OUTREACH COMMUNITY HUB SHOTTON | MECHANICAL SPECIFICATION | Issue: TENDER T1 Date: June 2023

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1788 Outreach Community Hub Shotton

MECHANICAL SERVICES SPECIFICATION

Introduction

The works comprise the supply and installation of new Mechanical Services to new build Outreach Community Hub in Shotton County Durham. Refer to the Architect's drawings and associated documentation for further information.

The Main Contractor shall employ a Mechanical Services Contractor to undertake the works detailed in this specification. The Mechanical Contractor shall have broad experience of undertaking projects of a similar nature and value.

This specification shall be read in conjunction with the Architectural Specification and Drawings, the Electrical Drawings, the Mechanical Services Specification and Drawings and the Structural Engineers Specification and Drawings.

Compliance with Statutory Instruments, Regulations and Bye-Laws

The Contractor shall install and complete the works in accordance with the following relevant requirements:-

- Building Regulations.
- British Standards Specifications.
- CIBSE
- BESA
- The Chartered Institute of Plumbing and Heating Engineering
- Health and Safety at Work Act.
- Statutory Instruments.
- Local Authority Bye-Laws.
- Electricity Supply Regulations.
- IEE Regulations for the Electrical Equipment of Buildings.
- Gas, Water and Electricity Authorities' requirements.
- All relevant Codes of Practice.
- Notify all Authorities in accordance with their Bye-Laws.

Scope of Work

The Contract includes the supply, delivery to site, off-loading, positioning, installation and commissioning of all items of equipment and materials required for the following works including all skilled and unskilled labour and all incidental items necessary for the full completion of the Mechanical Services Installation ready for handing over to the Client in

working order and in accordance with the agreed programme. Throughout this specification the word 'Contractor' shall read as meaning Mechanical Engineering Services Contractor.

Outreach Community Hub is a new building which is to replace the function of an existing building on the site. The Mechanical services for the new Community Centre shall generally consist of the following.

Heating

The under-floor heating system shall be contractor design portion of this project and as described in this specification. The heat source for the heating shall be by air to water heat pump units located externally to the plant room.

Domestic Hot and Cold Water Services

An existing mains water supply which presently supplies the existing facility shall be isolated and capped to allow demolition then diverted to supply this new facility, the new mains water supply shall be taken to the new plant room and shall distribute to serve mechanical equipment, WC's, Cleaners Closet and Kitchen. The domestic hot water shall be provided by instantaneous electric water heaters WH-01 and WH-02 as described in schedule, each water heater shall be complete with un-vented kit where required.

A countertop Water Boiler WB-01 shall be provided and installed in the kitchen and shall be as schedule.

All domestic hot and cold outlets shall be fitted with chromium plated ballofix valves.

Ventilation

Supply air Ventilation to areas shall be via natural means such as manually opening windows and motorised roof lights. Extract ventilation shall be provided in WC's, Kitchen and Cleaners Closet and additional Extract Ventilation shall be provided in the Multi-Activity Space and Chill Out Space to augment the Natural Ventilation strategy.

The kitchen cooker shall be provided with a cooker hood as described in schedule; this shall be confirmed before ordering.

Programme

Commencement and completion on site shall be agreed with the Main Contractor and shall be in accordance with the Main Contractor's Programme of Works. The Contractor shall pay particular attention to site access and traffic restrictions, noisy work limitations and permitted working hours, the details for which are contained within the Main Contract Conditions of Contract and Preliminaries.

Allowance for such factors shall be included within the tender. Claims for lack of knowledge shall not be considered.

Co-ordination, prior to the installation of any equipment the Contractor shall agree with other trades, the location of equipment, routes for ductwork, pipework, cables, trunking, etc. in order to avoid friction between the trades. This shall include all structural elements and services running through or adjacent the respective areas.

Installation Requirements

All services shall be installed to achieve reliability and disruption free operations. All components shall be fully accessible for maintenance and replacement. Items requiring regular adjustment or affording isolation facilities, where located in concealed positions shall have removable access covers, tiles, or other suitable provision made to afford ease of access.

Contractor to satisfy himself that all plant spaces are adequate to house all items of plant as described.

The Contractor shall confirm all equipment sizes prior to ordering, Calculations shall be forwarded to d3associates for review prior to works commencing.

All services shall be installed with all aspects of Health and Safety at Work fully considered. All systems shall be installed to be economical in operation and particular emphasis shall be placed on the use of energy conserving design techniques and reliable components.

When preparing installation drawings, the Contractor shall have due regard for all aspects of the building design, location of all proposed services and shall make himself aware of any co-ordination problems which need to be resolved before the installation commences.

The Contractor shall retain on site a full set of up-to-date drawings, marked up showing current progress including any agreed amendments and these shall be available for inspection at all times.

All dimensions given on drawings shall be verified by the Contractor on site before the installation commences. The Contractor shall comply fully with Section (Inspection and Testing) of this specification. The Contractor's attention is drawn to the requirement to comply with Building Regulations.

This includes the requirement to comply with Part L – Conservation of Energy. In addition to suitable metering of energy usage, energy saving measures must be provided, including photoelectric and presence detection for lighting.

Tender and Summary

Tenders shall comply strictly with the specification and shall not deviate from it. Should anything be omitted from this specification which is normally considered necessary for the proper operation of the proposed plant or compliance with any relevant code, standard or regulation, the contractor shall include for the provision of all materials and the execution of the associated works so omitted to the reasonable satisfaction of the project manager (pm) or his appointed representative, as if they were specified herein. Any costs or savings occasioned by departures from the specification shall not be included in the tender figure. Such extra costs or savings, together with a clear description of the variation(s) or deviation(s), shall be submitted separately at the time of tendering.

The Tender drawings issued are provided to show primary routes, design intent, component order etc. They shall not be used as working or fabrication drawings.

Ascertain on site that the installation will not foul other permanent services or equipment. Notify the Engineer if it is necessary to make changes to take account of site conditions.

The positions of equipment shown on the drawings shall be assumed to be correct for the purpose of tendering but these positions are approximate only, and must not be scaled for the purpose of actual fixing.

The Contractor shall complete all sections and elements of the Summary of Tender enclosed with this specification and return it with the tender submission.

The Contractor shall provide the following minimum information:

- Properly completed tender summary sheets.
- Schedule of proposed manufacturers for plant and equipment where not uniquely specified.
- Proposed programme identifying design and installation periods and key procurement dates.

The Contractor shall note that this project shall be carried out in accordance with the Health & Safety Executive Construction (Design and Management) Regulations 2007.

The Contractor shall include in the tender for complying with the CDM Regulations 2007 in full and as detailed in the Main Contract Preliminaries.

Builders Work

The builders work associated with the Mechanical Installation works shall be executed by the Main Contractor. The builders work comprises the elements of building work necessary to incorporate the services installation into the building/structure, fabric and finishes including cutting out of all chases, holes, forming openings and pipe sleeves, provision of supports/noggins in walls to accommodate fixing of services equipment and the provision of plywood backboards for the support of ceiling mounted grilles, etc.

The Contractor shall be responsible for marking out builders work where required.

All making good and painting shall be carried out by the Main Contractor.

Fire Stopping of small holes shall be coordinated with the main contractor. the contractor shall identify on layout drawings any small holes formed for the routing of services that breach the fire compartment walls.

The contractor shall include for all access equipment, lifting tackle, scaffolding, manual handling equipment, personal protective equipment and site operatives to enable all materials required for the works to be safely delivered, moved around the site, hoisted into position and installed.

The following is a schedule of the builder's work which shall be adopted as guidance only and shall be not limited to it:

Mechanical Services Builders Work

- External concrete pad for mounting ASHP's; 800 mm wide x 2800 mm long x 150 mm high above ground level.
- Provide purpose made Security Enclosure for ASHP's, to be chain link type to provide free air flow. Enclosure shall be fixed to wall and base and enclosing ASHP's on three sides, 800 mm wide x 2800 mm long x 1500 mm high. Enclosure shall be removable to allow maintenance to the units.
- Provide, frame out and build-in 1 no 600 mm x 600 mm access panel in the Store shall be fire rated as per architectural requirements. All access panel locations shall be agreed with Mechanical Contractor before installation.
- Build in and provide 1 no 100 mm diameter ducts in plant room floor to accept Mains Cold Water Services.
- Form holes in external walls to accept ventilation louvres; 1 no 800 mm x 900 mm, 2 no 300 mm x 300 mm.
- Undercut doors; 4 no by 10 mm.
- Excavate trench for incoming mains water from existing services approximately 600mm wide x 1100mm deep x 20 m long, cover top and bottom with sand/pea gravel and back fill with graded material.

Tender Drawings

DRAWING NUMBER	DRAWING TITLE
SHO-D3A-00-00-DR-M-5601	Mechanical Building Services - Ventilation Installation
SHO-D3A-00-00-DR-M-5602	Mechanical Building Services – Domestic Water Services
SHO-D3A-00-00-DR-M-5603	Mechanical Building Services - Heating Services

Under Floor Heating

The underfloor heating shall be a "contractor design" however manifold locations and piping arrangements are shown on drawing M-5603 for coordination purposes, any deviation from these drawings shall be deemed to be included in the tender as with any subsequent electrical and builders work.

The wet underfloor heating system (UFH) shall be designed, installed and commissioned by the underfloor heating supplier **MYSON UFH** Quote reference **GHD 50423** and shall include control **Option 1** and the following, as a minimum:

230V Actuators	20 no
230V Wiring Centres	2 no
A-Rated Pump Packs	2 no
Unisenza Dial Thermostats	9 no
MEP1C Programmers	2 no
Discreet Air / Floor Sensors	9 no

The Composite Blending Manifold, with BBA CERT.10-4738 accreditation, shall be installed to operate the UFH flow and return temperatures at 45°c flow / 40°c return subject to design criteria.

The manifold shall include AAV valve assembly, flow indicators, pressure and temperature gauges, isolating valves, thermal actuators, thermostatic control valve, Grundfos Alpha (or equal) 2L 15-60 circulating pump and high limit flow protection thermostat, to interrupt the power supply, in the event the flow temperature exceeds a recommended safe level.

Pipework shall be a 5 layer polybutylene with an EVOH oxygen barrier layer in 16 or 20 mm. The pipe shall carry a warranty of 100 years and manufactured in the UK.

