



HAYES HIGGINS

*Project Managers
Chartered Civil, Structural
& Building Services Engineers*

TIPPERARY COUNTY COUNCIL

Cahir Market Centre

**A.5.1.1 MECHANICAL
SITE SPECIFIC SPECIFICATION**

TENDER ISSUE

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1. GENERAL

1.1. INTRODUCTION

The particular specification provides site specific details of particularly important areas of the design. It is to be read in conjunction with the data sheets at the end of this specification, the general specification, the drawings and all other contract documentation. Any apparent contradictions between tender documentation should be queried with the Employer's representative during the tender process. In the case where a contradiction is not highlighted it will be at the discretion of the Employer's Representative to decide which document takes precedence. In the case of all standards outlined in this and other contract documentation it is to be taken that the latest version or superseding standard is the relevant standard. (The precedence of information as defined within the Contract will still stand on all other matters.)

All Tenderers are expected to inspect the existing site prior to submission of their Tender to ensure that all elements of the works are covered within the Tender. This can be arranged through the Engineers or Project Manager.

1.2. LABELLING

Neat, aligned, correctly orientated for viewing and secured labelling is an essential requirement of the contract and must be provided and installed for the following items:

Labelling Requirements	
Item	Requirement
All Plant	To be labelled with name, area served and reference number
All Valves	To be labelled with function and reference number
All Pipe-work	To be labelled at least once in each compartment + every 5metres on longer runs e.g. in corridors. Care is to be taken that rainwater pipe-work particularly identifiable.
All ductwork	To be labelled at least once in each compartment + every 5metres on longer runs e.g. in corridors.
Boiler-room	A full schematic of as-installed system and valve chart shall be provided on the plantroom wall in a wooden frame with clear perspex cover.
Main Control Panel	Laminated specific, custom designed instructions for setting and changing of time

	schedules in simple language will be provided beside the main control panel.
Habitable Spaces	Laminated specific, custom designed instructions for setting and changing of temperature stat in simple language will be provided beside each habitable space temperature control stat. Laminated label in each habitable space describing how natural ventilation in the space operates. Wording to be approved by Employer's Representative. Laminated label in each habitable space with wording 'Raise Blinds when not required in order to reduce lighting energy used.' Laminated label in each habitable space with clear instructions on what lighting controls are installed and how they operate.

BMS labelling, switch, and lamp layouts must be provided to the Employer's Representative for approval prior to manufacture. Failure to provide this information may result in rejection of the panel on arrival to site.

1.3. SCOPE OF WORKS

The scope of the work is for the refurbishment of an existing three-storey protected structure (approx. 631sqm) and comprise:

I. Gas & Oil Installation:

- **There are no Natural, LPG or Oil installations associated with this development.**

II. Space Heating:

- **LPHW Flow and Return type system at 55/45 FR temperatures.**
- **2 no.of R290 Air Source Heat Pumps (ASHP) with a rated heating capacity of 13 kW each at A-7W55 conditions. Installation to come complete with all controls (incl. cascade control) as recommended by the manufacturer.**
- **Above-mentioned ASHP's to be housed on the Flat roof on First Floor Level as indicated on the drawings.**

- Above-mentioned ASHP's to all have onboard hydronic modules and be piped in a header configuration from where it will feed into the Buffer Vessel housed in the Plantroom (**Ground Floor Level underneath the Stairs**).
- The Plantroom will house **1 no. of Buffer Vessels of 370L** capacity.
- From the Buffer Vessels the LPHW will be piped into a Low Loss Header feeding **3 no. of LPHW** circuit pumped via variable speed pump.
- Balance of LPHW Space Heating Plant to be provided includes, but are not limited to, Pressurisation Unit, Dosing Unit, Expansion Vessel.
- Insulated Flow and Return distribution piping including all valves, sensors, meters and controls as per Drawings, Datasheets and balance of Specifications.
- Radiators:
 - All rads shall be sized for 55/45deg Flow/Return Temp.
 - Complete with all valves, TRV's, thermostats and controls as detailed on the Drawings, Datasheets and balance of Specifications.
- Underfloor Heating:
 - All Underfloor Heating shall be sized for 55/45deg Flow/Return Temp.
 - Underfloor Heating shall be able to achieve 60W/sqm output
 - Complete with all manifold, valves, thermostats and controls as detailed on the Drawings, Datasheets and balance of Specifications.
- All of the above complete as detailed on the Drawings, Datasheets and balance of Specifications.

III. Ventilation & Air Conditioning

- Mechanical Ventilation with Heat Recovery (MVHR) comprising supply and installation of new:
 - 2 no. of MVHR units
 - 1 no. of DX Heating/Cooling coil with associated outdoor unit to be fitted to the MVHR feeding the Meeting Room
 - Supply and exhaust ductwork and final connections incl grilles, diffusers, louvres, Roof vents
 - Fire Smoke Dampers,
 - Controls and interfaces,
 - All of the above complete as detailed on the Drawings, Datasheets and balance of Specifications.
- Fans comprising supply and installation of new:
 - Supply and Extract Fans
 - Supply and exhaust ductwork including sound attenuation and final connections incl grilles, diffusers, louvres,
 - Fire Smoke Dampers,
 - Controls and interfaces,
 - All of the above complete as detailed on the Drawings, Datasheets and balance of Specifications.

- Fire Smoke Dampers as per drawings.

IV. Domestic Hot Water (DHW) Services:

- **4 no-off** Undersink Heaters to be provided at DHW outlets as per Drawings, Datasheets and balance of Specifications.
- **1 no-off** Hot Water Boiler to be provided in Canteen

V. Cold Water Services (CWS)

- CWS Tank: comprising of **1 no. 300l** new tank with onboard Booster pump as per Datasheets
- CWS Meters: to be provided with pulsed output for the incoming water connection.
- CWS Distribution: comprising supply and installation of new distribution pipework and final connections to fixtures. All final connections shall be valved for isolation.
- All of the above complete as detailed on the Drawings, Datasheets and balance of Specifications.

VI. Mains Water Services (MWS)

- MWS meter: to be provided with pulsed output for the incoming water connection.
- Mains Water Distribution: comprising supply and installation of new Dosing Unit, distribution pipework and final connections to fixtures. All final connections shall be valved for isolation.
- All of the above complete as detailed on the Drawings, Datasheets and balance of Specifications.

VII. Soils & Waste Services

- Installation of soils and wastes above ground
- To include condensate drainage from any MVHR & AC units (as required), tank overflows and warning pipes for all internal tanks.

VIII. Sanitary Ware

- Fixing of sanitary ware - comprising of works associated with the installation of new sanitary ware and final connection of same including all water services, drainage pipework and associated fittings.

- The mechanical contractor shall allow for all non-return valves and isolation valves as indicated.
- All of the above complete as detailed on the Drawings, Datasheets and balance of Specifications.

IX. Fire Protection Services

- Comprising fire extinguishers, fire stopping of service opes and fire blankets. Extinguishers shall comply with IS 290. The siting of portable extinguishers shall be in accordance with IS 2912.
- All of the above complete as detailed on the Drawings, Datasheets and balance of Specifications.

X. Electrical

- Wiring to and from MCC – refer to Controls Drawing and Specification,
- Power wiring of Mechanical equipment from local SDB's - refer to Electrical drawings "Mechanical Wiring Layouts" in order to ensure battery limits of wiring responsibilities,
- Wiring of low voltage mechanical equipment incl thermostats, two/three port valves, sensors, etc from MCC,
- All of the above complete as detailed on the Drawings, Datasheets and balance of Specifications.

XI. General:

- Insulation: Comprising lagging of pipework as described in General Mechanical Specification.
- Brackets: To support all Mechanical Services as described in General Mechanical Specification.
- Builders Work: comprising of providing of access to ceiling voids, opes etc. as required, making good & re-instatement of wall & floor surfaces and site services trenching.
- Commissioning: of all plant shall be provided as specified.
- Maintenance Manuals & Record Drawings as outlined.
- Storage of Goods and Plant: shall be provided by the contractor.
- Programme of Work: **As per Architects requirements**

1.4. PHASING

Prior to installation of any internal services the contractor will provide a method statement for the phasing works:

- **As per Architects requirements**

The Contractor shall refer to the architects phasing / hoarding plan drawings for the proposed phasing of the works.

