

PROJECT: Cashel FET Centre, Kenyon Street, Co, Tipperary

TEM CONTRACT No: 18572

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Mechanical Specification

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Location	Hold	Action	By

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1 INTRODUCTION

1.1 Form of Contract

The contract conditions are as outlined in this document and in this contract the Mechanical contractor shall act as a nominated sub-contractor to the main contractor and all works shall be carried out in accordance with this specification and associated drawings. The works covered by this Specification includes the complete Mechanical Installation, and these works shall be carried out with this specification and all associated drawings and in-line with the conditions and in conjunction with the main contract and main contractor.

1.2 Nature of Contract

The Mechanical tenderer will act as a Nominated Sub Contractor under the main contractor yet to be appointed under the contract. The contract shall be determined by the Quantity Surveyor.

1.3 Main Contract Conditions

The following conditions shall apply to this contract:

- Public Liability Insurance policies are to be maintained until the issue of the Certificate of Final Completion of the works by the Employers Representative under this Contract.
- Before the work commences on the site the Mechanical Contractor will be required to produce a letter in clear terms from his insurance company or brokers to the effect that they are insured in accordance with the terms of this Contract.
- In the event of the Mechanical Contractor's failure to satisfy the Employer that he is so insured the Employer will immediately operate the remedies provided within the terms of this contract.

1.4 Tender Documents

The Tender documents comprise the documents listed in our document 'Schedule of Documents / Transmittal Sheet'. The Tenderer is requested to check the documents and the number of each page and if any are missing or duplicated, or if any writing or figures are indistinct to notify at once the Consultant. No subsequent claim for loss consequent upon the Tenderers failure to comply with this Clause will be entertained.

1.5 Materials Costs and Deliveries

At the commencement of the works the Mechanical Contractor shall confirm that deliveries of all materials can meet the programme requirements. On claiming an increase in material

costs, he shall produce satisfactory proof of such variation, the acceptance of which shall be at the discretion of the Engineer. In the case of imported materials, costs shall be stated in Euro's and the currency exchange rate at tender date shall be stated in the tender return.

1.6 Labour Hourly rates and Time Sheets

The Mechanical Contractor shall produce a Schedule of current net hourly rates as laid down by the appropriate regulating body and current on the designated date. Time Sheets recording the total hours worked by each operative per day must be submitted for signature to the Engineer or his representative weekly. No claims will be considered unless this clause is strictly adhered to.

1.7 Tender Price

Should a discrepancy exist between the tender price quoted in figures and words, the words shall take precedence over the figures. The tender price is to include the provision of all equipment, materials, carriage, customs, tools, plant, carriage and labour including all levies and productivity and welfare payments, unless otherwise specified in this Specification.

Value Added Tax is to be excluded from the Contract sum, but identified as a separate item.

1.8 Delivery of Tenders

Tenders shall be returned to the Client as stated on the tender invitation.

1.9 Other definitions

The "Contract Documents" shall mean the Form of Contract, this Specification and Conditions and the Form of Tender, the drawings relating to the work and the letter accepting the Tender.

The terms "approved" "directed" and "selected" shall mean the approval of or considered necessary, equal or required by the Consulting Engineer.

The terms "supply" and/or "provide" shall unless otherwise stated, include both supply and fixing.

1.10 Specification Structure

This specification is divided in the following parts:

INTRODUCTION: it presents general understanding about the specification, form of contract and tender return.

KEY PROJECT ENTITIES: it presents the client and companies involved in the design. In this section is also showed the terms/definitions for main contractor and mechanical contractor.

SCOPE: it defines all elements which the contractor shall consider for tender.

BOUNDARIES: it sets out the boundaries/limits of works for tender.

MAIN TECHNICAL CHARACTERISTICS: It presents the main technical characteristics. For more detailed information, contractor shall consult the equipment schedule and drawings.

TECHNICAL SPECIFICATION: it covers all other data/information not presented in previous sections and other associated documents.

SPECIFICATION SCHEDULES: it presents other documents to be consulted.

TENDER SUMMARY: It presents the structure for tender pricing.

1.11 Site Visit

The Mechanical Contractor, prior to submitting his tender, is recommended to visit the site, and ascertain for himself the means of access thereto and any other factors which may affect his tender, as no claim will be allowed on account of his not having done so.

1.12 Engineers Drawings

The Mechanical Contractor shall be deemed to have examined all drawings on the project (Mechanical, Electrical, architects & structural) and no claim for additional payment shall be entertained arising from lack of information.

1.13 Omissions and Anomalies

Should a tenderer find omissions or anomalies a request for clarification should be made to Engineer, prior to tender return.

Such clarifications shall be confirmed in the form of Addendum, receipt of same must be recorded in the appropriate section of this Specification. Where anomalies between Drawings and Specifications do not come to light until the contract stage, then the Mechanical Contractor shall provide the goods or perform the work to the higher standard as ruled by the Engineer.

