.

90-90-55/620 Installing valve charts and schematics

- **Fixing:** To be defined.
- **Position:** Plant room.

90-90-55/630 Installing valve identification labels

- **Fixing:** Secure with metal chain.

90-90-55/660 Installing identification on pipework

Shared by: 90-90-55/430 Identifying pipework type A and type B.

- **Application of basic identification colour:** Coloured bands as BS 1710 clause 3.3.
- **Safety colour identification:** On or next to the colour bands.
- **Information:** Colour bands as BS 1710 appendix D.
- **Direction of flow:** Indication arrow and the word FLOW or the letter F and Indication arrow and the word RETURN or the letter R.

90-90-60/620 Installing pipeline supports

- **Position:**
  - **In plant rooms:** To be defined.
  - **Distribution corridors and risers:** To be defined.
  - **Surface mountings:** Split ring, spacer nipple and backplate.

System completion

55-40-40/810 Commissioning of hot and cold water supply systems

Shared by: 55-40-40/120 Cold water supply system; and 55-40-40/150 Direct hot water storage supply system.

- **Pre-commissioning:** In accordance with BSRIABG 2/2010 and CIBSECommissioning Code W.
- **Commissioning:** In accordance with BS EN 806-4, BSRIABG 2/2010 and CIBSE Commissioning Code W.
- **Notice (minimum):** 48 h.
- **Equipment:** Check and adjust operation of equipment, controls and safety devices.
- **Outlets:** Check operation of outlets for satisfactory rate of flow and temperature.

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55-40-40/820 Inspection and test records

Shared by: 55-40-40/120 Cold water supply system; and 55-40-40/150 Direct hot water storage supply system.

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

55-40-40/830 Demonstrations

Shared by: 55-40-40/120 Cold water supply system; and 55-40-40/150 Direct hot water storage supply system.

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

55-40-40/840 Documentation

Shared by: 55-40-40/120 Cold water supply system; and 55-40-40/150 Direct hot water storage supply system.

- **Operating and maintenance instructions:**
  - **Scope:** Submit for the system giving optimum settings for controls.
  - **Product information:** Include product description, date of purchase, performance characteristics, application (suitability for use), method of operation and control, and cleaning and maintenance requirements.
  - **Format:** Paper copy.
  - **Number of copies:** Three.
- **Record drawings:**
  - **Content:** Location and arrangement of plant in plant rooms;
    Location, size and route of hot and cold water services;
    Location, route and depth of underground services;
    Location and identification of regulating, isolation and control valves;
    and Location of outlets.
  - **Format:** A1 paper print and Electronic.
  - **Number of copies:** Three.
- **Submittal date:** At handover.
- **Wholesome water consumption notice:** Submit within 30 days.

55-40-40/850 Water quality tests

Shared by: 55-40-40/110 Incoming water supply; 55-40-40/120 Cold water supply system; and 55-40-40/150 Direct hot water storage supply system.

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

Ω End of system

55-60-55/110 Incoming gas supply

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System outline

55-60-55/110 Incoming gas supply

- **Description:** Chantry Centre will require a new dedicated gas supply to fed the new plantroom.

  The contractor shall arrange with the gas supplier a new gas supply and meter to fed the new boiler plant.

  The contractor shall connect the new Boilers to the new Gas Meter with Steel pipework and install new Gas Solenoid and Isolating Valves in the plantroom as shown on the drawings.
- **Gas transporter:** National Grid.
- **Gas supplier:** Existing.
- **Volume flow rate:** 27.49 m3/h
- **Position of meter:** as shown on the drawings

Ω End of system

55-60-55/120 Natural gas supply system

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System outline

55-60-55/120 Natural gas supply system

- **Description:** Chantry Centre will require a new dedicated gas supply to fed the new plantroom.

  The contractor shall connect the new Boilers to the new Gas Meter with Steel pipework and install new Gas Solenoid and Isolating Valves in the plantroom as shown on the drawings. A new gas meter shall be installed in the boiler room and linked to the new BMS system to monitor the gas consumption of the new plant.

  The contractor shall manage with the Gas supplier for the provision of the New Gas Supply to the boilers and gas fired water heater according to the gas regulations and gas supplier requirements.

  The contractor shall install a Gas Pressure Proving & Gas Detection system manufactured and supplied by S&S Ltd and shall be the Merlin 1000BH panel to comply with BS6644, IGEM UP/1A Edition 2 and IGEM UP/2 Edition 3. The system comprises a control panel and a gas pressure sensor.
  The Merlin 1000BH can receive connections from remote emergency shut-off buttons, two gas detectors, fire panel and heat detectors. It also can be integrated with a BMS.

  The panel dimensions are 178mm high x 253mm wide x 62 mm deep. The box shall be rated to IP65 it shall be an ABS enclosure and be CE Approved. The system shall be capable of controlling the gas in the area shown. The fascia of the panel should be key operated (Gas on/off) and a shrouded emergency shut off button shall be fitted. The panel shall have a total of 9 LED'S on the fascia, these should be: Gas On, Testing, Test Fail, Pressure Low, Gas Detector 1, Gas Detector 2, Heat Detector, EM Stop and Fire Alarm.

  S&S Ltd will also supply the gas solenoid valve.
  - 1 Off Merlin 1000BH c/w Transducer
  - 1 Off Gas Solenoid Valve (Size to be confirmed)
  - 1 Off Natural Gas Detector
  - 1 Off Carbon Monoxide Detector
  - 1 Off Thermal Link (normally one over each boiler)
  - 1 Off FAB-1 (Fire Alarm Bypass)

  The new gas installation shall be commissioned by approved gas specialist according IGEM and Building Regulations.

  A provisional sum of £1500 shall be allowed for the new gas supply to the Boilers as well as to
  address any shortfall/defect in the gas system.
- **System performance:** 55-60-55/210 Design of gas supply installations.
- **Metering:** New Gas meter
- **Pipeline material:** 90-10-65/415 Steel pipelines type A.
- **Support:** 90-90-60/405 Pipe clips.

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- **Gas valves:** 90-10-90/380 Ball valves, manually operated and 90-30-35/320 Gas solenoid valves.
- **Gas equipment:** 90-30-35/370 Safety and control devices.
- **Plant and equipment identification:** 90-90-55/430 Identifying pipework type B; 90-90-55/480 Mechanical plant and equipment identification labels; 90-90-55/490 Valve charts and schematics; and 90-90-55/495 Valve identification labels.
- **Execution:** 55-60-55/650 Installing gas pipelines and 55-60-55/670 Connection to gas outlets.
- **System completion:** 55-60-55/810 Testing gas pipeline installations; 55-60-55/840 Commercial and industrial gas installations; 55-60-55/850 Pressure testing of natural gas supply systems; 55-60-55/860 Performance testing; 55-60-55/870 Inspection and test records; and 55-60-55/875 Documentation.

System performance

55-60-55/210 Design of gas supply installations

- **Design:** Complete the design of the natural gas supply system.
- **Standards:**
  - **General:** To IGEMStandard UP/2.
  - **Low pressure gas for premises:** To BS 6891.
  - **Gas pipework for buildings:** To BS EN 1775.
  - **Industrial gas supply:** To BS EN 15001-1.
- **Requirement:** Submit proposals, including detailed design drawings, technical information, calculations and manufacturers' literature.

Products

90-10-65/415 Steel pipelines type A

- **General requirements:** 90-10-65/425 Steel pipeline jointing materials and 90-10-65/420 Steel pipeline fittings.
- **Manufacturer:** To be defined.
- **Standard:**
  - **Up to 150mm:** To BS EN 10255, heavy weight.
  - **150mm and above:** To be defined.
- **Finish:** Painted yellow.
- **Execution:** 90-10-65/680 Installing steel pipelines; 90-10-65/685 Welding steel pipelines; 90-10-65/700 Installing buried pipelines; and 90-10-65/705 Protection of buried pipelines.

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90-10-65/420 Steel pipeline fittings

Shared by: 90-10-65/415 Steel pipelines type A and type B.

- **Manufacturer:** Crane, Hattersley, Pegler Yorkshire or equal approved
- **Standards:**
  - **Malleable:** To BS 143 and 1256.
  - **Flanged:** To BS EN 1092-1.
  - **Welded:** To BS EN 10253-1 and BS EN 10253-2.
  - **Wrought:** To BS EN 10241.
  - **Press fit fittings:** Manufacturer's standard.
  - **Mechanical couplings:** To be defined.

90-10-65/425 Steel pipeline jointing materials

Shared by: 90-10-65/415 Steel pipelines type A and type B.

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

    Gas welding: To BS EN 12536.

    Arc welding: To BS EN ISO 636.

90-10-90/380 Ball valves, manually operated

- **Manufacturer:** Crane, Hattersley or equal approved
- **Standard:** To BS EN 331.
- **Arrangement:** Manufacturer's standard.
- **Material:** Brass and Stainless steel.
- **Connections:** Compression to BS EN 1254-2;
  Flanged to BS EN 1092-3;
  Pressure tight joints threaded to BS EN 10226-1;
  and Threaded joints to BS EN ISO 228-1.
- **Execution:** 90-10-90/610 Installation of valves generally.

90-30-35/320 Gas solenoid valves

- **Manufacturer:** Submit proposals.
- **Arrangement:** To be defined.
- **Mounting:** Horizontal pipeline.
- **Speed of opening:** To be defined.
- **Connections:** To be defined.
- **Pressure rating:** To be defined.
- **Solenoid supply voltage:** Submit proposals.

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• **Actuation method:** To be defined. • **Reset:** To be defined. • **Accessories:** Pressure test points.		
90-30-35/370 Safety and control devices • **Manufacturer:** As noted above in description • **Standard:** To BS EN 13611.		
90-90-55/430 Identifying pipework type B **Shared by:** 55-60-55/120 Natural gas supply system; 60-45-40/110 Low temperature hot water heating system; and 60-45-95/110 Variable refrigerant flow system. • **Manufacturer:** To be defined. • **Standards:** To BS 1710. • **Identification type:** Painting. • **Execution:** 90-90-55/660 Installing identification on pipework.		

90-90-55/480 Mechanical plant and equipment identification labels
Shared by: 55-40-40/120 Cold water supply system; 55-40-40/150 Direct hot water storage supply system; 55-60-55/120 Natural gas supply system; 60-45-40/110 Low temperature hot water heating system; 60-45-95/110 Variable refrigerant flow system; 65-10-95/130 Mechanical supply ventilation system; and 65-10-95/140 Mechanical extract ventilation system.
• **Manufacturer:** To be defined.
• **Material:** Engraved anodized aluminium and Face engraved rigid plastic laminate.
• **Label size:** To be defined.
• **Colour:**
  – **Background:** To be defined.
  – **Lettering:** To be defined.
• **Typography:**
  – **Font:** To be defined.
  – **Size:** To be defined.
• **Information to be included:** Equipment name;
Equipment reference number;
and Service.
• **Execution:** 90-90-55/610 Installing mechanical plant and equipment identification.		

90-90-55/490 Valve charts and schematics **Shared by:** 55-40-40/120 Cold water supply system; 55-40-40/150 Direct hot water storage supply system; 55-60-55/120 Natural gas supply system; 60-45-40/110 Low temperature hot water heating system; and 60-45-95/110 Variable refrigerant flow system. • **Manufacturer:** To be defined. • **Material:** Engraved plastics laminate. • **Information to be included:** Location and identification of pipework regulating, isolating and control valves. • **Execution:** 90-90-55/620 Installing valve charts and schematics.		

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90-90-55/495 Valve identification labels

Shared by: 55-40-40/120 Cold water supply system; 55-40-40/150 Direct hot water storage supply system; 55-60-55/120 Natural gas supply system; 60-45-40/110 Low temperature hot water heating system; and 60-45-95/110 Variable refrigerant flow system.

- **Manufacturer:** To be defined.
- **Material:** Engraved anodized aluminium.
- **Label size:** To be defined.
- **Colour:**
  - **Background:** To be defined.
  - **Lettering:** To be defined.
- **Typography:**
  - **Font:** To be defined.
  - **Size:** To be defined.
- **Information:** Purpose and reference number.
- **Execution:** 90-90-55/630 Installing valve identification labels.

90-90-60/405 Pipe clips

Shared by: 55-40-40/120 Cold water supply system; 55-40-40/150 Direct hot water storage supply system; 55-60-55/120 Natural gas supply system; and 60-45-40/110 Low temperature hot water heating system.

- **Manufacturer:** To be defined.
- **Clip type:** Manufacturer's standard.
- **Material:** Stainless steel.
- **Execution:** 90-90-60/620 Installing pipeline supports.

Execution

55-60-55/650 Installing gas pipelines

- **Standards:**
  - **General:** To IGEMStandard UP/10.
  - **Gas pipelines:** To BS 6891 and BS EN 1775.

55-60-55/670 Connection to gas outlets

- **Equipment:** Gas-fired condensing boilers and Instantaneous water heaters, gas fired.
- **Connection:** Connect to installed equipment.

90-10-65/610 Pipelines installation generally

Shared by: 90-10-65/630 Installing copper pipelines; 90-10-65/645 Installing plastics pipelines; 90-10-65/665 Installing refrigerant pipework; and 90-10-65/680 Installing steel pipelines.

- **Standard:** BESATechnical Report TR/20/9 Natural gas.
- **Dissimilar metals:** Prevent electrolytic corrosion.

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90-10-65/615 Installing pipeline fittings

Shared by: 90-10-65/630 Installing copper pipelines; 90-10-65/645 Installing plastics pipelines; and 90-10-65/680 Installing steel pipelines.

- **Bushes:** To be defined.
- **Fabricated junctions and fittings:** To be defined.
- **Demountable joints:** To be defined.

90-10-65/620 Installing anchors generally

Shared by: 90-10-65/630 Installing copper pipelines; 90-10-65/645 Installing plastics pipelines; and 90-10-65/680 Installing steel pipelines.

- **Purpose:** To resist axial stress transmitted by flexure of horizontal and vertical pipe runs, and loading on vertical pipes.
- **Fixings:** Provide associated backing plates, nuts, washers and bolts for attachment to, or building into building structure.
- **Fixing to building structure:** Bolted.
- **Building structure:** To be defined.

90-10-65/625 Installing slide guides

Shared by: 90-10-65/630 Installing copper pipelines; and 90-10-65/680 Installing steel pipelines.

- **Expansion and contraction:** Direct movement from pipe anchor points towards loops, bellows or flexible inserts.
- **Thrust:** Linear relative to the axis of pipe.
- **Friction:** To be defined.

90-10-65/680 Installing steel pipelines

- **General requirements:** 90-10-65/690 Spacing of pipelines;
  90-10-65/625 Installing slide guides;
  90-10-65/615 Installing pipeline fittings;
  90-10-65/610 Pipelines installation generally;
  90-10-65/710 General inspection and testing;
  and 90-10-65/620 Installing anchors generally.
- **Permanently concealed joints:** To be defined.
- **Accessible joints:** To be defined.
- **Expansion loops:** To be defined.
- **Anchor:**
  - **Method:** To be defined.
  - **Pipe restraints:** To be defined.

90-10-65/685 Welding steel pipelines

- **Standard:** In accordance with BESATechnical Report TR/5.
- **Welder identification:** To be defined.
- **Non-destructive examination:** Visual examination, to BS EN ISO 17637.
- **Completed welds:** To be defined.

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90-10-65/690 Spacing of pipelines

Shared by: 90-10-65/630 Installing copper pipelines; 90-10-65/645 Installing plastics pipelines; and 90-10-65/680 Installing steel pipelines.

- **Minimum clearance between insulated pipelines and:**
  - **Wall finish:** To be defined.
  - **Ceiling finish or soffit:** To be defined.
  - **Floor:** To be defined.
  - **Electrical services:** To be defined.
  - **Adjacent services:** To be defined.
  - **Uninsulated pipeline:** To be defined.
  - **Another insulated pipeline:** To be defined.
- **Minimum clearance between uninsulated pipelines and:**
  - **Wall finish:** To be defined.
  - **Ceiling finish or soffit:** To be defined.
  - **Floor:** To be defined.
  - **Electrical services:** To be defined.
  - **Adjacent services:** To be defined.
  - **Another uninsulated pipeline:** To be defined.

90-10-65/700 Installing buried pipelines

Shared by: 90-10-65/310 Copper pipelines; 90-10-65/365 Polyethylene (PE) pipelines for water supply; and 90-10-65/415 Steel pipelines type A.

- **Depth of cover:** To be defined.
- **Set out:** To be defined.
- **Concealment:** Do not lay under surfaced footpaths or drives.
- **Trench excavations:** To be defined.
- **Installation:** Thoroughly clean lengths of pipe internally before laying. Temporarily cap until jointing takes place. After laying and jointing keep leading end capped.
- **Thrust blocks:** Install at changes of direction and blank ends.
- **Backfilling:** To be defined.

90-10-65/705 Protection of buried pipelines

Shared by: 90-10-65/310 Copper pipelines; 90-10-65/365 Polyethylene (PE) pipelines for water supply; and 90-10-65/415 Steel pipelines type A.

- **Earth cover (minimum):**
  - **Water pipework:** To be defined.
  - **Fuel oil and gas:** To be defined.
  - **Under roadways:** To be defined.
- **Protection:** To be defined.
- **Application:** To be defined.
- **Marker tape:** Required.

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90-10-65/710 General inspection and testing

Shared by: 90-10-65/630 Installing copper pipelines; 90-10-65/645 Installing plastics pipelines; and 90-10-65/680 Installing steel pipelines.

- **Inspection of joints:**
  - **Joints:** To be defined.
  - **Number of joints:** To be defined.
- **Safety precautions:** In accordance with HSEGS 4.

90-10-90/610 Installation of valves generally

Shared by: 90-10-90/310 Copper alloy service stop valves; 90-10-90/318 Backflow prevention devices; 90-10-90/330 Ball valves; 90-10-90/370 Thermostatic mixing valves; 90-10-90/374 Draining taps; 90-10-90/380 Ball valves, manually operated; 90-10-90/640 Installation of thermostatic radiator valves; and 90-10-90/670 Installation of check valves.

- **Installation:** In accordance with BS 6683.
- **Position:** As drawings. Contractor's choice where unspecified.
- **Isolation and regulation valves:** Provide at equipment and on sub-circuits.
- **Access:** Locate valves so they can be readily operated and maintained. Locate next to equipment which is to be isolated.
- **Connection to pipework:** Fit with joints that suit the pipe material.

90-90-55/610 Installing mechanical plant and equipment identification

- **Fixing:** Fix with adhesive to equipment.
- **Position:** On equipment and On wall adjacent equipment.

90-90-55/620 Installing valve charts and schematics

- **Fixing:** To be defined.
- **Position:** Plant room.

90-90-55/630 Installing valve identification labels

- **Fixing:** Secure with metal chain.

90-90-55/660 Installing identification on pipework

Shared by: 90-90-55/430 Identifying pipework type A and type B.

- **Application of basic identification colour:** Coloured bands as BS 1710 clause 3.3.
- **Safety colour identification:** On or next to the colour bands.
- **Information:** Colour bands as BS 1710 appendix D.
- **Direction of flow:** Indication arrow and the word FLOW or the letter F and Indication arrow and the word RETURN or the letter R.

90-90-60/620 Installing pipeline supports

- **Position:**
  - **In plant rooms:** To be defined.
  - **Distribution corridors and risers:** To be defined.

- **Surface mountings:** Split ring, spacer nipple and backplate.

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System completion

55-60-55/810 Testing gas pipeline installations

- **Standards:**
  - **Testing, purging and commissioning:** To BS 6891 and BS EN 1775.
  - **Soundness testing and purging:** To IGEM Standard UP/1A.
  - **Tightness testing and direct purging:** To IGEM/UP/1B

55-60-55/840 Commercial and industrial gas installations

- **Soundness testing and purging:** To IGEM Standard UP/1.
- **Testing, purging and commissioning pipelines:** To BS EN 15001-2.
- **Commissioning gas fired plant:** To IGEM Standard UP/4.

55-60-55/850 Pressure testing of natural gas supply systems

- **Notice (minimum):** 48 h.
- **Pressure:** 2 times working pressure.
- **Duration of test:** 2 h.

55-60-55/860 Performance testing

- **Guaranteed efficiency:** To be defined.
- **Reports:** Submit on completion.

55-60-55/870 Inspection and test records

- **Reports:** To be defined.
- **Record sheets:**
  - **Submission:** Submit proposals.
  - **Number of copies:** To be defined.

55-60-55/875 Documentation

- **Operating and maintenance instructions:**
  - **Scope:** Submit for the system giving optimum settings for controls.
  - **Product information:** Include product description, date of purchase, performance characteristics, application (suitability for use), method of operation and control, and cleaning and maintenance requirements.
  - **Format:** Electronic and Paper copy.
  - **Number of copies:** Three.
- **Record drawings:**
  - **Content:** Location and arrangement of plant in plant rooms;
    Location, size and route of mechanical services;
    Location, route and depth of underground services;
    Location and identification of pipework regulating, isolation and control valves;
    and Location of outlets.

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

- **Submittal date:** At handover.

Ω End of system

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60-45-40/110 Low temperature hot water heating system

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System outline

60-45-40/110 Low temperature hot water heating system

- **Description:** New Chantry Centre will be fitted with new gas fired condensing boilers that will provide LTHW heating to radiators generally. The contractor shall design, supply and install a new Underfloor heating system and connect to the heating distribution as shown on the drawings.

  The contractor shall:
  1. Install new gas fired condensing boiler, Expansion Vessels, pumps, flues and fittings with new steel pipework (welded or screwed) as shown on the drawings and as per manufacturer recommendations.
  2. Install Balanced flues through external wall as shown on the drawings. Concentric flues shall be installed through external wall at high level according to manufacturer recommendations and shall be fully compliant with building regulations.
  3. Install new gas pipework from the existing meter to the new gas meter and connect the boiler to the gas distribution with steel pipework as indicated on the drawings.
  4. Install new underfloor heating system in Main Hall, including pipes, manifold and ancillaries. Connect system into new boiler plant as indicated on the drawings. Reference tu Nu-Heat quotation number UFH143935.
  5. Provide new BMS controls in the boiler room for the operation of the Heating system and Domestic Hot Water Service
  6. The new system shall be commissioned by the boiler manufacturer (or approved agent) and the system and set to work.
  7. Install new radiators as shown on the drawings and connect the to the heating distribution with new steel pipework as per the drawings. The contractor shall install new isolating valves and commissioning stations so the system is fully commissionable.

  The new plant shall be as scheduled in the plant schedules.

  The contractor shall make good any holes and paint imperfections

  - Install and connect new heating flow & return pipes to serve new radiators as shown on the drawings and specification below.

  - Agree with the consultant the Inhibitor dosing and refill the system with dosed water for static testing and at completion of the heating installation.

  - Pressure test
  - Flush
  - Test for adequate water chemistry and Microbiological content
  - Set to work
  - Include facilities to enable the system to be dosed and proved/witnessed before practical completion

- Provide Record drawings and O&M information in line with this specification and other contract documents. • **System performance:** 60-45-40/210 Design of heating systems. • **Arrangement:** Two-pipe. • **Distribution:** Constant temperature and Variable flow. • **Heat source:** 90-40-05/340 Gas-fired condensing boilers. • **Burner:** – **Arrangement:** To be defined. – **Type:** To be defined. • **Fuel:** Natural gas. • **Flues and chimneys:** Balanced flues • **Solid fuel equipment:** – **Solid fuel handling equipment:** To be defined. – **Accumulators:** To be defined. – **Accumulator accessories:** To be defined. • **Pressurization units:** 90-10-70/400 Pressurization units. • **Feed and expansion tanks:** To be defined. • **Pumps:** 90-10-70/340 Canned rotor pumps type B. • **Water treatment plant:** – **Equipment:** 90-15-95/350 Dosing pots. – **Chemicals:** 90-15-95/317 Corrosion inhibitors for closed circuit systems and 90-15-95/335 Bacteria and biofouling inhibitors for closed circuit systems. • **Pipelines:** 90-10-65/415 Steel pipelines type B. • **Pipeline ancillaries:** – **Venting devices:** 90-10-60/310 Automatic air vents. – **Expansion devices:** 90-10-60/320 Angular expansion compensators and 90-10-60/325 Axial expansion compensators. – **De-aerators:** Combined air/dirt separator – **Separators:** Combined air/dirt separator – **Gauges:** 90-10-60/370 Pressure gauges and 90-10-60/380 Temperature gauges. – **Accessories:** 90-10-60/405 Pipe sleeves type A; 90-10-60/405 Pipe sleeves type B; 90-10-60/420 Tundishes; and 90-10-60/400 Pipeline strainers. – **Pipeline supports:** 90-90-60/405 Pipe clips. • **Valves:** – **Isolating valves:** 90-10-90/330 Ball valves. – **Check valves:** To be defined. – **Regulating valves:** commissioning stations – **Balancing valves:** To be defined. – **Mixing valves:** To be defined. – **Radiator valves:** 90-10-90/364 Thermostatic radiator valves. – **Draining devices:** 90-10-90/374 Draining taps.	£	p

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Accessories: 90-10-90/360 Test points and 90-10-90/376 Safety valves.

- **Thermal insulation:** 90-90-40/330 Mineral wool pipe section insulation type C and 90-90-40/360 Phenolic foam insulation type B.
- **Vibration isolation:** To be defined.
- **Heat emitters:** 90-40-35/310 Air curtains and 90-40-35/405 Radiators.
- **Controls:** Heating systems control.
- **System accessories:** .
- **Plant and equipment identification:** 90-90-55/390 Equipment labels and warning notices; 90-90-55/430 Identifying pipework type A; 90-90-55/430 Identifying pipework type B; 90-90-55/480 Mechanical plant and equipment identification labels; 90-90-55/490 Valve charts and schematics; and 90-90-55/495 Valve identification labels.
- **Execution:** 60-45-40/610 Removing heating systems; 60-45-40/620 Installing water based heating systems; 60-45-40/670 Installing water treatment for heating systems; 60-45-40/650 Filling and pressure testing of water based heating systems; and 60-45-40/660 Flushing and pre-commission cleaning of heating systems.
- **System completion:** To be defined.

System performance

60-45-40/210 Design of heating systems

- **Design:** Complete the design of the heating systems.
- **Method:** In accordance with CIBSE AM11.
- **Requirement:** Submit proposals including detailed design drawings, technical information, calculations and manufacturers' literature.
- **Computer calculations:**

  Submittals: U-values and heat loss calculations for each room.

  Format: IES and HEVACOMP.

Products

90-10-60/310 Automatic air vents

- **Manufacturer:** To be defined.
- **Arrangement:** To be defined.
- **Material:** Gunmetal.
- **Connections:** Threaded.

90-10-60/320 Angular expansion compensators

Shared by: 55-40-40/150 Direct hot water storage supply system; and 60-45-40/110 Low temperature hot water heating system.

- **Manufacturer:** To be defined.

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• **Format:** To be defined.
• **Material:**
  – **Bellows:** To be defined.
  – **Inner sleeve:** To be defined.
• **Connections:** Flanged.
• **Execution:** To be defined.		

90-10-60/325 Axial expansion compensators
Shared by: 55-40-40/150 Direct hot water storage supply system; and 60-45-40/110 Low temperature hot water heating system.
• **Manufacturer:** To be defined.
• **Arrangement:** To be defined.
• **Material:**
  – **Bellows:** To be defined.
  – **Inner sleeve:** To be defined.
• **Connections:** To be defined.
• **Execution:** To be defined.		

90-10-60/370 Pressure gauges **Shared by:** 55-40-40/120 Cold water supply system; 55-40-40/150 Direct hot water storage supply system; and 60-45-40/110 Low temperature hot water heating system. • **Manufacturer:** To be defined. • **Standard:** To BS EN 837-1. • **Diameter:** To be defined. • **Scale subdivisions:** To be defined. • **Material:** To be defined. • **Connections:** To be defined. • **Execution:** To be defined.		
90-10-60/380 Temperature gauges **Shared by:** 55-40-40/150 Direct hot water storage supply system; and 60-45-40/110 Low temperature hot water heating system. • **Manufacturer:** To be defined. • **Standard:** To BS EN 13190. • **Format:** Manufacturer's standard. • **Diameter:** To be defined. • **Case:** Brass. • **Connections:** To be defined. • **Integral accessories:** 100 mm immersion length pocket.		
90-10-60/400 Pipeline strainers • **Manufacturer:** Crane or equal approved. • **Pattern:** To be defined.		

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- **Baskets:**
  - **Perforation size:** To be defined.
  - **Mesh size:** To be defined.
- **Material:** Bronze;
  Cast iron;
  and Dezincification resistant brass (DZR).
- **Connections:** To be defined.
- **Integral accessories:** Plugged connections for drain, air vent and differential pressure monitoring.
- **Execution:** 90-10-60/650 Installing strainers.

90-10-60/405 Pipe sleeves type A

Shared by: 50-10-05/120 Above ground wastewater drainage system with internal stacks; 55-40-40/120 Cold water supply system; 55-40-40/150 Direct hot water storage supply system; and 60-45-40/110 Low temperature hot water heating system.

- **Manufacturer:** Submit proposals.
- **Material:** Manufacturer's standard.
- **Form:** Manufacturer's standard.

90-10-60/405 Pipe sleeves type B

Shared by: 55-40-40/120 Cold water supply system; 55-40-40/150 Direct hot water storage supply system; and 60-45-40/110 Low temperature hot water heating system.

- **Manufacturer:** Submit proposals.
- **Material:** Manufacturer's standard.
- **Form:** Manufacturer's standard.

90-10-60/420 Tundishes

Shared by: 55-40-40/120 Cold water supply system; 55-40-40/150 Direct hot water storage supply system; and 60-45-40/110 Low temperature hot water heating system.

- **Manufacturer:** To be defined.
- **Material:** To be defined.
- **Connections:** Diameter to suit drain line.

90-10-65/415 Steel pipelines type B

- **General requirements:** 90-10-65/425 Steel pipeline jointing materials and 90-10-65/420 Steel pipeline fittings.
- **Manufacturer:** To be defined.
- **Standard:**
  - **Up to 150mm:** To be defined.
  - **150mm and above:** To be defined.
- **Finish:** To be defined.
- **Execution:** To be defined.

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90-10-65/420 Steel pipeline fittings

Shared by: 90-10-65/415 Steel pipelines type A and type B.

- **Manufacturer:** Crane, Hattersley, Pegler Yorkshire or equal approved
- **Standards:**
  - **Malleable:** To BS 143 and 1256.
  - **Flanged:** To BS EN 1092-1.
  - **Welded:** To BS EN 10253-1 and BS EN 10253-2.
  - **Wrought:** To BS EN 10241.
  - **Press fit fittings:** Manufacturer's standard.
  - **Mechanical couplings:** To be defined.

90-10-65/425 Steel pipeline jointing materials

Shared by: 90-10-65/415 Steel pipelines type A and type B.

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

    Gas welding: To BS EN 12536.

    Arc welding: To BS EN ISO 636.

90-10-70/320 Pumps generally

Shared by: 90-10-70/340 Canned rotor pumps type A and type B.

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

90-10-70/340 Canned rotor pumps type B

- **General requirements:** 90-10-70/320 Pumps generally.
- **Manufacturer:** Grundfos
- **Arrangement:** Twin.
- **Material:**
  - **Impeller:** To be defined.

- **Housing:** To be defined.

- **Duties:**
  - **Operation:** Refer to mechanical schedules
  - **Flow rate:** Refer to mechanical schedules
  - **Resistance:** Refer to mechanical schedules
  - **Motor:**

    Nominal voltage: Refer to mechanical schedules

    Frequency: 50 Hz.
- **Speed control:** To be defined.
- **Connections:** To be defined.
- **Accessories:** Blanking plate and gasket.
- **Execution:** 90-10-70/610 Installation of pumps generally and 90-10-70/640 Commissioning preparation.

90-10-70/400 Pressurization units

- **Manufacturer:** Mikrofill
- **Standards:**
  - **General:** To BS EN 13831.
  - **Domestic heating and hot water supply:** In accordance with BS 7074-1.
  - **Low and medium temperature hot water heating:** In accordance with BS 7074-2.
  - **Chilled water and condenser water:** In accordance with BS 7074-3.
- **Format:** Fully automatic pre-wired packaged unit on common base plate.
- **Arrangement:** To be defined.
- **Duties:**
  - **Static head:** Refer to mechanical schedules
  - **Plant rating:** Refer to mechanical schedules
  - **System water content:** Refer to mechanical schedules
  - **Operating temperatures:**

    Flow: 80 C.

    Return: 60 C.
  - **Operating pressure:** To be defined.
  - **Motor:**

    Nominal voltage: To be defined.

    Frequency: To be defined.
- **Components:** To be defined.
- **Accessories:** Manufacturer's standard.
- **Execution:** 90-10-70/630 Installing pressurization units.

90-10-90/330 Ball valves

Shared by: 55-40-40/120 Cold water supply system; 55-40-40/150 Direct hot water storage supply system; and 60-45-40/110 Low temperature hot water heating system.

- **Manufacturer:** Crane, Hattersley or equal approved
- **Material:** Brass copper alloy and Bronze.

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• **Connections:** Compression to BS EN 1254-2 and Press-fit. • **Finish:** Manufacturer's standard. • **Execution:** 90-10-90/610 Installation of valves generally.		
90-10-90/360 Test points **Shared by:** 55-40-40/150 Direct hot water storage supply system; and 60-45-40/110 Low temperature hot water heating system. • **Manufacturer:** To be defined. • **Arrangement:** To be defined. • **Material:** To be defined. • **Connections:** To be defined.		
90-10-90/364 Thermostatic radiator valves • **Manufacturer:** Danfoss, Honeywell or equal approved. • **Standard:** To BS EN 215. • **Arrangement:** Manufacturer's standard. • **Pattern:** To be defined. • **Connections:** Compression to BS EN 1254-2 and Threaded to BS EN 10226-1. • **Execution:** 90-10-90/640 Installation of thermostatic radiator valves.		
90-10-90/374 Draining taps **Shared by:** 55-40-40/120 Cold water supply system; 55-40-40/150 Direct hot water storage supply system; and 60-45-40/110 Low temperature hot water heating system. • **Manufacturer:** To be defined. • **Standard:** To BS 2879. • **Size:** To be defined. • **Arrangement:** To be defined. • **Material:** Copper alloy. • **Connections:** Threaded joints to BS EN 10226-1. • **Accessories:** Lever pattern key. • **Execution:** 90-10-90/610 Installation of valves generally.		
90-10-90/376 Safety valves • **Manufacturer:** To be defined. • **Standard:** To BS EN ISO 4126-1. • **Lift type:** To be defined. • **Arrangement:** To be defined. • **Material:** To be defined. • **Connections:** To be defined. • **Accessories:** To be defined. • **Execution:** To be defined.		

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90-15-95/317 Corrosion inhibitors for closed circuit systems

- **Manufacturer:** Submit proposals.
- **Corrosion inhibitors:** Submit proposals.

90-15-95/335 Bacteria and biofouling inhibitors for closed circuit systems

- **Manufacturer:** To be defined.
- **Non-oxidizing biocides:** To be defined.

90-15-95/350 Dosing pots

- **Manufacturer:** Submit proposals.
- **Standard:** To PD 5500.
- **Material:** To be defined.
- **Working pressure (maximum):** 8 bar.
- **Execution:** 90-15-95/610 Installing dosing equipment.

90-40-05/340 Gas-fired condensing boilers

- **Manufacturer:** Remeha Quinta Pro
- **Standards:**
  - **Boilers with heat input not exceeding 70 kW:** Heat only boiler to BS EN 15502-1 and BS EN 15502-2-1 and System boiler to BS EN 15502-1 and BS EN 15502-2-2.
  - **Boilers with heat input greater than 70 kW but not exceeding 1000 kW:** Type B to BS EN 656 and BS EN 15417;
    Type B to BS EN 13836 and BS EN 15417;
    and To BS EN 15502-1 and BS EN 15502-2-1.
  - **Thermal performance testing:** To BS 845-1.
- **Output:** Refer to mechanical schedules
- **Seasonal efficiency (gross calorific value (minimum)):** To be defined.
- **NOx emissions (maximum):** To be defined.
- **Mounting:** Cascade Kit
- **Operating pressure:** To be defined.
- **Test pressure:** To be defined.
- **Operating temperature:** To be defined.
- **Heat exchanger:** Manufacturer's standard.
- **Fuel:** Natural gas.
- **Electrical supply type:** Single phase.
- **Accessories:** Expansion vessel;
  Optimization control unit with two digital sensors;
  Pressure gauge;
  Safety valve;
  and Temperature gauge.
- **Execution:** 90-40-05/610 Installing gas and oil-fired boilers.

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90-40-35/310 Air curtains

- **Manufacturer:** Refer to mechanical schedule
- **Standards:** To BS 4856-1, BS 4856-2, BS 4856-3 and BS 4856-4.
- **Heating method:** To be defined.
- **Arrangement:** To be defined.
- **Output:** Refer to mechanical schedules
- **Air volume:** To be defined.
- **Mounting height:** To be defined.
- **Electrical supply:** Single phase.
- **Casing finish:** Refer to mechanical schedules
- **Connections:** Refer to mechanical schedules
- **Accessories:** Door interlock relay and Remote on/ off switch.
- **Execution:** 90-40-35/670 Installing unit heaters and air curtains and 90-40-35/610 Installing heat emitters generally.

