LIMERICK AND CLARE
EDUCATION AND TRAINING BOARD

HEATING SERVICES UPGRADE & GAS CONVERSION
EMERGENCY WORKS PROJECT 2026

AT

SCARIFF COMMUNITY COLLEGE
DREWSBOROUGH,
SCARIFF
Co. CLARE

VOLUME A

WORKS DESCRIPTION
PARTICULAR MECHANICAL SPECIFICATION

Project 2625 - September 2026

Fahey O'Riordan
Consulting Engineers
Shanaclogh, Cappawhite, Co Tipperary. Tel:- 062 75929 Email:- info@force.ie

Revision	*Issue*	*Prepared By*	*Approved By*	*Date*
T0	Tender Issue	L. Lanna	J. Fahey	29th July 2026
T1	Revised Tender Issue	L. Lanna	J. Fahey	7th September 2026

Table of Contents

1.0 GENERAL CONDITIONS & NON TECHNICAL PARTICULARS 5
1.1 Project Particulars 5
1.2 Contract 6
1.3 Acceptance of Tender 6
1.4 Insurances 6
1.5 Assignment Or Transfer Of Contract 6
1.6 Drawings 6
1.7 Site Description & Access 6
1.8 Management of the Works 7
1.9 Quality 7
1.10 Security 8
1.11 Project Timescale and Restrictions 8
1.12 Working Drawings 8
1.13 Site Meetings 9
1.14 Commissioning 9
1.15 As-Installed Drawings and O & M Manuals 9
1.16 Site Access and Delivery of Materials 9
1.17 Health, Safety and Welfare at Work 9
1.18 Patent Rights 11
1.19 Verify Existing Conditions 11
1.20 Co-Ordination 11
1.21 Technical Submittals 12
1.22 Factory Acceptance Testing 14
1.23 Operation of Plant Prior To Practical Completion 14
1.24 Cleaning Upon Completion 14
1.25 Operating and Maintenance Manuals 14
1.26 Site Modifications 16
1.27 Operational Demonstrations 16
1.28 Loose Tools and Lubricants 16
1.29 Defects Liability Period 17
1.30 Site Survey 17

2.0 SUMMARY DESCRIPTION OF THE WORKS 18
2.1 General 18
2.2 Standards 18
2.3 Scope of Work 18
2.4 Works By Others 20
2.5 Demolitions / Site Temporaries 20
2.6 Maintenance 20
2.7 Preliminary Plan for Phased Upgrade Programme 20

3.0 ELEMENT (51) : HEATING CENTRE SERVICES 22
3.1 Extent of Works in This Section 22
3.2 Boiler Plant Upgrade 22
3.3 Flue System 24
3.4 Domestic Hot Water System Upgrade 24
3.5 Feed and Expansion Unit 24
3.6 Heating Circulating Pumps 25
3.7 LTHW Valves 26
3.8 Pipework and Fittings 27
3.9 Pipe Supports and Brackets 28
3.10 Pipe Supports 29
3.11 Provision for Anchoring, Guidance and Expansion of Pipe work 29
3.12 Automatic Air Vents 29
3.13 Balancing / Commissioning Valves 29
3.14 Provision for Air Venting and Drainage 30
3.15 Treatment of LPHW Water. 30
3.1 Heating Centre Controls 30
3.2 Fire Protection Services 31

3.3 Painting and Identification of Pipework 31
3.4 Valve Labels and Valve Charts 32

4.0 ELEMENT (54) : GAS SERVICES 33
4.1 Description 33
4.2 Liaison With Gas Supplier 33
4.3 Pipework - Gas 33
4.4 Boiler Room Gas Detection Systems 34
4.5 Gas Slam Shut Valve 35
4.6 Painting - Gas 35
4.7 Pressure Testing - Gas Pipework 35
4.8 Commissioning-Gas Pipework 35
4.9 Commissioning Gas Detection Systems 35

5.0 ELEMENT (56) : SPACE HEATING INSTALLATION 37
5.1 General 37
5.2 Pipework and Fittings 37
5.3 Pipework Supports and Brackets 38
5.4 LTHW Valves 39
5.5 Heat Emitters – Convector Radiators 40
5.6 Radiator Valves 42
5.7 Heat Emitters – Radiant Panels 42
5.8 Radiant Panel Valve Sets 42
5.9 Automatic Air Vents 42
5.10 Balancing / Commissioning Valves 42
5.11 Painting 43

6.0 ELEMENT (58) : OTHER SERVICES 44
6.1 Testing and Commissioning 44

7.0 ELEMENT (58) : THERMAL INSULATION 47
7.1 General 47
7.2 Boiler House and Plantroom 47
7.3 Internal Pipework Insulation 48
7.4 Thickness of Insulation on Pipework 48

8.0 ELEMENT (60) : ELECTRICAL SERVICES 49
8.1 Extent of Works in This Section 49
8.2 Demolitions 49
8.1 Mechanical Equipment Power & Controls 49
8.2 Boiler Room General & Emergency Lighting 50
8.3 Earthing 50
8.4 Builders Work and Attendances 50

9.0 ELEMENT (59) : BUILDERS WORKS 51
9.1 General 51
9.2 Site Survey / Inspection 51
9.3 Protection of School Finishes & Equipment 51
9.4 Suspended Ceilings 51
9.5 Demolitions 52
9.6 Flooring Repairs 52
9.7 Boiler Room Refurbishment 52
9.8 Coring of Opes 52
9.9 New External Service Risers 52
9.10 New Internal Service Risers 52
9.11 Trenching & Civil Works 53
9.12 LPG Compound 53
9.13 Electrical Builders Works 54
9.14 Painting & Redecoration 54
9.15 Contract Site Temporaries / Access / Hot Works etc 54

9.16 Contract Clean 54

Appendices:

A Drawing Schedule

1.0 GENERAL CONDITIONS & NON TECHNICAL PARTICULARS

This specification covers the standard requirements for the supply, assembly, installation, connecting up, testing and setting to work of the Mechanical installations for this project.

1.1 Project Particulars

Project Name Heating Services Upgrade & Gas Conversion Emergency Works Project

Site
Name: Scariff Community College
Address/Location: Drewsborough, Scariff, Co. Clare V94 Y9W2

Employer
Name: Limerick and Clare Education and Training Board
Address: Capital Procurement Section, Station Road, Ennis, Co. Clare
Contact: Marie Cooney
Telephone: (065) 686 5476
Email: marie.cooney@lcetb.ie

School
Name: Scariff Community College
Address: Drewsborough, Scariff, Co. Clare V94 Y9W2
Contact: Ms. Angela McNamara, Principal
Telephone: (061) 921 083
Email: angela.mcnamara@lcetb.ie

M&E Consulting Engineers & Employer's Representative
Name: Fahey O'Riordan Consulting Engineers
Address: Shanaclogh, Cappawhite, Co. Tipperary
Contact: John Fahey
Telephone: 062 75929
Mobile 087 933 9582
Email: john@force.ie

Project Supervisor Design Process
Name: Fahey O'Riordan Consulting Engineers
Address: Shanaclogh, Cappawhite, Co. Tipperary
Contact: John Fahey
Telephone: 062 75929
Mobile: 087 9339582
Email: john@force.ie

Contractor
Name: TBA
Address:
Contact:

Project Supervisor Construction Stage
Name: TBA (Appointed Main Contractor)
Address:
Contact:

The Contractor

Reference to "The Contractor" shall always indicate the contracting company to which the Particular Specification refers. The Contractor will be appointed as the main contractor for the works.

1.2 Contract

The proposed upgrade works shall be executed as a main contract between the successful tenderer and the employer.

The Main Contract Form shall be the current version of the Public Works Short Form Contract reference PW-CF6 as published by the Department of Finance.

Submission of a tender shall be taken as acceptance of the proposed contract form.

1.3 Acceptance of Tender

The client does not bind themselves to accept the lowest or any tender. Acceptance of any tender will be subject to compliance with the Pre-Contract Procedures including production of the Contractors current C2 certificate, safety statement and evidence of current insurances.

1.4 Insurances

The Contractor shall make full provision in his tender for complying with the General Conditions of Contract relative to Insurance and Compensation. The Contractor shall effect adequate insurance in his own name and also in the name of the Employer to cover all the risks or claims specified in the General Conditions of Contract and shall hold the Employer indemnified against all such claims and risks in anyway arising out of the works included in the Contract. The Contractor shall fully comply with the Social Welfare Acts, the Conditions of Employment Acts and other Statutory Orders effecting the Employer and Employed.

The contractor shall note that it is a requirement that The Contractor's Public insurance must be extended to note the Limerick and Clare Education and Training Board as an Additional Insured and a Non-Vitiation clause applied, similar notations are required under the Contractor's Products Liability and Contract Works Insurances.

The contractor will be required to arrange for their insurers to provide evidence of their insurances confirming the extension noting the Limerick and Clare Education and Training Board as an Additional Insured and a Non Vitiation clause applying.

1.5 Assignment Or Transfer Of Contract

The contractor shall not assign all or any part of the work to another company, firm or individual without prior written consent of the Employer's Representative.

1.6 Drawings

Mechanical Services Drawings

The Mechanical services tender drawings are listed in the Drawing and Document schedule included as an appendix to this document.

It is the sole responsibility of the Contractor to apprise himself of details or information contained on the above drawings and accompanying specifications which may impact on the works.

1.7 Site Description & Access

Scariff Community College is located in the town of Scariff, Co. Clare. It is located on an enclosed site with low boundary walls and fences to the front and hedging and fences to rear and both sides which are not secure.

It is proposed to upgrade the heating system in the main school building and convert to LPG gas fired system and replace the heating distribution system throughout the school which has passed end of economic life.

The contractor's normal access to the refurbishment works shall be via the main entrance from the adjacent public road which runs along the front boundary of the school grounds.

For full details refer to the Preliminary Health and Safety Plan accompanying this specification.

1.8 Management of the Works

The Contractor shall assign full time to the project a competent supervisor who shall have sole responsibility for, and make all decisions regarding site operations.

The Contractor shall prepare a programme, based on network analysis techniques, for the completion of the Works within the Contract period.

The Contractor, or his authorised representative, shall attend site progress meetings which will be held at regular intervals (minimum fortnightly). The Contractor shall be responsible for informing sub-contractors and suppliers as are necessary that their attendance at progress meetings will be required.

Where a contract will be carried on at the same time as one or more independent contracts on the same site, the Contractor shall liaise as necessary with other Contractors. The client's representative's decision regarding inter-contractor issues (use of available work areas, programming of related work, etc.) shall be final.

This Contractor shall liaise with all relevant authorities, e.g. Employer, etc. regarding access to and availability of the site.

No work of any kind, payment for which is to be made in accordance with a record of time and material, shall be executed unless complete arrangements for such are specially authorised by the Client's representative **in writing** beforehand.

Daywork Sheets, specifying the time and materials employed on each Daywork item, shall be submitted to and signed by the Client's representative or his authorised Agent on or before the expiration of the week following that in which such work shall have been done. One unpriced copy of such Daywork Sheets shall be forwarded to the Engineer/Client's representative followed within 14 days by priced copies in duplicate.

The Client's representative must be advised, in advance or within seven days, of any works considered by the Contractor to constitute a variation to the contract. This will apply whether the works are caused by circumstances within the Contractor's control or not. Costs incurred by such variations will only be considered for payment if they comply with this procedure. Variations to the Contract shall only be carried out when clearly instructed in writing by the Client's representative.

The Contractor shall give the Client's representative each week a return of the number and descriptions of tradesmen and general labourers employed on the Works including those employed by specialist sub-contractors listed separately.

1.9 Quality

Contractors, sub-contractors and suppliers shall be ISO 9000 certified. Where such certification is not achieved, the contractor shall, on request, provide satisfactory evidence of quality control systems that meet with the Client's representative's approval.

The Contractor shall guarantee the performance of the entire installation and all items forming part of the installation. The defects liability period shall be as set out in the Form of Tender and shall extend from the Date of Practical Completion for that period. The Contractor shall make good any defects which occur during this period. Failures of consumable items (e.g. lamps etc) during the defects liability period shall be rectified by the contractor at his expense.

The contractor shall ensure that all materials and equipment are new unless otherwise specified and shall handle store and fix materials and equipment with care to ensure that they are in perfect condition when incorporated into the works.

The contractor shall handle, store and fix each material and item of equipment in accordance with the

manufacturer's recommendations and submit copies of manufacturer's recommendations to the Building Services Engineer when requested.

The Employer may appoint an Inspector. Neither the appointment nor the action of the Inspector will invalidate the responsibilities of the Contractor. The Inspector will have no power to authorise variations to the work.

Assessment of the quality of materials and workmanship shall be made in the presence of the Engineer or his representative, unless otherwise instructed.

The Contractor shall conform to all Local Authority requirements with regard to regulations, inspections, permissions to erect hoardings, demolitions, clearance, etc., as applicable.

The Client's representative shall be notified in writing, a minimum of five working days in advance, of the performance of any tests or commissioning procedures being undertaken by the Contractor and any of his sub-contractors, suppliers, etc. in order to allow for witnessing of such tests by the ER. Where notice is not given in accordance with these requirements the tests shall be repeated at the ER's request.

1.10 Security

All personnel working on or attending the site will be required to have valid photo identification (Safepass). The names of all contractor personnel shall be submitted to the employer on a weekly basis.
Personnel and materials entering and leaving the site may be searched.

Photographs of any part of the site may not be taken without the written permission of the employer.

Documents shall be restricted to the use of the Contractors staff and must not be issued to third parties, other than members of the Project Team, unless authorised in writing by the Client's representatives.

The Contractor shall not impede or interfere with the Security Systems and procedures in use by the Employer.

1.11 Project Timescale and Restrictions

The project will commence on appointment and will progress strictly in accordance with the programme as set out in the contract documents / Preliminary Health and Safety Plan. The contractor shall comply with the requirements and restrictions as set out in the preliminary plan.

1.12 Working Drawings

The Engineers are not obliged to produce any working drawings and the tenderer shall note that the drawings accompanying this enquiry will not be detailed further.

It is the sole responsibility of the successful tenderer to produce working drawings, which are to be detailed sufficiently to allow site operatives to install the services without the necessity for site design.

The contractor shall prepare and submit for the approval of the Engineer, working drawings for all systems to be installed under this Contract, together with such schedules of data, calculations and other information called for by the Engineer **within 14 days of contract award.** These works shall include the following:

- Equipment schedules and technical specifications
- Equipment installation co-ordination and equipment layouts.
- Ducting and Piping Routes for all services
- Control drawings and schedules
- Builders works setting out drawings and details

The tendered figure shall include for the design development and production of all of the above. Allow a minimum of 5 working days response time from the Client's representatives.

1.13 Site Meetings

The following information must be presented in writing to the Engineers at least 1 full working day prior to the site meeting:

- Updated programme and progress report
- Cost report, including notification of all actual or potential variations
- Costs associated with any agreed variations
- Site manpower for previous period
- Listing of information required
- Equipment and material status

1.14 Commissioning

The Contractor shall provide the Client's representative with a schedule of all commissioning and testing procedures and dates giving at least 5 working days notice of same. Facilities shall be provided for the Employer's Representative to witness all testing and commissioning.

1.15 As-Installed Drawings and O & M Manuals

Two full sets of hardcopy drawings and manuals in strict compliance with the Specifications, shall be required for this project and in addition two soft copy sets shall be provided on disk or memory stick.

Record drawings shall be required as hard copies and on disc in AutoCAD Release 2014 (or later) format.

The Contractor shall be supplied with a full set of tender drawings, which shall be retained on site and marked up as the project progresses. The marked-up drawings shall be made available at site meetings for inspection.

Reservation of copyright will not be permitted. All technical submissions and drawings including electronic and printed material shall become the property of the client.

1.16 Site Access and Delivery of Materials

The Contractor will arrange site access for materials and plant.

The Contractor shall check the dimensions of all materials and plant prior to delivery to site and ensure adequate turning circles and access is available.