Tie-ins to existing infrastructure must be sensitive to the operational requirements of the existing facilities and any shut-downs to existing services to facilitate tie-ins should be allowed for out of hours and in a rapid manner. Method statements will be required for approval by the design team in good time before the works are carried out for any tie-in works or shut-downs.

All works, tie-ins and associated shut downs to be agreed with consulting engineer, Employers representative and the CNU. Phasing details and programme are contained within the main contract documents, and should be read in conjunction with the M&E documents. No variations will be accepted for lack of contractor co-ordination.

1.5. MOCK – UP’S

Prior to installation of any internal services the contractor will provide a mock-up section of the main distribution route to a minimum length of 3 metres to include all of the following elements:

- Sections of each type of water pipework to be used on the project.
- Sections of each type of heating pipework to be used on the project.
- Sections of each type of medical gas-pipe-work to be used on the project.
- Pipework brackets with appropriate insulation / pipework protection details.
- Drop rods to be trimmed and capped.
- Pipework insulation
- Pipework labelling, all pipes (neat, inline, clear)
- Typical joint detail for each type of pipe
- Pipework paint protection
- Electrical services trunking and tray
- FSD fixing Details
- Any electrical items to be fitted to services trunking and tray (e.g. sensors, detectors, etc.).

1.6. SUBMITTALS AND SAMPLES

The mechanical sub-contractor will provide submittals sheets for all elements of the mechanical installation. The initial submittal package will include all items in a single submittal for ease of assessment. Submittals shall have the relevant technical information presented in a proper datasheet with the specific product highlighted.

Evidence of CE Marking, warranties and triple E register compliance will be provided where applicable. Following approval of submittals by the M&E consultant all visible elements of the installation will be provided on a samples board on site for the M&E consultant and Architect to review. Following this review of samples final design team approval is issued.

The following samples to be provided as a minimum:

- Radiators
- Radiant Panels
- PIBCV Valves
- Thermostats
- MVHR
- FSD

1.7. TRIPLE E REGISTER

The Triple E Products Register is a benchmark register of best in class energy efficient products. The European Union (Energy Efficient Public Procurement) Regulations 2011, SI 151 of 2011, state “a public body shall only procure equipment or vehicles which are (a) listed on the Register or (b) satisfy the published SEAI energy efficiency criteria for the equipment or vehicle concerned, and the public body shall specify this requirement in any documentation describing its procurement requirements”.

The contractor shall ensure that all products or electrical equipment installed in schools are listed on the Sustainable Energy Authority Ireland’s (SEAI) Triple E lists of energy efficient equipment or are compatible with the criteria of the Triple E evaluation scheme.

1.8. BC(A)R 2014 BUILDING CONTROL (AMENDMENT) REGULATIONS:

The mechanical (electrical) specialist is to allow in full for the compliance with all statutory obligations under the Building Control (Amendment) Regulations BC(A)R, S.1.9 of 2014, including all revisions thereafter.

1.9. MATERIALS

Materials shall be selected and all building elements designed to ensure that the building and all components are durable and low maintenance and do not present a hazard to the health and safety of the users. In accordance with Part D of the Building Regulations all works shall be carried out with proper materials and in a workmanlike manner. “Proper materials” means materials which are fit for the use for which they are

intended and for the conditions in which they are to be used, and includes materials which:

(a) Bear a CE Marking in accordance with the provisions of the Construction Products Regulation;

(b) Comply with an appropriate harmonised standard or European Technical Assessment in accordance with the provisions of the Construction Products Regulation;

Or

(c) Comply with an appropriate Irish Standard or Irish Agreement Certificate or with an alternative national technical specification of any State which is a contracting party to the Agreement on the European Economic Area, which provides in use an equivalent level of safety and suitability.

1.10. CLINICALLY CLEAN FINISH

This project will require that the visible finish is of straight easily cleaned flat surfaces without hidden or hard to reach areas in terms of cleaning. As such, all distribution services are hidden. No exposed pipe-work, distribution components or similar will be accepted in habitable areas. If the contract design appears to contradict this approach in any manner it should be highlighted to the client's representative during the tender process otherwise it is expected that all distribution is routed in voids, partitions, fixed furniture or boxed out sections. All valves and similar components will be located where they can be accessed easily for maintenance.

1.11. SPECIALIST CONTRACTOR DESIGN

Any items that are not explicitly designed by the design team are the remit of the contractor.

These items include but are not limited to:

- Temporary Pipework, Temporary Wiring, temporary supports.
- Temporary Builders Work.
- These works are the specialist contractor's responsibility to design and will be covered under the contractors P.I. insurance but must be presented in good time for design team approval before works are carried out.

1.12. CO-ORDINATION DRAWINGS AND METHOD STATEMENTS

The mechanical contractor shall comply with all current health and safety legislation. The contractor shall provide method statements for all elements of the works and submit to the clients design team and engineering representatives for approval prior to commencement of any works on site. As part of the works the Mechanical Contractor, in conjunction with all other Building Services' Contractors, shall issue co-ordinated working drawings for the building services to be installed prior to any work taking place. The drawings shall be co-ordinated with all aspects of the building, i.e. fabric, external

and internal features and furniture and fittings etc. In particular, the position of service entry positions and box-outs shall be fully detailed and co-ordinated.

1.13. PRINTING OF DOCUMENTS

The M&E Consultant will print the contract documents for signing in A4 specification and A3 drawing format. The M&E consultant will issue all construction documentation including drawings in soft copy format only (PDF and DWF) and all required hard copies will be printed by the contractor. A single set of up to date A4 M&E specifications and A1 M&E drawings will be maintained on site by the contractor for the design team's use. A separate set of up to date A4 M&E specifications and A1 M&E drawings will be maintained on site by the contractor for the Clerk of Work's use.

2. HEATING SYSTEM

The contractor will supply, install, test and commission an LPHW system to meet the heating requirements of the project. All drains, vents and safety valves shall be piped to low level. Special care and attention shall be paid to the manner in which the pipes and valves are laid out to ensure that all equipment's and valves have proper access. No pipework is to be run at floor level where personnel could trip or find it difficult to maintain the equipment. The location of the associated control panel shall be identified at an early stage and the contractor shall ensure that pipes are not routed in the vicinity of this unit. Space shall always be left for future extensions.

The contractor shall allow for identifying pipework and apply colour coded labelling in accordance with BS1710:2014 and BS 4800:2011/BS 5252:1976 KIT Colour.

The heating system shall be as indicated on the attached drawings and outlined in the General Specification. A weather compensation system shall be connected to the variable temperature circuit within the boiler house. All pumps valves and compensators shall be supplied. All areas shall be heated by means of steel panel radiators, as indicated on the drawings and outlined in the General Specification.

From 26th September 2015, all commercial heating products must carry labels indicating the energy efficiency rating of the product and meet the new minimum energy performance criteria established under the new regulations.

2.1. HEAT GENERATION & BUFFER VESSELS

As described under section 1.2. II of this Spec, Drawings, Mech Datasheets, Controls & General Mechanical Specification.

The heat generation system equipment is detailed in the drawings and datasheets and will in general comprise of:

- Air Source Heat Pumps (ASHP)
- Buffer Vessel
- Pressurisation unit with appropriately sized expansion vessel

- Header arrangement and Pipe-work
- Circulation Pumps
- All associated valves
- Filtration Equipment including Air-Dirt Separators and Magna-Clean Filter
- Water treatment package

For Space Heating the Heat Source will be R290 ASHP's capable of achieving flow temperatures of 75°C

The heat emitters (radiators, and underfloor heating) were sized based on a ΔT_{30} with flow and return temperatures of 55°C / 45°C. The ASHP's will be selected for their reliability, quality, efficiency and the availability of spare parts in the local region.

The ASHP's will be housed in a dedicated ASHP Plant.