90-40-35/405 Radiators

- **Manufacturer:** Stelrad
- **Standards:** To BS EN 442-1 and BS EN 442-2.
- **Third party certification:** To be defined.
- **Radiator type:** Refer to mechanical schedules
- **Output:** Refer to mechanical schedules
- **Size:**
  - **Length (maximum):** Refer to mechanical schedules
  - **Height (maximum):** Refer to mechanical schedules
  - **Depth (maximum):** Refer to mechanical schedules
- **Finish:** Refer to mechanical schedules
- **Connections:** 15 mm B.O.E.
- **Accessories:** Refer to mechanical schedules
- **Execution:** 90-40-35/610 Installing heat emitters generally.

90-90-40/330 Mineral wool pipe section insulation type A

Shared by: 50-10-05/120 Above ground wastewater drainage system with internal stacks; 55-40-40/120 Cold water supply system; 55-40-40/150 Direct hot water storage supply system; and 90-90-40/480 Insulation for valves and flanges.

- **Manufacturer:** ROCKWOOL Ltd.
- **Product reference:** Contractor's choice.
- **Standard:** To BS 3958-4.
- **Recycled content:** 25% (minimum) to BS EN ISO 14021 and 50% (minimum) to BS EN ISO 14021.
- **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.

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0.040 W/m·K at 75°C.
0.044 W/m·K at 100°C.

- **Finish:** Manufacturer's standard.
- **Insulation thickness (minimum):** To BS 5422, and Metropolitan Design Guide.
- **Accessories:**
  - **Vapour barrier:** 90-90-40/380 Vapour barrier.
  - **Protection:** 90-90-40/390 Protection.
  - **Insulation at loadbearing pipeline supports:** 90-90-40/485 Insulation at loadbearing pipeline supports.
  - **Insulation for valves and flanges:** 90-90-40/480 Insulation for valves and flanges.
- **Execution:** 90-90-40/620 Installing canvas faced mineral insulation and 90-90-40/625 Installing foil faced mineral wool insulation on pipelines.

90-90-40/330 Mineral wool pipe section insulation type C

- **Manufacturer:** ROCKWOOL Ltd.
- **Product reference:** Contractor's choice.
- **Standard:** To BS 3958-4.
- **Recycled content:** 25% (minimum) to BS EN ISO 14021 and 50% (minimum) to BS EN ISO 14021.
- **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.
- **Finish:** Manufacturer's standard.
- **Insulation thickness (minimum):** To BS 5422, and Metropolitan Design Guide.
- **Accessories:**
  - **Vapour barrier:** 90-90-40/380 Vapour barrier.
  - **Protection:** 90-90-40/390 Protection.
  - **Insulation at loadbearing pipeline supports:** 90-90-40/485 Insulation at loadbearing pipeline supports.
  - **Insulation for valves and flanges:** 90-90-40/480 Insulation for valves and flanges.
- **Execution:** 90-90-40/620 Installing canvas faced mineral insulation and 90-90-40/625 Installing foil faced mineral wool insulation on pipelines.

90-90-40/360 Phenolic foam insulation type A

- **Manufacturer:** Kingspan Insulation Ltd.
- **Product reference:** The Kooltherm Pipe Insulation System.
- **Standard:** To BS EN 13166.
- **Kooltherm pipe insulation thickness:** In accordance with Metropolitan Design Guide.
- **Pipe support inserts:**
  - **Thickness:** To be defined.
- **Form:** To be defined.

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• **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. • **Finish:** To be defined. • **Insulation thickness (minimum):** To be defined. • **Accessories:** – **Vapour barrier:** To be defined. – **Protection:** To be defined. – **Insulation at loadbearing pipeline supports:** To be defined. – **Insulation for valves and flanges:** To be defined. – **Items to be insulated:** To be defined. • **Execution:** 90-90-40/640 Installing phenolic foam insulation on pipelines.		
90-90-40/360 Phenolic foam insulation type B • **Manufacturer:** Kingspan Insulation Ltd. • **Product reference:** The Kooltherm Pipe Insulation System. • **Standard:** To BS EN 13166. • **Kooltherm pipe insulation thickness:** In accordance with Metropolitan Design Guide. • **Pipe support inserts:** – **Thickness:** To be defined. • **Form:** To be defined. • **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. • **Finish:** To be defined. • **Insulation thickness (minimum):** To be defined. • **Accessories:** – **Vapour barrier:** To be defined. – **Protection:** To be defined. – **Insulation at loadbearing pipeline supports:** To be defined. – **Insulation for valves and flanges:** To be defined. – **Items to be insulated:** To be defined. • **Execution:** 90-90-40/640 Installing phenolic foam insulation on pipelines.		
90-90-40/380 Vapour barrier **Shared by:** 90-90-40/330 Mineral wool pipe section insulation type A; type B and type C. • **Material:** Flexible sheet. • **Vapour permeability:** To BS 5422, clause 5.6. • **Execution:** 90-90-40/780 Installing vapour barriers.		
90-90-40/390 Protection **Shared by:** 90-90-40/330 Mineral wool pipe section insulation type A; type B and type C.		

- **Manufacturer:** Contractor's choice.
- **Material:** Submit proposals.
- **Colour:** Self finish.
- **Execution:** To be defined.

90-90-40/480 Insulation for valves and flanges

Shared by: 90-90-40/330 Mineral wool pipe section insulation type A; type B and type C.

- **Material:** 90-90-40/330 Mineral wool pipe section insulation type A and 90-90-40/360 Phenolic foam insulation type A.
- **Form:** Submit proposals.
- **Finish:** Submit proposals.
- **Execution:** 90-90-40/740 Installing at valves and flanges.

90-90-40/485 Insulation at loadbearing pipeline supports

Shared by: 90-90-40/330 Mineral wool pipe section insulation type A; type B and type C.

- **Pipelines carrying fluids at temperature up to 120°C:** Manufacturer's standard.
- **Pipelines carrying fluids at temperatures above 120°C:** Manufacturer's standard.
- **Pipelines carrying cold fluids:** Manufacturer's standard.
- **Execution:** To be defined.

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

Shared by: 60-45-40/110 Low temperature hot water heating system; 70-70-25/110 Earthing and bonding system; 70-70-45/110 Low voltage distribution system; 70-70-75/110 Hard wired low voltage small power system; 70-80-25/120 Amenity lighting system; and 70-80-35/110 Hard wired general lighting system.

- **Manufacturer:** To be defined.
- **Material:** To be defined.
- **Label size:** To be defined.
- **Colour:**
  - **Background:** To be defined.
  - **Lettering:** To be defined.
- **Typography:**
  - **Font:** To be defined.
  - **Size:** To be defined.
- **Notice wording:** To be defined.

90-90-55/430 Identifying pipework type A

Shared by: 50-10-05/120 Above ground wastewater drainage system with internal stacks; 55-40-40/120 Cold water supply system; 55-40-40/150 Direct hot water storage supply system; 60-45-40/110 Low temperature hot water heating system; and 60-45-95/110 Variable refrigerant flow system .

- **Manufacturer:** Contractor's choice.
- **Standards:** To BS 1710.
- **Identification type:** Adhesive colour bands.

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• **Execution:** 90-90-55/660 Installing identification on pipework.		

90-90-55/430 Identifying pipework type B

Shared by: 55-60-55/120 Natural gas supply system; 60-45-40/110 Low temperature hot water heating system; and 60-45-95/110 Variable refrigerant flow system.

- **Manufacturer:** To be defined.
- **Standards:** To BS 1710.
- **Identification type:** Painting.
- **Execution:** 90-90-55/660 Installing identification on pipework.

90-90-55/480 Mechanical plant and equipment identification labels

Shared by: 55-40-40/120 Cold water supply system; 55-40-40/150 Direct hot water storage supply system; 55-60-55/120 Natural gas supply system; 60-45-40/110 Low temperature hot water heating system; 60-45-95/110 Variable refrigerant flow system; 65-10-95/130 Mechanical supply ventilation system; and 65-10-95/140 Mechanical extract ventilation system.

- **Manufacturer:** To be defined.
- **Material:** Engraved anodized aluminium and Face engraved rigid plastic laminate.
- **Label size:** To be defined.
- **Colour:**
  - **Background:** To be defined.
  - **Lettering:** To be defined.
- **Typography:**
  - **Font:** To be defined.
  - **Size:** To be defined.
- **Information to be included:** Equipment name;
  Equipment reference number;
  and Service.
- **Execution:** 90-90-55/610 Installing mechanical plant and equipment identification.

90-90-55/490 Valve charts and schematics

Shared by: 55-40-40/120 Cold water supply system; 55-40-40/150 Direct hot water storage supply system; 55-60-55/120 Natural gas supply system; 60-45-40/110 Low temperature hot water heating system; and 60-45-95/110 Variable refrigerant flow system.

- **Manufacturer:** To be defined.
- **Material:** Engraved plastics laminate.
- **Information to be included:** Location and identification of pipework regulating, isolating and control valves.
- **Execution:** 90-90-55/620 Installing valve charts and schematics.

90-90-55/495 Valve identification labels

Shared by: 55-40-40/120 Cold water supply system; 55-40-40/150 Direct hot water storage supply system; 55-60-55/120 Natural gas supply system; 60-45-40/110 Low temperature hot water heating system; and 60-45-95/110 Variable refrigerant flow system.

- **Manufacturer:** To be defined.
- **Material:** Engraved anodized aluminium.

- **Label size:** To be defined.
- **Colour:**
  - **Background:** To be defined.
  - **Lettering:** To be defined.
- **Typography:**
  - **Font:** To be defined.
  - **Size:** To be defined.
- **Information:** Purpose and reference number.
- **Execution:** 90-90-55/630 Installing valve identification labels.

90-90-60/405 Pipe clips

Shared by: 55-40-40/120 Cold water supply system; 55-40-40/150 Direct hot water storage supply system; 55-60-55/120 Natural gas supply system; and 60-45-40/110 Low temperature hot water heating system.

- **Manufacturer:** To be defined.
- **Clip type:** Manufacturer's standard.
- **Material:** Stainless steel.
- **Execution:** 90-90-60/620 Installing pipeline supports.

Execution

60-45-40/610 Removing heating systems

- **Scope:** Remove all heating services within the building

60-45-40/620 Installing water based heating systems

- **Standard:** To BS EN 14336.

60-45-40/650 Filling and pressure testing of water based heating systems

- **Testing:** Water tightness test in accordance with BS EN 14336, Annex A;
  Pressure testing in accordance with BS EN 14336, Annex B;
  and Procedure for filling and pressure testing in accordance with BSRIA BG 29/2012.
- **Notice (minimum):** 48 h.
- **Pressure:** 2 times working pressure.
- **Inspection and witnessing:** In accordance with the procedure in BSRIA BG 29/2012.
- **Duration of test:** 1 h.

60-45-40/660 Flushing and pre-commission cleaning of heating systems

- **Preliminary checks:** Thoroughly inspect pipework. Complete pressure tests before cleaning.
- **Flushing:** In accordance with BSRIA BG 29/2012.
- **Cleaning:** In accordance with BSRIA BG 29/2012 and BSRIA BG 50/2013.
- **Waste products:** Neutralize, and dispose of to drain. Preferably direct to manhole.

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60-45-40/670 Installing water treatment for heating systems

- **Treatment:** Closed circuit systems in accordance with BSRIA BG 50/2013.
- **Water sampling:** In accordance with BS 8552.

90-10-60/650 Installing strainers

- **Angle type:** Install with strainer cap at the bottom. Inlet at the top or side.
- **Y-type:** Install in direction of flow with the pocket in the horizontal plane.

90-10-70/610 Installation of pumps generally

Shared by: 90-10-70/340 Canned rotor pumps type A and type B.

- **Pipeline connections:** Arrange to prevent transmission of pipeline forces to pump casing.
- **Pressure gauge tappings:** Provide in flow and return pipeline connections and in common suction and delivery pipeline.
- **Brackets:** Support pipeline mounted pumps on purpose made brackets lined with vibration absorbent material.
- **Alignment:** Align and balance to minimize vibration.
- **Belt tension:** Correctly tension drive belts.
- **Access:** Provide adequate space for service and maintenance.
- **Identification plate:**
  - **Format:** Submit proposals.
  - **Details:** To be defined.

90-10-70/630 Installing pressurization units

- **Standards:** Low and medium temperature hot water heating systems in accordance with BS 7074-2.
- **Location of expansion vessel:** In the system return pipeline close to the heat source or chilled water unit.

90-10-70/640 Commissioning preparation

Shared by: 90-10-70/340 Canned rotor pumps type A and type B.

- **In-line pumps:** Change impeller if necessary.
- **Belt driven pumps:** Change belt and pulley if necessary.

90-10-90/610 Installation of valves generally

Shared by: 90-10-90/310 Copper alloy service stop valves; 90-10-90/318 Backflow prevention devices; 90-10-90/330 Ball valves; 90-10-90/370 Thermostatic mixing valves; 90-10-90/374 Draining taps; 90-10-90/380 Ball valves, manually operated; 90-10-90/640 Installation of thermostatic radiator valves; and 90-10-90/670 Installation of check valves.

- **Installation:** In accordance with BS 6683.
- **Position:** As drawings. Contractor's choice where unspecified.
- **Isolation and regulation valves:** Provide at equipment and on sub-circuits.
- **Access:** Locate valves so they can be readily operated and maintained. Locate next to equipment which is to be isolated.

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• **Connection to pipework:** Fit with joints that suit the pipe material.		
90-10-90/640 Installation of thermostatic radiator valves		
• **General requirements:** 90-10-90/610 Installation of valves generally.		
• **Position:** To be defined.		
90-15-95/610 Installing dosing equipment		
• **Position:** Install where there is a high differential pressure between flow and return pipeline.		
• **Drain point:** To be defined.		
• **Fixing:** To be defined.		
90-40-05/610 Installing gas and oil-fired boilers		
• **Standards:**		
– **Gas fired boilers:** In accordance with BS 6798 or BS 6644.		
– **Oil fired boilers:** In accordance with BS 5410-1 or BS 5410-2.		
• **Position:** Submit proposals.		
• **Space around boiler:** Facilitate boiler maintenance and servicing.		
• **Preparation:** Pressure test joints immediately before installing lagging and casing. Submit test results.		
• **Fixing of equipment, components and accessories:** Fix securely to purpose-made bases or supports.		
• **Access:** Provide for inspection and servicing of boilers and ancillary equipment.		
90-40-35/610 Installing heat emitters generally		
Shared by: 90-40-35/310 Air curtains; and 90-40-35/405 Radiators.		
• **Fixing:** Secure and parallel or perpendicular to the structure of the building.		
• **Stud walls:** Fix to studs and/ or noggings.		
90-40-35/670 Installing unit heaters and air curtains		
• **Suspension:** Fix high level supports.		
90-90-40/610 Installing insulation and protection products generally		
Shared by: 90-90-40/620 Installing canvas faced mineral insulation; 90-90-40/625 Installing foil faced mineral wool insulation on pipelines; 90-90-40/630 Installing nitrile rubber insulation on pipelines; and 90-90-40/640 Installing phenolic foam insulation on pipelines.		
• **Standard:** In accordance with BS 5970.		
• **Timing:** Insulate after installed system has been fully tested and joints proved sound.		
• **Insulation:** Do not enclose adjacent units together.		
• **Clearance:** Maintain between pipes.		
• **Finish:** Neatly finish joints, corners, edges and overlaps.		
90-90-40/620 Installing canvas faced mineral insulation		
Shared by: 90-90-40/330 Mineral wool pipe section insulation type A; type B and type C.		
• **General requirements:** 90-90-40/610 Installing insulation and protection products generally.		

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• **Joints:** Close butt; secure canvas overlaps with adhesive. • **At fittings:** Mitre. Secure with adhesive. • **Sealant:** Apply two coats of class 0 polymer solution.		
90-90-40/625 Installing foil faced mineral wool insulation on pipelines **Shared by:** 90-90-40/330 Mineral wool pipe section insulation type A; type B and type C. • **General requirements:** 90-90-40/610 Installing insulation and protection products generally. • **Joints:** Close butt; seal with 50 mm wide class 0 tape on both longitudinal and circumferential joints. • **At fittings:** Mitre. Secure with tape. • **Vapour seal:** Tape exposed insulation membrane. Seal vapour barrier at pipe support with class 0 tape.		
90-90-40/640 Installing phenolic foam insulation on pipelines **Shared by:** 90-90-40/360 Phenolic foam insulation type A; type B and type C. • **General requirements:** 90-90-40/610 Installing insulation and protection products generally. • **Joints:** Close butt, seal with 50 mm wide class 0 tape on both longitudinal and circumferential joints. • **At fittings:** Mitre. Secure with tape. • **Vapour seal:** Tape exposed insulation membrane. Seal vapour barrier at pipe support with class 0 tape.		
90-90-40/740 Installing at valves and flanges • **Application:** Do not obstruct removal of nuts and bolts, or operation of valves.		
90-90-40/780 Installing vapour barriers **Shared by:** 90-90-40/350 Nitrile rubber insulation; and 90-90-40/380 Vapour barrier. • **Integrity:** Seal to maintain throughout.		
90-90-55/610 Installing mechanical plant and equipment identification • **Fixing:** Fix with adhesive to equipment. • **Position:** On equipment and On wall adjacent equipment.		
90-90-55/620 Installing valve charts and schematics • **Fixing:** To be defined. • **Position:** Plant room.		
90-90-55/630 Installing valve identification labels • **Fixing:** Secure with metal chain.		
90-90-55/660 Installing identification on pipework **Shared by:** 90-90-55/430 Identifying pipework type A and type B. • **Application of basic identification colour:** Coloured bands as BS 1710 clause 3.3. • **Safety colour identification:** On or next to the colour bands.		

- **Information:** Colour bands as BS 1710 appendix D.
- **Direction of flow:** Indication arrow and the word FLOW or the letter F and Indication arrow and the word RETURN or the letter R.

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90-90-60/620 Installing pipeline supports

- **Position:**
  - **In plant rooms:** To be defined.
  - **Distribution corridors and risers:** To be defined.
  - **Surface mountings:** Split ring, spacer nipple and backplate.

Ω End of system

60-45-95/110 Variable refrigerant flow system

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System outline

60-45-95/110 Variable refrigerant flow system

- **Description:** Chantry Centre Building shall be provided with a new VRF and Split AC systems to provide simultaneous heating and cooling to several areas.

  Air Conditioning System:
  The contractor shall:
  - Provide and install new AC outdoor condensers on the ground as indicated on the drawings. Refer to mechanical schedules for unit details.
  - Provide and install BC Master controller in Mechanical Riser as indicated on the drawings.
  - Provide and install new AC wall mounted cassettes as shown on the drawings.
  - Install and connect insulated refrigerant pipework to connect Outdoor AC condenser to BC controller
  - Install and connect insulated refrigerant pipework to connect AC indoor units to BC controller as shown on the drawings.
  - Commission and Test the entire new system.
  - Provide record drawings and O&M information.

  Installation shall be completely in compliance with the manufacturers recommendations and requirements by Mitsubishi BSP to secure the 7 year manufacturer warranty.

  Indoor units shall be provided with condensate drains, pumped where necessary and one Mitsubishi PAR-31MMA controller per room.

  The contractor shall provide a cost option to link the new Air Conditioning Systems to the new BMS plantroom for to monitor and control the new system
- **System performance:** 60-45-95/210 Design of variable refrigerant flow systems.
- **System manufacturer:** Mitsubishi
- **Compressor:** Refer to Mechanical Schedules
- **System:** Three pipe heat recovery.
- **Pipelines:** 90-10-65/390 Refrigerant pipelines and fittings.
- **Thermal insulation:** 90-90-40/350 Nitrile rubber insulation.
- **Outlets:** 90-40-95/330 Indoor units.
- **Controls:** Submit proposals.
- **System accessories:** To be defined.
- **Plant and equipment identification:** 90-90-55/430 Identifying pipework type A;
  90-90-55/430 Identifying pipework type B;
  90-90-55/480 Mechanical plant and equipment identification labels;
  90-90-55/490 Valve charts and schematics;
  and 90-90-55/495 Valve identification labels.
- **Execution:** 60-45-95/620 Installing variable refrigerant flow systems generally.
- **System completion:** 60-45-95/810 Commissioning of refrigerating systems;
  60-45-95/820 Performance testing;

60-45-95/830 Inspection and test records;
60-45-95/840 Demonstrations;
and 60-45-95/850 Documentation.

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System performance

60-45-95/210 Design of variable refrigerant flow systems

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

Products

90-10-65/390 Refrigerant pipelines and fittings

- **Manufacturer:** To be defined.
- **Standard:** To BS EN 378-2.
- **Pipelines:** To BS EN 12735-1.
- **Execution:** 90-10-65/665 Installing refrigerant pipework.

90-40-95/330 Indoor units

- **Manufacturer:** Mitsubishi
- **Standards:** To BS EN 378-1 and BS EN 378-2.
- **Arrangement:** Ceiling mounted 4-way cassette and Wall-mounted, high level.
- **Output cooling:** Refer to mechanical schedules
- **Output heating:** Refer to mechanical schedules
- **Accessories:** Condensate pumps to all indoor units

90-90-40/350 Nitrile rubber insulation

- **Manufacturer:** To be defined.
- **Standard:** To BS EN 60684-3-151.
- **Form:** To be defined.
- **Recycled content:** To be defined.
- **Thermal conductivity:** 0.035 W/m·K at 0°C.
  0.037 W/m·K at 10°C.
  0.040 W/m·K at 50°C.
  0.043 W/m·K at 75°C.
- **Finish:** Manufacturer's standard.
- **Reaction to fire classification:** To be defined.
- **Insulation thickness (minimum):** To BS 5422.
- **Vapour barrier:**
  - **Material:** To be defined.
  - **Vapour permeability:** To BS 5422, clause 5.6.

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• **Protection:** To be defined. • **Accessories:** To be defined. • **Items to be insulated:** To be defined. • **Execution:** 90-90-40/780 Installing vapour barriers and 90-90-40/630 Installing nitrile rubber insulation on pipelines.		
90-90-55/430 Identifying pipework type A **Shared by:** 50-10-05/120 Above ground wastewater drainage system with internal stacks; 55-40-40/120 Cold water supply system; 55-40-40/150 Direct hot water storage supply system; 60-45-40/110 Low temperature hot water heating system; and 60-45-95/110 Variable refrigerant flow system . • **Manufacturer:** Contractor's choice. • **Standards:** To BS 1710. • **Identification type:** Adhesive colour bands. • **Execution:** 90-90-55/660 Installing identification on pipework.		
90-90-55/430 Identifying pipework type B **Shared by:** 55-60-55/120 Natural gas supply system; 60-45-40/110 Low temperature hot water heating system; and 60-45-95/110 Variable refrigerant flow system. • **Manufacturer:** To be defined. • **Standards:** To BS 1710. • **Identification type:** Painting. • **Execution:** 90-90-55/660 Installing identification on pipework.		
90-90-55/480 Mechanical plant and equipment identification labels **Shared by:** 55-40-40/120 Cold water supply system; 55-40-40/150 Direct hot water storage supply system; 55-60-55/120 Natural gas supply system; 60-45-40/110 Low temperature hot water heating system; 60-45-95/110 Variable refrigerant flow system; 65-10-95/130 Mechanical supply ventilation system; and 65-10-95/140 Mechanical extract ventilation system. • **Manufacturer:** To be defined. • **Material:** Engraved anodized aluminium and Face engraved rigid plastic laminate. • **Label size:** To be defined. • **Colour:** – **Background:** To be defined. – **Lettering:** To be defined. • **Typography:** – **Font:** To be defined. – **Size:** To be defined. • **Information to be included:** Equipment name; Equipment reference number; and Service. • **Execution:** 90-90-55/610 Installing mechanical plant and equipment identification.		

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90-90-55/490 Valve charts and schematics

Shared by: 55-40-40/120 Cold water supply system; 55-40-40/150 Direct hot water storage supply system; 55-60-55/120 Natural gas supply system; 60-45-40/110 Low temperature hot water heating system; and 60-45-95/110 Variable refrigerant flow system.

- **Manufacturer:** To be defined.
- **Material:** Engraved plastics laminate.
- **Information to be included:** Location and identification of pipework regulating, isolating and control valves.
- **Execution:** 90-90-55/620 Installing valve charts and schematics.

90-90-55/495 Valve identification labels

Shared by: 55-40-40/120 Cold water supply system; 55-40-40/150 Direct hot water storage supply system; 55-60-55/120 Natural gas supply system; 60-45-40/110 Low temperature hot water heating system; and 60-45-95/110 Variable refrigerant flow system.

- **Manufacturer:** To be defined.
- **Material:** Engraved anodized aluminium.
- **Label size:** To be defined.
- **Colour:**
  - **Background:** To be defined.
  - **Lettering:** To be defined.
- **Typography:**
  - **Font:** To be defined.
  - **Size:** To be defined.
- **Information:** Purpose and reference number.
- **Execution:** 90-90-55/630 Installing valve identification labels.

Execution

60-45-95/620 Installing variable refrigerant flow systems generally

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

90-10-65/610 Pipelines installation generally

Shared by: 90-10-65/630 Installing copper pipelines; 90-10-65/645 Installing plastics pipelines; 90-10-65/665 Installing refrigerant pipework; and 90-10-65/680 Installing steel pipelines.

- **Standard:** BESATechnical Report TR/20/9 Natural gas.

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• **Dissimilar metals:** Prevent electrolytic corrosion.		
90-10-65/665 Installing refrigerant pipework		
• **General requirements:** 90-10-65/610 Pipelines installation generally.		
• **Standards:** To BS EN 378-3 and BS EN 378-4.		
• **Refrigerant lines:** Submit proposals.		
90-90-40/610 Installing insulation and protection products generally		
Shared by: 90-90-40/620 Installing canvas faced mineral insulation; 90-90-40/625 Installing foil faced mineral wool insulation on pipelines; 90-90-40/630 Installing nitrile rubber insulation on pipelines; and 90-90-40/640 Installing phenolic foam insulation on pipelines.		
• **Standard:** In accordance with BS 5970.		
• **Timing:** Insulate after installed system has been fully tested and joints proved sound.		
• **Insulation:** Do not enclose adjacent units together.		
• **Clearance:** Maintain between pipes.		
• **Finish:** Neatly finish joints, corners, edges and overlaps.		
90-90-40/630 Installing nitrile rubber insulation on pipelines		
• **General requirements:** 90-90-40/610 Installing insulation and protection products generally.		
• **Joints:** Close butt, secure with adhesive.		
• **At fittings:** Fabricate from mitre cut pieces. Secure with adhesive.		
90-90-40/780 Installing vapour barriers		
Shared by: 90-90-40/350 Nitrile rubber insulation; and 90-90-40/380 Vapour barrier.		
• **Integrity:** Seal to maintain throughout.		
90-90-55/610 Installing mechanical plant and equipment identification		
• **Fixing:** Fix with adhesive to equipment.		
• **Position:** On equipment and On wall adjacent equipment.		
90-90-55/620 Installing valve charts and schematics		
• **Fixing:** To be defined.		
• **Position:** Plant room.		
90-90-55/630 Installing valve identification labels		
• **Fixing:** Secure with metal chain.		
90-90-55/660 Installing identification on pipework		
Shared by: 90-90-55/430 Identifying pipework type A and type B.		
• **Application of basic identification colour:** Coloured bands as BS 1710 clause 3.3.		
• **Safety colour identification:** On or next to the colour bands.		
• **Information:** Colour bands as BS 1710 appendix D.		
• **Direction of flow:** Indication arrow and the word FLOW or the letter F and Indication arrow and the word RETURN or the letter R.		

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System completion

60-45-95/810 Commissioning of refrigerating systems

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

60-45-95/820 Performance testing

- **General:** Demonstrate the performance of the installations.
- **Guaranteed efficiency:** To be defined.
- **Environmental tests:** Carry out environmental testing. If necessary, use artificial loads to simulate operating conditions.
- **Recorders:**
  - **Type:** To be defined.
  - **Number:** To be defined.
  - **Duration of loan:** To be defined.
- **Reports:** Submit on completion.

60-45-95/830 Inspection and test records

- **Construction phase reports:** System design is commissionable;
  Post-installation;
  System cleanliness;
  and System commissionable.
- **Records for air systems:** In accordance with BSRIA BG 49/2015.
- **Record sheets:**
  - **Submission:** On completion.
  - **Number of copies:** Three.

60-45-95/840 Demonstrations

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

60-45-95/850 Documentation

- **Operating and maintenance instructions:**
  - **Scope:** Submit for the system giving optimum settings for controls.
  - **Product information:** Include product description, date of purchase, performance characteristics, application (suitability for use), method of operation and control, and cleaning and maintenance requirements.
  - **Format:** Paper copy.

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– **Number of copies:** Three.		
• **Record drawings:**		
– **Contents:** Location and arrangement of plant in plant rooms; Location, size and route of mechanical services; Location, route and depth of underground services; Location and identification of pipework regulating, isolation and control valves; and Location of outlets.		
– **Format:** A1 paper print drawing and Electronic drawing.		
– **Number of copies:** Three.		
• **Submittal date:** At handover.		
Ω End of system		

65-10-95/130 Mechanical supply ventilation system

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System outline

65-10-95/130 Mechanical supply ventilation system

- **Description:** The new Chantry Centre will be ventilated both, naturally and mechanically. The contractor shall provide and install new mechanical ventilation plant and connect it into new ventilation distribution as indicated on the drawings and in this specification report.

  There are 2 systems:
  - General Extract
  - General Supply

  The Heat Recovery Units shall be manufactured by Nuaire as indicated on the mechanical schedules. The contractor shall order these units and include for the plant to be supported within the new ceiling voids or steelwork. The units shall be commissioned and tested on completion. All ancillaries recommended by the manufacturer shall be included and installed by the contractor.

  New motorised fire dampers shall be fitted with the new ductwork where ducts penetrate fire compartment walls. New Fire/Smoke Dampers to be linked and connected to the new Fire Damper Panel.

  Access shall be provided to access the internals of ductwork where fire dampers are installed and for cleaning purposes. The whole installation shall comply with DW144 including the location and frequency of duct access. The new ductwork installation shall be in sheet steel low pressure Class A circular steel as indicated on the drawings. On completion the ductwork shall be cleaned and certified as clean. New ductwork is designed to operate at near room temperature so does not require insulation. New ductwork shall be labelled with the HRU reference service and direction of flow.

  On completion the contractor shall commission, test and balance the entire new ventilation system.

  The contractor shall install intake and exhaust vents in window panels as indicated on the drawings. New vents shall match new external wall surfaces.
- **System performance:** 65-10-95/210 Design of ventilation systems.
- **Location of plant:** As indicated on drawings
- **Route of distribution:** As indicated on drawings
- **Type of system:** To be defined.
- **External air intake:** 45-25-50/305 Aluminium louvre panel units.
- **Air filters:** 90-45-15/310 Air handling unit.
- **Heat recovery:** 90-45-45/320 Plate recuperators.
- **Air handling units:** To be defined.
- **Supply fans:** To be defined.
- **Acoustic treatment:** Silencers to be provided by Nuaire

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- **Air ductwork and accessories:**
  - **Ductwork:** 90-45-25/315 Circular sheet metal ductwork and fittings and 90-45-25/365 Rectangular sheet metal ductwork and fittings.
  - **Accessories:** 90-45-25/400 Access doors;
    45-35-22/430 Bird guards;
    90-45-25/420 Fire and smoke dampers;
    and 45-35-22/435 Insect guards.
- **Thermal insulation on supply air ductwork:** 90-90-40/360 Phenolic foam insulation type C.
- **Vibration isolation mountings:** 90-90-95/320 Compression isolators and 90-90-95/330 Spring isolators.
- **Reheat batteries:** To be defined.
- **Room supply air terminal devices:** 90-45-20/380 Grilles.
- **Accessories:** To be defined.
- **Controls:** Local Ventilation Controls. (ECOSMART)
- **Identification of ductwork and equipment:** 90-90-55/480 Mechanical plant and equipment identification labels and 90-90-55/420 Identifying ductwork.
- **Testing:** 90-45-25/785 Air leakage testing of medium pressure ductwork type A and 90-45-25/790 Air leakage testing of plant items type A.
- **Execution:** 65-10-95/630 Installing ductwork on air handling units and 65-10-95/640 Ductwork systems cleaning.
- **System completion:** 65-10-95/810 Commissioning of air distribution systems;
  65-10-95/820 Performance testing;
  65-10-95/830 Inspection and test records;
  65-10-95/840 Demonstrations;
  and 65-10-95/850 Documentation for ventilation systems.

System performance

65-10-95/210 Design of ventilation systems

Shared by: 65-10-95/130 Mechanical supply ventilation system; and 65-10-95/140 Mechanical extract ventilation system.

- **Design:** Complete the design of the ventilation systems.
- **Method:** To be defined.
- **Requirement:** Submit proposals including detailed design drawings, technical information, calculations and manufacturers' literature.
- **Computer calculations:**
  - **Submittals:** To be defined.
  - **Format:** To be defined.

Products

45-25-50/305 Aluminium louvre panel units

Shared by: 65-10-95/130 Mechanical supply ventilation system; and 65-10-95/140 Mechanical extract ventilation system.

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• **Manufacturer:** Submit proposals.
• **Size (l x w x d):** Submit proposals.
• **Material:** To be defined.
• **Finish:** Submit proposals.
• **Colour:** To be defined.
• **Texture:** To be defined.
• **Construction:** To be defined.
• **Air intake and exhaust performance:**
  – **Application:** To be defined.
  – **Air volume:** To be defined.
  – **Face velocity:** To be defined.
  – **Core velocity (maximum):** To be defined.
• **Calculated weighted sound reduction index (Rw):**
  – **Standard:** To be defined.
  – **Frequency range:** To be defined.
• **Weather performance:**
  – **Water penetration class (minimum):** To be defined.
  – **Discharge loss coefficient (minimum):** To be defined.
• **Louvre configuration:**
  – **Number of banks:** To be defined.
  – **Blade orientation:** To be defined.
  – **Blade pitch:** To be defined.
  – **Blade angle:** To be defined.
• **Actuators:** To be defined.
• **Accessories:** To be defined.		

45-35-22/430 Bird guards
Shared by: 65-10-95/130 Mechanical supply ventilation system; and 65-10-95/140 Mechanical extract ventilation system.
• **Manufacturer:** To be defined.
• **Target species:** To be defined.
• **Format:** To be defined.
• **Size:** To be defined.
• **Materials:** To be defined.
• **Finish and colour:** To be defined.
• **Mesh:**
  – **Material:** To be defined.
  – **Format:** To be defined.
  – **Colour:** To be defined.
• **Features:** To be defined.
• **Accessories:** To be defined.
• **Execution:** To be defined.		

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45-35-22/435 Insect guards

Shared by: 65-10-95/130 Mechanical supply ventilation system; and 65-10-95/140 Mechanical extract ventilation system.

- **Manufacturer:** To be defined.
- **Target species:** To be defined.
- **Format:** To be defined.
- **Size:** To be defined.
- **Frame:**
  - **Material:** To be defined.
  - **Colour:** To be defined.
- **Mesh:**
  - **Material:** To be defined.
  - **Format:** To be defined.
  - **Colour:** To be defined.
- **Fixing type:** To be defined.
- **Features:** To be defined.
- **Accessories:** To be defined.
- **Execution:** To be defined.

90-45-15/310 Air handling unit

- **Manufacturer:** Nuaire
- **Standard:** To BS EN 13053.
- **Duty:**
  - **Air volume:** Refer to mechanical schedules
  - **External resistance:** To be defined.
  - **Discharge velocity:** To be defined.
  - **Sound power level:** To be defined.
- **Environment:** To be defined.
- **Casing construction:**
  - **Standard:** To BS EN 1886.
  - **Details:** Submit shop drawings and details of dimensions and weight.
  - **Casing class:** To be defined.
  - **Leakage class of casing:** To be defined.
  - **Filter bypass leakage:** To BS EN 1886, section 7.
  - **Thermal performance of casing:**
    - **Thermal transmittance:** To be defined.
    - **Thermal bridging:** To be defined.
  - **Acoustic insulation of casing:** To BS EN 1886, section 9.
  - **Fire protection:** To be defined.
  - **Mechanical safety:** To BS EN 1886, section 11.
  - **Material:** To be defined.

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– **Finish:** To be defined. – **Air handling unit feet:** To be defined. – **Special requirements:** To be defined. • **Arrangement:** To be defined. • **Method of support:** Submit proposals. • **Anti-vibration mountings:** To be defined. • **Components:** – **Dampers:** **Purpose:** To be defined. **Mixing temperature efficiency:** To be defined. **Damper control:** To be defined. **Damper type:** To be defined. **Material:** To be defined. **Ancillaries:** To be defined. – **Filters:** To be defined. – **Humidifiers:** To be defined. – **Pre-heaters:** To be defined. – **Re-heaters:** To be defined. – **Cooling coils:** To be defined. – **Heat recovery:** **Heat recovery equipment:** To be defined. **Heat recovery class:** To be defined. – **Fans:** **Fan type:** To be defined. **Average air class:** To be defined. **Power input class:** To be defined. – **Attenuators:** To be defined. • **Flexible connections:** To BESADW/144. • **Access:** – **General:** Provide access openings and covers complete, including opening devices. – **Seal:** To prevent excessive air leakage. – **Seal durability:** For normal maintenance operations over at least 10 years. – **Access type:** To be defined. – **Access clear width (minimum):** 400 mm. – **Opening device:** To be defined. – **Components requiring access:** Primary filters; Secondary filters; Preheater coils; Cooling coils; Hot water coils; and Fans. • **Direction of airflow:** To be defined. • **Accessories:** ECOSMART controls, Silencers and condensate trap.		