1.14 Compliance with Specification

The Tender Sum shall include for equipment and materials PRECISELY AS SPECIFIED. Should the Mechanical Contractor wish to offer "equivalent" equipment or materials to those specified, such equipment or materials shall not be included in the main tender but offered in the form of a Supplementary Schedule with details of the Manufacture, Specification and cost or delivery advantage.

For his tender to receive consideration the Tenderer shall complete in full the Schedule of Manufacturers and delivery periods section of this Specification.

Subject to compliance with this Specification in respect of Standard Specifications, materials shall, where possible be manufactured and assembled in Ireland.

The Mechanical Contractor shall, upon the request of the Consulting Engineer, furnish him with vouchers to prove that the materials comply with the requirements of the appropriate paragraph of this condition.

1.15 Quotation to be Inclusive

The price quoted will be held to include for the supply and delivery on the site of all necessary material and for all work, material matters including bonus or other incentive payments to the workforce and things reasonably required for the due and proper carrying out and completion of the work according to the true intent and meaning of this Specification and the drawings (if any) taken together, whether specifically mentioned herein, or shown on the drawings or not.

1.16 Trade Names

Where Trade Names are given, it is to be clearly understood that such references are inserted for the guidance of the Mechanical Contractor with respect to the nature and quality of the articles or services required. The Mechanical Contractor is free to offer alternatives provided they comply in full with the Specification of the specified goods and subject to the written approval of the Engineer.

1.17 Compliance with Regulations

The Mechanical Contractor is to guarantee that his work will comply with all regulations, Building Regulations, bye-laws, Acts of Government and other requirements of any Local Authority, Statutory Undertaking, Factory Inspector, Insurance Company, or any other authority whatsoever. No additional cost will be allowed to the Contractor after receipt of his tender for compliance with this Clause.

1.18 Site Meetings/Visits

The consultant shall visit site to inspect the works, the contractor is advised to deal with any queries at this time.

1.19 Sub-letting

The Mechanical Contractor shall not assign the Subcontract or sub-let any portion of the work without the written authority of the Engineers, except where sub-letting is expressly called for in this Specification. The Tenderer shall state in his tender return the names of all firms to whom he proposes to sub-let portions of the work, for the Engineer's approval. Approval of the sub-letting by the Engineer and Contractor shall not relieve the Mechanical Contractor of any of

his obligations under this contract. The Mechanical Contractor shall be responsible for the programming and execution of all the work sub-let.

1.20 Reading of Specification

Items 2, 3 and 4 of this specification give data/orientation about the specific requirements for the project. Scope of works shall be considered according those three items.

Other parts shall be consulted for more detailed information, but it can have more systems described than the required on the scope and the reader shall consider the parts which the scope applies.

2 KEY PROJECT ENTITIES & SITE LOCATION

2.1 Key Project Entities

Key project entities are:

Entity	Name
Client:	Tipperary Educational & Training Board
Architect/Project Manager	Spentide Architecture & Project Management
M&E Services Consulting Engineers	TEM Engineering & Management DAC

Other key entities mentioned in this document:

- Main Contractor or Building Contractor: The firm appointed to carry out the building works.
- Mechanical Contractor: The firm appointed to carry out the Mechanical works.

2.2 Description of Site

The site is located at Cashel Further Education and Training Centre – Hogan Square, Cashel, Co, Tipperary.

3 SCOPE OF WORKS

The scope of works is comprised of:

Definitions:

- Mechanical Contractor – MC;
- Not Applicable – NA.

Item	Description	Scope
1	Preliminaries	MC
2	Site Services (Element 50)	NA
3	Heating Centre (Element 51)	NA
4	Drainage (Element 52) (only for installation of items 1 and 2)	NA
5	Water Distribution (Element 53)	MC
6	Gases Distribution (Element 54)	NA
7	Space Cooling (Element 55)	NA
8	Space Heating (Element 56)	NA
9	Ventilation (Element 57)	NA
10	Other Services (Element 58)	MC

Notes:

1. The elements described above follow the "Capital Works Management Framework" document "How to use the Costing Document (Building Works) – CO 1".

4 BOUNDARIES

All above ground mechanical services to be included.

5 MAIN TECHNICAL CHARACTERISTICS

This section presents the main technical characteristics for all elements. The contractor shall include any miscellaneous needed for the perfect running of the system, even if it's not listed below.

5.1 Preliminaries

Typical preliminaries services/preparation for the development of all elements.

5.2 Site Services (Element 50)

No works envisaged

5.3 Heating Centre (Element 51)

No works envisaged

5.4 Drainage (Element 52)

No works envisaged

5.5 Water Distribution (Element 53)

The mains water supply for the building will be connected into the existing mains water supply. The mains water service shall provide mains water to all sinks and external taps.

Hot water to the building shall be provided by means of electric hot water cylinder and under-sink electric water heaters, as indicated on the drawings.