As part of the testing and commissioning process the heating system will be flushed and appropriate chemical treatment provided. The contractor shall provide, prior to handover, a commissioning certificate to confirm that correct treatment has been carried out.

2.2. ASHP COMPOUND & PLANTROOM PIPEWORK:

The contractor shall install new pipework within the ASHP Compound & Plantroom as shown on the drawings. All exposed steel pipework shall be insulated and fitted with aluminium cladding – refer to General Mechanical Specification for further guidance. All pipework (& rising mains) shall be corrosion protected by painting with zinc rust primer (or epoxy primer where subject to dampness) and by other methods described elsewhere. Special care and attention shall be paid to the manner in which the pipes and valves are laid out to ensure that all equipment and valves have proper access. No pipework is to be run at floor level where personnel can trip or find it difficult to maintain the equipment. The contractor shall include for the removal of the non-re-usable ancillary equipment within the existing boiler house. The contractor shall allow for identifying pipework and apply colour coded labelling in accordance with BS1710:2014 and BS 4800:2011. The contractor to ensure that all sensors, valves and meters relating to the ASHP to be installed as per the Mechanical Datasheet.

2.3. WATER HARDNESS TESTING

The contractor shall allow for testing a sample of water for hardness. The complete heating system shall be filled with softened water. This test shall be witnessed by the engineer. The

Contractor shall provide for a water treatment contractor to select the appropriate corrosion inhibitors to minimize corrosion and biocides to prevent any proliferation to the medium grade steel of the heating system. The system shall be thoroughly flushed of any debris before chemical dosing.

2.4. LPHW PRESSURISATION UNIT:

The LPHW Pressurisation Unit fills the LPHW system from the mains water supply. It automatically tops up the system as required. Allow for a fast fill connection for filling and flushing the new heating system

Allow for 1 No. Flexcon, Wilo or Grundfos sealed system pressurisation units or equal & approved shall be supplied and installed and shall comprise of:

- Automatic pressurisation pumping set and make up tank.
- Expansion vessel
- High and low limit pressure cut out switches.
- Header tank overflow to drain.
- Water supply chemical treatment system.
- End suction pumps.
- Low water protection.
- Pressurization vessel fitted with removable diaphragm.
- High and low pressure cut-out switches.
- Pressure gauge.
- Pump control pressure switch.
- Foot valve.
- Coverball cock.
- Break tank.

Note:

1. Anticipated static head equals 12 metres.
2. The unit shall be connected directly to the boiler without any isolating valves incorporate on the line.

System capacity and Size of Expansion Equipment to be verified by contractor before ordering.

2.5. PUMPS

The contractor shall ensure that pumps are in compliance with the EuP directive for circulators. From January 1st 2013, glandless standalone circulators, (except for those specifically designed for primary circuits of thermal solar systems and heat pumps) must have an energy efficiency index (EEI) of no more than 0.27 dropping to 0.23 in 2015. Refer to the data sheets for pump schedules. Pumps should have isolation valves at both sides on pumps and anti-vibration mount.

Pumps should have isolation valves at both sides on pumps, check valve on the suction side of the pump, suction and discharge pressure gauges on tell-tale pipes with microball valves and anti-vibration mounts. No dead leg of over 15mm will be permitted so as to minimise the risk of Legionella.

Variable Speed Pumps

Boiler primary and zone secondary heating pumps shall be twin head, duty/assist, and variable speed high efficiency type. Pumps shall be electronically controlled, rated for 6 bar, suitable for operating continuously with fluid temperatures of 98°C, single headed with screwed or flanged connections, with integral differential pressure control for constant head control and infinitely variable pump speed to 2850rpm. Head set-point shall be adjustable at the pump without further tools or instruments. Pump body shall be cast iron, with fibre re-enforced PPS impeller, stainless steel shaft, and metal impregnated carbon bearings. Motor shall be rated to IP43, with Class F insulation. Provide built in graphical display, pump integrated overload protection with trip relay, infrared interface for remote monitoring, run and fault lights, volt-free collective fault signal, automatic setback operation, factory provided thermal insulation to pump body, suitable for vertical mounting. Pumps up to 180watts shall be mountable in vertical or horizontal position.

Pumps electronics shall satisfy EN50081-1 regarding interference emission and EN50081-2 regarding interference resistance.

Provide union fittings for screw ended pumps.

Provide one infrared monitoring device to the project regardless of number of pumps, to be used for commissioning and stored in the boiler house control panel.

2.6. INHIBITOR

An inhibitor is to be installed in the heating system. Incabiol, Fernox or equal and approved.

2.7. DISTRIBUTION

The heating system shall be controlled through the use of a variable twin head speed pumps and two-port motorized valves Pressure Independent Balancing Control Valves as well as Thermostatic Radiator Valves for each space. Each of these two-port valves is linked to a digital thermostat/sensor in the relevant room forming a zone for each space. The thermostat/sensor will be BMS linked allowing the mid-range temperature setting for each space to be set via the BMS. The thermostat/sensor in each space will have display allowing interaction by the user in each space allowing them to adjust the heating set-point +/- 3°C from the BMS-set midpoint value. All of the PIBCV two-port valves will also be BMS-linked. Each thermostat and two-port valve will be separately and individually wired directly to the BMS i.e. one will not be wired via the other. The BMS shall record the temperature and PIBCV operation for each space allowing the maintenance staff to call up records to deal with any occurring issues with end-user satisfaction or similar. The variable speed circulation pump will operate on the basis of constant pressure control and adjust its operation as the heating load varies with the opening and closing of PIBCV valves. Staff will also be able to turn each individual PIBCV on or off from the BMS allowing areas to be shut down as required.

One coat of red oxide paint will be provided on heating pipe-work before insulation is fitted to prevent corrosion. Exposed pipe-work will be painted in a second coat with colour to the architect's agreement. All heating pipe-work shall be installed with foil-back insulation to the same level as external insulation and Velcro insulating jackets shall be installed on all plant-room and main riser valves. All installed pipe-work will be

concealed. All parts of the heating system which require access must be installed in a manner that allows ease of access for maintenance, reading and cleaning. All plant-room valves, pumps and meters should be installed within 1.5m of the finished floor level. All installed pipe-work will be concealed.

Prior to handover the contractor will provide commissioning certificates for all variable speed drives confirming that they are operating correctly. All installed pipe-work will be concealed.

2.8. DISTRIBUTION PIPEWORK:

The contractor shall install new pipework as shown on the drawings.

Special care and attention shall be paid to the manner in which the pipes and valves are laid out to ensure that all equipment's and valves have proper access. No pipework is to be run at floor level where personnel can trip or find it difficult to maintain the equipment. The location of the associated control panel shall be identified at an early stage and the contractor shall ensure that pipes are not routed in the vicinity of this unit.

New pipework shall be capable of withstanding max continuous operating pressure up to 10 bar.

Pipework shall be capable of operating to temperatures up to 95°C. All pipework testing must be witnessed by the Engineer, Architect or their nominated representatives. Failure to comply with these requirements will result in additional costs being incurred, which will be the mechanical contractor's responsibility and will not be recoverable from the client. These comments also apply to all underground gas and heating pipework.

The contractor shall allow for identifying pipework and apply colour coded labelling in accordance with BS1710:2014 and BS 4800:2011.

2.9. DOUBLE REGULATING VALVES

Fixed Orifice Double Regulating Valve (FODRV), at each location as indicated on the drawings the main branches shall have the flow rate regulated using a basis of design, Crane DPF931, D921, D923, D931, D933, D934 valves to suit flow rates. Contractor to supply FODRV to suit DPCV requirements as described below.

Contractor to submit final selection of valves prior to ordering and in good time to allow for comments by the Engineers (2weeks).

These shall be in general, be CE marked, PED certified, be suitable for LPHW balancing and flow measurement, be bronze, be isolating with memory flow reset by means of a key, Be PN16, suitable for mounting on a Mild Steel threaded connection system.