1.17 Health, Safety and Welfare at Work

The project design and construction shall be executed in accordance with the Health, Safety and Welfare at Work (Construction) Regulations 2006-2013. In this regard, the Contractor shall be aware of the Regulations, and the specific details that are contained in the accompanying Preliminary Health and Safety Plan. The format for all agreements under this act shall be in accordance with the format set down by the IEI (Institution of Engineers of Ireland/ACEI Association of Consulting Engineers of Ireland)/of copies of which can be obtained on request.

Comply with all safety, health and welfare regulations, whether statutory or deriving from the Employer or other bodies having powers, regarding all work done, including work done by sub-contractors.

The Contractor shall appoint a Safety Officer to visit the site as often as necessary, but no greater than monthly intervals, to ensure that safety requirements are being observed. The Safety Officer shall prepare a written report of each visit which highlights the safety procedures and practices being observed and any deviations from them. A signed copy of the written report shall be submitted to the Client's representative.

The Safety Officer shall notify the Main Contractor, in writing, of all breaches of safety regulations or dangerous practices which are observed and are the responsibility of the Main Contractor, the Employer, other contractors, companies or individuals on the site.

1.17.1 Project Supervisors

The Project supervisors are as indicated in section 1.1 above.

1.17.2 Contractors with Design Input - General Duties of Designers -

Where a contractor designs any element of the works (or engages someone else to design it on his behalf) as part of his contract, the contractor has a statutory obligation to perform the duties set out in Section 16 of the regulations in relation to those parts of the works. These are:

a) Take account of the general principles of prevention as specified in the Third Schedule of the Principal Regulations (S.I.10 of 2005) and any relevant Safety and Health Plan or Safety File prepared in accordance with the Health Safety and Welfare at Work (Construction) Regulations 2006.

b) Co-operate with the Project Supervisor appointed for the Design Process or the Project Supervisor appointed for the Construction Stage, as appropriate, to enable that project supervisor to comply with these regulations.

c) Promptly provide the Project Supervisor appointed for the Design Process or the Project Supervisor appointed for the Construction Stage, as appropriate, with such information as is known to that person regarding particular risks to the safety and health of persons at work as referred to in the First Schedule which may be associated with the project and also with such information regarding the nature and scope of the project to the extent necessary to enable the project supervisor to comply with these Regulations.

d) Take into account any directions from the Project Supervisor appointed for the Design Process or the Project Supervisor appointed for the Construction Stage, as appropriate.

1.17.3 Safety File

Under Section 15 of the Regulations, each Designer is required to provide the Project Supervisor (Construction Stage) with relevant health and safety information to be taken into account during any subsequent construction work (which would include for instance maintenance, upkeep etc.). This might include such information as:

a) Drawings showing the part of the works for which the Designer is responsible.

b) The general design criteria adopted.

c) Details of the construction or installation including manufacturer's instructions for the installation of proprietary elements, pipe layouts, wiring routes and diagrams.

d) Information considered relevant to the maintenance of the construction or installation.

1.17.4 Co-ordination of Persons Engaged in the Design of the Project

In accordance with Section 11 of the Regulations it is the duty of the Project Supervisor for Design Process to co-ordinate the activities of persons engaged in the design of the project.

1.17.5 Preliminary Health and Safety Plan

To enable the Project Supervisor for Design Process to prepare the preliminary Health and Safety Plan for the project and where the timing permits it is necessary for the contractor to give the information which is relevant to the requirements of the Regulations in relation to that part of the works for which they are tendering:

- A general description of the works.
- The time in which it is intended that the works will be completed.
- Work which will involve Particular Risks as defined in Schedule 1 & 2 of the

Regulations.

1.17.6 Health and Safety Plan for Project

To enable the Project Supervisor for Construction Stage to develop or amend the Health and Safety Plan for the project where a contractor with design input is appointed after the Preliminary Health and Safety Plan has been prepared by the Project Supervisor for Design Process it is necessary for the sub-contractor to give the Project Supervisor for Construction Stage information which is relevant to the requirements of the Regulations in relation to that part of the works for which they are tendering:

- A general description of the works
- The time in which it is intended that the works will be completed
- Work which will involve Particular Risks as designed in Schedule 1 & 2 of the Regulations

1.17.7 Contractor to Check All Matters

The contractor is to examine the site and the information supplied regarding the nature and extent of the proposed works so as to be satisfied as to what is required to be done to fulfil the duties in relation to the design and preparation for the works and also what measures are required to be taken to meet the requirements of the Regulations in the execution of the works including complying with the Health and Safety Plan. All costs arising in respect of these obligations are to be included in the tender figure and the Client will not be liable for any such costs which are reasonably foreseeable and which are not so included.

1.18 Patent Rights

The contractor shall ensure costs of all materials and equipment supplied includes for costs associated with patent rights and royalties arising from use of any such materials and equipment.

1.19 Verify Existing Conditions

The contractor shall before commencing work examine all adjoining work on which this work is in any way dependent for perfect workmanship according to the intent of this specification and report to the Employer's Representative any condition which prevents performance of first-class work. NO "waiver of responsibility" for incomplete, inadequate or defective adjoining work will be considered unless notice has been filed before submittal of a proposal.

1.20 Co-Ordination

Certain materials may be furnished, installed, or furnished and installed, by others. Examine the Contract Documents to ascertain these requirements.

In relation to such works this contractor shall:-

A. Carefully check space requirements with other trades to ensure that all material can be installed in the spaces allotted thereto. Finished suspended ceiling elevations are indicated on the general construction drawings.

B. Caution workers both verbally and in writing as to the dangers involved in doing work within or adjacent to electric closets, plant rooms and Switchboard Rooms, due to the dangers caused by presence of high voltage and currents in these spaces and operate a permit to work system as necessary.

C. Provide required supports and hangers for the distributed services and equipment, so that loading will not exceed allowable loadings of structure while retaining the frequency of supports as dictated by this Specification. Submittal of a bid shall be deemed a representation that submitting such bid has ascertained allowable loadings and has included in estimates the costs associated in furnishing required supports.

D. Be responsible for scheduling this work with other trades in accordance with the construction sequence.

E. Coordinate with others field drilling, cutting and/or reinforcing of holes in structural slab required for work under this specification and obtain approval from Structural Engineer. Allow for all costs for all such drilling, cutting and reinforcing costs.

F. Install the engineering services in accordance with the requirements for ceiling heights and fully co-ordinate with all other trades.

G. Take responsibility to co-ordinate the supply, installation, commissioning, testing and programming of all the works described in the contract documents, whether it is supplied or modified under these Works or is a free issue for installation.

H. Accept responsibility for co-ordination and liaison with others to ensure that the installation as detailed does not conflict with other services or the building fabric, either during the construction or within the finished building.

I. Ensure that co-ordination with all related elements of work has been fully coordinated and planned prior to submitting information for acceptance or commencing the installation. No instructions will be issued in respect to additional cost due to modifications not being so co-ordinated.

J. Allow for the positioning, routing and/or locating of any service run or equipment to be adjusted from the positions shown on the Tender drawings, during the production of co-ordinated Installation (Shop) Drawings.

K. Take site dimensions during the preparation of the Installation (Shop) Drawings and be responsible for their accuracy.

1.21 Technical Submittals

The requirements in relation to technical submittals shall be as follows:-

A. Submit to the Building Services Engineer for acceptance detailed Builders work Drawings, Installation Drawings, Co-ordinated Shop Drawings, technical literature and samples for the installation and equipment described herein.

B. Produce Builders work Drawings showing all bases, holes, openings, chases and other builders work requirements associated with the package of works specified herein.

C. Confirm any preliminary builders work and structural information, already provided by the Building Services Engineer, and incorporate into Builders work Drawings.

D. Fully detail and dimension Builders work Drawings and be solely responsible for their accuracy.

E. Fully co-ordinate the drawings with all other services and the structure. Work in conjunction with other trades to ensure that the drawings are fully co-ordinated.

F. Submit detailed Installation (Shop) Drawings and Builders Work Drawings for all areas and elements of the installation including plant rooms, showing equipment layouts, cores and risers. Provide the drawings at a scale sufficient to fully inform the Building Services Engineer of all installation details with general arrangement layout drawings at a scale not less than 1:50 with plant rooms, risers, details and sections at 1:20 scale.

G. Show in layout and detail pads, foundations, anchorages, supports and attachments to the building structure where required for the installation of the work with dimensions, materials and method of construction noted.

H. Check Shop Drawings and samples for accuracy, completeness of required information and conformance with the contract documents. Be responsible for Shop Drawings found to be inaccurate, incomplete or not in conformance with the contract documents before submitting for review.

I. Ensure shop drawings for manufactured material and equipment includes model numbers, dimensioned drawings, operating weights, material specifications, operating features and controls, wiring diagrams, performance characteristics, service procedures, including clearance requirements for maintenance work, and conformance to specified codes and standards. Note that in addition to these requirements, other specific submittal data, and forms of data submission, are required by the Contract Documents for particular items of equipment and material.

J. Submit names, sizes, catalogue numbers and samples of equipment for acceptance as detailed elsewhere in this document.

K. Ensure that for each submittal there is clearly indicated the Contract Drawing Number or Specification Section used as reference.

L. Ensure samples are identical in all respects to the material which is to be installed or applied in the execution of the work, and of sufficient size or quantity to permit proper evaluation and review. Furnish with the material, manufacturer's descriptive labels and printed application instructions which are normally attached to the material or its packaging. Submit samples for acceptance when requested by the Building Services Engineers.

M. All drawings and technical literature submitted for acceptance shall receive a Building Services Engineers review stamp indicating A, B or C action as defined below:

"A - Accepted"
Action means that fabrication, manufacture or construction MAY proceed providing the submittal complies with the Contract Documents.

"B1 - Accepted"
Action means that fabrication, manufacture or construction MAY proceed providing the submittal complies with the Building Services Engineer notations, comments, changes or alterations made and the Contract Documents. The submittal shall be resubmitted incorporating all comments made by the Building Services Engineer.

"B2 - Resubmit"
Action means fabrication, manufacture or construction MAY proceed with only the portion of the drawings not affected by the Building Services Engineer comments. The remainder of the drawing shall be revised incorporating the comments and resubmitted prior to fabrication, manufacture or construction.

"C - Rejected"
Action means that the submittal DOES NOT comply with the Contract Documents and that fabrication, manufacture or construction SHALL NOT proceed. Submittals stamped in this manner are not permitted on the job site.

Works fabricated/installed prior to completion of this process is performed at contractors own risk.

N. Ensure that all drawings used by site personnel for the installation of equipment bear the Building Services Engineers' review stamp indicating the acceptance status.

O. Be responsible for materials installed or work performed without acceptance of material samples and/or shop drawings. Accept the cost of removal of such material or work which is judged unsatisfactory for any reason.

P. Acceptance by the Building Services Engineer of drawings, technical literature and other submittals relates to conformance with the design intent only and is not a release of responsibility for detailed compliance with the specification, design drawings and Contract Documents.

Q. Upon appointment issue a detailed programme for submittals agreed with the Building Services Engineer. 10 working days shall be allowed for the review and acceptance of each submittal.

R. Properly reference each submittal with the project name, submittal contents and a unique number.

S. Submit for review a list of the special tools, lubricants, and recommended spare parts to be supplied in the service kits.

1.22 Factory Acceptance Testing

The Building Services Engineer requires that all plant be factory tested and precommissioned prior to delivery to site. The contractor shall give five working days notice of proposed factory testing and pre commissioning and shall afford the Engineer the opportunity to witness such tests at the factory.

The contractor shall submit factory test method statements for approval prior to factory acceptance testing visits.

1.23 Operation of Plant Prior To Practical Completion

The contractor shall ensure systems are not, without the prior written approval of the Building Services Engineer used or set into operation before Practical Completion.
Systems to be used before practical completion for the benefit of these works must have all defective consumable elements (including lamps and tubes) replaced by new not more than seven days prior to Practical Completion.

No system shall be put into use prior to handover to the Client, except for testing and commissioning, unless in accordance with the following procedure:

1) Following the receipt of written instructions, operate designated parts of these works, provided that such operation is practicable and does not prejudice your responsibilities and obligations as specified herein.

2) Additionally and with adjustment to the works sum, if instructed, provide:

    a) Comprehensive insurance including indirect loss for any plant being operated
    b) Maintenance of the installation
    c) Re-instatement of the installation to “as new” condition prior to handover to the Client
    d) Allow the defects liability to commence at handover

1.24 Cleaning Upon Completion

At completion the contractor shall carry out a thorough clean-down of all the installations using a specialist contract cleaning company. Such cleaning shall only commence when all works are completed and when authorised by the employers’ representative.

1.25 Operating and Maintenance Manuals

The contractor shall provide two hardcopy hard copies and two disks of all operating and maintenance manuals and as installed drawings for the works. Drawings shall be provided in the latest revision of AutoCAD and also in PDF format.

The contractor shall agree the format and contents of the handover manual with the Building Services Engineer. The operating and maintenance manuals shall include, but are not limited to the following:

1. Index of Contents
2. Contact details for the contractor and all equipment suppliers and involved parties.
3. A full description of each of the systems installed, written to ensure that the Client’s staff fully understand the scope and facilities provided. Description to include data on general

design parameters, normal associated operating conditions and manufacturer's information concerning correct operation, etc, based on commissioning results.

4. A description of the mode of operation of all systems.
5. Diagrammatic drawings to each system indicating principal items of plant, equipment, valves, etc.
6. A photo-reduction of all record drawings, together with an index. In A4 / A3
7. Legend for all colour-coded services.
8. Schedules (system by system) of plant, equipment, valves, etc, stating their locations within the building, duties and performance figures. Ensure each item has a unique code number cross-referenced to the record and diagrammatic drawings and schedules.
9. The name, address and telephone number of the manufacturer of every item of plant and equipment together with catalogue list and order acknowledgement numbers.
10. Manufacturer's technical literature for all items of plant and equipment, assembled specifically for the project, excluding irrelevant matter and including detailed drawings, electrical circuit details and operating and maintenance instructions.
11. A copy of all Test Certificates, Inspection and Test Records, Commissioning and Performance Test Records (including, but not limited to, electrical circuit tests, corrosion tests, type tests, start and commissioning tests) for the installations and plant, equipment, valves, etc, used in the installations.
12. A copy of all manufacturers' guarantees or warranties.
13. Copies of Insurance and Inspecting Authority Certificates and Reports.
14. Starting up, operating and shutting down instructions for all equipment and systems installed.
15. Details of procedures to maintain plant in safe working conditions.
16. Control sequences for all systems installed.
17. Schedule of all fixed and variable equipment settings established during commissioning.
18. Back-up copies of any system software.
19. Documentation of the procedures for updating and/or modifying software operating systems and control programs.
20. Instructions for the creation of control procedure routines and graphic diagrams.
21. Details of the software revision for all programs provided.
22. Two back-up copies of all software items, as commissioned.
23. Details of regular tests to be carried out (e.g., water cooling towers, etc).
24. Copies of relevant HSE/CIBSE/IEE/ETCI etc Guidance notes, etc.
25. Procedures for seasonal change-over and/or precautions necessary for the care of apparatus subject to seasonal disuse.
26. Recommendations for the preventative maintenance frequency and procedures which should be adopted by the Client to ensure the most efficient operation of the systems.
27. Details of lubrication systems and lubrication schedules for all lubricated items.
28. A list of normal consumable items.
29. A list of recommended spares to be kept in stock by the Client, being those items subject to wear or deterioration and which may involve the Client in extended deliveries when replacements are required at some future date.
30. A list of any special tools needed for maintenance cross referenced to the particular item for which required.

31. Procedures for fault finding.
32. Emergency procedures, including telephone numbers for emergency services.
33. Copies of all items incorporated in the plant room and switch room schedules and schematics.

The contractor shall provide the Manuals in A4 size, plastic-covered, loose leaf, four ring binders with hard covers, each indexed, divided and appropriately cover-titled. Fold drawings larger than A4 and include in the binder so that they may be unfolded without being detached from the rings.

The contractor shall provide record drawings and include for the provision of relevant framed plasticized drawings in all electrical rooms.

Two copies of all record drawings, in print form, are required to be handed to the PSDP before completion of the project. They shall have been previously submitted to the Building Services Engineer for comment. The PSDP also requires 2 copies of all record drawings to be made available on disk. All record drawings are to be prepared on AutoCAD and shall also be provided in PDF format.