Each individual zone shall have dedicated circuits controlled by the Sentio control system. The controls shall have the ability to protect floor finishes against overheating.

Pressure test pipework to a minimum of 3 bar and a maximum of 6 bar must be applied to all under floor heating pipework prior to and during floor fixing.

The temperature within each of the heating zones shall be sensed by a room temperature sensor and monitored by the underfloor heating automatic control system.

Outside the occupancy period the underfloor heating control system will open and close the underfloor heating circuit manifold control valves in order to maintain a setback temperature of 15^{o}C

Screed Curing

Screed curing, a minimum of 21 days should be allowed for the screed to be fully cured before the heating system is commissioned (7 days for Anhydrite). At this time the under-floor heating flow temperature shall be limited to 30^{O}C and then increased by 3^{O}C per day until the design flow temperature is reached.

The floor screed must comply with the requirements of British Standard 8204-1:2000. Particular attention must be given to screed thickness, bay sizes and expansion joints.

Floor Covering

Floor finishes shall be as identified on Architectural drawings. Ceramic Tiles or Vinyl floor coverings should not be laid until the screed has been fully dried. The heating should be turned off one day prior to laying these floor coverings. To avoid re-absorption of moisture, the flooring should be laid no more than 3 days after the heating is turned off. Where a timber floor is to be fitted, the floor must not be laid until the screed is fully cured and the heating system has been running for a minimum of 1 week. The screed moisture content should be checked to ensure that it falls between the acceptable limits as given by the flooring manufacturer.

Ambient Ait Temperatures

The under-floor heating pipework should not be laid with ambient air temperatures below 0^{o}C. Screed should not be laid with ambient air temperatures below 5^{o}C.

Air Source Heat Pumps (ASHP's)

General

The ASHP's shall be Mitsubishi ECODAN with performance and details are to be as scheduled on the drawings.

The ASHP's shall be factory sealed, packaged, inverter driven. The inverter-controlled compressor will allow for a soft start current at initial start, and optimise the unit capacity and efficiency to that of the connected heating system. The heat pump will use the outdoor air as its heat source and be optimised to run on R32 refrigerant. The refrigerant circuit shall be hermetically sealed and factory tested ready for installation.

The ASHP unit will comprise of:

Air to refrigerant stainless steel heat exchanger.
Inverter controlled evaporator fan(s).
Evaporator coil will be constructed from copper tubing and aluminium fins.
Inverter driven, R32, hermetic compressor.
The heating or defrost cycle will be controlled by a four way valve, which will reverse the cycle of the refrigerant to change the mode of the outdoor unit.
Selectable 'low noise' mode to reduce sound level at normal conditions if required.

The range of units shall be capable of operation down to the following ambient temperatures.

The performance de-rate due to low ambient air temperature must be minimal, the defrost cycle should be both 'sensed' and 'timed' by the control system.

Electrical Details

W085 model – SP&N, Nominal running current 11.2 A, Maximum 29.5A

ASHP Controls

All controls described below shall be confirmed as applicable to current standards and applications set out by the manufacturer regardless.

LTHW Pump (P-01A/B) shall be operated by the Heat Pump control system via a relay and power from the supply. The specified pump includes a variable speed drive which shall be utilized for commissioning purposes only, with fixed speed during operation.

Installation of Heat Pump Unit

The two Mitsubishi Heat Pump units PUZ-WM85YAA are to be installed by **ACROL AIR CONDITIONING QUOTE Reference EN 20583/DW** and shall include for all control wiring, low loss header assembly and individual Heat Pump circulation pumps, installation, and commissioning of the ECODAN system shall only be undertaken by a Mitsubishi Electric

approved ECODAN installer (AEI's) as well as being a member of the Micro generation Certification Scheme.

It shall be the contractors responsibility to locate the units to provide unobstructed air flow, access for servicing and maintenance and correct installation of pipe work. The units shall be complete with extended height anti-vibration mounts and located and securely fixed on a concrete pad or paving slabs with security fencing and a lockable access door. Unit(s) shall be complete with condense drain kit and trace heating, including relay to avoid condense freezing.

All field supplied pipework shall be connected to the unit(s) by two 600 mm long braided steel flexible pipes, (insulated) on the flow and return connections, supplied with the unit. All internal and external pipework shall be insulated to ensure minimal heat loss and with external pipework having maximum weather protection. The insulation shall be closed cell foam insulation (armaflex or equivalent). All insulation joints shall be joined by tape/glue to reduce heat losses and with external pipework protected with an approved paint finish to prevent UV degrading.

Pipework shall be protected from freezing by adding FERNOX ALPHA-11 anti-freeze inhibitor to the primary circuit at a concentration of 25% by volume or as recommended by the manufacturer. To aid in filtering and plate heat exchanger protection FERNOX TF1 shall also be added to the primary circuit, this shall be provided by with the ECODAN unit by the manufacturer.

A flow setter valve(s) shall be installed in the primary circuit to prove the required minimum

Heat Pumps shall be supplied, installed and commissioned by ACROL Air Conditioning Co Ltd, Saltmeadows Road, Gateshead, Tyne and Wear, NE8 3AH.

Pipework and Fittings

Pipework

All pipework shall be copper tube to BS 2871 Part 1 Table X assembled with Yorkshire `YP' capillary ring fittings up to and including 54 mm to BS 864 employing 'lead free' solder rings. For ease of maintenance compression type fittings shall be used at connections to equipment. All materials and fittings shall be non dezincifiable and shall meet the requirements of the current Water Regulations

Horizontal pipes shall have a gradient set to clear air at the vent points. All reductions in size on horizontal pipes shall be made with eccentric fittings. Careful observation of parallels and symmetry of arrangement is required throughout always providing that the air gradients are maintained. Where fixed along walls, floors or ceilings, the pipe surfaces, or if insulated, shall have a clearance of 25 mm from walls, 100 mm from finished floor level at the lowest points and 100 mm from ceilings.

All pipes shall be fixed with sufficient clearance from obstructions capable of resisting expansion. All pipes and plant, where practicable, shall have a clearance of 150 mm from electric cables and/or conduits. Domestic cold water pipework shall not be run adjacent or above "hot" pipes.

Pipework Insulation

The following services shall be thermally insulated:

- The LTHW Heating installation from ASHP to manifolds.
- The H&CWS Installations.

Insulation shall be carried out by an approved firm being a member of the Thermal Insulation Contractors' Association. Insulation shall not be applied to any service until all the systems have been tested and witnessed, and be in accordance with this specification. All surfaces shall be thoroughly cleaned down and damaged areas painted before insulation is applied.

The thickness of the insulation (based on a 'k value' of 0.04 W/mK) shall be in accordance with the details indicated in the following table.

Pipe Size mm	LTHW Htg	HWS	MCWS
15	25	30	30
20/22	25	30	30
25/28	25	30	30
32/35	25	40	30
40/42	25	40	30
50/54	25	40	30

Insulation materials containing CFCs or where CFCs are used in the manufacturing process shall not be permitted.

Insulation Materials

Insulation material for pipework shall be mineral rock fibre rigid sections complying with BS 3958 Part 4; BS 5422, BS 476 Part 4 or 'Koolpen'. The internal pipework insulation shall be finished in aluminium paper foil providing a Class 'O' surface spread of flame with all joints sealed. Bends and fittings shall be insulated with similar sections neatly mitred to fit with all joints sealed with aluminium tape. External pipework insulation shall be as above with water proof covering OSOGENOPAK or equal.

Insulation of all valves and flanges in plant spaces shall be by fully insulated with purpose made ceramic filled valve/flange jackets neatly sewn throughout complete with velcro band fasteners and draw chords.

Identification of Services

The Contractor shall include for the identification of all services which shall be in accordance with BS 1710.

For pipework basic colour bands shall be placed either side of the safety colour band and shall be a minimum width of 75 mm for diameters up to 50 mm and 150 mm wide for diameters above 150 mm. Basic colour bands shall be located at all valves, junctions, service appliances, structural and fire penetrations, access openings to ducts and voids and at intervals not greater than 3 metres throughout the pipework installation. The band shall be provided 75 mm wide, showing direction arrows. The arrows and shall be black on a white background. The band shall be provided with lettering indicating the contents of the pipe. The lettering shall be black on a white background 10 mm high for insulation diameters less than 50 mm and 38 mm for diameters greater than 50 mm.

Expansion Devices and Anchoring

Expansion of pipework shall be taken up by the natural offsets and changes of direction of pipe runs and the installations shall be such to accommodate this expansion; alternatively expansion devices shall be fitted as specified

Anchoring of pipework shall generally comply with BS 3974 Parts 1 and 2 provided with steel brackets rigidly attached to the structure. Pipes shall be secured and guided such that they do not deform or become overstressed.

Fixing to Structural Steelwork

Welding to, or fixing beam clamps to, structural steelwork for brackets, supports or anchor points shall not be permitted without the approval of the Engineer. Drilling of structural steelwork for fixing of services will not be permitted without prior approval by the Engineer.

Brackets and Hangers

All brackets and hangers shall be fitted with special attention to freedom for expansion either in horizontal or vertical planes and for air elimination and drainage. Supports for pipework shall be arranged to allow freedom for expansion movement.

Where it is not practicable to use standard commercially manufactured brackets, the Contractor shall supply and fix suitable purpose made supports to suit the positions. All pipelines shall be individually supported; pipes slung from other pipes shall not be permitted.

All metal supports, tees, angle and channel iron, screws, bolts, etc. shall be provided and fixed by the Contractor who shall be responsible for the accurate setting out of same.

Table of Maximum Spacings for Pipework Supports

	Horizontal Spacings Metres			**Vertical Spacings Metres**		
Nominal Pipe Size mm	Steel or Iron Pipes	or UPVC ABS Pipes	or Copper Pipes	Steel or Iron Pipes	or UPVC ABS Pipes	or Copper Pipes
15	1.8	0.8	1.2	2.4	1.2	1.8
20	2.4	0.8	1.2	3.0	1.2	1.8
25	2.4	0.9	1.5	3.0	1.3	2.4
32	2.4	1.0	1.8	3.0	1.5	3.0
40	2.4	1.1	1.8	3.7	1.6	3.0
50	2.4		1.8	3.7		3.0

Supports Ceiling in & Roof Voids

Pipe supports shall be Flamco Type A clips supported from drop rods on Unistrut members either spanning between purlins or secured to the structure. In roof voids the Unistrut shall be clamped/bolted to steel roof supports (see above).