Each valve will be pre-set by the commissioning contractor with the valve having sufficient authority to give effective regulation over the range of flow expected in the pipelines. Valve to be selected for flow or low flow as defined by the manufacturer and installed to manufacturer's recommendations in terms of diameter up or down stream. Valve to BS 7350, Sizes 1" to 2" taper threaded to BS EN 10226-2 (ISO 7-1) formerly BS 21. Sizes 1/2" & 3/4" DN15 & DN20 parallel threaded to BS EN ISO 228-1(formerly BS 2779). Adaptor kits for use with copper tubing shall be supplied as needed by the

contractor, PN16 rated and suitable for 95°C system flow temperature. Refer to drawings for more details (M-100 Series).

2.10. ROOM TEMPERATURE CONTROL VALVES.

Control of local space temperature, shall be achieved by the installation of motorised 2-port pressure independent balancing control valves (PIBCV) on the flow pipe serving each radiator. Pressure Independent Balancing and Control Valves shall be pressure independent and fitted with an on/off or modulating actuator with a M28 x 1.5 mounting thread and 4mm lift. The body is constructed from DZR Brass with the diaphragm and seals being EPDM. The valve maintains the flow at the desired flow rate as the diaphragm responds to the pressure upstream and downstream of the balancing valve (via an internal impulse line). The maximum volume flow is set according to the flow charts by means of a key and can be reset at any time if required. The valve has male threads to allow union connections to be fitted for any type of pipe.

Each PIBCV or combination of PIBCV's shall control the internal space temperature based upon a wall mounted temperature sensor. Each temperature sensor and control valve shall be linked back individually to the BMS. It shall control heating in the range of 18 to 25°C for that occupied zone and be locally adjustable. Communal areas will be set to 21°C again adjustable. Local on/off control shall also be provided. Refer to drawings for more details (M-100 Series).

2.11. AUTOMATIC VENT VALVES:

Provide automatic vent valves at top of forced water risers and high points as necessary to prevent trapping of air.

2.12. VALVE SCHEDULE:

Furnish a printed schedule, in duplicate, describing each valve by number, giving locations, including cross-reference to data sheets in the operation and maintenance manuals, for each valve. One copy of this schedule shall be mounted under glass in a simple black enamel steel frame and be hung in the boiler room. The other copy shall be included in the bound operation and maintenance manuals.

2.13. DIELECTRIC COUPLINGS

Provide sweat-to-screw dielectric couplings at junction of copper and steel, and insulating bushings for flanged connections to steel or cast iron valves and fittings.

2.14. EXPANSION BELLOWS

Expansion bellows shall be axial type with multi-ply stainless steel convoluted bellows, aluminium outer sleeve with integral length limit device, and heavy duty carbon steel inner sleeve. End connectors shall be carbon steel. Axial movement shall be at least 34 mm after 5,000 cycles. Bellows shall be installed where shown and as necessary to absorb expansion. Pipework shall be provided with lateral support and anchors are recommended by the bellows manufacturer. Bellows shall be tested to 21 bar minimum at temperature up to 120 °C.

2.15. RADIATORS

Radiators shall be as shown on the attached datasheets. Care shall be taken during the storage and handling of radiators to avoid scratching of paint work. Fixings shall be rigid so that stress is not induced on the pipe connections or valves. Mounting radiators shall be so organised that it is possible to readily clean underneath each unit.

On completion of the installation all radiators shall be fully vented and balanced on the lock shield valves. Radiators with sharp edges shall not be installed in locations where injury to personnel is possible. Radiators shall be a RAL colour of client choice. The contractor is responsible for checking site dimensions prior to ordering radiators and reporting dimensional discrepancies back to the services engineer. If this exercise is not implemented the contractor shall carry the additional costs of purchasing replacement radiators where the units as scheduled do not fit properly.

2.16. UNDERFLOOR HEATING

An underfloor heating system is to be provided for all bedrooms. This underfloor heating system needs to be capable of providing at least 60W/sqm heating.

3. VENTILATION SYSTEMS

3.1. GENERAL

The contractor will supply, install, test and commission extract ventilation in the areas outlined in the contract drawings and as per Building Regulation Part F.

- In general ducts will exit the building vertically and horizontally.
- Passive supply ducts will be used to provide make-up air.
- Passive air ducts will be provided to achieve passive ventilation to all Stores.

Automatic dampers will be fitted to any ventilation ducting which exits to the external, dampers on ducting for mechanical ventilation will automatically close when the fan turns off. Non-return backdraught dampers will be provided on ducts with a diameter of 150mm or less and motorized dampers will be provided on all ducts greater than 150mm diameter. Fire dampers will also be provided wherever a ventilation duct passes through a fire rated structure and will be linked to the fire alarm system.

The fire damper installation must include an automatic smoke/fire damper control system which is a completely modular and flexible computerised system which operates and continuously monitors smoke/fire dampers. Each damper shall be graphically represented in the open, closed, travelling or fault state. Manual damper override shall be allowed via touch screen keyboard/mouse operation. The software must be capable of zoning and grouping devices and allows complex multiple cause and effect' schedules to be programmed. Please refer to the Control Specification and Schematic regarding the number, location and Functionality of FSD Control Panels.

The entire installation shall be clinically cleaned and certified before hand-over. All ductwork will have access panels to each straight length allow future clinical cleaning.

3.2. MVHR

The scope of ducted Mechanical ventilation with Heat Recovery (MVHR) Unit/Systems shall consist of the supply & installation of integrated units comprising:

- intake and exhaust fans,
- a counterflow heat exchanger,
- air filters,
- isolating and bypass dampers,
- temperature sensors and a control system.
- Wall mounted controllers
- Duct system including air diffusion and weather louvres/grilles.

Please refer to Drawings and Datasheets for the locations and selections of MVHR units.

Please refer to the Control Schematic and Specification for the control functionality of the MVHR systems.

Please refer to the General Specification for the applicable Standards, performance and workmanship requirements,

3.3. FANS

Fans should be operated through speed controllers. Where extract ducts terminate on the roof of the building the contractor shall provide weathering cowls and aprons for upstands. Great care and attention shall be taken in the selection of fans to ensure that no noisy units are installed (not exceeding 25dBA at 3metres).

Fans shall be linked to the BMS for fault monitoring. When ordering fans it is the contractor's responsibility to ensure that fans can be monitored on the BMS.

Note: All fans must be ErP Compliant and carry the CE marking.

3.4. AUTOMATICALLY OPENING VENTILATORS

The contractor shall allow for the supply and installation of automatic opening ventilators as indicated on the architect's drawings. Each section requires 1 No. ventilators to a total free area of 1m² for each section. Each ventilator shall have an automatic closing function. A total of 2 No control panels (one for each section) will be required to be installed, interlinked together and interfaced with a with fireman's break glass unit located at ground floor level. The installation shall conform to BS 7346: Part 1 1990 Specification for Natural Smoke and Heat Exhaust Ventilators or equivalent. The vents shall be located such that they will not be affected by adverse wind pressures. Ventilation in compliance with DoECLG Building Regulations, Part: F - Ventilation shall be provided in sanitary facilities in primary schools.

3.5. DUCTING

Ductwork as shown on the drawings and described in the General Specification shall be installed in compliance with DW141 and DW142. Ductwork is to be installed in a neat and workman like manner.

3.6. SUPPLY AND EXHAUST GRILLES

Grilles as shown on the drawings shall be supplied and installed. All grilles shall have welded construction joints and be completely rattle free and shall be erected square and level and accurately set out as regards spacing to fit in with the ceiling modules. While the cutting of ceiling tile opens for the grilles shall be the responsibility of the ceiling contractor the mechanical contractor shall supply and install flexible ductwork spigot pieces to allow freedom in the positioning of the air grilles and diffusers. These flexible ducts shall have Jubilee clip fixing at each end. Additionally the contractor shall allow additional time for assisting the ceiling contractor in levelling the grilles to match the ceiling. All grilles shall be of RAL colour of architect's choice.

3.7. FIRE DAMPERS AND FIRE STOPPING

All ducts passing through fire walls and all floor slabs shall have fire dampers fitted. The units shall be as described in the General Specification. Proprietary fire stopping materials shall be utilised throughout and formal approval shall be obtained from the Engineer prior to carrying out this operation.