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• **Execution:** 90-45-15/610 Installing air handling units; 90-45-15/615 Access; 90-45-15/620 Coil installation generally; 90-45-15/625 Installing cooling coils; 90-45-15/630 Installing hot water coils; 90-45-15/660 Support for air handling units; 90-45-15/665 Pre-commissioning of coils; 90-45-15/680 Air leakage testing; and 90-45-15/685 Testing.		

90-45-20/380 Grilles

Shared by: 65-10-95/130 Mechanical supply ventilation system; and 65-10-95/140 Mechanical extract ventilation system.

- **Manufacturer:** Gilberts, Waterloo or equal approved
- **Standards:**
  - **Mixed flow applications:** To BS EN 12238.
  - **Displacement flow applications:** To BS EN 12239.
  - **Sound power levels:** To BS EN ISO 5135.
- **Application:** Extract and Supply.
- **Duty:**
  - **Air volume:** Refer to mechanical schedule
  - **Size:** Refer to mechanical schedule
  - **Sound power level:** Refer to mechanical schedule
- **Core velocity (maximum):** To be defined.
- **Shape:** Refer to mechanical schedule
- **Grille type:** Refer to mechanical schedule
- **Position:** As indicated on the drawings
- **Material:** Refer to mechanical schedule
- **Finish:** Refer to mechanical schedule
- **Accessories:** 90-45-20/400 Ceiling or wall mounted plenum boxes.
- **Execution:** 90-45-20/650 Installing grilles and 90-45-20/690 Support of air terminal units in ceiling grids.

90-45-20/400 Ceiling or wall mounted plenum boxes

- **Manufacturer:** Gilberts, Waterloo or equal approved
- **Duty:**
  - **Air volume:** To be defined.
  - **Spigot size:** To be defined.
  - **Spigot position:** To be defined.
- **Configuration:** To be defined.
- **Construction:** Sturdy and rigid with circular inlet spigots of 65 mm minimum length.
- **Fixing:** Incorporate means for fixing to, or suspending from, building or other construction.

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90-45-25/315 Circular sheet metal ductwork and fittings

Shared by: 65-10-95/130 Mechanical supply ventilation system; and 65-10-95/140 Mechanical extract ventilation system.

- **Manufacturer:** To be defined.
- **Standards:** To BESADW/144, BS EN 1506 and BS EN 12237.
- **Classification:** Class A.
- **Special installations:** To be defined.
- **Material:** Zinc coated steel to BS EN 10346 grade DX51D+Z140.
- **Construction:** Spirally wound.
- **Regulating dampers:**
  - **Standard:** As BESADW/144.
  - **Regulating function:** Balancing and Control.
  - **Damper type:** Single skin multi-blade.
  - **Operation:** Manual.
  - **Material:** To match ductwork.
- **Access openings:**
  - **Purpose:** Inspection;
    Cleaning;
    and Maintenance.
  - **Sizes:** To BS EN 12097.
- **Execution:** 90-45-25/610 Air ductwork generally;
  90-45-25/640 Installing sheet metal ductwork;
  90-45-25/740 Installing control equipment and instruments in metal ductwork;
  90-45-25/720 Weatherproofing ductwork penetrations;
  90-45-25/785 Air leakage testing of medium pressure ductwork type B;
  90-45-25/790 Air leakage testing of plant items type B;
  and 90-45-25/795 Air leakage testing of low pressure ductwork.

90-45-25/365 Rectangular sheet metal ductwork and fittings

Shared by: 65-10-95/130 Mechanical supply ventilation system; and 65-10-95/140 Mechanical extract ventilation system.

- **Manufacturer:** To be defined.
- **Standards:** To BESADW/144, BS EN 1505 and BS EN 1507.
- **Classification:** Class A.
- **Special installations:** To be defined.
- **Material:** Zinc coated steel to BS EN 10346 grade DX51D+Z140.
- **Regulating dampers:**
  - **Standard:** To BESADW/144.
  - **Regulating function:** Balancing and Control.
  - **Damper type:** Opposed blade.
  - **Operation:** Manual.
  - **Material:** To match ductwork.
- **Access openings:**

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– **Purpose:** Inspection; Cleaning; and Maintenance. – **Sizes:** To BS EN 12097. • **Execution:** 90-45-25/610 Air ductwork generally; 90-45-25/640 Installing sheet metal ductwork; 90-45-25/720 Weatherproofing ductwork penetrations; 90-45-25/740 Installing control equipment and instruments in metal ductwork; 90-45-25/785 Air leakage testing of medium pressure ductwork type A; 90-45-25/785 Air leakage testing of medium pressure ductwork type B; 90-45-25/790 Air leakage testing of plant items type A; 90-45-25/790 Air leakage testing of plant items type B; and 90-45-25/795 Air leakage testing of low pressure ductwork.		
90-45-25/400 Access doors **Shared by:** 65-10-95/130 Mechanical supply ventilation system; and 65-10-95/140 Mechanical extract ventilation system. • **Manufacturer:** To be defined. • **Material:** To be defined.		
90-45-25/420 Fire and smoke dampers **Shared by:** 65-10-95/130 Mechanical supply ventilation system; and 65-10-95/140 Mechanical extract ventilation system. • **Manufacturer:** Submit proposals. • **Standard:** – **Fire dampers:** To BS EN 15650. – **Test:** To BS EN 1366-2. – **Classification:** To BS EN 13501-3. – **Aerodynamic performance:** To BS EN 1751 and BS EN ISO 5135. • **Arrangement:** To be defined. • **Classification:** To be defined. • **Material:** Zinc coated steel. • **Accessories:** To be defined. • **Fusible links:** – **Fusing temperature:** To be defined. – **Spare fusible links:** To be defined. • **Execution:** 90-45-25/725 Installing fire and smoke control dampers and 90-45-25/750 Access to dampers for resetting and maintenance.		
90-45-45/320 Plate recuperators • **Manufacturer:** To be defined. • **Duty:** – **Number of coil rows:** To be defined. – **Supply air volume:** To be defined. – **Exhaust air volume:** To be defined.		

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– **Air temperature:** **Supply:** To be defined. **Exhaust:** To be defined. – **Maximum static pressure:** To be defined. • **Casing:** To be defined. • **Finish:** To be defined. • **Heat transfer plates:** To be defined. • **Coating material:** To be defined. • **Access doors for maintenance:** Hinged, airtight and watertight. • **Accessories:** To be defined. • **Execution:** To be defined.		
90-90-40/360 Phenolic foam insulation type C • **Manufacturer:** Kingspan Insulation Ltd. • **Product reference:** The Kooltherm Pipe Insulation System. • **Standard:** To BS EN 13166. • **Kooltherm pipe insulation thickness:** In accordance with Metropolitan Design Guide. • **Pipe support inserts:** – **Thickness:** To be defined. • **Form:** To be defined. • **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. • **Finish:** To be defined. • **Insulation thickness (minimum):** To be defined. • **Accessories:** – **Vapour barrier:** To be defined. – **Protection:** To be defined. – **Insulation at loadbearing pipeline supports:** To be defined. – **Insulation for valves and flanges:** To be defined. – **Items to be insulated:** To be defined. • **Execution:** 90-90-40/640 Installing phenolic foam insulation on pipelines.		
90-90-55/420 Identifying ductwork **Shared by:** 65-10-95/130 Mechanical supply ventilation system; and 65-10-95/140 Mechanical extract ventilation system. • **Manufacturer:** To be defined. • **Standard:** To BS 1710 and To BS EN 13779. • **Identification type:** Self-adhesive plastics or transfers. • **Colour:** To be defined. • **Lettering:** To be defined. • **Shape and size:** To be defined.		

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• **Execution:** 90-90-55/650 Installing ductwork identification.		

90-90-55/480 Mechanical plant and equipment identification labels

Shared by: 55-40-40/120 Cold water supply system; 55-40-40/150 Direct hot water storage supply system; 55-60-55/120 Natural gas supply system; 60-45-40/110 Low temperature hot water heating system; 60-45-95/110 Variable refrigerant flow system; 65-10-95/130 Mechanical supply ventilation system; and 65-10-95/140 Mechanical extract ventilation system.

- **Manufacturer:** To be defined.
- **Material:** Engraved anodized aluminium and Face engraved rigid plastic laminate.
- **Label size:** To be defined.
- **Colour:**
  - **Background:** To be defined.
  - **Lettering:** To be defined.
- **Typography:**
  - **Font:** To be defined.
  - **Size:** To be defined.
- **Information to be included:** Equipment name;
  Equipment reference number;
  and Service.
- **Execution:** 90-90-55/610 Installing mechanical plant and equipment identification.

90-90-95/320 Compression isolators

Shared by: 55-40-40/120 Cold water supply system; 55-40-40/150 Direct hot water storage supply system; 65-10-95/130 Mechanical supply ventilation system; and 65-10-95/140 Mechanical extract ventilation system.

- **Manufacturer:** To be defined.
- **Compression isolators type:** To be defined.
- **Colour code:** To be defined.
- **Load:** To be defined.
- **Deflection:** To be defined.

90-90-95/330 Spring isolators

Shared by: 55-40-40/120 Cold water supply system; 55-40-40/150 Direct hot water storage supply system; 65-10-95/130 Mechanical supply ventilation system; and 65-10-95/140 Mechanical extract ventilation system.

- **Manufacturer:** To be defined.
- **Spring isolators type:** To be defined.
- **Colour code:** To be defined.
- **Load:** To be defined.
- **Deflection:** To be defined.

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Execution

65-10-95/630 Installing ductwork on air handling units

Shared by: 65-10-95/130 Mechanical supply ventilation system; and 65-10-95/140 Mechanical extract ventilation system.

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

65-10-95/640 Ductwork systems cleaning

Shared by: 65-10-95/130 Mechanical supply ventilation system; and 65-10-95/140 Mechanical extract ventilation system.

- **Standards:** In accordance with BESATechnical Report TR/19 and to BS EN 15780.
- **Specialist:** To be defined.
- **Cleaning methods:**
  - **Mechanical:** To be defined.
  - **Manual:** To be defined.
  - **Wet:** To be defined.
- **Verification:**
  - **Method:** To be defined.
  - **Completion report:**

    Information: To be defined.

    Format: To be defined.

    Submit: To be defined.

    Number of copies: To be defined.

90-45-15/610 Installing air handling units

- **Standard:** In accordance with BS EN 13053.
- **Component assembly:**
  - **Sealing:** Provide gaskets between air handling unit sections to prevent air leakage from casing.
  - **Site drilling of air handling unit:** Submit method statement.

90-45-15/615 Access

- **Access space:** Position air handling units to allow space for maintenance and access.

90-45-15/620 Coil installation generally

- **Venting and draining:** Set out pipelines to and from the coils to allow venting and draining of the coils and piping.
- **Support:** Do not support pipelines and valves on coil connections.
- **Access:** Allow space to inspect and maintain the coils on both sides.

90-45-15/625 Installing cooling coils

- **Airflow:** Evenly distributed over face area of coil.

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• **Air velocity:** Ensure it is below level at which moisture carry over occurs.
• **Condensate drain lines:**
  – **Trap:** Provide to prevent flooding.
  – **Fall:** 10 mm/m.
  – **Discharge:** To a tundish or other form of air break.
  – **Clean-out plugs:** Fit at each change of direction in the drain line.
  – **Size:** At least that of the drain pan connection.		

90-45-15/630 Installing hot water coils • **Expansion:** Connect pipelines to allow free expansion of headers and tubes.		
90-45-15/660 Support for air handling units • **Method:** Submit proposals.		
90-45-15/665 Pre-commissioning of coils • **Preparation:** Remove protective covering; Check frost protection and drain if heat is not available in freezing conditions; and Straighten fins. • **Cleaning and chemical treatment:** Use chemicals compatible with the materials in the coils.		
90-45-15/680 Air leakage testing • **Testing:** In accordance with BS EN 1886.		
90-45-15/685 Testing • **Test location:** On site before incorporation in works. • **Tests:** Component air pressure drops; Component water pressure drops; Fan and motor speeds; Fan running to check rotation and vibration; Fan flow rate and developed pressure, using simulated system resistance; Functional test on electrical equipment; Motor starting and running currents; Power consumption; Sound power level; and Vibration measurements. • **Test results:** Submit on completion.		
90-45-20/610 Installing air terminal devices • **General:** Do not distort air terminal devices. Fix securely. • **Air leakage:** Prevent. Seal joints with self adhesive foam strip or equivalent. • **Appearance:** Finish visible edge joints neatly. Do not leave sharp edges and protruding screws. • **Operation:** Fit so that moving parts operate correctly and removable cores can be taken out and replaced. • **High level and ceiling applications:** On removable cores, provide safety wires with quick release ends.		

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90-45-20/650 Installing grilles

- **General requirements:** 90-45-20/610 Installing air terminal devices.
- **Method:** To be defined.

90-45-20/690 Support of air terminal units in ceiling grids

- **Standard:** To BESADW/144.
- **Wire safety support:** To be defined.
- **Independent support:** To be defined.
- **Position:** Agree final position of air terminals before installation.

90-45-25/610 Air ductwork generally

Shared by: 90-45-25/315 Circular sheet metal ductwork and fittings; and 90-45-25/365 Rectangular sheet metal ductwork and fittings.

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

90-45-25/640 Installing sheet metal ductwork

Shared by: 90-45-25/315 Circular sheet metal ductwork and fittings; and 90-45-25/365 Rectangular sheet metal ductwork and fittings.

- **Standard:** To BESADW/144.
- **Hangers and supports:** To be defined.
- **Installing flexible joint connections:** To be defined.

90-45-25/720 Weatherproofing ductwork penetrations

Shared by: 90-45-25/315 Circular sheet metal ductwork and fittings; and 90-45-25/365 Rectangular sheet metal ductwork and fittings.

- **Roof penetrations:** Submit proposals.
- **Wall penetrations:** Submit proposals.

90-45-25/725 Installing fire and smoke control dampers

- **Standard:** In accordance with ASFPVolume 1: EN fire dampers. (Grey book);
  In accordance with BESADW/145;
  and To BS EN 12101-8.

90-45-25/740 Installing control equipment and instruments in metal ductwork

Shared by: 90-45-25/315 Circular sheet metal ductwork and fittings; and 90-45-25/365 Rectangular sheet metal ductwork and fittings.

- **General:** Fit sensors, damper motors and other control equipment.
- **Connections:** Connect control equipment and instruments.

90-45-25/750 Access to dampers for resetting and maintenance

- **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.

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• **Fire links:** Provide access for replacement.		
90-45-25/785 Air leakage testing of medium pressure ductwork type A **Shared by:** 65-10-95/130 Mechanical supply ventilation system; 65-10-95/140 Mechanical extract ventilation system; and 90-45-25/365 Rectangular sheet metal ductwork and fittings. • **Standard:** To BESADW/144 and BESADW/143. • **Extent:** Random testing of 10% maximum of the ductwork system. Carry out tests as work proceeds before thermal insulation is installed. Where a test fails, select two further sections for testing. Carry out remedial work where tests fail. • **Test pressure:** To BESADW/144, Table 22. • **Documentation:** Air leakage test sheet. • **Report:** – **Format:** Electronic and Paper copy. – **Submit:** On completion. – **Number of copies:** 3		
90-45-25/785 Air leakage testing of medium pressure ductwork type B **Shared by:** 65-10-95/140 Mechanical extract ventilation system; 90-45-25/315 Circular sheet metal ductwork and fittings; and 90-45-25/365 Rectangular sheet metal ductwork and fittings. • **Standard:** To BESADW/144 and BESADW/143. • **Extent:** Random testing of 10% maximum of the ductwork system. Carry out tests as work proceeds before thermal insulation is installed. Where a test fails, select two further sections for testing. Carry out remedial work where tests fail. • **Test pressure:** To BESADW/144, Table 22. • **Documentation:** Air leakage test sheet. • **Report:** – **Format:** Electronic and Paper copy. – **Submit:** On completion. – **Number of copies:** 3		
90-45-25/790 Air leakage testing of plant items type A **Shared by:** 65-10-95/130 Mechanical supply ventilation system; 65-10-95/140 Mechanical extract ventilation system; and 90-45-25/365 Rectangular sheet metal ductwork and fittings. • **Standard:** To BESADW/144. • **Procedure:** To be defined. • **Report:** – **Format:** To be defined. – **Submit:** To be defined. – **Number of copies:** To be defined.		
90-45-25/790 Air leakage testing of plant items type B **Shared by:** 65-10-95/140 Mechanical extract ventilation system; 90-45-25/315 Circular sheet metal ductwork and fittings; and 90-45-25/365 Rectangular sheet metal ductwork and fittings.		

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- **Standard:** To BESADW/144.
- **Procedure:** To be defined.
- **Report:**
  - **Format:** To be defined.
  - **Submit:** To be defined.
  - **Number of copies:** To be defined.

90-45-25/795 Air leakage testing of low pressure ductwork

Shared by: 90-45-25/315 Circular sheet metal ductwork and fittings; and 90-45-25/365 Rectangular sheet metal ductwork and fittings.

- **Standard:** To BESADW/144 and DW/143.
- **Extent:** Random testing of 10% maximum of the ductwork system.
  Carry out tests as work proceeds before thermal insulation is installed.
  Where a test fails, select two further sections for testing.
  Carry out remedial work where tests fail.
- **Test pressure:** To BESADW/144, Table 22.
- **Documentation:** Air leakage test sheet.
- **Report:**
  - **Format:** Electronic and Paper copy.
  - **Submit:** On completion.
  - **Number of copies:** 3

90-90-40/610 Installing insulation and protection products generally

Shared by: 90-90-40/620 Installing canvas faced mineral insulation; 90-90-40/625 Installing foil faced mineral wool insulation on pipelines; 90-90-40/630 Installing nitrile rubber insulation on pipelines; and 90-90-40/640 Installing phenolic foam insulation on pipelines.

- **Standard:** In accordance with BS 5970.
- **Timing:** Insulate after installed system has been fully tested and joints proved sound.
- **Insulation:** Do not enclose adjacent units together.
- **Clearance:** Maintain between pipes.
- **Finish:** Neatly finish joints, corners, edges and overlaps.

90-90-40/640 Installing phenolic foam insulation on pipelines

Shared by: 90-90-40/360 Phenolic foam insulation type A; type B and type C.

- **General requirements:** 90-90-40/610 Installing insulation and protection products generally.
- **Joints:** Close butt, seal with 50 mm wide class 0 tape on both longitudinal and circumferential joints.
- **At fittings:** Mitre. Secure with tape.
- **Vapour seal:** Tape exposed insulation membrane. Seal vapour barrier at pipe support with class 0 tape.

90-90-55/610 Installing mechanical plant and equipment identification

- **Fixing:** Fix with adhesive to equipment.
- **Position:** On equipment and On wall adjacent equipment.

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90-90-55/650 Installing ductwork identification

- **Standard:** In accordance with BESADW/144.
- **Position:** Locate where visible.
- **Direction of flow:** Equilateral triangle, 150 mm length of side, with one apex pointing in the direction of flow.
- **Information:** Space served by the duct and associated plant;
  Air being conveyed, direction of flow, destination of the air;
  and Location or designation of plant which treats the air.

System completion

65-10-95/810 Commissioning of air distribution systems

Shared by: 65-10-95/130 Mechanical supply ventilation system; and 65-10-95/140 Mechanical extract ventilation system.

- **Pre-commissioning:** In accordance with BSRIABG 49/2015 and CIBSECommissioning code A.
- **Commissioning:** In accordance with BSRIABG 49/2015 and CIBSECommissioning code A.
- **Notice (minimum):** 48 h.

65-10-95/820 Performance testing

Shared by: 65-10-95/130 Mechanical supply ventilation system; and 65-10-95/140 Mechanical extract ventilation system.

- **General:** Demonstrate the performance of the installations.
- **Guaranteed efficiency:** Tolerances defined in this specification.
- **Environmental tests:** Carry out environmental testing. If necessary, use artificial loads to simulate operating conditions.
- **Recorders:**
  - **Type:** To be defined.
  - **Number:** To be defined.
  - **Duration of loan:** To be defined.
- **Reports:** Submit on completion.

65-10-95/830 Inspection and test records

Shared by: 65-10-95/130 Mechanical supply ventilation system; and 65-10-95/140 Mechanical extract ventilation system.

- **Reports:**
  - **Construction phase:** System design is commissionable;
    Post-installation;
    System cleanliness;
    and System commissionable.
- **Records for air systems:** In accordance with BSRIABG 49/2015.
- **Record sheets:**
  - **Submission:** To be defined.

- **Number of copies:** To be defined.

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65-10-95/840 Demonstrations

Shared by: 65-10-95/130 Mechanical supply ventilation system; and 65-10-95/140 Mechanical extract ventilation system.

- **Running of plant:**
  - **Operation:** Contractor's choice.
  - **Duration:** Two weeks.
- **Instruction:** Instruct and demonstrate the purpose, function and operation of the installations.

65-10-95/850 Documentation for ventilation systems

Shared by: 65-10-95/130 Mechanical supply ventilation system; and 65-10-95/140 Mechanical extract ventilation system.

- **Operating and maintenance instructions:**
  - **Scope:** Submit for the system as a whole giving optimum settings for controls.
  - **Product information:** Include product description, date of purchase, performance characteristics, application (suitability for use), method of operation and control, and cleaning and maintenance requirements.
  - **Format:** Paper copy.
  - **Number of copies:** Three.
- **Record drawings:**
  - **Content:** Location and arrangement of plant in plant rooms;
    Location, size and route of ductwork;
    Location and identification of regulating dampers and fire dampers;
    and Location of outlets.
  - **Format:** A1 paper print and Electronic.
  - **Number of copies:** Three.
- **Submittal date:** At handover.

Ω End of system

65-10-95/140 Mechanical extract ventilation system

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System outline

65-10-95/140 Mechanical extract ventilation system

- **Description:** The new Chantry Centre will be ventilated both, naturally and mechanically. The contractor shall provide and install new mechanical ventilation plant and connect it into new ventilation distribution as indicated on the drawings and in this specification report.

  There are 2 systems:
  - General Extract
  - General Supply

  The Heat Recovery Units shall be manufactured by Nuaire as indicated on the mechanical schedules. The contractor shall order these units and include for the plant to be supported within the new ceiling voids or steelwork. The units shall be commissioned and tested on completion. All ancillaries recommended by the manufacturer shall be included and installed by the contractor.

  New motorised fire dampers shall be fitted with the new ductwork where ducts penetrate fire compartment walls. New Fire/Smoke Dampers to be linked and connected to the new Fire Damper Panel.

  Access shall be provided to access the internals of ductwork where fire dampers are installed and for cleaning purposes. The whole installation shall comply with DW144 including the location and frequency of duct access. The new ductwork installation shall be in sheet steel low pressure Class A circular steel as indicated on the drawings. On completion the ductwork shall be cleaned and certified as clean. New ductwork is designed to operate at near room temperature so does not require insulation. New ductwork shall be labelled with the HRU reference service and direction of flow.

  On completion the contractor shall commission, test and balance the entire new ventilation system.

  The contractor shall install intake and exhaust vents in window panels as indicated on the drawings. New vents shall match new external wall surfaces.
- **System performance:** 65-10-95/210 Design of ventilation systems.
- **Room extract air terminal devices:** 90-45-20/380 Grilles.
- **Air ductwork and accessories:**
  - **Ductwork:** 90-45-25/315 Circular sheet metal ductwork and fittings and 90-45-25/365 Rectangular sheet metal ductwork and fittings.
  - **Accessories:** 45-35-22/430 Bird guards;
    45-35-22/435 Insect guards;
    90-45-25/400 Access doors;
    and 90-45-25/420 Fire and smoke dampers.
- **Thermal insulation on extract air ductwork:** To be defined.
- **Vibration isolation mountings:** 90-90-95/320 Compression isolators and 90-90-95/330 Spring isolators.

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- **Heat recovery:** To be defined.
- **Acoustic treatment:** To be defined.
- **Extract fans:** To be defined.
- **External exhaust air terminals:** 45-25-50/305 Aluminium louvre panel units.
- **Accessories:** To be defined.
- **Controls:** To be defined.
- **Identification of ductwork and equipment:** 90-90-55/420 Identifying ductwork and 90-90-55/480 Mechanical plant and equipment identification labels.
- **Testing:** 90-45-25/785 Air leakage testing of medium pressure ductwork type A;
  90-45-25/785 Air leakage testing of medium pressure ductwork type B;
  90-45-25/790 Air leakage testing of plant items type A;
  and 90-45-25/790 Air leakage testing of plant items type B.
- **Execution:** 65-10-95/630 Installing ductwork on air handling units and 65-10-95/640 Ductwork systems cleaning.
- **System completion:** 65-10-95/810 Commissioning of air distribution systems;
  65-10-95/820 Performance testing;
  65-10-95/830 Inspection and test records;
  65-10-95/840 Demonstrations;
  and 65-10-95/850 Documentation for ventilation systems.

System performance

65-10-95/210 Design of ventilation systems

Shared by: 65-10-95/130 Mechanical supply ventilation system; and 65-10-95/140 Mechanical extract ventilation system.

- **Design:** Complete the design of the ventilation systems.
- **Method:** To be defined.
- **Requirement:** Submit proposals including detailed design drawings, technical information, calculations and manufacturers' literature.
- **Computer calculations:**
  - **Submittals:** To be defined.
  - **Format:** To be defined.

Products

45-25-50/305 Aluminium louvre panel units

Shared by: 65-10-95/130 Mechanical supply ventilation system; and 65-10-95/140 Mechanical extract ventilation system.

- **Manufacturer:** Submit proposals.
- **Size (l x w x d):** Submit proposals.
- **Material:** To be defined.
- **Finish:** Submit proposals.
- **Colour:** To be defined.

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• **Texture:** To be defined.
• **Construction:** To be defined.
• **Air intake and exhaust performance:**
  – **Application:** To be defined.
  – **Air volume:** To be defined.
  – **Face velocity:** To be defined.
  – **Core velocity (maximum):** To be defined.
• **Calculated weighted sound reduction index (Rw):**
  – **Standard:** To be defined.
  – **Frequency range:** To be defined.
• **Weather performance:**
  – **Water penetration class (minimum):** To be defined.
  – **Discharge loss coefficient (minimum):** To be defined.
• **Louvre configuration:**
  – **Number of banks:** To be defined.
  – **Blade orientation:** To be defined.
  – **Blade pitch:** To be defined.
  – **Blade angle:** To be defined.
• **Actuators:** To be defined.
• **Accessories:** To be defined.		

45-35-22/430 Bird guards
Shared by: 65-10-95/130 Mechanical supply ventilation system; and 65-10-95/140 Mechanical extract ventilation system.
• **Manufacturer:** To be defined.
• **Target species:** To be defined.
• **Format:** To be defined.
• **Size:** To be defined.
• **Materials:** To be defined.
• **Finish and colour:** To be defined.
• **Mesh:**
  – **Material:** To be defined.
  – **Format:** To be defined.
  – **Colour:** To be defined.
• **Features:** To be defined.
• **Accessories:** To be defined.
• **Execution:** To be defined.		

45-35-22/435 Insect guards **Shared by:** 65-10-95/130 Mechanical supply ventilation system; and 65-10-95/140 Mechanical extract ventilation system. • **Manufacturer:** To be defined. • **Target species:** To be defined.		

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• **Format:** To be defined.
• **Size:** To be defined.
• **Frame:**
  – **Material:** To be defined.
  – **Colour:** To be defined.
• **Mesh:**
  – **Material:** To be defined.
  – **Format:** To be defined.
  – **Colour:** To be defined.
• **Fixing type:** To be defined.
• **Features:** To be defined.
• **Accessories:** To be defined.
• **Execution:** To be defined.		

90-45-20/380 Grilles
Shared by: 65-10-95/130 Mechanical supply ventilation system; and 65-10-95/140 Mechanical extract ventilation system.
• **Manufacturer:** Gilberts, Waterloo or equal approved
• **Standards:**
  – **Mixed flow applications:** To BS EN 12238.
  – **Displacement flow applications:** To BS EN 12239.
  – **Sound power levels:** To BS EN ISO 5135.
• **Application:** Extract and Supply.
• **Duty:**
  – **Air volume:** Refer to mechanical schedule
  – **Size:** Refer to mechanical schedule
  – **Sound power level:** Refer to mechanical schedule
• **Core velocity (maximum):** To be defined.
• **Shape:** Refer to mechanical schedule
• **Grille type:** Refer to mechanical schedule
• **Position:** As indicated on the drawings
• **Material:** Refer to mechanical schedule
• **Finish:** Refer to mechanical schedule
• **Accessories:** 90-45-20/400 Ceiling or wall mounted plenum boxes.
• **Execution:** 90-45-20/650 Installing grilles and 90-45-20/690 Support of air terminal units in ceiling grids.		

90-45-20/400 Ceiling or wall mounted plenum boxes
• **Manufacturer:** Gilberts, Waterloo or equal approved
• **Duty:**
  – **Air volume:** To be defined.
  – **Spigot size:** To be defined.
  – **Spigot position:** To be defined.		

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• **Configuration:** To be defined. • **Construction:** Sturdy and rigid with circular inlet spigots of 65 mm minimum length. • **Fixing:** Incorporate means for fixing to, or suspending from, building or other construction.		
90-45-25/315 Circular sheet metal ductwork and fittings **Shared by:** 65-10-95/130 Mechanical supply ventilation system; and 65-10-95/140 Mechanical extract ventilation system. • **Manufacturer:** To be defined. • **Standards:** To BESADW/144, BS EN 1506 and BS EN 12237. • **Classification:** Class A. • **Special installations:** To be defined. • **Material:** Zinc coated steel to BS EN 10346 grade DX51D+Z140. • **Construction:** Spirally wound. • **Regulating dampers:** – **Standard:** As BESADW/144. – **Regulating function:** Balancing and Control. – **Damper type:** Single skin multi-blade. – **Operation:** Manual. – **Material:** To match ductwork. • **Access openings:** – **Purpose:** Inspection; Cleaning; and Maintenance. – **Sizes:** To BS EN 12097. • **Execution:** 90-45-25/610 Air ductwork generally; 90-45-25/640 Installing sheet metal ductwork; 90-45-25/740 Installing control equipment and instruments in metal ductwork; 90-45-25/720 Weatherproofing ductwork penetrations; 90-45-25/785 Air leakage testing of medium pressure ductwork type B; 90-45-25/790 Air leakage testing of plant items type B; and 90-45-25/795 Air leakage testing of low pressure ductwork.		
90-45-25/365 Rectangular sheet metal ductwork and fittings **Shared by:** 65-10-95/130 Mechanical supply ventilation system; and 65-10-95/140 Mechanical extract ventilation system. • **Manufacturer:** To be defined. • **Standards:** To BESADW/144, BS EN 1505 and BS EN 1507. • **Classification:** Class A. • **Special installations:** To be defined. • **Material:** Zinc coated steel to BS EN 10346 grade DX51D+Z140. • **Regulating dampers:** – **Standard:** To BESADW/144. – **Regulating function:** Balancing and Control. – **Damper type:** Opposed blade.		

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– **Operation:** Manual. – **Material:** To match ductwork. • **Access openings:** – **Purpose:** Inspection; Cleaning; and Maintenance. – **Sizes:** To BS EN 12097. • **Execution:** 90-45-25/610 Air ductwork generally; 90-45-25/640 Installing sheet metal ductwork; 90-45-25/720 Weatherproofing ductwork penetrations; 90-45-25/740 Installing control equipment and instruments in metal ductwork; 90-45-25/785 Air leakage testing of medium pressure ductwork type A; 90-45-25/785 Air leakage testing of medium pressure ductwork type B; 90-45-25/790 Air leakage testing of plant items type A; 90-45-25/790 Air leakage testing of plant items type B; and 90-45-25/795 Air leakage testing of low pressure ductwork.		
90-45-25/400 Access doors **Shared by:** 65-10-95/130 Mechanical supply ventilation system; and 65-10-95/140 Mechanical extract ventilation system. • **Manufacturer:** To be defined. • **Material:** To be defined.		
90-45-25/420 Fire and smoke dampers **Shared by:** 65-10-95/130 Mechanical supply ventilation system; and 65-10-95/140 Mechanical extract ventilation system. • **Manufacturer:** Submit proposals. • **Standard:** – **Fire dampers:** To BS EN 15650. – **Test:** To BS EN 1366-2. – **Classification:** To BS EN 13501-3. – **Aerodynamic performance:** To BS EN 1751 and BS EN ISO 5135. • **Arrangement:** To be defined. • **Classification:** To be defined. • **Material:** Zinc coated steel. • **Accessories:** To be defined. • **Fusible links:** – **Fusing temperature:** To be defined. – **Spare fusible links:** To be defined. • **Execution:** 90-45-25/725 Installing fire and smoke control dampers and 90-45-25/750 Access to dampers for resetting and maintenance.		
90-90-55/420 Identifying ductwork **Shared by:** 65-10-95/130 Mechanical supply ventilation system; and 65-10-95/140 Mechanical extract ventilation system. • **Manufacturer:** To be defined.		

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- **Standard:** To BS 1710 and To BS EN 13779.
- **Identification type:** Self-adhesive plastics or transfers.
- **Colour:** To be defined.
- **Lettering:** To be defined.
- **Shape and size:** To be defined.
- **Execution:** 90-90-55/650 Installing ductwork identification.

90-90-55/480 Mechanical plant and equipment identification labels

Shared by: 55-40-40/120 Cold water supply system; 55-40-40/150 Direct hot water storage supply system; 55-60-55/120 Natural gas supply system; 60-45-40/110 Low temperature hot water heating system; 60-45-95/110 Variable refrigerant flow system; 65-10-95/130 Mechanical supply ventilation system; and 65-10-95/140 Mechanical extract ventilation system.

- **Manufacturer:** To be defined.
- **Material:** Engraved anodized aluminium and Face engraved rigid plastic laminate.
- **Label size:** To be defined.
- **Colour:**
  - **Background:** To be defined.
  - **Lettering:** To be defined.
- **Typography:**
  - **Font:** To be defined.
  - **Size:** To be defined.
- **Information to be included:** Equipment name;
  Equipment reference number;
  and Service.
- **Execution:** 90-90-55/610 Installing mechanical plant and equipment identification.

90-90-95/320 Compression isolators

Shared by: 55-40-40/120 Cold water supply system; 55-40-40/150 Direct hot water storage supply system; 65-10-95/130 Mechanical supply ventilation system; and 65-10-95/140 Mechanical extract ventilation system.

- **Manufacturer:** To be defined.
- **Compression isolators type:** To be defined.
- **Colour code:** To be defined.
- **Load:** To be defined.
- **Deflection:** To be defined.

90-90-95/330 Spring isolators

Shared by: 55-40-40/120 Cold water supply system; 55-40-40/150 Direct hot water storage supply system; 65-10-95/130 Mechanical supply ventilation system; and 65-10-95/140 Mechanical extract ventilation system.

- **Manufacturer:** To be defined.
- **Spring isolators type:** To be defined.
- **Colour code:** To be defined.
- **Load:** To be defined.

- **Deflection:** To be defined.

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Execution

65-10-95/630 Installing ductwork on air handling units

Shared by: 65-10-95/130 Mechanical supply ventilation system; and 65-10-95/140 Mechanical extract ventilation system.

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

65-10-95/640 Ductwork systems cleaning

Shared by: 65-10-95/130 Mechanical supply ventilation system; and 65-10-95/140 Mechanical extract ventilation system.

- **Standards:** In accordance with BESATechnical Report TR/19 and to BS EN 15780.
- **Specialist:** To be defined.
- **Cleaning methods:**
  - **Mechanical:** To be defined.
  - **Manual:** To be defined.
  - **Wet:** To be defined.
- **Verification:**
  - **Method:** To be defined.
  - **Completion report:**

    Information: To be defined.

    Format: To be defined.

    Submit: To be defined.

    Number of copies: To be defined.

90-45-20/610 Installing air terminal devices

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

90-45-20/650 Installing grilles

- **General requirements:** 90-45-20/610 Installing air terminal devices.
- **Method:** To be defined.

90-45-20/690 Support of air terminal units in ceiling grids

- **Standard:** To BESADW/144.
- **Wire safety support:** To be defined.

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- **Independent support:** To be defined.
- **Position:** Agree final position of air terminals before installation.

90-45-25/610 Air ductwork generally

Shared by: 90-45-25/315 Circular sheet metal ductwork and fittings; and 90-45-25/365 Rectangular sheet metal ductwork and fittings.

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

90-45-25/640 Installing sheet metal ductwork

Shared by: 90-45-25/315 Circular sheet metal ductwork and fittings; and 90-45-25/365 Rectangular sheet metal ductwork and fittings.

- **Standard:** To BESADW/144.
- **Hangers and supports:** To be defined.
- **Installing flexible joint connections:** To be defined.

90-45-25/720 Weatherproofing ductwork penetrations

Shared by: 90-45-25/315 Circular sheet metal ductwork and fittings; and 90-45-25/365 Rectangular sheet metal ductwork and fittings.

- **Roof penetrations:** Submit proposals.
- **Wall penetrations:** Submit proposals.

90-45-25/725 Installing fire and smoke control dampers

- **Standard:** In accordance with ASFPVolume 1: EN fire dampers. (Grey book);
  In accordance with BESADW/145;
  and To BS EN 12101-8.

90-45-25/740 Installing control equipment and instruments in metal ductwork

Shared by: 90-45-25/315 Circular sheet metal ductwork and fittings; and 90-45-25/365 Rectangular sheet metal ductwork and fittings.