1.26 Site Modifications

The contractor shall not make site modifications to assemblies without authorisation from the Building Services Engineer.

Where site modifications to assemblies are authorised make in accordance with manufacturer's certified drawings and instructions. Ensure that modifications made comply with any type test certificate obtained for arrangement of components.

1.27 Operational Demonstrations

The contractor shall provide a written statement to the Building Services Engineer confirming that each installation has been correctly tested and commissioned and that the performance requirements can be achieved.

The contractor shall demonstrate to the Building Services Engineer that all system components are operating correctly, and the completely integrated installation will function in accordance with the specified performance requirements. Allow for a 1 week environmental test period for this demonstration.

1. Run each plant for 1 week.
2. Provide a log book and record all hours run.
3. Where required provide equipment to simulate loads on-site.
4. Where required, allow for "Doomsday" testing of Mechanical, Electrical and Systems to observe correct operation of building under failure of the normal power.
5. Where required, allow for the full testing of the air conditioning system(s).

Any items, which have failed their acceptance tests shall not be accepted by the employer and shall be replaced by the contractor at contractor expense.

1.28 Loose Tools and Lubricants

The contractor shall provide special loose tools recommended by plant and equipment manufacturers for the satisfactory maintenance of their machinery to the Client at the completion of the works.

The contractor shall identify and all such tools and provide a suitable galvanised/lockable steel box for storage

The contractor shall provide lubricants for all moving plant and equipment as recommended by the manufacturers.

1.29 Defects Liability Period

The contractor shall be responsible for making good any defect in or damage to any portion of the works which may develop during a period of twelve months after practical completion and which arise either from defective materials or workmanship or from any act or omission.

During the defects liability period the contractor shall be responsible for all routine and preventative maintenance as required / recommended by the equipment manufacturers also service / maintenance of boiler & burner at end of the defect period.

1.30 Site Survey

The tenderer shall have visited and checked the site relative to all aspects of the work and include for same in his tender. No claims whatsoever will be entertained by the engineer due to the lack of knowledge of site conditions or existing installations.

Tendering contractors shall only visit the school **by prior arrangement**. Requests for an appointment for a site visit shall be made by contacting Ms. Angela McNamara, Principal via email at angela.mcnamara@lcetb.ie, telephone (061) 921 083 or on mobile 086 382 4224.

Tendering contractors visiting the school must report to the school office on arrival and adhere to any instructions provided while in the school.

2.0 SUMMARY DESCRIPTION OF THE WORKS

The following is a summary of the works proposed. Refer to the relevant sections of this specification, and the associated drawings for full details. **The contractor shall price for ALL items of plant and materials to provide a complete fully functional installation whether specifically mentioned or not.**

2.1 General

The scope of work for the heating services upgrade and gas conversion emergency works contract involves the replacement of the existing oil fired boilers with new LPG gas fired condensing boilers mounted in back-to-back cascade arrangement complete with a low loss header kit, a full upgrade of the heating centre and heating distribution system throughout the school and all associated electrical and civil and builder's works at Scariff Community College, Drewsborough, Scariff, Co. Clare as detailed herein and on the accompanying drawings. The scope of work shall also include all temporary works as necessary to keep the existing heating system in the Phase 2 areas in operation while the new heating distribution system is being installed on a phased room by room basis, with a maximum of two rooms being given over to the contractor at any one time. The Phase 2 upgrade areas will continue to be served by the existing heating distribution system and circuit pump which shall be connected to the new gas fired heating centre via plate heat exchanger to protect the new boilers.

The works will be carried out during the autumn school term in a live operational school environment and it is proposed that the appointed contractor will operate extensively outside of normal school hours, at evening and weekends to deliver the upgrade in a phased manner as detailed in the preliminary plan and as summarised at Section 2.7 below.

2.2 Standards

The Mechanical services shall be installed in accordance with current editions of the Department of Education and Youth Technical Guidance, Building Regulations, relevant Irish Standard Specifications, EU Standards and Directives and the recommendations of the Chartered Institution of Building Services Engineers, which are, in the Engineer's opinion, applicable. Refurbishment works shall in particular conform to the latest edition of the following standards and codes of practice in effect at time of tendering:

(a) SDG-02-03 – Post Primary School Design Guidance DoEY
(b) Relevant DoEY SDGs and TGDs including TGD-003, TGD 031 and TGD 30.1 Mechanical and Electrical Building Services Engineering Guidelines for Post Primary Schools.
(c) Irish Standard IS 820:2019 – Non Domestic Gas Installations (Edition 3)
(d) Chartered Institute of Building Services Engineer (C.I.B.S.E)
(e) American Society of Heating, Refrigeration and Air Conditioning Engineers (A.S.H.R.A.E)
(f) Relevant BSI and ASME Codes and Standards
(g) LPC Codes and Practices
(h) Current Building Regulations
(i) Health & Safety at Work Act, 2006 - 2021

The associated electrical services shall be installed in accordance with current editions of the NSAI IS 10101 National Rules for Electrical Installations, Building Regulations, relevant Irish Standard Specifications, EU Standards, and Directives and the recommendations of the Chartered Institution of Building Services Engineers, which are, in the Engineer's opinion, applicable.

2.3 Scope of Work

The scope of the works for the heating upgrade includes the following:

The scope of the works for the heating services upgrade & gas conversion includes the following:-

a) De-commission, isolate, drain down, remove and dispose of the redundant oil fired boilers in the boiler house and all associated header pipework and services

including the oil storage tank and any remaining heating oil to a licenced waste recycling facility.

b) Careful removal and salvage of the existing domestic hot water cylinder and reinstallation in the upgraded heating centre.
c) De-commission, isolate, drain down, removal and disposal of the redundant heating distribution system and associated services throughout the main school building to a licenced waste facility on a phased basis in a live school campus environment .
d) All temporary works as necessary to keep the existing heating system in the Phase 2 areas in operation while the new system is being installed on a phased room by room basis.
e) Convert the heating system fuel supply to LPG as the fuel source, construction of a new bulk LPG tank storage compound and connection of the new gas service to run underground to the boiler room.
f) Supply and installation of four new gas fired boilers in back-to-back arrangement mounted on a new concrete plinth c/w low loss header kit, flue systems and gas safety systems.
g) Supply and installation of the new heating centre pipe work, valves, actuators, pumps and controls etc.
h) Supply of a new dual packaged pressurisation unit and expansion vessel and associated controls.
i) New heating distribution pipework and low water content radiator systems throughout the school.
j) New heating system control panel and all associated controls and provide a new remote booster control panel in the principal's office.
k) Controls upgrade to provide new two port motorised valves and zone thermostats to each room for independent temperature control.
l) De-commission, isolate, purge and disconnect the existing ¼ tonne gas storage tank serving main school building practical classrooms and connect to the new bulk storage system.
m) De-commission, isolate, purge and disconnect the existing 2 x 34kg gas bottles serving the modular building science lab and connect to the new bulk storage system.
n) All associated electrical works including isolations disconnections and strip out and new power and controls cabling run in new galvanised steel containment systems to serve the new heating system plant equipment and controls
o) All associated builders works including removal of the boilers and equipment plinths, clean out of the boiler house and repainting, removal of the oil tank and demolition of the oil tank support walls, bund walls and concrete base and removal of spoil and reinstate and make good to lay new infill tarmacadam level with the existing adjacent tarmacadam yard.
p) Civil works to trench and lay a new underground gas services from the new LPG tank storage compound to the boiler house, main school building and modular building room, reinstate the tarmacadam yard, concrete footpaths and grass margins and make good to match existing levels and finishes.
q) Testing & commissioning of the new boilers and heating system and controls.
r) Maintenance of the heating system and associated electrical installations during the 12 months defects period.
s) Routine service and maintenance of the new boilers and heating system including service of the gas boilers and gas safety system and re-certification at end of defects period.

The Mechanical Contractor shall supply all labour, materials, equipment and engineering services, and perform all works necessary to install the complete, tested, commissioned, and operational mechanical systems in accordance with the Specification and Drawings.

2.4 Works By Others

None. It is assumed that a mechanical contractor will operate as the main contractor and will complete the upgrade of the heating services and that the electrical and building contractors, domestic to the main contractor, shall be responsible for all electrical and builders works associated with the heating upgrade contract.

Alternative contractual arrangements may be accepted subject to satisfactory previous experience; however one contractor must take on the role of main contractor with other contractors operating as domestic sub-contractors.

2.5 Demolitions / Site Temporaries

The existing redundant Mechanical and associated electrical Installations shall be traced, isolated, removed and disposed of off-site to a licenced waste recycling facility by the contractor. Reinstate make good and redecorate on completion of strip out.

Temporary power supplies shall be installed as required and shall be maintained for the duration of the works. Site temporaries power supply connection shall be taken from the existing supply.

2.6 Maintenance

The Mechanical Contractor shall include for full routine and preventative maintenance of the new Mechanical Installations including Heating Centre Equipment, Gas Fired Boilers, Gas Safety Systems and Controls supplied under the contract, for a period of 12 months from date of substantial completion and final hand over to the Client.

Such maintenance shall include a full service of the new gas boilers and gas safety system at the end of the defects period in accordance with the manufacturer's recommendations by the boiler supplier specialist service engineer and all charges for maintenance for year 1 shall be included in the tender. Release of retention monies will require provision of records of maintenance being completed.

2.7 Preliminary Plan for Phased Upgrade Programme

It is proposed that the heating upgrade works would be completed on a phased basis during the autumn school term with overall completion by the start of the spring term on January 5th 2027. The proposed phasing is as follows:-

2.7.1 Phase 1 – Boiler House and North Side Heating Upgrade Works

Phase 1 would commence immediately on appointment at the end of September 2026 and includes the full strip out of the boiler room and heating distribution system in the north side of the school only. The existing heating distribution system in the south side of the school and the existing header pipework back to the boiler house is to be retained and be reconnected to the new heating centre via plate heat exchanger and the existing circuit pump to provide heating to the south of the building from November 2nd 2026. Phase 1 would be split into three sub phases as follows:-

Phase 1A will include the heating centre upgrade and gas services and can be completed during normal hours. The strip out and upgrade of the distribution system within the East side of the northern end of the building will be stripped out and the new heating system installed generally outside of school hours, during evenings and weekends with a maximum of two classrooms being given into the possession of the contractor during normal school hours. The school must be returned in suitable condition each morning for normal school activities. A maximum of two classrooms can be made available to the contractor, on a sequential basis, during normal school hours. Works within the circulation corridors will be completed outside of school hours as these areas cannot be made available to the contractor during school hours.

Phase 1B will include upgrade of the heating distribution system to the west side of the northern end of the building. Again the strip out and upgrade of the distribution system within the West side of the northern end of the building will be stripped out and the new heating system installed generally outside of school hours, during evenings and weekends, with a maximum of two classrooms being given into the possession of the contractor during normal school hours. It is

therefore envisaged that there would be a day crew and a separate evening crew working in the school after school hours. The school must be returned in suitable condition each morning for normal school activities. A maximum of two classrooms can be made available, on a rotational basis to the contractor during normal school hours to complete works but all works within the corridors, offices, staff room, GP Room / Canteen will be completed outside of school hours as these areas cannot be made available to the contractor during normal school hours

Phase 1C will include upgrade of the heating distribution header pipework within the corridor areas of the South Side of the school building with valved tap offs into each classroom to facilitate later changeover of the heating within the rooms on a room by room basis as part of phase 2. The Phase 1C works shall be installed generally outside of school hours, during evenings and weekends and during the mid-term break. During school term the Phase 1C areas of the school must be returned in suitable condition each morning for normal school activities.

2.7.2 Phase 2 – South Side Heating Upgrade Works

The Phase 2 works commence after mid-term on November 2nd and extend to January 5th 2027 as follows:-

Phase 2 will include upgrade of the heating distribution system and radiators within the Zone 2 southern side of the school building with rooms changed over from the existing heating distribution system to the new system installed as part of phase 1C on a room by room basis. The school will make two classrooms available during normal school hours on a sequential basis. Otherwise the contractor will need to work outside of normal school hours to complete the upgrade works. On completion of rooms the work areas must be cleaned and returned to the school in suitable condition for normal school activities. The existing heating circulation pump and heating pipework serving the south side of the building must remain in operation to provide space heating during the upgrade changeover works which will be completed in November / December when cold ambient temperatures will pertain and the school must not be left without a heating system. On completion of the changeover the existing header pipework back to the boiler house shall be decommissioned and stripped out outside of normal school hours and the ceilings re-instated.

In summary it is envisaged that the works within the school will be completed both during normal school hours, with two classrooms being given into the contractor possession and also extensively outside of school hours for circulation corridor areas, offices, toilets staff room, GP room / canteen and other communal rooms and that the contractor will work in a flexible manner to accommodate the school's normal timetable in so far as is practical.

The contractor shall be required to prepare a fully detailed programme of works in consultation with the School Principal and Employers Representative prior to commencement. The programme will be subject to ongoing review and adjustment in consultation with the school management for the duration of the works to ensure that the school can deliver the curriculum and the contractor can deliver the upgrade works project.

3.0 ELEMENT (51) : HEATING CENTRE SERVICES

3.1 Extent of Works in This Section

The proposed heating centre upgrade works comprise of the following:

- Isolation disconnection and strip out of the existing redundant oil boilers & burners and flue systems and the associated oil supply pipework serving main school building heating system and D.H.W. system, heating centre pipework, pumps, valves etc in the boiler room and safe disposal off site to a licenced waste facility. – Note: The existing calorifier shall be salvaged and placed in client stores and reinstalled into the upgraded heating centre. The existing heating circulation pump and DHW secondary return pump and ry return circulation pump
- Isolation pump down and safe disposal of the redundant oil tank and any remaining oil and pump down of the oil feed line to the boiler room to remove any remaining oil.
- Supply and installation of the new high efficiency gas fired boilers mounted in back-to-back arrangement including new flue system and accessories and connection to the new gas services.
- Supply and installation of the new heating centre low loss headers, plate heat exchanger, boiler room pipework, electronic variable speed pumps, valves and actuators and air dirt separators as detailed on the drawings.
- Supply and installation of a new dual auto fill pressurisation unit and expansion tank with anti-gravity loop.
- Weather compensating controls
- Two stage frost protection controls with external frost stat and immersion sensor in the return pipework.
- Controls including new MCC Control Panel to provide new power supplies, two stage frost protection zone controls weather compensation and remote 'Boost' zone control panel.
- All temporary works as necessary to keep the existing heating system in the Phase 2 areas in operation while the new system is being installed on a phased room by room basis including temporary connection of the existing circuit pump tpo the upgrade heating centre via plate heat exchanger to protect the boilers.

The new heating system will have three heating circuits, with circuit 1 sub zoned as follows:-

Zone 1A - North Side Classrooms, Circulation Corridors Heating Services
Zone 1B - Admin Offices and Staffroom
Zone 2 - South Side Classrooms and Circulation Corridors Heating Services
Zone 3 – Radiant Panel Circuit
Zone 4 – DHW Constant Temperature Circuit

Local zone room space heating controls shall be provided using two port valves with spring loaded actuators and digital anti-tamper zone thermostats to control the space heating in each space as detailed on the drawings.

3.2 Boiler Plant Upgrade

Supply, install and commission, in the existing boiler room a 4-boiler back-to-back frame unit fitted with 4 condensing gas boilers. Boilers shall be as De Dietrich Innovens Pro MCA 115 wall mounted in back-to-back system c/w combined flue system connected to a flue liner in the existing masonry chimney and a hydraulic cascade kit with low loss header and primary pumps. The boilers shall be as particularly specified and scheduled on the drawings or equal and pre-approved. Supply to site ready assembled cascade boilers and install and connect to pipe network.

Minimum performance requirements, materials, manufacture, mountings and fittings, automatic controls, inspection, hydraulic testing and marking, and electrical wiring shall comply with the requirements of BS 779.

Boilers to be SEDUK A rated with a minimum operating efficiency of 93% at 80°C flow & 60°C return.