All water services pipework drops to sinks; cisterns and WCs are to be concealed.

The Contractor shall flush and clean the domestic water system on completion of the works.

5.6 Gases Distribution (Element 54)

No works envisaged

5.7 Space Cooling (Element 55)

No works envisaged

5.8 Space Heating (Element 56)

No works envisaged

5.9 Ventilation (Element 57)

No works envisaged

5.10 Other Services (Element 58)

No works envisaged

6 DEVELOPMENTS OF WORKS

6.1 Specialist Equipment

It shall be the sole responsibility of the Mechanical Contractor to ensure that all special equipment conforms in every detail to all relevant clauses of this Specification.

The Mechanical Contractor shall note that he is to inform Specialist Manufacturers and Suppliers of the full intent of the terms and conditions of this Contract and that they will be bound to these terms and conditions of contract, as will be the Sub Contractors.

The Mechanical Contractor is advised to check all suppliers of specialist equipment that the boilers, burners, starting equipment etc., contained in their offer are in full accordance with the Consulting Engineers' requirements.

6.2 Royalties

The Mechanical Contractor shall indemnify the Consulting Engineers from and against all claims and expenses which may be brought or made against them by reasons of the Mechanical Contractor infringing or being held to have infringed any Patent Rights or non-payment of any articles, processes and inventions, and in the event of any injunction being obtained against the use of same, the Mechanical Contractor shall forthwith replace the same, by other materials or appliances to the satisfaction of the Engineers without extra cost, and in addition shall be responsible by way of damages by reason of any delay occasioned thereby in the execution of the work.

6.3 Bill of Quantities

The Mechanical Contractor shall within 7 days of being requested, submit to the Engineer a detailed schedule of rates covering every item fixed, as specified, upon which the Mechanical Contractor's estimate has been based.

The number of items and quantities shall be given and extended to form a Bill of Quantities adding up to the totals as indicated in the Tender Summary. The Bill of Quantities shall remain with the Engineer until the works are completed and shall form the basis for agreement of variations by measurement. However, the contract is a lump sum contract, and is not subject to re-measurement.

The tenderer is to submit a priced Bill of Quantities in accordance with ARM 4 Supplement 2 with his tender.

6.4 Contractor's Work Co-Ordination

Before any work is commenced on site the Mechanical contractor shall agree all pipe routes necessary to complete the works.

6.5 Record and Working Drawings

When the installation is complete, the Mechanical Contractor shall supply a set of Record Drawings showing the layout of the installation as installed. Three sets of white prints, coloured to assist interpretation, together with a set on CD shall be provided. Drawings shall be handed over to the Engineers for checking and their approval obtained before final printing. The information contained on the Mechanical Contractor's working drawings shall be incorporated on the Record Drawings. Additionally, a Maintenance Manual shall be provided by the Mechanical Contractor as specified.

In the event of failure by the Mechanical Contractor to produce approved Record Drawings and Manuals, the Engineer may deduct up to 1% of the Contract value to cover the costs of having the site surveyed and the record documents produced on behalf of the Client.

6.6 Labelling

The Mechanical Contractor shall be responsible for labelling and circuitry charts for all items of mechanical plant.

6.7 Agreement of Programme

The programme for the works will be as outlined in the PQS data. The Mechanical contractor will ensure that he has the adequate resources available at each stage of the programme where the electrical works will be completed.

6.8 Materials and Equipment Delivery Schedules

Once the Mechanical Contractor has been confirmed by the Main Contractor the Mechanical Contractor will confirm delivery dates for all Mechanical equipment and accessories.

6.9 Co-ordination

The Mechanical Contractor shall familiarise himself with the details of the location and routes of other building services and he shall, co-ordinate his work with such services. Failure of the Mechanical Contractor to co-ordinate his works shall involve the Contractor re-arranging installed works to the satisfaction of the Engineer and at the Contractor's expense. When preparing his tender, the Contractor should inspect the drawings.

6.10 Contracts Manager & Foreman

The Contracts Manager or Foreman shall be approved by the Engineers, which approval may be at any time withdrawn, given sufficient reason. The Contracts Manager or the Foreman, whose name shall be set out in writing by the Contractor, shall be maintained constantly on the works, and he shall not be changed except with the written approval of the Engineer. Such Contracts Manager shall be authorised on the Contractor's behalf to

receive instructions from the Engineer, and shall give his whole time to the superintendence of the work. He shall keep accurate records and details of all installed works and shall furnish the Consulting Engineer with all particulars demanded. The Contracts Manager and Foreman shall not be transferred off site without the agreement of the Engineer.

6.11 Site Management & Staff

The Contractor shall include for providing from the outset, and maintaining permanently on site a contracts manager, Foreman and chargehands as required, to effectively fulfil the requirement for management of the site and workforce to the satisfaction of the Engineer.

The Contractor shall submit with his tender a labour histogram incorporating management structure proposal for the project. The Contractor shall name the senior personnel who shall be responsible for a management of the project. The labour histogram shall include man/hour levels for each main area and a graph showing labour force build-up, peak and run down.

6.12 Materials and Workmanship

The standards for materials and workmanship shall be as specified in the relevant sections of this Specification and as shown on the Drawings. Items of equipment generally shall comply with the relevant National, European and International Standards laid down in the specification

6.13 Setting Out

The position of all fittings, pipes, equipment machinery apparatus etc., indicated on the drawings are to be taken as approximate only and are intended to indicate generally the arrangement of the works under this Contract.

The Mechanical Contractor shall be held responsible for notifying the Consulting Engineers for any discrepancy between the Specification, Schedules and Drawings.

Should any portion of the works, which would reasonable and obviously be inferred as necessary for the complete, safe and satisfactory operation of the installation as a whole, not be expressly described or specified, the Contractor shall provide and execute such works as part of the Contract and shall not be entitled to any extra payment on that account.

The exact positions of all fittings, equipment and apparatus and all pipe routes shall be verified by the Contractor on the site and approved by the Engineer/Architect or Clients Representative prior to installation.

6.14 Builders Work through Structure

Should it be required to cut or drill any of the structural steelwork the Contractor shall obtain the approval of the Consultant in writing before any such cutting and drilling is carried out.

The Contractor shall include in his Tender for all drilling and cutting of structural steelwork where required, but such drilling or cutting shall be witnessed by the Engineer.

The contractor is responsible for all builders work necessary to complete the works. Where cables are routes and penetrate existing fire compartments the contractor is to re-seal same with a suitable fire seal.

6.15 Clear Work Areas

The Mechanical Contractor shall at all times keep the site free from obstructions and rubbish and he shall remove from the site all surplus materials and temporary works as soon as these are no longer required on site. Facilities for disposal of rubbish shall be provided by the Contractor. On completion of the works, the Contractor shall remove all surplus materials, benches, racking, tools, cable drums, equipment and all rubbish and shall leave the site in a clean and tidy condition to the satisfaction of the Engineer.

For the purpose of this Clause, the definition of the word 'site' shall be extended to include all roadways, paths, passageways or any other means by which the Contractor or his workmen obtain access to or egress from the site.

6.16 Clear Access Routes

Corridors, roads and paths etc., shall be kept clear of all obstructions during such times as the work is not being carried out and no materials shall be deposited in those places.

The information contained on the Mechanical Contractors working drawings shall be incorporated on the Record Drawings.

6.17 Safety, Health and Welfare at Work Act 2005

The attention of the Mechanical Contractor is directed to the requirements of the Safety, Health and Welfare at Work Act 2005 and to the regulations made there under in relation to the work comprised herein.

7. WARRANTY / MAINTENANCE

The work is to be maintained in good running order for a period of twelve months after the completion of the Contract and after this period of twelve months, finally passed by the Engineers. Any defect developing in the system during this period to be rectified and made good at the Mechanical Contractor's own expense. Causes outside the control of the Contractor are accepted.

In the event of the Contractor refusing to rectify defects within a reasonable period, the Engineer Specialist Manufacturers and Suppliers of the full shall have the power to have the work done by others and deduct the cost of such work from the Mechanical Contractor's

account, without prejudice to any other claim, which may arise out of the refusal of the Mechanical Contractor to make good the defects.

8. TECHNICAL SPECIFICATIONS

The purpose of this section is to set out the specific criteria for the Mechanical Services.

8.1 Energy requirements

Energy is a key consideration at every stage of the construction process. The Mechanical Services Installation shall be in accordance with Building Regulations (Particularly Part L) with system installed efficiencies suited to achieve NZEB requirements.

8.2 Codes, Standards and Design Guidelines

- Building Regulations:
 - Technical Guidance Document B – Fire Safety;
 - Technical Guidance Document G – Hygiene;
 - Technical Guidance Document H – Drainage and Waste Water Disposal;
 - Any other relevant technical guidance documentation.
- Other Regulations
 - All relevant Irish Standards and Regulations;
 - All relevant European Standards and Regulations;
 - Guidance documentation from CIBSE, IEI etc. ;
 - Any other relevant technical guidance documentation.

8.3 Preliminaries

Typical preliminaries services/preparation for the development of all elements.

8.4 Site Services (Element 50)

No works envisaged

8.5 Heating Centre (Element 51)

No works envisaged

8.6 Drainage (Element 52)

No works envisaged

8.7 Water Distribution (Element 53)

The mains water enters the building according our drawings. Water softener to be provided if needed (according water analysis to be carried out by the mechanical contractor).

Cold water will be provided by a cold-water storage tank located according our drawings. This system will be pressurised (pump) or gravity (see drawings and equipment schedule) and from there will distribute throughout the building.