3.8. TESTING & COMMISSIONING

Ventilation systems should be tested and commissioned at completion so that the systems and their controls are left in the intended working order and can operate effectively and efficiently. A way of demonstrating compliance would be to commission and test in accordance with the CIBSE commissioning codes in order to verify that the systems perform in accordance with the specification.

Detailed information on the installation and commissioning of ventilation systems is provided in "Installation and Commissioning of Ventilation Systems for Dwelling – Achieving Compliance with Part F (to be published)" and DoECLG Building Regulations Part F, Section 1.2 Dwellings, Par 1.2.1.7.

All the plant installed shall be commissioned as outlined in the general specification. Additionally full assistance shall be provided to the electrical contractor with the commissioning of all controls.

Commissioning shall comply with the requirements of:

CIBSE Commissioning Code A: Air Distribution Systems
CIBSE Commissioning Code B: Boilers
CIBSE Commissioning Code C: Automatic Controls
CIBSE Commissioning Code M: Management
CIBSE Commissioning Code R: Refrigeration
CIBSE Commissioning Code W: Water Distribution Systems

4. WATER SERVICES

General

No sanitary appliance, special equipment, device or piping shall be installed which will provide cross connection between a distributing supply from domestic water and a non-potable supply or drainage system. Systems shall be separated by a physical air gap.

All products shall be UK WRC approved and listed in the UK WRAS Water Fittings and Materials current directory.

Furnish submittals in accordance with the general requirements of the contract. Submit operation and maintenance instructions, and pressure, flushing and disinfection certificates for Engineer's action.

The Water services under installation within the scope of this contract shall include the following services:

- Mains Water Supply installation.
- Cold Water Supply installation.

4.1. MAINS WATER

General

Requirements for the external water mains are generally contained within the civil & structural specification and documents. All internal water installations are described within this specification, the general mechanical specification and the contract drawings.

Works

The contractor shall install the incoming water supply into the building from a connection off the existing mains entering the site. Refer to civil/structural engineers drawings showing this connection and water meter location. The mechanical contractor shall then pick up this connection at that point shown on HHP drawings to serve the building as set out on the Water Services Drawings (M-3000 Series). Water meter shall be installed as per the equipment datasheets and Water Services Drawings (M-3000 Series). This meter will display mains water usage and will be linked to the BMS to record such information. A separate mains water meter is required for the mains water supply to the kitchen.

The contractor is to ensure that the recommended length of straight run of supply pipe before and after each meter is installed as per the meter manufacturer's recommendations and that all other meter manufacturer's recommendations are adhered to. It will be the contractor's responsibility to ensure that the all meters are sized properly for the installed load and do not introduce inaccuracies due to being over-sized.

A mains water break tank and booster set is required and shall be installed by the mechanical contractor in the lower ground floor plant room. The mechanical contractor shall design and install a support system for the mains water break tank to allow it to be elevated 1000mm from finished floor level.

All water pipe-work shall be installed with foil-back insulation to the same level as external insulation and Velcro insulating jackets shall be installed on all main valves. All connections to outlets will be in solid copper pipe-work. Flexible connections are not to be installed as the client has experienced a number of issues with these in the past.

Before connecting to the public mains the entire system will be tested, flushed and chlorinated. The contractor will provide a signed certificate of testing and flushing.

All installed pipe-work will be concealed.

4.2. DRINKING WATER IDENTIFICATION

At all locations where mains water is supplied to a tap, sink, drinking fountain etc. the contractor shall mount an ivory screw fixed, 35mm by 25mm high white with black text at 16point high, label clearly marked "Drinking Water". This shall be worded in English and in Irish.

4.3. COLD WATER SERVICE

The cold water supplies from the water tank are to be pressurised with a water booster that will be onboard to the cold water storage tank. This water booster system is to have adequate support and maintenance access. Anti-vibration mountings are to be used to ensure that noise is not an issue for spaces below. The cold water tanks will feed the hot water calorifier located in the plant-room by a dedicated feed. It will also feed all cold water fittings as indicated on the contract drawings
See M3000 series drawings for more details of routing of pipework.

All internal pipework shall be installed with foil-back insulation to the same level as external insulation and Velcro insulating jackets shall be installed on all plant-room, main riser valves. Fill tanks and pressure vessels will have a minimum of 100mm of insulation applied. All connections to outlets will be in solid copper insulated pipe-work. Flexible connections are not to be installed as the client has experienced a number of issues with these in the past.

A BMS-linked meter will be provided on the pipe exiting from any cold water storage tanks. A separate meter will be provided in the plant-room on the cold water feed to the hot water generator. The purpose of the metering installation is to allow all water usage to be monitored in line with the principles of CIBSE TM51. The contractor is to ensure that the recommended length of straight run of supply pipe before and after each meter is installed as per the meter manufacturer's recommendations and that all other meter manufacturer's recommendations are adhered to. It will be the contractor's responsibility to ensure that the all meters are sized properly for the installed load and do not introduce inaccuracies due to being over-sized.

- Isolating ballcock valves are to be provided for at all connections to sanitary ware and outlets allowing isolation for maintenance.
- All installed pipe-work will be concealed.
- Before use the entire system will be tested, flushed and dosed. The contractor will provide a signed certificate of treatment and testing.

Isolating ballcock valves are to be provided for at all connections to sanitary ware and outlets allowing isolation for maintenance. All water pipe-work shall be installed with foil-back insulation to the same level as external insulation and Velcro insulating jackets shall be installed on all plant-room, main riser and tank-room valves. Fill tanks and pressure vessels will have a minimum of 100mm of insulation applied. All connections to outlets will be in solid copper pipe-work.

Where pipework passes through floors or walls copper sleeves shall be provided and installed. In the case of floors through plant room, these sleeves shall all be puddle flanged and cast in with the floor slab. All brackets shall be of brass manufacture with holderbats provided where pipes are exposed. All mains and sub-circuit valves shall

be provided and installed. Final connections to every fixture throughout the building including isolating valves shall be included. Insulation of pipework as specified elsewhere shall be carried out after testing. Where pipework is buried underground it shall be Kuterlon flexible copper tubing wrapped with three layers of Denso tape throughout. Exposed pipework, not in plant areas, shall be of a chrome finish. This applies to all water services not just hot and cold pipework. Local isolating valves shall be provided on the water supplies to all wash hand basins, sink units and toilets to facilitate future maintenance and replacement of fittings etc.

Flexible connections are not to be installed. All installed pipe-work will be concealed. Before use the entire system will be tested, flushed and dosed. The contractor will provide a signed certificate of treatment and testing.

4.4. HOT WATER SERVICE

In general hot water will be provided from Undersink Water Heaters.

Thermostatic blending valves will be provided at all hot water outlets to prevent scalding.

4.5. HOT WATER CONTROLS

All hot water to outlets except the cleaners store sinks shall be provided with thermostatic mixing valves. These shall be located such that a maximum dead leg of 0.5 metre only is achievable on the blended water supply.

Thermostatic mixing valves shall be TMV3; WRC approved and shall consist of copper alloy body. Valve shall be non-shut-off type, present temperature, thermostatically controlled, with gunmetal or copper alloy body, suitable for under basin mounting. The outlet temperature shall be adjusted by a hexagonal headed screw. Each valve shall be complete with integral strainer and check valves suitable for backflow prevention on both the cold and hot inlets. A vacuum moulded plastic casing shall protect the unit from unauthorised tampering. Minimum working pressure shall be 0.1 bar. Maximum working pressure shall be 6 bar.

Only thermostatic mixing valves (TMV) that meet TMV3 standard with fail safe lockable thermostatic blending valves limiting the temperature to 42° / 43° Celsius shall be used.

The TMV installed must:

- Be suitable for the system head pressure available
- Comply with BS EN 1287 for low pressure
- Be suitable for under basin installation or where installed in an IPS be fully accessible
- Comply with EN 1111 and EN1287
- Be WRAS Approved
- Provide safe thermostatic shutdown
- Be complete with isolation valves, check valves and easily removable strainers
- Have tamper proof temperature adjustment and lockdown

All TMVs shall be tested for shut-off in the event of loss of the cold water supply and test certificates included in the handover documentation. TMVs must never be

connected to the mains water supply. They must only be connected to the hot water distribution services and cold water distribution services.