The boilers shall be a fully packaged system complete with integral burner, pump, expansion vessel, safety valve and pressure gauge mounted on an integral frame. The boilers shall be suitable for a working pressure of 3.0 bar.

Each boiler shall be complete with a condensate drain with full bore drip pipe to a suitable waste outlet and complete with a matched pressure / safety valve with a full bore drip pipe to floor level.

A 150mm diameter altitude gauge to be fitted to system flow and 150mm diameter temperature gauges (1 on flow, the other on return) will be supplied and fitted to each boiler.

All electric wiring external to the appliance shall be in accordance with current NSAI IS10101 Rules for Electrical Installations, and the Regulations of the Electricity Supply Board.

The contractor shall allow for full commissioning of the upgraded gas fired boilers by the suppliers commissioning engineer, and shall submit a copy of the final commissioning certificate to the engineers.

The contractor shall, in addition to the operating instructions, provide full wiring diagrams and comprehensive maintenance manuals for the boiler plant.

Pressure gauges and temperature gauges shall be located on the flow and return headers in an easily accessible location within the boiler room for ease of viewing and maintenance.

The boiler shall be fitted with a matched shunt pump installed on a bypass between the flow and return pipework. The pump shall pump from the flow into the return to afford back end protection. The pump shall be as scheduled herein.

Irrespective of heating system mode of control, the boiler shall be fitted with high limit manual reset immersion thermostat suitably located and arranged to isolate the fuel burning equipment under high temperature conditions.

Boiler/burner assemblies shall be suitable for operation with 230V, single-phase, 50Hz electrical supply, and shall be fitted with an integral isolator.

The Boilers shall be installed strictly in accordance with manufacturer’s recommendations.

Each boiler/burner shall be fully modulating and shall come with:

- Electronic control box with lockout lamp complete with reset button and a remote lockout signal.
- Ignition transformer.
- Ionisation probe for flame detection.
- Air pressure switch.
- Fully closing air damper.
- Burner mounting flange complete with gasket, hinge assembly and mounting bolts.
- Electrical connections complete with plugs.
- Matching multi-block gas train to EN 676.

Details of the proposed boiler control schematic and boiler room layout shall be as indicated on the Drawings.

(a) Pressure Gauges

Pressure gauges shall be Bourdon tube pressure gauges to DIN 16064 Class 1. All pressure gauges shall have 100mm dial and have an operating range of 0 to 5 bar. It shall have a brass connection with copper alloy tubing, complete with brass pointer and aluminium face, painted white with black digits. The pressure gauge housing and bayonet ring shall be stainless steel and the dial shall be instrument glass.

Pressure gauges shall be by Manotherm or similar approved.

(b) Temperature Gauges

Temperature gauges shall be Bimetallic measuring systems. All temperature gauges shall have a 100mm dial and an operating range of 0 to 150°C. It shall have a brass connection, complete with pointer and a face painted white with black digits.

The unit shall be stainless steel with the dial in instrument glass.

Temperature gauges shall be by Manotherm or similar pre-approved.

The Contractor shall include for two tapings 19mm in the boiler flow pipe for the thermometers and altitude gauges. They shall also include a 20 mm MF elbow fitted to the boiler for the safety valve. The contractor will also allow 2 No. 25 mm draw off cocks with hose connection for draining down if required.

3.3 Flue System

Supply and install a new combined flue system for the new four back-to-back boilers to be connected through the existing masonry chimney of the boiler room complete with new weathering apron, cowl, terminals, etc as required. The new flue system shall be completed and in accordance with boiler manufactures requirements and building regulations.

3.4 Domestic Hot Water System Upgrade

The domestic hot water supply to the main school building is supplied by an existing 300 litre single high recovery coil pre-insulated cylinder manufacture by Joule model Cyclone CY300L solar twin short.

The contractor shall allow for carefully relocating the existing calorifier as detailed on the drawings and reconnect to the upgraded heating centre DHW Zone to serve all piped hot water requirements in the main school building. A new secondary return pump shall be installed to serve the new hot water return system.

The contractor shall also allow for relocating the existing 80 litre expansion vessel serving the calorifier circuit and provide new 1 No. 20mm TP Safety Valve and 1 No. 15mm anti vibration Kit.

A new cold water booster pump shall also be fitted and shall be connected to the existing cold feed and cold water distribution system which is to be retained.

The relocated Calorifier unit, secondary return pump and cold water booster pump shall be connected to the new Heating System control MCC which shall include MCB feeders suitably rated for the duties.

3.5 Feed and Expansion Unit

Supply and install 1 No. Grundfos PHT-A-T-225 Packaged twin pressurisation unit in the boiler room, with duty pressure pumps suitable for 1/220/50 Hz Ac including the following:

- Break tank with ball-valve and lid. Interconnecting pipe work with gate and non-return valves. 140 Litre make-up diaphragm pressure vessel with Low differential control pressure switch and gauge.
- Twin top up pressurisation units
- High/Low limit pressure switches assembled on independent manifold.
- Fully automatic control panel with D.O.L starters, overloads, run and trip lights, high & low pressure indicating lights, power on indicating light, fusing, control terminal rail, door interlocked isolator, all fully wired in enclosure.

All the above components shall be assembled on a common base plate, fully tested and painted prior to dispatch from suppliers works.

The package shall include the loose supply of 1 No. 425 litre expansion vessel with mild steel shell, butyl rubber diaphragm suitable for a maximum working pressure of 6 Bar for the

distribution system and 1 No. 110 litre expansion vessel for the primary side of the plate heat exchanger.

The twin feed and expansion pressurisation unit shall be connected to the new boiler control MCC which shall include an MCB feeder suitably rated for the duty. The MCC shall also be fitted with high / low pressure alarm red lights for both systems.

3.6 Heating Circulating Pumps

Supply and install the new circulation pumps for the space heating circuits. The pumps shall be twin-head in-line mounted and valved on the inlet and outlet pipework. The new pumps shall be as scheduled on the Drawings.

Heating pumps shall be invertor driven 'A' rated, with integral differential pressure control as standard and shall be as indicated on the drawings and as scheduled therein.

The pumps shall be selected for the duties detailed in the equipment schedule, and sized to give a non-overload characteristics, and the motors should have a margin of 10 per cent above the power consumed at the peak of the power consumption curve. The pump speeds shall not exceed 17 rev/s unless agreed by the Engineer.

All pumps shall be invertor type units with integral pressure differential control. Upon handover, the contractor shall hand over to the school 1 No. remote control unit suitable for use with the installed pumps

The pumps shall be direct drive glandless pump sets.

The pump casing shall be made easily removable for access to the impeller.

The impeller shall be of high grade cast gun-metal or stainless steel machined and accurately balanced and rotating in renewable phosphor bronze sealing rings.

Shafts shall be of the best quality stainless steel. The bearings shall be external ball or roller type, specially selected for quiet operation, with additional phosphor bronze sleeve bearings internally.

All pumps shall undergo hydraulic and performance tests before leaving the manufacturer's works and test certificates are to be forwarded to the Engineer.

Pump motors shall conform to the British Standard requirements.

The pumps for each water circuit shall be installed complete with isolating valves, non return valves.

Each pump shall be fitted with an engraved name plate giving the following details:

Maker's Name	|	
Capacity - litres/sec	|	**and manufacturer's identification**
Head developed kN/m or N/m²	|	**numbers**
Revolutions per second	|	
Model No	|	

The pumps shall be manufactured by Grundfos or equal and pre-approved. Please note that all pumps shall be from the same manufacturer, a mixture of different manufacturers pump sets shall not be accepted.

The pumps shall be installed to comply with the following:

1. The pump shall be installed, close to the boiler, on the main flow pipe.
2. It shall be easily accessible for maintenance.
3. It shall be fitted with valves to allow for its removal without the need to drain the system.

4. It shall be installed with its shaft horizontal.
5. It shall be capable of maintaining a flow velocity of 1.5 metres per second in every part of the system, with the available suction pressure, and against the resistance of the system under full load.
6. It shall be capable of operating in the system without generating undue noise.

3.7 LTHW Valves

In the boiler room all valves 65 mm bore and above shall be cast iron flanged gate valves with a bronze trim disc wedge, rising stem and outside screw and yoke. They shall comply with BS 5150 with flanges drilled and faced to BS 4504 for a nominal pressure of 10 bar and shall be similar to Crane Fig. FM 82 or equal to approval.

The boiler room valves fitted in pipes with a bore from 25 mm up and including 50 mm shall be bronze flanged full way gate valves with a solid gun-metal wedge and non-rising stem. They shall comply with BS 5154/B drilled and faced to BS 4504 for a nominal pressure of 10 bar and shall be similar to Pegler Fig. 1071 PN 16 or equal to approval.

Valves 20 mm bore and below shall be in bronze of the full way gate type with internally screwed ends to BS 5154/B SIMILAR TO Pegler Fig. 1070 M-PM 25 or equal to approval.

Outside the boiler room isolating or circuit valves up to 100 mm bore shall be in bronze of the full way gate type with internally screwed ends and shall comply with BS 5154/B similar to Pegler Fig. 1070 PN 32 or equal to approval. Valves fitted to pipework over 100 mm bore shall be of the cast iron flanged type similar to Crane FM 82 or equal to approval.

Flanged valves shall be provided with suitable steel mating flanges and where the mating flange and the flanged valve are of dissimilar materials the joint shall be made with a suitable rubber composition insertion joint which shall be the full free diameter of the flange. Flanged valves in the boiler house and plant rooms shall be fitted with an 'open and shut' indicator.

Union type valves shall be fitted to the flow and return connections to each radiator, natural or fan assisted convector unit heater or pipe coil. These valves shall conform in all respects to BS 2767-10 manufactured in forged brass with a chromium plated finish similar to Pegler Fig. 2063 or Fig. 2076 or equal to approval. A wheel valve shall be fitted to the flow inlet to the appliance with a lock shield valve on the return outlet the valves being of the angle or straight pattern as necessary.

On single or two pipe circuits up to and including 32 mm bore the circuit isolating valves shall be of the union type in forged brass to BS 2767-10 similar to Pegler Fig 2076 WH on the flow and Pegler Fig. 2076 LS on the return or equal to approval.

Valve Type	**Gun-Metal Hattersley Crane**	**Cast Iron Hattersley Crane**
Gate	Fig 33X D151/9	Fig 549 F52/F51
Lockshield	Fig 33XLS D235/7	

Valve Type	**Manufacturer**	**Reference**
Globe	Crane	F366 73/E or
	Hattersley	Flanges to BS4504
Double Regulating	Bailey	2707/2705/2504 -
	Crane	DM 900/910/920/930
	Hattersley	CV2432/4733DR/CV2733/4733DR
Automatic Air Vents	Winns	Type 1680
3-Way Vent Cocks	Winns	Type 1680
	NABIC	Fig 503
Drain Cocks	Hattersley	To comply with BS2789
	Crane	Type 2
Check Valves	Crane	FM 492

Needle Valves Crane D71
Any valves necessary for isolation and/or regulating the system shall be provided and installed so that they are accessible for operation and maintenance.

3.8 Pipework and Fittings

LTHW heating pipework shall be fabricated from black MS tube medium grade to BS 1387.

Pipes shall be new, clean, free from defects, of even bore throughout, shall be delivered with the manufacturers protective coating undamaged and shall have plain chamfered ends for welded joints or screwed and socketed ends as detailed in the Particular Specification.

All mains shall be graded to ensure that no air locking occurs.

Cold feed and open vent pipes shall be fabricated from galvanised MS medium grade tube to BS 1387 with screwed and socketed ends.

Drain pipes from automatic air vents, pumps, safety valves etc. shall be fabricated from light gauge copper piping to BS 2871 Table X.
Piping to valves and equipment shall be connected with either flanges or unions to facilitate the removal of the equipment.

a	Pipework within ceiling voids and exposed to view up to and including 50 mm ID	**Screwed BSP**
	65 mm Dia and above	**Welded**
b	Pipework within ducts	**Welded**

All joints on concealed pipework shall be formed using proprietary fittings be of the seamless steel 'medium' butt welding type to BS 1965 Part 1. All branches shall be arranged to sweep in the direction of flow. Stab-in branch welds or swagged reducers and or branches shall not be accepted. All branches shall be by a tee piece. All reducers shall be eccentric where the pipework is on the horizontal and concentric on the vertical. The flat side of eccentric reducers shall be positioned to allow venting to the high point in the run or system. Pulled bends may be used on all exposed pipework up to 25 mm bore and up to 40 mm bore for concealed pipes. For pipes over 25 mm bore on exposed pipework and over 40 mm bore on concealed pipework long radius welding bends shall be used. If the cross-sectional area of any pulled bend is altered or if the throat of any bend is rippled it will be rejected.

To provide for drain points on welded pipework an internally screwed MS socket shall be welded into the main with the base of the socket shaped to the contour of the main pipe. Air venting points on pipes 32 mm bore and above shall be provided by welding a plain pipe 150 mm long x 32 mm dia. to the top of the main with the end of the branch swaged down and fitted with a MA screwed socket to connect to the automatic air eliminator. For pipes below 32 mm dia the bore of the air collecting branch shall be equal to the bore of the pipe being vented.

Flanges used on welded pipelines shall be in steel of the slip-on welding type to BS 4504 and shall be drilled and faced for a nominal working pressure of 10 bar.

Fittings for use with screwed pipework shall be in black malleable iron to BS 1256 with connections to heating surface made with sweep type fittings. Where two mains connect or divide sweep or twin elbow branch fittings as may be appropriate shall be used.

If a tee piece has to reduce on the run and a reducing fitting is not available the reduction shall be made by using a hexagon nipple and an eccentric reducing socket. The use of bushings will not be permitted.

Pulled bends may be used as described for welded pipework otherwise long radius screwed bends must be fitted. Short radius elbows may only be used with the permission of the Engineer.

Drain or air venting branches shall be provided as described for welded pipework only screwed

pipe fittings with square branches shall be used.

Flanges used on screwed pipelines shall be of steel to BS 4504 threaded to BS 21 and drilled and faced for a nominal pressure of 10 bar.

Malleable iron unions shall have gun-metal ground seats and the use of connectors and backnuts will not be permitted. During the progress of the work any surplus flux and jointing paste visible at joints shall be carefully removed. The amount of jointing materials used shall be the minimum required to complete the joint. Care shall be taken that fittings are not excessively tool-marked and when pipes are cut they shall be carefully reamed out to restore the bore.

Sufficient flanges or unions shall be used to ensure that any part of the installation can be easily removed.

Fittings for use on cold feed and open vent lines shall be in galvanised malleable iron to BS 1256. Square tees can be used on this pipework.

The main heating flow and return headers shall each be provided with two 50 mm valved and capped connections for future heating circuits

3.9 Pipe Supports and Brackets

The complete heating installation shall be supported from the building structure other than the roof purlins generally in accordance with the General Specification.

The contractor shall be responsible for the overall design and installation of all supports and brackets necessary for the installation as contained within this specification and on the associated drawings.

Pipework shall be supported in a manner which will allow for free movement due to expansion and contraction with supports arranged as near as possible to joints and changes in direction.

In the boiler room pipework shall be supported from the walls or floors on purpose made MS brackets and in overhead ducts, MS wall brackets shall be attached to the walls using rawl-bolts, hilti-bolts or similar. The erection of these brackets shall be the responsibility of this contractor.

All pipework shall be set on cast iron or bronze rollers and chairs fixed to the angle framework, or alternatively adjustable suspension type rods and pipe rollers may be used. Pipework in floor ducts shall also be set on rollers and chairs fixed to angle framework, bolted to the sides of the duct. Alternatively, rollers placed in MS channel attached to the duct floor may be used.
The erection and fitting of the angle iron framework or mild steel channel is the responsibility of this contractor. Care will be taken to ensure that the correct support is applied to MS and copper piping and that dissimilar metals are not in contact. Provision shall be made to ensure that pipework does not leave the roller by providing inverted 'U' guides fabricated from 9 mm dia. round iron at 12.0 m centres. All brackets and supports shall be thoroughly cleaned and painted one coat of red oxide of lead paint.

