

**RENOVATION AND REPURPOSING OF 58
MAYORSTONE, LIMERICK**

MECHANICAL SERVICES SPECIFICATION

Date	Issue	Section Changes	Written By	Checked By
APRIL 2025	Tender		RY	RY

CLIENT



PREPARED BY

**CBS CONSULTING ENGINEERS LTD
UNIT 12, ORANMORE BUSINESS PARK
ORANMORE
CO GALWAY**

**PROJECT NO: 2025/04065
TENDER ISSUE: APRIL 2025**

CONTRACT PARTICULARS AND PRELIMINARIES	5
1.1 Extent of Work	5
1.2 Scope of Contract.....	6
1.3 Contract Documents	7
1.4 Defects Liability	7
1.5 Plant Warranties.....	7
1.6 Clients Approval	7
1.7 Workmanship and Materials.....	7
1.8 Site Meetings.....	7
1.9 Rubbish/Site Cleanliness	8
1.10 Fire Precautions.....	8
1.11 Instructing the Client's Staff.....	8
1.12 Records of Tests.....	8
1.13 Operation & Maintenance Manuals and Record Drawings	8
1.14 Alterations, Additions and Omissions	9
1.15 Site Visit.....	10
1.16 Co-ordination	10
1.17 Mechanical Design Engineer.....	11
1.18 Existing Site Services	12
1.19 Prevailing Standards	12
1.20 Interpretation	13
ELEMENT 01 - GENERAL DESCRIPTION OF THE WORKS.....	14
01.0 GENERAL	14
01.1 GENERAL COMPLIANCE	15
01.2 GENERAL CONSTRUCTION WORKS.....	16
01.3 CONSTRUCTION PRODUCTS REGULATION (CPR 305-2011)	16
01.4 BUILDING CONTROL (AMENDMENT) REGULATIONS	16
01.5 DESCRIPTION OF SERVICES.....	16
01.6 DRAWINGS.....	21
01.7 ELECTRICITY SUPPLY AND ELECTRICAL WORK.....	21
01.8 SITE INSPECTION.....	22
ELEMENT 25 - FIRE STOPPING INSTALLATION	23
25.0 GENERAL	23
25.1 FIRE PROTECTION SLEEVES FOR PLASTIC PIPEWORK.....	23
25.2 FLAME AND SMOKE SEALING OF SERVICES OPENINGS THROUGH BUILDING STRUCTURE - PIPEWORK	23
25.3 FLAME AND SMOKE SEALING OR SERVICES OPENINGS THROUGH BUILDING STRUCTURE - DUCTWORK	24

25.4	FLAME AND SMOKE SEALING OF GRILLES.....	24
25.5	CERTIFICATION	24
ELEMENT 52 - SOILS, WASTES AND OVERFLOWS INSTALLATION		25
52.0	GENERAL	25
52.1	PIPEWORK AND FITTINGS	25
52.2	JOINTING.....	26
52.3	PIPEWORK SUPPORTS AND BRACKETS	26
52.4	CISTERN OVERFLOWS.....	26
52.5	AIR ADMITTANCE VALVES	26
52.6	CONNECTIONS TO BUILDER'S FLOOR SOCKETS	26
52.7	SANITARYWARE – FITTING.....	27
52.7	MINIMUM REQUIRED INSTALLATIONS	27
ELEMENT 53 – HOT, COLD AND MAINS WATER INSTALLATION		28
53.0	GENERAL	28
53.1	PIPEWORK AND FITTINGS	28
53.2	VALVES.....	29
53.3	PIPEWORK BRACKETS AND SUPPORTS	29
53.4	SANITARY WARE SUPPLIES ISOLATION.....	29
53.5	PIPEWORK INSTALLATION	29
53.6	DOUBLE CHECK VALVES	29
53.7	THERMOSTATIC MIXER VALVES.....	29
53.8	COLD WATER STORAGE TANK	30
53.9	THERMOSTATIC SHOWER MIXER VALVES	30
53.9	MINIMUM REQUIRED INSTALLATIONS	33
54.1	DESCRIPTION OF WORKS	Error! Bookmark not defined.
54.2	GAS NETWORKS IRELAND	Error! Bookmark not defined.
ELEMENT 56 - SPACE HEATING INSTALLATION		36
56.0	GENERAL	36
56.1	PIPEWORK AND FITTINGS	36
56.2	LTHW VALVES	37
56.3	RADIATORS.....	37
56.4	AUTOMATIC AIR VENTS	37
56.5	BALANCING/COMMISSIONING VALVES	38
56.6	THERMOSTATIC RADIATOR VALVES	38
56.7	WALL & FLOOR PLATES.....	38
56.8	HEATING ZONE CONTROL VALVES.....	38
56.9	HEATING MANIFOLDS	38
56.10	ROOM TEMPERATURE CONTROL.....	38
56.11	MAIN HEATING PLANT	38

56.12	HEATING PIPEWORK INSULATION.....	39
56.13	TESTS - PIPEWORK.....	39
56.14	HEATING CONTROLS STRATEGY & EQUIPMENT	40
56.15	MINIMUM REQUIRED INSTALLATIONS	40
ELEMENT 57 - VENTILATION INSTALLATION		42
57.0	GENERAL	42
57.1	DUCTWORK CLASSIFICATION.....	42
57.2	MATERIALS	42
57.3	SEALANTS.....	42
57.4	BENDS AND FITTINGS	42
57.5	BRACKETS AND SUPPORTS.....	42
57.6	POSITIVE INPUT VENTILATION	42
57.7	COOKER HOODS.....	45
57.8	BACK DRAUGHT DAMPERS	45
56.15	MINIMUM REQUIRED INSTALLATIONS Error! Bookmark not defined.	
MECHANICAL SERVICES INSTALLATION COMMISSIONING PROCEDURES		45
1.1	COMMISSIONING MECHANICAL SERVICES	45
1.2	BALANCING OF HEATING SYSTEMS	46
1.3	GENERAL - COMMISSION, TESTING AND BALANCING	46
1.4	INDEPENDENT COMMISSIONING.....	46

CONTRACT PARTICULARS AND PRELIMINARIES

1.1 Extent of Work

The works detailed within this specification are for the mechanical services installation:

Element 25 – Fire Stopping

Element 52 – Above Ground Drainage

Element 53 – Domestic Water Services

Element 56 – Space Heating Services

Element 58 – Insulation

Element 60 – Heating Controls

1.2 Scope of Contract

- 1.2.1 The scope of works for the Mechanical installation systems shall include the design, supply, delivery, off-loading, lifting/crainage, installation, co-ordination, testing & commissioning, set to work and demonstrate the complete installation as outlined in this specification. The mechanical Contractor shall account for all components necessary for a safe, fully functioning, energy efficient, easily maintainable installation at design stage. These systems shall be included, but not be limited to, lighting, fire alarm, all wiring, containment, distribution boards, accessories and support systems. The detailed design of the Works shall be the responsibility of the Contractor. **Under this contract, the contractor shall allow for development of design. It has not been possible to carry out a detailed survey of each premises and as such the contractor who undertakes this project will be expected to apply the indicated design intent to each individual property.**

1.2.2 Detail Design" shall mean:

Attendance at design team meetings, preparation of detail design drawings and specifications, including sizing and material specification of the entire mechanical installations and systems. The Contractor shall assume responsibility for the detailed sizing, selection, co-ordination with reflected ceiling plans. No variations shall be accepted arising from any changes to plant or equipment locations or changes in services routes. The Contractor shall submit design documentation and builders work drawings to the Engineer for review and commentary prior to execution of the works.

1.2.3 The Works shall comprise the whole of the labour and all materials necessary to form a complete installation and such tests, adjustments and commissioning as specified and as may otherwise be required to provide a complete working installation.

1.2.4 The words "complete installation" in the above clause shall include all the incidental sundry components necessary for the complete execution of the works, and for the proper installation with their labour charges, whether or not these sundry components are mentioned in detail in the documents issued with this sub-contract.

1.2.5 The Contractors responsibilities shall also include liaison with main contractor to ensure their work is programmed in co-ordination with the Main Contractor's overall construction programme. Liaison with the Project Supervisor (Design) Stage for design issued and liaison with the Project Supervisor (works) Stage for construction/on-site issues to ensure that Health and Safety Act 2005 Requirements are complied with.

1.2.6 Checking of dimensions on site and preparation of Builder's Work Installation & Fabrication drawings. Design associated with Building Services, including secondary supplementary steelworks, access platforms and lift equipment for maintenance purposes (including loads imposed on the structure). Where required, design associated with temporary works not forming part of the final installation. Co-ordination with the Works of other Sub-contractors and attendance at meetings as may be required by the Main Contractor.

1.2.7 Preparation of Method Statements covering the whole of the Works inclusive of, but not limited to, off and on site testing, inspection, installation, setting-to-work, testing and commissioning.

1.2.8 Weatherproofing and flashing to all services supplied under this contract which penetrate external elements of the building.

1.2.9 Supply of sleeves, inserts and any other items required under this contract to be cast in for the structure by others, including the co-ordination of positions.

1.3 Contract Documents

The contract documents shall include:

1.3.1 Outline Design Drawings.

1.3.2 General Specification

1.3.3 Performance Specification.

1.4 Defects Liability

1.4.1 The whole of the works, including the materials, workmanship and performance shall be guaranteed for a period of 12 months from the practical completion date, confirmed in writing.

1.4.2 All defects developed within this period to be rectified at the Mechanical Contractor's own expense. Defects resulting from lack of maintenance will be excluded. The nature of the defects shall be determined by the Engineers.

1.5 Plant Warranties

1.5.1 The warranties on plant and equipment shall commence from the date of commissioning and acceptance of plant by the Engineers, where a manufacturer's warranty applies or from the date of practical completion, whichever is the later date.

1.6 Clients Approval

1.6.1 Where specified to be approved, all equipment and materials MUST be cleared in writing before orders are placed with suppliers. Adequate time (ten working days) must be allowed for to obtain the Engineer's approval.

1.6.2 The Mechanical Contractor shall include for the supply & erection of working samples to be installed in a mock-up room for comment by Architect and Engineer.

1.6.3 Any loss incurred by the Mechanical Contractor not complying with the above procedure will be at their own cost.

1.7 Workmanship and Materials

1.7.1 The workmanship and materials used on this contract shall be of the highest standard and only suitably qualified Labour shall be employed for the Works.

1.7.2 Any sub-standard materials shall be removed and replaced at the Mechanical Contractors own expense.

1.8 Site Meetings

- 1.8.1 The Mechanical Contractor shall allow in his tender for his Contracts Manager to attend each site meeting, or any other meeting as dictated by the progress of the works. Site meetings shall normally be held at weekly intervals.

1.9 Rubbish/Site Cleanliness

- 1.9.1 The Mechanical Contractor shall keep the workplace tidy at all times. The Mechanical Contractor shall be responsible for removal of their debris/wastes from site.
- 1.9.2 The Mechanical Contractor shall, on completion of the project, remove from the site all their left over materials and plant and they shall also remove their site accommodation.
- 1.9.3 Particular attention is drawn to the removal of all surplus materials, cartons, packing, off-cuts etc., from the ceiling void, plant rooms and concealed spaces. The clearing-out of these areas shall be carried out on an on-going basis by the Mechanical Contractor during the course of the installation period. This is in the interests of health, safety and hygiene.

1.10 Fire Precautions

- 1.10.1 The main contractor responsible to take all measures necessary to prevent fire so that existing tenants in adjacent occupied properties are not put at risk.
- 1.10.2 The Mechanical Contractor shall take all reasonable precautions to prevent the outbreak of fire, particularly in work involving the use of naked flames.

1.11 Instructing the Client's Staff

- 1.11.1 The Mechanical Contractor shall allow in their tender for instruction and demonstrating to the Client's staff the working and maintenance of all items supplied and installed under this contract.
- 1.11.2 The Mechanical Contractor should also allow for having the equipment Manufacturers demonstration staff in attendance where necessary.

1.12 Records of Tests

- 1.12.1 After all tests have been carried out and the system set to work and commissioned, the Mechanical Contractor shall submit to the Engineers in triplicate detailed records of tests with all relevant commissioning information. The exact commissioning procedure shall be agreed in advance with the Engineers.

1.13 Operation & Maintenance Manuals and Record Drawings

- 1.13.1 The Contractor shall within one month of practical completion of the works, furnish to the Client 'as built' drawings, and all commissioning/test certificates and Maintenance & Operating Manuals relevant to the works.

Before completion, the Contractor shall submit a rough draft of each maintenance manual. After approval and before making application for Final Payments, the Contractor shall deliver two (2) corrected hard bound copies and two electronic copies to the Engineer. Scanned images shall be clearly legible and shall be not less than 300 DPI.

- 1.13.2 Preparation of Operating and Maintenance Manuals shall be based on the following documents:

1. B.S. 4884, Parts 1 & 2.
Specifications for Mechanical Manuals.
2. BSRIA Technical Note TN 1/84.
Guidelines for building services operating and maintenance manuals.
3. BSRIA Application Guide 1/87.
Operating and maintenance manuals for building services installation.
4. BSRIA Technical Note TN 12/86.
Fault finding procedures in the building service industry.

1.13.3 Operating and Maintenance Manuals shall include the following information:

1. Index, introduction and safety of work.
2. Description of all systems and equipment.
3. Names, addresses and telephone numbers of all sub-contractors, suppliers and local firms for each item.
4. Technical documentation.
5. Equipment schedules and spare parts list.
6. Operating information.
7. Maintenance instructions.
8. Maintenance schedules.
9. Fault finding.

1.13.4 The Mechanical Contractor shall provide two number complete sets of operation and maintenance instructions adequately prepared and bound together in manual form.

1.13.5 The Mechanical Contractor shall provide 1 no. set of reproducible as built drawings and 2 sets of prints from these drawings.

1.13.6 The Mechanical Services design drawings have been produced utilising "Auto-CAD 2015".

Upon completion of the project the Contractor shall be provided with discs of these drawings and will be expected to alter the drawings on Auto-CAD or a compatible computerised drafting system. In addition to the "hard copies" stated above the Contractor shall submit 2 sets of 'As Built' drawings in disc form.

1.13.7 The above documentation shall be submitted to the Engineers for approval before handing over to the Client.

1.14 Alterations, Additions and Omissions

1.14.1 No departure from the tender plans and specifications or any other alteration or additions shall be permitted or paid for until the written instructions of the Engineers has been obtained.

- 1.14.2 Any alterations, additions or omissions shall be priced in accordance with the Mechanical Contractors Schedule of Rates.
- 1.14.3 Where it is not possible to apply the Schedule of Rates to any variation from the Contract, such variations shall be charged at the day work rates indicated by the Mechanical Contractor in the Form of Tender.
- 1.14.4 The Mechanical Contractor must advise the Engineers, in advance, of the details of any variations to the contract which may be necessary and the cost of same. He must in turn receive written approval from the Engineer before proceeding with any associated works.

1.15 Site Visit

- 1.15.1 Contractors tendering for the works shall be deemed to have visited the site of the works and ascertained the facilities for access thereto, the general convenience of working, the proximity of existing buildings and the supply of materials and labour the district will afford.
- 1.15.2 Contractors shall pay particular attention to the building structure regarding the supporting of the Mechanical Services Installation.
- 1.15.3 The Contractor shall be deemed to have made a thorough examination of the tender drawings, the site and all features thereof with all services, drains, mains or other things affecting the proposed works to ascertain precisely the nature and extent of same and the conditions under which they will have to be executed and shall obtain their own information on all matters and all other things which can in any way influence their tender.

1.16 Co-ordination

- 1.16.1 Before any of the installation work commences the Mechanical contractor shall consult the engineers and other contractors to determine the correct, routes, heights and location of all services and to determine the correct sequence of erection. No claims for extras will be considered for work done due to the contractor's failure to predetermine the above aspects of the installation before the installation commences.
- 1.16.2 The Mechanical contractor is to employ full time on site person as a competent M&E services co-ordinator. The Mechanical contractor shall be fully responsible for their element of works. The Mechanical contractor shall ensure clashes with other services and trades are detected and addressed before commencing work. **The mechanical contractor shall be fully responsible for their element of works. The mechanical contractor shall ensure clashes with other services and trades are detected and addressed before commencing work.** The service coordinators responsibilities shall include but are not limited to the following:
- Managing production of co-ordination drawings
 - Managing production of builders work drawings
 - Managing production of Technical Submissions
 - Chairing services technical meetings.
 - Chairing services coordination meetings
 - Managing service installation – prior to installation approval and signoff required from ER
 - Reporting at site meetings
 - Liaising with Site team

- Liaising with Utility Companies
- Progressing review of installations
- Managing Services method statements
- Managing commissioning
- Managing services demonstrations and handover process
- Complying with H&S Requirements
- Managing compliance with BCAR requirements
- Snagging & de-snagging
- Managing production & verification of As-Built Documentation
- Post hand over liaison
- Liaising with Design Team members
- Liaising with Employers representative

1.16.3 The mechanical and electrical sub-contractors must co-ordinate to produce fully coordinated working drawings for the entire installation. These drawings must be produced on a phased basis to co-ordinate with the builder's programme.

1.16.4 The Mechanical contractor must act as lead co-ordinator in the co-ordination process and in the production of the finalised co-ordination drawings. The lead co-ordinator will be responsible for setting up and conducting coordination meetings to co-ordinate the electrical, mechanical and builder's services. The co-ordinated drawings must include detailed plan layouts and detail cross sectional drawings. Separate co-ordinated drawings will be produced for each floor for each dwelling in the project.

1.16.5 The drawings must be issued to the architects and the consulting engineers for comment prior to commencement of work in any section of the installation.

1.16.6 The Mechanical contractor will be responsible for issuing co-ordinated mechanical and electrical drawings to the design team and main contractor. The Mechanical Contractor must provide all necessary coordination drawings, working drawings and builder's works drawings that are required to carry out the project. The Engineer will issue Mechanical and Electrical drawings to allow the Mechanical Contractor to co-ordinate the works, who will be acting as lead co-ordinator of the services. The Engineer will be issuing Tender, Contract and Works Requirements (construction information) drawings to the contractor to allow them to develop their drawings. The Engineer will not be issuing working drawings to the Contractors. The Mechanical Contractor is required to present a full set of co-ordinated working services drawings for the full mechanical and electrical installation to the Engineer two weeks in advance of the mechanical and electrical works commencing on site.

1.17 Mechanical Design Engineer

1.17.1 The mechanical services contractor shall ensure all equipment selected for this development complies in full with the requirements of the project preliminary BER Part L reports and specifications. No deviations without prior approval shall be accepted as part of this project. Where the contractor proposes to deviate from the mechanical services tender drawings, documents or BER Part L reports and specifications, the contractor shall be required to demonstrate how the alternative equipment complies in full with the project requirements without affecting the required project BER Part L rating(s). This information shall be provided by the mechanical contractor well to the Design Team & BER Assessor well in advance of installation works in order to allow the BER Assessor to evaluate the equipment performance and ensure compliance with Part L. In the event that the BER needs to be recalculated as a result of deviating from the project specifications and/or BER requirements, the mechanical contractor shall pay all associated fees to complete this task.

The contractor shall ensure that the services installations meet the requirements of Technical Guidance Document (TGD) Part L NZEB standards in order to achieve the Preliminary BER Ratings.

The contractor shall employ the services of a competent and qualified mechanical engineer. The mechanical engineer shall carry out all onsite coordination and development of design.

1.17.2 The mechanical contractor shall carry out the following:

- Development of design where necessary
- Coordination of installation
- Liaison with utility companies to ensure disconnection and reconnection of services.
- Close out documentation including the collation of certification and as built drawings and documents.

Drawings shall be made available to the client in original AutoCAD format (DWG) V.2015

Design calculations shall be presented to the Client for review.

Design acceptance is subject to the approval of the Client.

1.18 Existing Site Services

*******Note for the main contractor*******

It shall be the responsibility of the Main Contractor acting as the PSCS to identify all existing services before commencing work. The main contractor shall ensure the continuity of all utility services to existing dwellings for the duration of the contract.

1.19 Prevailing Standards

1.19.1 The mechanical services contractor shall ensure the entire mechanical services installation is fully compliant with the most recent edition of the following codes and standards as a minimum:

- Irish Building Regulations Document B, Volume 2 – Fire Safety.
- Irish Building Regulations Document F, - Ventilation.
- Irish Building Regulations Document G, - Hygiene.
- Irish Building Regulations Document H, - Drainage & Waste Water Disposal.
- Irish Building Regulations Document J, - Heat Producing Appliances.
- Irish Building Regulations Document L, - Conservation of Fuel & Energy, Dwellings.
- Irish Building Regulations Document M, - Access & Use.
- F-Gas Regulations. Where the project requires works on refrigerant gas pipelines and equipment, the contractor shall be a registered and accredited F-Gas contractor and evidence of this certification shall be provided to the Consultant Engineer.
- RGII Registered Gas Installers TGD. Where the project requires works on gas pipelines and equipment, the contractor shall be a registered and accredited specialist gas contractor and evidence of this certification shall be provided to the Consultant Engineer.

- Irish Water Code of Practice July 2020.
- BS 6700 Design, installation, testing and maintenance of services supplying water for domestic use within buildings and their curtilages – Specification.

All relevant Acts of the Oireachtas and Statutory Instruments, in particular:

- The Safety, Health and Welfare at Work Act, 2005.
- S.I. No. 299 of 2007 (General Application Regulations) / SI No. 732 of 2007) including all amendments.
- Safety, Health and Welfare at Work (Construction) Regulations, 2013 (SI No. 291 of 2013).

The requirements of the above noted Standards/Codes shall be applied to this project as appropriate. Where the appropriate Standard is unavailable or a specific issue associated with this project is not explicitly detailed in the Irish Building Regulations, the relevant and appropriate BS standard will be consulted and become the governing document.

1.20 Interpretation

The drawings accompanying this Specification indicate generally the arrangement of the installation and are for assistance in tendering only. The position of points and apparatus shown thereon are approximate only. The exact positions will be advised during the course of the contract. The Contractor shall provide for all that may reasonably be inferred from the Specification in order to leave the installation safe, complete, efficient and clean. The Contractor shall consider the Specification and drawings jointly and any point arising out of discrepancies between these shall be queried before tendering.

ELEMENT 01 - GENERAL DESCRIPTION OF THE WORKS

01.0 GENERAL

The project involves the complete strip of existing mechanical services of a former garda station which is being repurposed as 2No. apartment units. The property will be completely stripped back to allow a new mechanical services installation in each dwelling. The contractor shall assist with the disconnection to facilitate demolition, and strip out works to the building fabric. The mechanical contractor will be responsible for the strip out and removal of waste materials from site, then the subsequent complete mechanical services installation of each dwelling.

The successful tenderer shall be aware, the design drawings provided as part of this tender are an indication of requirements only. The successful tenderer will be expected to deliver a fully functioning mechanical services installation in all cases and in accordance with the quantities set out in this document, indicated on drawings, indicated in Limerick City and County Councils sustainable housing document and in accordance with the minimum capacities required by the building regulations technical guidance documents. Where a conflict arises, the largest recorded quantity shall take precedence.

The successful tenderer shall be fully aware that the installations as appear on drawings may not be practical onsite and an onsite assessment will be required in each case. The contractor shall carry out the indicated works in a manner suitable for the site, adjusting the design as required. The successful contractor must be willing to work withing the spirit of the contract and deliver a complete installation in all cases.

The contractor shall carry out the complete mechanical installation in accordance with this specification, all relevant codes and standards and the outline drawings provided. It is advisable that the contractor considers the background information provided as part of this tender, however the background information does not form part of the tender package.

The Mechanical Contractor shall supply all labour, materials, equipment, and engineering services and perform all works necessary to design, install, test, commission and render operational a complete mechanical system as specified hereinafter.

Delivery, receiving, off-loading, handling, storing, putting into position, assembling and erection of all equipment shall form part of this Contact.

The extent of the work to be carried out under this specification shall include, but not be limited to, the following items:

- The contractor shall co-ordinate with the Main Contactor and all other Contractors on site to ensure the installation of all services is fully coordinated. **The mechanical contractor shall ensure no conflicts between the mechanical and electrical installation.**
- Coordination and attendances, where required, for Gas Networks Ireland's works to disconnect or provide a gas supply to any and all required locations within the defined project works. The mechanical contractor shall include for the appointment of Gas Networks Ireland to complete the installation of the gas service throughout the site.
- Supply samples for approval by the client. Supply and install samples in a mock-up for approval by the client.

- Supply, install, test and commission all elements of the gas services installation from Gas Network Ireland meters to the various points of use. All elements of the gas services installation shall be in compliance with IS813:2013.
- Design, supply, install, test and commission all elements of the heating system(s) including heat pump, pumps, expansion vessels, pipework, heat emitters & heating controls.
- Design, supply, install, test and commission all elements of the water services system(s) including cold water storage tanks, hot water storage cylinder, distribution pipework, manifolds, & valves.
- Design, supply, install, test and commission all elements of the above ground drainage system(s) including soil vent pipes, branches, cleaning eyes, traps and final connections.
- Design, supply and install all support steelwork, brackets and fixings required for the satisfactory installation of all items of mechanical plant & equipment.
- Inspect, test, commission and certify the completed installation including all pre-commissioning and attendance on others during the commissioning and setting to work of the installation.
- Remove from site all waste and surplus materials and plant, debris, packing materials and rubbish to render the site in a safe, clean and tidy condition.
- Provide spare parts and special tools for the installation.
- Provide detailed and accurate O&M manuals and record drawings in both hard copy and electronic format.
- Demonstrate to and train the relevant Client personnel on the operation and maintenance of the completed installation including presentation of O&M Manuals.
- Provide a comprehensive routine and emergency call out service throughout the Defects Liability Period.
- Supply and install all the fire stopping of associated mechanical services.

Mechanical Contractor shall make good all damage caused during this contract.

Mechanical Contractor is advised to visit the site to inspect the extent of the work involved before submitting an estimate. No additions will be permitted to the contract sum because of site knowledge or conditions.

Mechanical contractor is reminded that it is their responsibility to co-ordinate and control all trades and sub-contractors as the main contractor. No additions or variations will be permitted to the contract sum because of failure to co-ordinate works.

01.1 GENERAL COMPLIANCE

This specification shall be read in conjunction with all relevant Irish standards and codes of practice, Irish building regulations, technical guidance documents to the Irish building regulations, NSAI National wiring rules and all the relevant laws of the Republic of Ireland. The requirements of these documents shall be fully adhered to by the mechanical subcontractor in their execution of the sub contract works. In the event of there being any conflict between the requirements of this specification and any of the above-mentioned Irish Standard documents, the requirements of the Irish Standard documents shall prevail over those of this specification. The Mechanical Subcontractor shall, giving adequate notice before taking any particular course of action, inform the architect or project manager of any such disagreement in the documentation. Adequate notice shall never be less than one week.

This specification shall be read in conjunction with the relevant drawings and Bill of quantities. In the event of there being any conflict between the drawings,

specifications and Bills of Quantities the Mechanical Subcontractor shall allow for the most onerous option when submitting a tender.

The Mechanical Subcontractor shall satisfy himself that the installation is in accordance with all codes and standards as set out in the General Mechanical Specification.

01.2 GENERAL CONSTRUCTION WORKS

All works shall be designed and installed in accordance with the following regulations, standards and guidance documents.

- Requirements of the Health and Safety Authority/ SI 138.
- Building Regulations.
- Requirements of the Fire Officer.
- Requirements of Gas Networks Ireland.
- Requirements of the E.S.B Networks.
- Factories Act/ Statutory Instruments.
- Client Safety Protocol.
- Client Specifications.
- Chartered Institute of Building Services Engineers Guidance Documents.
- EMC Directive
- Low Voltage Directive.
- Machinery Directive.
- ERP Directive.
- All materials used shall be (CE) marked in accordance with the EU Construction Product Regulations (CPR) (No.305/2011). Refer to Annex IV of the Regulations for the list of applicable products.

01.3 CONSTRUCTION PRODUCTS REGULATION (CPR 305-2011)

All materials used shall be (CE) marked in accordance with the EU Construction Product Regulations (CPR) (No. 305/2011). Refer to Annex IV of the Regulations for the list of applicable products.

01.4 BUILDING CONTROL (AMENDMENT) REGULATIONS

The project falls under the requirements of the Building Control (Amendment) Regulations – BC(A)R and the Contractor shall be required to provide all necessary certification of his work and allow all required attendances and notifications to facilitate the inspections of the works by the design team in accordance with the Assigned Certifiers Inspection Plan for the project.

The Contractor shall provide all certification required by the Engineer or the Assigned certifier in advance of completion of each dwelling in a timely manner so as not to adversely impact on the completions of sales of any dwelling in the development. Certification will be required for each and every dwelling all records/certificates will be dwelling specific.

01.5 DESCRIPTION OF SERVICES

The following describes the various elements of works associated with the mechanical services sub-contract.

Fire Stopping of Services (Element 25)

The mechanical contractor is responsible for all elements of the design and installation of the fire stopping services. Fire stopping shall be designed and installed to achieve compliance with TGD Part B – Dwellings. It is the sole responsibility of the mechanical contractor as the designer to achieve compliance with all relevant standards.

All penetrations of floors or walls are to be fire stopped by a recognised specialist sub-contractor.

Soils and Wastes Installation (Element 52)

All items of sanitary ware shall be connected to the above ground drainage system, which in turn will connect to upstands and back inlet gulleys as provided by the main contractor.

Sanitary ware shall be provided by the main contractor and connected by the mechanical services contractor.

The extent of the soil and waste systems to be covered under this contract shall be all work above the finished ground floor slab level. Below ground sanitary pipework installations will be provided by the main contractor. However, the mechanical services contractor shall fully co-ordinate the installation requirements with the main contractor including pop-ups/upstand positions etc.

The soil and waste sanitary systems shall be one pipe fully ventilated systems. Soils and wastes connections shall be provided to all items of sanitary and white goods as required and as indicated on the architects drawings. Drains shall also be provided for safety discharges on indoor heat pump units as well as any indoor vertical cold water storage tanks. Under no circumstances shall any soil vent pipes installed internally be installed horizontally in the attic of any dwellings. All internal SVP's must be taken vertically and directly out through roof slate vents and this shall be fully co-ordinated between the main contractor and mechanical contractor.

Bottle traps with 75mm seal shall be provided on the outlets of all sanitary fittings connected to the waste pipes.

Main vertical soil pipes and vent pipes shall be 110mm diameter. The pipes and fittings shall be manufactured from Wavin.

The Mechanical contractor shall include for the supply and installation of fire collars to all soils and waste pipework penetrations through all fire rated floors, ceilings and walls.

Domestic Water Installation (Element 53)

Domestic potable water for hygiene purposes will be provided to all areas as detailed on the relevant drawings. All external site watermains (including boundary boxes) shall be completed by the main contractor. The external site watermains shall include branch connections to serve each dwelling. The mains water connections shall be terminated just above the ground floor slab by the main contractor. The mechanical services contractor shall complete the internal domestic mains water service connection from this point throughout each building.

The incoming metered mains water service will connect to the cold-water storage tank and kitchen appliances within each dwelling. Each dwelling cold-water storage tank shall have a boosted cold-water service which shall in turn serve the dwelling

appliances and indoor heat pump equipment. The boosted cold-water service shall be provided with "unvented kit" at connections to the heat pump equipment where required. All cold-water storage tanks in each dwelling shall be WRAS Approved and to Format 30 standard as a minimum. All tanks shall be fully insulated.

The domestic cold water service to all appliances shall be completed in hard rigid piping. Flexible hose connections shall not be accepted and will be removed if installed in the project and replaced with hard rigid piping.

Domestic hot water to each house shall be provided by a dedicated air-to-water heat pump system as detailed on the design drawings and scheduled herein.

All connections to sanitaryware etc as part of this development shall be provided with ballofix isolating valves as necessary.

Thermostatic mixing valves shall be provided to all hot water outlets to prevent risk from scalding.

Thermostatic unvented shower mixing valves shall be provided to all bath/shower points as outlined on the drawings and scheduled herein. Each shower shall be fitted with flow restrictor (6 l/min) device which can only be removed using appropriate tools and shall be SEAI approved and listed on the *European Water Label* portal.

The entire potable water services distribution system right up to the final draw-off demand points shall be fully chlorinated, treated and sterilised for potable water usage and certified accordingly.

All hot water outlets serving wash basins within each dwelling shall be provided with a thermostatic mixing valve to TMV2 specification whether shown on the drawings or not. This shall be supplied and installed by the mechanical services contractor.

All domestic water pipework used on this project shall be WRAS approved pre-insulated multilayer pipework with minimum 13mm insulation.

Space Heating Installation (Element 56)

The mechanical contractor is responsible for all elements of the design and installation of the space installation. The space installation shall be designed and installed to achieve compliance with TGD Part L and Part J. It is the sole responsibility of the mechanical contractor as the designer to achieve compliance with all relevant standards.

Space heating (and domestic hot water) to each unit shall be achieved by a mono bloc, air to water heat pump. This heat pump shall be installed on a dedicated plinth as shown on the Architects design drawings. All interconnecting pipework and fittings including insulation shall be provided as part of this installation.

The outdoor units shall be provided with a flexi-feet 400 support base (or equal and approved) and a protective cage as outlined on drawings.

The primary flow and return pipework connecting to manifolds shall be rigid copper or multi layer heating type pipework. Final connections to the heating plant shall be made in copper pipework. Pipework to radiators shall be rigid copper or multi layer heating type pipework.

The heating shall be based on steel panel or aluminium radiators with thickness of 1.5mm and no greater than 1mm or less gap between the tubes to each dwelling. These radiators shall have a standard tested pressure of 6 Bar with an operating pressure of 4.6 Bar. Outputs are to be tested in accordance with EN442. Standard RAL 9016 anti-bacterial finish. The choice of connection shall be confirmed with design team. In general, heating pipework shall be run joint-free in the ceiling joists of each dwelling.

All equipment and fittings required for the full complete and operational packaged heating system shall be provided and installed under the mechanical services sub-contract.

The mechanical contractor shall take into consideration the separation distance between the indoor and outdoor heat pump units.

The primary flow and return pipework connecting to each manifold shall be rigid WRAS approved pre-insulated multilayer pipework with minimum 13mm insulation. All interconnecting space heating pipework from the indoor heat pump unit to each manifold location shall be run in 32mm flow and return rigid-section pipework.

The mechanical services contractor shall also include for the supply and installation of all radiators required as outlined on the drawings. The heating shall be based on kite marked aluminium radiators. These radiators shall have a standard tested pressure of 6 Bar with an operating pressure of 4.6 Bar. Outputs are to be tested in accordance with EN442. Standard RAL 9016 anti-bacterial finish. The choice of connection shall be confirmed with design team. In general, the main heating distribution pipework in each house shall be run joint-free in the ceiling joists of each dwelling.

The contractor shall prepare detailed drawings of the proposed packaged heat pump and heating system as offered by the appointed packaged system specialist. These drawings shall be issued to the Consultant Engineer for review, comment, and approval. The mechanical services sub-contractor shall confirm the proposed heat pump type as part of the submitted tender.

All indoor and outdoor sensors as well as interconnecting controls cabling and associated devices required to complete the installation of the system shall be supplied and installed as part of this contract.

All Air-to-Water Heat Pump systems installed in this project MUST be selected from the SEAI Triple E approved list.

The mechanical services contractor shall include in the tender for appointing a suitable and reputable heat pump specialist contractor to carry out the works. The mechanical services contractor shall also include in the tender for the provision of detailed SR50 heat loss calculations, detailed design calculations, detailed design drawings of the heat pump and radiator heating system for each individual dwelling. This shall be supported by detailed equipment datasheets. The contractor shall provide radiators selection based on the heat loss calculations completed by the contractor's appointed heat pump/heating system specialist company.

The mechanical services contractor shall include for providing detailed heat loss calculations as completed by the specialist heat pump/underfloor heating company. All heat loss calculations shall be based on SR50-1:2010, Code of Practice for Building Services – Part 1 Domestic Plumbing & Heating Systems. A full set of SR50-1 calculation files shall be issued in DEAP format to the Building Services Consultant for inclusion in the final BER Assessment.

The specialist heat pump/underfloor heating company shall use the project XML files and use DEAP Software and Heat Pump tools to ensure that the proposed heating system is fully compliant with Part L of the Building Regulation's and complies in full with the minimum requirements as described in the preliminary BER reports.

Note, if the tendering contractor wishes to select an alternative heat pump system or equipment other than that detailed herein, a full detailed plant submittal will be required together with updated BER assessment (XML files) confirming that the proposed alternative system will achieve the minimum BER Energy Ratings as described herein. Note, all these docs must be provided by the mechanical services contractor.

The heat pumps shall be supplied with an integral 6.0m head ErP A-Rated inverter circulating pump. Where the heat pump is not fitted with an integral circulating pump, the mechanical services contractor shall and install all ErP Rated inverter circulating pumps (6.0m head) required to complete the installation. The pump shall be interlinked to the system controls.

The heat pump indoor unit shall be provided with anti-vibration mounts, cylinder immersion heater, expansion vessel, backup heater and temperature/pressure relief kit and drain connections as required by the manufacturer.

The heat pump indoor and outdoor unit shall be provided with anti-vibration mounts. The outdoor unit shall be provided with three flexi-feet supports owing to the physical footprint of the larger monobloc unit.

The mechanical services contractor shall ensure all equipment required to complete the full successful mechanical services installation are included in the tender submission.

The mechanical services contractor and main contractor shall fully co-ordinate the requirements for the controls cabling and interconnecting pipework which connects the indoor and outdoor heat pump units. Provisions **must** be made at the very beginning of the project before floor slabs are laid for all service duct ways required to enable the installation of the heat pump interconnecting pipework and cabling.

Ventilation (Element 57)

Mechanical ventilation will be provided in accordance with the current building regulations for areas indicated on drawings.

Note, the mechanical services sub-contractor shall be responsible for the supply and installation of all ventilation equipment. This shall include all passive wall vents required to be installed in perimeter walls of all habitable spaces whether shown on the drawings or not. If the contractor wishes to use window vents in lieu of wall vents, this must be made known to the design team (for review and approval) well in advance of any works being carried out on site.

Mechanical ventilation to each house type shall be provided by means of a Demand Controlled Ventilation System. The Mechanical Contractor shall supply and install all required components of the system as shown on drawings. This will include all wall vents required for external walls of each dwelling.

The ventilation ductwork installed as part of the DCV system shall be fully compatible, tested, certified and approved for use with the DCV system as per SAP App Q. The fan must be installed with ductwork which has been tested and specifically listed on SAP App Q. The ductwork shall be provided with fire collars at all locations where the duct penetrates fire compartment walls/ceilings/floors.

A ventilation system status indicator shall be installed in each dwelling which fulfils the requirements of Section 1.2.2.10 of TGD Part F.

The ventilation system must comply with Part L 2019, in specific regard to SFP values of the system and equipment. CMEV must have an SFP value of no more than 0.2 W/(l/s).

Insulation (Element 58)

Insulation of all pipework and ductwork services will be provided as part of this contract. All domestic water service and space heating service pipework shall be pre-insulated multilayer pipe with an insulation thickness which is fully compliant with Irish Building Regulations Technical Guidance Document Part L requirements.

All demand-controlled ventilation ductwork passing through uninsulated areas shall be fully insulated in accordance with the DCV manufacturer's requirements.

Electrical Wiring (Element 62)

All electrical wiring associated with the mechanical services installation will be carried out as part of this contract. The mechanical contractor shall design and install complete control system in accordance with CIBSE Guide H.

The electrical supplies for mechanical equipment shall be designed and installed by the contractor.

Fire Fighting Equipment (Element 68)

Fire fighting equipment will be provided as required by relevant standards and regulations. A minimum of a fire blanket is required in the kitchen of each dwelling.

The fire fighting equipment will be supplied by a specialist sub contractor as part of the mechanical services sub-contract.

01.6 DRAWINGS

The contract drawings issued with this specification are listed in the schedule. The drawings indicate the approximate location of the various fittings with the final location being agreed on site with the Architect or Engineer. As previously stated, in this particular contract, the drawings provide an indication of overall requirements. The mechanical contractor will be required to interpret the intent of the drawings and carry out the mechanical installation to the actual site conditions rather than the drawings.

01.7 ELECTRICITY SUPPLY AND ELECTRICAL WORK

Electricity supply will be from the Electricity Supply Board mains and will be AC single phase 50 cycles. Electricity required to operate tools for the erection of the works will be provided by the Building Contractor, without cost to the Mechanical Services Contractor. The Mechanical Services Contractor shall provide all extension

leads for use with electrical tools and a 110 volt transformer if his tools operate on this voltage.

The cost of the electrical works in the housing development associated with this contract and necessary to complete the works will be carried out by the Site Electrical Contractor.

01.8 SITE INSPECTION

Mechanical contractor is advised to visit the site to inspect and examine the full extent of the contract before submitting a cost for the works as no addition will be allowed to the tender sum because of lack of site knowledge or conditions.

01.9 CE CERTIFICATION

All plant items procured and installed on this project MUST be provided with "CE" certification to indicate conformity with health, safety and environmental protection standards. All plant must be provided with appropriate "CE" marking. Failure to install plant and equipment bearing this certification shall require the contractor to remove same and replace with appropriate approved CE certified equipment at no expense to the client.

01.10 PLANT SUBMITTALS

The appointed mechanical services contractor is required to provide detailed technical plant submittals for all items of plant associated with this development. Plant submittals shall be submitted to the Consultant Engineer in a timely manner. This shall give due consideration to plant lead-times as well as the time required to review, seek clarifications and approve of plant. A minimum of two weeks should be given to review and approval of plant submittals.

Note every effort must be made by the mechanical services contractor to clearly identify in each submittal how the proposed plant complies in-full with the equipment detailed and specified on the drawings and specifications. It is not up to the Consultant Engineer to identify differences or shortfalls in the proposed plant but up to the mechanical services contractor to clearly show how the proposed equipment complies and/or exceeds the requirements of the specifications. This also accelerates the submittal review/approvals process.

Where equipment detailed in plant submittals falls short of the specification, the contractor will be required to proceed with the requirements of the drawings and specifications.

It is a strict condition of this contract that where the mechanical services contractor proposes to install alternative equipment, the plant submittals shall clearly show what specific equipment is being proposed and how it matches the performance of the specified equipment. This includes operating performance data as well as acoustic performance etc. Any restrictions or implications in relation to equipment maintenance must be taken into account by the contractor.

It is entirely the responsibility of the mechanical services contractor to clearly demonstrate how the equipment proposed in plant submittals clearly matches the performance of the specified equipment.

ELEMENT 25 - FIRE STOPPING INSTALLATION

25.0 GENERAL

This section of the specification shall include for all necessary fire stopping of all services that penetrate all walls and floors, or that pass up through enclosed vertical service ducts whose floors and ceilings shall be fire stopped as if for an opening through a fire compartment floor.

The Contractor must base his tender price only using rates received from one of the fire stopping specialists listed later.

25.1 FIRE PROTECTION SLEEVES FOR PLASTIC PIPEWORK

Fire protection sleeves for all plastic pipes over 38 mm diameter passing through building structure, as follows:

- a Galvanised steel sleeve with intumescent liner enclosing piping where it passes through a fire compartment wall, floor or ceiling.

At a temperature of 150°C intumescent line shall expand inward to close the softened plastic pipe and seal the aperture.
- b Two hours fire resistant in accordance with BS 476 Part B (1972) unless otherwise stated.
- c Suitable for horizontal or vertical installation.
- d Install in accordance with the Manufacturer's recommendations.

The sleeve shall be equal to "Fire Sleeve" manufactured by Dufaylite Developments Ltd.

25.2 FLAME AND SMOKE SEALING OF SERVICES OPENINGS THROUGH BUILDING STRUCTURE - PIPEWORK

The spaces between and around pipework services (non plastic) where they pass through walls or floors slabs to be sealed with Firetard mineral wool firebatt and finished flush with the face of the building fabric as follows:

- a All loose building fabric to be removed
- b The same space is then to be tightly packed with Firetard mineral wool firebatt and finished with Firetard mastic to give a flame and smoke tight joints.
- c This work must be carried out by a Specialist Contractor who will issue a Certificate on completion of the work certifying that all openings have been properly treated.
- d Existing or new builder's work to be finished to an approximate dimension of 75 mm to the services.

The specialist contractor shall be Wormald Limited.

25.3 FLAME AND SMOKE SEALING OR SERVICES OPENINGS THROUGH BUILDING STRUCTURE - DUCTWORK

The spaces between and around pipework services where they pass through walls or floor slabs to be sealed with Firetard mineral wool fibrebatt and finished flush with the face of the building fabric as follows:

- a All loose building fabric to be removed
- b The same space is then to be tightly packed with Firetard mineral wool firebatt and finished with Firetard mastic to give a flame and smoke tight joints.
- c This work must be carried out by a Specialist Contractor who will issue a Certificate on completion of the work certifying that all openings have been properly treated.
- d Existing or new Builder's work to be finished to an approximate dimension of 75 mm to the services.

25.4 FLAME AND SMOKE SEALING OF GRILLES

All wall and ceiling mounted supply and extract grilles are to be fitted with a fire sealant around the flanges to prevent smoke and or flame infiltration around the grille.

The sealant is to be applied as follows:

- a The Ventilation Sub-Contractor should fix the grille of diffuser, aligning where necessary and screw finger-tight.
- b The grille or diffuser will then be removed and all loose building fabric cleaned.
- c A 5 mm thick fillet of Firetard mastic is to be applied to the back of the grille flanged which must then be fixed to the wall of ceiling/duct spigot before the mastic sets.
- d After fixing, all excess mastic must be removed immediately, and both the grille and wall/ceiling left in a clean condition.
- e This work must be carried out by a Specialist Contractor who will issue a Certificate on completion certifying that all grilles and openings have been properly treated.

25.5 CERTIFICATION

Upon completion of the work described above, the specialist contractor shall issue a certificate (in triplicate), which certifies that all the Mechanical Services within the building have been fire stopped to comply with the requirements of the Limerick Fire Authority.

ELEMENT 52 - SOILS, WASTES AND OVERFLOWS INSTALLATION

52.0 GENERAL

The complete soils, wastes and overflows design and installations shall be carried out in accordance with Local Authority requirements and the relevant British and Irish Standards.

Drainage Surface and Foul BS 8301
Sanitary Installations BS 5572/BS 6465

Also, the Building Regulations, Sections H1 and H3 apply.

The Contractor shall be responsible for obtaining Local Authority approval before proceeding with the installation.

52.1 PIPEWORK AND FITTINGS

All soil pipe work and fittings shall comply with BS 4514, UPVC pipework.

All waste pipe work and fittings up to 55 mm dia. shall comply with BS 5255, MuPVC pipework.

All exposed branch waste and anti-syphon pipes, between stacks and sanitary fittings will be in PVC with compression fittings.

At the foot of all vertical stacks and changes of direction and at all principal junctions at each floor level, access shall be provided.

The soil and waste stacks shall be connected at lower ground floor level to the drainage system with an approved fitting. At the roof level all soil and waste ventilating pipes will terminate with suitable roof connector weathered (by others) and copper wire balloon gratings.

The connection of anti-syphon stacks to main stacks will occur above the flood level of the highest fitting or be taken to atmosphere independently.

Unless otherwise indicated, soils and wastes pipework running through occupied spaces or concealed in void spaces shall be fully insulated for acoustic purposes.

All external pipework, including existing pipework at the existing cold water storage tank shall be insulated in 25mm thickness Thermobreak No Clad™ – External Insulation or, all external pipework insulation is to be clad in 2mm armachek-r. The manufacturers guidelines for installation are to be strictly followed.

The entire internal installation shall be insulated using Armaflex Class "O" pipe work insulation to the thicknesses as laid down in this Specification. All insulation is to be 25mm thickness.

The armaflex application manual shall be followed strictly for the insulation of all pipework, valves, bends, fittings, flanges, etc. All of the aforementioned shall be insulated. The thickness of armaflex shall be calculated according to armaflex software available online www.armacell.com/uk. All pipe supports are to incorporate armaflex (armafix) insulated pipe supports.

All external pipework insulation is to be clad in 2mm armachek-r. The manufacturers guidelines for installation are to be strictly followed.

52.2 JOINTING

UPVC pipe work and fittings shall have neoprene 'O' ring joints.

MuPVC waste pipe work and fittings shall have solvent welded joints except at expansion joints or boss connections to discharge stacks, which shall be jointed using 'O' rings.

Joints on socket less cast iron pipe work shall be flexible mechanical type to BS 6087.

Jointing to WC pans shall be made using patent connectors.

All jointing shall comply with the manufacturer's instructions.

Where applicable on a single stack system a collar boss may be used on the vertical stack to take bath discharge pipes.

52.3 PIPEWORK SUPPORTS AND BRACKETS

The complete soils, wastes and overflows pipework shall be supported using brackets as supplied by the pipework manufacturer and they shall be installed strictly in accordance with the manufacturer's instructions in regard to spacing, fixings, etc. Pipework shall not be fixed to any suspended ceiling or to its supports. All supports shall be fixed to the roof or immediate floor structure.

52.4 CISTERN OVERFLOWS

Internal WC's may have their overflows discharging to tundishes fitted to the WC flush pipe. This arrangement shall be completed in chrome plated copper or polished stainless steel and be so arranged as to be visible to the user.

Where WC cisterns are concealed, a Type 1003 single inlet indi-flow stainless steel overflow indicator complete with glass viewing panel shall be fixed to the duct cover.

52.5 AIR ADMITTANCE VALVES

Air admittance valves shall be provided as indicated on the drawing or where it is necessary in order to prevent syphonage of traps, etc. The valve shall be suitable for PVC pipe and it shall be manufactured in high impact ABS with EPDM rubber seals. Each valve shall be installed vertically and shall operate when negative pressure in the system lifts the valve diaphragm and admits air to the system.

52.6 CONNECTIONS TO BUILDER'S FLOOR SOCKETS

The mechanical contractor shall include for making the joint at each builder's floor socket at Ground Floor level.

The mechanical contractor shall include for installing and testing all wastes, soils/vent and overflows pipework above ground floor level and for making all connections to sanitary fittings. Connections to WC pans shall be made by using multi-quick adaptors.

52.7 SANITARYWARE – FITTING

The mechanical contractor shall provide for the fitting of all sanitaryware. A detailed sanitary ware schedule shall be developed by the mechanical contractor and issued to the client for approval.

52.7 MINIMUM REQUIRED INSTALLATIONS

The mechanical contractor shall ensure a full above ground drainage installation is carried out in the following locations and the following minimum provisions are made:

Kitchen:

- 1No. 40mm waste to kitchen sink c/w deep seal trap
- 1No. 40mm waste to Dishwasher c/w deep seal trap
- 1No. 40mm waste to Washing Machine c/w deep seal trap

Bathroom/Ensuite (Per Room)

- 1No. 100mm waste to W.C
- 1No. 40mm waste to Bath c/w deep seal trap
- 1No. 40mm waste to Shower c/w deep seal trap
- 1No. 32mm waste to wash hand basin c/w deep seal

W.C (Per Room)

- 1No. 100mm waste to W.C
- 1No. 32mm waste to wash hand basin c/w deep seal trap

External

- 1No. 40mm ACO Drain for Heat Pump Unit

Hot Press/Plant Area

- 1No. 40mm HEPVO Dry Trap for cylinder/indoor unit

Note the above is a guide to minimum requirements. The contractor is expected to review Architectural drawings and include for all necessary above ground drainage.

ELEMENT 53 – HOT, COLD AND MAINS WATER INSTALLATION

53.0 GENERAL

The hot, cold and mains water installation shall be designed and installed as to all relevant guides and standards and specified herein. The hot water system shall be designed in compliance with the Part L report. It shall be the responsibility of the Mechanical Services Contractor to co-ordinate his services with those of other trades to avoid clashes. Any abortive work, which occurs as a result of a clash due to lack of co-ordination, shall be resolved without cost to the client or his representatives.

The clauses outlining the standards of workmanship and materials within the General Specification shall apply as well as those outlined below.

53.1 PIPEWORK AND FITTINGS

The main hot, cold and mains water infrastructure pipework connecting the heat pump to the aluminum cylinder and manifolds shall be carried out in copper to Table X standard or pre insulated multilayer pipework. All other piping for the hot, cold and mains water services within the building shall be carried out in pex barrier pipe incorporating a barrier layer within the pipe wall or multilayer pipework.

All work associated with the hot, cold and mains water installation shall be carried out strictly in accordance with the Water Authority By-Law 1989 and the Building Regulations 1985 in Particular Section G.

The systems shall also be installed and maintained to BS 6465 Part 7:1984 and BS 6700:1987.

All double check valves stopcocks overflows (By Law 30) as required under these By Laws and Regulations shall be deemed to be part of this sub-contract, whether or not they are indicated on the drawings or specifications and they shall be supplied and fitted without additional cost to the client or his representatives.

Prior to use, the complete systems shall be flushed out completely to remove any debris which is within the pipework and the systems shall then be chlorinated in accordance with BS 6700:1987 Clause 13.9.

During construction all open ends shall be capped off to avoid ingress of foreign materials to the systems. All pipework shall be laid to a slight fall to reduce the risk of air locks forming and to facilitate easy drawing.

Drain points shall be provided at all low points in the system and the drain cocks shall be the hose union type and glandless.

All exposed domestic water service pipework shall be run in chromium plated copper.

All external pipe work , including existing pipe work at the cold water storage tank shall be insulated in 25mm thickness Thermobreak No Clad™ – External Insulation or, all external pipe work insulation is to be clad in 2mm armachek-r. The manufacturer's guidelines for installation are to be strictly followed.

The Contractor shall supply and install insulation to the entire internal cold water down water service installation. The entire installation shall be insulated using Armaflex Class "O" pipe work insulation to the thicknesses as laid down in this

Specification. All insulation is to be 25mm thickness. The armaflex application manual shall be followed strictly for the insulation of all pipework, valves, bends, fittings, flanges, etc. All of the aforementioned shall be insulated. The thickness of armaflex shall be calculated according to armaflex software available online www.armacell.com/uk. All pipe supports are to incorporate armaflex (armafix) insulated pipe supports.

All external pipework insulation is to be cladded in 2mm armachek-r. The manufacturers guidelines for installation are to be strictly followed.

53.2 VALVES

All valves on the hot, cold and mains water installation shall be as necessary. All valves shall be gun-metal and non-dezincifiable, brass valves are not acceptable.

All individual supplies to each item of sanitary ware shall be provided with a "Ballofix" isolating valve (finished to match exposed pipework).

53.3 PIPEWORK BRACKETS AND SUPPORTS

All pipework shall be fixed or supported by the mechanical sub-contractor.

It shall be the responsibility of the Mechanical Services Sub-Contractor to co-ordinate his supports, etc with those of other trades so that a neat and workmanship like installation can be achieved.

The design and installation of all supports and bracketing shall also be the responsibility of the Mechanical Sub-Contractor.

53.4 SANITARY WARE SUPPLIES ISOLATION

Each supply to each item of sanitary ware shall have a Ballofix valve fitted, which is non-dezincifiable.

53.5 PIPEWORK INSTALLATION

All pipework dropping to items of sanitary ware etc shall be concealed within the partitions and be insulated. Surface pipework droppers etc shall not be permitted.

53.6 DOUBLE CHECK VALVES

Double check valves manufactured in non-dezincifiable gun-metal shall be provided at the following locations whether indicated on the drawings or not:

- Hose Union Taps
- Mainswater Bell Valves
- All Locations Recommended in the Water By Law Regulations

53.7 THERMOSTATIC MIXER VALVES

Each dwelling wash hand basin shall be provided with a thermostatic mixing valve.

Thermostatic mixer valves shall be of the lockshield pattern for exposed mounting. Each valve shall be complete with isolating valves, in line strainers and non return valves. The mixing valves shall be pre-set to a delivery temperature of 42 °C.

53.8 COLD WATER STORAGE TANK

The contractor shall design, supply and install a pre-insulated schedule 30 one-piece cold water storage tank c/w lid, drip tray and overflow from both the tank and drip tray as indicated on the drawings. A minimum clearance of 300mm shall be provided above each CWS tank to ensure ease of maintenance of ballcock in the future.

The mechanical contractor shall carry out sizing calculations for the cold-water storage tank, however minimum sizes requirement's set out in TGD G shall be adhered to. The cold-water storage tank shall be selected according to which requirement is more onerous.

The tank dimensions shall be cross-checked on site prior to order. In any event, the mechanical contractor shall procure a tank which will fit within the allocated space with adequate provision for future maintenance as described above. Approx tank dimensions are as indicated on the drawings (545mm insulated height).

The tank shall be suitable for potable water and be of fibreglass construction, lids shall be sealed and insulated, shall have a screened inlet and overflow and insulated in CFC free foam on all sides.

The contractor shall provide for working at a height and for all alterations to pipework connection, vents and overflows as well as for all new connections. The contractor shall provide for full attendance and design from the tank specialist in respect of the cold water storage tank.

All water services installations shall be flushed and disinfected with water having a minimum concentration of 20mg/l of free available chlorine. This can be achieved using a sodium hypochlorite solution.

The Mechanical Sub-Contractor shall be required to prepare a Plant Submittal for the cold water storage tank for each house type which shall be submitted to the Main Contractor and Consultant Engineer for approval prior to order.

53.9 THERMOSTATIC SHOWER MIXER VALVES

The mechanical contractor shall supply and install an unvented Sonas Bathrooms Jay T-Bar Thermostatic T-Bar Shower & Slide Rail Kit (MYK116). This shall be fitted to each shower cubicle and over each bath.

TMV2 Exposed Shower Valve Slide Rail Kit Fast Fit Brackets Min Operating pressure 1 Bar.

*5 Year Guarantee.

*5 Year Guarantee on Showers to apply to chrome finishes and main body of products. Flexible tail connections; thermostatic cartridges; hoses and handsets to be covered by a 2 year guarantee.

All showers to be fitted with a 6 l/min flow restrictor as part of mechanical contract whether supplied as part of shower kit or not. The flow restrictor shall be of a type which can only be removed by using the appropriate and suitable tools and shall be SEAI approved and listed on the *European Water Label* portal.

The Mechanical Sub-Contractor shall be required to prepare a Plant Submittal for the mixer/blending valves for each house type which shall be submitted to the Main Contractor and Consultant Engineer for approval prior to order.

TEMPERATURE CONTROL AND FLOW PERFORMANCE	
Temperature Control	Thermostatic
Open Outlet Flow Rate	3 l/min at 0.1 Bar
SAFETY	
Installation Set Maximum Temperature Limit	No
Adjustable Maximum Temperature Stop	No
Automatic Shutdown	Yes
CONTROLS	
Separate Flow and Temperature Controls	Yes
Combined Flow and Temperature Control	No
Temperature Control	Yes
Flow Diverter Control	No
Combined Flow and Diverter Control	No
SHOWER FITTINGS	
Number of Spray Patterns (Showerhead 1)	3
Shower Head Diameter	84mm / 3.31 Inches
Rub Clean Nozzles	Yes
Rail Diameter	19mm / 0.75inches
Rail Length	530mm / 20.87inches
Distance Between Rail Brackets	Adjustable
Shower Head Holder Mechanism	Push Button Release
Soap Dish	Yes
Hose Length	1.25m anti-twist
Hose Retainer	Yes
Hose Material	Double interlocked stainless steel
Colours Available	Chrome
FINISH	
Finish	Chrome
GUARANTEE AND APPROVALS	
Guarantee	5 Years
Approvals	Complies with: BSEN1111, 1287, TMV2, WRAS (valve only)
INSTALLATION	
Plumbing System	Suitable for all Systems
Water Entry Points	Back
Inlet Connections	15mm push-fit (fixings to pipe) 3/4" flat face union (valve to fixings)
Pipe Inlet Centres	150mm
Outlet Connection	1/2" BSP bottom
Minimum Running Pressure / Flow	0.1 Bar @ 8 l/min
Maximum Running Pressure	5 Bar

The Mechanical Sub-Contractor shall be required to prepare a detailed design drawing for approval by the client. All mixer/blending valves for each unit type which shall be submitted to the client for approval prior to order.

53.9 MINIMUM REQUIRED INSTALLATIONS

Cold Water Storage Tank

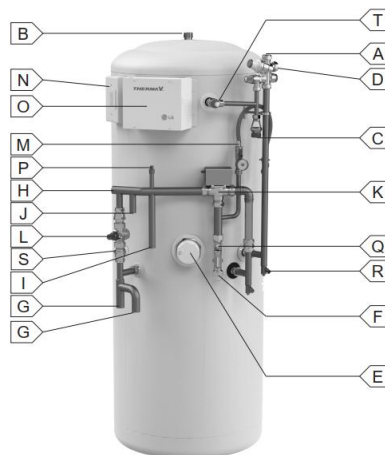
- Supplied with Bylaw 30 Kit
- Supplied with Drip Tray
- Supplied with drainage pipe work in accordance with TGD G
- All tanks must be pumped, and attic or plant area mounted. Shape of tank dependant on plant space available.
- Minimum integrated storage 340 litres
- 22mm Mains Water Supply to Tank



Example of Acceptable Pumped CWS Tank

Hot Water Storage Cylinder

- Supplied with inlet control set
- Supplied flow valve
- Supplied with circulating pump
- All necessary valves.
- 3kW immersion heater
- 25litre expansion vessel
- Temperature and pressure sensors



Example of Acceptable HW Cylinder

Kitchen

- 22mm Mains Water (MWS) and 22mm Hot water (HWS) Supply to kitchen sink
- 15mm HWS to dishwasher
- 15mm Boosted Cold Water (CWS) and 15mm HW Supply to washing machine

Bathroom/Ensuite (Per Room)

- 15mm CWS to W/C
- 15mm Boosted Cold Water (CWS) and 15mm HW Supply to Wash hand Basin
- 22mm Boosted Cold Water (CWS) and 22mm HW Supply to Bath
- 15mm Boosted Cold Water (CWS) and 15mm HW Supply to Shower

W.C (Per Room)

- 15mm CWS to W/C
- 15mm CWS and 15mm HW Supply to Wash hand Basin

Hot Press/Plant Area

- 22mm Boosted Cold Water (CWS) to Heat Pump Cylinder.

Note the above is a guide to minimum requirements. The contractor is expected to review Architectural drawings and include for all necessary above water services.

53.10 INDOOR HEAT PUMP

In positions as shown on relevant drawings and scheduled herein, provide indoor floor standing unvented pre-plumbed heat pump cylinder c/w all necessary fittings including expansion vessel, backup heater, immersion sensors, pressure gauges, surface mounted wiring and control centre, T&P valve, zone valves, fill connection, automatic air vent, integrated control unit, flow regulator, temperature and pressure reducing valves, safety valve, tundish, flexible connections and drain pipework.

The capacity of each indoor heat pump cylinder shall be approx. 180 litres with a 20 Litre expansion vessel. The indoor unit shall be pre-plumbed, wired and commissioned prior to delivery on site. The unit shall include a low loss header which shall act as an intermediary vessel for the heating system which will help the system flow rate and defrost cycling. All control wires shall be hidden from view behind the cable cover. All pipework shall be manufactured from 316L stainless tubing.

The cylinder shall be constructed from stainless steel. All indoor heat pump units shall be provided with anti-vibration mounts.

53.11 MANIFOLDS

The Mechanical Sub-Contractor shall include for the supply and installation of all WRAS approved domestic water distribution manifolds and manifold cabinets as part of this contract. These shall form part of the domestic water system and shall be detailed on the specialists design drawings which are required as part of this contract. The manifold shall be in stainless steel with flat sealing collar nut. The manifold shall be pre-assembled with fill, drain valves, vent plugs, terminal caps

and flow and return ball valves plus anti-noise support. The manifolds and manifold cabinets shall be as manufactured by Oventrop or equal and approved.

The Mechanical Sub-Contractor shall be required to prepare a Plant Submittal for the domestic water system which shall be submitted to the Main Contractor and Consultant Engineer for approval prior to order.

53.12 THERMOSTATIC ELECTRIC SHOWERS

Where noted on the drawings, the Mechanical Sub-Contractor shall include for the supply and installation thermostatic electric showers which shall be as Triton T150+ or equal and approved. The shower shall be provided with all required fittings including shower head, hose, screws, brackets and adjustable shower rail.

In line with the BER requirements, all showers shall be the unvented type and shall be fitted with flow restrictors (6 l/min) which cannot be removed by hand and can only be removed by using appropriate tools. This must be clearly detailed in the plant submittals.

53.13 DOMESTIC WATER PIPE INSULATION

The entire installation shall be carried out in pre-insulated WRAS approved multilayer pipework with minimum insulation thickness which complies in full with Conservation of Fuel and Energy – Dwellings 2019 if Part L. Pipework with just 9mm insulation shall not be accepted.

Unless the heat loss from a pipe or duct carrying hot water contributes to the useful heat requirement of a room or space, the pipe or duct must be correctly insulated in accordance with Part L. The following levels of insulation should suffice:

- pipe or duct insulation meeting the recommendations of BS 5422:2009 Methods of specifying thermal insulating materials for pipes, ductwork and equipment (in the temperature range – 40 °C to + 700 °C); or
- insulation with material of such thickness that gives an equivalent reduction in heat loss as that achieved using material having a thermal conductivity at 40 °C of 0.035 W/mK and a thickness equal to the outside diameter of the pipe, for pipes up to 40mm diameter, and a thickness of 40mm for larger pipes.

Insulation materials used are to satisfy the 'non combustibility' test BS 476, Part 4. Alternatively, the materials used are satisfactory if they obtain a Class O finish when tested to BS 476 Parts 6 and 7.

Mineral wool insulation with taped joints and an aluminium foil back is required on all water services pipework.

All water outlets are to be fed from gravity from the water tank, unless they are supplemented by a booster pump as indicated on the drawings.

53.14 SURGE ARRESTORS

The mechanical contractor shall supply and install surge arrestors in the event that water hammer arises in the newly installed water services installation in each house. The surge arrestor shall be Biworld 810 Series Water Hammer Arrestor or equal and approved. The mechanical contractor shall allow for two devices per dwelling as part of the tender.

53.15 FLOW RESTRICTORS

The mechanical contractor shall supply and install flow restrictors (6 l/min) to all showers which shall be the unvented type. The flow restrictors shall be of a type which cannot be removed by hand and can only be removed by using appropriate tools. The flow restrictor must be SEAI approved and listed on the *European Water Label* portal. This must be clearly detailed in the plant submittals.

ELEMENT 56 - SPACE HEATING INSTALLATION

56.0 GENERAL

The space heating installation shall be designed and installed in accordance with the Part L compliance report and all relevant guides and standards.

The mechanical contractor shall provide a full set of detailed design drawings along with heat loss calculations to the client for review and approval. The mechanical contractor shall provide both layout and schematic drawings for review from the contractor's specialist supplier. Pre-engagement has been carried out with Liam Jordan liam@unithermhs.ie regarding preliminary designs for the heating system, the contractor is welcome to continue to pursue the finalisation of designs through Unitherm or equivalent supplier.

It shall be the responsibility of the Mechanical Services Sub-Contractor to co-ordinate his services with those of other trades to avoid clashes. Any abortive work which occurs as a result of a clash due to lack of co-ordination shall be resolved without cost to the client or his representatives.

The clauses outlining the standards of workmanship and materials within the General Specification shall apply as well as those outlined below.

56.1 PIPEWORK AND FITTINGS

The main heating infrastructure pipework connecting the heat pump to the copper cylinder and manifolds shall be carried out in copper to Table X standard. All other heating distribution piping installed as part of the heating installation shall be multilayer high-density a base cross-linked polyethylene (PEX) plastic pipe with an ethylene vinyl alcohol (EVOH) layer at mid wall thickness providing 100% oxygen barrier. Approximate wall thickness pipe dimension of between 1.70 and 2.70mm.

The pipework serving radiators on the first and second floors shall be a composite multilayer high-density a base cross-linked polyethylene (PEX) plastic pipe with an ethylene vinyl alcohol (EVOH) layer at mid wall thickness providing 100% oxygen barrier. The pipework shall be clipped at regular intervals in line with manufacturer's requirements to prevent pipe sagging.

The multiplayer pipework shall as an absolute minimum comply in full with the requirements of DIN Standard 4726 and BS 7291-1 2001 and ISO EN 15875-1:2003. The allowable oxygen permeation should not exceed 0.1 grams/m³/day at 50°C.

The piping system shall utilise proprietary manufacturer's fixtures and fittings as part of the complete installation.

Except where otherwise stated, all pipes shall be fixed at a sufficient distance from walls, ceilings, etc. so as to readily allow for cleaning behind the pipes and where insulated shall be fixed at a sufficient distance from the walls, ceilings, etc. and from each other to allow for suitable covering. The clear distance between pipes shall be not less than 50 mm.

Care shall be taken to prevent dirt or rubbish getting into the pipe work during erection. Timber or metal plugs shall be used for this purpose. Should any stoppage occur in the circulation owing to the foregoing causes, the Contractor shall attend to and rectify any such trouble at his own expense.

Special care shall be taken in fitting pipe work to ensure that no damage shall be done to structure, furnishings, etc and the Contractor shall take full responsibility for any such damage caused.

The installation shall be arranged such that joints below floors and within floor/ceiling spaces is joint-free.

56.2 LTHW VALVES

Valves, shall be provided to allow for the isolation of all branches, sub-branches and equipment.

56.3 RADIATORS

The steel radiators shall be selected in accordance with this specification. They shall be manufactured and tested to EN442 and all radiators shall be CE marked. All radiators shall be factory tested to 6 bar gauge for a working pressure of 4.6 bar gauge. Each radiator shall be provided with a manual air vent and the Mechanical Sub-Contractor shall give 6 No keys to the client prior to handover of the building.

The Sub-Contractor shall allow for erecting the radiator, removal for painting and re-erecting each radiator to suit the Main Contractor.

Each radiator shall have its brackets fixed to the wall by 50 mm No 10 brass wood screws and plastic rawlplugs.

The mechanical contractor shall provide a radiator schedule for each house type to the client for review and approval.

The Mechanical Sub-Contractor shall be required to prepare a Plant Submittal for all radiators which shall be submitted to client for approval prior to order. Radiator selections shall be based on a *Delta T* 20 deg C for a heat pump.

56.4 AUTOMATIC AIR VENTS

Automatic air vents shall be provided on all high points in the system and they shall be as Spirax Sarco Fig No AE 31 CV. Each air vent shall be fitted with a Lockshield isolating valve and 10 mm table x copper pipe to BS 2871, to drain outside to the Service Yard.

The contractor shall give careful consideration to venting the heating system, particularly considering the system shall be installed using continuous lengths of joint-free pipework. The pipework shall be routed in such a way that venting is easily achievable with access available to automatic air vents installed at all system high points as well as on all manifolds.

56.5 BALANCING/COMMISSIONING VALVES

Balancing/commissioning valves shall be provided as a ***minimum*** as indicated on the drawings or more as necessary to complete the balancing of the heating installation.

The water flow rate through each circuit, sub-circuit and heater battery shall be declared and proved to the Engineer's satisfaction.

If additional valves are found to be necessary in the estimation of the Mechanical Sub-Contractor, then he shall make due allowance for any difference in pressure loss in the final selection of pump duties. Any difference in cost shall be borne by the Sub-Contractor and any claim to the Employer in this respect shall not be entertained.

56.6 THERMOSTATIC RADIATOR VALVES

Radiators where indicated on the drawings and as scheduled shall be provided with a thermostatic radiator valve on the flow and a lockshield type valve on the return connection for balancing. Each thermostatic valve shall be set to give 21°C. All as Tour & Anderson

56.7 WALL & FLOOR PLATES

Where pipework penetrates walls, ceilings and floors and is exposed, the pipework shall be fitted with a chrome plated collar fixed flush to the wall/ceiling/floor. The cover plate shall be securely fixed to resist tempering.

56.8 HEATING ZONE CONTROL VALVES

The heating shall be fitted with all heating zone control valves. These valves will be mounted as indicated on the drawings. The quantity of zone control valves will differ between each house type. The Mechanical Sub-Contractor shall take care to ensure the correct quantity of zone control valves has been included in ordered unit.

56.9 HEATING MANIFOLDS

The Mechanical Sub-Contractor shall include for the design, supply and installation of all zone heating manifold as part of this contract. These shall form part of the heating system and shall be detailed on the specialists design drawings which are required as part of this contract. The manifold shall be in stainless steel with flat sealing collar nut. The manifold shall be pre-assembled with fill, drain valves, vent plugs, terminal caps and flow and return ball valves plus anti-noise support.

The Mechanical Sub-Contractor shall be required to prepare a Plant Submittal for the heating system which shall be submitted to the Main Contractor and Consultant Engineer for approval prior to order.

56.10 ROOM TEMPERATURE CONTROL

Room temperature control thermostats shall be provided and installed by the mechanical services sub-contractor in locations as set out on the design drawings. The devices shall be mains set point room thermostat with digital temperature display.

56.11 MAIN HEATING PLANT

The Mechanical Sub-Contractor shall design, supply and install a mono bloc Heat pump as the primary heat source. Selection should be based on the result of the Part L compliance report.

The Heat Pump should have a capacity in accordance with the mechanical contractor's heat loss calculations.

The heat pump is selected shall be a mono bloc unit with separate hot water storage cylinder. All components necessary to complete a successful installation such as buffer vessels, valves, pumps etc... should be supplied as part of the heat pump package.

Heating Controls

As per TGD Part L, the space and water heating shall be controlled so as to ensure the efficient use of energy by limiting the provision of heat energy to the dwelling by means of temperature control with the dwelling and of the domestic hot water cylinder.

This should be located in the kitchen / dining room and master bedroom suite – although final positions to be determined on site by contractor.

The control pack shall consist of:

- System Programmer – capable of independent time and temperature control with all zones; 2# heating zones and separate domestic hot water control
- 2# Delay Start Digital Thermostats
- 1# Clamp on cylinder stat
- 3# Zone Valves
- 1# Wiring Centre
- 1# Outdoor Weather Sensor

56.12 HEATING PIPEWORK INSULATION

The entire installation shall be insulated using Class "O" pipe work insulation to the thicknesses as laid down in this Specification. All insulation is to be a minimum of 25mm thickness.

56.13 TESTS - PIPEWORK

After erection is completed the whole of the piping, valves and fittings shall be tested under hydraulic pressure of 7 bar excluding radiators, radiators valves,. The whole of the installation must be drop tight at the test pressure for a period of 24 hours and should any leakage occur the Contractor shall make good at his own expense notwithstanding that previous tests may have been satisfactory. Brackets securing piping shall be loosened up to allow for straining while under pressure. Fourteen days notice in writing shall be given to the Client before the installation is ready for testing.

If all the above tests are proven satisfactory a 3.5 bar test for 24 hours shall be completed in the whole installation including radiators, coils, heat pump, etc. Test certificates shall be issued on the completion of all successful tests.

The mechanical services contractor shall serve adequate notice of the system pressure tests to the client.

56.14 HEATING CONTROLS STRATEGY & EQUIPMENT

The control strategy for the completed heating system will be designed to allow time and temperature zone control of either 2 "zones" or 3 "zones" within the dwelling.

The 2 zones are required to allow time and temperature control of the living area and hot water independently.

The 3 zones are required to allow time and temperature control of the living area, sleeping and hot water independently.

The required control strategy identified above shall be achieved with a 24 hour 7 day time clock, zone thermostats and 2-port motorised valves.

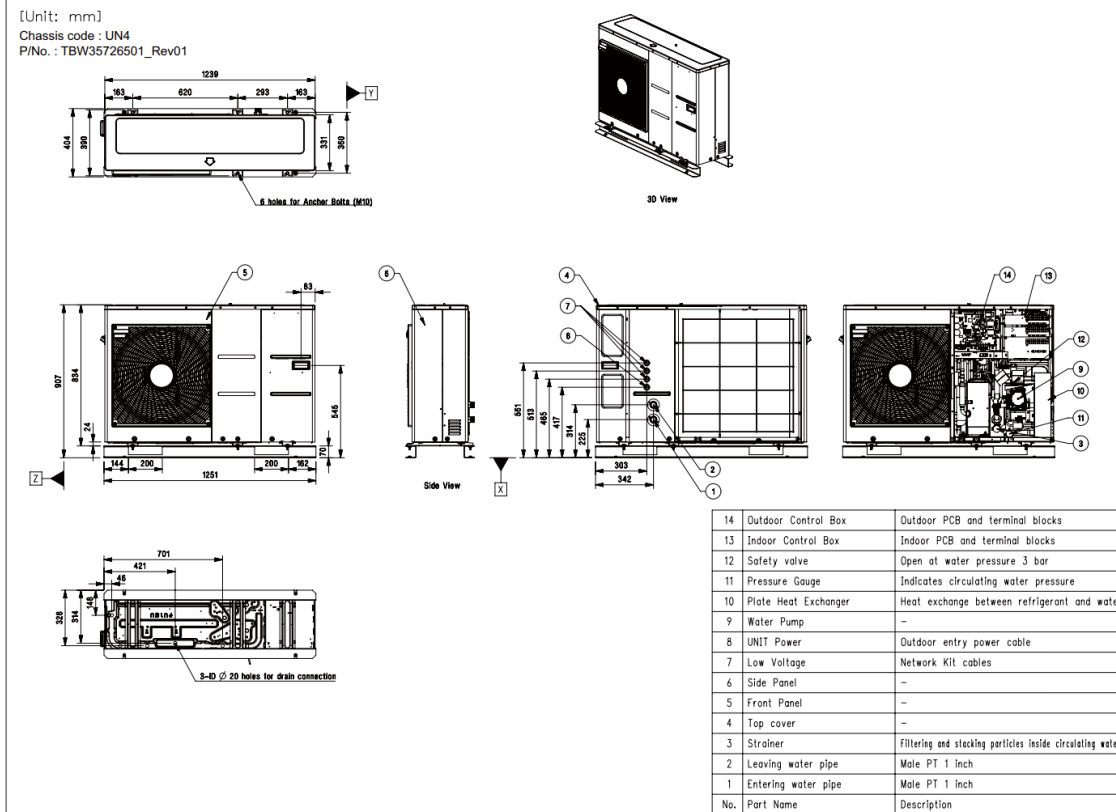
- 3No. Channel 24/7 programmable controller.
- 2No. wall mounted space heating thermostats with LED icons model reference
- 1No. electro-mechanical surface mounted cylinder thermostat with cable strain relief and a simple fitting to attach to the cylinder
- 3No. motorized valves are designed to be long lasting and reliable.
- 1No. wiring centre to provide a systemised and tidy approach to wiring.

All necessary controls and mains power wiring shall be included to ensure correct function of the system.

56.15 MINIMUM REQUIRED INSTALLATIONS

Mono Bloc Heat Pump Unit

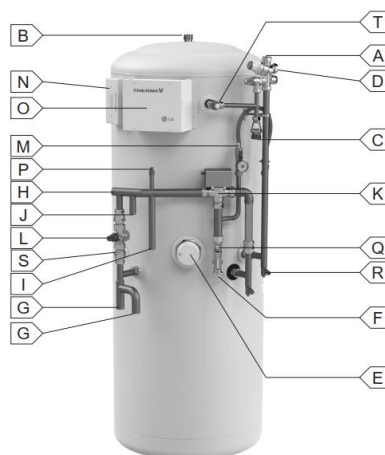
- Supplied with Drip Tray
- Supplied with drainage pipe work in accordance with TGD G
- Supplied with all auxiliary circulating pumps



Example of Acceptable Heat Pump Unit

Storage Cylinder

- Supplied with inlet control set
- Supplied flow valve
- Supplied with circulating pump
- All necessary valves.
- 3kW immersion heater
- 25litre expansion vessel
- Temperature and pressure sensors



Example of Acceptable HW Cylinder

ELEMENT 57 - VENTILATION INSTALLATION

57.0 GENERAL

The ventilation installation shall be provided in accordance with the TGD Part F. The minimum standard in relation to the supply, installation and testing of ductwork shall be DW142 and DW143 as issued by the HVCA. Where differences occur between the General Specification and DW142/DW143/DW144, the higher standard shall apply.

57.1 DUCTWORK CLASSIFICATION

The ductwork classification shall be "Low" with air leakage Class 'A' having a limit of 0.027 x p0.65 litres per second per square metre of duct surface area.

All ductwork shall be pressure tested to the procedure laid out in DW143 to confirm the leakage limit specified above at 500 Pa. The air leakage test pump shall have a current calibration certificate as issued by BSRIA.

57.2 MATERIALS

All ductwork shall be manufactured from uPVC and shall be low profile flat channel rigid 204 x 60 mm ducting. The ducting shall be lightweight and shall comprise internal steel helix to resist distortion.

57.3 SEALANTS

Only sealant manufactured by 3M or an equivalent, which has been certified as complying with DW142/DW144, may be used.

57.4 BENDS AND FITTINGS

Bends, tees, adaptor pieces, brick grilles, airbrick adaptors and junctions shall be of matching dimensions and shall be matched to the selected flat channel uPVC duct. All fittings necessary to complete the installation shall be provided as part of this contract.

57.5 BRACKETS AND SUPPORTS

Proprietary manufacturer's brackets and supports matched to the selected flat channel ducting system shall be utilised throughout. Support and brackets shall be installed in full accordance with manufacturer's instructions. All brackets necessary to complete the installation shall be provided as part of this contract.

57.6 DEMAND CONTROL VENTILATION

The mechanical contractor shall design and install a Demand Control Ventilation system in accordance with Part F of the building regulations. The system shall include:

- Air Inlets
- Wall Vents
- Central Fan
- Sensors

The system shall include all necessary duct work, grilles and accessories in order to hand over a fully functioning compliant system to the client.

Operational Requirements

The demand-driven ventilation system shall provide ventilation for each residence. Humidity controlled ventilators shall continuously transport the exhaust air from the bathrooms, kitchen, utility room and WC to the external, thus creating a slightly reduced, or negative air pressure in the living spaces. Due to this low-pressure fresh air must flow into the living and sleeping areas through humidity controlled fresh air inlets. Air inlets must be acoustic and wind pressure protected and ensure draught free fresh air.

System Components:

- Air inlets to bring fresh air to habitable rooms
- Extract units to transfer moisture or odour intensive air to external via ducting and a central extract fan/fans.
- Central electric constant pressure fan to extract moisture and odour intensive air from each dwelling to external.

Humidity sensors in the fresh air inlets and extract units automatically adjust air flow volume to ensure a comfortable room climate. The system automatically adjusts ventilation volume according to the humidity.

Performance Specification

The ventilation system consists of three main parts:

1. The air inlets that brings fresh air into the habitable rooms of the dwelling.
2. The extract units that facilitate the removal the moisture and odour from the dwelling.
3. The central electric fan and associated ducting and accessories that extracts the used humid air from the kitchen, utility, bathroom and WC's in the dwelling.

Doors shall be undercut to allow the air to move from the habitable rooms to the 'wet' rooms by the negative pressure induced by the fan.

The three parts of the system (air inlets, extract units and fan/fans) must be designed to provide good indoor air quality and to reduce the relative humidity in the dwelling.

The air inlets must achieve the following performance criteria:

1. An air flow rate that ensures good indoor air quality, based on relative humidity, of min 5m³/hr and max 35-40m³/hr at 10 Pa. Air inlets should be incorporated within the window frame or shall be wall mounted.
2. A wind damping device to control draughts in windy conditions by reducing the size of the air passage duct.
3. Silent operation.
4. Acoustic attenuation incorporated into the air inlet to reduce the impact of sound into the dwelling.
5. An internal grille which disperses the air without draughts, which is difficult to seal.
6. Be provided with an external grille or slot with an insect screen.

The extract units must achieve the following performance criteria:

1. An air flow rate of min. 12m³/hr and max. of 70m³/hr @100Pa. Bathrooms and ensuite with WCs shall be humidity sensitive and shall also incorporate a boost function that opens the extract unit to max. on activation of a PIR sensor, incorporated in the extract unit. Kitchen and utility rooms shall be humidity sensitive only, with WC extract units being PIR activation only.

2. Silent operation.

The centralised extract fan must achieve the following performance criteria:

1. Be constant pressure/variable volume central extract fan.
2. Be of low energy consumption and have EC motors.
3. Have a proven long service life.
4. Be quiet in operation and be installed c/w acoustic adaptor.

Extract air is to be brought to the exterior through appropriate ducting in compliance with all relevant Codes, regulations and manufacturer's recommendations. fan set. The mechanical services sub-contractor shall include for fittings fans to the flat channel ducting & testing.

All ductwork required to complete the installation shall be supplied and installed as part of this contract. The ductwork can be circular or square/rectangular depending on the location of the duct and the space available to install the ducting.

The ducting system installation shall be DOMUS Ventilation, Verplas, Lindab InDomo or equal and approved. In any case, the ventilation ductwork must be tested, certified and approved for use with the proposed DCV System.

The contractor shall supply and install the appropriate fire rated fittings and ceiling vents for all penetrations for fire compartments or where web joist, open joist etc ceiling systems have been installed.

The mechanical services contractor shall liaise directly with the ventilation systems supplier to ensure all correct fittings with correct spigot sizes etc are selected for the project.

Drawings

The mechanical services contractor shall include in the tender for the completion of detailed drawings of the DCV ventilation system. These shall be completed by the DCV ventilation system specialist for each house type and forwarded to the Consultant Engineer at the early stages of the project for comment and approval.

Where the mechanical services contractor intends to supply and install an alternative brand/type of DCV system, the contractor shall supply detailed drawings of the system for the Consultant Engineers approval. These drawings shall be prepared by the DCV specialist company.

57.7 COOKER HOODS

The mechanical services contractor shall connect the 150mm dia Plastic Easipipe cooker hood ductwork to the cooker hood in locations as shown on the design drawings. Note, final connections points shall be agreed on site with the main contractor and specialist kitchen manufacturer.

The Mechanical Sub-Contractor shall be required to prepare a Plant Submittal for the flat channel ductwork which shall be submitted to the Main Contractor and Consultant Engineer for approval prior to order.

The mechanical contractor shall supply and install a charcoal grille recirculating type cooker hood should MVHR be required by the Part L compliance report.

57.8 BACK DRAUGHT DAMPERS

The mechanical services contractor shall connect the 150mm dia cooker hood ductwork to the cooker hood in locations and supply and install back draught dampers to all ducted ventilation systems as necessary.

MECHANICAL SERVICES INSTALLATION COMMISSIONING PROCEDURES

1.1 COMMISSIONING MECHANICAL SERVICES

The Contractor shall be responsible for commissioning the entire mechanical services for all phases and stages of the installation to the satisfaction of the Engineers. The Contractor shall produce for the approval of the Engineers a detailed specification for Commissioning Procedures for the completed installation. This Specification shall be provided well in advance of the commissioning programme and at a time agreed with the Main Contractor.

The Commissioning Procedures Specification shall include the following:

Detailed operating programme.

Bar chart showing weekly analysis of programme.

Data to be used for each stage of commissioning.

Detailed commissioning schedules for each item of plant and equipment.

Requirements and involvement of Resident Engineer.

Method of logging all performance data with processing and issuing to Clients representatives.

Method of issuing certificates including supplier's certificates.

Instruments and method of measurement to be used in commissioning.

Instructing Staff in use of plant and systems.

The Contractor shall co-ordinate with the Mechanical contractor in arranging a seminar to present and explain the commissioning methods and programme he proposes for the installation. He shall also arrange for all specialist suppliers/installers involved in the mechanical installation to be in attendance to outline their own commissioning procedures.

Important Note:

The mechanical services contractor shall fill and pressure test all heating pipework prior to pouring of the liquid floor screed. The pressure readings shall be recorded from each pressure gauge and re-checked after 30 mins. The developer and site foreman shall witness all tests and pressure readings.

Once satisfied that there are no leaks, the floor screed can be poured. Once the floor screed is complete, all heating pipework shall be re-tested with pressure readings recorded from each pressure gauge and compared to the initial readings to ensure no leaks have arisen from the installation of the floor screed. All the heating pipework installation in the floor screed shall be installed in the protected floor sleeves as indicated on the drawings.

1.2 BALANCING OF HEATING SYSTEMS

The Contractor shall include for balancing of heating circuits and systems associated with the heating installation.

All balancing shall be carried out by the Contractor prior to independent commissioning as specified hereafter. The independent commissioning by specialist contractor does not relieve the Contractor of the duty to carry out balancing and commissioning of equipment as specified.

1.3 GENERAL - COMMISSION, TESTING AND BALANCING

The Contractor is to carry out and be responsible for the complete testing, balancing, commissioning, certification, reporting and setting to work of all the mechanical systems and equipment. The Contractor must employ a specialist commissioning Contractor to carry out this work. For a period of not less than ten (10) working days, the Contractor is to demonstrate to and fully instruct the clients appointed staff in the complete operation of the system and equipment.

1.4 INDEPENDENT COMMISSIONING

Final balancing of the new heating and water distribution systems shall be carried out by an independent commissioning company approved by the Engineers. The Contractor shall measure and record the flow rates and amperages on all pumps, coils, commissioning sets, etc.

The Contractor shall include in his tender for the cost of the independent commissioning.

COMMISSIONING COMPANIES NAME

NAME

The commissioning shall be carried out strictly in accordance with the following CIBSE Commissioning Codes.

Series A – Heating System

Series B - Water Distribution Systems

Series C - Ventilation Systems

Schedule 1: HEAT PUMP SYSTEM

Outdoor Unit	
Description:	Hisense split air to water Heat Pump complete with 220 litre pre-plumbed cylinder and ground mounting kit.
Manufacturer:	Hisense
Model:	HIM4.4
Output:	4.4 kW
Quantity Required:	One per unit.
Fuel:	Electricity
Equipment Image	
Each outdoor heat pump shall be provided with a protective cage enclosure by the Mechanical contractor.	
Accessories:	Drip Tray & Drain. 400mm Flexi Feet (3 No per unit). Fixing Kit for Flexi Feet. Circulating Pump.
Indoor Unit	
Description:	200 litre pre-plumbed cylinder.
Manufacturer:	Hisense
Model:	WW200LGHP
Capacity:	200 Litres.
Quantity Required:	One per unit

Equipment Image	 Where the indoor unit is installed in the kitchen/utility space, the main contractor shall provide a kitchen cabinet to enclose the unit including the expansion vessel and fittings. This shall be considered at kitchen layout stage by the main contractor and kitchen designer/fitter.
Accessories:	Expansion Vessels. Unvented Kit. Volumiser (if required). Circulating Pump. Zone Control Valves.
Controls:	Heatmiser Slimline Digital Display Thermostat. Time & Temperature Control. Advanced multizone control. Remote app and wifi enabled.

Notes:

1. The mechanical services contractor shall supply and install the above equipment as detailed herein and on the design drawings. The mechanical services contractor shall provide a detailed plant submittal at the beginning of the project detailing the technical performance of the proposed equipment. Should the mechanical services contractor wish to select alternative equipment to that detailed herein, the plant

submittal shall detail how the alternative equipment complies in full with the requirements of this specification and detailed design drawings.

All plant submittals shall be provided to the engineering consultant with sufficient time for review and approval. Any delays to the construction programme which arise due to the failure to provide sufficient technical information and/or a delay in the submission of plant submittals of mechanical equipment shall be borne by the mechanical services contractor.

Agent:

Unitherm Heating Systems, Unit 9 City East Business Park, Ballybrit, Co Galway. 091 380038.



CBS Consulting Engineers

MECHANICAL & ELECTRICAL ENGINEERS