Brackets shall be malleable iron for steel pipes and brass for copper pipes.

Except where otherwise specially stated on drawings, horizontal and vertical pipes shall be supported at intervals not greater than those given in the above table.

Pipe Sleeves and Cover Plates

All pipes passing through walls, floors, ceilings, etc. shall be provided with a loose fitting sleeve keyed into the structure, finished flush with wall, floor except in bathrooms and toilets where they shall have a 15 mm upstand above the floor or ceiling and complete with Flamco RKW white plastic Escutcheons. Wall sleeves shall not be used as supports for pipes and pipes shall in all cases be clear of the sleeves at all points.
Pipe sleeves shall, in all cases, be manufactured from the same material as the pipework conveying the service.

Isolating Valves

Sizes up to and including 50 mm shall be Crane Fig. D155C/D151A/D237A gate valve, solid wedge disk, non rising stem, screwed in bonnet handwheel or lockshield pattern as applicable, threaded to BS 21, pressure rating PN20 or equal and approved. Alternatively, Crane Fig. D171 ACEXS improved leak resistance, bronze ball valve, quarter turn, lever operation, with extended stem to suit insulation thickness shall be used, include for adaptor kits for copper pipe. All valves on domestic Hot and Cold Water Services shall be WRAS approved.

Double Regulating Valves (DRV)

Sizes up to and including 50mm shall be Crane Fig. D921/ D923 double regulating valve (Y-Pattern globe valve incorporating a characterised throttling disk), 1" to 2" taper threaded to BS EN 10226-2 (ISO 7 – 1), ½" and ¾" parallel threaded to BS EN ISO 228-, pressure rating PN25, include for adaptor kits for copper pipe, or equal and approved.

Fixed Orifice Double Regulating Valves (FODRV)

Sizes up to and including 50mm shall be Crane Fig. D933/ D934 double regulating valve (Y-Pattern globe valve incorporating a characterised throttling disk), 1" to 2" taper threaded to BS EN 10226-2 (ISO 7 – 1), ½" and ¾" DN15 & DN20 parallel threaded to BS 2779 EN ISO 228-, pressure rating PN25, include for adaptor kits for copper pipe, or equal and approved.

Commissioning Valve Sets (CS)

Sizes up to and including 50mm shall be Crane Fig. D942, D941 or D940 depending on flow rate, fixed orifice double regulating valve, 1" to 2" threaded to BS EN 10226-2 (ISO 7-1), ½" and ¾" DN15 & DN20 BS 2779 (ISO 228) pressure rating PN25, include for adaptor kits for copper pipe, or equal and approved.

Check Valve (NRV)

Sizes ¾" to 3" shall be Crane Fig. D138, depending on flow rate, bronze swing check valve with metal disk, taper threaded to BS EN 10226-2 (ISO 7-1), pressure rating PN25, include for adaptor kits for copper pipe, or equal and approved.

Strainer (STR)

Sizes 15mm to 50mm shall be Crane Fig. D298 for heating and D297 for domestic (WRAS approved), bronze body to BS EN 1982 CC49K, stainless steel mesh to A.I.S.I type 304, taper threaded to BS EN 10226-2 (ISO 7-1), pressure rating PN16, include for adaptor kits for copper pipe, or equal and approved.
Each Heat Pump shall be fitted with heat pump manufacturers type F1 filter.

Ballofix Isolation Valve (BV)

To be installed at every domestic hot and cold water outlet, sizes 15mm to 28mm shall be Pegler ballofix isolating valve, straight pattern, compression ends, DZR brass, commercial chrome finish, WRAS approved, or equal and approved.

Thermostatic Mixing Valves (TMV)

Thermostatic mixing valves shall be CRANE D1089 TMV3 complete with integral strainer, check valves, isolation valves and tamper proof adjustment. TMV shall be tested and certified to the requirements of D08 specification under TMV3 scheme. Valves shall be installed on all domestic hot water outlets on wash hand basins in public and assisted WC's, compression ends, DZR brass, commercial chrome finish, WRAS approved, or equal and approved.

Air Vents

Air cocks and air bottles shall be provided and fixed in the positions indicated on the drawings and where they may be required to vent the installations. Three air cock keys shall be handed to the Employer. Automatic air vents shall be installed at all high points in the system in order that the full system is automatically vented. These shall be Flamco Flexvent Super installed complete with an isolating ball valve.

Drain Cocks (DC)

The Contractor shall fit drain cocks to ensure that the entire system can be drained down. Drain cocks in Plant Rooms shall be of the gunmetal plug type with interchangeable hose unions and loose level handles. Emptying cocks above floors shall be fixed as unobtrusively as possible and are to be brass draw-off plugs type.
Drain cocks shall be provided to allow all sections of the hot and cold water services to be drained down. Drain cocks shall be Crane Fig. D341, WRAS approved, or equal, positioned such that the hose connection can be easily made. Provide 3 no. operating keys.

Thermometers.

Provision shall be made for temperature measurement by installing thermometer pockets in the positions indicated on the drawings and where specified. Pockets shall be stainless steel and comply with BS 2765 with external threads for attachment to the pipework and internal threads to accept the detecting element of a thermometer. Fittings shall be arranged so that the thermometer can be easily read from an access area. Pockets shall be filled with an approved paste or oil to ensure an accurate reading.

Thermometers shall be mercury in steel direct monitoring type with 100mm dial complying with BS 5235. The dial shall be graduated so that the normal working temperature is in the midpoint of the scale.

Pressure Gauges

Provision shall be made for pressure measurement by installing gauge connections in the positions indicated on the drawings and where specified. Gauge connectors shall comprise copper syphon pipe to BS 2871 Table X complete with gauge cock. Gauge cocks shall be bronze construction with lever handles and ends screwed to BS 21 to suit connections to the pressure gauge. Pressure gauges shall be direct mounting Bourdon type with 100mm dials complying with BS 1780 scaled in kPa on the outer scale and bar on the inner scale. Each pressure gauge shall be complete with an adjustable red pointer which can be set at the normal working pressure of the system. Pressure gauges shall have dials calibrated to read from zero to 1.3 times and not more than twice the operating pressure.

Ventilation

Supply, install and commission the ranges of ductwork as shown on the drawings.

The Ductwork Manufacturer and installer shall be a member of the Heating and Ventilation Contractors' Association Ductwork Group. Notwithstanding any sets, offsets and changes of section indicated on the drawings the Contractor shall allow for all ductwork sections which are required for the installations.

Ductwork shall be constructed and installed in accordance with HVCA Document DW 144 for low velocity ductwork systems.

Extract Ventilation

Mult-Activity Space Hall extract fans **EF-01**; shall be located at high level in plant room discharging through a wall mounted louvre. The fans shall be complete with ON/OFF speed controllers mounted on wall (see schedule).

WC extract fan **EF-02**; shall be located in roof space above the cleaners room 17 and discharging through a wall mounted louvre. The fan shall be a cabinet twin type with duty and standby with auto change over from a type 149-ACO14E factory controller, the extract fan shall operate by activation of one of seven PIR detectors for an adjustable predetermined period.

Extract fan **EF-03**; shall be ceiling void mounted and generally provide ventilation from the adjoining space to the office 6. The fan shall be complete with ON/OFF speed controllers mounted on wall (see schedule).

Kitchen extract fan **EF-04**; shall be ceiling space mounted and discharging through a wall mounted louvre. The fan shall be complete with ON/OFF speed controllers mounted on wall (see schedule).

Testing and Commissioning

The Contractor shall include for the Testing and Commissioning of all the systems and plant installed under this contract.

Commissioning generally shall be carried out in accordance with the CIBSE Commissioning Codes and Publications.

Testing of all the various systems and plant installed under this contract shall include pressure tests, heating and contraction tests, calibration and operation tests to ensure that the whole of the contract is handed over in proper working order.

It is the Contractor's responsibility as part of commissioning to ensure that free movement is obtained at maximum expansion on all heat carrying systems.

The Contractor shall include for costs of all necessary attendance, labour, fuel, materials, electricity, heat, temporary equipment, tools and instruments required to carry out the Testing and Commissioning procedure.

The Contractor shall include for all arrangements to enable the Architect or his representative (including Insurance Company's Inspector) to test and inspect as required at manufacturers works plant and equipment during the manufacturing and erection stages.
The Architect or his appointed representative shall be present to witness all aspects of on-site tests.

The Architect shall be given 5 working days' notice of all intended on site tests.

The Contractor shall include in his tender for the proper filling, venting and draining of all installations or sections of installations and make due provision for suitable disposal of the testing media, and shall make good all defects arising out of or caused by tests. If the test pressure is not maintained for the specified period the Contractor shall make good any weak joints, defective fittings or plant and repeat the test in the presence of the Architect or his appointed representative until the test conditions are maintained.

Certification of all tests made on site or at manufacturers works shall be forwarded to the Architect for his approval.

All tests shall be carried out and approved before any paint, thermal insulation or similar cladding material is applied to pipes or plant and before any services are concealed within the building structure.

Where necessary a separate set of drawings shall be provided by the Architect for the purpose of accurately recording site tests.

All site test certificates shall be signed by the Contractor and by the Architect or his representative appointed to witness the test.

When systems have been tested and drained down, they shall be flushed out and/or cleaned and left ready for subsequent commissioning.

The Contractor shall include for the necessary filling, recharging, venting and the like of the system and plant to allow commissioning to proceed at times to be agreed with the Architect.

When hot and cold-water service pipes, fittings, the Contractor shall allow for suitable chlorination treatment (in conjunction with the supplying authority) and flushing out followed by confirmatory tests to ensure that bacteriological contamination is not present.
Sterilisation of the HWS/CWS installation shall be carried out in accordance with BS 6700, Section 3, Clause 13.9 on Page 61 and DHSS Code of Practice "Prevention of Legionella" testing procedures. Installation and commissioning of such systems shall comply with CIBSE Publications TM13 and GN3 (1993).

All test certificates shall include the following particulars: -

Plant and Equipment

All plant and equipment specified of this specification shall be tested either on site or at the manufacturer’s works in accordance with the appropriate British Standards and Statutory requirements.