Before manufacture the design of brackets and supports must be agreed in writing with the Engineer and where necessary this contractor shall submit drawings to the Engineer for approval.

Exposed pipework in rooms shall be supported on malleable iron or brass split pattern screw-to-wall school board brackets depending on the pipe service. This contractor shall include for lining up the brackets, drilling and plugging the walls and fixing the brackets. Screws shall have a minimum length of 50 mm with brass screws being used with brass brackets. Plastic type wall plugs to suit the screw size shall be used.

Where floor level pipes are subject to abuse additional floor type brackets comprising a split pipe ring, pipe nipple and back-plate secured to the floor shall be fitted in locations decided by the Engineer. Brackets which have to be secured to structural steelwork shall be fixed with special girder clips; welding or drilling the steelwork may not be carried out without special permission.

Supports shall be spaced in metres according to the following table.

STEEL PIPE			LG COPPER PIPE		
BORE	HORIZONTAL	VERTICAL	BORE	HORIZONTAL	VERTICAL
15 mm	1.5	1.8	15 mm	0.9	1.2
20 mm	1.5	2.1	22 mm	1.2	1.5
25 mm	1.8	3.0	28 mm	1.5	1.5
32 mm	1.8	3.0	35 mm	1.5	2.0
40 mm	2.4	3.0	42 mm	1.8	2.4
50 mm	2.4	3.5	54 mm	1.8	3.0
65 mm	2.7	4.0	65 mm	2.4	3.7
80 mm	3.0	4.0	76 mm	2.4	3.7
100 mm	3.0	4.6	108 mm	2.4	3.7
125 mm	3.7	5.5	133 mm	3.0	3.7
150 mm	45	5.5	159 mm	3.7	3.7

3.10 Pipe Supports

Pipe work generally in the boiler room shall be supported by means of hanger brackets with screwed socket pipe clips suspended from a mild steel channel suitably secured to the underside of the boiler house ceiling.

Purpose made brackets for mounting headers etc., vertically on the wall shall also be provided, but the engineer's approval as to the arrangement should be obtained before erection. All pipe work for vertical risers or where run on the surface shall be supported by means of school board type brackets built in or screwed on, according to location. Pipe supports shall generally be in accordance with B.S 3974.

Contact of dissimilar metals shall be avoided; steel pipes shall have steel supporting members in contact with the pipe. Copper tubing shall be supported by contact members of copper alloy. Multiple pipe supports for pipes of differing sizes shall be spaced at intervals required for the smallest pipe.

Exposed pipe work fixed to walls in occupied areas shall be supported on brass or mild steel pipe rings as appropriate with screw on backplanes.

Where chrome plated pipe work is indicated on the drawings it shall be supported on chrome plated brass pipe rings and backplanes.

3.11 Provision for Anchoring, Guidance and Expansion of Pipe work

Pipe work is to be laid out and fixed so that as much of the thermal expansion as possible can be taken up within the system. Where this is not possible, expansion loops or bellows type expansion compensators shall be in accordance with B.S 3974. Anchoring of the high level heating mains shall be provided where indicated.

All pipe work shall be neatly installed and graded so as to allow for venting and drainage. All pipe work shall rest properly on supports at all times. Particular care shall be taken of the spacing between pipes when setting out to ensure that due consideration has been taken of the insulation thickness to be applied and its effect on the neatness of the finished installation.

3.12 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, piped to drain.

3.13 Balancing / Commissioning Valves

Balancing/commissioning valves shall be provided as a <u>minimum</u> 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.

All balancing and commissioning valves shall be clearly identified.

3.14 Provision for Air Venting and Drainage

Provision shall be made for automatic venting of air and for drainage of pipe work where required.

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.

The Contractor shall include for 19mm bore gunmetal drain cocks with hose connection at all low points in the system.

3.15 Treatment of LPHW Water.

When filling the heating system with water, Sentinel X500 or similar approved product, should be added to the water, which is a multipurpose inhibitor and antifreeze to reduce the risk of freezing and corrosion. This mixture should be added as per manufactures details to cover the LPHW water to a freezing point of -15°C.

3.1 Heating Centre Controls

The Heating Centre shall have its own dedicated wall mounted MCC control panel; this should come complete with all necessary switchgear and controls etc for the Boilers, Pumps and Pressurisation Unit etc.

RUN and TRIP indicating lights shall be provided for all motor drives, in addition to ON/OFF/AUTO switches. Holiday switching and summer / winter switch will also be provided on the heating centre control panel.

The panel enclosure itself will be IP 54 rated, and the internal ratings of the board will be IP 20 in accordance with I.E.C 144. Wiring shall be by means of PVC cables, minimum size 1.5sq.mm cross section, unless otherwise stated. Cable shall be enclosed in PVC trunking. Where enclosed in trunking their spacing shall not exceed 30% and labelled at intervals of 300mm maximum. Cables to any moving parts shall be flexible and housed in PVC spiral wrap or some other equal and approved means of protection.

A 5 Zone hardwired remote control panel complete with 1 / 2 / 3 hour boost facility and holiday mode switch shall be interlinked with the Boiler House MCC panel to control the three sub zones. The following areas will have individual zone time and temperature control:

- Zone 1A – North side classrooms and circulation corridors
- Zone 1B – North side admin offices and staff rooms
- Zone 2 – South side classrooms and circulation corridors
- Zone 3 – Domestic Hot Water System
- Zone 4 – Spare

The heating circuits shall have thermostatic control system having weather compensating features and shall consist of the following:-

Two stage frost protection shall also be provided as follows:

(a) A frost stat (in weatherproof housing) shall be mounted externally in a metal weatherproof enclosure and shall be so arranged that the external stat will start up the circulating pumps independently of the time switch if the external air temperature were to drop below 4°C.

(b) An immersion type frost thermostat shall be set into the boiler return pipework and shall be so arranged that the stat will start up to the boiler/burner unit if the return water temperature were to drop below 2°C.

Temperature controls which shall monitor the signals from the temperature detectors and regulate the outgoing temperature to the heating installation.

Motorised 3 port weather compensating mixing valves mounted on the flow headers, which shall modulate and control the outgoing temperature.

Three temperature detectors i.e. one detector set into the flow pipework to the heating system and one mounted externally on a north facing wall for each heating circuit and one mounted in a representative area of the heated space.

The temperature control equipment shall be as follows for each heating circuit:-

- 3 Way Mixing Valve
- Actuator
- Outside Temperature Sensor
- Immersion Flow Temperature Sensor
- Heated Space Temperature Sensor

The control panel shall include provision for control of the two main heating zones (North and South) using pump controls and the sub zoning of north side zone using zone valves for separate control of the classroom & corridors and the admin & staff areas.

Individual rooms shall have two port zone valves controlled by local room 230 Volt thermostats complete with room temperature digital display screen as shown on the schematic drawings which shall be served from new mains power circuits fed from the new heating MCC. The exact locations of room temperature sensors shall be agreed on site.

All wording on the control panel and local control panel will be agreed with the school principal to avoid misleading terminology.

All of the above controls shall be as Sygma Automation contact Tim Jones 021 430 8824 or projects@sygma.ie or equal and pre-approved controls specialist.

3.2 Fire Protection Services

A 6 kg ABC dry powder hand held fire extinguisher will be provided at the escape exit to the boiler room.

A slam shut valve operated by the gas safety systems shall be provided on the gas line at the entry point to the boiler room. The slam shut shall also be interfaced to the fire alarm system to automatically close in the event of a fire.

A carbon monoxide sensor and LPG gas safety system with low level gas sensors and control panel shall be provided to automatically shut down the boilers and gas slam shut valve on detection of carbon monoxide or a gas leak.

3.3 Painting and Identification of Pipework

All steel pipework shall be wire brushed and given two coats of red oxide paint prior to insulation. Where exposed to view, one primer coat, one undercoat and two gloss coats of gloss oil based paint suitable for the temperature application to the client / engineers colour specification to match existing room finishes.

3.4 Valve Labels and Valve Charts

All valves supplied and fitted by the contractor, excluding heating surface control valves, shall be provided with circular traffolite labels with black lettering on a white background.

The contractor shall also supply in triplicate and mounted on hardboard, a schedule of all valves indicating their function and the service each valve controls. The schedules shall be heat sealed and one of these schedules shall be fitted in a hardwood frame with a glass front and mounted in the boiler house. The other two schedules will be handed to the Engineers for the Client's use.

4.0 ELEMENT (54) : GAS SERVICES

4.1 Description

This section covers the complete works required to convert the school heating system from oil to LPG. The scope of works includes

- Decommission & purge existing gas distribution pipework and liaison with LPG Supplier to arrange removal of the existing ¼ tonne storage tank serving the main school building practical classrooms to enable full upgrade of the gas storage compound to a 3 x 1 tonne storage facility. Existing gas pipework within the school shall be retained. The Science Lab in the main school is currently being refurbished under a separate contract.
- Liaison with LPG Supplier to arrange for supply and installation of three new 1 tonne LPG Bulk Gas Tanks and construction of the Storage Compound at the school
- Pipework from the LPG Storage Compound to the Boiler Room (PE pipework underground externally to the building and change to mild steel externally to enter the boiler room.)
- Lay new underground PE pipework from the LPG Storage Compound to the Main School Building and change to mild steel fitted with isolation valve and stainless steel housing as detailed on the drawings. (Liaise with the Science Lab Contractor to make connection to the existing pipework serving the main school)
- Lay new underground PE pipework from the LPG Storage Compound to the Modular Prefab Science Classroom and change to mild steel fitted with isolation valve and stainless steel housing as detailed on the drawings. (Liaise with the Modular Building Contractor to make connection to the existing pipework serving the Modular Building)
- Gas detection and gas safety system equipment in the boiler room including LPG gas sensors, CO monitor, emergency stop and slam shut valve.
- Supply and install gas services to four new back-to-back cascade arrangement of LPG gas fired boilers each with its own isolator valve, in ready accessible location
- Initial full fill of gas to the new storage tanks.
- Test and commission the LPG gas systems.

The Mechanical contractor shall allow for liaison directly with the LPG supplier to arrange for delivery of the new bulk tanks and the initial full fill of gas and for completion of the required gas conversion upgrade works and connection of the gas supply.

The Mechanical contractor shall allow for liaison directly with the Science Lab Refurbishment works contractor and the Modular Prefab Building contractors to make connection of the new gas services to the main school building and the Modular Building.

4.2 Liaison With Gas Supplier

The client will arrange with an LPG Supplier for a supply agreement to provide LPG to the school. The LPG supplier will supply and install the new Bulk Tanks and first stage regulator. The contractor shall clear and strip the compound area, construct the concrete base and erect the V mesh fence enclosing the compound and lay the gas lines to the boiler room and main school building and the modular building.

The mechanical contractor will be required to liaise with the LPG gas Supplier to ensure the bulk gas storage tank is installed in a timely manner to meet the program dates.

The mechanical contractor shall allow in the contract for payment of the first full fill of gas to the 3x1 tonne tanks to enable commissioning.

4.3 Pipework - Gas

The Mechanical Contractor shall be responsible for interconnection and installation of the new PE gas pipework from the new LPG Bulk Storage compound to the boiler room to serve the new gas boilers and to the main school and modular prefab buildings to serve the practical rooms.

The gas pipework shall change to mild steel outside the boiler room and enter the boiler room via an above ground sleeved core in accordance with regulations. The second stage regulator and isolator

at the boiler room shall be enclosed in an external IP rated stainless steel enclosure to prevent tampering.

All new pipe work within the boiler room shall be run in 65mm mild steel tubing and all joints shall be welded. The contractor shall allow for purging of the gas pipework.

The gas pipework shall change to mild steel outside the main building and modular building and shall connect to existing pipework above ground. Existing pipework entries and distribution shall be retained. The new second stage regulator and isolator at the main building and modular building shall be enclosed in an external IP rated stainless steel enclosure to prevent tampering.

The Mechanical Contractor shall also be responsible for laying new PE gas pipework from the new LPG Bulk Storage compound to the main school building and modular prefab classroom to serve the existing practical rooms gas services. The gas pipework shall change to mild steel outside adjacent to the existing gas pipework, be fitted with isolation valve and shall be enclosed in an external IP rated stainless steel enclosure to prevent tampering. The Mechanical contractor shall allow for liaison directly with the Science Lab Refurbishment works contractor and the Modular Prefab Building contractors to make connection of the new gas services to the main school building and the Modular Building and for final certification of the gas sservices.

The Mechanical Contractor shall carry out the works in accordance with IS265, IS 820 & IS 813. Pipe supports shall be at a maximum of 3 m spacing.

4.4 Boiler Room Gas Detection Systems

The contractor shall supply and install gas detection systems in the boiler room as Medem Gas Detection system or equal and pre-approved as supplied by Modern Plant and shall be complete with the following.

- Detection Panel AGDS – 2 em v2
- LPG Gas Sensors
- Carbon Monoxide Sensor
- Slam Shut Valve 2½”
- Electro-Thermal Fusible link
- Emergency Stop Button
- Audible flashing alarm

The control panel supplied should comply with the following:

- In accordance with IS820:2019
- Comprise a control panel, remote mounted gas sensor(s) and a 230v gas solenoid valve
- Panel to be wall mounted with emergency knock-off button, reset button, mute button and LED indication for power, alarm condition, gas-on, em-stop and alerts.
- Panel to have potential free relay output for the remote panel and terminals to allow the connection of additional emergency stops.
- The system will begin to operate as soon as mains power is applied; for the first 90 seconds the unit will calibrate itself and will beep every few seconds until this set-up process is complete – then the attached solenoid valve will open and normal operation will commence.
- The gas sensor(s) are to be wired to the control panel using a four core signal and low voltage cable and be powered up from this source – a green LED on the sensor will indicate normal status
- The 230volt mains supply to the panel should be from a 3amp fused switch. The solenoid valve is connected to the terminals marked ‘Valve’ on the panel.
- If an alarm begins (at 5% LEL) then the pre-alarm light will illuminate and the unit will emit a beep but the valve will remain open. If the gas levels continue to rise the panel will go to high alarm (at 10% LEL), a constant buzzer will sound and the valve will close. The light on the sensor concerned will also turn from green to red confirming the location of the alarm.

4.5 Gas Slam Shut Valve

The gas slam shut valve, designed to EN 161 and DIN Class A shall be installed internally at the entry point to the boiler house as shown on drawings. The boiler house slam shut valve shall be controlled by the boiler house gas leak detection panel and shall also be interfaced with the Fire Alarm System to automatically shut off in the event of a fire alarm.

Each appliance shall have its own isolator valve, in ready assessable locations.

4.6 Painting - Gas

The entire gas pipe work system shall be painted yellow RAL 1004 throughout and shall be labelled 'LPG gas' at 2 m intervals and at suitable locations, in particular at the entry point to the boiler room. The pipe work shall only be painted after the pressure tests have been carried out and the results accepted.

4.7 Pressure Testing - Gas Pipework

Comply with IGE/UP/1 Soundness testing and purging of industrial and commercial gas installations.

Pressure test gas supply pipework in accordance with BS EN 12327

Pressure test all gas pipework to 3.5 bar, test gauge.

Comply with procedures given in HVCA Guide to Good Practice for Site Pressure Testing of Pipework. Ensure safety precautions detailed in HSE Guidance Note GS4 Safety in Pressure Testing are adopted.

All equipment and assemblies which fall within the scope of the Pressure Equipment Directive (PED) 97/23/EC, implemented in the UK through the Pressure Equipment Regulations 1999, must be tested by the manufacturers, and be certified as compliant with the Directive. Such compliance shall be evidenced by displaying the appropriate CE Mark on the equipment and assemblies.

Only relevant equipment and assemblies certified as compliant will be permitted under this specification, and any substitution put forward must also be compliant with the Directive.

4.8 Commissioning-Gas Pipework

Preliminary checks

Follow the procedures laid down for carrying out Preliminary Checks and Start Operation in accordance with CIBSE Commissioning Code B and manufacturer's instructions.

Apparatus and Instruments

Use Apparatus and Instruments detailed in CIBSE Commissioning Code B, Appendix B3.1. Apply tolerances defined in Appendix B3.2.

Comply with the manufacturers recommendations for the commissioning of heat pump plant.