- **General:** Fit sensors, damper motors and other control equipment.
- **Connections:** Connect control equipment and instruments.

90-45-25/750 Access to dampers for resetting and maintenance

- **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.
- **Fire links:** Provide access for replacement.

90-45-25/785 Air leakage testing of medium pressure ductwork type A

Shared by: 65-10-95/130 Mechanical supply ventilation system; 65-10-95/140 Mechanical extract ventilation system; and 90-45-25/365 Rectangular sheet metal ductwork and fittings.

- **Standard:** To BESADW/144 and BESADW/143.
- **Extent:** Random testing of 10% maximum of the ductwork system.
  Carry out tests as work proceeds before thermal insulation is installed.

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Where a test fails, select two further sections for testing.
Carry out remedial work where tests fail.

- **Test pressure:** To BESADW/144, Table 22.
- **Documentation:** Air leakage test sheet.
- **Report:**
  - **Format:** Electronic and Paper copy.
  - **Submit:** On completion.
  - **Number of copies:** 3

90-45-25/785 Air leakage testing of medium pressure ductwork type B

Shared by: 65-10-95/140 Mechanical extract ventilation system; 90-45-25/315 Circular sheet metal ductwork and fittings; and 90-45-25/365 Rectangular sheet metal ductwork and fittings.

- **Standard:** To BESADW/144 and BESADW/143.
- **Extent:** Random testing of 10% maximum of the ductwork system.
  Carry out tests as work proceeds before thermal insulation is installed.
  Where a test fails, select two further sections for testing.
  Carry out remedial work where tests fail.
- **Test pressure:** To BESADW/144, Table 22.
- **Documentation:** Air leakage test sheet.
- **Report:**
  - **Format:** Electronic and Paper copy.
  - **Submit:** On completion.
  - **Number of copies:** 3

90-45-25/790 Air leakage testing of plant items type A

Shared by: 65-10-95/130 Mechanical supply ventilation system; 65-10-95/140 Mechanical extract ventilation system; and 90-45-25/365 Rectangular sheet metal ductwork and fittings.

- **Standard:** To BESADW/144.
- **Procedure:** To be defined.
- **Report:**
  - **Format:** To be defined.
  - **Submit:** To be defined.
  - **Number of copies:** To be defined.

90-45-25/790 Air leakage testing of plant items type B

Shared by: 65-10-95/140 Mechanical extract ventilation system; 90-45-25/315 Circular sheet metal ductwork and fittings; and 90-45-25/365 Rectangular sheet metal ductwork and fittings.

- **Standard:** To BESADW/144.
- **Procedure:** To be defined.
- **Report:**
  - **Format:** To be defined.
  - **Submit:** To be defined.
  - **Number of copies:** To be defined.

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90-45-25/795 Air leakage testing of low pressure ductwork

Shared by: 90-45-25/315 Circular sheet metal ductwork and fittings; and 90-45-25/365 Rectangular sheet metal ductwork and fittings.

- **Standard:** To BESADW/144 and DW/143.
- **Extent:** Random testing of 10% maximum of the ductwork system.
  Carry out tests as work proceeds before thermal insulation is installed.
  Where a test fails, select two further sections for testing.
  Carry out remedial work where tests fail.
- **Test pressure:** To BESADW/144, Table 22.
- **Documentation:** Air leakage test sheet.
- **Report:**
  - **Format:** Electronic and Paper copy.
  - **Submit:** On completion.
  - **Number of copies:** 3

90-90-55/610 Installing mechanical plant and equipment identification

- **Fixing:** Fix with adhesive to equipment.
- **Position:** On equipment and On wall adjacent equipment.

90-90-55/650 Installing ductwork identification

- **Standard:** In accordance with BESADW/144.
- **Position:** Locate where visible.
- **Direction of flow:** Equilateral triangle, 150 mm length of side, with one apex pointing in the direction of flow.
- **Information:** Space served by the duct and associated plant;
  Air being conveyed, direction of flow, destination of the air;
  and Location or designation of plant which treats the air.

System completion

65-10-95/810 Commissioning of air distribution systems

Shared by: 65-10-95/130 Mechanical supply ventilation system; and 65-10-95/140 Mechanical extract ventilation system.

- **Pre-commissioning:** In accordance with BSRIABG 49/2015 and CIBSECommissioning code A.
- **Commissioning:** In accordance with BSRIABG 49/2015 and CIBSECommissioning code A.
- **Notice (minimum):** 48 h.

65-10-95/820 Performance testing

Shared by: 65-10-95/130 Mechanical supply ventilation system; and 65-10-95/140 Mechanical extract ventilation system.

- **General:** Demonstrate the performance of the installations.
- **Guaranteed efficiency:** Tolerances defined in this specification.

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- **Environmental tests:** Carry out environmental testing. If necessary, use artificial loads to simulate operating conditions.
- **Recorders:**
  - **Type:** To be defined.
  - **Number:** To be defined.
  - **Duration of loan:** To be defined.
- **Reports:** Submit on completion.

65-10-95/830 Inspection and test records

Shared by: 65-10-95/130 Mechanical supply ventilation system; and 65-10-95/140 Mechanical extract ventilation system.

- **Reports:**
  - **Construction phase:** System design is commissionable;
    Post-installation;
    System cleanliness;
    and System commissionable.
- **Records for air systems:** In accordance with BSRIABG 49/2015.
- **Record sheets:**
  - **Submission:** To be defined.
  - **Number of copies:** To be defined.

65-10-95/840 Demonstrations

Shared by: 65-10-95/130 Mechanical supply ventilation system; and 65-10-95/140 Mechanical extract ventilation system.

- **Running of plant:**
  - **Operation:** Contractor's choice.
  - **Duration:** Two weeks.
- **Instruction:** Instruct and demonstrate the purpose, function and operation of the installations.

65-10-95/850 Documentation for ventilation systems

Shared by: 65-10-95/130 Mechanical supply ventilation system; and 65-10-95/140 Mechanical extract ventilation system.

- **Operating and maintenance instructions:**
  - **Scope:** Submit for the system as a whole giving optimum settings for controls.
  - **Product information:** Include product description, date of purchase, performance characteristics, application (suitability for use), method of operation and control, and cleaning and maintenance requirements.
  - **Format:** Paper copy.
  - **Number of copies:** Three.
- **Record drawings:**
  - **Content:** Location and arrangement of plant in plant rooms;
    Location, size and route of ductwork;
    Location and identification of regulating dampers and fire dampers;
    and Location of outlets.
  - **Format:** A1 paper print and Electronic.

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– **Number of copies:** Three. • **Submittal date:** At handover. Ω End of system		

70-50-45/110 Incoming low voltage electricity supply

System outline

70-50-45/110 Incoming low voltage electricity supply

- **Description:** New incoming 200A 400V (140kVA) supply to be installed, UKPN head and Ryfield/ panel-board to be located within the electrical cupboard located within the Ground Floor Plant Room at the rear of the building. Refer to external services tender drawing for cable and buried duct route detail. UKPN duct to be 125mm diamtere black rigiduct buried at minmum 600mm to top of duct, care is to be taken that UKPN cable bending radius parameters are adhered to. Duct to be installed with draw rope.
- **System performance:** 70-50-45/210 Design of incoming low voltage electricity supply.
- **Nature of current:** Alternating.
- **Phase:** Three phase 4 wire.
- **Voltage:** 400 V.
- **Electricity distributor:** UK Power Networks.
- **Electricity supplier:** TBA
- **Metering:** Single meter to landlords supplies.
- **Execution:** To be defined.
- **System completion:** To be defined.

System performance

70-50-45/210 Design of incoming low voltage electricity supply

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

Ω End of system

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70-70-25/110 Earthing and bonding system

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System outline

70-70-25/110 Earthing and bonding system

- **Description:** Earthing and bonding system
- **System performance:** 70-70-25/210 Design of earthing and bonding systems and 70-70-25/230 Equipotential bonding in buildings with information technology equipment.
- **Main incoming earth:** Establish with the Electricity Distributor.
- **Main earth electrode type:** 90-75-50/330 Earth rods.
- **Main protective bonding conductors:** 90-55-15/346 Single core non-sheathed cables with LSHF insulation and 90-75-50/390 Copper tape.
- **Supplementary bonding conductors:** 90-55-15/346 Single core non-sheathed cables with LSHF insulation.
- **Circuit protective conductors:** Cable armour and auxiliary.
- **Earth terminal type:** 90-75-50/310 Earth bars and Distribution Network Operators earth terminal block.
- **Accessories:** To be defined.
- **Electrical identification:** 90-90-55/395 Electrical diagrams;
  90-90-55/320 Electrical shock treatment signs;
  and 90-90-55/390 Equipment labels and warning notices.
- **Execution:** 70-70-25/630 General installation.
- **System completion:** 70-70-25/810 Inspection and testing and 70-70-25/820 Documentation.

System performance

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

- **Standards:** In accordance with BS 7671 and BS 7430.
- **Design:** Complete the design of the earthing and bonding systems.
- **Earthing conductor:** Size to BS 7454.
- **Main protective bonding conductors:**
  - **Connect the following to the main earthing terminal:** To be defined.
  - **Size (minimum):** In accordance with BS 7671, Regulation 544.1.1.
- **Supplementary bonding conductors:**
  - **Bond the following:** To be defined.
  - **Size (minimum):** Minimum of 2.5 mm² if sheathed or where mechanical protection is provided, otherwise 4 mm².
- **Circuit protective conductors:** Size to BS 7454.
- **Requirement:** Submit proposals including detailed design drawings, technical information, calculations and manufacturers' literature.

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70-70-25/230 Equipotential bonding in buildings with information technology equipment

- **Standard:** To BS EN 50310.
- **Objectives:** To be defined.

Products

90-55-15/346 Single core non-sheathed cables with LSHF insulation

- **Manufacturer:** To be defined.
- **Standards:** To BS EN 50525-1 and BS EN 50525-3-41.
- **Third party certification:** To be defined.
- **Cable type:** To be defined.
- **Size:** To be defined.
- **Reaction to fire class:**
  - **Fire behaviour:** To be defined.
  - **Additional classification for smoke production:** To be defined.
  - **Additional classification for flaming droplets and/ or particles:** To be defined.
  - **Additional classification for acidity:** To be defined.
- **Execution:** To be defined.

90-75-50/310 Earth bars

- **Manufacturer:** To be defined.
- **Material:**
  - **Bar type:** Hard drawn copper to BS EN 13601.
  - **Support:** PVC-U.
- **Size:**
  - **Profile:** To be defined.
  - **Length:** To be defined.
- **Predrilled connections (minimum):** To be defined.
- **Disconnecting links:** To be defined.
- **Execution:** To be defined.

90-75-50/330 Earth rods

- **Manufacturer:** To be defined.
- **Standards:** To be defined.
- **Material:** To be defined.
- **Size:**
  - **Diameter:** To be defined.
  - **Length:** To be defined.
- **Earth rod clamps:** To be defined.
- **Execution:** To be defined.

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90-75-50/390 Copper tape

- **Manufacturer:** To be defined.
- **Standards:** To BS EN 13601.
- **Size:** To be defined.
- **Cover:** To be defined.
- **Execution:** To be defined.

90-90-55/320 Electrical shock treatment signs

Shared by: 70-70-25/110 Earthing and bonding system; 70-70-45/110 Low voltage distribution system; and 70-70-75/110 Hard wired low voltage small power system.

- **Manufacturer:** To be defined.
- **Format:** Plastics encapsulated.

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

Shared by: 60-45-40/110 Low temperature hot water heating system; 70-70-25/110 Earthing and bonding system; 70-70-45/110 Low voltage distribution system; 70-70-75/110 Hard wired low voltage small power system; 70-80-25/120 Amenity lighting system; and 70-80-35/110 Hard wired general lighting system.

- **Manufacturer:** To be defined.
- **Material:** To be defined.
- **Label size:** To be defined.
- **Colour:**
  - **Background:** To be defined.
  - **Lettering:** To be defined.
- **Typography:**
  - **Font:** To be defined.
  - **Size:** To be defined.
- **Notice wording:** To be defined.

90-90-55/395 Electrical diagrams

Shared by: 70-70-25/110 Earthing and bonding system; 70-70-45/110 Low voltage distribution system; 70-70-75/110 Hard wired low voltage small power system; 70-80-25/120 Amenity lighting system; and 70-80-35/110 Hard wired general lighting system.

- **Material:** To be defined.
- **Format:** Single line engineering drawings to BS EN 61082-1.
- **Information to be included:** Supply characteristics.Maximum demand.Cable types and sizes.Switchgear ratings.Protective device types, ratings and function.
  Prospective fault current values at each item of switchgear.
  Earth fault loop impedance values at each item of switchgear.
  Circuits containing equipment vulnerable to testing.

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Execution

70-70-25/630 General installation

- **Standards:** In accordance with BS 7430 and BS 7671.

System completion

70-70-25/810 Inspection and testing

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

70-70-25/820 Documentation

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

Ω End of system

70-70-45/110 Low voltage distribution system

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System outline

70-70-45/110 Low voltage distribution system

- **Description:** Electrical supplies to ground floor and first floor distribution boards and mechanical plant control panel to be fed from panel-board located within the external plant room along with the mechanical control panel. The ground and first floor DB's are to be located within the cleaners/store cupboards as identified on the tender drawings. The distribution boards are to comply with TM39 (split metering) and BS7671 18th Edition.
  Note: AFDD's required on lighting and small power circuits in the following locations:
  1) Bin store
  2) Server Room
  3) External lighting
  4) Lift power and any circuit relating to in-shaft services
  5) Kitchen services
  6) Store rooms
- **System performance:** 70-70-45/210 Design of low voltage distribution systems and 70-70-45/215 Low voltage distribution circuit cables generally.
- **Connection to low voltage supply:** To be defined.
- **Switchgear:** 90-50-45/410 Distribution boards.
- **Distribution circuit cabling:** 90-55-15/324 Thermosetting insulated and thermoplastic sheathed (LSHF) armoured cables.
- **Cable accessories:** To be defined.
- **Containment:** 90-55-10/325 Cable baskets;
  90-55-10/330 Cable ladders;
  90-55-10/350 Buried conduit;
  90-55-10/380 Rigid conduit;
  and 90-55-10/385 PVC trunking.
- **Containment accessories:** To be defined.
- **Rewireable installation:** Required.
- **Concealed installation:** Required.
- **Monitoring and metering:** 90-65-55/320 Active electrical energy meters.
- **Power conditioning equipment:** 90-60-30/410 Surge protective devices for low voltage power supplies.
- **Accessories:** To be defined.
- **Electrical identification:** 90-90-55/320 Electrical shock treatment signs;
  90-90-55/390 Equipment labels and warning notices;
  and 90-90-55/395 Electrical diagrams.
- **Execution:** 70-70-45/625 Installing low voltage distribution systems.
- **System completion:** 70-70-45/810 Inspecting, testing and commissioning of switchgear generally and 70-70-45/820 Documentation.

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System performance

70-70-45/210 Design of low voltage distribution systems

- **System designer:** Member of the Institution of Engineering and Technology (IET) or Member of the Chartered Institution of Building Services Engineers (CIBSE).
- **Design:** Complete the design of the low voltage distribution system.
- **Standard:** In accordance with BS 7671.
- **Provision of low voltage distribution:** Provide electrical supplies to equipment requiring power.
- **Spare capacity throughout the low voltage distribution system:** 20% of current carrying capacity.
- **Requirement:** See Tender Drawings

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

- **Proposed selection of low voltage distribution cables:** See Tender Drawings
- **Conductor sizes (minimum):** To be defined.
- **Cable sizes not stated:** Submit.
- **Format:** To be defined.

Products

90-50-45/410 Distribution boards

- **Manufacturer:** To be defined.
- **Standards:** To BS EN 61439-1 and BS EN 61439-3.
- **Third party certification:** To be defined.
- **Rated operational voltage (Ue):** To be defined.
- **Incoming device:** To be defined.
- **Outgoing devices:**
  - **Type:** To be defined.
  - **Quantity:** To be defined.
- **Busbars and connections:**
  - **Type:** Fully shrouded.
  - **Rated operational current (Ie):** To be defined.
  - **Rated short-time withstand current (Icw) for 1 s:** To be defined.
- **Neutral and earth bars:** Individual terminal for each outgoing circuit.
- **Neutral terminations:** Match current carrying capacity of phase conductor.
- **Spare ways:** To be defined.
- **Enclosure:**
  - **Ingress protection (minimum):** To be defined.
  - **Material:** To be defined.

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– **Finish:** To be defined. – **Colour:** To be defined. – **Locking mechanism:** Cylinder locks with a standard key type. • **Accessories:** To be defined. • **Execution:** To be defined.		
90-55-10/325 Cable baskets **Shared by:** 70-70-45/110 Low voltage distribution system; 70-70-75/110 Hard wired low voltage small power system; 70-80-35/110 Hard wired general lighting system; 75-45-20/110 Data distribution system; 75-60-05/110 Electronic access control system; 75-60-10/110 CCTV system; 75-60-40/110 Intrusion and hold-up alarm system; and 75-65-30/110 Fire detection and alarm systems in non-domestic premises. • **Manufacturer:** To be defined. • **Standard:** To BS EN 61537. • **Material:** To be defined. • **Coating material:** To be defined. • **Sizes:** – **Width:** To be defined. – **Side height:** To be defined. • **Features:** – **Segregation:** To be defined. – **Protective cover:** To be defined. • **Execution:** To be defined.		
90-55-10/330 Cable ladders • **Manufacturer:** To be defined. • **Standard:** To BS EN 61537. • **Material:** To be defined. • **Resistance against flame propagation:** To be defined. • **Electrical properties:** – **Continuity characteristics:** To be defined. – **Conductivity characteristics:** To be defined. • **Coating material:** To be defined. • **Temperature properties for transport, storage, installation and application:** – **Minimum:** To be defined. – **Maximum:** To be defined. • **Mechanical properties:** – **Cable ladder free base area:** To be defined. – **Resistance to impact:** To be defined. • **Width:** To be defined. • **Features:** – **Segregation:** To be defined. – **Protective cover:** To be defined.		

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• **Execution:** To be defined.		
90-55-10/350 Buried conduit **Shared by:** 70-70-45/110 Low voltage distribution system; and 70-70-75/110 Hard wired low voltage small power system. • **Manufacturer:** To be defined. • **Standards:** To BS EN 61386-1 and BS EN 61386-24. • **Mechanical properties:** – **Resistance to compression:** To be defined. – **Resistance to impact:** To be defined. • **Resistance to bending:** To be defined. • **Electrical characteristics:** To be defined. • **Resistance to external influences:** – **Protection against ingress of solid objects (minimum):** To BS EN 60529, IP3X. – **Protection against ingress of water (minimum):** To BS EN 60529, IPX0. • **Resistance to corrosion:** To be defined. • **Resistance to flame propagation:** To be defined. • **Sizes (OD):** To be defined. • **Execution:** To be defined.		
90-55-10/380 Rigid conduit **Shared by:** 70-70-45/110 Low voltage distribution system; 70-70-75/110 Hard wired low voltage small power system; 70-80-25/120 Amenity lighting system; 70-80-35/110 Hard wired general lighting system; and 75-45-20/110 Data distribution system. • **Manufacturer:** To be defined. • **Standards:** To BS EN 61386-1 and BS EN 61386-21. • **Mechanical properties:** – **Resistance to compression:** To be defined. – **Resistance to impact:** To be defined. • **Transport, installation and application:** – **Lower temperature (minimum):** To be defined. – **Upper temperature (maximum):** To be defined. • **Resistance to bending:** Rigid. • **Electrical characteristics:** To be defined. • **Resistance to external influences:** – **Protection against ingress of solid objects (minimum):** To BS EN 60529, IP3X. – **Protection against ingress of water (minimum):** To BS EN 60529, IPX0. • **Resistance to corrosion:** To be defined. • **Tensile strength:** To be defined. • **Resistance to flame propagation:** To be defined. • **Suspended load capacity:** To be defined. • **Colour:** To be defined. • **Sizes (OD):** To be defined.		

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• **Execution:** To be defined.		
90-55-10/385 PVC trunking **Shared by:** 70-70-45/110 Low voltage distribution system; and 70-70-75/110 Hard wired low voltage small power system. • **Manufacturer:** To be defined. • **Standard:** To BS 4678-4. • **Sizes:** To be defined. • **Compartments:** To be defined. • **Accessories and fittings:** – **Generally:** Factory made by the cable trunking manufacturer and of the same material type and finish as the cable trunking. – **Types:** To be defined. • **Strength class:** To be defined. • **Colour:** To be defined. • **Execution:** To be defined.		
90-55-15/324 Thermosetting insulated and thermoplastic sheathed (LSHF) armoured cables • **Manufacturer:** To be defined. • **Standard:** To BS 6724. • **Third party certification:** To be defined. • **Size:** To be defined. • **Insulation:** To be defined. • **Sheath colour:** Black. • **Reaction to fire class:** – **Fire behaviour:** To be defined. – **Additional classification for smoke production:** To be defined. – **Additional classification for flaming droplets and/ or particles:** To be defined. – **Additional classification for acidity:** To be defined. • **Execution:** To be defined.		
90-60-30/410 Surge protective devices for low voltage power supplies **Shared by:** 70-70-45/110 Low voltage distribution system; and 70-70-75/110 Hard wired low voltage small power system. • **Manufacturer:** To be defined. • **Standard:** To be defined. • **Operating voltage and frequency (nominal):** To be defined. • **Number of poles:** To be defined. • **Maximum continuous operating voltage (Uc):** To be defined. • **Mode of protection:** To be defined. • **Lightning impulse current (Iimp):** To be defined. • **Nominal discharge current (In):** To be defined. • **Maximum discharge current 8/20µs (Imax):** To be defined.		

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• **Minimum short-circuit current rating (Isccr):** To be defined. • **Voltage protection level (Up):** To be defined. • **Open circuit voltage (Uoc):** To be defined. • **Thermal overload protection:** To be defined. • **Protection status indicators:** To be defined. • **Remote monitoring:** To be defined. • **Ingress protection (minimum):** To be defined. • **Mounting method:** To be defined. • **Execution:** To be defined.		
90-65-55/320 Active electrical energy meters • **Manufacturer:** To be defined. • **Standard:** To BS EN 50470-1. • **Third party certification:** Measuring Instruments Directive approved. • **Display:** To be defined. • **Rated voltage:** To be defined. • **Phase arrangement:** To be defined. • **Current measuring range:** To be defined. • **Rated frequency:** 50 Hz. • **Metering functions:** To be defined. • **Mounting:** To be defined. • **Ingress protection (minimum):** To be defined. • **Outputs:** To be defined. • **Execution:** To be defined.		
90-90-55/320 Electrical shock treatment signs **Shared by:** 70-70-25/110 Earthing and bonding system; 70-70-45/110 Low voltage distribution system; and 70-70-75/110 Hard wired low voltage small power system. • **Manufacturer:** To be defined. • **Format:** Plastics encapsulated.		

90-90-55/390 Equipment labels and warning notices
Shared by: 60-45-40/110 Low temperature hot water heating system; 70-70-25/110 Earthing and bonding system; 70-70-45/110 Low voltage distribution system; 70-70-75/110 Hard wired low voltage small power system; 70-80-25/120 Amenity lighting system; and 70-80-35/110 Hard wired general lighting system.
• **Manufacturer:** To be defined.
• **Material:** To be defined.
• **Label size:** To be defined.
• **Colour:**
  – **Background:** To be defined.
  – **Lettering:** To be defined.
• **Typography:**		

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– **Font:** To be defined. – **Size:** To be defined. • **Notice wording:** To be defined.		

90-90-55/395 Electrical diagrams

Shared by: 70-70-25/110 Earthing and bonding system; 70-70-45/110 Low voltage distribution system; 70-70-75/110 Hard wired low voltage small power system; 70-80-25/120 Amenity lighting system; and 70-80-35/110 Hard wired general lighting system.

- **Material:** To be defined.
- **Format:** Single line engineering drawings to BS EN 61082-1.
- **Information to be included:** Supply characteristics.Maximum demand.Cable types and sizes.Switchgear ratings.Protective device types, ratings and function.
  Prospective fault current values at each item of switchgear.
  Earth fault loop impedance values at each item of switchgear.
  Circuits containing equipment vulnerable to testing.

Execution

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

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

System completion

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

- **Standard:** In accordance with BS 7671.
- **Notice before testing and commissioning:** 1 day.
- **Switches and circuit breakers:** Clean to remove all visible traces of dust.
- **Protective devices settings:** Configure to match the grading study.
- **Switchboard monitoring:** Continuous for 30 minutes following first energizing.
- **Additional inspecting and testing:** Check levelling and alignment of assembly.
  Check operation of instruments and metering devices.
  Check and adjust tightness of busbar connections and supports.
  Check tightness of bolted connections.
  Check busbar joints with duct or resistance measurements.
  Check earth connections at compartments, switches and earth electrodes.
  Check clearance of live parts from direct contact.
  Check polarity and phase sequence of protective devices.
  Check operation of protective devices using secondary and primary current injection.
  Manually operate protective devices.
  Carry out earth fault protection simulation tests.
  Check functional operation of circuit breakers.
  Check operation of switch tripping devices.
- **Testing and commissioning results:** Submit one copy.

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

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70-70-45/820 Documentation

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

Ω End of system

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

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System outline

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

- **Description:** The small power items, specifically the socket outlets, fused connection units and mechanical plant power supplies are to be fed from the distribution boards (TM39) located in the store rooms on the related floor as well as the plant room (mechanical plant). Refer to tender M&E drawings for additional detail.

  Note: The desktop socket outlets within the Council Chamber and the meeting rooms are to have integral USB ports.

  Specialist and mechanical power requirements
  1) Skylights within council chamber and meeting rooms to have 3 wire supply (up/down/common) switched via wall switch with rain sensor (located on roof) auto bypass for auto close.
  2) Server room to have 2No 16A Commando socket outlets
  3) Lift supply - refer to appendices.
  4) 3 Phase required for mechanical plant equipment control panel located within main plant room
  5) Main hall to have high level sound bar with integral socket outlets (16No)
  6) Main Hall High level projector requires socket and data
  7) Main Hall stage area requires power and switch for powered drop down screen.
  8) Spurs for Hand Dryers in WC's
- **System performance:** 70-70-75/210 Design of low voltage small power systems;
  70-70-75/215 Low voltage small power cables generally;
  and 70-70-75/220 Selection of conduit, trunking and ducting generally.
- **Connection to low voltage supply:** DBGF, DBFF, DBMECH
- **Final circuit cabling:** 90-55-15/350 Thermosetting insulated and thermoplastic sheathed (LSHF) cables.
- **Containment:** 90-55-10/325 Cable baskets;
  90-55-10/350 Buried conduit;
  90-55-10/380 Rigid conduit;
  90-55-10/385 PVC trunking;
  90-55-10/335 Cable trays;
  and 90-55-10/420 Cable trunking and cable ducting for floor mounting.
- **Containment accessories:** To be defined.
- **Rewireable installation:** Required.
- **Concealed installation:** Required.
- **Final connections:** 90-55-15/398 Heavy duty heat resistant LSHF insulated and sheathed flexible cables.
- **Partial installation:** Required.
- **Power conditioning equipment:** 90-60-30/410 Surge protective devices for low voltage power supplies.

- **Electrical accessories and outlets:** To be defined.
- **Controls and starters:** Refer to Lift and mechanical plant specification
- **Accessories:** To be defined.
- **Electrical identification:** 90-90-55/320 Electrical shock treatment signs; 90-90-55/390 Equipment labels and warning notices; and 90-90-55/395 Electrical diagrams.
- **Execution:** To be defined.
- **System completion:** 70-70-75/820 Documentation and 70-70-75/830 Spares.

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System performance

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

- **Provision of small power:** For fixed and portable equipment requiring power.
- **Design:** Complete for the low voltage small power systems.
- **Standards:** In accordance with BS 7671.
- **Diversity:** In accordance with IETGuidance Note 1.
- **Spare capacity throughout the small power system:** 20%.
- **Requirement:** Submit proposals including detailed design drawings, technical information, calculations and manufacturers' literature.

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

- **Standard:** In accordance with BS 7671.
- **Proposed selection of low voltage cables:** Submit drawings, technical information, calculations and manufacturers' literature.
- **Conductor sizes (minimum):** 1.5mm²
- **Cable sizes not stated:** Submit.
- **Format:** Amtech or equivalent

70-70-75/220 Selection of conduit, trunking and ducting generally

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

Products

90-55-10/325 Cable baskets

Shared by: 70-70-45/110 Low voltage distribution system; 70-70-75/110 Hard wired low voltage small power system; 70-80-35/110 Hard wired general lighting system; 75-45-20/110 Data distribution system; 75-60-05/110 Electronic access control system; 75-60-10/110 CCTV system; 75-60-40/110 Intrusion and hold-up alarm system; and 75-65-30/110 Fire detection and alarm systems in non-domestic premises.

- **Manufacturer:** To be defined.
- **Standard:** To BS EN 61537.
- **Material:** To be defined.
- **Coating material:** To be defined.
- **Sizes:**
  - **Width:** To be defined.
  - **Side height:** To be defined.
- **Features:**
  - **Segregation:** To be defined.
  - **Protective cover:** To be defined.
- **Execution:** To be defined.

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90-55-10/335 Cable trays

Shared by: 70-70-75/110 Hard wired low voltage small power system; 70-80-25/120 Amenity lighting system; and 70-80-35/110 Hard wired general lighting system.

- **Manufacturer:** To be defined.
- **Standard:** To BS EN 61537.
- **Material:** To be defined.
- **Resistance against flame propagation:** To be defined.
- **Electrical properties:**
  - **Continuity characteristics:** To be defined.
  - **Conductivity characteristics:** To be defined.
- **Coating material:** To be defined.
- **Temperature properties for transport, storage, installation and application:**
  - **Minimum:** To be defined.
  - **Maximum:** To be defined.
- **Mechanical properties:**
  - **Cable tray free base area:** To be defined.
  - **Resistance to impact:** To be defined.
- **Width:** To be defined.
- **Features:**
  - **Flange type:** To be defined.
  - **Segregation:** To be defined.
  - **Protective cover:** To be defined.
- **Execution:** To be defined.

90-55-10/350 Buried conduit

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

- **Manufacturer:** To be defined.
- **Standards:** To BS EN 61386-1 and BS EN 61386-24.
- **Mechanical properties:**
  - **Resistance to compression:** To be defined.

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– **Resistance to impact:** To be defined. • **Resistance to bending:** To be defined. • **Electrical characteristics:** To be defined. • **Resistance to external influences:** – **Protection against ingress of solid objects (minimum):** To BS EN 60529, IP3X. – **Protection against ingress of water (minimum):** To BS EN 60529, IPX0. • **Resistance to corrosion:** To be defined. • **Resistance to flame propagation:** To be defined. • **Sizes (OD):** To be defined. • **Execution:** To be defined.		
90-55-10/380 Rigid conduit **Shared by:** 70-70-45/110 Low voltage distribution system; 70-70-75/110 Hard wired low voltage small power system; 70-80-25/120 Amenity lighting system; 70-80-35/110 Hard wired general lighting system; and 75-45-20/110 Data distribution system. • **Manufacturer:** To be defined. • **Standards:** To BS EN 61386-1 and BS EN 61386-21. • **Mechanical properties:** – **Resistance to compression:** To be defined. – **Resistance to impact:** To be defined. • **Transport, installation and application:** – **Lower temperature (minimum):** To be defined. – **Upper temperature (maximum):** To be defined. • **Resistance to bending:** Rigid. • **Electrical characteristics:** To be defined. • **Resistance to external influences:** – **Protection against ingress of solid objects (minimum):** To BS EN 60529, IP3X. – **Protection against ingress of water (minimum):** To BS EN 60529, IPX0. • **Resistance to corrosion:** To be defined. • **Tensile strength:** To be defined. • **Resistance to flame propagation:** To be defined. • **Suspended load capacity:** To be defined. • **Colour:** To be defined. • **Sizes (OD):** To be defined. • **Execution:** To be defined.		
90-55-10/385 PVC trunking **Shared by:** 70-70-45/110 Low voltage distribution system; and 70-70-75/110 Hard wired low voltage small power system. • **Manufacturer:** To be defined. • **Standard:** To BS 4678-4. • **Sizes:** To be defined. • **Compartments:** To be defined.		

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• **Accessories and fittings:**
  – **Generally:** Factory made by the cable trunking manufacturer and of the same material type and finish as the cable trunking.
  – **Types:** To be defined.
• **Strength class:** To be defined.
• **Colour:** To be defined.
• **Execution:** To be defined.		

90-55-10/420 Cable trunking and cable ducting for floor mounting
• **Manufacturer:** To be defined.
• **Standards:** To BS EN 50085-1 and BS EN 50085-2-2.
• **Resistance to floor maintenance:** To be defined.
• **Resistance to vertically applied load:** To be defined.
• **Resistance to impact:** To be defined.
• **Temperature properties:**
  – **Storage and transport temperature (minimum):** To be defined.
  – **Installation and application temperature (minimum):** To be defined.
  – **Application temperature (maximum):** To be defined.
• **Resistance to flame propagation:** To be defined.
• **Electrical properties:** To be defined.
• **Protection by enclosure:**
  – **Protection against ingress of solid objects (minimum):** To BS EN 60529, IP4X.
  – **Protection against ingress of water (minimum):** To BS EN 60529, IPX1.
  – **Protection against access to hazardous parts (minimum):** To BS EN 60529, IPXXD.
• **Access method:** To be defined.
• **Screening:** To be defined.
• **Sizes:** To be defined.
• **Compartments:** To be defined.
• **Levelling devices:** Screwed.
• **Accessories and fittings:**
  – **Generally:** Factory made by the cable trunking or ducting manufacturer and of the same material type and finish as the cable trunking or ducting.
  – **Types:** To be defined.
• **Execution:** To be defined.		

90-55-15/350 Thermosetting insulated and thermoplastic sheathed (LSHF) cables **Shared by:** 70-70-75/110 Hard wired low voltage small power system; and 70-80-35/110 Hard wired general lighting system. • **Manufacturer:** To be defined. • **Standard:** To BS 7211. • **Third party certification:** To be defined. • **Cable type:** To be defined.		

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• **Size:** To be defined.
• **Reaction to fire class:**
  – **Fire behaviour:** To be defined.
  – **Additional classification for smoke production:** To be defined.
  – **Additional classification for flaming droplets and/ or particles:** To be defined.
  – **Additional classification for acidity:** To be defined.
• **Execution:** To be defined.		

90-55-15/398 Heavy duty heat resistant LSHF insulated and sheathed flexible cables
• **Manufacturer:** To be defined.
• **Standards:** To BS EN 50525-1 and BS EN 50525-3-21.
• **Third party certification:** To be defined.
• **Cable type:** H07ZZ-F.
• **Size:** To be defined.
• **Sheath colour:** To be defined.
• **Reaction to fire class:**
  – **Fire behaviour:** To be defined.
  – **Additional classification for smoke production:** To be defined.
  – **Additional classification for flaming droplets and/ or particles:** To be defined.
  – **Additional classification for acidity:** To be defined.
• **Execution:** To be defined.		

90-60-30/410 Surge protective devices for low voltage power supplies **Shared by:** 70-70-45/110 Low voltage distribution system; and 70-70-75/110 Hard wired low voltage small power system. • **Manufacturer:** To be defined. • **Standard:** To be defined. • **Operating voltage and frequency (nominal):** To be defined. • **Number of poles:** To be defined. • **Maximum continuous operating voltage (Uc):** To be defined. • **Mode of protection:** To be defined. • **Lightning impulse current (Iimp):** To be defined. • **Nominal discharge current (In):** To be defined. • **Maximum discharge current 8/20µs (Imax):** To be defined. • **Minimum short-circuit current rating (Isccr):** To be defined. • **Voltage protection level (Up):** To be defined. • **Open circuit voltage (Uoc):** To be defined. • **Thermal overload protection:** To be defined. • **Protection status indicators:** To be defined. • **Remote monitoring:** To be defined. • **Ingress protection (minimum):** To be defined. • **Mounting method:** To be defined.		

- **Execution:** To be defined.

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90-90-55/320 Electrical shock treatment signs

Shared by: 70-70-25/110 Earthing and bonding system; 70-70-45/110 Low voltage distribution system; and 70-70-75/110 Hard wired low voltage small power system.

- **Manufacturer:** To be defined.
- **Format:** Plastics encapsulated.

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

Shared by: 60-45-40/110 Low temperature hot water heating system; 70-70-25/110 Earthing and bonding system; 70-70-45/110 Low voltage distribution system; 70-70-75/110 Hard wired low voltage small power system; 70-80-25/120 Amenity lighting system; and 70-80-35/110 Hard wired general lighting system.

- **Manufacturer:** To be defined.
- **Material:** To be defined.
- **Label size:** To be defined.
- **Colour:**
  - **Background:** To be defined.
  - **Lettering:** To be defined.
- **Typography:**
  - **Font:** To be defined.
  - **Size:** To be defined.
- **Notice wording:** To be defined.

90-90-55/395 Electrical diagrams

Shared by: 70-70-25/110 Earthing and bonding system; 70-70-45/110 Low voltage distribution system; 70-70-75/110 Hard wired low voltage small power system; 70-80-25/120 Amenity lighting system; and 70-80-35/110 Hard wired general lighting system.