Heating Systems

The whole of the heating system shall be subjected to a hydraulic test pressure of twice the working pressure or 3.40 bar whichever is the greater; the test shall be maintained for a

period of not less than one hour or as is necessary to inspect the whole of the installation.

Note: Under floor heating pipework may not be able to sustain the same test pressure as the main distribution pipework and therefore the two systems shall be tested separately.

Hot Water Services Systems

The whole of the Hot Water Service installation shall be subjected to a hydraulic test pressure of twice the working pressure or 3.40 bar whichever is the greater for a period of one hour or as long as is necessary to inspect the whole of the system.

Cold Water Services Systems

The whole of the main cold water supply systems shall be subjected to a hydraulic test pressure of twice the working pressure or 6.80 bar whichever is the greater for a period of one hour or as long as is necessary to inspect the whole installation.

Ventilation System

All ventilation systems shall be operated under normal working conditions during which time all joints shall be tested for air leaks and all air inlets and/or outlets tested.

The systems generally shall be tested to conform with DW 144.

Commissioning

After the foregoing tests have been satisfactorily completed by the Contractor and at the appropriate stage of the works the Contractor shall carry out the necessary commissioning procedures which shall include the following:-

a) Setting to work all systems and plant together with associated control systems as specified and ensuring that the performance requirements have been achieved.

b) Balancing and regulating all systems and plant to meet specified performance requirements shall include the preparation of records/drawings giving the following typical information: -

i) External Conditions DB/WB.

ii) Circuit flow and return temperatures.

iii) Internal space temperatures DB/WB.

iv) Air flow volumes, relating to ventilation systems.

v) Settings of all circuit regulating valves and dampers.

vi) Settings of all automatic control elements and the like.

vii) Pressures and flow developed by pumps.

viii) Water draw off temperatures.

Operation and Maintenance Manuals

Digital cad files shall be provided by the consultant for the contractor, to be digitally updated for the provision of “as fitted drawings” to be incorporated into the O&M manuals.

The Contractor shall furnish to the Engineer before Practical Completion two copies of the Operation and Maintenance Manual. A copy of the complete set of manuals shall also be provided on memory stick which is to compatible with the Employers I.T. system.

The manual shall be of the loose-leaf lever arch type A4 size, having stiff covers, cardboard sub-divisions for each section, a ready means of reference and a detailed index.

The manual shall contain full Operating and Maintenance Instructions for each item of equipment presented in a form to deal systematically with each system and shall include for, but not be limited, to the following:

- Health and Safety Information
- Risk Assessment for the installations.
- Plant with nameplate details.
- Valves
- Automatic control items and systems and control settings.
- Type of lubricant required for each item and frequency of lubrication.
- Legend for colour coding of all services.
- Internal wiring diagrams of equipment and panels.
- Procedures for fault finding.
- Procedure to adopt in an emergency should any item fail in its operation.
- Itemised lists of essential and secondary spares for all plant and equipment.
- Index of As Fitted Drawing numbers and titles.
- Records of Performance Tests.

The manual shall contain Manufacturer's standard Operating and Maintenance Instructions and leaflets where these are applicable. Where the equipment is non-standard then information for the manual shall be obtained by the Contractor from the Manufacturer.

Standard `hand-out' cards supplied by the manufacturers with the equipment shall be fixed by the Contractor to plant room walls adjacent to the equipment.

Demonstrations of plant operations to user.

The contractor shall include for arranging and demonstrating to the user the operation and maintenance requirements for all items of plant and equipment. This shall include but not limited to:

- Ascertaining the user's operation of the building and setting all automatic controls to suit these requirements without the detriment to the plant and equipment.
- Explaining and detailing any Time Clock and temperature control of underfloor heating and air source heat pumps, controls etc.
- Explaining and detailing the maintenance requirements of all plant and equipment during and after the 12-month defects liability period.
- Providing emergency contact details for defects to all equipment occurring during the 12-month defects liability period.
- A record of the above shall be made by the contractor detailing the name(s) of the users and the contractors' representatives present and submitted as part of the O and M manuals.
-

Add in handover information required testing & commissioning certs etc.

Hand Over Requirements

Operating and Maintenance Instructions

No later than two weeks prior to the commencement of commissioning provide one draft copy of the manual for comment.

Issue the final version of the manual on completion of the works. (3 copies required plus one electronic copy). Each manual

should be A4 size, in plastic covered loose-leaf ring binders with hard covers.

Ensure each manual contains the following information: -

Section 1 - General Index.

This section shall contain the index for the entire content of the manual.

Section 2 – Emergency Procedures

This section shall describe actions to be undertaken in the event of an emergency and shall include a full directory of names addresses and telephone numbers of individuals, or organisations to be contacted. A guide to fault finding.

Section 3 – System Operation

This section shall contain a description of each system, its operational intent, and a schedule of the parameters used as a basis for the design of that particular system.

A full legend for the colour coding of all services.

Section 4 – System Operation & Set points.

This section shall contain a description of operational routines, which includes procedures to be followed to 'start up' and 'shut down' all items of plant and equipment, how to undertake various testing procedures and fault finding.

A schedule of set point control settings for normal operation of each system shall also be included. Schedules system by system, of plant and equipment stating their locations, duties, and performance figures.

Section 5 – Schedule of Plant & Equipment

This section shall contain a full schedule of all plant and equipment, including duty, electrical load, flow rates and the like where applicable. A schedule of all equipment settings established during commissioning. Procedures for seasonal changeovers. The manufacturers name, address and telephone number for each item of plant and equipment.

Section 6 – Spares

This section shall contain comprehensive lists of spares and materials as proposed, a list of normal consumables and recommended lubricants.

Section 7 – Planned Maintenance Instructions

This section shall contain a description of planned maintenance instructions, for all systems and each item of plant and equipment, and must include step by step instructions, to supplement the manufacturer's literature.

This section shall contain manufacturer's literature, relevant equipment data only shall be extracted from the manufacturer's literature and included within these documents, literature which contains descriptions of equipment, which is of concern to the end user, shall not be included.

Recommendations as to the preventative maintenance frequency and procedures to be carried out to ensure efficient operation.

Where equipment is non-standard, information for the maintenance manual shall be obtained from its manufacturer.

Section 8 – Commissioning Results

This section shall contain a full set of the commissioning results for each system, presented in a format which is easily understandable, and which contains equipment and valve references which relate exactly to references noted on the installation and record drawings.

Originals of the following shall be provided:

- Main Plant Testing & Commissioning sheets.
- Chemical Cleaning Certificates.
- Water treatment analysis & regime.
- Chlorination Certificates.
- I.E.E. inspection and completion certificates.
- Manufacturer's Test Certificates for specialist equipment.
- Secondary & Tertiary systems flushing certificates.

- Secondary & Tertiary systems pressure testing certificates.
- Secondary & Tertiary systems balancing certificates.
- Automatic Controls (BMS) Testing & Commissioning Certificates.
- Electrical services associated with the Mechanical Services Testing & Commissioning certificates.

Section 9 – As-Installed Drawings

The use of the base services layout drawings prepared by the Services Engineer will be permitted to enable the drawings required by this section of the works to be prepared. The engineer will not, under any circumstances, accept any responsibility for any discrepancies, errors or omissions in any of the base drawings provided by him.

These drawings shall indicate the routes and sizes of all external and internal services and the actual positions of all terminal points.

Provide for each plant and switch room included in his works, drawings/diagrams on heavy gauge paper sheet, framed, glazed and wall mounted in the respective rooms. Include positions of all items of plant and equipment as well as pipework, ductwork and electrical circuits of the installed plant.

Obtain approval before glazing and mounting.

Record drawings of buried services shall be dimensioned from fixed points, e.g. curbs, building lines etc. to indicate the exact route of all services and actual positions of all joints.

In order to prepare these drawings, the Contractor shall keep on site one set of drawings showing the progress of the work installed indicating all pipework, valves, pumps, control stats, heat emitters, thermostatic valves, mechanical plant and equipment etc. and showing all modifications and variations. These drawings shall be kept up to date as the work proceeds and facility shall be afforded to the Engineer to inspect these drawings upon request.

The drawings shall indicate for each pipe whether it is run on the surface, concealed in wall chase, wall partition, structural floor or other method of routing.

All drawings shall be suitably layered, and each layer shall be given a short descriptive name.

Include on the drawings the following items in sufficient detail to enable the building occupier to operate, maintain and adjust the plant and equipment:

- The location level and sizes of all below ground services.
- The positions of all plant and apparatus.
- The sizes, types and routes of all pipework, cables and conduits.
- The exact route and invert levels and the sizes, types and dates of installation of all underground pipework.

- The exact route and invert levels and the sizes, types and dates of installation of all underground cables.
- The location of any other services or obstructions in the routes of underground pipework and cables.
- The location and size of all isolation, regulation and control devices for each pipeline system.
- The location and size of all isolation, regulation, fire and control devices for each ventilation system.
- The location and reference numbers of access panels in suspended ceilings.
- The location of all electrical equipment associated with the mechanical services installation.
- The identification references of all plant and equipment.

Record drawings shall also be provided for all plant and equipment which, together with the printed instructions provided shall be sufficient to enable the plant and equipment to be operated, maintained, dismantled, re-assembled and adjusted.

Control wiring diagram for all equipment supplied (including manufacturers drawings of special equipment) shall be kept on site and modified as the work proceeds to record any variations.

Not later than two weeks prior to the completion of the works provided two copies of each record drawing to the Engineer for approval. Following approval, insert one print copy in the operating and maintenance document, and one disk copy of the drawings in AutoCAD format.

The relevant record drawings of plant, equipment and instructions shall be completed by the date of Practical Completion, or Taking Over of part of, or Whole of the works. If the record drawings are not available, the Engineer will not recommend the issue of a Certificate certifying completion. Thereby delaying the adoption of said asset, the situation will also apply if the marked-up drawings required to be produced during the progress of the works are not made available.

Section 10 – Electronic Copy of Documents

Three copies of the Operating & Maintenance Manuals shall be completed and Issued to the Engineer by the date of Practical Completion, Partial Possession or Taking Over.

Receipt of the completed Manuals by the Engineer shall be a condition precedent to the issue of any Certificate of Practical Completion, Partial Possession or Taking Over.