Hot water will be provided by a factory insulated hot water cylinder located in according our drawings, this hot water system will be unvented and pressurised by the cold-water system. From the cylinder, the hot water will distribute throughout the building. Considerations:

- TMV3 valves will be provided at all hot water outlets.
- Isolation valves to be provided at all taps.
- Non return valves to be provided at all taps.
- All water services pipework drops to sinks; cisterns and WC's are to be concealed.

Mains, Cold, Hot Water Installation

This section covers the mains, cold and hot water services distribution throughout the building.

Copper pipework to be employed for these services.

General

All pipework and tubing shall be free from imperfections, cleanly finished, straight, round in cross section, free from cracks/flaws, laminations and other similar deteriorations.

All cuts from standard lengths of pipe shall have burrs and swarf removed. Pipework ends shall be trimmed square and thoroughly cleaned before erection.

Care shall be taken to avoid damage to pipe surfaces or malleable fittings through indiscriminate use of wrenches, vice jaws etc. Any pipework or fittings so damaged shall be replaced.

Pipework shall be installed to the satisfaction of the Engineer. Costs for altering pipework which does not met this Specification, or the requirements of the Engineer, shall be replaced at the installing Contractors cost.

Pipework sleeves and fire-stopping shall be installed to meet the approval of Fire Safety Consultant.

Materials

All pipework and fittings shall comply with the relevant Irish Standards, and be suitable for the environment in which they are to be installed

Installation

Exposed pipe runs shall be installed neatly and parallel to adjacent pipes and surrounding building fabric/structure, wherever practical. Pipework systems shall be routed to set around all columns and structural projections and shall be set to take up any imperfections within the structural surface. All vertical pipes shall be plumb unless indicated otherwise. Valves, unions, flanges etc. will be arranged in an orderly manner.

Due regard must be taken of grading, venting and drainage requirements. The positions of all valves, drains, supports and fixings will take into consideration routine maintenance requirements. Particular attention shall be given to the co-ordination of adjacent pipework.

All pipe runs shall be arranged so that the longest length of pipe practicable is used between bends, tees and flanges or unions. Jointed short lengths of pipe forming a longer straight length will not be acceptable. Unions must be accessibly positioned enabling the joint to be disconnected.

Pipe work installations shall allow for the application of the full thickness of thermal insulation and its finish as specified.

Pipework, valves, fittings and equipment forming a system installation shall be erected and locally supported so that it can be dismantled. It must be accessible for repair and replacement i.e. the flange, union etc. can be reached, manipulated and worked upon either in the open or else by removal of a purpose made duct cover, manhole or similar cover.

Pipework passing through walls, floors, ceiling or similar manner shall be complete with flanges or unions enabling the system to be dismantled as may be necessary. No joints shall be formed within the thickness of walls, floors or ceilings. Where pipework is contained in floor ducts the installation shall be completed with a minimum of joints.

Full access shall be provided for concealed pipework having screwed joints to air vents, drain cocks and pressure gauges to allow the complete inspection, dismantling, removal, replacement and rejoining.

Due allowance shall be made in all cases for obtaining full details relating to the skirting heights, sill heights and floor finishes. Where pipework is visible, off-sets shall only be allowed by prior agreement.

Pipe clearances shall not be less than:

- Pipework to pipework – 50mm;

- Pipework to ceiling – 100mm;
- Pipework to floor – 100mm.

Bends and off-sets shall be formed by use of an efficient bending machine. Fire sets shall not be employed. Copper tube may have its bends and off-sets formed with springs or a bending machine.

All changes of direction formed shall be made with a minimum of loss of local wall thickness and the cross-section diameter shall remain true Crinkled or scored pipework will not be accepted.

Open ends of all pipework shall be protected. Open ends shall be covered with suitable caps, plugs or plastic covers. Wood, rag or paper plugs shall not be used. The right is reserved to order the dismantling and internal cleaning of pipework should these requirements not be observed.

Pipework Jointing and Fittings

Jointing materials and fittings are to be suitable for the working temperature and pressure of the system.

The following fittings and joint types shall be provided to facilitate pipework removal for maintenance purposes:

- Unions on welded or screwed steel pipework up to 50mm nominal bore;
- Flanges on welded or screwed steel pipework above 50mm nominal bore;
- Unions on copper pipework up to 65mm nominal bore;
- Flanges on copper pipework above 65mm nominal bore.

Such fittings shall be provided as a minimum at 12m intervals or as otherwise directed by the Engineer.

Supports and Fittings

Pipework shall be properly supported with secure brackets and must permit, where required, adequate free and/or guided movement due to the operating conditions applicable. Where pipes pass through structural walls and partitions via sleeves, then these sleeves will not be considered as supports.

Brackets and supports will be positioned and marked out with care to ensure that they do not obstruct the access to valves, flanges or fittings requiring maintenance. Supports shall be positioned adjacent to such pipe fittings and at each change in direction.

Supports shall be positioned in consideration of the position of joints for dismantling purposes such that the adjoining pipework shall remain adequately supported.