A manual mixing tap, where the hot and cold water only mixes on exiting the spout outlet, must only be used with main water so as not to contaminate the mains water supply. On all sinks the temperature controlled mixed supply should be taken from the under sink TMV outlet to the hot water inlet on the manual mixer. A mains water supply shall be connected to the cold water inlet side on the same manual mixer tap.

Installation of water services taps, showers and other fittings in areas of mental health shall be provided via anti-ligature fittings. The contractor shall note the drawings locations as to where these are to be provided. Unless noted the contractor shall assume that all rooms used for mental health patients are provided with same and included costs for supply, fitting, commissioning.

DHW Automatic Commissioning Valves:

Commissioning valves should be located at each hot water return pipe connection as detailed on the drawings to ensure balancing of the return water at each branch. Commissioning valves shall be bronze automatic regulating type. Valves shall thermostatically control regulation of the volume flow – self balancing and incorporate a settable temperature sensing cartridge, factory pre-set at a standard 57°C, which can be replaced without valve removal.

- Valve shall be manufactured to BS 7942:2000, NHS DO8.
- Basis of design: Oventrop Aquastrom VT Thermal
- Commissioning valves shall be mounted in straight lengths of pipe as recommended by the manufacturer as far as practical.

Temperature Control Valves (TCV), shall be installed to every hot water return line, supplied, installed, commissioned under this contract. These shall be capable of:

- Thermostatic Valve operation
- Adjustable residual volume flow
- Suitable for the line pressures (PN16)
- suitable for passivation temperatures (90 degC)
- With Insulation, clips as supplied by the vendor.

4.6. DISHWASHER

Dishwashers shall be supplied by others but provided with mains water and hot water. Connections to the Dishwasher shall be hard plumbed in copper. Each dishwasher shall be fitted with water via an isolation valve, double check valve, penny drain valve and filter (as supplied by vendor as an option) by the mechanical contractor.

4.7. PIPING & VALVES

The main contractor shall install sanitary appliances provided under the main contract. The mechanical sub-contractor shall make final connections of hot and cold water pipework to the appliance, including fitting any taps, mixer valves, etc. to the appliance but supplied by the main contractor.

Make all changes in direction with fittings and changes in main sizes through reducing fittings.

Include:

- Shut-off valves and either unions or flanges at each item of equipment, pumps, water heaters, tanks, etc., suitably located to isolate each unit, branch circuit or section of piping to facilitate maintenance and/or removal of equipment.
- Shut-off valves on capped services for extension to equipment furnished by others.
- Drain valves at all low points to enable complete drainage and manual air at high points.
- Drain piping from cisterns, relief and safety valves etc. to spill over open sight drains, floor drains etc., terminating drain line with plain end.
- Horizontal forced water supply piping, with straight side of eccentric fittings at top of pipe, and pitch upward 1 to 500 in direction of flow.
- Sweat-to-screw insulating adapters at junction of copper pipe to steel pipe and insulating bushings for flanged connections to steel or cast iron valves and fittings.
- Cast iron clamping flange fitting with caulking ring where piping passes through waterproofing membrane.
- Pressure gauges where indicated on the drawings, and as follows:
 - On discharge at each pump
 - Each side of pressure reduction valves
- Strainers where indicated on the drawings and immediately upstream of each automatic valve, water meter, and pressure reduction valve.
- Such tees, shut-off valves and temporary connection points as are necessary to test and sterilise new pipework. Upon completion, cap connection points.
- Pipe expansion, in general, is to be absorbed in bends, swing joints, expansion loops and offsets.

All piping mains, branches and runouts shall be so installed as to allow for expansion and contraction without developing leaks or undue stressing of pipe.

4.8. STERILISATION:

Prior to being placed into service, all components of system and entire system shall be thoroughly flushed and sterilised, then re-flushed. Sterilisation shall be in accordance with CIBSE Commissioning Codes or BS806 – Part 1-6.

4.9. FLOW TEST:

After pressure testing and after fixtures have been set and piped, and prior to final hand over, each fitting shall be flow tested to observe proper dynamic action of the set,

including splash pattern of taps. Adjust system to obtain satisfactory flow characteristics.

4.10. VALVE IDENTIFICATION

Valve identification discs for all valves, which shall be attached to valves by means of brass chains, are required. The mechanical contractor shall ensure that identification discs are engraved traffolite 35mm dia. discs and indicate the particular service by colour code and the number of the valve relating to the layout of the particular installation. Valve chart shall be produced by the mechanical contractor showing the location of each valve.

4.11. THERMAL INSULATION

All pipework shall be insulated with thicknesses as described in the General Specification by means of rigid sections with foil or PVC backing as required and band finish. Insulation shall comply with BS5422:2001. It shall be Class O or Euroclass B, low smoke to EN 13823, EN ISO 11925-2.

4.12. DOMESTIC WATER INTERNAL PIPING INSTALLATION

Install Foil Back, Rigid insulation, sealed and lapped joints, to thickness listed below.

4.13. DOMESTIC WATER EXTERNAL PIPING INSTALLATION

Install Foil Back, Rigid insulation, sealed and lapped joints, to thickness listed below. Wire brush all pipes. Painted with 2 coats of red oxide paint. Wrapped in Oppanol Sheeting. Insulated. Clad in 18 gauge aluminium. All valves, flanges, support mount positions to 150mm below the pipe shall likewise be insulated and clad. Heat race tape applied and installed to the manufacturers requirements. Insulation to have a thermal conductivity of 0.025W/m.K. and provided by TIDL Tarecphen.

4.14. DOMESTIC WATER PLANTROOM PIPING INSTALLATION

The whole of the piping in the plant rooms is insulated as previously specified and as stated on drawings.

Contractor shall ensure that the insulation is in sections and, on completion, the insulation is clad with 18 gauge aluminium, fixed with self-tapping screws. The contractor shall ensure that the body of valves is insulated with purpose made insulated valve bags arranged to facilitate maintenance and that pump bodies are encased in formed removable metal casings with fasteners lined with the same insulation as fitted to adjacent pipes; spaces within casings must be filled with removable bonded flexible insulating material. The contractor shall ensure that all pipework insulation and methods of application whether mounted externally or internally complies fully with the requirements within the following BS 5422:2001 and BS 5970, all thermal insulation buried within the ground complies with BS 4508 and the thermal properties of the insulating materials comply with the provisions as described in IS EN 13166:2001 AMD: 2004, BS 3958 and BS 5608 as appropriate.

Further guidance is available in:

- BS 5422:2001 Method for specifying thermal insulating materials for pipes, tanks, vessels, ductwork and equipment operating within the temperature range of -40°C to $+700^{\circ}\text{C}$
- BRE Report No 262 Thermal insulation: avoiding risks, 2002 edition

In assessing the thickness of insulation required to meet the provision, standardised conditions should be used in all compliance calculations based in this instance on a horizontal pipe at 60°C in still air at 15°C

4.15. CO-ORDINATION

The mechanical contractor shall co-ordinate the installation of water services with all other trades. First in approach shall not be tolerated. The installation of water services shall be coordinated by the mechanical contractor on behalf of the builder. All plumbed services shall not clash with structure, electrical services, other mechanical services, final finishing details by the architect. Access to all valves shall be provided. Access to all final connections shall be provided.

The mechanical contractor shall set up meetings, issue drawings for approval with 6 weeks prior to installation, issue meeting minutes and ensure that the co-ordination of the plumbing installation is completed with minimal interruptions to other trades as the mechanical contractor has previously signed off on all such issues prior to issuing of the drawings for construction.

No rework, variations or any other costs shall be entertained in the event of bad co-ordination in the opinion of the engineers.

Mock ups will be required for each final connection to outlets.