If for other reasons a Certificate of Practical Completion or Taking Over Certificate is issued without the Manuals being provided the adoption process may be delayed.

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APPENDIX A -1

AIR SOURCE HEAT PUMP SCHEDULE			
REF	**MODEL**	**CAPACITY**	**POWER-Running Current-(Max A)**
ASHP-01	**PUZ-WM85YAA**	**8.5 kW**	**TP&N-2.9 A-(11.5A)**
ASHP-02	**PUZ-WM85YAA**	**8.5 kW**	**TP&N-2.9 A-(11.5A)**

Note:

1. **Heat Pumps shall not be ordered until underfloor heating requirements are confirmed.**
2. **To be read in conjunction with specification for ancillaries.**
3. **Heat Pumps shall include unit circulating pumps etc.**
4. **Units shall be complete with extended height anti-vibration mounts.**
5. **Shall include all control wiring by ACROL.**
6. **Heat Pumps shall be supplied, installed and commissioned ACROL Conditioning.**

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APPENDIX A - 2

COOKER EXTRACT HOOD				
REF	**MODEL**	**DIMENSIONS**	**FLOW RATE**	**POWER**
CH-01	**Luxair LA Master Range**	**1200 wide x 550 deep**	**TBC**	**SP&N**

Notes:

1. **Extract hood shall be the recirculation type. As manufactured by LUXAIR or equal.**
2. **To be confirmed by user before ordering.**

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APPENDIX A - 3

DOMESTIC HOT WATER HEATERS and WATER BOILER				
REF	**CAPACITY**	**MANUFACTURER**	**MODEL**	**POWER**
WH-01	**30L**	**ZIP**	**Aquapoint 4 AP4/30S**	**SP&N 2 kW**
WH-02	**15L**	**ZIP**	**Aquapoint 4 AP3/15/OB**	**SP&N 2 kW**
WB-01	**5L**	**ZIP**	**Hydroboil**	**SP&N 2.4 kW**

Notes:

1. WH-01 & W-02 to be wall mounted in Cleaners Room 17 and Store 18 respectively with suitable brackets, DRAINS and fitted with un-vented kit as supplied by manufacturer.

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LOUVRE SCHEDULE - APPENDIX A – 4

LOUVRE SCHEDULE						
REF	**MODEL**	**DESIGNATION**	**SIZE**	**FLOW RATE**	**PRESSURE DROP**	**ANCILLARIES**
L-01	**WGF-38**	**EF-01 Exhaust**	**800 mm H x 900 mm L**	**600 l/s**	**11 Pa**	**c/w plenum box with 315 dia spigot and insect screen**
L-02	**WGF-38**	**EF-02 Exhaust**	**300 mm H x 300 mm L**	**51 l/s**	**neg**	**c/w plenum box with 125 dia spigot and insect screen**
L-03	**WGF-38**	**EF-03 Exhaust**	**300 mm H x 300 mm L**	**60 l/s**	**neg**	**c/w plenum box with 150 dia spigot and insect screen**

Notes:

1. **Louvre Finish shall be Polyester Powder Coating in RAL 8012 (Red Brown) Colour provisional. Contractor to confirm colour with Architect before ordering.**
2. **All louvres manufactured by Gilberts of Blackpool or equal and approved.**

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EXTRACT FAN SCHEDULE - APPENDIX A – 5

EXTRACT FAN SCHEDULE						
REF	**TYPE**	**MODEL**	**FLOW RATE**	**PRESSURE DRP**	**ELECTRICAL POWER**	**ANCILLARIES AND CONTROL**
EF-01 Hall	**Mixed Flow - In Line**	**Multiflow SEM-315EC**	**600 l/s**	**175 Pa**	**SP&N 2.0 A @ max Speed**	**EC speed controller 149-POT-10 Wiring by Electrical Contractor. c/w Back draft damper. AV mounts. Flexible connections. 1 x 450 dia, 600 long Silencers**
EF-02 WC's	**Twin Cabinet Fan**	**SQT-125-ECL**	**51 l/s**	**60 Pa**	**SP&N 1.21 A @ max Speed**	**149-ACO14E C/W 7 no PIR's, AV mounts, Flexible connections auto change over. Wiring by Electrical Contractor.**
EF-03 Office	**Mixed Flow - In Line**	**SEM150-1EC**	**60 l/s**	**95 Pa**	**SP&N 0.3 A @ max Speed**	**EC speed controller 149-POT-10 Wiring by Electrical Contractor. c/w Back draft damper. AV mounts. Flexible connections. 4 x 150 dia, 300 long Silencers**
EF-04 Kitchen	**Mixed Flow - In Line**	**SEM150-1EC**	**60 l/s**	**90 Pa**	**SP&N 0.3 A @ max Speed**	**EC speed controller 149-POT-10 Wiring by Electrical Contractor. c/w Back draft damper. AV mounts. Flexible connections.**

Notes

1. **Contractor to include all necessary mounting rail and drop rods to support from structure.**
2. **All fans manufactured by Elta Fans or equal and approved.**

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GRILLE AND AIR VALVE SCHEDULE - APPENDIX A – 6

GRILLE AND AIR VALVE SCHEDULE							
REF	LOCATION	NECK SIZE	TYPE	FLOW RATE	STYLE	PLENUM	SPIGOT DIA
EG-01	Multi Activity Space	250mm x 250mm	GECA/DO	150 l/s	Egg Crate Duct Mounted	n/a	n/a
EG-02	Multi Activity Space	250mm x 250mm	GECA/DO	150 l/s	Egg Crate Duct Mounted	n/a	n/a
EG-03	Multi Activity Space	250mm x 250mm	GECA/DO	100 l/s	Egg Crate Duct Mounted	n/a	n/a
EG-04	Multi Activity Space	250mm x 250mm	GECA/DO	100 l/s	Egg Crate Duct Mounted	n/a	n/a
EG-05	Multi Activity Space	250mm x 250mm	GECA/DO	100 l/s	Egg Crate Duct Mounted	n/a	n/a
EG-06	Multi-Purpose	150mm x 150mm	DG4-SEB	60 l/s	4-way Diffuser	yes	150mm
EG-07	Multi-Purpose	150mm x 150mm	DG4-SEB	60 l/s	4-way Diffuser	yes	150mm
EG-08	Multi-Purpose	150mm x 150mm	DG4-SEB	60 l/s	4-way Diffuser	yes	150mm
EG-09	Multi-Purpose	150mm x 150mm	DG4-SEB	60 l/s	4-way Diffuser	yes	150mm
EG-10 to 15	WC's 10 to 15	100mm dia	GX	6 l/s	Air Valve	n/a	n/a
EG-16	Cleaner 17	125mm dia	GX	15 l/s	Air Valve	n/a	n/a
EG-17	Kitchen 2	200mm dia	GXF	60l/s	Air Valve with Fire Damper	n/a	n/a

Notes:

All grilles and diffusers to have PPC white RAL 9010 20% gloss finish as manufactured by Gilberts of Blackpool or equal and approved.

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LTHW PUMP SCHEDULE

FLOW RATE AND PRESSURE TO BE CONFIRMED WITH UNDER FLOOR HEATING AND HEAT PUMP MANUFACTURERS REQUIREMENTS BEFORE ORDERING.

APPENDIX A – 7

LTHW PUMP SCHEDULE					
REF	**TYPE**	**FLOW RATE**	**PRESSURE DROP**	**MODEL**	**POWER AND CONTROL**
P-01	**Single**	**0.4 L/s**	**25 Kpa**	**Grundfos UPS3-15-50/65**	**SP&N**
P-02	**Single**	**0.4 L/s**	**25 Kpa**	**Grundfos UPS3**	**SP&N**
P-03 & P-04	**Duplex, duty and standby**	**1.0 L/s**	**76 kpa (NOM)**	**Stratos –D**	**SP&N 500 w (NOM). c/w IF module.**

Notes:

1. **P-03 & P-04 to have variable Speed control for pump this is for commissioning purposes only.**
2. **P-03 & P-04 to have auto changeover on failure and duty share modules.**
3. **P-01 & P-02 to be supplied by Acrol Air Conditioning.**
4. **Pump as Manufactured by Grundfos Pumps, WILO PUMPS or equal and approved.**

MANIFOLD TABLE(S):

MANIFOLD 2 — DESIGN Spcng — Heat Watts UFH Ht.

Room		
Multi+Chill:	150	5988
WC15:	150	149
WC14:	150	152
WC13:	150	147
WC12:	150	107
Cleaner:	150	133
AAC-WC:	150	222
AAC-WC2:	150	226

LOOP Num	LEN Mtr	FLOW Kg/H	VEL r M/s	Vol Ltrs	Re No	Pres TotP	kV aVAL	Turns OPEN	Fittd LpLen
1: Multi+Chill	89.8	218.8	0.46	11.9	10023	28517	1.39	5.00	
2: Multi+Chill	83.5	203.0	0.43	11.1	9297	23504	0.74	2.50	
3: Multi+Chill	89.4	217.9	0.46	11.9	9979	28193	1.30	4.75	
4: Multi+Chill	87.2	212.4	0.45	11.6	9729	26402	0.99	3.25	
5: WC14/15	60.7	152.2	0.32	8.1	8972	10888	0.34	1.50	
6: WC12/13	61.9	152.3	0.32	8.2	8974	11081	0.34	1.50	
7: Cleaner	70.2	168.0	0.35	9.3	7693	14553	0.41	1.75	
8: AAC WC 10 & 11	67.1	156.9	0.33	8.9	7187	12437	0.36	1.50	

Total Flow1481.5 Kg/Hr (0.412 Kg/sec) at 28.5 KPa

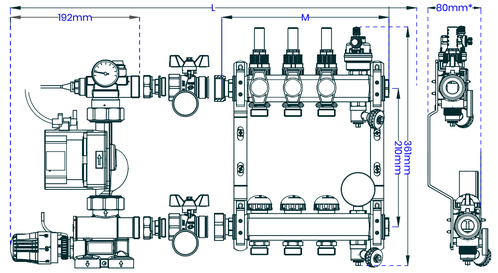
MANIFOLD 1 — DESIGN Spcng — Heat Watts UFH Ht.