- **Material:** To be defined.
- **Format:** Single line engineering drawings to BS EN 61082-1.
- **Information to be included:** Supply characteristics.Maximum demand.Cable types and sizes.Switchgear ratings.Protective device types, ratings and function.
  Prospective fault current values at each item of switchgear.
  Earth fault loop impedance values at each item of switchgear.
  Circuits containing equipment vulnerable to testing.

System completion

70-70-75/820 Documentation

- **Operating and maintenance instructions:**
  - **Scope:** Submit for the system giving optimum settings for controls.
  - **Product information:** Include product description, date of purchase, performance characteristics, application (suitability for use), method of operation and control, and cleaning and maintenance requirements.

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– **Format:** Paper copy. – **Number of copies:** Two. • **Record drawings:** – **Content:** Location of all electrical outlets, including isolators, starters, control equipment and electrical accessories Schematic drawings showing all low voltage final circuits, the cable origin, circuit designation, cable type, size, number of cores, size and type of overcurrent protective device. – **Format:** Electronic drawing. – **Number of copies:** One • **Submittal date:** At handover. **70-70-75/830 Spares** • **Plugs:** To be defined. • **Fuse links:** To be defined. Ω End of system		

70-80-25/120 Amenity lighting system

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System outline

70-80-25/120 Amenity lighting system

- **Description:** Refer to the tender drawings for detail of the external lighting. External lighting to be LED with 2 hour Emergency back-up, switched via day/night switch, integral PIR and timer. Timer to be set to limit lighting after midnight. All external lighting to be screened type - to limit light spread to downward only and restrict nuisance lighting. The in-ground drive over lights are to have a central emergency battery supply for 2 hour back-up, the placement of the battery pack to be within the store at the rear of the Community Hub reception.

  There are lights mounted on the temporary hoarding that illuminate the Harry's Bar parking area, these lights are to be reoved with the hoarding so column lighting is to be installed to compensate. 2No galvanised standard duty 3m lighting columns, root mount, complete with LED floodlight mounting brackets for 2No LED floodlights per column. LED floodlights on adjustable brackets with backlight shielding as 230V Luceco Slimline 38W 5000K LED Floodlight black die cast aluminium. Existing electrical supply from Harry's Bar to be retained the cable is currently suspended from the building to a tree, the cable must drop to ground level and run buried within a trench and contained within a PVC duct at 600mm to top of duct to the first and second column and terminated within the column termination point. Existing lighting control to be retained. Electrical installation and final testing to comply with latest revision of BS7671.
- **System performance:** 70-80-25/220 Amenity lighting design.
- **System manufacturer:** Refer to lighting equipment schedule elsewhere in this spec.
- **Electrical supply:** DBGF
- **Final circuit cabling:** 90-55-15/341 PVC insulated and sheathed cables. LSF
- **Containment:** 90-55-10/335 Cable trays and 90-55-10/380 Rigid conduit.
- **Containment accessories:** To be defined.
- **Rewireable installation:** Required.
- **Concealed installation:** Required.
- **Low voltage switchgear:** To be defined.
- **Columns and brackets:** 90-60-45/320 Steel lighting columns;
  90-60-45/340 Steel lighting bollards;
  90-60-45/360 Steel column luminaire brackets;
  and 90-60-45/380 Steel luminaire brackets.
- **Luminaires:** 90-60-50/382 Floodlights;
  90-60-50/384 Ground recessed luminaires;
  and As per Luminaire Schedule.
- **Lamp types:** 90-60-50/336 Self-ballasted LED lamps.
- **Controls:**
  - **Types:** 90-65-05/430 Photoelectric control units and 90-65-25/380 Time switches.
  - **Configuration:** Group.
- **System accessories:** To be defined.

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• **Electrical identification:** 90-90-55/390 Equipment labels and warning notices and 90-90-55/395 Electrical diagrams. • **Execution:** 70-80-25/620 Installing roadway and amenity lighting systems generally. • **System completion:** 70-80-25/812 Commissioning; 70-80-25/820 Documentation; and 70-80-25/830 Spares.		

System performance

70-80-25/220 Amenity lighting design

- **Design:** Complete the design of the amenity lighting system.
- **Standards:** In accordance with Guidance notes for the reduction of obtrusive light GN01 and To BS 5489-1.
- **Lighting class:** SC1-SC9
- **Average power density energy consumption (maximum):** To be defined.
- **Initial circuit luminous efficacy (minimum):** Manufacturers standard
- **Proposals:** Submit detailed design drawings including circuit diagrams, luminaire layouts, luminaire photometric data including flux fraction ratios, polar intensity curves and utilisation factors, lamp and luminaire technical information, road surface reflectance values, power density and efficacy of the installation. Include computer generated point calculations with contribution from inter-reflected light, maintenance factor calculations, schedule of design and calculated maintained average illuminance values, and a schedule of design and calculated uniformity values.

Products

90-55-10/335 Cable trays

Shared by: 70-70-75/110 Hard wired low voltage small power system; 70-80-25/120 Amenity lighting system; and 70-80-35/110 Hard wired general lighting system.

- **Manufacturer:** To be defined.
- **Standard:** To BS EN 61537.
- **Material:** To be defined.
- **Resistance against flame propagation:** To be defined.
- **Electrical properties:**
  - **Continuity characteristics:** To be defined.
  - **Conductivity characteristics:** To be defined.
- **Coating material:** To be defined.
- **Temperature properties for transport, storage, installation and application:**
  - **Minimum:** To be defined.
  - **Maximum:** To be defined.
- **Mechanical properties:**
  - **Cable tray free base area:** To be defined.
  - **Resistance to impact:** To be defined.

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• **Width:** To be defined.
• **Features:**
  – **Flange type:** To be defined.
  – **Segregation:** To be defined.
  – **Protective cover:** To be defined.
• **Execution:** To be defined.		

90-55-10/380 Rigid conduit
Shared by: 70-70-45/110 Low voltage distribution system; 70-70-75/110 Hard wired low voltage small power system; 70-80-25/120 Amenity lighting system; 70-80-35/110 Hard wired general lighting system; and 75-45-20/110 Data distribution system.
• **Manufacturer:** To be defined.
• **Standards:** To BS EN 61386-1 and BS EN 61386-21.
• **Mechanical properties:**
  – **Resistance to compression:** To be defined.
  – **Resistance to impact:** To be defined.
• **Transport, installation and application:**
  – **Lower temperature (minimum):** To be defined.
  – **Upper temperature (maximum):** To be defined.
• **Resistance to bending:** Rigid.
• **Electrical characteristics:** To be defined.
• **Resistance to external influences:**
  – **Protection against ingress of solid objects (minimum):** To BS EN 60529, IP3X.
  – **Protection against ingress of water (minimum):** To BS EN 60529, IPX0.
• **Resistance to corrosion:** To be defined.
• **Tensile strength:** To be defined.
• **Resistance to flame propagation:** To be defined.
• **Suspended load capacity:** To be defined.
• **Colour:** To be defined.
• **Sizes (OD):** To be defined.
• **Execution:** To be defined.		

90-55-15/341 PVC insulated and sheathed cables
• **Manufacturer:** To be defined.
• **Standard:** To BS 6004.
• **Third party certification:** To be defined.
• **Cable type:** To be defined.
• **Size:** To be defined.
• **Sheath colour:** Grey.
• **Reaction to fire class:**
  – **Fire behaviour:** To be defined.
  – **Additional classification for smoke production:** To be defined.		

- **Additional classification for flaming droplets and/ or particles:** To be defined. - **Additional classification for acidity:** To be defined. • **Execution:** To be defined.	£	p
90-60-45/320 Steel lighting columns • **Manufacturer:** To be defined. • **Standard:** To BS EN 40-5. • **Performance under vehicle impact:** - **Speed class:** To be defined. - **Energy absorption category:** To be defined. - **Occupant safety level:** To be defined. • **Format:** To be defined. • **Profile:** To be defined. • **Cross section:** To be defined. • **Height (nominal):** To be defined. • **Base:** - **Type:** To be defined. - **Root length:** To be defined. • **Lantern fixing dimension:** To be defined. • **Corrosion protection:** - **Area A:** To be defined. - **Area B:** To be defined. - **Area C:** To be defined. • **Column door locks and keys:** Door lock pattern to be the same for all columns installed. Keys to be the same for each group of columns. • **Identification:** To Highways EnglandTo be defined.Specification for highway works Volume 1. • **Accessories:** To be defined. • **Execution:** To be defined.		
90-60-45/340 Steel lighting bollards • **Manufacturer:** To be defined. • **Profile:** To be defined. • **Cross section:** To be defined. • **Height (nominal):** To be defined. • **Base:** - **Type:** To be defined. - **Root length:** To be defined. • **Bollard diameter:** To be defined. • **Corrosion protection:** - **Type:** To be defined. - **Colour:** To be defined.		

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• **Light source:**
  – **Head:** To be defined.
  – **Optic:** To be defined.
  – **Lamp type and rating:** To be defined.
  – **Ingress protection (minimum):** To be defined.
  – **Impact protection (minimum):** To be defined.
• **Accessories:** To be defined.
• **Execution:** To be defined.		

90-60-45/360 Steel column luminaire brackets
• **Manufacturer:** To be defined.
• **Arrangement:** To be defined.
• **Lantern fixing angle:** To be defined.
• **Projection (nominal):** To be defined.
• **Lantern fixing dimension:** To be defined.
• **Corrosion protection:**
  – **Type:** To be defined.
  – **Colour:** To be defined.
• **Accessories:** To be defined.		

90-60-45/380 Steel luminaire brackets
• **Manufacturer:** To be defined.
• **Luminaire orientation:** To be defined.
• **Cable entry:** To be defined.
• **Fixing:** To be defined.
• **Projection (nominal):** To be defined.
• **Corrosion protection:**
  – **Type:** To be defined.
  – **Colour:** To be defined.
• **Accessories:** To be defined.		

90-60-50/336 Self-ballasted LED lamps **Shared by:** 70-80-25/120 Amenity lighting system; and 70-80-35/110 Hard wired general lighting system. • **Manufacturer:** To be defined. • **Standards:** To BS EN 62560 and BS EN 62612. • **Third party certification:** To be defined. • **Cap type:** To be defined. • **Wattage:** To be defined. • **Colour temperature:** To be defined. • **Colour rendering index (Ra):** To be defined. • **Rated life (minimum):** To be defined.		

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• **Initial lumens (minimum):** To be defined. • **Rated lamp efficacy (minimum):** To be defined. • **Energy efficiency label:** To be defined. • **Dimmable:** To be defined.		
90-60-50/382 Floodlights • **Manufacturer:** To be defined. • **Standards:** To BS EN 60598-1 and BS EN 60598-2-5. • **Third party certification:** To be defined. • **Luminaire description:** To be defined. • **Classification:** – **Electric shock:** To be defined. – **Ingress protection (minimum):** To be defined. – **Suitability for direct mounting on normally flammable surfaces:** To be defined. – **Circumstances of use:** To be defined. • **Rated maximum ambient temperature:** To be defined. • **Impact protection (minimum):** To be defined. • **Luminaire performance:** To BS EN 62722-1 and BS EN 13032-1. • **Control gear position:** To be defined. • **Supply circuit conductor connections:** To be defined. • **Internal fuse:** To be defined. • **Nominal voltage:** To be defined. • **Luminaire power factor:** To be defined. • **LED luminaires:** – **Performance standards:** To BS EN 62717 and BS EN 62722-2-1. – **Safety standard:** To BS EN 62031. – **Initial LED luminaire efficacy (minimum):** To be defined. – **Wattage:** To be defined. – **Colour temperature:** To be defined. – **Colour rendering index (Ra):** 80–89 – **Beam angle:** To be defined. – **Useful life:** To be defined. • **Non LED luminaires:** – **Ballasts CELMA energy efficiency index (minimum):** To be defined. – **Lamp properties:** **Wattage:** To be defined. **Colour temperature:** To be defined. **Colour rendering index (Ra):** To be defined. **Beam angle:** To be defined. **Initial lumens (minimum):** To be defined. • **Dimming protocol:** To be defined. • **Pre-wired cable length (minimum):** To be defined.		

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• **Accessories:** To be defined. • **Execution:** To be defined.		

90-60-50/384 Ground recessed luminaires
• **Manufacturer:** To be defined.
• **Standards:** To BS EN 60598-1 and BS EN 60598-2-13.
• **Third party certification:** To be defined.
• **Luminaire description:** To be defined.
• **Classification:**
  – **Electric shock:** To be defined.
  – **Ingress protection (minimum):** To be defined.
  – **Suitability for direct mounting on normally flammable surfaces:** To be defined.
  – **Circumstances of use:** To be defined.
• **Resistance to static load (minimum):** To be defined.
• **Rated maximum surface temperature:** To be defined.
• **Rated maximum ambient temperature:** To be defined.
• **Impact protection (minimum):** To be defined.
• **Luminaire performance:** To BS EN 62722-1 and BS EN 13032-1.
• **Control gear position:** To be defined.
• **Supply circuit conductor connections:** To be defined.
• **Internal fuse:** To be defined.
• **Nominal voltage:** To be defined.
• **Luminaire power factor:** To be defined.
• **LED luminaires:**
  – **Performance standards:** To BS EN 62717 and BS EN 62722-2-1.
  – **Safety standard:** To BS EN 62031.
  – **Initial LED luminaire efficacy (minimum):** To be defined.
  – **Wattage:** To be defined.
  – **Colour temperature:** To be defined.
  – **Colour rendering index (Ra):** To be defined.
  – **Beam angle:** To be defined.
  – **Useful life:** To be defined.
• **Dimming protocol:** To be defined.
• **Pre-wired cable length (minimum):** To be defined.
• **Accessories:** To be defined.
• **Execution:** To be defined.		

90-65-05/430 Photoelectric control units **Shared by:** 70-80-25/120 Amenity lighting system; and 70-80-35/110 Hard wired general lighting system. • **Manufacturer:** To be defined. • **Standard:** To BS 5972.		

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• **Equipment interconnectivity:** To be defined.
• **Inductive switching capacity:** To be defined.
• **Switching settings:**
  – **Adjustable switching time delay:** To be defined.
  – **On lighting level:** To be defined.
  – **Off lighting level:** To be defined.
  – **Timed on:** To be defined.
  – **Timed off:** To be defined.
• **Remote setup/ override:** To be defined.
• **Mounting:** To be defined.
• **Ingress protection (minimum):** To be defined.
• **Execution:** To be defined.		

90-65-25/380 Time switches
Shared by: 70-80-25/120 Amenity lighting system; 70-80-35/110 Hard wired general lighting system; and 75-75-50/190 Gas fired heating system control strategy.
• **Manufacturer:** To be defined.
• **Standards:** To BS EN 60730-1 and BS EN 60730-2-7.
• **Third party certification:** To be defined.
• **Equipment interconnectivity:** To be defined.
• **Format:** To be defined.
• **Display:** To be defined.
• **Programme capability:** To be defined.
• **Number of switching channels:** To be defined.
• **Inductive switching capacity:** To be defined.
• **Cable termination capacity:** To be defined.
• **Override facility:** To be defined.
• **GMT/BST daylight saving:** To be defined.
• **Enclosure:**
  – **Ingress protection (minimum):** To be defined.
  – **Material and construction:** To be defined.
• **Battery backup:** To be defined.
• **Execution:** To be defined.		

90-90-55/390 Equipment labels and warning notices **Shared by:** 60-45-40/110 Low temperature hot water heating system; 70-70-25/110 Earthing and bonding system; 70-70-45/110 Low voltage distribution system; 70-70-75/110 Hard wired low voltage small power system; 70-80-25/120 Amenity lighting system; and 70-80-35/110 Hard wired general lighting system. • **Manufacturer:** To be defined. • **Material:** To be defined. • **Label size:** To be defined. • **Colour:**		

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- **Background:** To be defined. - **Lettering:** To be defined. • **Typography:** - **Font:** To be defined. - **Size:** To be defined. • **Notice wording:** To be defined.		
90-90-55/395 Electrical diagrams **Shared by:** 70-70-25/110 Earthing and bonding system; 70-70-45/110 Low voltage distribution system; 70-70-75/110 Hard wired low voltage small power system; 70-80-25/120 Amenity lighting system; and 70-80-35/110 Hard wired general lighting system. • **Material:** To be defined. • **Format:** Single line engineering drawings to BS EN 61082-1. • **Information to be included:** Supply characteristics.Maximum demand.Cable types and sizes.Switchgear ratings.Protective device types, ratings and function. Prospective fault current values at each item of switchgear. Earth fault loop impedance values at each item of switchgear. Circuits containing equipment vulnerable to testing.		
Execution		
70-80-25/620 Installing roadway and amenity lighting systems generally • **Standard:** In accordance with BS 7671 and To Highways EnglandSpecification for highways works Volume 1.		
System completion		
70-80-25/812 Commissioning • **Setting for control devices:** Submit. • **Operation of control devices:** Verify. • **Orientation of adjustable luminaires:** Adjust to give optimum performance.		
70-80-25/820 Documentation • **Operating and maintenance instructions:** - **Scope:** Submit for the system giving optimum settings for controls. - **Product information:** Include product description, date of purchase, performance characteristics, application (suitability for use), method of operation and control, and cleaning and maintenance requirements. - **Format:** Paper copy. - **Number of copies:** Two • **Record drawings:** - **Content:** As installed - **Format:** Electronic drawing.		

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– **Number of copies:** One • **Submittal date:** At handover.		
70-80-25/830 Spares • **Sensors:** To be defined. • **Lamps:** – **Quantity of each type to be supplied:** To be defined. – **Labelling:** Label the lamps with the corresponding luminaire reference. • **Lighting column access door keys:** To be defined. • **Padlock keys:** To be defined.		
Ω End of system		

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

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System outline

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

- **Description:** All light fittings to be LED. Refer to the tender lighting drawings for detail. The internal lighting is a mixture of surface mounted, suspended and recessed LED lighting, Refer to lighting equipment schedule under the appendices.
  MID Lighting has been specified for the internal building lighting system. Contact details are:
  Donna Snell - 07812 217885; donna@midlighting.co.uk
  Marlow Integrated Designs Ltd
  Head Office: Loudwater House, London Road, Loudwater, High Wycombe, Bucks, HP10 9TL.

  NOTE: The ceiling panels within the Community Hub entrance lobby is to be supplied and installed complete with recessed LED downlights, the electrical contractor must supply and install all wiring and switching to the recessed lighting and must liaise with the specialist ceiling supplier in connection with the electrical supplies. The contact details for the ceiling specialist are:
  Armstrong Building Products
  Karamjit Sidhu - Area Specification Manager
  Mobile: 07917843941
  Email: ksidhu@armstrongceilings.com

  All lighting within kitchen and store rooms to be switched at wall - spring rocker switch - with Absence detection.

  NOTE: The stage lighting is a specialist item to be supplied and installed by others, an overhead horizontal lighting bar is to be installed by the contractor to be suspended from the ceiling position. The lighting bar is to be equipped with 16No. socket outlets (8No double) evenly spaced along the length of the bar and wired back to the ground floor distribution board, the bar length is to be 8000mm and suspended from the ceiling support structure as required.
  Contact details for stage lighting and Audio specialist as follows:
  Rob Alvis - Sales Director
  Creative Audio-Visual Solutions Ltd
  Brookmans Park Teleport
  Great North Road, Brookmans Park
  Hertfordshire, AL9 6NE
  Tel: 0844 5678 065
  Mob: 07968 403055
  Email: rob@cavsolutions.co.uk
- **System performance:** 70-80-35/210 Design of general lighting systems and 70-80-35/215 Design of emergency lighting systems.
- **Final circuit cabling:** 90-55-15/350 Thermosetting insulated and thermoplastic sheathed (LSHF) cables.
- **Containment:** 90-55-10/325 Cable baskets;
  90-55-10/335 Cable trays;
  and 90-55-10/380 Rigid conduit.

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• **Containment accessories:** To be defined. • **Rewireable installation:** Required. • **Concealed installation:** Required. • **Luminaire types:** 90-60-50/380 Emergency luminaires; 90-60-50/386 Recessed luminaires; 90-60-50/390 Surface luminaires; and 90-60-50/392 Suspended luminaires. • **Lamp types:** 90-60-50/336 Self-ballasted LED lamps. • **Connections to luminaires:** To be defined. • **Lighting controls:** 90-65-05/410 Combined daylight and occupancy detectors; 90-60-25/330 Dimmer switches and controls; 90-65-05/420 Extra-low voltage occupancy detectors; 90-60-25/325 Light switches; 90-65-05/425 Mains voltage occupancy detectors; 90-65-05/430 Photoelectric control units; and 90-65-25/380 Time switches. • **Accessories:** To be defined. • **Electrical identification:** 90-90-55/390 Equipment labels and warning notices and 90-90-55/395 Electrical diagrams. • **Execution:** 70-80-35/630 Installing general lighting systems; 70-80-35/640 Installing emergency lighting systems; and 70-80-35/660 Installing electrical low mounted way-guidance lighting systems. • **System completion:** 70-80-35/810 Testing and commissioning of general lighting systems; 70-80-35/812 Testing and commissioning emergency lighting systems; 70-80-35/820 Documentation relating to general lighting; and 70-80-35/822 Documentation relating to emergency lighting.		

System performance

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

- **Design:** Complete the design of the general lighting systems and Complete commissioning checklist in accordance with Commissioning Code L, Appendix LA2.
- **Standard:** To BS EN 12464-1 and In accordance with SLLCode for lighting.
- **Design calculations:** Refer to tender drawings
- **Submit the following information:** As built drawings

70-80-35/215 Design of emergency lighting systems

- **System designer:** Refer to tender drawings/MID lighting detail.
- **Design:** Complete the design of the emergency lighting and signage systems.
- **Standards:** To BS EN 1838, BS EN 50172 and in accordance with BS 5266-1 and In accordance with BS 5266-2.
- **Submit the following information:** As installed drawings
- **Emergency lighting classification:**
  - **Type:** X.
  - **Duration of emergency mode:** 120 minutes.

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Products

90-55-10/325 Cable baskets

Shared by: 70-70-45/110 Low voltage distribution system; 70-70-75/110 Hard wired low voltage small power system; 70-80-35/110 Hard wired general lighting system; 75-45-20/110 Data distribution system; 75-60-05/110 Electronic access control system; 75-60-10/110 CCTV system; 75-60-40/110 Intrusion and hold-up alarm system; and 75-65-30/110 Fire detection and alarm systems in non-domestic premises.

- **Manufacturer:** To be defined.
- **Standard:** To BS EN 61537.
- **Material:** To be defined.
- **Coating material:** To be defined.
- **Sizes:**
  - **Width:** To be defined.
  - **Side height:** To be defined.
- **Features:**
  - **Segregation:** To be defined.
  - **Protective cover:** To be defined.
- **Execution:** To be defined.

90-55-10/335 Cable trays

Shared by: 70-70-75/110 Hard wired low voltage small power system; 70-80-25/120 Amenity lighting system; and 70-80-35/110 Hard wired general lighting system.

- **Manufacturer:** To be defined.
- **Standard:** To BS EN 61537.
- **Material:** To be defined.
- **Resistance against flame propagation:** To be defined.
- **Electrical properties:**
  - **Continuity characteristics:** To be defined.
  - **Conductivity characteristics:** To be defined.
- **Coating material:** To be defined.
- **Temperature properties for transport, storage, installation and application:**
  - **Minimum:** To be defined.
  - **Maximum:** To be defined.
- **Mechanical properties:**
  - **Cable tray free base area:** To be defined.
  - **Resistance to impact:** To be defined.
- **Width:** To be defined.
- **Features:**
  - **Flange type:** To be defined.
  - **Segregation:** To be defined.

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– **Protective cover:** To be defined. • **Execution:** To be defined.		
90-55-10/380 Rigid conduit **Shared by:** 70-70-45/110 Low voltage distribution system; 70-70-75/110 Hard wired low voltage small power system; 70-80-25/120 Amenity lighting system; 70-80-35/110 Hard wired general lighting system; and 75-45-20/110 Data distribution system. • **Manufacturer:** To be defined. • **Standards:** To BS EN 61386-1 and BS EN 61386-21. • **Mechanical properties:** – **Resistance to compression:** To be defined. – **Resistance to impact:** To be defined. • **Transport, installation and application:** – **Lower temperature (minimum):** To be defined. – **Upper temperature (maximum):** To be defined. • **Resistance to bending:** Rigid. • **Electrical characteristics:** To be defined. • **Resistance to external influences:** – **Protection against ingress of solid objects (minimum):** To BS EN 60529, IP3X. – **Protection against ingress of water (minimum):** To BS EN 60529, IPX0. • **Resistance to corrosion:** To be defined. • **Tensile strength:** To be defined. • **Resistance to flame propagation:** To be defined. • **Suspended load capacity:** To be defined. • **Colour:** To be defined. • **Sizes (OD):** To be defined. • **Execution:** To be defined.		
90-55-15/350 Thermosetting insulated and thermoplastic sheathed (LSHF) cables **Shared by:** 70-70-75/110 Hard wired low voltage small power system; and 70-80-35/110 Hard wired general lighting system. • **Manufacturer:** To be defined. • **Standard:** To BS 7211. • **Third party certification:** To be defined. • **Cable type:** To be defined. • **Size:** To be defined. • **Reaction to fire class:** – **Fire behaviour:** To be defined. – **Additional classification for smoke production:** To be defined. – **Additional classification for flaming droplets and/ or particles:** To be defined. – **Additional classification for acidity:** To be defined. • **Execution:** To be defined.		

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90-60-25/325 Light switches

- **Manufacturer:** To be defined.
- **Standard:** To BS EN 60669-1.
- **Current rating:** To be defined.
- **Actuating method:** To be defined.
- **Poles:** To be defined.
- **Arrangement:** To be defined.
- **Mounting:** To be defined.
- **Ingress protection (minimum):** To be defined.
- **Cable termination:** To be defined.
- **Plate:**
  - **Material:** To be defined.
  - **Finish:** To be defined.
- **Insert colour:** To be defined.
- **Execution:** To be defined.

90-60-25/330 Dimmer switches and controls

- **Manufacturer:** To be defined.
- **Standards:** To BS EN 60669-1 and BS EN 60669-2-1.
- **Rated load:** To be defined.
- **Arrangement:** To be defined.
- **Actuating method:** To be defined.
- **Control functions:** To be defined.
- **Suitable for the following loads:** To be defined.
- **Mounting:** To be defined.
- **Ingress protection (minimum):** To be defined.
- **Cable termination:** To be defined.
- **Plate:**
  - **Material:** To be defined.
  - **Finish:** To be defined.
- **Insert colour:** To be defined.
- **Execution:** To be defined.

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

Shared by: 70-80-25/120 Amenity lighting system; and 70-80-35/110 Hard wired general lighting system.

- **Manufacturer:** To be defined.
- **Standards:** To BS EN 62560 and BS EN 62612.
- **Third party certification:** To be defined.
- **Cap type:** To be defined.
- **Wattage:** To be defined.

• **Colour temperature:** To be defined. • **Colour rendering index (Ra):** To be defined. • **Rated life (minimum):** To be defined. • **Initial lumens (minimum):** To be defined. • **Rated lamp efficacy (minimum):** To be defined. • **Energy efficiency label:** To be defined. • **Dimmable:** To be defined.	£	p

90-60-50/380 Emergency luminaires
• **Manufacturer:** To be defined.
• **Standards:** To be defined.
• **Third party certification:** To be defined.
• **Luminaire description:** To be defined.
• **Classification:**
  – **Electric shock:** To be defined.
  – **Ingress protection (minimum):** To be defined.
  – **Suitability for direct mounting on normally flammable surfaces:** Suitable for direct mounting on normally flammable surfaces.
  – **Circumstances of use:** To be defined.
  – **Type:** To be defined.
  – **Mode of operation:** To be defined.
  – **Facilities:** To be defined.
  – **Duration of emergency mode (minimum):** To be defined.
• **Rated maximum ambient temperature:** To be defined.
• **Impact protection (minimum):** To be defined.
• **Luminaire performance:** To BS EN 62722-1 and BS EN 13032-1.
• **Control gear position:** To be defined.
• **Supply circuit conductor connections:** To be defined.
• **Internal fuse:** To be defined.
• **Nominal voltage:** To be defined.
• **Luminaire power factor:** To be defined.
• **LED luminaires:**
  – **Performance standards:** To BS EN 62717 and BS EN 62722-2-1.
  – **Safety standard:** To BS EN 62031.
  – **Initial LED luminaire efficacy (minimum):** To be defined.
  – **Wattage:** To be defined.
  – **Colour temperature:** To be defined.
  – **Colour rendering index (Ra):** To be defined.
  – **Beam angle:** To be defined.
  – **Useful life:** To be defined.
• **Non LED luminaires:**
  – **Ballasts CELMA energy efficiency index (minimum):** To be defined.		

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– **Number of lamps:** To be defined. – **Lamp properties:** **Wattage:** To be defined. **Colour temperature:** To be defined. **Colour rendering index (Ra):** To be defined. **Beam angle:** To be defined. **Initial lumens (minimum):** To be defined. • **Graphical symbol format:** To be defined. • **Accessories:** To be defined. • **Execution:** To be defined.		
90-60-50/386 Recessed luminaires • **Manufacturer:** To be defined. • **Standards:** To be defined. • **Third party certification:** To be defined. • **Luminaire description:** To be defined. • **Classification:** – **Electric shock:** To be defined. – **Ingress protection (minimum):** To be defined. – **Suitability for direct mounting on normally flammable surfaces:** To be defined. – **Circumstances of use:** To be defined. • **Rated maximum ambient temperature:** To be defined. • **Impact protection (minimum):** To be defined. • **Luminaire performance:** To BS EN 62722-1 and BS EN 13032-1. • **Control gear position:** To be defined. • **Supply circuit conductor connections:** To be defined. • **Internal fuse:** To be defined. • **Nominal voltage:** To be defined. • **Luminaire power factor:** To be defined. • **LED luminaires:** – **Performance standards:** To BS EN 62717 and BS EN 62722-2-1. – **Safety standard:** To BS EN 62031. – **Initial LED luminaire efficacy (minimum):** To be defined. – **Wattage:** To be defined. – **Colour temperature:** To be defined. – **Colour rendering index (Ra):** To be defined. – **Beam angle:** To be defined. – **Useful life:** To be defined. • **Non LED luminaires:** – **Ballasts CELMA energy efficiency index (minimum):** To be defined. – **Number of lamps:** To be defined. – **Lamp properties:**		

Wattage: To be defined. **Colour temperature:** To be defined. **Colour rendering index (Ra):** To be defined. **Beam angle:** To be defined. **Initial lumens (minimum):** To be defined. • **Dimming protocol:** To be defined. • **Emergency version:** – **Standard:** To BS EN 60598-2-22. – **Classification:** **Type:** To be defined. **Mode of operation:** To be defined. **Facilities:** To be defined. **Duration of emergency mode (minimum):** To be defined. • **Integral sensors:** To be defined. • **Accessories:** To be defined. • **Execution:** To be defined.	£	p
90-60-50/390 Surface luminaires • **Manufacturer:** To be defined. • **Standard:** To be defined. • **Third party certification:** To be defined. • **Luminaire description:** To be defined. • **Classification:** – **Electric shock:** To be defined. – **Ingress protection (minimum):** To be defined. – **Suitability for direct mounting on normally flammable surfaces:** To be defined. – **Circumstances of use:** To be defined. • **Rated maximum ambient temperature:** To be defined. • **Impact protection (minimum):** To be defined. • **Luminaire performance:** To BS EN 62722-1 and BS EN 13032-1. • **Control gear position:** To be defined. • **Supply circuit conductor connections:** To be defined. • **Internal fuse:** To be defined. • **Nominal voltage:** To be defined. • **Luminaire power factor:** To be defined. • **LED luminaires:** – **Performance standards:** To BS EN 62717 and BS EN 62722-2-1. – **Safety standard:** To BS EN 62031. – **Initial LED luminaire efficacy (minimum):** To be defined. – **Wattage:** To be defined. – **Colour temperature:** To be defined. – **Colour rendering index (Ra):** To be defined.		

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– **Beam angle:** To be defined. – **Useful life:** To be defined. • **Non LED luminaires:** – **Ballasts CELMA energy efficiency index (minimum):** To be defined. – **Number of lamps:** To be defined. – **Lamp properties:** **Wattage:** To be defined. **Colour temperature:** To be defined. **Colour rendering index (Ra):** To be defined. **Beam angle:** To be defined. **Initial lumens (minimum):** To be defined. • **Dimming protocol:** To be defined. • **Emergency version:** – **Standard:** To BS EN 60598-2-22. – **Classification:** **Type:** To be defined. **Mode of operation:** To be defined. **Facilities:** To be defined. **Duration of emergency mode (minimum):** To be defined. • **Integral sensors:** To be defined. • **Accessories:** To be defined. • **Execution:** To be defined. **90-60-50/392 Suspended luminaires** • **Manufacturer:** To be defined. • **Standards:** To BS EN 60598-1 and BS 4533-102-1. • **Third party certification:** To be defined. • **Luminaire description:** To be defined. • **Classification:** – **Electric shock:** To be defined. – **Ingress protection (minimum):** To be defined. – **Suitability for direct mounting on normally flammable surfaces:** To be defined. – **Circumstances of use:** To be defined. • **Rated maximum ambient temperature:** To be defined. • **Impact protection (minimum):** To be defined. • **Luminaire performance:** To BS EN 62722-1 and BS EN 13032-1. • **Control gear position:** To be defined. • **Supply circuit conductor connections:** To be defined. • **Internal fuse:** To be defined. • **Nominal voltage:** To be defined. • **Luminaire power factor:** To be defined. • **LED luminaires:**		

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– **Performance standards:** To BS EN 62717 and BS EN 62722-2-1. – **Safety standard:** To BS EN 62031. – **Initial LED luminaire efficacy (minimum):** To be defined. – **Wattage:** To be defined. – **Colour temperature:** To be defined. – **Colour rendering index (Ra):** To be defined. – **Beam angle:** To be defined. – **Useful life:** To be defined. • **Non LED luminaires:** – **Ballasts CELMA energy efficiency index (minimum):** To be defined. – **Number of lamps:** To be defined. – **Lamp properties:** **Wattage:** To be defined. **Colour temperature:** To be defined. **Colour rendering index (Ra):** To be defined. **Beam angle:** To be defined. **Initial lumens (minimum):** To be defined. • **Dimming protocol:** To be defined. • **Emergency version:** – **Standard:** To BS EN 60598-2-22. – **Classification:** **Type:** To be defined. **Mode of operation:** To be defined. **Facilities:** To be defined. **Duration of emergency mode (minimum):** To be defined. • **Integral sensors:** To be defined. • **Accessories:** To be defined. • **Execution:** To be defined.		
90-65-05/410 Combined daylight and occupancy detectors • **Manufacturer:** To be defined. • **Daylight sensitivity:** To be defined. • **Equipment interconnectivity:** To be defined. • **Occupancy sensitivity:** To be defined. • **Range:** To be defined. • **Field of view:** To be defined. • **Remote setup/ override:** To be defined. • **Mounting:** To be defined. • **Ingress protection (minimum):** To be defined. • **Adjustable sensor settings:** To be defined. • **Execution:** To be defined.		

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90-65-05/420 Extra-low voltage occupancy detectors

- **Manufacturer:** To be defined.
- **Equipment interconnectivity:** To be defined.
- **Format:** To be defined.
- **Occupancy sensitivity:** To be defined.
- **Range:** To be defined.
- **Field of view:** To be defined.
- **Remote setup/ override:** To be defined.
- **Mounting:** To be defined.
- **Ingress protection (minimum):** To be defined.
- **Adjustable sensor settings:** To be defined.
- **Execution:** To be defined.

90-65-05/425 Mains voltage occupancy detectors

- **Manufacturer:** To be defined.
- **Format:** To be defined.
- **Inductive switching capacity:** To be defined.
- **Occupancy sensitivity:** To be defined.
- **Range:** To be defined.
- **Field of view:** To be defined.
- **Switching delay:** To be defined.
- **Remote setup/ override:** To be defined.
- **Mounting:** To be defined.
- **Ingress protection (minimum):** To be defined.
- **Adjustable sensor settings:** To be defined.
- **Execution:** To be defined.

90-65-05/430 Photoelectric control units

Shared by: 70-80-25/120 Amenity lighting system; and 70-80-35/110 Hard wired general lighting system.

- **Manufacturer:** To be defined.
- **Standard:** To BS 5972.
- **Equipment interconnectivity:** To be defined.
- **Inductive switching capacity:** To be defined.
- **Switching settings:**
  - **Adjustable switching time delay:** To be defined.
  - **On lighting level:** To be defined.
  - **Off lighting level:** To be defined.
  - **Timed on:** To be defined.
  - **Timed off:** To be defined.
- **Remote setup/ override:** To be defined.

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• **Mounting:** To be defined. • **Ingress protection (minimum):** To be defined. • **Execution:** To be defined.		

90-65-25/380 Time switches
Shared by: 70-80-25/120 Amenity lighting system; 70-80-35/110 Hard wired general lighting system; and 75-75-50/190 Gas fired heating system control strategy.
• **Manufacturer:** To be defined.
• **Standards:** To BS EN 60730-1 and BS EN 60730-2-7.
• **Third party certification:** To be defined.
• **Equipment interconnectivity:** To be defined.
• **Format:** To be defined.
• **Display:** To be defined.
• **Programme capability:** To be defined.
• **Number of switching channels:** To be defined.
• **Inductive switching capacity:** To be defined.
• **Cable termination capacity:** To be defined.
• **Override facility:** To be defined.
• **GMT/BST daylight saving:** To be defined.
• **Enclosure:**
  – **Ingress protection (minimum):** To be defined.
  – **Material and construction:** To be defined.
• **Battery backup:** To be defined.
• **Execution:** To be defined.		

90-90-55/390 Equipment labels and warning notices
Shared by: 60-45-40/110 Low temperature hot water heating system; 70-70-25/110 Earthing and bonding system; 70-70-45/110 Low voltage distribution system; 70-70-75/110 Hard wired low voltage small power system; 70-80-25/120 Amenity lighting system; and 70-80-35/110 Hard wired general lighting system.
• **Manufacturer:** To be defined.
• **Material:** To be defined.
• **Label size:** To be defined.
• **Colour:**
  – **Background:** To be defined.
  – **Lettering:** To be defined.
• **Typography:**
  – **Font:** To be defined.
  – **Size:** To be defined.
• **Notice wording:** To be defined.		

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90-90-55/395 Electrical diagrams

Shared by: 70-70-25/110 Earthing and bonding system; 70-70-45/110 Low voltage distribution system; 70-70-75/110 Hard wired low voltage small power system; 70-80-25/120 Amenity lighting system; and 70-80-35/110 Hard wired general lighting system.

- **Material:** To be defined.
- **Format:** Single line engineering drawings to BS EN 61082-1.
- **Information to be included:** Supply characteristics.Maximum demand.Cable types and sizes.Switchgear ratings.Protective device types, ratings and function.
  Prospective fault current values at each item of switchgear.
  Earth fault loop impedance values at each item of switchgear.
  Circuits containing equipment vulnerable to testing.

Execution

70-80-35/630 Installing general lighting systems

- **Standard:** In accordance with BS 7671 and CIBSECommissioning Code L.
- **Commissioning method statement:** Submit prior to commissioning.
- **Luminaire layout:** Refer to tender drawings
- **Fixing master/ lighting distribution boxes:** To be defined.
- **Connection of luminaire supporting couplers:**
  - **General luminaires:** White plug with white cover.
  - **Flex length (maximum):** 3 m.
- **Switches and controls:**
  - **Location:** Refer to drawings
  - **Staircases:** Two-way switching at top and bottom landings with intermediate at full landings.
- **Rooms smaller than 4 m²:** Restrict lighting circuits to one electrical phase.

70-80-35/640 Installing emergency lighting systems

- **Standards:** In accordance with BS 5266-1 and BS 7671.
- **Connection of luminaire supporting couplers:**
  - **Emergency luminaires:** Red plug with red cover.
  - **Flex length (maximum):** 3 m.
- **Permanent electrical supplies to self-contained emergency luminaires:** Derive from the closest general lighting circuit.

70-80-35/660 Installing electrical low mounted way-guidance lighting systems

- **Standards:** In accordance with BS 5266-1 and BS 5266-2.
- **Position:** Refer to tender drawings

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System completion

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

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

70-80-35/812 Testing and commissioning emergency lighting systems

- **Commissioning:** In accordance with BS 5266-1, Annex H and In accordance with BS 5266-1, Annex I.
- **Results:** Submit two copies of emergency lighting completion certificates, in accordance with BS 5266-1, Annex H, Figures H.1, H.2, H.3, and H.4 and Submit two copies of an emergency lighting completion certificate, in accordance with BS 5266-1, Annex I, Figures I.1 and I.2.
- **Certificates of calibration for meters and instruments:** Submit.

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

- **Operating and maintenance instructions:**
  - **Scope:** Submit for the system giving optimum settings for controls.
  - **Product information:** Include product description, date of purchase, performance characteristics, application (suitability for use), method of operation and control, and cleaning and maintenance requirements.
  - **Format:** Paper copy.
  - **Number of copies:** Two.
- **Record drawings:**
  - **Content:** General arrangement drawings showing the location of luminaires, lighting circuit distribution boxes, master and slave distribution boxes, switch modules, manual and automatic switches and controls including timeswitches, passive infrared detectors, and daylight sensors and Schematic diagram showing all final circuit cabling, the cable origin, device addresses for automated controls, route from controls to luminaires, and the location of all joints and tees. Include conductor material and c.s.a., insulation type and colour, number of cores per cable, number of cables in ducts, on tray or ladder.
  - **Format:** Electronic drawing.
  - **Number of copies:** One
- **Submittal date:** At handover

70-80-35/822 Documentation relating to emergency lighting

- **Operating and maintenance instructions:**
  - **Scope:** Submit for the system giving optimum settings for controls.
  - **Product information:** Include product description, date of purchase, performance characteristics, application (suitability for use), method of operation and control, and cleaning and maintenance requirements.
  - **Format:** Paper copy.
  - **Number of copies:** Two.

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• **Record drawings:** – **Content:** General arrangement drawings showing the location of emergency luminaires, lighting circuit distribution boxes, master and slave distribution boxes, switch modules, manual and automatic emergency lighting test panels and Schematic diagram showing all final circuit cabling, the cable origin, device addresses for automated controls, route from controls to luminaires, and the location of all joints and tees. Include conductor material and c.s.a., insulation type and colour, number of cores per cable, number of cables in ducts, on tray or ladder. – **Format:** Electronic drawing. – **Number of copies:** One • **Submittal date:** At handover. • **Certification for re-engineered luminaires:** Submit completed ICEL 1004 model test record certificate. • **Logbook:** Submit, including the following information: Date of commissioning of the system, including any certificate relating to alterations; Date of each periodic inspection and test; Date and brief details of each service, inspection or test carried out; Dates and brief details of any defects and of remedial action taken; Date and brief details of any alteration to the emergency lighting installation; If any automatic testing device is employed, a description of the main characteristic and the mode of operation; Details of replacement components of luminaires such as lamp type, battery and fuses.		
Ω End of system		

75-45-20/110 Data distribution system

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System outline

75-45-20/110 Data distribution system

- **Description:** Refer to tender drawings for detail. The central server rack will be located within the first floor store at the rear of the council chamber. The following is required for the IT/Data system, the contractor must obtain the services of a specialist data proffessional to supply, install and commsion the IT/Data system, the items required for a complete data system including (this list is not comprehensive - refer to specialist contact details below)
  1) 42U floor standing 19" Data cabinet with glass doors
  2) Rack cooling
  3) Suitably sized PSU
  4) 5No 24 port data switches
  5) CCTV image storage
  6) Telecomms switch for 10 lines + redcare link
  7) 4Tb data storage
  8) UPS for 30 minute network support

  Contact details:
  Matrix Communications Ltd
  Matrix House, 9a Chapel Hill,
  Halstead, Essex, CO9 1JJ
  Telephone: 0203 137 4218
  Email: enquiries@matrix-communications.com
- **System performance:** 75-45-20/210 Design of data distribution systems and 75-45-20/260 Connections with other systems.
- **Applications:** CSMA/ CD 100Base-TX (ISO/IEC/IEEE 8802-3 u fast ethernet) and PoE (ISO/IEC/IEEE 8802-3 at Power over Ethernet).
- **Cabling hierarchy:**
  - **Campus distributors (CD):** 90-70-25/320 Balanced twisted-pair cabling patch panels.
  - **Campus backbone cabling:** To be defined.
  - **Building distributors (BD):** 90-70-25/320 Balanced twisted-pair cabling patch panels.
  - **Building backbone cabling:** 90-55-15/405 Balanced twisted-pair cables.
  - **Floor distributors (FD):** 90-70-25/320 Balanced twisted-pair cabling patch panels.
  - **Horizontal cabling:** 90-55-15/405 Balanced twisted-pair cables.
  - **Consolidation points (CP):** 90-70-25/320 Balanced twisted-pair cabling patch panels.
  - **Consolidation point cabling:** 90-55-15/440 Work area and patch cord cables.
  - **Telecommunications outlets (TO):** 90-60-25/455 Balanced twisted-pair cable outlet plates.
  - **Work area cabling:** 90-55-15/440 Work area and patch cord cables.
- **Containment:** 90-55-10/325 Cable baskets and 90-55-10/380 Rigid conduit.
- **Containment accessories:** To be defined.
- **Rewireable installation:** Required.

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- **Concealed installation:** Required.
- **System accessories:** To be defined.
- **Execution:** 75-45-20/650 Installing cabinets.
- **System completion:** 75-45-20/810 Testing and inspection of data distribution systems; 75-45-20/820 Documentation for data distribution systems; 75-45-20/830 Spares and consumables; and 75-45-20/850 System manufacturer's warranty.

System performance

75-45-20/210 Design of data distribution systems

- **Design:** Complete the design of the data distribution system.
- **Standards:** To BS EN 50173-1; To BS EN 50173-2; To BS EN 50173-3; To BS EN 50173-4; To BS EN 50173-5; and To BS EN 50173-6.
- **Cabling topology:**
  - **Campus backbone:** To be defined.
  - **Building backbone cabling:** To be defined.
  - **Horizontal cabling:** To be defined.
- **Requirement:** Submit proposals including detailed design drawings indicating cabinet general arrangement, cabling topology schematics, distribution point layouts, equipment room layout, interconnection diagrams and work area layout drawings. Include technical information, calculations and manufacturers' literature.

75-45-20/260 Connections with other systems

- **Requirements:** Access control, CCTV camera and data storage, security systems

Products

90-55-10/325 Cable baskets

Shared by: 70-70-45/110 Low voltage distribution system; 70-70-75/110 Hard wired low voltage small power system; 70-80-35/110 Hard wired general lighting system; 75-45-20/110 Data distribution system; 75-60-05/110 Electronic access control system; 75-60-10/110 CCTV system; 75-60-40/110 Intrusion and hold-up alarm system; and 75-65-30/110 Fire detection and alarm systems in non-domestic premises.

- **Manufacturer:** To be defined.
- **Standard:** To BS EN 61537.
- **Material:** To be defined.
- **Coating material:** To be defined.
- **Sizes:**
  - **Width:** To be defined.

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- **Side height:** To be defined. • **Features:** - **Segregation:** To be defined. - **Protective cover:** To be defined. • **Execution:** To be defined.		
90-55-10/380 Rigid conduit **Shared by:** 70-70-45/110 Low voltage distribution system; 70-70-75/110 Hard wired low voltage small power system; 70-80-25/120 Amenity lighting system; 70-80-35/110 Hard wired general lighting system; and 75-45-20/110 Data distribution system. • **Manufacturer:** To be defined. • **Standards:** To BS EN 61386-1 and BS EN 61386-21. • **Mechanical properties:** - **Resistance to compression:** To be defined. - **Resistance to impact:** To be defined. • **Transport, installation and application:** - **Lower temperature (minimum):** To be defined. - **Upper temperature (maximum):** To be defined. • **Resistance to bending:** Rigid. • **Electrical characteristics:** To be defined. • **Resistance to external influences:** - **Protection against ingress of solid objects (minimum):** To BS EN 60529, IP3X. - **Protection against ingress of water (minimum):** To BS EN 60529, IPX0. • **Resistance to corrosion:** To be defined. • **Tensile strength:** To be defined. • **Resistance to flame propagation:** To be defined. • **Suspended load capacity:** To be defined. • **Colour:** To be defined. • **Sizes (OD):** To be defined. • **Execution:** To be defined.		
90-55-15/405 Balanced twisted-pair cables **Shared by:** 75-45-20/110 Data distribution system; 75-60-05/110 Electronic access control system; and 75-60-10/110 CCTV system. • **Manufacturer:** To be defined. • **Standard:** To be defined. • **Third party certification:** To be defined. • **Category:** To be defined. • **Cable type:** To be defined. • **Number of pairs:** To be defined. • **Size:** To be defined. • **Sheath:** - **Type:** To be defined.		

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– **Colour:** To be defined.		
• **Reaction to fire class:**		
– **Fire behaviour:** To be defined.		
– **Additional classification for smoke production:** To be defined.		
– **Additional classification for flaming droplets and/ or particles:** To be defined.		
– **Additional classification for acidity:** To be defined.		
• **Execution:** To be defined.		
90-55-15/440 Work area and patch cord cables		
• **Manufacturer:** To be defined.		
• **Standard:** To be defined.		
• **Third party certification:** To be defined.		
• **Category:** To be defined.		
• **Impedance:** 100 ohm.		
• **Cable type:** To be defined.		
• **Number of pairs:** 4.		
• **Conductors:**		
– **Type:** To be defined.		
– **Size:** To be defined.		
• **Sheath:**		
– **Material:** To be defined.		
– **Colour:** To be defined.		
• **Reaction to fire class:**		
– **Fire behaviour:** To be defined.		
– **Additional classification for smoke production:** To be defined.		
– **Additional classification for flaming droplets and/ or particles:** To be defined.		
– **Additional classification for acidity:** To be defined.		
• **Length:** To be defined.		
• **Connecting hardware:** Factory fitted, insulation displacement connection (IDC).		
• **Loom:** To be defined.		
90-60-25/455 Balanced twisted-pair cable outlet plates		
• **Manufacturer:** To be defined.		
• **Standard:** To be defined.		
• **Category:** To be defined.		
• **Screening:** To be defined.		
• **Outlet arrangement:** To be defined.		
• **Outlet ports:** To be defined.		
• **Spring loaded shutter:** Required.		
• **Circuit designation label with transparent cover:** Required.		
• **Cable termination:** Insulation displacement connection (IDC).		
• **Plate:**		

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– **Material:** To be defined. – **Finish:** To be defined. • **Execution:** To be defined.		
90-70-25/320 Balanced twisted-pair cabling patch panels • **Manufacturer:** To be defined. • **Standard:** To be defined. • **Arrangement:** To be defined. • **Adaptor plates:** To be defined. • **Height:** To be defined. • **Ports with RJ-45 outlets:** To be defined. • **Category:** To be defined. • **Cable connections:** – **Front:** RJ-45. – **Rear:** Insulation displacement connection (IDC). – **Pin assignment:** To be defined. • **Outlet labelling:** – **Front:** Engraved port number with circuit description and transparent cover. – **Rear:** Engraved port number.		
Execution **75-45-20/650 Installing cabinets** • **Cable termination sequence:** Left to right and bottom to top. • **Clear access (minimum):** – **Cabinet front:** 1.2 m. – **Cabinet rear:** Withdrawable cabinet (on rollers) – **Cabinet sides:** To be defined. • **Fixing:** Level and secure to floor or wall. Group wall-mounted cabinets into logical arrangements. • **Cable route:** Do not exceed 24 cables in any loom. Maximum distance between cable supports: 300 mm. • **Patch panels:** Install any fibre optic patch panels at top of cabinet with copper patch panels below. • **Interconnecting cabinets:** Connect without side panels with manufacturer's baying kit. • **Cabinet identification:** – **Type:** Face engraved rigid plastic laminate. – **Colour:** **Background:** White. **Lettering:** Black. – **Typography:** **Font:** To be defined.		

Size: To be defined.

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System completion

75-45-20/810 Testing and inspection of data distribution systems

- **Standards:** To BS EN 50346.
- **Testing and inspection agent:** Contractor's choice.
- **Notice before commencing tests (minimum):** 24 h.
- **Inspection of cabling:** Inspect cables for kinks, bends, snags and compression and deformation damage.
- **Permanent link:** Measure length of each cabling segment (connector to connector).
- **Pin assignment and continuity:** Verify and submit results.
- **Cable temperature during testing:** Submit.
- **Results:** Submit in accordance with BS EN 50346, Annex A.
- **Certificates of calibration for meters and instruments:** Submit.

75-45-20/820 Documentation for data distribution systems

- **Standard:** To BS EN 50174-1.
- **Operating and maintenance instructions:**
  - **Scope:** Submit for the system giving optimum settings for controls.
  - **Product information:** Include product description, date of purchase, performance characteristics, application (suitability for use), method of operation and control, and cleaning and maintenance requirements.
  - **Format:** Paper copy.
  - **Number of copies:** Two.
- **Record drawings:**
  - **Content:** General arrangement drawings. Cabling topology schematics. Distribution point layout drawings.
  - **Format:** Electronic drawing.
  - **Number of copies:** One
- **Submittal date:** At handover.
- **Cabling topology schematics:**
  - **Location:** To be defined.
  - **Format:** Laminated A1 size paper print.
  - **Installation:** Wall mounted with cup and screw fixings.

75-45-20/830 Spares and consumables

- **Cable terminations:** To be defined.
- **Telecommunication outlets:** To be defined.
- **IDC punch down tool:** To be defined.
- **Patch cord loom spares:**
  - **Type:** To be defined.

- **Quantity:** To be defined.

- **Cabinet keys:** To be defined.

75-45-20/850 System manufacturer's warranty

- **Performance warranty:** Required.
- **Warrant operation with the following applications:** CSMA/ CD 100Base-TX (fast ethernet) and Future applications approved by ISO as being compatible with the installed system.
- **Warranty period (minimum):** Manufacturer specification

Ω End of system

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75-45-40/110 Audio-frequency-induction-loop system

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System outline

75-45-40/110 Audio-frequency-induction-loop system

- **Description:** Induction loop systems are required within the reception area, meeting rooms and main hall, the contractor must supply, install and commission all required equipment for a complete Induction Loop/Hearing loop system including amplifiers, cabling, audio leads, fixed and portable microphones, cable clips, radio microphone and receiver system, microphone to loop connection cable and a loop listener/test to set up and periodically test the induction loop system and any other item required to install a complete working system within the rooms/areas mentioned.
- **System performance:** 75-45-40/210 Design of induction loop systems
- **System manufacturer:** As C-TEC or equivalent and approved
- **Source equipment:** 90-70-10/340 Microphones.
- **Distribution equipment:** As specified by specialist supplier
- **Equipment interconnectivity:** Wired.
- **Loop cabling:**
  - **Loop arrangement:** Dependant on room requirements
  - **Cable type:** To be defined.
  - **Containment:** To be defined.
  - **Rewireable installation:** Required.
  - **Concealed installation:** Required.
- **System accessories:** To be defined.
- **Execution:** 75-45-40/630 Installing induction-loop systems generally.
- **System completion:** 75-45-40/810 Testing and commissioning induction-loop systems generally;
  75-45-40/815 Equipment labelling and system diagrams;
  75-45-40/820 Documentation;
  75-45-40/850 Verification certificate;
  and 75-45-40/860 Acceptance certificate.

System performance

75-45-40/210 Design of induction loop systems

- **Design:** Complete the design of the induction-loop system.
- **Qualifications of designer:** To be defined.
- **Standard:** In accordance with BS 7594, class A2;
  In accordance with BS 7594, class A3;
  and In accordance with BS 7594, class A4.
- **Variations:** To be defined.

- **Requirement:** Submit proposals including detailed design drawings, technical information including location, type and size of loop cable, calculations and manufacturers' literature.
- **System design certificate:** Submit with design proposals.

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Products

90-70-10/340 Microphones

Shared by: 75-45-40/110 Audio-frequency-induction-loop system; and 75-45-60/110 Sound system.

- **Manufacturer:** To be defined.
- **Standard:** To BS EN 60268-4.
- **Element:** To be defined.
- **Frequency response:** To be defined.
- **Polar pattern:** To be defined.
- **Sensitivity (open circuit):** To be defined.
- **Impedance (maximum):** 600 ohm.
- **Controls:** To be defined.
- **Cable connector:** XLR male connection.
- **Accessories:** To be defined.
- **Mounting:** To be defined.

Execution

75-45-40/630 Installing induction-loop systems generally

- **Installation:** In accordance with BS 7594 and BS 7671.
- **Equipment interconnectivity:** All components of the induction loop system to be derived from the same electrical phase.

System completion

75-45-40/810 Testing and commissioning induction-loop systems generally

- **Standard:** In accordance with BS 7594.
- **System commissioning agent:** System manufacturer.
- **Notice before commencing tests (minimum):** 1 week
- **System commissioning:**
  - **Magnetic field strength:** Measure.
  - **Speech transmission index value (minimum):** Measure in accordance with BS EN 60268-16.
- **Cable testing:** Measure the insulation resistance between conductors, between each conductor and earth, and between each conductor and any screen. Measure the continuity of loop cable, and earth continuity.
- **Loop circuit:** Measure the d.c. resistance.

- **Test results:** Submit at handover.

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75-45-40/815 Equipment labelling and system diagrams

- **Equipment rack:** Label with a unique identification code.
- **Final amplifiers:** Label with induction-loop identification information.
- **System diagram:**
  - **Include the following:** Show the location and identity of system equipment and routes.
  - **Position:** Next to the final amplifier.

75-45-40/820 Documentation

- **Operating and maintenance instructions:**
  - **Scope:** Submit for the system giving optimum settings for controls.
  - **Product information:** Include product description, date of purchase, performance characteristics, application (suitability for use), method of operation and control, and cleaning and maintenance requirements.
  - **Format:** Paper copy.
  - **Number of copies:** Two.
- **Log book:** Submit one copy in accordance with BS 7594, Section 6, clause 27.
- **Record drawings:**
  - **Content:** General arrangement drawings showing the location of distribution equipment including equalizers, induction loop amplifiers or induction loop transformers, the type, c.s.a. and route of all induction loop cables, the position of induction loop pads, microphones and reassurance indicators or visual alarm signal devices.
  - **Format:** Electronic drawing.
  - **Number of copies:** One
- **Submittal date:** At handover.
- **Certification:**
  - **Design certificate:** Submit two copies in accordance with BS 7594, Annex D.1.
  - **Installation certificate:** Submit two copies in accordance with BS 7594, Annex D.2.
  - **Commissioning certificate:** Submit two copies in accordance with BS 7594, Annex D.3.

75-45-40/850 Verification certificate

- **System verification agent:** Submit proposals.
- **Verification certificate:** Submit two copies in accordance with BS 7594, Annex D.5.

75-45-40/860 Acceptance certificate

- **Acceptance certificate:** Submit two copies in accordance with BS 7594, Annex D.4.

Ω End of system

75-45-60/110 Sound system

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System outline

75-45-60/110 Sound system

- **Description:** The main Hall requires a sound system, the contractor must enlist the services of a specialist audio services company in connection with the required public addess system. The contractor must contact the following Company:
  Rob Alvis - Sales Director
  Creative Audio-Visual Solutions Ltd
  Brookmans Park Teleport
  Great North Road, Brookmans Park
  Hertfordshire, AL9 6NE
  Tel: 0844 5678 065
  Mob: 07968 403055
  Email: rob@cavsolutions.co.uk
- **System performance:** 75-45-60/210 Design of sound systems.
- **System manufacturer:** To be advised by specialist supplier/installer
- **Environment:** Indoors.
- **Source equipment:** 90-70-10/340 Microphones and 90-70-10/415 External source input points.
- **Equipment interconnectivity:** Wired.
- **Cable type:** 90-55-15/410 Coaxial cables;
  90-55-15/436 Speaker cables;
  and 90-55-15/430 Microphone cables.
- **Containment:** To be defined.
- **Containment accessories:** To be defined.
- **Spare containment:** Required.
- **Rewirable installation:** Required.
- **Concealed installation:** Required.
- **Outlets:** 90-70-10/435 Loudspeakers.
- **Controls:** 90-70-10/425 Local volume controls and 90-70-10/360 Mixer amplifiers.
- **System accessories:** 90-70-25/340 Audio visual equipment racks.
- **Execution:** 75-45-60/620 Installation of sound systems generally.
- **System completion:** 75-45-60/810 Testing and commissioning sound systems and 75-45-60/820 Documentation.

System performance

75-45-60/210 Design of sound systems

- **Design:** Complete the design of the public address system.
- **Standard:** In accordance with BS 6259, type S2.

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• **System designer:** Creative Audio-Visual Solutions Ltd • **Signal transmission:** TBA • **System frequency response:** To be defined. • **Speech:background noise ratio (minimum):** To be defined. • **Sound pressure level (peak):** To be defined. • **Speech transmission index value (minimum):** To be defined. • **Zoning:** To be defined. • **Volume restoration:** Required during paging. • **Signal priorities:** Priority – Local microphone/ external source input point. • **Requirement:** Submit proposals including detailed design drawings, technical information indicating correct matching to ensure selected equipment works together satisfactorily, calculations and manufacturers' literature. • **Spare capacity (minimum):** 20%		

Products

90-55-15/410 Coaxial cables

- **Manufacturer:** To be defined.
- **Standards:** To be defined.
- **Third party certification:** To be defined.
- **Conductor:**
  - **Sheath colour:** To be defined.
  - **Nominal impedance:** 75 ohm.
- **Reaction to fire class:**
  - **Fire behaviour:** To be defined.
  - **Additional classification for smoke production:** To be defined.
  - **Additional classification for flaming droplets and/ or particles:** To be defined.
  - **Additional classification for acidity:** To be defined.
- **Execution:** To be defined.

90-55-15/430 Microphone cables

- **Manufacturer:** To be defined.
- **Cable type:** To be defined.
- **Conductor:**
  - **Material:** Copper.
  - **Size:** To be defined.
- **Length:** To be defined.
- **Connectors:**
  - **Standard:** To BS EN 60268-12.
  - **Type:** To be defined.
- **Reaction to fire class:**
  - **Fire behaviour:** To be defined.

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– **Additional classification for smoke production:** To be defined. – **Additional classification for flaming droplets and/ or particles:** To be defined. – **Additional classification for acidity:** To be defined. • **Execution:** To be defined.		
90-55-15/436 Speaker cables • **Manufacturer:** To be defined. • **Cable type:** To be defined. • **Conductor:** – **Material:** Oxygen-free copper. – **Cross-sectional area:** To be defined. • **Connector type:** To be defined. • **Sheath:** – **Material:** To be defined. – **Colour:** To be defined. • **Reaction to fire class:** – **Fire behaviour:** To be defined. – **Additional classification for smoke production:** To be defined. – **Additional classification for flaming droplets and/ or particles:** To be defined. – **Additional classification for acidity:** To be defined. • **Execution:** To be defined.		
90-70-10/340 Microphones **Shared by:** 75-45-40/110 Audio-frequency-induction-loop system; and 75-45-60/110 Sound system. • **Manufacturer:** To be defined. • **Standard:** To BS EN 60268-4. • **Element:** To be defined. • **Frequency response:** To be defined. • **Polar pattern:** To be defined. • **Sensitivity (open circuit):** To be defined. • **Impedance (maximum):** 600 ohm. • **Controls:** To be defined. • **Cable connector:** XLR male connection. • **Accessories:** To be defined. • **Mounting:** To be defined.		
90-70-10/360 Mixer amplifiers • **Manufacturer:** To be defined. • **Channels:** To be defined. • **Inputs:** – **Line:** To be defined. – **Microphone:** To be defined.		

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• **Input socket type:** To be defined. • **Number of zones:** To be defined. • **Phantom power:** To be defined. • **Remote music mute:** Required. • **Rated power output (per channel rms):** To be defined. • **Signal to noise ratio (minimum):** 105 dB. • **Loudspeaker output impedance:** To be defined. • **Channel separation (minimum):** To be defined. • **Frequency response at rated power output:** To be defined. • **Soft start:** Required. • **Ventilation:** Integral variable speed fan. • **Mounting:** Rack mounted.		

90-70-10/415 External source input points
• **Manufacturer:** To be defined.
• **Input socket type:** To be defined.
• **Key operated on/ off control:** Required.
• **Enclosure:**
  – **Ingress protection (minimum):** To be defined.
  – **Mounting:** To be defined.
  – **Faceplate finish:** Match electrical accessories.
• **Integral volume control:** Required.		

90-70-10/425 Local volume controls
• **Manufacturer:** To be defined.
• **Volume control:** To be defined.
• **Override circuit:** Required.
• **Key operated control:** Required.
• **Enclosure:**
  – **Ingress protection (minimum):** To be defined.
  – **Mounting:** To be defined.
  – **Faceplate finish:** Match electrical accessories.
• **Execution:** To be defined.		

90-70-10/435 Loudspeakers • **Manufacturer:** To be defined. • **Standard:** To BS EN 60268-5. • **Frequency response:** To be defined. • **Sensitivity:** To be defined. • **Rated impedance:** To be defined. • **Power handling (continuous):** To be defined. • **Dispersion:** To be defined.		

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• **Enclosure:**
  – **Format:** To be defined.
  – **Ingress protection (minimum):** To be defined.
  – **Material:** To be defined.
  – **Finish:** To be defined.
  – **Protective grille:** To be defined.
• **Transformer tappings:** To be defined.
• **Features:** To be defined.
• **Cable connections:**
  – **Type:** To be defined.
  – **Capacity:** 6 mm².
• **Execution:** To be defined.		

90-70-25/340 Audio visual equipment racks
• **Manufacturer:** To be defined.
• **Format:** To accept 19 inch racking with front and rear adjustable rails.
• **Rack height:** To be defined.
• **Enclosure:**
  – **Mounting:** To be defined.
  – **Material:** To be defined.
  – **Finish:** To be defined.
  – **Handles:** To be defined.
  – **Side panels:** Removable.
  – **Locking castor wheels:** To be defined.
  – **Door:** To be defined.
• **Ventilation:** To be defined.
• **Power:**
  – **Supply:** Integral.
  – **1 U mounted rack power modules:** To be defined.
• **Lighting:** To be defined.
• **Spare U sections:** Provide individual blanking plates.
• **Execution:** To be defined.		

Execution		
75-45-60/620 Installation of sound systems generally • **Installation:** In accordance with BS 6259 and BS 7671. • **Loudspeaker zones:** As defined by specialist • **Equipment interconnectivity:** All components of the sound system to be derived from the same electrical phase.		

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System completion

75-45-60/810 Testing and commissioning sound systems

- **Standard:** In accordance with BS 6259.
- **System commissioning agent:** Creative Audio-Visual Solutions Ltd
- **Notice before commencing tests (minimum):** To be defined.
- **Cable testing:** Measure the insulation resistance between conductors, between each conductor and earth, and between each conductor and any screen.
- **Acoustic testing:**
  - **Location:** To be defined.
  - **Sound pressure levels:** Tabulate and submit results. Compare with design values.
  - **Speech transmission index value (minimum):** Measure in accordance with BS EN 60268-16, Annex B.
- **System re-commissioning:**
  - **Re-commissioning:** To be defined.
  - **Timing:** To be defined.

75-45-60/820 Documentation

- **Operating and maintenance instructions:**
  - **Scope:** Submit for the system giving optimum settings for controls.
  - **Product information:** Include product description, date of purchase, performance characteristics, application (suitability for use), method of operation and control, and cleaning and maintenance requirements.
  - **Format:** Paper copy.
  - **Number of copies:** Two
- **Log book:** Submit one copy in accordance with BS 6259, Section 4, clause 10.5.
- **Record drawings:**
  - **Content:** General arrangement drawings showing the location of all sound equipment, the position of all microphones, loudspeakers and inputs, and the type, c.s.a. and route of all cables.
  - **Format:** Electronic
  - **Number of copies:** One
- **Submittal date:** At handover.
- **Certification:**
  - **Design certificate:** Submit two copies in accordance with BS 6259, Annex F.1.
  - **Installation certificate:** Submit two copies in accordance with BS 6259, Annex F.2.
  - **Commissioning certificate:** Submit two copies in accordance with BS 6259, Annex F.3.

Ω End of system

75-45-85/110 Telecommunications system

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System outline

75-45-85/110 Telecommunications system

- **Description:** A high speed broadband connection is required for the use of the building, this will be supplied, installed and tested by Openreach. The containment infrastructure must be installed in preparation for the Openreach services, a 90mm diamtere grey PVC duct to BT specifications must be run from the building boundary to the server room complete with draw wire. STAKKAbox is the only modular access chamber approved for use on BT's cable network.
- **System performance:** 75-45-85/210 Design of telecommunications systems;
  75-45-85/235 Capacity of system;
  and 75-45-85/260 Interconnections with other systems.
- **System manufacturer:** Openreach
- **Type of system:** Fibre-optic
- **Method of operation:** Digital.
- **Control software:** To be defined.
- **System components:** To be defined.
- **Cable type:** FO
- **Containment:** To be defined.
- **Containment accessories:** To be defined.
- **Concealed installation:** Required.
- **Rewireable installation:** Required.
- **System accessories:** To be defined.
- **Execution:** To be defined.
- **System completion:** 75-45-85/810 Testing and inspection of telecommunications systems.

System performance

75-45-85/210 Design of telecommunications systems

- **Design:** Complete the design of the telecommunications system.
- **Standards:** To BS 6701 and BS EN 50174-1.
- **Functional requirements:**
  - **Call handling:** To be defined.
  - **Additional features:** To be defined.
- **Cabling topology:**
  - **Backbone cabling:** Star.
  - **Horizontal cabling:** Star.
- **Requirement:** Submit proposals including cabinet general arrangement drawings, cabling topology schematics, distribution point layout drawing, equipment room layout drawings,

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interconnection diagrams and work area layout drawings, technical information, calculations and manufacturers' literature.		

75-45-85/235 Capacity of system

- **External exchange lines:**
  - **Number available:** To be defined.
  - **Number connected:** To be defined.
- **External private lines:**
  - **Number available:** To be defined.
  - **Number connected:** To be defined.
- **Internal extensions:**
  - **Number available:** To be defined.
  - **Number connected:** To be defined.

75-45-85/260 Interconnections with other systems

- **Systems to interconnect:** General telecomms, life safety services Redcare link, Lift failure call
- **Requirements:** To be defined.

System completion

75-45-85/810 Testing and inspection of telecommunications systems

- **Standard:** To BS EN 50346.
- **Testing and inspection agent:** Openreach
- **Notice before commencing tests (minimum):** To be defined.
- **Inspection of cabling:** Inspect cables for kinks, bends, snags and compression and deformation damage.
- **Permanent link:** Measure length of each cabling segment (connector to connector).
- **Pin assignment and continuity:** Verify and submit results.
- **Cable temperature during testing:** Submit.
- **Results:** Submit in accordance with BS EN 50346, Annex A.
- **Certificates of calibration for meters and instruments:** Submit.

Ω End of system

75-60-05/110 Electronic access control system

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System outline

75-60-05/110 Electronic access control system

- **Description:** The contractor must enlist the services of Salto Systems for the access control system, contact details:
  SALTO Systems UK, South
  Unit 1 The Court
  Holywell Business Park
  Northfield Road
  Southam
  Warwickshire - CV 47 OFG
  NEW Tel.: +44 01926 811979
  NEW Fax: +44 01926 814783
  E-mail: info.uk@saltosystems.com
  http://www.saltosystems.com/en-uk

  The front entrance door requires an intercom station located externally, to the left of the door at wheel chair height for DDA requirements and at standing height. Both stations must have a call request push button, a camera, a microphone, a speaker and a key fob scanner. The external intercom stations must be linked to an internal intercom station in the reception office on the ground floor and another within the Council Chamber on the first floor. Both internal stations must have a video screen for visual identification, microphone and speaker for audible communication and a push button to release the door. The station located in the first floor Council Chamber must have a key switch operated lock out facility to isolate the station without compromising the ground floor reception station. In addition to this the building will require a total lock release facility to release the door for a set period of time as well as an active repository/slot box that would acknowledge the insertion of a fob/card and would send a signal to the 24 hour offsite monitoring station for them to activate the security alarm.
- **System performance:** 75-60-05/210 Design of electronic access control systems;
  75-60-05/228 Standby power supplies;
  75-60-05/230 Connection to fire detection and alarm systems;
  and 75-60-05/240 Integration with other alarm and security systems.
- **System supplier:** Salto Systems
- **Registration:** To be defined.
- **System type:** Open non-proprietary platform.
- **Equipment interconnectivity:** Wired.
- **Control software:** Resident on site PC.
- **Method of authorization:** TBC
- **Readers:** 90-75-05/365 Keypads;
  90-75-05/360 Proximity readers;
  and 90-75-05/350 Swipe card readers.
- **Locking mechanisms:** 90-75-05/400 Electric strikes and faceplates and 90-75-05/410 Magnetic locks and strike plates.
- **Controls:** 90-75-05/430 Access control units and Servers.

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- **Door status monitoring:** 90-75-05/465 Door status monitoring devices.
- **Cable type:** 90-55-15/405 Balanced twisted-pair cables.
- **Containment:** 90-55-10/325 Cable baskets.
- **Containment accessories:** To be defined.
- **Rewireable installation:** Required.
- **Concealed installation:** Required.
- **System accessories:** To be defined.
- **Execution:** 75-60-05/620 Installing electronic access control systems.
- **System completion:** 75-60-05/810 Testing and commissioning electronic access control systems;
  75-60-05/820 Documentation;
  and 75-60-05/830 Spares and consumables.

System performance

75-60-05/210 Design of electronic access control systems

- **Design:** Complete the design of the electronic access control system.
- **Requirement:** Submit proposals including detailed design drawings, technical information, calculations and manufacturers' literature.
- **Standards:** BS EN 60839-11-1 and BS EN 60839-11-2.
- **Security grading:** As advised by specialist contractor
- **Environmental classification:** As advised by specialist contractor
- **Number of users (minimum):** 1000.
- **Number of transactions (minimum):** 500 per 24 hour.
- **Spare capacity:** Required.
- **Database:**
  - **Redundancy:** Required.
  - **Backup arrangements:** Automatic.
- **Operation in the event of mains failure:** Access points remain secure.
- **Anti-passback:** Logical.
- **Functional requirements:** Duress signalling.

75-60-05/228 Standby power supplies

- **Standby capacity (minimum):** Continue to operate in the event of a failure of the primary power source for a minimum period of two hours.

75-60-05/230 Connection to fire detection and alarm systems

- **Operation in the event of a fire signal:** Access points open.

75-60-05/240 Integration with other alarm and security systems

- **Objectives:** Interlocked
- **Systems to be integrated:** Closed circuit television systems;

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Fire detection and alarm systems; and Intruder detection and alarm systems.		

Products

90-55-10/325 Cable baskets

Shared by: 70-70-45/110 Low voltage distribution system; 70-70-75/110 Hard wired low voltage small power system; 70-80-35/110 Hard wired general lighting system; 75-45-20/110 Data distribution system; 75-60-05/110 Electronic access control system; 75-60-10/110 CCTV system; 75-60-40/110 Intrusion and hold-up alarm system; and 75-65-30/110 Fire detection and alarm systems in non-domestic premises.

- **Manufacturer:** To be defined.
- **Standard:** To BS EN 61537.
- **Material:** To be defined.
- **Coating material:** To be defined.
- **Sizes:**
  - **Width:** To be defined.
  - **Side height:** To be defined.
- **Features:**
  - **Segregation:** To be defined.
  - **Protective cover:** To be defined.
- **Execution:** To be defined.

90-55-15/405 Balanced twisted-pair cables

Shared by: 75-45-20/110 Data distribution system; 75-60-05/110 Electronic access control system; and 75-60-10/110 CCTV system.

- **Manufacturer:** To be defined.
- **Standard:** To be defined.
- **Third party certification:** To be defined.
- **Category:** To be defined.
- **Cable type:** To be defined.
- **Number of pairs:** To be defined.
- **Size:** To be defined.
- **Sheath:**
  - **Type:** To be defined.
  - **Colour:** To be defined.
- **Reaction to fire class:**
  - **Fire behaviour:** To be defined.
  - **Additional classification for smoke production:** To be defined.
  - **Additional classification for flaming droplets and/ or particles:** To be defined.
  - **Additional classification for acidity:** To be defined.
- **Execution:** To be defined.

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90-75-05/350 Swipe card readers

- **Manufacturer:** To be defined.
- **Security grading:** To be defined.
- **Environmental classification:** To be defined.
- **Materials and finishes:** To be defined.
- **Colour:** To be defined.
- **Type of operation:** To be defined.
- **Communications interface:** To be defined.
- **Credential Reader:** To be defined.
- **Read direction:** To be defined.
- **Integral keypad:** To be defined.
- **Remote door opening:** To be defined.
- **Visual indication:** Multi-coloured LED displaying red when access point status secure, green when unlocked.
- **Audio status indication:** Required.
- **Execution:** To be defined.

90-75-05/360 Proximity readers

- **Manufacturer:** To be defined.
- **Security grading:** To be defined.
- **Environmental classification:** To be defined.
- **Material and finish:** To be defined.
- **Colour:** To be defined.
- **Impact protection (minimum):** To be defined.
- **Relative humidity (non-condensing):** To be defined.
- **Type of operation:** To be defined.
- **Communication interface:** To be defined.
- **Number of users (minimum):** To be defined.
- **Operating frequency:** 125 kHz.
- **Proximity read range:** To be defined.
- **Integral keypad:** To be defined.
- **Remote door opening:** To be defined.
- **Mounting position:** To be defined.
- **Visual indication:** Multi-coloured LED displaying red when access point status secure, green when unlocked.
- **Audio status indication:** To be defined.
- **Accessories:** To be defined.
- **Execution:** To be defined.

90-75-05/365 Keypads

- **Manufacturer:** To be defined.

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• **Security grading:** To be defined. • **Environmental classification:** To be defined. • **Material and finish:** To be defined. • **Colour:** To be defined. • **Impact protection (minimum):** To be defined. • **Type of operation:** To be defined. • **Communication interface:** To be defined. • **Keypad arrangement:** To be defined. • **User codes:** To be defined. • **Key characteristics:** To be defined. • **Number of users (minimum):** To be defined. • **Remote door opening:** To be defined. • **Doorbell function:** To be defined. • **Mounting position:** To be defined. • **Visual indication:** Multi-coloured LED displaying red when access point status secure, green when unlocked. • **Audio status indication:** To be defined. • **Execution:** To be defined.		
90-75-05/400 Electric strikes and faceplates • **Manufacturer:** To be defined. • **Standards:** To be defined. • **Rated operational voltage (Ue):** To be defined. • **Operation in the event of mains failure:** To be defined. • **Holding force (minimum):** To be defined. • **Monitoring:** To be defined. • **Features:** To be defined. • **Ingress protection (minimum):** To be defined. • **Fire rating:** To be defined. • **Material and finish:** To be defined. • **Colour:** To be defined. • **Operating temperature range:** To be defined. • **Accessories:** To be defined. • **Execution:** To be defined.		
90-75-05/410 Magnetic locks and strike plates • **Manufacturer:** To be defined. • **Standard:** To BS EN 13637, when used on escape routes. • **Rated operational voltage (Ue):** To be defined. • **Operation in the event of mains failure:** To be defined. • **Holding force (minimum):** To be defined. • **Monitoring:** To be defined.		

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• **Features:** Anti-tamper. • **Material and finish:** Brushed aluminium. • **Colour:** To be defined. • **Instant release circuit:** Required. • **Operating temperature range:** To be defined. • **Execution:** To be defined.		

90-75-05/430 Access control units
• **Manufacturer:** To be defined.
• **Standards:** To BS EN 60839-11-1 and BS EN 60839-11-2.
• **Security grading:** To be defined.
• **Environmental classification:** To be defined.
• **Enclosure:**
  – **Material and finish:** To be defined.
  – **Colour:** To be defined.
• **Rated operational voltage (Ue):** To be defined.
• **Rated operational current (In):** To be defined.
• **Battery backup:**
  – **Battery location:** To be defined.
  – **Battery backup capacity:** To be defined.
• **Type of operation:** To be defined.
• **Number of doors per controller:** To be defined.
• **Number of users (minimum):** To be defined.
• **Communication interface:** To be defined.
• **Visual indication:** To be defined.
• **Interfaces:**
  – **Door lock relays:** To be defined.
  – **Door status monitoring:** To be defined.
  – **Readers:** To be defined.
  – **Volt free relays:** To be defined.
  – **Request to exit buttons:** To be defined.
• **Data encryption:** To be defined.
• **Random access memory (RAM) capacity (minimum):** To be defined.
• **Storage memory capacity:** To be defined.
• **Administration access:** Password protected.
• **Database:** To be defined.
• **Information fields per user:** To be defined.
• **Spare information fields per user (minimum):** To be defined.
• **Import and export of database in ASCII format:** To be defined.
• **Incorporation of external data:** To be defined.
• **Integral event memory capacity (minimum):** To be defined.		

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• **Monitor and record the following transactions and events:** To be defined.
• **Events and transactions:** Data and time stamp.
• **Customised event alarms:** Display.
• **Control features:**
  – **Include the following:** To be defined.
  – **Anti-passback:** To be defined.
  – **Time between credential presentation and door unlock (maximum):** 0.3 seconds.
• **Reports:**
  – **Transaction and event reports:** By access point.
  By area.
  By department.
  By time and date period.
  By transaction type.
  By user.
  – **Other reports:** Building occupancy.
  Staff time and attendance.
• **Publishing:** To be defined.
• **Accessories:** To be defined.
• **Execution:** To be defined.		

90-75-05/465 Door status monitoring devices

- **Security grading:** To be defined.
- **Environmental classification:** To be defined.
- **Device type:** Magnetic reed switch.
- **Material:** To be defined.
- **Mounting:** To be defined.

Execution

75-60-05/620 Installing electronic access control systems

- **Standards:** As advised by specialist contractor
- **Location of the access controller:** As advised by specialist contractor
- **Installing cabling:**
  - **Standard:** In accordance with BS 7671.
  - **Routes:** As advised by specialist contractor
  - **Security measures:** Suitably protect all cabling from inadvertent damage or tampering to avoid compromising the security of the system.

System completion

75-60-05/810 Testing and commissioning electronic access control systems

- **Standards:** To BS EN 60839-11-1 and BS EN 60839-11-2.

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• **System commissioning agent:** System manufacturer.
• **Notice before commencing tests (minimum):** 7 d.
• **System programming:** Configure access permissions.
• **Cable testing:**
  – **Insulation resistance:** Submit results.
  – **Earth continuity:** Submit results.
• **Access points:** Verify the correct operation of reader, across each access level. Check alignment of lock mechanism. Configure unlock times.
• **Standby supply:** Verify operation in the event of a mains failure. Check capacity and submit results. Verify operation of battery charger.
• **Equipment tamper detection:** Verify operation.		

75-60-05/820 Documentation
• **Standards:** To BS EN 60839-11-1 and BS EN 60839-11-2.
• **System communications:** Submit details of the communication network and any relevant protocols used.
• **Operating and maintenance instructions:**
  – **Scope:** Submit for the system, giving all configuration settings.
  – **Product information:** Include product description, date of purchase, performance characteristics, application (suitability for use), method of operation and control, and cleaning and maintenance requirements.
  – **Format:** Electronic Copy
  – **Number of copies:** One
• **Record drawings:**
  – **Content:** General arrangement drawings.
  – **Format:** Electronic drawing.
  – **Number of copies:** One
• **Submittal date:** At handover.		

75-60-05/830 Spares and consumables
• **Credentials to be supplied:** 100 of each type used.
• **Spares to be supplied:**
  – **Fuses:** 10 x internal access control unit fuses.
  – **Frangible elements:** 10 x emergency break glass elements.
  – **Printer ink cartridges:** To be defined.		

Ω End of system		

75-60-10/110 CCTV system

System outline

75-60-10/110 CCTV system

- **Description:** The contractor must enlist the services of Heronway Ltd for the CCTV system, contact details:
  Herongrange Ltd
  11 Cirrus Park Lower Farm Rd Moulton Park Northampton NN3 6UR Contact: John Powell - Account Manager
  Mobile: 07715 522307
  24hr tel: 01604 498830
- **System performance:** 75-60-10/210 Design of CCTV systems.
- **System manufacturer:** As advised by specialist contractor
- **Automatic activation of cameras:** As advised by specialist contractor
- **Surveillance equipment:** As advised by specialist contractor
- **Control equipment:** As advised by specialist contractor
- **Data storage:** 90-75-10/370 Digital video recorders.
- **Cable type:** 90-55-15/405 Balanced twisted-pair cables.
- **Containment:** 90-55-10/325 Cable baskets.
- **Containment accessories:** To be defined.
- **Rewireable installation:** Required.
- **Concealed installation:** Required.
- **System accessories:** 90-60-30/430 Surge protective devices for telecommunications and signalling networks.
- **Execution:** 75-60-10/620 Installing closed circuit television systems.
- **System completion:** 75-60-10/810 Closed circuit television system testing and commissioning;
  75-60-10/850 Training;
  75-60-10/820 Documentation;
  and 75-60-10/830 Spares and consumables.

System performance

75-60-10/210 Design of CCTV systems

- **Design:** Complete the design of the CCTV system.
- **Standards:** In accordance with BS 8418.
- **System type:** Digital.
- **Security grading:** To BS EN 62676-1-1, Grade 2.
- **Requirement:** Submit proposals, including positions of cameras (including field of view), detectors (including range and coverage), areas designated for parking, control rooms, power

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supplies and interconnections. Include technical information, calculations and manufacturers' literature.

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Products

90-55-10/325 Cable baskets

Shared by: 70-70-45/110 Low voltage distribution system; 70-70-75/110 Hard wired low voltage small power system; 70-80-35/110 Hard wired general lighting system; 75-45-20/110 Data distribution system; 75-60-05/110 Electronic access control system; 75-60-10/110 CCTV system; 75-60-40/110 Intrusion and hold-up alarm system; and 75-65-30/110 Fire detection and alarm systems in non-domestic premises.

- **Manufacturer:** To be defined.
- **Standard:** To BS EN 61537.
- **Material:** To be defined.
- **Coating material:** To be defined.
- **Sizes:**
  - **Width:** To be defined.
  - **Side height:** To be defined.
- **Features:**
  - **Segregation:** To be defined.
  - **Protective cover:** To be defined.
- **Execution:** To be defined.

90-55-15/405 Balanced twisted-pair cables

Shared by: 75-45-20/110 Data distribution system; 75-60-05/110 Electronic access control system; and 75-60-10/110 CCTV system.

- **Manufacturer:** To be defined.
- **Standard:** To be defined.
- **Third party certification:** To be defined.
- **Category:** To be defined.
- **Cable type:** To be defined.
- **Number of pairs:** To be defined.
- **Size:** To be defined.
- **Sheath:**
  - **Type:** To be defined.
  - **Colour:** To be defined.
- **Reaction to fire class:**
  - **Fire behaviour:** To be defined.
  - **Additional classification for smoke production:** To be defined.
  - **Additional classification for flaming droplets and/ or particles:** To be defined.
  - **Additional classification for acidity:** To be defined.
- **Execution:** To be defined.

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90-60-30/430 Surge protective devices for telecommunications and signalling networks

- **Manufacturer:** To be defined.
- **Standard:** To BS EN 61643-21.
- **Category:** To be defined.
- **Maximum continuous operating voltage (Uc):** To be defined.
- **Mode of protection:** To be defined.
- **Rated current:** To be defined.
- **Voltage protection level (Up):** To be defined.
- **Bandwidth:** To be defined.
- **Mounting method:** To be defined.
- **Execution:** To be defined.

90-75-10/370 Digital video recorders

- **Manufacturer:** To be defined.
- **Video system:** To be defined.
- **Video compression formats:** To be defined.
- **Bandwidth (minimum):** To be defined.
- **Recording speed and resolution:** To be defined.
- **Recording mode:** To be defined.
- **Digital watermarking:** Apply at point of recording and include time and date.
- **Playback function:** To be defined.
- **Video search function:** To be defined.
- **Video inputs:** To be defined.
- **Video outputs:** To be defined.
- **Audio inputs:** To be defined.
- **Audio outputs:** To be defined.
- **Alarms:** To be defined.
- **Screen display:**
  - **Window arrangement:** To be defined.
  - **Display the following information:** To be defined.
- **Display resolution (minimum):** To be defined.
- **Storage media:**
  - **Type:** Hard disk.
  - **Capacity:** To be defined.
- **Network connectivity:** 10/100 base T via RJ45.
- **Video backup:** To be defined.
- **Telemetry protocol:** To be defined.
- **Power supply:** 230 V a.c.
- **Mounting:** To be defined.
- **Execution:** To be defined.

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Execution

75-60-10/620 Installing closed circuit television systems

- **Standard:** In accordance with BS 8418.
- **Site survey:** Assess the site conditions and available artificial light.
- **Access:** Locate system to provide safe access for maintenance and testing.

System completion

75-60-10/810 Closed circuit television system testing and commissioning

- **Standard:** To BS EN 62676-4.
- **System commissioning agent:** Heronway Ltd
- **Notice before commencing tests (minimum):** 24h
- **Cable testing:**
  - **Insulation resistance:** Submit results.
  - **Earth continuity:** Submit results.
- **Camera coverage:** Adjust to obtain optimal performance with normal and infrared illumination.
- **Infrared illuminators:** Accurately adjust to suit angle of associated cameras.
- **Pan and tilt units:** Check accuracy of pre-set positions and demonstrate movement covers whole of relevant surveillance area.
- **Alarm and motion detection devices:** Verify the operation, and adjust to provide maximum coverage.
- **Image storage time:** Confirm.
- **Live and recorded images:** Demonstrate from each camera and provide digital copies for reference purposes.

75-60-10/820 Documentation

- **Standard:** In accordance with BS EN 62676-1-1.
- **Operating and maintenance instructions:**
  - **Scope:** Submit for the system giving optimum settings for controls.
  - **Product information:** Include product description, date of purchase, performance characteristics, application (suitability for use), method of operation and control, and cleaning and maintenance requirements.
  - **Format:** Paper copy.
  - **Number of copies:** Two
- **Secure recording area logbook:** Hard back cover embossed 'CCTV LOGBOOK' with A4 lined paper, minimum 100 pages.
- **Number of copies:** Two
- **Record drawings:**

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– **Content:** General arrangement drawings showing the location of all control equipment, including receivers, transmitters, recorders, cameras, monitors, and associated power supply. – **Format:** Electronic drawing. – **Number of copies:** One • **Submittal date:** At handover.		
75-60-10/830 Spares and consumables • **Supply the following spares:** To be defined. • **Supply the following consumables:** To be defined.		
75-60-10/850 Training • **Operator training:** – **Training provider:** Heronway Ltd – **Training period:** To be defined. – **Training content:** To be defined.		
Ω End of system		

75-60-40/110 Intrusion and hold-up alarm system

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System outline

75-60-40/110 Intrusion and hold-up alarm system

- **Description:** The contractor must enlist the services of Heronway Ltd for the Intrusion & Hold Up Alarm System, contact details:
  Herongrange Ltd
  11 Cirrus Park Lower Farm Rd Moulton Park Northampton NN3 6UR Contact: John Powell - Account Manager
  Mobile: 07715 522307
  24hr tel: 01604 498830
- **System performance:** 75-60-40/210 Design of intrusion and hold-up alarm systems;
  75-60-40/235 Connection to fire detection and alarm systems;
  75-60-40/236 Integration with CCTV systems;
  75-60-40/240 Continuous monitoring;
  and 75-60-40/238 Integration with other alarm and security systems.
- **System manufacturer:** Refer to specialist contractor
- **Control and indicating equipment (CIE):** 90-75-40/305 Intrusion and hold-up alarm panels and 90-75-40/310 Intrusion and hold-up alarm remote keypads.
- **Notification equipment:** 90-75-40/375 External warning devices and 90-75-40/380 Internal warning devices.
- **Detectors:** as advised by specialist contractor
- **Cable type:** 90-55-15/432 Multicore alarm cables.
- **Containment:** 90-55-10/325 Cable baskets.
- **Containment accessories:** To be defined.
- **Rewireable installation:** Required.
- **Concealed installation:** Required.
- **Execution:** 75-60-40/620 Installing intrusion and hold-up alarm systems.
- **System completion:** 75-60-40/810 Testing and commissioning intrusion and hold-up alarms systems;
  75-60-40/820 Documentation;
  75-60-40/830 Spares and consumables;
  and 75-60-40/840 Maintenance.

System performance

75-60-40/210 Design of intrusion and hold-up alarm systems

- **Design:** Complete the design of the intrusion and hold-up alarm system.
- **Standard:** In accordance with PD 6662.
- **Security grading:** To BS EN 50131-1, Grade 2.
- **Environmental classification:** To BS EN 50131-1, Class II.

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- **Power supply:** To BS EN 50131-1, Type A.
- **Confirmation of alarm condition:**
  - **Standard:** In accordance with BS 8243.
  - **Means of confirmation:** Audio.
- **Requirement:** Submit proposals In accordance with DD CLC/TS 50131-7, Annex G.

75-60-40/235 Connection to fire detection and alarm systems

- **Fire and fault signal:** Accept and relay to the alarm receiving centre.

75-60-40/236 Integration with CCTV systems

- **Integration:** In accordance with BS 8418.

75-60-40/238 Integration with other alarm and security systems

- **Objectives:** To be defined.
- **Systems to be integrated:** To be defined.

75-60-40/240 Continuous monitoring

- **Objective:** To be defined.
- **Continuous monitoring:** All plant room doors.

Products

90-55-10/325 Cable baskets

Shared by: 70-70-45/110 Low voltage distribution system; 70-70-75/110 Hard wired low voltage small power system; 70-80-35/110 Hard wired general lighting system; 75-45-20/110 Data distribution system; 75-60-05/110 Electronic access control system; 75-60-10/110 CCTV system; 75-60-40/110 Intrusion and hold-up alarm system; and 75-65-30/110 Fire detection and alarm systems in non-domestic premises.

- **Manufacturer:** To be defined.
- **Standard:** To BS EN 61537.
- **Material:** To be defined.
- **Coating material:** To be defined.
- **Sizes:**
  - **Width:** To be defined.
  - **Side height:** To be defined.
- **Features:**
  - **Segregation:** To be defined.
  - **Protective cover:** To be defined.
- **Execution:** To be defined.

90-55-15/432 Multicore alarm cables

- **Manufacturer:** To be defined.
- **Standard:** To BS 4737-3-30.

• **Third party certification:** British Approvals Service for Cables (BASEC) certified.
• **Cable type:** To be defined.
• **Conductor:**
  – **Number of cores:** To be defined.
  – **Type:** To be defined.
  – **Size:** To be defined.
  – **Sheath:** To be defined.
  – **Colour:** To be defined.
  – **Screen:** To be defined.
• **Reaction to fire class:**
  – **Fire behaviour:** To be defined.
  – **Additional classification for smoke production:** To be defined.
  – **Additional classification for flaming droplets and/ or particles:** To be defined.
  – **Additional classification for acidity:** To be defined.
• **Execution:** To be defined.
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90-75-40/305 Intrusion and hold-up alarm panels
• **Manufacturer:** To be defined.
• **Standard:** To BS EN 50131-3 and BS EN 50131-6.
• **Security grading:** To be defined.
• **Environmental classification:** To be defined.
• **Control features:**
  – **User input:** To be defined.
  – **Event log capacity (minimum):** To be defined.
  – **Communication interfaces:** To be defined.
  – **Access door control:** To be defined.
• **Number of zones (minimum):** To be defined.
• **Number of groups (minimum):** To be defined.
• **Number of users (minimum):** To be defined.
• **Execution:** To be defined.		

90-75-40/310 Intrusion and hold-up alarm remote keypads
• **Manufacturer:** To be defined.
• **Standard:** To BS EN 50131-3 and BS EN 50131-6.
• **Security grading:** To be defined.
• **Environmental classification:** To be defined.
• **Control features:**
  – **User input:** To be defined.
  – **Setting and unsetting:** To be defined.
  – **Operation:** Full system control.
  – **Communication interfaces:** To be defined.
• **Enclosure:** To be defined.		

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• **Execution:** To be defined.		
90-75-40/375 External warning devices		
• **Manufacturer:** To be defined. • **Standard:** To BS EN 50131-4. • **Security grading:** To be defined. • **Environmental classification:** To be defined. • **Category:** To be defined. • **Storage device type:** To be defined. • **Enclosure:** – **Material:** Polycarbonate. – **Body colour:** To be defined. – **Lens colour:** To be defined. • **Strobe:** Integral xenon beacon. • **Status indicators:** Alternating LEDs indicating power supply 'On' and 'Tamper/ fault'. • **Sound pressure level (minimum):** 95 dB(A) @1m with automatic cut off after 15 minutes. • **Execution:** To be defined.		
90-75-40/380 Internal warning devices		
• **Manufacturer:** To be defined. • **Standard:** To BS EN 50131-4. • **Security grading:** To be defined. • **Environmental classification:** To be defined. • **Category:** To be defined. • **Storage device type:** To be defined. • **Enclosure:** – **Material:** To be defined. – **Colour:** To be defined. • **Sound pressure level (minimum):** 75 dB(A) @1m, with automatic cut off after 15 minutes and selectable alternating or continuous tone. • **Strobe:** Integral xenon strobe. • **Status indicators:** Alternating LEDs indicating alarm condition. • **Execution:** To be defined.		
Execution		
75-60-40/620 Installing intrusion and hold-up alarm systems		
• **Standards:** To DD CLC/TS 50131-7.		

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System completion

75-60-40/810 Testing and commissioning intrusion and hold-up alarms systems

- **Standard:** To DD CLC/TS 50131-7.
- **System commissioning agent:** Heronway Ltd
- **Notice before commencing tests (minimum):** 24h
- **Cable testing:**
  - **Insulation resistance:** Submit results.
  - **Earth continuity:** Submit results.
- **Charger:** Verify operation.
- **Detection devices:** Verify the operation, and adjust to provide maximum coverage.
- **Device voltage:** Submit details of the voltage at powered devices.
- **Local warning devices:** Verify operation.
- **Remote signalling:** Verify operation.
- **Standby supply:** Verify operation in the event of a mains failure. Check capacity and submit results.
- **Tamper detection:** Verify operation.
- **Timers:** Set up and adjust entry and exit timers.
- **User codes:** Set up and commission.

75-60-40/820 Documentation

- **Standard:** To DD CLC/TS 50131-7.
- **Operating and maintenance instructions:**
  - **Scope:** Submit for the system giving optimum settings for controls.
  - **Product information:** Include product description, date of purchase, performance characteristics, application (suitability for use), method of operation and control, and cleaning and maintenance requirements.
  - **Format:** Paper copy.
  - **Number of copies:** Two
- **Logbook:** Hardback cover embossed 'INTRUDER AND HOLD-UP ALARM SYSTEM LOGBOOK' with A4 lined paper, minimum 100 pages.
- **Number of copies:** One
- **Record drawings:**
  - **Content:** General arrangement drawings showing the location of all control and indicating equipment, remote key pads, detectors, sounders, visual indicators, protective switches and any associated power supply.
  - **Format:** Electronic drawing.
  - **Number of copies:** One
- **Submittal date:** At handover.

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75-60-40/830 Spares and consumables

- **Supply the following spares:**
  - **Deliberately operated devices:** Two of each type.
  - **Detectors:** Two of each type.
  - **Protective switches.:** Two of each type.

75-60-40/840 Maintenance

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

Ω End of system

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

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System outline

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

- **Description:** Refer to tender drawings for detail, the contractor must enlist the services or Victory Fire in connection with the Fire alarm and detection system. The contact details are:
  Peter McLaren
  Victory Fire Limited
  0845 4567 345
  www.victoryfire.co.uk
  Unit 30, Thurrock Commercial Centre,
  Juliet Way, Purfleet,
  Essex RM15 4YG
- **System performance:** 75-65-30/210 Design of fire detection and alarm systems in non-domestic premises.
- **System manufacturer:** Refer to Victory Fire quotation
- **System type:** Addressable.
- **Detection devices:**
  - **Atmosphere:** Normal.
  - **Types:** Refer to Victory Fire quotation
- **Equipment interconnectivity:** FP cable
- **Cable containment:** 90-55-10/325 Cable baskets.
- **Containment accessories:** To be defined.
- **Rewireable installation:** Required.
- **Concealed installation:** Required.
- **Internal alarms:**
  - **Primary:** 90-75-30/360 Sounders.
  - **Secondary:** 90-75-30/415 Visual alarm signal devices.
- **External alarms:** To alarm receiving centre (ARC).
- **Controls:** 90-75-30/380 Fire detection and alarm control and indicating equipment (CIE).
- **System accessories:** To be defined.
- **Execution:** 75-65-30/610 Installing fire detection and alarm systems in non-domestic premises.
- **System completion:** 75-65-30/805 System information;
  75-65-30/806 Device identification and testing;
  75-65-30/807 Standby battery testing;
  75-65-30/808 System soak testing;
  75-65-30/809 Measurement of sound pressure levels;
  75-65-30/810 Testing and commissioning fire detection and alarm systems in non-domestic premises;
  75-65-30/820 Documentation for fire detection and alarm systems in non-domestic premises;

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75-65-30/830 Spares and consumables; 75-65-30/840 Maintenance; 75-65-30/850 Verification certificate for fire detection and alarm systems in non-domestic premises; and 75-65-30/860 Acceptance certificate for fire detection and alarm systems in non-domestic premises.		

System performance

75-65-30/210 Design of fire detection and alarm systems in non-domestic premises

- **System designer:** Victory Fire
- **Standards:** Complete the design of the fire detection and alarm system in accordance with BS 5839-1.
- **Category:** L2.
- **Coverage:** Refer to Victory Fire design
- **Requirement:** Submit proposals including detailed design drawings, technical information, calculations and manufacturers' literature.
- **System design certificate:** Submit with design proposals.

Products

90-55-10/325 Cable baskets

Shared by: 70-70-45/110 Low voltage distribution system; 70-70-75/110 Hard wired low voltage small power system; 70-80-35/110 Hard wired general lighting system; 75-45-20/110 Data distribution system; 75-60-05/110 Electronic access control system; 75-60-10/110 CCTV system; 75-60-40/110 Intrusion and hold-up alarm system; and 75-65-30/110 Fire detection and alarm systems in non-domestic premises.

- **Manufacturer:** To be defined.
- **Standard:** To BS EN 61537.
- **Material:** To be defined.
- **Coating material:** To be defined.
- **Sizes:**
  - **Width:** To be defined.
  - **Side height:** To be defined.
- **Features:**
  - **Segregation:** To be defined.
  - **Protective cover:** To be defined.
- **Execution:** To be defined.

90-75-30/360 Sounders

- **Manufacturer:** To be defined.
- **Standard:** To be defined.
- **Third party certification:** To be defined.

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• **Sounder type:** To be defined. • **Rated voltage:** To be defined. • **Sound patterns:** In accordance with BS 5839-1. • **Enclosure protection:** To be defined. • **Sound pressure level (minimum):** To be defined. • **Integral beacon:** To be defined. • **Mounting:** To be defined. • **Power supply:** To be defined. • **Execution:** To be defined.		

90-75-30/380 Fire detection and alarm control and indicating equipment (CIE)
• **Manufacturer:** To be defined.
• **Standard:** To be defined.
• **Third party certification:** To be defined.
• **Standby power supply:**
  – **Standard:** To BS EN 54-4.
  – **Capacity:** To be defined.
• **Main display:** To be defined.
• **Zone indication:** To be defined.
• **Installed capacity:** To be defined.
• **Monitored sounder circuits (minimum):** To be defined.
• **Printer:** To be defined.
• **Indications:** To be defined.
• **Controls:** To be defined.
• **Outputs:** To be defined.
• **Input device:** To be defined.
• **Features:** To be defined.
• **Enclosure:**
  – **Ingress protection (minimum):** To be defined.
  – **Material:** To be defined.
  – **Finish:** To be defined.
  – **Colour:** To be defined.
  – **Mounting:** To be defined.
• **Execution:** To be defined.		

90-75-30/415 Visual alarm signal devices **Shared by:** 75-65-30/110 Fire detection and alarm systems in non-domestic premises; and 75-70-05/120 Emergency voice communication system. • **Manufacturer:** To be defined. • **Standard:** To BS EN 54-23. • **Device type:** To be defined. • **Enclosure protection:** To be defined.		

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• **Category:** To be defined. • **Body colour:** To be defined. • **Lens colour:** To be defined. • **Execution:** To be defined.		

Execution

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

- **Standard:** In accordance with BS 5839-1.

System completion

75-65-30/805 System information

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

75-65-30/806 Device identification and testing

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

75-65-30/807 Standby battery testing

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

75-65-30/808 System soak testing

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

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

- **Sound pressure levels:** Measure throughout the building.
- **Test instrument:**
  - **Standard:** To BS EN 61672-1.
  - **Setting:** Slow response, weighting A.
- **Doors:** Close before measuring sound pressure levels.

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• **Results:** Submit electronic layout drawing showing location of measurements with results.		

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

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

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

- **Standard:** In accordance with BS 5839-1.
- **Operating and maintenance instructions:**
  - **Scope:** Submit for the system giving optimum settings for controls.
  - **Product information:** Include product description, date of purchase, performance characteristics, application (suitability for use), method of operation and control, and cleaning and maintenance requirements.
  - **Format:** Paper copy.
  - **Number of copies:** Two.
- **Logbook:** Submit one copy in accordance with BS 5839-1 Annex F.
- **Record drawings:**
  - **Content:** General arrangement drawings showing the location of all control and indicating equipment, manual call points, detectors, radio transmitters and aerials, sounders, visual alarm signal devices, short circuit isolators, end of line devices, remote indicators, interface units connecting to other equipment, and automatic door hold open devices.
  - **Drawing format:** Electronic drawing.
  - **Number of copies:** One
  - **Submittal date:** At handover.
- **Fire evacuation plan:** Submit electronic colour CAD layout.
- **Certification:**
  - **Design certificate:** Submit two copies in accordance with BS 5839-1 Annex G.1.
  - **Installation certificate:** Submit two copies in accordance with BS 5839-1 Annex G.2.
  - **Commissioning certificate:** Submit two copies in accordance with BS 5839-1 Annex G.3.

75-65-30/830 Spares and consumables

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

75-65-30/840 Maintenance

- **Standard:** As advised by Victory Fire
- **Duration:** Until 12 months after Practical Completion.

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

- **System verification agent:** Victory Fire
- **Verification certificate:** Submit two copies in accordance with BS 5839-1, Annex G.5.

75-65-30/860 Acceptance certificate for fire detection and alarm systems in non-domestic premises

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

Ω End of system

75-70-05/120 Emergency voice communication system

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System outline

75-70-05/120 Emergency voice communication system

- **Description:** Disabled refuge emergency communication points required for disabled refuge bay on first floor to be linked back to reception and main fire alarm panel in entrance lobby. As C-TEC SigTEL Compact system or equivalent and approved
- **System performance:** 75-70-05/220 Design of emergency voice communication systems and 75-70-05/230 Integration with other alarm and security systems.
- **System manufacturer:** As C-TEC SigTEL Compact system or equivalent and approved
- **Operating voltage:** As defined by specialist manufacturer
- **Zones:** Two.
- **Equipment interconnectivity:** Wired.
- **Call actuator:** 90-70-05/340 Disabled refuge outstations.
- **Disabled refuge master station:** 90-70-05/370 Disabled refuge master station
- **Alarm indication:** 90-75-30/415 Visual alarm signal devices.
- **Power supply unit:** 90-70-05/390 Power supply units.
- **Circuit monitoring:** Open circuit and short circuit.
- **Cable type:** 90-55-15/330 Fire resistant screened (LSHF) cables.
- **Containment:** 90-55-10/410 Cable trunking and cable ducting for wall and ceiling mounting.
- **Rewireable installation:** Required.
- **Concealed installation:** Required.
- **System accessories:** 90-70-05/400 Battery backup supply.
- **Execution:** 75-70-05/640 Installing emergency voice communication systems.
- **System completion:** 75-70-05/810 Testing and commissioning assistance call systems generally;
  75-70-05/835 Documentation for emergency voice communication systems;
  75-70-05/850 Verification certificate;
  and 75-70-05/860 Acceptance certificate.

System performance

75-70-05/220 Design of emergency voice communication systems

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

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75-70-05/230 Integration with other alarm and security systems

- **Objectives:** Interlocks to life safety systems
- **Systems to be integrated:** Fire Alarm system

Products

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

- **Manufacturer:** To be defined.
- **Standards:** To BS EN 50085-1 and BS EN 50085-2-1.
- **Installation position:** To be defined.
- **Format:** To be defined.
- **Resistance to compression:** To be defined.
- **Resistance to impact:** To be defined.
- **Temperature properties:**
  - **Storage and transport temperature (minimum):** To be defined.
  - **Installation and application temperature (minimum):** To be defined.
  - **Application temperature (maximum):** To be defined.
- **Resistance to flame propagation:** To be defined.
- **Electrical properties:** To be defined.
- **Protection by enclosure:**
  - **Protection against ingress of solid objects (minimum):** To BS EN 60529, IP4X.
  - **Protection against ingress of water (minimum):** To BS EN 60529, IPX1.
  - **Protection against access to hazardous parts (minimum):** To BS EN 60529, IPXXD.
- **Access method:** To be defined.
- **Screening:** To be defined.
- **Sizes:** To be defined.
- **Compartments:** To be defined.
- **Accessories and fittings:**
  - **Generally:** Factory made by the cable trunking or ducting manufacturer and of the same material type and finish as the cable trunking or ducting.
  - **Types:** To be defined.
- **Execution:** To be defined.

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

- **Manufacturer:** To be defined.
- **Standard:** To BS 7629-1.
- **Third party certification:** To be defined.
- **Size:** To be defined.
- **Insulation:** To be defined.

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• **Fire resistance category:** To be defined. • **Screen:** To be defined. • **Execution:** To be defined.		
90-70-05/340 Disabled refuge outstations • **Manufacturer:** To be defined. • **Standard:** To be defined. • **Mounting:** To be defined. • **Accessories:** To be defined. • **Execution:** To be defined.		
90-70-05/370 Disabled refuge master station • **Manufacturer:** To be defined. • **Standard:** In accordance with BS 5839-9. • **Mounting:** To be defined. • **Communication interface:** To be defined. • **Accessories:** To be defined. • **Execution:** To be defined.		
90-70-05/390 Power supply units • **Manufacturer:** To be defined. • **Standard:** To BS EN 54-4. • **Standby source:** Rechargeable battery. • **Standby capacity:** To be defined. • **Integral replaceable fuse:** Required. • **Power-on indicator:** Required. • **Execution:** To be defined.		
90-70-05/400 Battery backup supply • **Manufacturer:** To be defined. • **Standby duration:** To be defined. • **Charge indicator:** Green. • **Battery enclosure:** White plastics. • **Execution:** To be defined.		
90-75-30/415 Visual alarm signal devices **Shared by:** 75-65-30/110 Fire detection and alarm systems in non-domestic premises; and 75-70-05/120 Emergency voice communication system. • **Manufacturer:** To be defined. • **Standard:** To BS EN 54-23. • **Device type:** To be defined. • **Enclosure protection:** To be defined.		

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• **Category:** To be defined. • **Body colour:** To be defined. • **Lens colour:** To be defined. • **Execution:** To be defined.		

Execution

75-70-05/640 Installing emergency voice communication systems

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

System completion

75-70-05/810 Testing and commissioning assistance call systems generally

- **Standards:** In accordance with BS 7671 and In accordance with BS 5839-9.
- **Notice before commencing commissioning:** 7 d.
- **System commissioning agent:** Submit proposals.
- **Controls:** Verify operation.
- **Alarm signalling:** Verify operation.
- **Results:** Submit.

75-70-05/835 Documentation for emergency voice communication systems

- **Operating and maintenance instructions:**
  - **Scope:** Submit for the system giving optimum settings for controls.
  - **Product information:** Include product description, date of purchase, performance characteristics, application (suitability for use), method of operation and control, and cleaning and maintenance requirements.
  - **Format:** Paper copy.
  - **Number of copies:** Two
- **Record drawings:**
  - **Content:** General arrangement drawings showing the location of all outstations, master stations, sounders, visual alarm signal devices and power supply units and Schematic diagram showing all control cabling, the cable origin, route from power supply units to master stations and outstations, sounders, visual alarm signal devices. Include conductor material and c.s.a., insulation type and colour, number of cores per cable, number of cables in ducts, on tray or ladder.
  - **Format:** Electronic drawings.
  - **Number of copies:** One
- **Submittal date:** At handover.
- **Test certificates:**
  - **Design certificate:** Submit proposals.
  - **Installation certificate:** Submit two copies in accordance with BS 5839-9, Annex C.2.

– **Commissioning certificate:** Submit two copies in accordance with BS 5839-9, Annex C.3.	£	p

75-70-05/850 Verification certificate

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

75-70-05/860 Acceptance certificate

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

Ω End of system

75-75-50/110 Water supply systems control

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System outline

75-75-50/110 Water supply systems control

- **Description:** This section details the requirements for the automatic controls works including MCP's, automatic controls and electrical power supplies associated with the mechanical plant and ancillaries for the building.

  The contractor shall design and provide a panel providing the following:
  1. Panel live indicator lamp
  2. Manual hand of auto switches for each item of new plant
  3. Indicate run/fault for each item of plant
  4. Contain a standard 230V single phase power outlet socket
  5. Contain all the necessary motor starters, power supplies and contactors to operate the new plant
  6. House the BMS outstation
  7. A BMS user interface (PRIVA)
  8. New panel doors shall be provided with a mechanically interlocked main power switch The design of control installations will be a contractor design portion, to meet the operational and performance requirements of this specification, and will include automatic controls, power installations and site head end BMS graphical representation/interface. This section must be read in conjunction with the all other sections of the specification.
  The control requirements for the new mechanical plant and ancillaries shall be but not limited to:

  Control:
  - Time-clock control
  - Calendar with holiday periods
  - Self-learning Heating optimum start
  - Heating flow temperature set point
  - 2Nr Boiler output modulation
  - 2Nr Boiler duty rotate and boiler sequencing, plus shunt pumps
  - Independent Weather compensation via 3 port mixing valve for 1Nr VT heating circuits
  - Heating system high/low pressure safety circuit
  - 1Nr Gas Fired Water Heater
  - 8Nr heating circulation pump sets
  - 1Nr DHWS recirculation pump

  Monitoring:
  - New external temperature sensor
  - New averaging room temperature sensors (3 sensors as one sensor per circuit)
  - 2Nr Boilers status and fault
  - Immersion temperature sensors (boiler primary flow and return headers, each heating circuit main flow and return)
  - 2Nr Pressurisation unit status and faults
  - 8Nr Heating circulation pumps run/fault status
  - 1Nr Variable Temperature heating circuits 3 port mixing valve position indication and status
  - 1Nr water heater recirculation pump run/fault status
  - Indirect Calorifier Storage Temperature

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- Domestic hot water flow and return temperatures The new control system shall be PRIVA. A data point shall be provided by the controls contractor, together with data connection to a local patch panel, to allow the new panel to be interfaced and accessed . The controls installation shall include all field power and control wiring, sensors, actuators etc. to form a fully working functional automatic controls system. Any claims for power or control wiring, or components not being provided as part of this contract shall be excluded. The new control panel shall have 20% additional spare capacity (control input/output ways, outgoing power circuits) to permit future upgrade works. The contractor shall request cost from the below specialist: Company Name: Colin Peacock LTD Contact person: Nigel Thompson Telephone number: 07713189837 email: nigelthompson@colinpeacock.com • **System performance:** 75-75-50/201 Design and 75-75-50/212 Time control. • **Objectives:** To be defined. • **Start and stop control strategies:** To be defined. • **Pressurization control strategies:** To be defined. • **Distribution control strategies:** 75-75-50/232 Domestic hot water non-storage calorifier control strategy. • **Pumps control strategies:** 75-75-50/235 Constant speed pumps control strategy. • **Additional functions:** To be defined. • **Equipment:** 90-65-50/310 Valve actuators; 90-65-50/340 Control panels; and 90-65-50/350 Motorized valves. • **Sensors:** 90-65-50/400 Flow in pipe sensors; 90-65-50/420 Pressure sensors; and 90-65-50/430 Water temperature sensors. • **Equipment interconnectivity:** To be defined. • **Cables:** To be defined. • **Containment:** To be defined. • **Containment accessories:** To be defined. • **Rewireable installations:** Required. • **Concealed installations:** Required. • **Control equipment power supply:** Mains supply. • **Execution:** 75-75-50/610 Removing mechanical engineering services control and management systems. • **System completion:** 75-75-50/810 Inspection and testing; 75-75-50/820 Start up and commissioning; 75-75-50/830 Commissioning of automatic control systems; and 75-75-50/860 Documentation.		

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System performance

75-75-50/201 Design

Shared by: 75-75-50/110 Water supply systems control; and 75-75-50/190 Gas fired heating system control strategy.

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

75-75-50/212 Time control

Shared by: 75-75-50/110 Water supply systems control; and 75-75-50/190 Gas fired heating system control strategy.

- **Time clock:** To be defined.
- **Extension of plant operation:**
  - **Action:** To be defined.
  - **Period:** To be defined.
- **Winter mode:**
  - **Time period:** To be defined.
  - **Outside temperature:** To be defined.

75-75-50/232 Domestic hot water non-storage calorifier control strategy

- **Medium:** Water, using three-port diverting valve and isolating valve.
- **Control valve:**
  - **Non-operation:** Open bypass port of control valve, close isolating valve and disable secondary pump.
  - **Operation:** When demand is signalled, operate secondary pump, open isolating valve and modulate control valve to maintain secondary flow temperature at set point.
  - **Set point:** To be defined.
- **Alarm:**
  - **Operation:** To be defined.
  - **Specified temperature:** To be defined.
- **High limit thermostat:**
  - **Operation:** To be defined.
  - **Set point:** To be defined.
  - **Overrun period:** To be defined.
- **Secondary circuit pump failure:** Set control valve to bypass and shut isolating valve.
- **Stratification pump:** To be defined.

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75-75-50/235 Constant speed pumps control strategy

- **Arrangement:** To be defined.
- **Plant shut down:**
  - **Operation:** To be defined.
  - **Long shutdown period:** To be defined.
- **Operation:** Run pumps on receipt of signal.
- **Change lead pump:** To be defined.
- **Prove flow:**
  - **Operation:** To be defined.
  - **Specified time:** To be defined.
  - **Failure:** If flow is not proved after standby pump start, raise alarm.
  - **Reset:** To be defined.

Products

90-65-50/310 Valve actuators

- **Manufacturer:** To be defined.
- **Standard:** To BS EN 60730-2-8.
- **Actuator type:** To be defined.
- **Action:** To be defined.
- **Torque:** To be defined.
- **Stroke:** To be defined.
- **Running time:** To be defined.
- **Operation:** To be defined.
- **Electrical supply:** To be defined.
- **Ancillaries:** To be defined.
- **Execution:** To be defined.

90-65-50/340 Control panels

- **Manufacturer:** To be defined.
- **Enclosure:**
  - **Ingress protection (minimum):** To be defined.
  - **Mechanical protection (minimum):** To be defined.
  - **Material:** To be defined.
  - **Finish:** To be defined.
  - **Colour:** To be defined.
  - **Doors and panels:**

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

    Swing: To be defined.

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

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Locks: Cylinder, with standardized key type.		
• **Isolator:**		
– **Type:** Switch-disconnector to BS EN 60947-3.		
– **Rated operational current (In):** To be defined.		
– **Rated operational voltage (Ue):** To be defined.		
– **Rated operational frequency:** To be defined.		
– **Number of poles:** To be defined.		
– **Rated short-time withstand current (Icw) for 1 s:** To be defined.		
– **Utilization category:** To be defined.		
– **Terminals:** To be defined.		
– **Mechanical interlocking:** To be defined.		
• **Internal separation:**		
– **Form:** To be defined.		
• **Cable entry:** To be defined.		
• **Gland plate gaskets:** Match the assembly's degree of ingress protection.		
• **Internal cable zones:** Sufficient to allow cabling to be neatly routed and terminated.		
• **Interconnecting cable:** Single core PVC insulated cables to BS 6231.		
• **Terminals:**		
– **Mounting:** Suitable for mounting to 35 mm DIN rail.		
– **Identification:**		
Neutral and earth bar terminals: Label with the outgoing circuit reference.		
Cable terminations: Label with circuit reference, with push-on plastics markers.		
• **Trunking:**		
– **Standard:** To BS EN 50085-2-3.		
– **Material:** PVC-U.		
• **Execution:** To be defined.		
90-65-50/350 Motorized valves		
• **Manufacturer:** To be defined.		
• **Standard:** To BS EN 60730-2-8.		
• **Arrangement:** To be defined.		
• **Valve authority:**		
– **Design:** To be defined.		
– **Minimum:** To be defined.		
• **Material:** To be defined.		
• **Connections:** To be defined.		
• **Execution:** To be defined.		
90-65-50/400 Flow in pipe sensors		
Shared by: 75-75-50/110 Water supply systems control; and 75-75-50/120 Heating systems control.		
• **Manufacturer:** To be defined.		
• **Standards:** To BS EN 60730-1 and BS EN 60730-2-15.		

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• **Sensor type:** To be defined. • **Equipment interconnectivity:** – **Wired:** Required. – **Radio based:** **Communications protocol:** To be defined. **Sensor power supply:** To be defined. **Battery life (minimum):** 5 years. • **Application:** To be defined. • **Execution:** To be defined.		
90-65-50/420 Pressure sensors **Shared by:** 75-75-50/110 Water supply systems control; and 75-75-50/120 Heating systems control. • **Manufacturer:** To be defined. • **Standards:** To BS EN 60730-1 and BS EN 60730-2-6. • **Sensor type:** To be defined. • **Application:** To be defined. • **Accuracy:** To be defined. • **Equipment interconnectivity:** – **Wired:** Required. – **Radio based:** **Communications protocol:** To be defined. **Sensor power supply:** To be defined. **Battery life (minimum):** 5 years. • **Execution:** To be defined.		
90-65-50/430 Water temperature sensors **Shared by:** 75-75-50/110 Water supply systems control; and 75-75-50/120 Heating systems control. • **Manufacturer:** To be defined. • **Standards:** To BS EN 60730-1 and BS EN 60730-2-9. • **Sensor type:** To be defined. • **Application:** To be defined. • **Range:** To be defined. • **Accuracy:** To be defined. • **Equipment interconnectivity:** – **Wired:** Required. – **Radio based:** **Communications protocol:** To be defined. **Sensor power supply:** To be defined. **Battery life (minimum):** 5 years. • **Execution:** To be defined.		

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Execution

75-75-50/610 Removing mechanical engineering services control and management systems

- **Scope:** To be defined.

System completion

75-75-50/810 Inspection and testing

Shared by: 75-75-50/110 Water supply systems control; 75-75-50/120 Heating systems control; and 75-75-50/190 Gas fired heating system control strategy.

- **Standard:** In accordance with BS 7671.
- **Notice before commencing tests (minimum):** One week.
- **Certificates:** To be defined.
- **Test equipment identity:** Record on test certificates.
- **Certificates of calibration:** Submit for each test instrument.
- **Control panel test certificates:** Submit one.

75-75-50/820 Start up and commissioning

Shared by: 75-75-50/110 Water supply systems control; 75-75-50/120 Heating systems control; and 75-75-50/190 Gas fired heating system control strategy.

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

75-75-50/830 Commissioning of automatic control systems

Shared by: 75-75-50/110 Water supply systems control; and 75-75-50/190 Gas fired heating system control strategy.

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

75-75-50/860 Documentation

Shared by: 75-75-50/110 Water supply systems control; 75-75-50/120 Heating systems control; and 75-75-50/190 Gas fired heating system control strategy.

- **Operating and maintenance instructions:**
  - **Scope:** Submit giving optimum settings for controls.
  - **Product information:** Include product description, date of purchase, performance characteristics, application (suitability for use), method of operation and control, and cleaning and maintenance requirements.
  - **Format:** Paper copy.
  - **Number of copies:** Three.
- **Record drawings:**

– **Content:** For all controls cabling, the cable origin, circuit designation, route, conductor material and insulation type and colour, number of cores per cable, number of cables in ducts, on tray or ladder and Location of control panels, equipment and repeater panels. – **Format:** A1 paper print and Electronic. – **Number of copies:** Three. • **Cable schedules:** – **Location:** To be defined. – **Format:** To be defined. – **Size:** To be defined. – **Contents:** To be defined. • **Submittal date:** At handover.	£	p

Ω End of system

75-75-50/120 Heating systems control

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System outline

75-75-50/120 Heating systems control

- **Description:** This section details the requirements for the automatic controls works including MCP's, automatic controls and electrical power supplies associated with the mechanical plant and ancillaries for the building.

  The contractor shall design and provide a panel providing the following:
  1. Panel live indicator lamp
  2. Manual hand of auto switches for each item of new plant
  3. Indicate run/fault for each item of plant
  4. Contain a standard 230V single phase power outlet socket
  5. Contain all the necessary motor starters, power supplies and contactors to operate the new plant
  6. House the BMS outstation
  7. A BMS user interface (PRIVA)
  8. New panel doors shall be provided with a mechanically interlocked main power switch The design of control installations will be a contractor design portion, to meet the operational and performance requirements of this specification, and will include automatic controls, power installations and site head end BMS graphical representation/interface. This section must be read in conjunction with the all other sections of the specification.
  The control requirements for the new mechanical plant and ancillaries shall be but not limited to:

  Control:
  - Time-clock control
  - Calendar with holiday periods
  - Self-learning Heating optimum start
  - Heating flow temperature set point
  - 2Nr Boiler output modulation
  - 2Nr Boiler duty rotate and boiler sequencing, plus shunt pumps
  - Independent Weather compensation via 3 port mixing valve for 1Nr VT heating circuits
  - Heating system high/low pressure safety circuit
  - 1Nr Gas Fired Water Heater
  - 8Nr heating circulation pump sets
  - 1Nr DHWS recirculation pump

  Monitoring:
  - New external temperature sensor
  - New averaging room temperature sensors (3 sensors as one sensor per circuit)
  - 2Nr Boilers status and fault
  - Immersion temperature sensors (boiler primary flow and return headers, each heating circuit main flow and return)
  - 2Nr Pressurisation unit status and faults
  - 8Nr Heating circulation pumps run/fault status
  - 1Nr Variable Temperature heating circuits 3 port mixing valve position indication and status
  - 1Nr water heater recirculation pump run/fault status
  - Indirect Calorifier Storage Temperature

	£	p
- Domestic hot water flow and return temperatures The new control system shall be PRIVA. A data point shall be provided by the controls contractor, together with data connection to a local patch panel, to allow the new panel to be interfaced and accessed . The controls installation shall include all field power and control wiring, sensors, actuators etc. to form a fully working functional automatic controls system. Any claims for power or control wiring, or components not being provided as part of this contract shall be excluded. The new control panel shall have 20% additional spare capacity (control input/output ways, outgoing power circuits) to permit future upgrade works. The contractor shall request cost from the below specialist: Company Name: Colin Peacock LTD Contact person: Nigel Thompson Telephone number: 07713189837 email: nigelthompson@colinpeacock.com • **System performance:** To be defined. • **Objectives:** To be defined. • **Start and stop control:** 75-75-50/205 Hand off auto switch; 75-75-50/207 Low temperature interlock signals for plant protection; and 75-75-50/210 Optimum start and stop heating. • **Heating plant control strategies:** 75-75-50/221 Modular boilers control strategy and 75-75-50/224 Sequencing boilers, with individual pump and bypass circuit, control strategy. • **Pumps:** – **Equipment:** To be defined. – **Primary pumps control strategies:** To be defined. – **Secondary pumps control strategies:** To be defined. • **Pressurization system control strategies:** To be defined. • **Water distribution control strategies:** To be defined. • **Outlet control strategies:** To be defined. • **Additional functions:** To be defined. • **Equipment:** To be defined. • **Sensors:** 90-65-50/400 Flow in pipe sensors; 90-65-50/420 Pressure sensors; 90-65-50/430 Water temperature sensors; and 90-65-50/380 Air temperature sensors. • **Meters:** To be defined. • **Equipment interconnectivity:** To be defined. • **Cables:** To be defined. • **Containment:** To be defined. • **Containment accessories:** To be defined. • **Rewireable installations:** Required. • **Concealed installations:** Required. • **Control equipment power supply:** Mains supply. • **Execution:** Installing controls.		

	£	p
• **System completion:** 75-75-50/810 Inspection and testing; 75-75-50/820 Start up and commissioning; and 75-75-50/860 Documentation.		

System performance

75-75-50/205 Hand off auto switch

- **Operation:**
  - **Hand:** To be defined.
  - **Off:** To be defined.
  - **Auto:** To be defined.

75-75-50/207 Low temperature interlock signals for plant protection

- **Low outside air temperature condition:**
  - **Operation:** To be defined.
  - **Activation set point:** To be defined.
  - **Termination set point:** To be defined.
- **Low primary heating return water temperature condition:**
  - **Operation:** To be defined.
  - **Activation set point:** To be defined.
  - **Termination set point:** To be defined.

75-75-50/210 Optimum start and stop heating

- **Start:**
  - **Optimum start time:** To be defined.
  - **Zone heating set point:** To be defined.
  - **Maximum preheat time:** To be defined.
  - **Air handling plant start:** To be defined.
- **Stop:**
  - **Optimum stop time:** To be defined.
  - **Minimum acceptable temperature during occupied period:** To be defined.
  - **Maximum period between stop and end of occupied period:** To be defined.

75-75-50/221 Modular boilers control strategy

- **Plant:**
  - **Boilers:** To be defined.
  - **Number:** To be defined.
  - **Directly linked plant:** To be defined.
- **Boiler off condition:** Disable boiler and primary pumps provided overrun is finished.
- **Boiler firing:** On/off.
- **Primary flow:**
  - **Operation:** To be defined.
  - **Start up period:** To be defined.

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• **Sequence control strategy:**
  – **Operation:** To be defined.
  – **Primary return temperature under full load:** To be defined.
  – **Nominal flow temperature:** To be defined.
  – **Primary return temperature set point:** To be defined.
  – **Start up delay:** To be defined.
  – **Shedding time delay:** To be defined.
  – **Boiler enabled set point deadband:** To be defined.
  – **Boiler sequence change:** To be defined.
  – **Boiler sequence override:** Provide a switch to inhibit the boiler sequence routine.
• **High limit temperature control thermostat:**
  – **Operation:** To be defined.
  – **Set point:** To be defined.
• **Boiler interlocks:** To be defined.
• **Panic buttons:**
  – **Operation:** To be defined.
  – **Position:** To be defined.
• **Fuel detection:**
  – **Detectors:** To be defined.
  – **Activation:** To be defined.
• **Fire alarm:** When activated, disable fuel supply and stop all plant.
• **Alarm:** To be defined.
• **Manual alarm reset:** To be defined.
• **Linked equipment:** To be defined.		

75-75-50/224 Sequencing boilers, with individual pump and bypass circuit, control strategy
• **Plant:**
  – **Boilers:** To be defined.
  – **Number:** To be defined.
  – **Directly linked plant:** To be defined.
• **Boiler off condition:** Disable boiler and primary pumps provided overrun is finished. Set mixing valve to full recirculation on each boiler.
• **Primary flow:**
  – **Operation:** To be defined.
  – **Start up period:** To be defined.
• **Sequence control strategy:**
  – **On/off boiler firing:** To be defined.
  – **High/low boiler firing:** To be defined.
  – **Modulating boiler firing:** To be defined.
  – **Primary return temperature under full load:** To be defined.
  – **Nominal flow temperature:** To be defined.
  – **Primary return temperature set point:** To be defined.
  – **Start up delay:** To be defined.		

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– **Shedding time delay:** To be defined. – **Boiler enabled set point deadband:** To be defined. – **Minimum boiler recirculation temperature:** To be defined. – **Boiler sequence change:** To be defined. – **Boiler sequence override:** Provide a switch to inhibit the boiler sequence routine. • **High limit temperature control thermostat:** – **Operation:** To be defined. – **Set point:** To be defined. • **Boiler interlocks:** Following boiler lock-out, reset via a switch on. Packaged boiler control panel. Motor control panel. • **Panic buttons:** – **Operation:** To be defined. – **Position:** To be defined. • **Fuel detection:** – **Detectors:** To be defined. – **Activation:** Hard wire interlocks. Disable fuel supply and shut down boiler via. Packaged boiler control panel. Central control panel. • **Fire alarm:** When activated, disable fuel supply and stop all plant. • **Alarm:** To be defined. • **Manual alarm reset:** To be defined. • **Linked equipment:** To be defined.		

Products

90-65-50/380 Air temperature sensors

- **Manufacturer:** To be defined.
- **Standard:** To BS EN 60730-2-9.
- **Application:** To be defined.
- **Range:** To be defined.
- **Accuracy:** To be defined.
- **Equipment interconnectivity:**
  - **Wired:** Required.
  - **Radio based:**
    Communications protocol: To be defined.
    Sensor power supply: To be defined.
    Battery life (minimum): 5 years.
- **Execution:** To be defined.

90-65-50/400 Flow in pipe sensors

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

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• **Manufacturer:** To be defined.
• **Standards:** To BS EN 60730-1 and BS EN 60730-2-15.
• **Sensor type:** To be defined.
• **Equipment interconnectivity:**
  – **Wired:** Required.
  – **Radio based:**
  Communications protocol: To be defined.
  Sensor power supply: To be defined.
  Battery life (minimum): 5 years.
• **Application:** To be defined.
• **Execution:** To be defined.		

90-65-50/420 Pressure sensors
Shared by: 75-75-50/110 Water supply systems control; and 75-75-50/120 Heating systems control.
• **Manufacturer:** To be defined.
• **Standards:** To BS EN 60730-1 and BS EN 60730-2-6.
• **Sensor type:** To be defined.
• **Application:** To be defined.
• **Accuracy:** To be defined.
• **Equipment interconnectivity:**
  – **Wired:** Required.
  – **Radio based:**
  Communications protocol: To be defined.
  Sensor power supply: To be defined.
  Battery life (minimum): 5 years.
• **Execution:** To be defined.		

90-65-50/430 Water temperature sensors
Shared by: 75-75-50/110 Water supply systems control; and 75-75-50/120 Heating systems control.
• **Manufacturer:** To be defined.
• **Standards:** To BS EN 60730-1 and BS EN 60730-2-9.
• **Sensor type:** To be defined.
• **Application:** To be defined.
• **Range:** To be defined.
• **Accuracy:** To be defined.
• **Equipment interconnectivity:**
  – **Wired:** Required.
  – **Radio based:**
  Communications protocol: To be defined.
  Sensor power supply: To be defined.
  Battery life (minimum): 5 years.
• **Execution:** To be defined.		

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System completion

75-75-50/810 Inspection and testing

Shared by: 75-75-50/110 Water supply systems control; 75-75-50/120 Heating systems control; and 75-75-50/190 Gas fired heating system control strategy.

- **Standard:** In accordance with BS 7671.
- **Notice before commencing tests (minimum):** One week.
- **Certificates:** To be defined.
- **Test equipment identity:** Record on test certificates.
- **Certificates of calibration:** Submit for each test instrument.
- **Control panel test certificates:** Submit one.

75-75-50/820 Start up and commissioning

Shared by: 75-75-50/110 Water supply systems control; 75-75-50/120 Heating systems control; and 75-75-50/190 Gas fired heating system control strategy.

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

75-75-50/860 Documentation

Shared by: 75-75-50/110 Water supply systems control; 75-75-50/120 Heating systems control; and 75-75-50/190 Gas fired heating system control strategy.

- **Operating and maintenance instructions:**
  - **Scope:** Submit giving optimum settings for controls.
  - **Product information:** Include product description, date of purchase, performance characteristics, application (suitability for use), method of operation and control, and cleaning and maintenance requirements.
  - **Format:** Paper copy.
  - **Number of copies:** Three.
- **Record drawings:**
  - **Content:** For all controls cabling, the cable origin, circuit designation, route, conductor material and insulation type and colour, number of cores per cable, number of cables in ducts, on tray or ladder and Location of control panels, equipment and repeater panels.
  - **Format:** A1 paper print and Electronic.
  - **Number of copies:** Three.
- **Cable schedules:**
  - **Location:** To be defined.
  - **Format:** To be defined.
  - **Size:** To be defined.
  - **Contents:** To be defined.
- **Submittal date:** At handover.

Ω End of system

75-75-50/190 Gas fired heating system control strategy

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System outline

75-75-50/190 Gas fired heating system control strategy

- **Description:** This section details the requirements for the automatic controls works including MCP's, automatic controls and electrical power supplies associated with the mechanical plant and ancillaries for the building.

  The contractor shall design and provide a panel providing the following:
  1. Panel live indicator lamp
  2. Manual hand of auto switches for each item of new plant
  3. Indicate run/fault for each item of plant
  4. Contain a standard 230V single phase power outlet socket
  5. Contain all the necessary motor starters, power supplies and contactors to operate the new plant
  6. House the BMS outstation
  7. A BMS user interface (PRIVA)
  8. New panel doors shall be provided with a mechanically interlocked main power switch The design of control installations will be a contractor design portion, to meet the operational and performance requirements of this specification, and will include automatic controls, power installations and site head end BMS graphical representation/interface. This section must be read in conjunction with the all other sections of the specification.
  The control requirements for the new mechanical plant and ancillaries shall be but not limited to:

  Control:
  - Time-clock control
  - Calendar with holiday periods
  - Self-learning Heating optimum start
  - Heating flow temperature set point
  - 2Nr Boiler output modulation
  - 2Nr Boiler duty rotate and boiler sequencing, plus shunt pumps
  - Independent Weather compensation via 2 port mixing valve for 1Nr VT heating circuits
  - Heating system high/low pressure safety circuit
  - 1Nr Gas Fired Water Heater
  - 8Nr heating circulation pump sets
  - 1Nr DHWS recirculation pump

  Monitoring:
  - New external temperature sensor
  - New averaging room temperature sensors (3 sensors as one sensor per circuit)
  - 2Nr Boilers status and fault
  - Immersion temperature sensors (boiler primary flow and return headers, each heating circuit main flow and return)
  - 2Nr Pressurisation unit status and faults
  - 8Nr Heating circulation pumps run/fault status
  - 1Nr Variable Temperature heating circuits 3 port mixing valve position indication and status
  - 1Nr water heater recirculation pump run/fault status
  - Indirect Calorifier Storage Temperature

- Domestic hot water flow and return temperatures The new control system shall be PRIVA. A data point shall be provided by the controls contractor, together with data connection to a local patch panel, to allow the new panel to be interfaced and accessed . The controls installation shall include all field power and control wiring, sensors, actuators etc. to form a fully working functional automatic controls system. Any claims for power or control wiring, or components not being provided as part of this contract shall be excluded. The new control panel shall have 20% additional spare capacity (control input/output ways, outgoing power circuits) to permit future upgrade works. The contractor shall request cost from the below specialist: Company Name: Colin Peacock LTD Contact person: Nigel Thompson Telephone number: 07713189837 email: nigelthompson@colinpeacock.com • **System performance:** 75-75-50/201 Design and 75-75-50/212 Time control. • **Equipment to be controlled:** Boiler and Gas Fired water Heater • **Start and stop control:** 90-65-25/380 Time switches. • **Operation:** – **Normal:** To be defined. – **Zones:** To be defined. – **Zone air temperature set point:** To be defined. – **Burner settings:** To be defined. • **Air flow switch:** – **Operation:** To be defined. – **Set time:** To be defined. – **Set point:** To be defined. • **High temperature cut out:** – **Operation:** To be defined. – **Set point:** To be defined. – **Reset:** To be defined. – **Warning signal:** To be defined. • **Fan overrun operation:** To be defined. • **De-stratification:** – **Operation:** To be defined. – **Temperature difference:** 3°C. • **Control points schedules:** To be defined. • **Electrical connections:** To be defined. • **Cables:** To be defined. • **Containment:** To be defined. • **Containment accessories:** To be defined. • **Rewireable installations:** Required. • **Concealed installations:** Required.	£	p

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• **Execution:** To be defined. • **System completion:** 75-75-50/810 Inspection and testing; 75-75-50/820 Start up and commissioning; 75-75-50/830 Commissioning of automatic control systems; and 75-75-50/860 Documentation.		

System performance

75-75-50/201 Design

Shared by: 75-75-50/110 Water supply systems control; and 75-75-50/190 Gas fired heating system control strategy.

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

75-75-50/212 Time control

Shared by: 75-75-50/110 Water supply systems control; and 75-75-50/190 Gas fired heating system control strategy.

- **Time clock:** To be defined.
- **Extension of plant operation:**
  - **Action:** To be defined.
  - **Period:** To be defined.
- **Winter mode:**
  - **Time period:** To be defined.
  - **Outside temperature:** To be defined.

Products

90-65-25/380 Time switches

Shared by: 70-80-25/120 Amenity lighting system; 70-80-35/110 Hard wired general lighting system; and 75-75-50/190 Gas fired heating system control strategy.

- **Manufacturer:** To be defined.
- **Standards:** To BS EN 60730-1 and BS EN 60730-2-7.
- **Third party certification:** To be defined.
- **Equipment interconnectivity:** To be defined.
- **Format:** To be defined.
- **Display:** To be defined.
- **Programme capability:** To be defined.
- **Number of switching channels:** To be defined.
- **Inductive switching capacity:** To be defined.

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• **Cable termination capacity:** To be defined. • **Override facility:** To be defined. • **GMT/BST daylight saving:** To be defined. • **Enclosure:** **Ingress protection (minimum):** To be defined. – **Material and construction:** To be defined. • **Battery backup:** To be defined. • **Execution:** To be defined.		

System completion

75-75-50/810 Inspection and testing

Shared by: 75-75-50/110 Water supply systems control; 75-75-50/120 Heating systems control; and 75-75-50/190 Gas fired heating system control strategy.

- **Standard:** In accordance with BS 7671.
- **Notice before commencing tests (minimum):** One week.
- **Certificates:** To be defined.
- **Test equipment identity:** Record on test certificates.
- **Certificates of calibration:** Submit for each test instrument.
- **Control panel test certificates:** Submit one.

75-75-50/820 Start up and commissioning

Shared by: 75-75-50/110 Water supply systems control; 75-75-50/120 Heating systems control; and 75-75-50/190 Gas fired heating system control strategy.

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

75-75-50/830 Commissioning of automatic control systems

Shared by: 75-75-50/110 Water supply systems control; and 75-75-50/190 Gas fired heating system control strategy.

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

75-75-50/860 Documentation

Shared by: 75-75-50/110 Water supply systems control; 75-75-50/120 Heating systems control; and 75-75-50/190 Gas fired heating system control strategy.

- **Operating and maintenance instructions:**

  Scope: Submit giving optimum settings for controls.

  Product information: Include product description, date of purchase, performance characteristics, application (suitability for use), method of operation and control, and cleaning and maintenance requirements.

  Format: Paper copy.

  Number of copies: Three.

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• **Record drawings:** **Content:** For all controls cabling, the cable origin, circuit designation, route, conductor material and insulation type and colour, number of cores per cable, number of cables in ducts, on tray or ladder and Location of control panels, equipment and repeater panels. **Format:** A1 paper print and Electronic. **Number of copies:** Three. • **Cable schedules:** **Location:** To be defined. **Format:** To be defined. **Size:** To be defined. **Contents:** To be defined. • **Submittal date:** At handover.		
Ω End of system		

75-85-45/110 Lightning protection system

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System outline

75-85-45/110 Lightning protection system

- **Description:** The contractor must enlist the services of JW Gray
  Contact details
  Richard Morris
  J W Gray Lightning Protection Ltd
  Unit 1, Swanbridge Industrial Park
  Black Croft Road
  Witham
  Essex CM8 3YN
  Tel: 01376 503330
  Email: richardmorris@jwgray.com
- **System performance:** 75-85-45/210 Design of lightning protection systems.
- **System manufacturer:** As advised by specialist contractor
- **Air termination system:** To be defined.
- **Down conductor system:** To be defined.
- **Earth termination system:** To be defined.
- **Accessories:** To be defined.
- **Electrical identification:** To be defined.
- **Execution:** 75-85-45/630 Installing lightning protection systems.
- **System completion:** 75-85-45/810 Inspection and testing of lightning protection systems and 75-85-45/820 Documentation.

System performance

75-85-45/210 Design of lightning protection systems

- **Design:** Complete the design of the lightning protection system.
- **System designer:** A member of the Association of Technical Lightning and Access Specialists.
- **Standards:** To BS EN 62305-1, BS EN 62305-2, BS EN 62305-3 and BS EN 62305-4.
- **Class of LPS:** As advised by specialist contractor
- **External LPS type:** As advised by specialist contractor
- **Earth termination system:** As advised by specialist contractor
- **Internal LPS type:** Lightning equipotential bonding by direct connections, surge protective devices, and electrical insulation.
- **Requirement:** Submit proposals including detailed design drawings, technical information, calculations and manufacturers' literature.

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Execution

75-85-45/630 Installing lightning protection systems

- **Standards:** To BS EN 62305-3 and BS EN 62305-4.
- **Position:**

  Air termination components: As advised by specialist contractor

  Down conductors: As advised by specialist contractor
- **Substructure:** When used as the earth terminal network measure its resistance to earth during the construction period.
- **Results:** Submit.

System completion

75-85-45/810 Inspection and testing of lightning protection systems

- **Standards:** To BS EN 62305-3 and BS EN 62305-4.
- **Results:** Include within inspection guide.

75-85-45/820 Documentation

- **Standards:** To BS EN 62305-3 and BS EN 62305-4.
- **Inspection guide:**

  Submit including the following information: The general status of the LPS including conditions of air termination components, down conductors and earth system components.

  Format: Electronic.

  Number of copies: One
- **Record drawings:**

  Content: General arrangement drawings showing the location of all air terminals, tapes, earth rods, plates and electrodes, test joints, and plates, route of protective bonding conductors from the lightning protection system to other services and to the main earthing terminal.

  Format: Electronic drawing.

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

Ω End of system

80-45-45/120 Hydraulic lift system

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System outline

80-45-45/120 Hydraulic lift system

- **Description:** Refer to addendum for Lift specification
- **System performance:** To be defined.
- **System manufacturer:** To be defined.
- **Lift function:** To be defined.
- **Drive space:** To be defined.
- **Free-standing self-supporting shaft:** To be defined.
- **Electrical supplies to firefighters' and evacuation lifts:**
  - **Primary source:** Small power system.
  - **Secondary source:** To be defined.
- **Door arrangement:** To be defined.
- **Lift car:** To be defined.
- **Landing doors, frames and sills:** To be defined.
- **Controls:**
  - **Features:** To be defined.
  - **Passenger collection strategy:** To be defined.
- **Drive system:** To be defined.
- **Jack arrangement:** To be defined.
- **Oil cooler:** Automatic control to minimum temperature required.
- **Oil heater:** Automatic control to minimum temperature required.
- **Lift shaft and machine room cabling and containment:**
  - **Cable type:** To be defined.
  - **Containment:** To be defined.
  - **Containment accessories:** To be defined.
  - **Rewireable installation:** Required.
  - **Concealed installation:** Required.
- **System accessories:** To be defined.
- **Electrical identification:** To be defined.
- **Execution:** To be defined.
- **System completion:** To be defined.

Ω End of system

600682
New Chantry Centre

Financial Summary

11/02/2019

Financial Summary

Financial Summary	£
55-40-40/110 Incoming water supply	
55-60-55/110 Incoming gas supply	
50-10-05/120 Above ground wastewater drainage system with internal stacks	
55-40-40/120 Cold water supply system	
55-40-40/150 Direct hot water storage supply system	
55-60-55/120 Natural gas supply system	
60-45-40/110 Low temperature hot water heating system	
60-45-95/110 Variable refrigerant flow system	
65-10-95/130 Mechanical supply ventilation system	
65-10-95/140 Mechanical extract ventilation system	
75-75-50/190 Gas fired heating system control strategy	
75-75-50/120 Heating systems control	
75-75-50/110 Water supply systems control	
70-50-45/110 Incoming low voltage electricity supply	
70-70-45/110 Low voltage distribution system	
70-70-75/110 Hard wired low voltage small power system	
70-80-25/120 Amenity lighting system	
70-80-35/110 Hard wired general lighting system	
75-45-20/110 Data distribution system	
75-45-85/110 Telecommunications system	
70-70-25/110 Earthing and bonding system	
75-60-10/110 CCTV system	
75-65-30/110 Fire detection and alarm systems in non-domestic premises	
75-60-05/110 Electronic access control system	
75-60-40/110 Intrusion and hold-up alarm system	
75-70-05/120 Emergency voice communication system	
75-45-40/110 Audio-frequency-induction-loop system	
75-45-60/110 Sound system	
80-45-45/120 Hydraulic lift system	
Total £	

Financial Summary	£
Total from previous page	
75-85-45/110 Lightning protection system	
Provisional Sum - Cold Water System	2,000.00
Provisional Sum - Natural Gas	1,500.00
Provisional Sum - Hot Water	1,500.00
Total £	

Signed _____

For and on behalf of _____

Date _____