Ensure instruments used for testing and commissioning are correctly calibrated. Record details of instruments on record sheets.
Submit evidence of correct calibration of instruments to be used in connection with commissioning and testing.

4.9 Commissioning Gas Detection Systems

The Mechanical Contractor shall allow in his tender for the specialist gas detection system supplier to commission all gas detection systems and instruct the client staff in the proper operation and maintenance of the gas safety system. The client instruction and demonstration

shall be arranged to suit client staff availability following substantial completion and shall be completed separately to the commissioning site visit.

The contractor shall include for the annual service testing of the gas safety system by the suppliers authorised specialist at the end of the defects period.

5.0 ELEMENT (56) : SPACE HEATING INSTALLATION

5.1 General

The scope of work involves phased isolation, drain down, disconnection and strip out of the existing heating distribution pipework and radiators throughout the main school building. All existing connections to underfloor pipework shall be cut and blank capped below floor level and floor made good and flooring patched to match existing flooring in so far as is possible.

Supply and installation of the new 2 pipe heating distribution system and radiators, on a phased basis, complete with individual zone controls with two port valves and tamperproof zone thermostats with digital display within each space.

The new heating controls shall provide two stage frost protection and weather compensation on each circuit including provision of new 3 port mixing valves and actuators and new zone temperature sensors.

The heating distribution installations shall be as detailed on the drawings and as specified herein. It shall be the responsibility of the mechanical contractor to co-ordinate his services with existing services and fixtures and fittings 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.

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

5.2 Pipework and Fittings

LTHW heating pipework shall be fabricated from black MS tubing medium grade to BS 1387. Cold feed and open vent pipework shall be fabricated from galvanised MS medium grade tubing to BS 1387 with screwed and socketed ends. Drain pipes from automatic air pipes, pumps, safety valves etc shall be fabricated from copper piping to BS EN 1057.

Pipes shall be new, clean, and free from defects, of even bore throughout, shall be delivered with the manufacturer's protective coating undamaged and shall have plain chamfered ends for welded joints or screwed and socketed ends as detailed in the Particular Specification.

All mains shall be graded to ensure that no air locking occurs.

The cold feed and the open vent pipes shall be fabricated from galvanised MS medium grade tube to BS 1387 with screwed and socketed ends.

Drain pipes from automatic air vents, pumps, safety valves etc. shall be fabricated from light gauge copper piping to BS EN 1057..

Piping to valves and equipment shall be connected with either flanges or unions to facilitate the removal of the equipment.

Pipework within ceiling voids and exposed to view up to and including 50 mm ID	**Screwed BSP**
65 mm dia and above	**Welded**
Pipework within ducts	**Welded**

All joints on concealed pipework shall be formed using proprietary fittings be of the seamless steel 'medium' butt welding type to BS 1965 Part 1. All branches shall be arranged to sweep in the direction of flow. Stab-in branch welds or swagged reducers and or branches shall not be accepted. All branches shall be by a tee piece. All reducers shall be eccentric where the pipework is on the horizontal and concentric on the vertical. The flat side of eccentric reducers shall be positioned to allow venting to the high point in the run or system. Pulled bends may be used on all exposed pipework up to 25 mm bore and up to 40 mm bore for concealed pipes. For pipes over 25 mm bore on exposed pipework and over 40 mm bore on concealed pipework long radius welding bends shall be used. If the cross-sectional area of any pulled bend is altered or if

the throat of any bend is rippled it will be rejected.

To provide for drain points on welded pipework an internally screwed MS socket shall be welded into the main with the base of the socket shaped to the contour of the main pipe. Air venting points on pipes 32 mm bore and above shall be provided by welding a plain pipe 150 mm long x 32 mm dia. to the top of the main with the end of the branch swaged down and fitted with a MA screwed socket to connect to the automatic air eliminator. For pipes below 32 mm dia the bore of the air collecting branch shall be equal to the bore of the pipe being vented.

Flanges used on welded pipelines shall be in steel of the slip-on welding type to BS 4504 and shall be drilled and faced for a nominal working pressure of 10 bar.

Fittings for use with screwed pipework shall be in black malleable iron to BS 1256 with connections to heating surface made with sweep type fittings. Where two mains connect or divide sweep or twin elbow branch fittings as may be appropriate shall be used.

If a tee piece has to reduce on the run and a reducing fitting is not available the reduction shall be made by using a hexagon nipple and an eccentric reducing socket. The use of bushings will not be permitted.

Pulled bends may be used as described for welded pipework otherwise long radius screwed bends must be fitted. Short radius elbows may only be used with the permission of the Engineer.

Drain or air venting branches shall be provided as described for welded pipework only screwed pipe fittings with square branches shall be used.

Flanges used on screwed pipelines shall be of steel to BS 4504 threaded to BS 21 and drilled and faced for a nominal pressure of 10 bar.

Malleable iron unions shall have gun-metal ground seats and the use of connectors and backnuts will not be permitted. During the progress of the work any surplus flux and jointing paste visible at joints shall be carefully removed. The amount of jointing materials used shall be the minimum required to complete the joint. Care shall be taken that fittings are not excessively tool-marked and when pipes are cut they shall be carefully reamed out to restore the bore.

Sufficient flanges or unions shall be used to ensure that any part of the installation can be easily removed.

Fittings for use on cold feed and open vent lines shall be in galvanised malleable iron to BS 1256. Square tees can be used on this pipework.

All pipework shown in floor ducts shall be fully welded, painted with two coats of corrosion resistant paint and insulated in accordance with the specification. All new pipework in floor ducts shall be inspected by the Consulting Engineer prior to back filling. There shall be no joints on underground pipework.

5.3 Pipework Supports and Brackets

The complete heating installation shall be supported from the building structure other than the roof purlins generally in accordance with the General Specification.

The contractor shall be responsible for the overall design and installation of all supports and brackets necessary for the installation as contained within this specification and on the associated drawings.

Pipework shall be supported in a manner which will allow for free movement due to expansion and contraction with supports arranged as near as possible to joints and changes in direction.

In the boiler house or plant rooms pipework shall be supported from the walls or floors on purpose made MS brackets and in overhead ducts, MS wall brackets shall be attached to the walls using rawl-bolts, hilti-bolts or similar. The erection of these brackets shall be the responsibility of this contractor.

All pipework shall be set on cast iron or bronze rollers and chairs fixed to the angle framework, or alternatively adjustable suspension type rods and pipe rollers may be used. Pipework in floor ducts shall also be set on rollers and chairs fixed to angle framework, bolted to the sides of the duct. Alternatively, rollers placed in MS channel attached to the duct floor may be used.
The erection and fitting of the angle iron framework or mild steel channel is the responsibility of this contractor. Care will be taken to ensure that the correct support is applied to MS and copper piping and that dissimilar metals are not in contact. Provision shall be made to ensure that pipework does not leave the roller by providing inverted 'U' guides fabricated from 9 mm Dia. round iron at 12.0 m centres. All brackets and supports shall be thoroughly cleaned and painted one coat of red oxide of lead paint.

Noise reduction measures such as brackets with rubber mountings and the use of isolation pads should be used where possible.

Before manufacture the design of brackets and supports must be agreed in writing with the Engineer and where necessary this contractor shall submit drawings to the Engineer for approval.

Exposed pipework in rooms shall be supported on malleable iron or brass split pattern screw-to-wall school board brackets depending on the pipe service. This contractor shall include for lining up the brackets, drilling and plugging the walls and fixing the brackets. Screws shall have a minimum length of 50 mm with brass screws being used with brass brackets. Plastic type wall plugs to suit the screw size shall be used.

Where floor level pipes are subject to abuse additional floor type brackets comprising a split pipe ring, pipe nipple and back-plate secured to the floor shall be fitted in locations decided by the Engineer. Brackets which have to be secured to structural steelwork shall be fixed with special girder clips; welding or drilling the steelwork may not be carried out without special permission.

Supports shall be spaced in metres according to the following table.

STEEL PIPE			LG COPPER PIPE		
BORE	HORIZONTAL	VERTICAL	BORE	HORIZONTAL	VERTICAL
15 mm	1.5	1.8	15 mm	0.9	1.2
20 mm	1.5	2.1	22 mm	1.2	1.5
25 mm	1.8	3.0	28 mm	1.5	1.5
32 mm	1.8	3.0	35 mm	1.5	2.0
40 mm	2.4	3.0	42 mm	1.8	2.4
50 mm	2.4	3.5	54 mm	1.8	3.0
65 mm	2.7	4.0	67 mm	2.4	3.7
80 mm	3.0	4.0	76 mm	2.4	3.7
100 mm	3.0	4.6	108 mm	2.4	3.7
125 mm	3.7	5.5	133 mm	3.0	3.7
150 mm	45	5.5	159 mm	3.7	3.7

5.4 LTHW Valves

In the boiler house and plant rooms all valves 65 mm bore and above shall be cast iron flanged gate valves with a bronze trim disc wedge, rising stem and outside screw and yoke. They shall comply with BS 5150 with flanges drilled and faced to BS 4504 for a nominal pressure of 10 bar and shall be similar to Crane Fig. FM 82 or equal to approval.

Boiler house and plant room valves fitted in pipes with a bore from 25 mm up and including 50 mm shall be bronze flanged full way gate valves with a solid gun-metal wedge and non-rising stem. They shall comply with BS 5154/B drilled and faced to BS 4504 for a nominal pressure of 10 bar and shall be similar to Pegler Fig. 1071 PN 16 or equal to approval.
Valves 20 mm bore and below shall be in bronze of the full way gate type with internally screwed ends to BS 5154/B SIMILAR TO Pegler Fig. 1070 M-PM 25 or equal to approval.

Outside the boiler house isolating or circuit valves up to 100 mm bore shall be in bronze of the full way gate type with internally screwed ends and shall comply with BS 5154/B similar to Pegler Fig. 1070 PN 32 or equal to approval. Valves fitted to pipework over 100 mm bore shall be of the cast iron flanged type similar to Crane FM 82 or equal to approval.

Flanged valves shall be provided with suitable steel mating flanges and where the mating flange and the flanged valve are of dissimilar materials the joint shall be made with a suitable rubber composition insertion joint which shall be the full free diameter of the flange. Flanged valves in the boilerhouse and plant rooms shall be fitted with an 'open and shut' indicator.

Union type valves shall be fitted to the flow and return connections to each radiator, natural or fan assisted convector unit heater or pipe coil. These valves shall conform in all respects to BS 2767-10 manufactured in forged brass with a chromium plated finish similar to Pegler Fig. 2063 or Fig. 2076 or equal to approval. A wheel valve shall be fitted to the flow inlet to the appliance with a lock shield valve on the return outlet the valves being of the angle or straight pattern as necessary.

On single or two pipe circuits up to and including 32 mm bore the circuit isolating valves shall be of the union type in forged brass to BS 2767-10 similar to Pegler Fig 2076 WH on the flow and Pegler Fig. 2076 LS on the return or equal to approval.

Valve Type	**Gun-Metal Hattersley Crane**	**Cast Iron Hattersley Crane**
Gate	Fig 33X D151/9	Fig 549 F52/F51
Lockshield	Fig 33XLS D235/7	

Valve Type	**Manufacturer**	**Reference**
Globe	Crane	F366 73/E or
	Hattersley	Flanges to BS4504
Double Regulating	Bailey	2707/2705/2504 -
	Crane	DM 900/910/920/930
	Hattersley	CV2432/4733DR/CV2733/4733DR
Automatic Air Vents	Winns	Type 1680
3-Way Vent Cocks	Winns	Type 1680
	NABIC	Fig 503
Drain Cocks	Hattersley	To comply with BS2789
	Crane	Type 2
Check Valves	Crane	FM 492
Needle Valves	Crane	D71

Any valves necessary for isolation and/or regulating the system shall be provided and installed so that they are accessible for operation and maintenance.

5.5 Heat Emitters – Convector Radiators

The Contractor shall supply and install low water content steel panel type radiators as detailed on the drawings. All wall radiators supplied should comply with the following:

- All radiators must be certified and tested in accordance with EN 442 supported by a CE Declaration of Performance
- All radiators must be DHSS DN4 Compliant
- All radiators to come with a 30-year guarantee
- All radiators must be suitable for low H20 water content - .98 litres per metre or less

- All emitters to be fabricated in pure copper and aluminium, totally non-corrosive as emitter
- Brass Collectors must be used in emitters with large aeration chamber for better controlled injection
- All heat exchangers must be corrugated and pressure tested to 20 bar and guaranteed suitable for a maximum working pressure of 10 bar and must be assembly electrostatically lacquered with anthracite grey epoxy polyester powder coating to RAL 7024
- Low water heat exchanger with dirt-repellent and dust-proof lacquer in graphite grey (RAL 7024) manufactured from round, seamless tubes made of pure red copper to EN12735-2, with corrugated pure aluminium fins and two brass collectors. Aluminium fins feature collars for maximum surface area contact between tubes and fins. Brass collectors complete with 2no. ½" BSP brass connections. Same end connections suitable for left- and right-hand installation with simple valve, TRV or remote control
- Touch Temperature must not exceed 43 degrees and must be guaranteed by manufacturer at a flow of 75 degrees
- All Radiators shall be provided with a key operated chromium plated air vent. All keys shall be interchangeable
- All radiators shall have a extended air vent with transparent synthetic drain tube as standard.
- To maximise heat transfer, aluminium fins must provide the following minimum surface area of aluminium per metre of finned tube: Type 10 (33000cm²), Type 15 (50000cm²), Type 11/20 (67000cm²), Type 16 (101000cm²), Type 21 (135000cm²)
- To maximise heat transfer, aluminium fins must provide the following minimum surface contact area with the copper tubes per metre of finned tube: Type 10 (1800cm²), Type 15 (2800cm²), Type 11/20 (3700cm²), Type 16 (5600cm²), Type 21 (7500cm²)
- All radiators shall have a soft-design with rounded angles / chamfered corners to avoid accidental injury.
- Scratch-resistant surface coating with a satin gloss finish. High UV resistance.
- The inside of the radiator front casing must have a convector plate to reduce resistance and promote convection.
- The radiator bracket system must incorporate convector plate guides on the side brackets to promote convection through the radiator.
- All radiators to be factory manufactured as follows:-
    - Standard colours without surcharge: traffic white RAL 9016 glossy (233)
    - All radiators shall be finished in anti-static paint with white glass washable enamel finish. The contractor shall allow for repainting radiators if damaged during installation
    - All flat panel radiators to have a one-piece cover
    - Front panel to incorporate 50mm folded profile sections folded to 3.0mm
    - Side panels built from 1.5mm sendzimir galvanised steel plate, folded to provide rounded corners.
    - Brackets built from 1mm sendizimir galvanised steel plate, to be installed with a maximum intermediate distance of 1050mm.
    - Casing locks supplied to prevent unauthorised removal of the casing from the brackets.
    - Casing finished with a scratch-resistant polyester powder coating with a satin gloss finish in colour RAL 9016.
- All mounting location and details to be agreed on site prior to installation
- Final dimensions of all radiators to be confirmed on site prior to ordering

All radiators shall be as manufactured and supplied by Versatile nZEB Maxi 2020 generally of the type and size as shown in the Radiator Schedule or equal and pre-approved, in the locations shown on the drawings.

Radiators shall be rigidly supported on steel brackets supplied by the radiator manufacturers. These shall be fitted at the back of the radiator and shall be generally concealed from view. Radiators shall have a clear space of 40 mm between the back of the radiator and the wall, and 150 mm between the bottom of the radiator and the finished floor. The case height shall be as per schedule of radiators.

In no case is any radiator to stand above the bottom of any window board, and the Contractor is to arrange to check the Schedule of Heaters with the Engineer before ordering to ensure that this is so.

The Contractor shall also allow in his tender for disconnection and temporary removal of all radiators for wall finishing and for re-decoration.

5.6 Radiator Valves

Control valves shall be fitted on the flow and return connections to all radiators. The valves on the flow shall be of the hand wheel pattern with mushroom composition hand wheels, while those on the return shall be of the lock shield pattern. Where exposed valves shall be of the easy clean chromium plated finish, Pegler type.

Control valves shall be gunmetal throughout and shall be of angle or straight pattern to suit connections. Valves generally shall be complete with gunmetal unions fitted on the heater side so as to allow disconnection of heaters without emptying down the system

5.7 Heat Emitters – Radiant Panels

The Contractor shall supply and install steel radiant panels as particularly specified on the drawings.

Radiant Panels in the classroom shall have a plain finish c/w integral insulation & shall be selected from the Zehnder Carboline range and as scheduled on the drawings or equal and pre-approved. Units to be supplied to engineers colour preference.

Radiant Panels shall be securely supported on proprietary steel brackets with chain and hooks as supplied by the radiant panel manufacturers. These shall be fixed to the main structure of the roof with secondary unistrut brackets as required and shall be generally concealed from view.

Radiant panels in classrooms shall comply with the following specification:-

- Flat panel finish
- Coated in Anti-Bacterial paint
- Manufactured to ensure all outputs are in accordance with EN14037
- Outputs quoted/written in literature must be EN14037 compliant
- Insulation must be closed cell and outputs quoted as complete with insulation
- No metal to metal contact to prevent bio-metallic reaction
- Median for heat transfer of copper tube to metal plate must be graphite to ensure over 90% conductivity
- Pipework must be 10mm to lower inertia
- There must be less than 2mm deflection within the Radiant Panel
- Chain hangers with adjustment to ensure panel will not sag
- Hangers must be installed as per the Radiant supplier’s specification to ensure no deflection
- Anti-deflection profile to be incorporated within the panel
- Radiant panel supplier must supply bespoke push-fit connections

5.8 Radiant Panel Valve Sets

Radiant Panels shall be connected via a thermostatic balancing valve, double regulating valve ball valve and strainer set as Herz Connect 4 RP or equal and pre-approved valve set designed to give a simple connection to radiant panels.

5.9 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.

5.10 Balancing / Commissioning Valves

Balancing/commissioning valves shall be provided as a <u>minimum</u> 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 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 contractor and any claim to the Employer in this respect shall not be entertained.

5.11 Painting

The manufacturers finish coat on radiators and other equipment shall be accepted as being a suitable finish provided it is undamaged and clean.

Any rust or marks on any of the equipment shall cause the equipment to be rejected and will be replaced by the contractor. Any rust marks on pipe work shall be well rubbed down and cleaned and shall be primed and painted. All-purpose made brackets or supports shall be primed and painted on all surfaces. Two finishing coats to client colour selection will be required on all exposed pipework.

6.0 ELEMENT (58) : OTHER SERVICES

6.1 Testing and Commissioning

6.1.1 General

The Contractor shall in relation to the Engineer's entitlement offer all plant for witness testing and inspection. If the tests are beyond the resources of the manufacturer he shall make arrangements for these to be carried out elsewhere. Any variation of this requirement shall be agreed in writing with the Engineer.

Testing of Motors

Witness testing will normally be waived on standard types of small motors made by approved manufacturers and small components used in the manufacture of units of plant.

Contractor's Obligations.

No inspection or passing by the Engineer or any other duly authorised person or group of the works, plant or materials shall release the Contractor from due obligations under the contract.

Testing

All pipework shall be tested as soon as practicable after installation and before completion of shaft walls, access panels, suspended ceilings and applications of any insulation.

In the event of the failure of any test the defect shall be located and repaired, and the test repeated.

Test Certificate.

A test certificate shall be submitted following successful testing of the complete system.

The Test Certificate shall include:

- Project Name:
- Name of Sub-contractor:
- Service:
- Section Under Test:
- Nature of Test:
- Water
- Pressure
- Duration
- System Flushed: Yes/No
- Record Drawings Submitted: Yes/No
- Signatures of Sub-contractor:
- Witness:
- Date of Test:

6.1.2 Heating Services

Preliminary checks

Prior to carrying out cleaning or chemical treatment process, ensure that:

- All foreign matter is removed.
- Certified pressure tests have been carried out in the parts of the system to be cleaned. Carry out further pressure tests on the isolated sections of the system independently.
- All water used for pressure testing is inhibited. Leave remaining pipework sections full after testing.
- Where there is a risk of freezing inhibited mono-ethyleneglycol is used.
- Circulation has been demonstrated and approval obtained on all parts of the system. Manipulate and leave fully open all valves other than those used to isolate sections. Carry out balancing and certification after the flushing, cleaning and passivation operations.
- No damage can occur to any item of plant or equipment due to cleaning and chemical processes.
- Chemicals used are compatible with system materials.
- All items of plant and equipment subject to damage or blockage due to cleaning and chemical treatment processes are isolated or removed.
- Dirt pockets are installed at low points to facilitate solids removal. Supply dirt pockets with drain valves sized to pipework size.
- All drains provided have been tested and approved and that any pumping equipment associated with the drainage system is fully commissioned.
- Dead legs that are more than 3 pipe diameters in length are looped to allow effective cleaning.
- Strainer baskets and filter media, incorporated within systems, are removed; and where necessary spool or stool pieces are installed.
- Temporary strainers and filters are installed as required for removal of solids during cleaning and chemical treatment processes.
- Strainers are clean prior to the start of the cleaning process, throughout the cleaning and on completion.
- Suitable supply and drainage points are provided with 50mm minimum connections, properly sited and installed, either valved or plugged.
- All automatic/manual air vents are fully commissioned.
- All requirements of COSHH regulations are complied with during the chemical cleaning and chemical treatment of the system.
- Where required by local water authority, provide effluent tanks for storage of all waste products of cleaning and chemical treatment processes.
- Following local water authority approval, either neutralize or dispose to drain all waste products; or ensure authorised disposal at registered sites.
- Comply with Waste Management Duty of Care: A Code of Practice and Control of Pollution (Special Waste) Regulations 1980 where appropriate.

Testing

- Pressure test all services pipework
- Operating gauge pressure less than 3.5 bar, test gauge one and a half times operating pressure.
- Operating gauge pressure 3.5 - 7.0 bar, test gauge pressure twice operating pressure.
- For below ground pipework test to 7 bar or twice the working pressure (whichever is the greater) for 4 hours.
- Comply with procedures given in HVCA Guide to Good Practice for Site Pressure Testing of Pipework. Ensure safety precautions detailed in HSE Guidance Note GS4 Safety in Pressure Testing are adopted.
- Test concealed or buried pipework before any permanent covering is applied.
- Advise engineer, in advance, of the time pressure tests may be witnessed.
- Carry out Hydraulic Pressure Testing as described in HVCA Guide to good Practice for Site Pressure Testing of Pipework. Test section by section for one hour, as the work proceeds and prior to application of thermal insulation.

- Keep record of pressure tests and issue them to the consultant engineer, and include them within the handover documentation.

Commissioning

Commissioning codes

Carry out commissioning of installations in accordance with the procedures, checks and tolerances given in the BSRIA Application Guides for water systems and air systems to achieve the standards set in the CIBSE Commissioning Codes.

Preliminary checks

Carry out checks and procedures as detailed in CIBSE Commissioning Code W, Section W1. Ensure system is statically complete as defined in section B4 of BSRIA Application Guide 2/89 Commissioning of water systems in buildings.
Use pre-commissioning checklist from BSRIA Application guide 2/89.

Setting to work and regulation
Set to work and regulate water distribution systems in accordance with CIBSE Commissioning Code W, Sections W2 and W3, and sections C3 and C4 in BSRIA Application Guide 2/89.

Measurement

Use instruments for measurement detailed in BSRIA Application Guide 2/89.

Test all outlets in groups to determine that appropriate flow rates and temperatures are achieved.

Advise engineer, in advance, of the time commissioning may be witnessed.

Instruments and Gauges

Ensure instruments are correctly calibrated. Record details of instruments on record sheets.
Submit evidence of correct calibration of instruments to be used in connection with commissioning and testing.

Thermostats and Temperature Sensors

Test all thermostat and temperature sensor readings against calibration equipment that is provided with a calibration cert that is dated within six months of the test period.

Performance Testing

Test the full system, under various conditions. Check the operation of run and standby plant, and check all controls settings, and the operation of every function of the controls system before requesting that the consultant engineer witness the correct operation of the system.

7.0 ELEMENT (58) : THERMAL INSULATION

7.1 General

In deference to the Engineer normally specifying the preferred Insulation Specialist, it is expected that Tenderers will have better local knowledge of Insulation Specialist available. The requirements of this specification shall be taken into consideration so as to provide a neat workmanlike and efficient installation, normally expected of a first class installation.

The Specialist appointed will be deemed to be competent in the Air Conditioning and Heating Industry and will be responsible for the complete insulation installation and conversant with the services applicable ie proper vapour sealing procedures and protection of hot surfaces for thermal retention and protection of against burning should the surfaces be touched.

The Engineer will closely inspect the insulation applied during installation and finally, if insulation below the standards is applied, without question it shall be removed and reinsulated to the satisfaction of the Engineer.

If the insulation work continues to be unsatisfactory, alternative arrangements shall be made to complete the installation to the satisfaction of the Engineer.

Allowing for the freedom of choice of a specialist, the works must be maintained on programme to the satisfaction of the main contractor. The management of the insulation works shall not be regarded as a separate issue.

At the time of tendering, the name of the firm who will be carrying out the insulation work shall be stated in the appropriate appendix.

The Specialist shall be acquainted with the hours of work and with all the site conditions, storage facilities provided and any other salient facts, which effect the insulation installation, including expected programme, features of inaccessibility and access to works installed.

The insulation specialist shall confirm to the Engineer the type and thickness of insulation to be applied before commencement of the work.

7.2 Boiler House and Plantroom

In these locations pipework and fittings shall be insulated with Class ‘O’ faced finish to BS 3958 Part 4 rigid fibreglass pipe sections similar to fibreglass crown preformed pipe sections or equal to approval. Pipe sections shall be split along one side only and shall have a plain finish and shall be secured to the pipework with copper wire at 150 mm centres.

The finish to this insulation shall be Class ‘O’ faced finish to BS 3958 Part 4 secured with tape, fitted so as to shed water in accordance with the manufacturer's recommendation. Calorifiers to be supplied pre insulated.

Boilers shall be provided with fitted insulation jackets by the boiler manufacturers unless detailed otherwise in the particular specification.

All valves of sizes 32 mm and above will be insulated with proprietary jackets with Velcro fittings of the same thermal insulation value as the pipework insulation.

Bends will be neatly and accurately mitred to provide a smooth surface to the insulation and shall be of the same insulation value and finish as the pipework insulation.

All flanges will be insulated as with valves. At flanges and flanged valves the pipe insulation should be neatly cut back at each side of the fitting and provided with plastic end caps to prevent deterioration to the insulation and access to the fitting. Removal of the preformed sections around the fitting must not disturb the pipe insulation.

Pump sets shall be fitted with the manufacturer’s pre-formed proprietary insulation jacket. Any missing or damaged jackets shall be replaced by the contractor at contractor expense.

7.3 Internal Pipework Insulation

Header Pipework at high level and pipework and fittings which are concealed in floor ducts, vertical service ducts, false ceilings, roof spaces, attics, wall chases, behind or below built-in furniture or trunk run as shown on the drawing and which is not subject to dampness shall be insulated as follows:-

Preformed sections of rigid mineral wool incorporating an aluminium foil laminate cover shall be provided to the pipework. All bends, tees, valves and connections shall be insulated. These sections shall be split along one side only, shall be provided in 1200 mm lengths and the longitudinal joints of the canvas shall be pasted down neatly with a suitable adhesive as recommended by the manufacturers. Butt joints shall be sealed with 100 mm wide self adhesive white lacquered dead soft aluminium foil tape. When the adhesive is dry aluminium bands shall be fitted at 300 mm centres.

Flexible glass wool or rock wool sections to BS 3958 Part 3 similar to Newalls FR stitched flexible sections or equal to approval. Flexible section shall be faced on one side with 25 mm mesh x 0.711 mm galvanised wire netting and shall be secured to the pipework and fittings with continuous wire stitching.

Exposed internal insulated pipework and fittings as called for in the particular specification shall be insulated as above only that the sections shall incorporate a white PVC finish. The longitudinal joints of the finish is to be sealed as recommended by the manufacturers with 100 mm wide PVC self-adhesive tape being fitted at butt joints, bends and tees.

Header pipework run at high level passing through toilets and store rooms which are not fitted with radiators shall not be insulated. All other header pipework shall be insulated.

7.4 Thickness of Insulation on Pipework

A required thickness of insulation will be applied to the various service pipes in accordance with section 5 of BS 5422 as detailed in the tables following. The thickness refers to the insulation only and does not include any hard setting compound or finish to the insulation.

These tables are based on insulating material with a nominal density of 72 Kg/m³ and a thermal conductivity of 0.041 W/mK at 100°C.

RECOMMENDED THICKNESS OF INSULATION FOR CENTRAL HEATING AND DOMESTIC HOT WATER SERVICE INSTALLATIONS SERVED BY OIL FIRED OR GAS FIRED BOILER PLANT

OUTSIDE OF PIPE(mm)	HOT FACE TEMPERATURE °C (with still ambient air at 20°C)			
	DOMESTIC HOT WATER		CENTRAL HEATING	
	60	75	100	150
17.2	25	19	25	32
21.3	25	19	25	32
26.9	25	25	25	32
33.7	32	25	32	32
42.4	32	25	32	32
48.3	32	32	32	32
60.3	32	32	32	38
76.1	32	32	32	38
88.9	32	32	32	50
114.3	38	32	38	63
139.7	50	32	50	63
168.3	50	32	50	63
219.1	50	50	50	75
273.0	50	50	50	75
323.9	50	50	50	75
and above	Mm	mm	mm	mm

8.0 ELEMENT (60) : ELECTRICAL SERVICES

8.1 Extent of Works in This Section

This Contract shall include the supply, delivery to site, off-loading, erection, connection, testing and commissioning of all materials necessary for the electrical works associated with the heating services upgrade unless specifically stated to the contrary. The electrical works include for the provision of all labour supervision, tools and equipment necessary for the efficient completion of the electrical works in the manner specified and to the complete satisfaction of the Engineer by a suitably qualified and experienced Safe Electric registered electrical sub-contractor (domestic to the mechanical contractor).

The scope of works for the domestic electrical sub-contract includes the complete electrical fit out as detailed herein and on the tender drawings. The works shall be carried out in the school building and shall include the following:-

- Trace, isolate, and disconnect the existing boiler room and main school heating equipment electrical and controls installations to allow safe strip out and removal of the redundant heating systems and all associated controls on a phased basis **(no redundant services or controls etc shall be left in situ).**
- Installation of galvanised steel trunking and conduit containment for new electrical services and controls cabling
- Installation of the sub mains cable from the Main Board to the new Heating MCC
- Installation of boiler control panel MCC and associated heating controls
- Installation of the gas safety system control panel and associated controls and interlock to the fire alarm system
- Mechanical Equipment power and control wiring to all field equipment and controls
- Boiler Room lighting & emergency lighting upgrade
- Equipotential earthing & bonding
- Liaison with and attendance on the controls specialist during testing and commissioning of the new controls systems
- Testing Commissioning and Certification of the upgraded heating electrical installations

The mechanical contractor shall employ the services of a Safe Electric registered electrical contractor to complete all specialist electrical works. The electrical contractor shall be subject to Engineer's prior written approval.

8.2 Demolitions

All redundant electrical installations and controls serving the existing heating systems shall be traced, isolated, disconnected and stripped out by the electrical contractor, to enable the safe refurbishment works.

8.1 Mechanical Equipment Power & Controls

A new 5x16mm Sq. power supply cable shall be installed from the existing Main Distribution Board located in the Electrical Closet adjacent to Principal's Office to supply the new heating MCC control panel. The new supply shall be run in SWA/PVC/SWA copper cables run on a new galvanised steel tray from the existing Main Distribution Board to the existing riser in Junior Boys WC and to run underground to the Boiler House in a MDPE duct, Contractor to allow for supply and installation of a new 40 Amp three phase MCB feeder in the existing Main Board to feed the new Heating MCC.

The contractor shall supply and install a new boiler control panel which shall be installed as indicated on the drawing. Power to the boiler house equipment shall be run in multicore armoured cable run on galvanised steel cable tray with final drops sleeved in conduit. Cable sizes shall be as indicated on the drawing. Provide a local isolator to each mains powered boiler room equipment device. Local isolators shall include facility for padlocking in the off position for maintenance purposes.

As an alternative, the contractor may propose to complete the boiler room power wiring installations using singles LSF wiring run in a galvanised steel conduit and trunking system. No other form of wiring shall be acceptable without prior written approval from the Engineer.

The Heating MCC shall provide the 230 Volt feeders for the local zone valve circuits as required. The contractor shall supply and install the new local room heating controls including two port valves and room thermostat with digital display and run the new power circuits fed from the Heating MCC via a local connection spur and controls wiring from the room thermostat to the two port valve. All power and controls wiring shall be run in galvanised steel trunking and conduit containment throughout.

All extra low voltage controls cabling shall be run on separate tray containment in the boiler room and in cable trunking system at high level throughout the school building with final drops to room stats run in surface mounted galvanised steel conduit which shall be segregated from power cables.

The electrical contractor shall allow in his tender for full testing of all new electrical installations associated with the mechanical upgrade to current IS 10101 standards. The electrical contractor shall allow for attendances on the controls specialist to complete testing and commissioning of the completed installation.

All items of switchgear, controls and cabling shall be suitably labelled with white/black/white labels to designate their respective service.

8.2 Boiler Room General & Emergency Lighting

The electrical contractor shall supply and install new LED lights and emergency lights to the boiler room as particularly detailed on the drawing. Alternatives shall be to engineer's prior written approval.

8.3 Earthing

The Contractor shall be responsible for making the entire installation mechanically and electrical continuous throughout and finally connecting the system to earth in accordance with IS 10101 wiring regulations.

8.4 Builders Work and Attendances

The Contractor shall include in his tender price for completing all associated electrical builders work i.e. chases/holes for conduit, trunking, tray etc., including all tracking for services concealed within the fabric of the building etc. Contractor shall make good and redecorate to match existing finishes on completion.

9.0 ELEMENT (59) : BUILDERS WORKS

9.1 General

The contractor shall be responsible for all elements of Builders Works as required to complete the heating upgrade works as described. The following sections describe the main elements. Contractor to allow for all ancillary elements of Builders Works whether described herein or not as required to complete the heating services upgrade and all reinstatement works and redecoration as intended.

9.2 Site Survey / Inspection

The contractor should include for inspection of the site at tendering stage, so accurate assessment of builders work can be obtained. No claims whatsoever will be entertained by the engineer due to the lack of knowledge of site conditions or existing installations.

The appointed contractor shall take a photographic record of pre-existing damage to existing furniture, fitting and finishes prior to commencing the works and issue to the consulting engineer to avoid any dispute as to damage caused by the contractor during the upgrade works.

9.3 Protection of School Finishes & Equipment

All flooring shall be adequately covered to stop damage occurring during the works.

The contractor shall lay heavy duty RAM Board as required to protect the existing flooring, which is mainly vinyl to the classrooms and corridors and carpet to offices, to prevent damage during the works.

If flooring is damaged during the works, the contractor shall be responsible for cost of cleaning or replacement as deemed appropriate by the engineer.

All Teaching Screens and Interactive White Boards (IWB) and projectors shall be adequately mechanically protected and covered to stop damage occurring during the works and to prevent ingress of dust into the sensitive electronic equipment. As a minimum the contractor shall allow for erection of 1000 gauge polythene covers sealed to the walls and ceilings around the Smart Screens. If Screens are damaged the contractor is responsible for cost of refurbishment or replacement as deemed appropriate by the engineer.

The contractor shall allow for carefully moving / reinstating of school furniture as required, to install new services. All loose and fitted furniture shall be covered by 1000 gauge polythene during the works to prevent damage and ingress of dust. If school furniture is damaged the contractor is responsible for cost of repairing or replacement as deemed appropriate by the engineer.

Where required existing built in furniture shall be carefully removed and re-instated by a competent fitted furniture specialist to allow strip out and installation of the new services.

The contractor shall allow in his tender for moving the loose furniture, tables and chairs back into their positions in classrooms under guidance by the school staff on an ongoing basis during works contract.

9.4 Suspended Ceilings

The Contractor shall allow carefully opening up existing 600x600 suspended grid ceiling throughout the corridors and locally as required within classrooms and offices to enable installation of the new heating services. Reinstate ceiling grids and tiles and make good on completion of the upgrade works.

The contractor shall allow for replacement of 15% of the existing tiles due to existing damage, accidental breakage and damage during the upgrade works.

9.5 Demolitions

The contractor is responsible for phased isolation, strip out and disposal of all redundant heating services equipment and materials to a licenced waste recycling facility. Allow for skip hire and cleaning out and removal of all redundant equipment, radiators pipework, rubbish, debris and waste.

9.6 Flooring Repairs

The contractor shall allow for completing patch repairs to the existing flooring where heating pipework and support brackets have been removed. The patching shall be completed by a flooring specialist and shall match existing flooring in so far as is practical.

9.7 Boiler Room Refurbishment

The contractor shall allow for removal of the oil boilers and all redundant equipment and associated pipework to a licensed waste recycling facility. The existing domestic hot water cylinder and associated 80 litre expansion vessel shall be carefully relocated in the upgraded heating centre to provide domestic hot water to the school as specified herein.

The contractor shall remove the existing windows and frames, window cill and window reveals in the boiler house, dispose all waste and debris to a licenced waste recycling facility and construct new infill blockwork to close the redundant window opening. Apply a dash render finish to match external wall finish

The Contractor shall make good to the boiler room floor and apply a suitable levelling compound to form a level floor. In addition, the contractor shall construct new 100mm high concrete equipment plinths for the upgraded heating centre equipment as detailed on the drawings.

Prepare the boiler house floor, plinths, walls and ceiling and apply a suitable sealer, undercoat and white paint finish coat (two coats) to the walls and ceiling and two coats of an oil resistant anti-slip floor sealer in dark grey finish to the boiler room floor prior commencement of the new heating centre services.

9.8 Coring of Opes

Contractor shall allow for carefully coring of all opes through external and internal blockwork walls as required to install new services. Allow for making good and weathering following installation of services. Allow for fire stopping fire compartment wall as necessary. New pipework opes to be cored and sleeved with sufficient room for pipe work movement.

9.9 New External Service Risers

The Contractor shall allow boxing out new Calpex heating pipework rising externally at the boiler house and at the main building. The external box outs shall comprise of 40mm Kingspan Quadcore KS1000RW Wall Panels fixed to unistrut support brackets fixed to wall from finished ground level up to soffit level as detailed on the drawings. The wall panels shall be screw fixed to enable future opening up and easy access for maintenance if required.

The service riser panels shall be finished in silver grey to match the existing soffits

9.10 New Internal Service Risers

The Contractor shall allow boxing out new heating pipework risers internally in the Junior Boys WC (Room 28) and Junior Girls WC (Room 29) in MDF board fixed to 75x50mm battens fixed to walls from entry point up to ceiling level. The MDF boards shall be screw fixed to the battens to enable future opening up and easy access for maintenance.

The contractor shall allow for applying an under coat and two finishing coats of matt emulsion painting to match existing wall finishes (Dulux Gloss or equal and pre-approved)

9.11 Trenching & Civil Works

The contractor shall complete a Ground Penetrating Radar survey of the proposed route of the new underground gas services and the new bulk gas storage compound to identify and locate existing underground services prior to commencing any trenching or excavation works. The exact route of the proposed new gas services shall be adjusted as necessary to minimise potential impact on existing underground services and to maintain the required minimum 300mm separation distance between the new gas service and existing underground services.

The contractor shall take care not to damage the existing school yard tarmacadam finish unnecessarily while completing the works. All plant equipment shall have rubber tyres – metal track machines shall not be used.

The contractor shall allow for excavating the grass margin and for saw cutting the existing tarmac yard and trenching through the grass margin and tarmac yard to lay a new 63mm PE gas service from the new LPG storage tank compound to the boiler room as indicated on the drawings.

The contractor shall also allow for excavating the grass margin and for saw cutting the existing tarmac yard and trenching through the grass margin and rear tarmac yard to lay a new 32mm PE gas service from the new LPG storage tank compound to the main school building and modular prefab classroom as indicated on the drawings.

The contractor shall allow for hand digging in the immediate vicinity of existing underground services to minimise potential for damaging existing services.

The new gas service is to be laid a minimum of 600mm below grade through the tarmac yard in a 75mm surround of fine sand with a warning tape over at 300mm below grade. Back fill the yard with new clause 804 fill in well compacted layers of 100mm and make good and reinstate the tarmac yard as detailed.

The new gas service to be laid a minimum of 600mm below grade through the grass margins in a 75mm surround of fine sand with a warning tape over at 300mm below grade. Backfill with well compacted suitable backfill material and lay a minimum of 100mm of clean new top soil level with the existing grass margin, remove any stones, rake, level and reseed the grass margins to match existing.

Remove all spoil off site to a licenced waste disposal facility and clean all work areas including a light power wash.

9.12 LPG Compound

The contractor shall allow for cutting down and removal of existing trees, shrubbery and hedging and for grubbing up the root balls within 3 meters of the new gas storage compound and for stripping off top soil and reducing the level of the embankment and forming a level base in preparation for constructing the new gas storage compound as indicated on the drawings.

All spoil shall be disposed of off-site to a licenced waste facility.

The contractor shall take care not to damage the existing school yard tarmacadam finish unnecessarily while completing the works. All plant equipment shall have rubber tyres – metal track machines shall not be used.

Contractor shall allow for carefully hand digging in the immediate vicinity of existing underground services to avoid damage to the existing services where necessary. Only clause 804 backfill material shall be used in preparing the formation layer for the new concrete base and this shall be well compacted in 100mm layers using a whacker plate to reduce the risk of settlement.

On completion of the base preparation the contractor shall construct the new storage tank compound concrete base as particularly detailed on the drawings.
Construct a new 1.8m high PVC coated V-Mesh fence with two personnel access gates opening outwards and with secure padlockable locks.

The contractor shall construct new 1.2m wide concrete footpaths minimum 100mm deep on top of a well compacted 150mm clause 804 formation layer from the compound access gates to the existing tarmacadam yard.

The contractor shall protect the existing bollard lights from damage during the construction works.

9.13 Electrical Builders Works

The Contractor shall allow for completing all associated electrical builders work i.e. chases/holes for conduit, trunking, tray etc. and for making good and redecoration to match existing finishes. Electrical services shall be generally surface mounted and painted to match existing finishes.

9.14 Painting & Redecoration

On completion of the works internally in the school the contractor shall clean and prepare wall and ceiling surfaces repaired / disturbed by this contract for final painting with standard emulsion paint finish. (Dulux Matt or equal - colours to match existing to engineer/client approval). All new surfaces shall be given an undercoat or primer before application of the two coat finish, with colours to match existing to client selection.

All new surface run heating pipe work are to be given a primer, one undercoat and two finish coats of paint, with colours to match existing room paint finishes.

All new galvanised trunkings conduit drops are to be given a ‘T’ cut, one undercoat and two finish coats of paint, with colours to match existing room paint finishes. (Paint to be Dulux Gloss or equal - colours to match existing to client approval).

The walls where radiators have been removed shall be given an undercoat and two finish coats of emulsion paint from floor to window board level to match existing wall paint finish.

The painting sub-contractor shall wire brush all gas distribution steel pipework and apply a primer one undercoat and two finishing coats of oil based gloss paint finish, colour yellow RAL 1004, and label ‘LPG’ at 3 meters interval.

9.15 Contract Site Temporaries / Access / Hot Works etc

The contractor shall provide adequate temporary lighting where required, whilst the work is being completed. Connection to the existing school power supply shall be allowed by the employer

The contractor shall provide a hot works permit, fire blanket and fire extinguisher where hot works are being carried out and should be observed for at least two hours after works are complete, to reduce risk of fire.

The contractor is responsible for hiring of a skip from reputable waste removal company for the removal and disposal of waste and redundant materials generated by the installation works.

9.16 Contract Clean

The proposed works shall generally be completed outside of normal school hours during the Autumn school term and the contractor shall be operating in a live school environment. The contractor shall complete a clean down of the work areas at the end of each shift to ensure the school is in a reasonably clean state to allow normal school activities to be undertaken on the following school day. It is envisaged that all contractor materials and equipment would nbe removed and stored away and that cleaners would complete a clean down of the work site.

The contractor shall allow for a thorough **deep clean** of the complete school immediately prior to final handover by a **specialist contract cleaning company**. The timing for the final contract clean shall be by prior agreement with the Engineer and School Principal and shall only proceed when all upgrade works are fully completed.

APPENDIX A

DRAWING SCHEDULE

DOCUMENT & DRAWING SCHEDULE

Fahey O'Riordan
Consulting Engineers
Shanaclogh, Cappawhite, Co Tipperary
Telephone:- 062 75929 Email:- info@force.ie

Project Nr.	**Project**	**By**	JF	JF					
2625	**Scariff Community College** **Heating Services Upgrade & Gas Conversion** **Emergency Works Project 2026**	**Day**	29	07					
		Month	07	09					
		Year	26	26					
Drawing Nr.	**Drawing Title**	**Size/Scale**							
2625-BW-01	Associated General Builders Works - Layout & Details Sheet 1 of 2	A1 / As Shown	T0	T1					
2625-BW-02	Associated General Builders Works - Layout & Details Sheet 2 of 2	A1 / As Shown	T0	T1					
2625-ME-01	Proposed Heating Services Power & Control and Boiler House Electrical Layout	A1 / As Shown	T0	T1					
2625-MG-01	Proposed Gas Services Upgrade and LPG Gas Compound Layout & Details	A1 / 1:00	T0	T1					
2625-MH-01 SH.1	Existing Heating Services Layout and Proposed Strip Out Works & Reinstatement	A1 / As Shown	T0	T1					
2625-MH-01 SH.2	Existing Heating Services Layout and Proposed Strip Out Works & Reinstatement	A1 / 1:100	T0	T1					
2625-MH-02 SH.1	Proposed Heating Services Layout & Details - Zone 1 North Facing Rooms Layout	A1 / 1:100	T0	T1					
2625-MH-02 SH.2	Proposed Heating Services Layout & Details - Zone 2 South Facing Rooms Layout	A1 / 1:100	T0	T1					
2625-MH-03	Proposed Boiler House Layout and Heating & Gas Services Details	A1 / As Shown	T0	T1					
2625-MS-01	Proposed Heating Services Schematic	A1 / NTS	T0	T1					
2625-MS-02	Proposed Heating Services MCC Power & Controls Schematic	A1 / NTS	T0	T1					
2625-MZ-01	School Site Plan & Proposed Phasing plan Layout	A1 / 1:200	T0	T1					
Document Nr.	**Document Title**								
2627 Letter	Letter of Invitation To Tender	A4	T0	T1					
2625-PP-01	Preliminary Plan for Phased Upgrade Programme	A4		T1					
2625-ITTW4	Instructions to Tenderers	A4	T0	T1					
2625 Declaration	Declaration of Suitability For Contractors for Small Works	A4	T0	T1					
2625-SPM	Volume A - Works Requirements - Particular Mechanical Specification	A4	T0	T1					
2625-FTS-6	Volume B - Form Of Tender & Schedule	A4	T0	T1					
2625-SOP	Volume C - Pricing Document / Schedule of Prices	A4	T0	T1					
2625-PHSP	Volume D - Preliminary Health & Safety Plan	A4	T0	T1					
PW-CF6	Conditions of Contract	A4	T0	T1					
Checklist	Tender Return Checklist	A4	T0	T1					
		Method of Issue	E	E					
		Purpose of Issue	T	T					

Distribution		**No of Copies**						
Marie Cooney	Limerick & Clare ETB	1	1					
Angela McNamara	Princial - Scariff Community College	1	1					
e-Tenders	Tendering Contractors	1	1					
File		1	1					

Method of Issue: P = Hardcopy Post E = Email D= Disk
Purpose of Issue: A = Approval I = Information T = Tender C = Construction PP = Progress Print