Room		
Multi+Chill:	150	5891
Multi-Purpose:	150	1034
Office:	150	528
Kitchen:	150	896
Store':	N/D	185
Lobby:	150	316

LOOP Num	LEN Mtr	FLOW Kg/H	VEL r M/s	Vol Ltrs	Re No	Pres TotP	kV aVAL	Turns OPEN	Fittd LpLen
1: Hall-Storage4	69.9	129.8	0.27	9.3	5946	9113	0.40	1.75	
2: Multi+Chill	74.6	171.1	0.36	9.9	7837	15791	0.85	2.75	
3: Multi+Chill	73.3	182.0	0.38	9.7	8337	17402	1.15	4.00	
4: Multi+Chill	74.4	184.9	0.39	9.9	8471	18127	1.39	5.00	
5: Multi+Chill	65.1	160.9	0.34	8.6	7371	12715	0.60	2.25	
6: Multi+Chill	65.5	161.9	0.34	8.7	7415	12907	0.61	2.25	
7: Kitchen	62.8	175.0	0.37	8.3	8016	14400	0.74	2.50	
8: Kitchen	66.1	161.7	0.34	8.8	7407	12978	0.62	2.25	
9: Lobby	71.6	149.5	0.32	9.5	6846	11975	0.54	2.25	
10: Office	72.6	131.2	0.28	9.6	6010	9582	0.41	1.75	
11: Multi-Purpose	59.2	111.5	0.24	7.9	5106	6085	0.30	1.25	
12: Multi-Purpose	44.6	82.0	0.17	5.9	3758	2821	0.20	1.00	

Total Flow1801.7 Kg/Hr (0.500 Kg/sec) at 18.1 KPa

PREMIUM MANIFOLD & PUMP PACK:

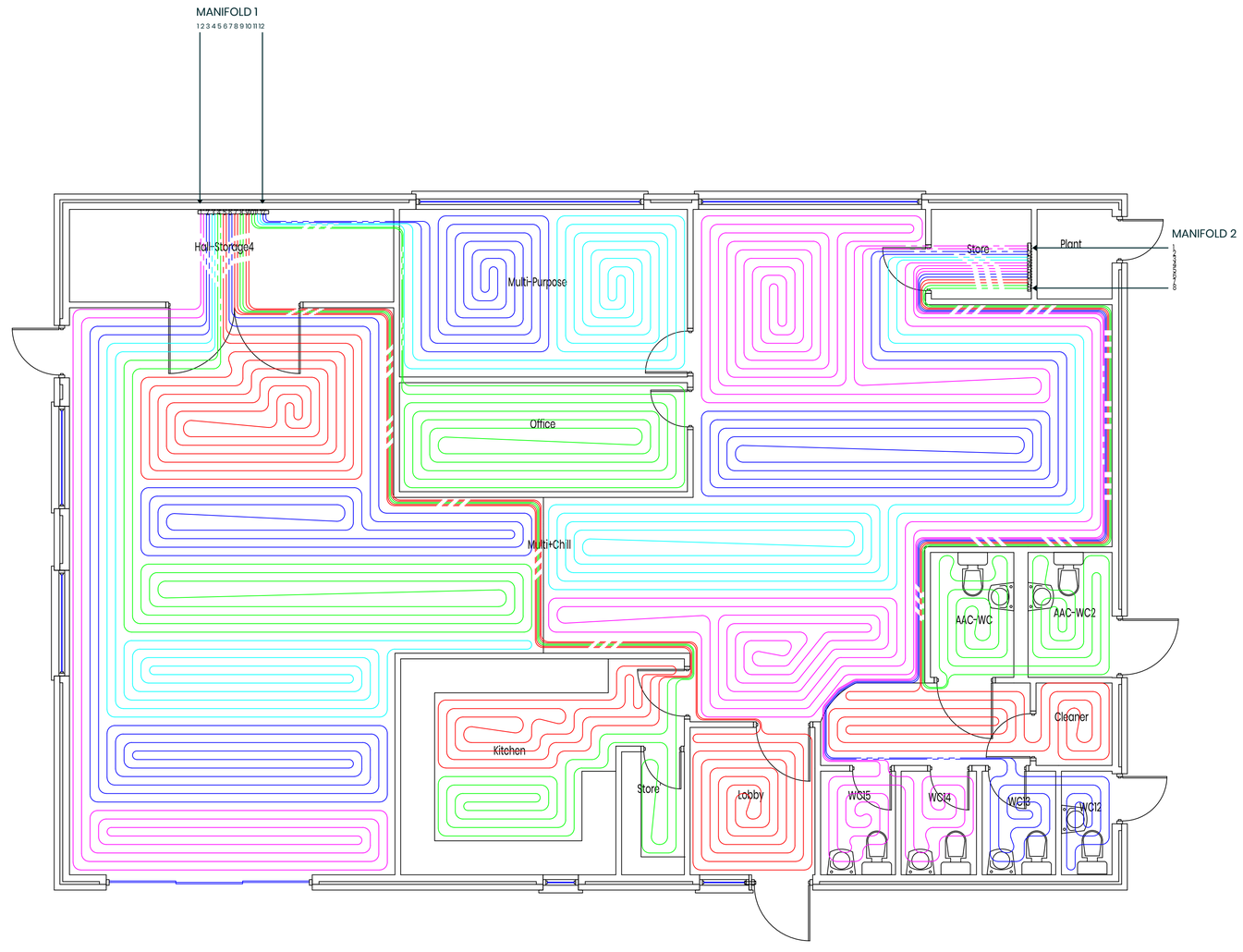


Number of Ports:	2	3	4	5	6	7	8	9	10	11	12
'M' Length (mm):	204	254	304	354	404	454	504	554	604	654	704
'L' Length (mm):	454	504	554	604	654	704	754	804	854	904	954

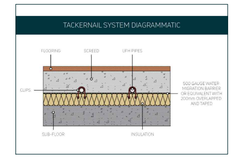
*Depth including Premium Pump Pack: 92mm

INSTALLATION NOTES:

1. All designs are based on information supplied by client and must be checked to ensure all specific requirements have been met.
2. PURMO GROUP are not be responsible for errors, omissions or inadequate performance as a result of poor quality plans or lack of information supplied.
4. These drawings are intended as a guide for installation purposes only.
5. Underfloor pipe work should not be laid below ambient air temperature of 0°C. Screed should not be laid when the ambient air temperature is below 5°C.
6. Underfloor heating pipe work passing through walls must be insulated and protected.
8. Flow rate(s) are calculated mathematically. Any flow rate shown under 1.0 l/min must be set to 1.0 l/min as a minimum to promote turbulent flow.
9. A wet pressure test between 3 bar (minimum) & 6 bar (maximum) must be applied to all of the underfloor heating pipe work prior to & during floor covering.
10. Screed systems must be fully cured in accordance with screed manufacturers recommendations before the heating system is commissioned. At this time the underfloor heating flow temperature should be limited to 20°C for 3 days & then increased by 3°C per day until design temperature reached.
11. Floor screeds must comply with the requirements of BS 8204-1:2000. Particular attention must be given to screed thickness, bay sizes and expansion joints.
12. Ceramic tiles or vinyl floor coverings should not be laid until the screed has been fully dried. The underfloor heating system should be turned off one day prior to laying these floor coverings. To avoid re-absorption of moisture the flooring should be laid no more than three days after the underfloor system has been off.
13. Where a timber floor is to be fitted, the floor must not be laid until the screed has fully cured and the underfloor heating system has been running for a minimum of 1 week. The screed moisture content must be checked to ensure that it is within acceptable limits as given by the flooring manufacturers. The timber manufacturers instruction must prevail for all timber floor finishes.
14. All electrical installation must comply with local or national wiring regulations and should be carried out by a qualified electrician.
15. All central heating systems must be cleaned in accordance with BS7593 with Adey MC3+ (HI-03-01670), then protected with ADEY MC1+ Inhibitor (CHI-03-01669). Where water hardness exceeds 200 PPM, Purmo Group only approve Adey Magnascale 15mm (SRI-03-01978) or Adey Electroscale 22mm (SRI-03-02784) products. All as stated in PART L of the building regulations. Only Adey products are approved by Purmo Group.



FIXING SYSTEM:



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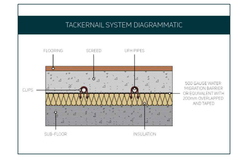
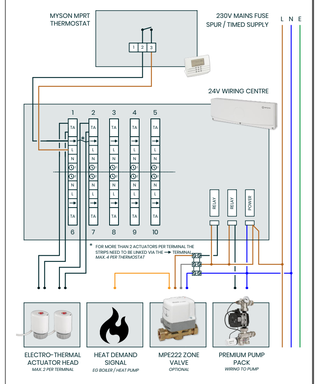


WIRING DIAGRAM:



DESIGN CRITERIA:

DESIGN CRITERIA:

Roof:	0.20	W/(m²·K)	Internal Walls:	2.30	W/(m²·K)
External Walls:	0.30	W/(m²·K)	Windows/Doors:	2.00	W/(m²·K)
Floor:	0.25	W/(m²·K)	Tightness@50Pa:	10.0	m³/(h·m²)