The support of pipework systems from each other shall not generally be permitted without the Engineer's express written authority. Pipes shall not be supported from any items of plant or equipment.

Vertical pipework shall be suitably supported at the base of the riser and at all intermediate levels and at centres indicated on the above table. Branch circuit pipes shall not be used as a means of support for the riser main.

Detailed drawings/illustrations of all bracket arrangements shall be submitted to the Engineer for approval before commencement of manufacture. Pre-fabricated brackets, anchor points, guides and clamps shall conform generally to the details in BS3974: Parts 1 and 2.

Particular attention shall be given to the co-ordination of combination bracketry.

All pipes exposed to view and generally routed around rooms at floor level shall be supported on long shank brackets.

Pipe brackets on exposed copper pipework shall be of the cast brass type. Under no circumstances will brass strip or copper strip type brackets be acceptable.

Brackets on insulated pipework incorporating a vapour seal shall be fitted with spacers and sleeves at the time of installation. An approved material shall be used between the bracket and pipe surface to achieve satisfactory vapour sealing.

Contact between dissimilar metals must be avoided. Steel piping shall have steel supporting members in contact with the pipe. Galvanised piping shall have galvanised contacts. Copper tubing shall be carried exclusively from contact members constructed from copper alloy, or where mild steel clamp saddles are used, a lead lining interposed.

Pipework subject to expansion that will cause distortion of hanger type brackets, shall be supported using roller brackets. Build-in type brackets shall only be used where satisfactory fastening cannot be attained using surface-fastening techniques.

Building structural steelwork or timber members shall not be drilled either for the passage of pipes or for the attachment of brackets, nor shall steelwork be welded to, without the Engineers express written permission.

All fastenings and fixings to the constructional and fabric elements of the building shall be included. Necessary supports and brackets complete with all bolts, screws and insert or plug fastenings shall be provided. Softwood plugs will not be permitted. All methods of fixing and fastening shall be purpose designed and submitted to the Engineer for comment prior to manufacture.

For pre-cast, pre-stressed and hollow floor constructions, metal plate and rod hanger supports with associated drilling of the structure and secondary spanning steelwork shall be employed.

For hollow wall construction and light partitions, fixing of the spring clip or toggle type shall be used.

Minimum pipework support intervals shall be as table below.

Copper Pipework Support Centres			Steel Pipework Support Centres		
Bore(mm)	Horizontal (m)	Vertical (m)	Bore (mm)	Horizontal (m)	Vertical (m)
15	1.5	2.0	15	2.0	2.5
22	1.5	2.0	20	2.5	2.5
28	1.5	2.0	25	2.5	3.0
35	1.5	2.0	32	2.5	3.0
42	2.0	2.5	40	3.0	3.5
54	2.0	2.5	50	3.5	3.5
67	2.0	2.5	65	3.5	4.0
76	2.5	2.5	80	3.5	4.0
108	2.5	3.0	100	4.0	4.5
For all copper pipework above 108mm diameter the support centres shall not exceed 3.0 metres.			150	4.5	5.0

Cover Plates

Pipes and tubes passing through walls, floors, ceiling, partitions and false ceilings of occupied rooms such that the entry/exit is exposed to view shall be fitted with a white plastic cover plate, neatly installed and secured. Such plates shall be split on the diameter, be snug fit to the pipe concerned and provided with securing clip or screws.

External Underground Pipework

Marker plates shall be fitted to a convenient adjacent structure or special marker post to indicate position of valves, siphons or purge points. Marker plates shall be in accordance with IM16.

External Underground Pipework – Water

All cast iron pipework shall be wrapped with bituminous hessian painted with two coats of bitumen. All plastic pipework shall be installed in accordance with British Standard Code of Practice CP312

Trenches and Backfilling

No backfilling shall take place without prior approval.

Details shall be provided by the Contractor for all trenches; this shall include size, depth and method of backfilling. The number, location, dimensions and loading of all anchor blocks necessary for the safe working of the installation shall also be detailed.

Details for backfilling shall include:

- Cold Water - 150mm of pea shingle all around the pipework

Pipework

Pipework will be copper pipework through for the water services.

Bends shall be formed from proprietary manufacturers' fittings. Pulled bends shall not be permitted unless specifically agreed with the Engineer. Similarly branch connections shall be purpose made tees either square or sweep to suit the application.

Where it is intended to use compression fitting(s), this shall only be allowed for following prior written approval from the Engineer and the fittings shall be of the type 'B' pattern.

Joints

For capillary fittings, care shall be taken to ensure that the solder used is suitable for the temperature range at which it is anticipated the system will operate and that the solder is lead free.

All jointing of copper tubes shall be strictly in accordance with the fitting manufacturer's recommendations.

Excess solder and solder droppings shall be removed on completion of the joint. Particular attention shall be given to removing surplus flux on completion of the joints. During all jointing operations using capillary welded and brazing fittings, the fitter/plumber shall be accompanied by a competent assistant and suitable fireproof mats shall be used to protect the building fabric and decoration. Every precaution shall be taken to prevent damage by scorching or fire and two portable fire extinguishers shall be provided for use by the fitters/plumbers in an emergency.

All fittings and jointing materials shall be suitable for the temperature and pressure of the system. Brazing and bronze welding shall be carried out in accordance with BS1723, BS1724 and the Code of Practice for Brazing and Bronze Welding Copper Pipework issued by the HVCA.

Where chemical injection is employed for water treatment or for chemical cleaning the system when commissioning, then the manufacturer's recommendations for materials and jointing shall be sought and adhered to.

Insulation

Pipework in the Schools, where concealed in ceiling void, chases etc. or carried at high level, shall be insulated as follows:

- Water Pipework - 19mm Armaflex Class'0'.

Cold Water Storage Tank

The Contractor shall supply, erect and install on prepared supports cold water tank(s) indicated on our drawings and/or indicated on the mechanical equipment schedule. Accessories:

- Complete overflow pipework;
- Support frame;
- Drip Tray.

Hot Water Cylinder

An indirect factory insulated hot water cylinder is to be supplied, installed, tested and commissioned.

Pipework Fittings

All fittings shall conform to I.S.239 "Sanbra Fyffe" fittings or similar to approval. The manufacturers' recommendations as regards erection of these fittings shall be strictly adhered to. On sizes 35mm Ø and larger, reducers, tees and elbows shall be by brazing fittings to BS. 2871. Bends and offsets may be hot formed on site.

Isolation Valves & Stopcocks

Isolation Valves & Stopcocks shall be provided where indicated. Where possible, they shall be so arranged as to control groups of fittings and shall be mounted in such positions as to be screened by the fittings. No isolation valve or stopcock shall be fitted in an exposed position except with the Engineer's approval. Stopcocks shall be 'Ballofix' patent valves screwdriver operated or equivalent.

They shall be suitable for connecting to Multi layer pipe with compression couplings.

Pipe Sleeves

In all places where pipes pass through solid walls or floors, suitable sleeves shall be provided and fitted in at such points. Sleeves shall be in one length and to be fixed flush with the surface of the finished wall or floor.

Wall and Floor Plates

In all positions where pipes pass through solid walls or floors, the holes shall be covered with suitable plates. All plates shall be of the hard grey plastic type.'Scanplate' as manufactured by Scanglo Industries Ltd. or similar to approval.

Branches to Sanitary and Other Fittings

The Contractor shall include for making branch connections off mains to service w.c. cisterns, wash hand basins etc The Contractor shall include for making the final connection to serve these units.

Sanitary Ware

The sanitary ware will be supplied by the main contractor. Fittings and taps etc., will be supplied under this mechanical sub contract.

Thermostatic Control

The Contractor shall supply, install and commission thermostatic control devices to all points of use as per the general arrangement drawings. These shall be TMV3.

Fire Stopping

The Contractor shall include for fire stopping all pipework passing through fire walls, slabs and floors, including installation of intumescent fire sealer between sleeves and pipework.

Tests

After the erection is complete, the whole of the pipework system shall be tested under hydraulic pressure of 7 bar(g).

The whole of this installation must remain drop tight at the test pressure for a period of eight hours, without any appreciable fall in pressure and should any leakage occur, the Contractor shall make good, at his own expense, notwithstanding that previous tests may have been satisfactory.

All tests on site are to be carried out in the presence of the Engineer or his representatives. The Engineer shall, if he thinks fit, call for the testing of installation in sections and no extras shall be allowed on this account.

8.8 Gas Distribution (Element 54)

No works envisaged

8.9 Space Cooling (Element 55)

No works envisaged

8.10 Space Heating (Element 56)

No works envisaged

8.11 Ventilation (Element 57)

No works envisaged

8.12 Other Services (Element 58)

General Technical Specification

Tests

Hydraulic tests shall be carried out on all pipe lines to the conditions specified in the appropriate clause in each section of this Specification.

Insulation

- Cold Water Pipework: 13mm Armaflex Class'0';
- Hot Water Pipework: 19mm Armaflex Class '0'.

Dissimilar Metals

Where galvanised piping is joined to stainless steel, copper or iron, a brass bush or flange shall be used so that no contact takes place between the metals. This section applies to all other sections of this Specification.

Painting

After erection and testing are complete and insulation has been placed, all exposed metalwork shall be power wire brushed and scraped to the Engineer's approval and painted with one base coat of good sound priming paint to the approved colour. The manufacturer's priming coat of the radiators shall be accepted as complying with this condition, provided that it is unharmed and to the Engineer's satisfaction after erection and testing are completed, other it will have to be made good. The insulation, where canvas or hard finished, shall also be thoroughly sized and made ready for painting. The finishing coats shall be applied under another Contract, but the Contractor shall include for supervising the application of same

Water Testing

The Mechanical Contractor shall in advance of carrying out the works get main water at each site analysed & tested (Incoming Pressure) and submit the results.

Anti-Corrosion Additive

The Subcontractor shall include for dosing the entire LPHW system with Multitech water treatment additive in the proportions recommended by the Suppliers, Water Technology Ltd., Cork or equivalent.

The additive is to be selected based on the results of the water test.

A commissioning certificate shall be issued by the specialist on completion.

The entire system shall first be flushed out to remove any foreign matter.

Fire Fighting Installation

No works envisaged

Ducts and Seals

General

All mechanical pipes/ducts entering buildings or passing through walls or floors shall be sealed by means of water, gas and fire-retardant seals. Such seals shall be readily removable, re-usable and capable of installation around existing and pipes. Split blocks of intumescent, compressible material shall be installed around each pipe or to fill unused apertures. These shall be mechanically clamped into position.

The Contractor shall ensure that the duct end to which these seals are fitted are fully and adequately supported by the surrounding structure to resist seal pressure. Seals shall be installed in full accordance with the manufacturer's instructions and recommendations.

All penetrations shall be fire stopped internally and externally when passing through a fire wall, floor or ceilings.

Commissioning

This section covers the commissioning of the new mechanical services in the building. The Contractor is advised that the commissioning will be detailed and exacting.

Commissioning Reports and Format

The commissioning format and reporting will be in accordance with CIBSE Guidelines and shall be as set out in the following commissioning reports:

- CR.201 Water Services Installation (Incl hot water installation);

Works in Existing Building

General

This section includes for the strip-out of the mechanical installation required to facilitate the new works: -

Existing mechanical services, being stripped out, are to be made safe and removed from site at the contractor's expense.

The scope of the works includes but is not limited to the following: -

Strip out and remove redundant under sink water heaters and associated pipework.

Strip out and remove redundant water tanks and associated pipework.

Strip out and remove redundant electric storage heaters and associated cabling.

All pipework or ductwork passing through fire rated walls or floors shall be sealed by means of fire-retardant seals. Split blocks of intumescent, compressible material shall be installed around each opening to fill the apertures. These shall be mechanically clamped into position.

All pipework penetrations shall be fire stopped when passing through a fire wall, floor or ceilings.

All riser cupboard's locations with pipework penetrations shall be fire stopped when passing through a fire wall, floor or ceiling.

Survey and Programme

General

The Contractor shall include for a detailed site survey of installation prior to works commencing.

Any items discovered which are at variance with TEM specifications and drawings are to be advised in writing prior to upgrade works.

A detailed programme of works shall be submitted for approval to Engineer for agreement with the Client.

The Client will be in operation at all times.

Operation and Maintenance Manuals

General

The Contractor shall supply two copies of a comprehensive Maintenance Manual, bound in a heavy transparent plastic cover containing the following:

- Description of complete installation;
- Operating instructions on all specialist equipment and systems;
- Details of emergency action to be taken in the event of breakdown;
- List of recommended spares;
- Adjustments, fault finding details;
- CD-ROM containing digital copies of "as installed" drawings and 2 No. sets of "as installed" drawings coloured to assist interpretation;
- Other relevant information.

Refer to TEM standard document for details on format and content required.

9 SPECIFICATION SCHEDULES

9.1 Mechanical Drawing Schedule

<u>DRAWING NO.</u>	<u>DRAWING TITLE</u>	<u>SIZE</u>	<u>SCALE</u>
18572-1-201	Water Services Layout - Ground & First Floor	A1	1:50

9.2 Schedule of Manufacturers and Suppliers

ITEM	MANUFACTURER/ SUPPLIER NAME	COST ADJUSTMENT	DELIVERY PERIOD
		EUR	

We confirm that the above alternative proposals do not form part of our lump sum tender amount, which is based on the specified plant and equipment. We further confirm that the proposals meet the specified standards in all respects, including space requirements, noise and pollution criteria, and include all costs associated with the change, e.g. labour, profit and overheads, and excludes Value Added Tax.

We understand that the Employer is not obliged to consider any of these alternatives. However, if considered, they may be taken up on total or in part and set against our lump sum tender bid.

Signed: _____

For and on Behalf of: _____

Date: _____

10 MECHANICAL TENDER SUMMARY

10.1 Tender Summary (Element 59)

Item	Description	Price
.1	Preliminaries	€
.2	Heating Centre (Element 51)	€
.3	Drainage (Element 52)	€
.4	Water Distribution (Element 53)	€
.5	Gas Distribution (Element 54)	€
.6	Space Cooling (Element 55)	€
.7	Space Heating (Element 56)	€
.8	Ventilation (Element 57)	€
.9	Other Services (Element 58)	€
.10	Any Items Not Included Above.	€
	TOTAL - To be carried forward to the BOQ	€