Water services will require electrical energy to operate and to control. The mechanical contractor shall advise on the location of all temperature sensor locations for water record logging to the pipe lines and tanks to the electrical and controls contractors. Temperature sensors shall be installed in pockets, with thermal paste by the mechanical contractors at positions as indicated or directed on site by the engineers. All temperature sensors shall be easily removable without operations to the system they are install into. Boiler, pumps power and control details shall be issued in a likewise fashion.

4.16. LABELLING AND IDENTIFICATION

The labelling and identification of plumbing services shall be to BS 1710: 1984. The mechanical contractor shall ensure that proprietary PVC identification bands or triangles are securely fitted to pipework throughout the building.

These shall identify the service and shall be fitted in the following locations unless otherwise indicated:-

1. Both sides of each valve.
2. At each change in direction.
3. At each branch connection.
4. At each floor level in vertical service ducts.
5. On all horizontal runs at a minimum of 4m intervals.
6. Both sides of any wall or partition through which the pipe passes.

In addition to colour bands or triangles and unless otherwise indicated, the mechanical contractor shall ensure that all ductwork and pipework in plant rooms, service areas, ceilings and floor voids, whether insulated or not, is identified with black or white letters to show the type of service and direction of flow.

5. DRAINAGE

The drainage described within this specification relates to the drainage installation above the ground slab, all below ground wastes including ground sockets is covered in the Architectural and Civil Engineering section of this contract. The contractor shall supply and install all over ground soils and wastes to the building as indicated on the drawings. This shall include all rising stacks, horizontal and rising branch pipes and connections to all sanitary ware items. The main contractor shall provide rising stacks to approximately 300mm over the ground floor level into which the contractor shall connect his pipework.

All pipework in the ground floor slabs shall be provided by the main contractor including shower wastes. All sanitary ware shall be supplied by the main contractor and fitted by the mechanical contractor as noted below and he shall make all plumbing and waste connections to same. The Mechanical Contractor is to supply and fit floor gullies as indicated on the mechanical layouts. Floor Gullies to be Kent KVT170 or equal and approved.

The entire over ground drainage system, including materials and installation, shall be in accordance with B.S. 5572 1994 and EN 12056-2:2000 and part H of the Building Regulations. Particular care shall be taken to ensure that all pipework is laid to correct falls and that all cleaning and venting facilities are installed as recommended.

The Contractor shall include for:

- Wrapping all internal soils and wastes pipework with insulation to prevent sound breakout and attenuation.
- Provision and installation of all traps.
- Final connections to all sanitary ware.
- Fitting of all sanitary ware.
- Fitting of all over flow pipe work required.
- Fitting cowls/slate ventilators to all SVP's where they terminate above roof level.
- Fitting traps and insect screens to all overflows.
- Flexible connections only on height adjustable sinks all other connections shall be rigid.
- Fitting of cleaning eyes and access points in soils installation to allow for unblocking and cleaning.
- The exact setting out of ground sockets to suit the actual sanitary wear or other equipment to be installed shall be the responsibility of the Contractor.
- Where required heat resistant pipework, stainless steel, vulcathene or equivalent shall be used from equipment with high discharge temperatures.

The contractor is to supply, install, test and commission a full drainage system to meet the needs of the building in full compliance with the latest version of (or superseding standard) EN12056-2 including:

- Provision and installation of all traps
- Final connections to all sanitary ware
- Fitting of all over flow pipe work required
- Fitting cowls to all Soil Vent Pipes (SVPs) where they terminate above roof level
- Fitting traps and insect screens to all overflows

Where plastic pipework is used, suitable intumescent collars should be fitted when breaching fire compartments, and acoustic wrapping should be applied where drainage pipework runs above wards and other sensitive areas. The gradient of branch drains should be uniform and adequate to convey the maximum discharge to the stack without blockage. Practical considerations such as available angles of bends, junctions and their assembly, as well as space constraints, will normally limit the gradient to about 1:50 (20 mm/m). For larger pipes, for example 100 mm in diameter, the gradient may be less, but this will require high quality workmanship if an adequate self-cleaning flow is to be maintained.

The system should provide for efficient discharge of material from all waste outlets utilising short routes and minimum fittings. Access must be easily available for easy maintenance and cleaning of all parts of the installation. At each floor access doors will be provided above flood level for each SVP. If it is deemed by the client representative that inadequate access is provided for cleaning the system additional access door will be provided at no additional cost.

Unless explicit permission is gained from the client's representative air admittance valves are not to be installed in the drainage system.

The installed piping is to be either uPVC or ABS with branches made from polypropylene.

An internal siphon overflow protection device that will prevent use of the toilet during overflow will be supplied and installed with each toilet cistern. All safety valves outlets shall be piped to a safe location. Any overflow to the external e.g. from water tanks etc. will be fitted with insect meshes.

The contractor will be fully responsible for co-ordination of ground sockets and sanitary equipment.

5.1. CONDENSATE DRAINAGE

The entire installation of the Copper Condensate Drains from each ASHP, Buffer Vessel, MVHR (where applicable), AC-Unit (Indoor and Outdoor units) and Bedpan Washers in the facility routed to final gully with personnel protection insulation shall be submitted, supplied, installed, set to work, witnessed by the Engineers, commissioned, O&M information supplied and certified by the mechanical contractor as being safe, fit for purpose and fully complete and installed in accordance with the drawings, specifications, schedules and as per manufacturers (vendors) recommendations.

5.2. VENTS

Vent pipes shall be of UPVC construction and no vent pipe shall be less than 25mm in diameter. The Part H TGD of the building regulation should be followed for venting requirements, unless a larger size is indicated on the drawings.

5.3. EXPANSION

Due to the relatively high co-efficient of thermal expansion, care shall be taken during the installation to allow for sufficient change in direction of pipework. Alternatively expansion couplings shall be provided in sufficient numbers. Where expansion couplings are used, support brackets shall be placed at either side of the expansion coupling.

5.4. PIPE SUPPORTS

All Soils / Waste pipework shall be fixed with pipe supports to the building structure, independent of all plant and equipment. Supports shall be of a proprietary manufacture or purpose made and shall be approved by the engineer.

Pipe supports shall be provided at the following maximum intervals measured along straight runs:

Nominal Bore	Vertical Spacing (mm)		Low Gradient Pipe Spacing (mm)	
Diameter (mm)	UPVC	Polyethylene	UPVC	Polyethylene
32	0.8	0.7	-	0.45
40	0.9	0.7	-	0.45
50	1.2	0.85	1.1	0.55
65	1.4	0.85	1.2	0.55
80	1.5	0.9	1.4	0.6
100	1.7	1.1	1.5	0.7

Notes:

1. Where other materials are specifically specified e.g. copper the spacing shall be as indicated under general services supports.
2. A diagonal brace shall be fitted at the socket of each length of horizontal soil pipe.
3. On vertical soil pipes and on waste pipes a support clip shall be fitted at each socket and at intervals set out in the above table.
4. Where bends are used to accommodate thermal movement, pipe clips shall be located on either side of such bends in such a way as to permit small deflections to take place.
5. Small diameter discharge pipes connected directly to the stack at ground floor level shall have close supporting anchor brackets on the boss branches.

In special cases where a complete solvent weld system is required on soil installations this will be referred to in the particular specification.

5.5. STACKS THROUGH FLAT ROOF

Where stacks pass through a roof slab the UPVC pipe shall pass through a lead sleeve with a plate welded to the sleeve for dressing under the Asphalt roof. Sleeve to be carried up to underside of UPVC vent weathering cap. Vents to terminate 500mm above roof slab with UPVC vent cowl terminal. Patent roof connectors where approved by the engineer may be used. Where alternative roof membranes are used the contractor shall offer an alternative proposals for approval.

5.6. STACKS THROUGH PITCHED ROOFS

To be terminated as indicated for flat roof, but with a flexible neoprene vent slate cap to be pulled into position over the top edge of the slate. Vent cowl to terminate above the eaves. Where roof construction the contractor shall provide a proprietary method of sealing the termination which is approved by the architect. Cowls and vent slates to be provided by the contractor.

5.7. PROTECTION DURING INSTALLATION

The contractor shall ensure that the Soils and Wastes installation is protected during installation and open end are sealed with purpose made fittings to prevent the entry of foreign matter into the system during construction. The contractor shall take special care with pipe systems having ring seal joints to prevent deflection of the joints after pipework is assembled. Pipework shall not carry any external load either during or after construction. All access covers and cleaning eyes shall be fitted at the time of installation and shall be finally fixed and sealed after testing.

5.8. TRAPS

All Traps shall be constructed of polypropylene.

The Type of trap to be provided shall be specified in the particular specification.

Table 2 Minimum trap sizes and seal depths		
Appliance	Diameter of trap (mm)	Depth of Seal (mm)
washbasin bidet	32	75
sink* bath* shower* food waste disposal unit urinal bowl washing machine dishwashing machine	40	75
wc pan	(min dimension) 100	50
<i>Note:</i> * Where these appliances are installed on a ground floor and discharge to a gully, the depth of seal may be reduced to not less than 40 mm.		

5.9. SOIL AND WASTE PIPE CONNECTIONS

The Contractor shall allow for connecting the outlets of all sanitary and other fittings with waste outlets to the soil or waste pipe work as appropriate. Traps generally shall be in polypropylene unless otherwise stated, mounted immediately below the fitting and complying with B.S. 5572. All traps shall be accessible and provided with adequate facilities for cleaning and where necessary shall be capable of being easily dismantled, or removed.

All exposed Traps shall be chromed and all drops from Traps to builder's upstands shall be chromed.

Traps with outlets for pipes up to and including 50mm size should have minimum water seal of 75mm and where over 50mm outlet the seal should not be less than 50mm unless otherwise indicated. Bottle traps shall be used on wash hand basins where the trap is exposed. Where syphonage may occur due to the arrangement of small discharge pipe work, re-sealing traps may be used provided the Engineers approval is obtained for each location.

5.10. BLANK CAPS AND CLEANING DOORS

Blank caps and cleaning doors shall be provided at all branches and other locations where rodding access is necessary for cleaning or removal of blockages. Generally their position shall be at branches as indicated on the drawings, but the Contractor shall check the proposed runs before installation and shall consult with the Engineer before installation commences to see whether any additional cleaning doors are necessary.

5.11. ERECTION OF SANITARY FITTINGS

The Mechanical contractor shall include for erection of all sanitary ware and for connecting to all the fittings as indicated on the drawings.

5.12. CLEANING EYES

On all bends of the uPVC piping cleaning eyes shall be fitted. The cleaning eyes shall be of approved design and shall not be less than the diameter of the pipe to which it is fitted.

5.13. RODDING EYES

Rodding eyes shall be provided on the waste floats for the wash hand basins and the waste floats for the urinals. Provide taper thread, counter sunk type rodding eye plugs where shown on the drawings and as required by the Regulations.

5.14. TRAPPED FLOOR GULLEYS

Trapped floor galley shall have water seal not less than 40mm and internal rodding eye accessible from above. Floor Gullies to be Kent KVT170 or equal and approved. Each trapped floor gully arrangement above ground floor level shall be complete with a 2 hour Marley fire collar. The trapped floor galley shall be installed in accordance with the manufacturer's recommendations. Each trapped floor galley arrangement shall be complete with a 2 hour Marley fire collar. The trapped floor galley shall be installed in accordance with the manufacturer's recommendations. Stainless Steel Floor Gullies are called for in the particular specification and the particular specification shall take precedence in this case.

5.15. FIRE COLLARS AND WRAPS

Fire Collars and Wraps will be supplied and installed by the mechanical contractor. Where PVC pipework passes through structural elements and the structure can be reinforced to withhold the bursting strength of the fire wrap, a wrap may be used. Where PVC pipework passes through partitions or structural opes larger than recommended for operation of the fire wrap, a fire collar is to be used. All Fire Collars are to be 2 hour Marley fire collars.

5.16. EXAMINATION:

Give careful consideration to clearances under beams, around columns, adjacent to doors and walls, over windows, above and below ceilings etc. to provide maximum headroom and egress in all spaces, and to the locations of equipment devices and piping, and type of fittings, hangers and supports used to obtain these clearances. Ascertain from the Architect's and Structural Engineer's drawings the heights of all suspended ceilings and the size of all pipe shafts in which piping is to be concealed, and the location and size of structural members. Co-ordinate the installation of equipment, devices and piping with ductwork, lighting and the work of other trades. In any location where insufficient space is available for the co-ordination of the work of the trades in rooms, corridors, above suspended ceilings, or in vertical shafts, obtain clarification from the Architect. Prior to fabricating or constructing any such work.

6. FIRE SUPPRESSION

Fire blankets and fire extinguishers are to be installed by the contractor at all locations described in the contract drawings and mechanical data sheets. Signage will be provided for all such firefighting equipment and external assembly points. All such points will have fire extinguisher cabinets and all fire extinguisher cabinets are to be recessed. The contractor shall ensure that the installation is in compliance with I.S. 291/ I.S. EN 3/ BS. 5306.

The selected fire extinguishers should be selected in accordance with the fire risk classification. Fire blankets shall be fitted adjacent to all cookers. Fire extinguishers should be fitted adjacent to all electrical panels. 5kg automatic fire extinguishers shall be provided in boiler house over each burner assembly. These shall be on a rigid frame to stop them rotating when discharging under pressure. The contractor to submit the fire extinguisher drawings at tender stage to a specialist to ensure there is complete coverage in compliance with the standards above.

6.1. MOUNTING OF FIRE EXTINGUISHERS

Small extinguishers with a mass up to and including 4 kg should be mounted so as to position the handle approximately 1.5m from the floor. The carrying handle of larger, heavier extinguishers should be approximately 1m from the floor. Contractor to ensure that Care should be taken to ensure that extinguishers do not themselves cause injuries by being dislodged and falling onto limbs or bodies. NOTE: Extinguishers may also be positioned on fire-stands, fire-points or in cabinets, in which case these height recommendations need not be followed.

6.2. BRACKETS

Mounting brackets used to position extinguishers should:

- a) be suitable for the extinguisher;
- b) be fixed in accordance with the manufacturer's instructions;
- c) enable easy removal of the extinguisher; and
- d) make its method of removal obvious.

6.3. FIRE STOPPING OF OPES

The contractor shall supply and install fire stopping of all services which pass through fire compartments. This shall include the provision of intumescent collars and strips

and fire dampers. The resultant fire rating shall not be less than two hours. The agreed system of fire proofing shall be based on a common manufacturer for all services and those opes which are being fire stopped by the main contractor.

7. BRACKETS FOR SERVICES:

The contractor shall install all necessary brackets for services as outlined in the general Specification. The contractor shall install all pipework in such a manner that the thermal length variation is not obstructed. This shall include compensating by expansion loops or expansion bellows. All pipe brackets supports shall be fitted Neoprene.

8. THERMAL INSULATION:

Pipework:

All pipework shall be insulated with thicknesses as described in the General Specification by means of rigid sections with foil or PVC backing as required and band finish. Insulation shall comply with BS5422:2009.

Each service shall be painted in accordance with the B.S. Specification code of practice relating to colour coding of services. Pipework subjected to dampness shall be finished with rigid sections and PVC backing. Boiler Room and Plant room pipework shall be metal clad. Elsewhere, insulation shall generally be in foil backed rigid sections. Steel pipework shall be painted prior to insulation being applied. All services shall be labelled and colour coded on completion to the relevant Irish / British Standard.

9. WEATHERING OF SERVICES:

As the mechanical contractor is the main contractor, he/she shall be responsible for the final weathering of all services which project through the roof and walls of the building. The contractor will dress the roof or the wall up to the opening and supply and install all weathering aprons and flashing to avoid ingress of water into the building.

ISSUE REGISTRATION:

Project: Cahir Market House

Project No: 21ME006

Rev	Date	Purpose of Issue/Nature of Revision	Prepared by	Issue Authorised by
T1	06/03/26	TENDER	P.P.	P.P.

This document takes into account the particular instructions and requirements of our Client. It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Hayes Higgins Partnership
The Arches
Gashouse Lane
Kilkenny
Ireland
Telephone (056) 7764710
Facsimile (056) 77232