REV:	REVISION:	BY:	DATE:
-	-	-	-
-	-	-	-
-	-	-	-

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CLIENT: D3 ASSOCIATES

TYPE: SHOTTON YIF

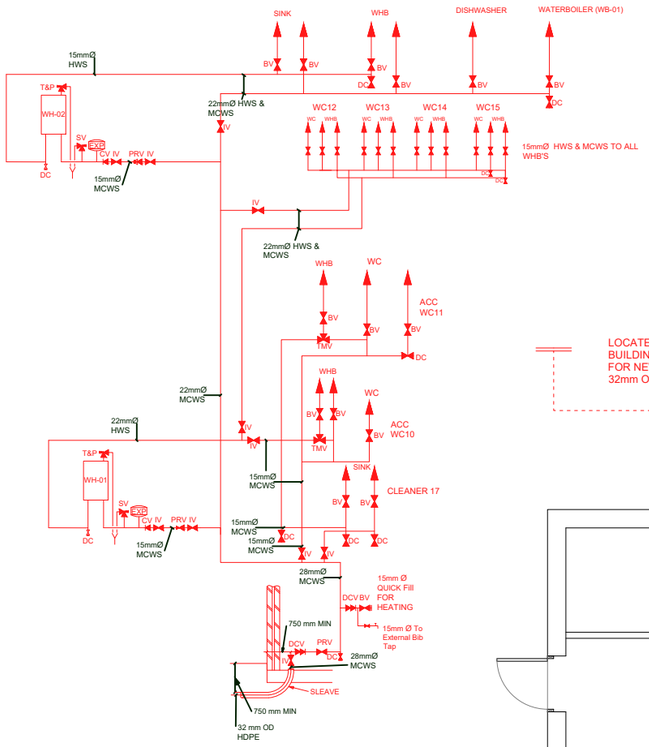
DRAWING NUMBER: GHD50423

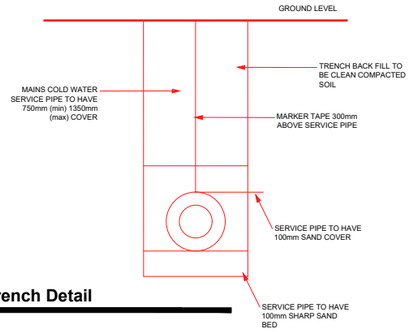
LEVEL:	SHEET:
GROUND FLOOR	UFH 01
DRAWN BY: AC	**DATE:** 16/06/23 — **SCALE AT A1:** 1:50

LEGEND:

Dense areas of underfloor heating pipe work to be insulated

A BRAND OF PURMO GROUP





Mains Cold Water Trench Detail

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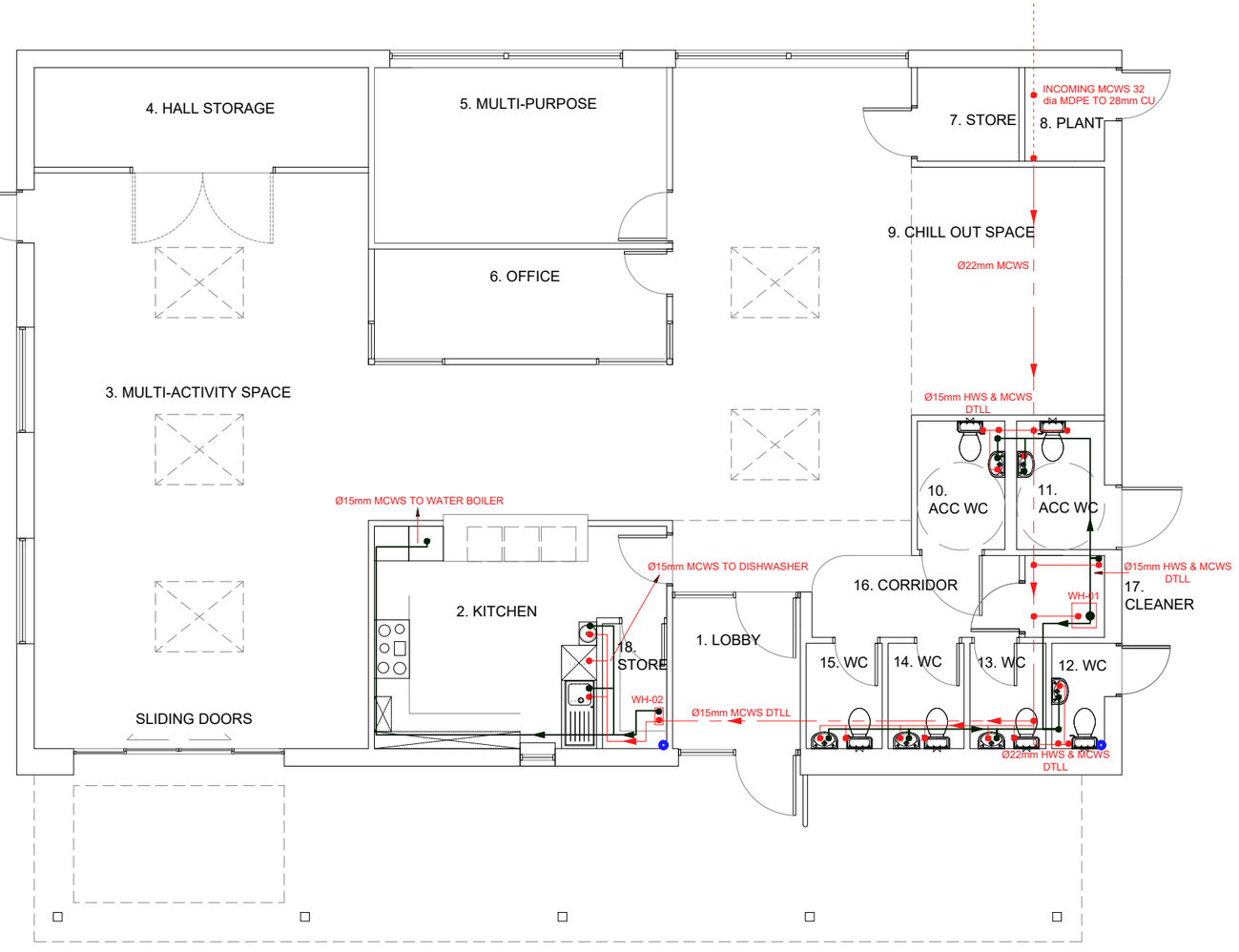
- Check all dimensions on site
- To be read in conjunction with Health and Safety plan and all relevant risk assessments

N

Scale (m)

0 1 2 4



LEGEND

IV	ISOLATION VALVE
BV	ISOLATION BALL VALVE
SV	PRESSURE RELIEF SAFETY VALVE
T&P	TEMPERATURE AND PRESSURE RELIEF VALVE
CV	CHECK VALVE
DCV	DOUBLE CHECK VALVE
PRV	PRESSURE REDUCING VALVE
TMV	THERMOSTATIC MIXING VALVE
DC	DRAIN COCK (INDICATIVE)
WH	ELECTRIC WATER HEATER, (SEE SCHEDULE)
EXP	EXPANSION VESSEL
	PIPEWORK AT HL VOID
	PIPEWORK AT LL SURFACE

NOTE: ALL TO BE WRAS APPROVED

Rev	Description	Issued	Checked	Date
P01	First Issue	AS	ST	18/05/23

Purpose of issue
Tender

Project Information
Outreach Community Hub Shotton

Drawing Information

Domestic Hot & Cold Water Service

Project ID	Originator	Zone	Level	Type	Role	Drawing No.
SHO	D3A	00	00	DR	M	5301

Project No.	Drawn	Scale @ A3	Status	Revision
1788	AS	1:100	D2	P01

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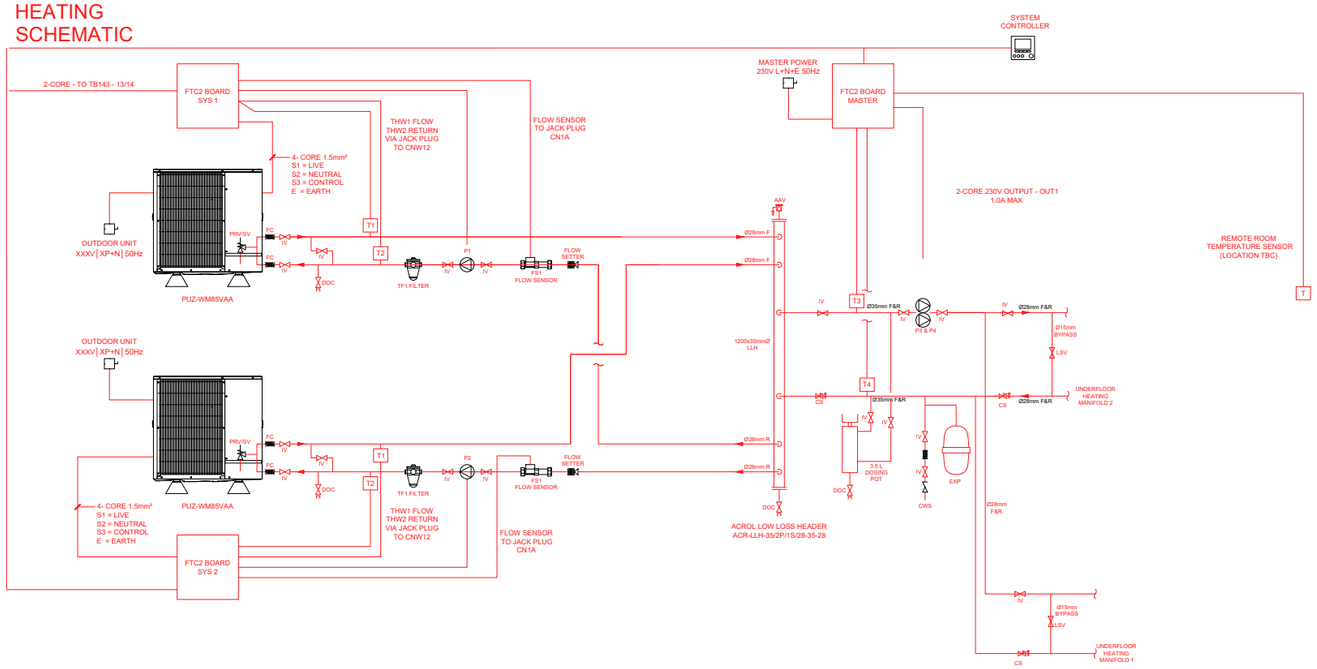
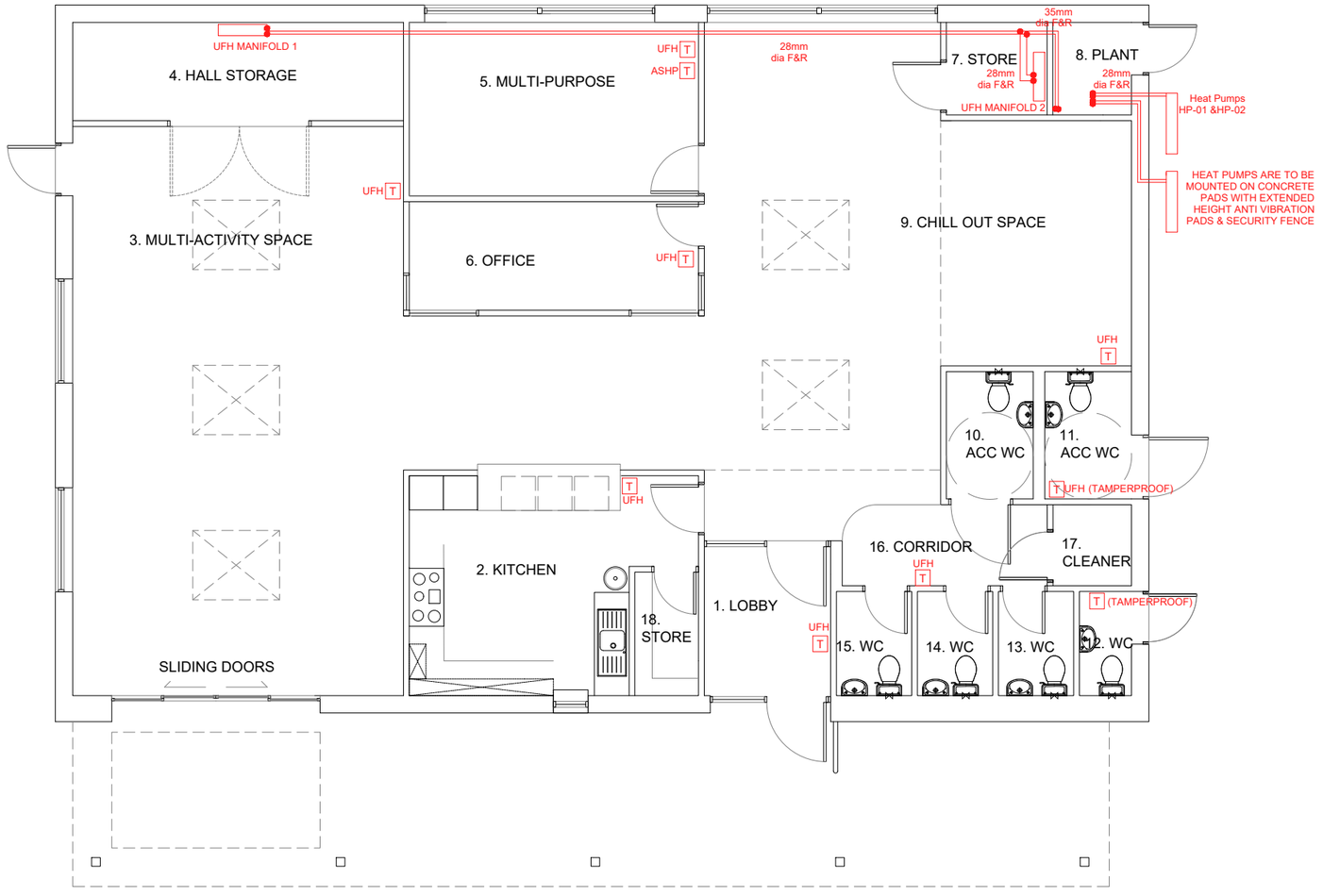
www.d3-associates.co.uk

Domestic Hot & Cold Water Service

1 : 100

HEATING SCHEMATIC





Heating

1 : 100

N

Scale (m)

0 1 2 4

LEGEND

	ISOLATION VALVE
	DOUBLE REGULATING VALVE & ORIFICE PLATE COMMISSIONING SET
DC	DRAIN COCK
	SAFETY VALVE
STR TF-1	STRAINER BY FERNOX TYPE TF-1 FILTER
AAV	AUTOMATIC AIR ELIMINATOR
	PUMP FLEXIBLE CONNECTOR
M	RHI METER
ASHP	TEMPERATURE SENSOR - BY MITSUBISHI
UFH	TEMPERATURE SENSOR FOR UNDERFLOOR HEATING, WIRING BY THIS CONTRACTOR
T	TEMPERATURE GAUGE
P	PRESSURE GAUGE
FS	ASHP FLOW SENSOR BY MITSUBISHI

NOTE:
1. ALL VALVING ARRANGEMENT AS PER SCHEMATIC
2. ALL UFH ARRANGEMENTS SEE SPECIFICATION

Rev	Description	Issued	Checked	Date
P01	First Issue	AS	ST	18/05/23

Purpose of issue: Tender

Project Information: Outreach Community Hub Shotton

Drawing Information: **Heating**

Project ID	Originator	Zone	Level	Type	Role	Drawing No.
SHO	D3A	00	00	DR	M	5601

Project No.	Drawn	Scale @ A3	Status	Revision
1788	AS	1:100	D2	P01

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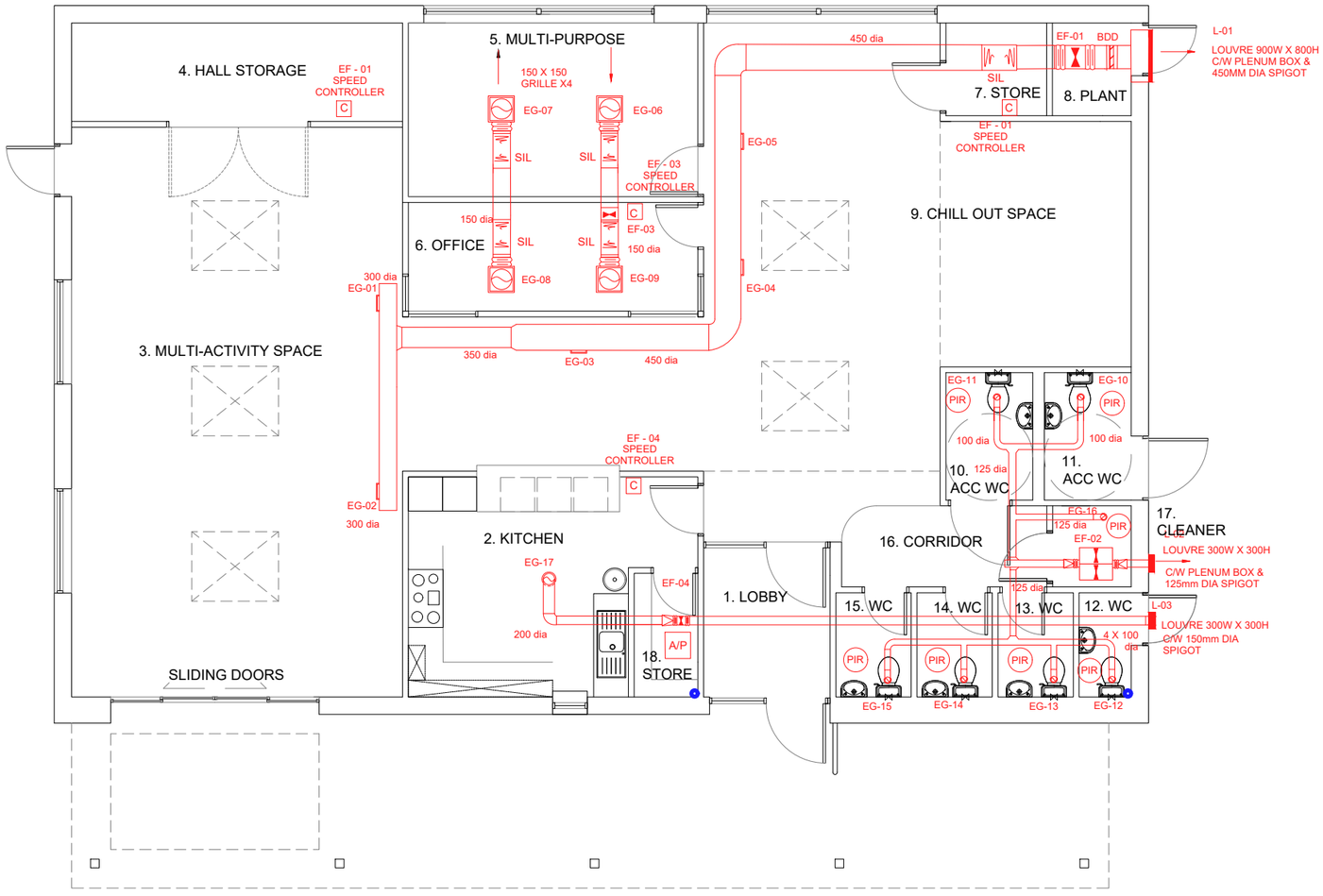
N

Scale (m)
0 1 2 4



LEGEND

- BDD — BACK DRAFT DAMPER
- PIR — PASSIVE INFRARED PRESENCE DETECTOR TO ACTIVATE EXTRACT FAN
- EF — SINGLE DUCT MOUNTED EXTRACT FAN (SEE EXTRACT FAN SCHEDULE)
- EF — DUTY & STANDBY CABINET EXTRACT FAN (SEE EXTRACT FAN SCHEDULE)
- SIL — SILENCER (SEE EXTRACT FAN SCHEDULE)
- C — EXTRACT FAN SPEED CONTROLLER
- A/P — CEILING ACCESS PANEL by Main Contractor (FIRE RATING as per Architects drawings)

NOTE:
THIS DRAWING SHALL BE READ IN CONJUNCTION WITH ARCHITECT 3D MODEL FOR INSTALLATION

Ventilation Layout

1 : 100

Rev	Description	Issued	Checked	Date
P01	First Issue	AS	ST	18/05/23

Purpose of issue
Tender

Project Information
Outreach Community Hub Shotton

Drawing Information
Ventilation Layout

Project ID	Originator	Zone	Level	Type	Role	Drawing No.
SHO	D3A	00	00	DR	M	5701

Project No.	Drawn	Scale @ A3	Status	Revision
1788	AS	1:100	D2	P01

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Project: Outreach Community Hub Shotton

Location: Station Road, Shotton, Co. Durham DH6 2JL

Project Ref: 1788

Mechanical Services Tender Summary

Item Description	£
Air Source Heat Pumps and LTHW distribution to Under Floor Heating Manifolds	
Under Floor Heating and Manifold Assemblies	
External Mains Cold Water Installation	
Domestic Hot and Cold Water Services	
Extract Ventilation	
Testing and Commissioning	
User Training and Instruction	
As Installed Drawings, Operating & Maintenance Manuals	
Mechanical Services Total To be carried forward to Section 18 of the Schedule of Works	

Contractors Name:

Address:

Signed:

Date: