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APPENDIX F

MECHANICAL SPECIFICATION

For - **Central Swindon North Parish Council**

Project - **John Moulton Hall Community Centre, Penhill Drive, Swindon, SN2 5DU**

Affleck Group Services
10a Oppenheimer Centre
Greenbridge
Swindon
SN3 3LH

Ref: **1960/6.1/GBL**

Date: **April 2018**

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DIVISION 01

INTRODUCTION

1 INTRODUCTION

- 1.1 This specification is intended to be used as the general basis for the refurbishment of the John Moulton Hall Community Centre in Penhill. This specification will provide the general mechanical services details required for the proposed new heating installation throughout including new heat emitters to match existing and new ceiling panel heaters. Allowance should be made for new sanitary ware connections. At this stage it is assumed the sanitary ware is to remain with minor alterations.
- 1.2 The scope is to include:
- Installation of gas service to the existing boiler.
 - Installation of water service to all appliances.
 - Installation of new heating system throughout, supply & fit radiators and high level panel heaters and fan convectors
 - Installation of all hot & cold water services local to appliances.
 - Installation of kitchenette hot and colds water services
 - Installation of new sanitary ware to each toilet area.
- 1.3 The drawings for the schemes are:
- a. Typical layout of the building including proposed new heating routes (sizing and routes to be confirmed)
 - b. Locations of existing heat emitters (sizes to be confirmed by contractor). Refer to the drawing issue sheets for the tender issue documents
- 1.4 The anticipated programme is to be agreed. The Contractor shall liaise with the Contract Administrator at all times with reference to the day to day activities and the site phases.
- 1.5 The Contractor shall prepare a detailed programme based on the outline programme and submit with the tender to show the works on site.
- 1.6 This document shall be read in conjunction with the general Electrical specification and drawings also provided with the tender documentation.

Any discrepancy between the specification, contract documentation or conceptual drawings shall be drawn to the attention of the Employer's Agent immediately.

DIVISION 02

SCOPE OF WORKS

1 SCOPE OF WORKS

- 1.1 The works for the mechanical and plumbing services installations shall comprise the procurement, delivery, off-loading, erection, installation, setting to work and commissioning of the complete installations as described within this document and indicated on the attendant drawings. Included within these works shall be the supply of all materials, plant, tools, labour, equipment and adequate resourcing, supervision and management for the complete and proper execution and subsequent operation of the works.
- 1.2 All aspects of the design and installations shall comply fully with the recommendations of the current CIBSE Guides [Books A,B and C], the Institute of Plumbing Engineering Services Design Guide, all **relevant British Standards Codes of Practice and Statutory/Local Authority By-Laws and Regulations**. The successful contractor shall be responsible for obtaining all necessary approvals from Statutory Authorities relating to incoming statutory services and all building control items relating to the building services installations.
- 1.3 The mechanical services on this project shall include:
- a) Boiler & controls
 - b) Heating pipe work installation and associated insulation
 - c) Domestic pipe work and associated insulation
 - d) LTS type radiators with TRV's, high level fan convectors and high level heating panels with controls
 - e) Kitchenette & toilet alterations.

2 EQUIPMENT SELECTION

2.1 Boiler Control Panel:

Aegir Technical Services Ltd
Unit 9B, Dunkirk Business Park,
Frome Road, Southwick,
Trowbridge, Wiltshire, BA14 9NL
Tel:- 01225 - 766983, Fax:- 01225 – 763998

or similar approved

2.2 Radiators (c/w TRV's):

Stelrad LST or similar approved

Duty: See schedules within this document

2.3 Fan convectors:

S.P.Coils or similar approved

Main Tel: **+44 (0) 116 2490044**

Main Fax: **+44 (0) 116 2490033**

Website: **www.spc-hvac.co.uk**

Address: **SPC House, Evington Valley Road,Leicester, LE5 5LU, UK**

2.4 Radiant heat panels:

S.P.Coils or similar approved

Main Tel: **+44 (0) 116 2490044**

Main Fax: **+44 (0) 116 2490033**

Website: **www.spc-hvac.co.uk**

Address: **SPC House, Evington Valley Road,Leicester, LE5 5LU, UK**

DIVISION 03

CONTRACTOR'S OBLIGATIONS

1 GENERAL/CONTRACTUAL

- 1.1 The Contractor shall, supply, install, test and commission the complete works as shown on the drawings and described in this specification, to the entire satisfaction of the Contract Administrator in the performance, aesthetics and general layout of the installation.
- 1.2 The specification and tender drawings shall apply throughout the period. **For contractual conditions and form of contract refer to detailed documents issued with this specification by the client and/or their representatives.**
- 1.3 Alterations shall not be made to the detail of the specification or the tender drawings without written permission from the Contract Administrator.
- 1.4 Samples of materials shall be provided before installation commences, upon request, at no cost to the Employer.
- 1.5 Contractor shall be responsible for programming the works, including any specialist contracts and responsibility for completing the project on time remains with the Contractor.

2 WORKING DRAWINGS

- 2.1 It is of the essence of the contract that the Contractor shall provide a complete set of working drawings showing the detailed layout of all the services and equipment that he is to supply and install.
- 2.2 No installation shall take place before the Contract Administrator has been allowed adequate time to make comments on the working drawings. Should comment by the Contract Administrator be required immediately in order to avoid delays, the Contractor shall bring this to the Contract Administrator's attention.
- 2.3 3no. copies of all working drawings shall be provided to the Contract Administrator for general issue to the other Contractors after the detail shown has been agreed.
- 2.4 Failure to comply with this requirement shall render the Contractor liable for the whole cost of rectification and responsible for any damages arising from any delays that may occur.
- 2.5 Working drawings shall be to a schedule and at a scale instructed by the Contract Administrator. All builders work and critical dimensions for the co-ordination of the installation with other trades shall be shown. The material of which each part of the installation is to be made is to be shown on the drawings.

- 2.6 The Contract Administrator's comments shall in no way relieve the Contractor of his responsibility to provide equipment suitable for its purpose or for the accuracy of his drawings. Modifications to the Contractor's drawings, as may be demanded by the Contract Administrator, shall not involve the Employer in extra expense.
- 2.7 The dimensional co-ordination between the building, the equipment and the services to be installed shall be to the responsibility of the mechanical contractor. He shall liaise with the Contract Administrator to ensure adequate space for the proper operation of the plant.

3 STANDARDS, CODES OF PRACTICE, REGULATIONS AND BYELAWS

3.1 STATUTORY AND LOCAL AUTHORITIES

All materials and installation techniques shall comply with:

- a. The Health & Safety at Work Act 1974
- b. The Control of Substances Hazardous to Health Regulations 2002
- c. Local Authority
- d. Fire Brigade
- e. British Gas
- f. Institution of Gas Engineers & Managers (IGEM)
- g. Electricity at Works Regulations 1989
- h. Water Board
- i. The relevant British Standards and Codes of Practice
- j. Police Regulations
- k. The Construction (Design & Management) Regulations (CDM) 2015
- l. Loss Prevention Council Guide

3.2 CODES OF PRACTICE

All materials and installation techniques shall comply with the Regulations and Codes of Practice of:

- a. The Chartered Institute of Building Services
- b. The Institute of Electrical Engineers [Regulations for the Electrical Equipment of Buildings].

3.3 MANUFACTURERS RECOMMENDATIONS

The design and installation shall be in accordance with the manufacturers' recommendations for all plant and equipment.

3.4 SITE BIBLIOGRAPHY

A current copy with all revisions included of the British Standard Handbook No. 3, the relevant British Standard Codes of Practice and manufacturers literature for the products to be used in the installation, shall be available to all supervisory personnel on site.

4 GENERAL/STATUTORY

- 4.1 Police Regulations: the Contractor shall ascertain and comply with Police Regulations.
- 4.2 Health, Safety and Welfare: the Contractor shall comply with enactments, regulations and working rules relating to the safety, health and welfare of workpeople.
- 4.3 Use of Site: the Contractor shall not use the site for any purpose other than carrying out the works.
- 4.4 Advertisements: the Contractor shall not display nor permit to be displayed on the site any advertisements without the Contract Administrator's approval.
- 4.5 Noise Control: the Contractor shall ensure that all measures to control the noise levels produced by his operations on site that are required by any regulation, enactment or working rules, are strictly adhered to. He must indemnify the employer against action concerned therewith arising from site operations.
- 4.6 Fire: the Contractor shall take all precautions to prevent personal injury, death and damage from fire.
- 4.7 Nuisance: the Contractor shall take all precautions to prevent nuisance caused by smoke, dust, rubbish and any other causes.
- 4.8 Protection of Materials and Equipment: the Contractor shall take all necessary precautions to protect from damage, theft and inclement weather those materials and equipment which form the installations whether they be fixed or unfixed.
- 4.9 Interruption of Existing Services: the Contractor shall not, without having received the written permission of the Contract Administrator, interfere with or interrupt in any way the operation of any existing services, such as gas, steam, hot and cold water, sewers, drains, electricity cables etc., and in the case of work of statutory authorities or private owners, without the permission of such authorities or owners.

5 MANAGEMENT/ADMINISTRATIVE PROCEDURES

- 5.1 Programme: immediately upon notification that his tender will be accepted, the Contractor shall arrange a programme for installation of the works including any Specialist Contractors. The whole of the work must be carried out in such order and stages to suit the building

operation agreed and approved between the Contract Administrator and the Specialist Contractor.

- 5.2 Supervision: the Contractor shall at all times throughout the execution of the works employ a competent foreman to supervise the proper carrying out of the work and the said foreman shall remain at all times on the site.
- 5.3 Progress Reports: the Contractor shall allow for preparing and submitting detailed reports of the progress of the manufacture, erection and installation of all plant, equipment and materials included in the contract.
- 5.4 Contract Administrator's Site Meetings and Main Contractor's Site Meetings: the Contractor shall allow for a qualified representative to be present at the Contract Administrator's site meetings and the Main Contractor's site meetings when requested.
- 5.5 Daywork/Daywork Vouchers: for the purpose of assessing daywork for labour and/or materials the Contractor is to complete the section for dayworks detailed in this specification. The Contractor shall obtain the signatures of the Clerk of Works and Foreman in Charge upon daywork vouchers as evidence that the time and materials as shown are correct, before being delivered to the Contract Administrator for verification and signature. Daywork vouchers shall include the workmens names.
- 5.6 Measurements: the Contractor shall give reasonable notice to the Contract Administrator before covering up work which will be concealed which the Quantity Surveyor requires to be measured and/or the Service Consultants wish to inspect.
- 5.7 Detailed Statements: the Contractor shall provide a detailed statement for the Main Contractor showing the amount of work executed to date and materials delivered to site in support of applications for each valuation.
- 5.8 Unfixed Materials; the Contractor shall at the time of each valuation disclose to the Contract Administrator which of the unfixed materials and goods on site are free from, and which are subject to, any reservation of title inconsistent with passing of property as required by Clause 14 of the conditions of contractor, together with their respective values. The Contractor shall when requested provide evidence of freedom from reservation of title.
- 5.9 Overtime: the Contractor shall give the Contract Administrator no less than 3 working days notice specifying times, types and locations of work to be done. Concealed work executed during overtime for which notice has not been given may be required to be opened up for inspection and reinstated at the Contractor's expense.

All works carried out under the Contract shall normally be executed during the normal working hours as agreed between the appropriate trade organisations, as applicable to the district in which the works are being carried out.

- 5.10 Making Good Defects: the Contractor shall make arrangements with the Employer and give reasonable notice of the precise dates for access to the various parts of the works for the

purposes of making good defects. The Contractor shall inform the Contract Administrator when remedial works to the various parts of the works are completed.

- 5.11 Covering Up: the Contractor shall give not less than two working days notice to the Contract Administrator or Clerk of Works before covering up work requiring inspection.
- 5.12 The Contractor shall allow in his tender for making amendments to his working/shop drawings and details consequent of Contract Administrator's site meetings.

DIVISION 04

COMPLETION

1 DEFINITIONS

- 1.1 The installation shall be certified as practically complete after all services installations for which the Contractor is responsible have been installed, tested and commissioned in accordance with the specification and the tender documents and any subsequent variations to the Contract Administrator's satisfaction.
- 1.2 Testing shall be deemed to be the proving of the installation during construction.

Commissioning shall be deemed to be bringing the plant into use and demonstrating the specified performance. In order that the Employer may use the building for its intended purpose, including specific areas for their specified purpose.

Failures brought to light by testing or commissioning shall be rectified and the system re-tested and re-commissioned at no additional cost to the contract.

2 TESTING AND COMMISSIONING

- 2.1 Testing and commissioning shall be carried out by the Contractor as itemised in this specification. There will also be a requirement for additional inspections and tests during manufacture and erection as requested by good building practice, manufacturers recommendations, or as the Contract Administrator shall prescribe to prove the performance of the materials and the installation.
- 2.2 Codes of Practice for Testing and Commissioning: where published by the Chartered Institute of Building Services Engineers shall be followed. Where codes of practice are not published, or applicable, the manufacturer's commissioning procedure shall be carried out.
- 2.3 Measuring instruments or meters for testing and commissioning calibrated to the Contract Administrator's satisfaction shall be provided by the Contractor at no cost to the Contract.
- 2.4 Power shall be provided free issue by the Employer, however, connecting to the service provision as necessary to complete the testing and commissioning will be carried out by the Contractor at no charge to the Employer.
- 2.5 Before putting any plant into operation, the Contractor shall ensure the proper preparation and lubrication of all plant.
- 2.6 The Contractor shall provide the Contract Administrator with a programme showing salient dates for demonstrating the completion of commissioning before hand over.
- 2.7 Full facilities shall be provided by the Contractor for the Contract Administrator to witness the commissioning tests, but this will not absolve the Contractor of his obligations to ensure the proper running of the plant. The Contractor will give a minimum of five working days notice, in writing, for such witnessing.

3 PROVISIONS BY THE CONTRACTOR

- 3.1 Equipment guarantees associated with the installation shall be passed on to the user, they shall not in any way affect the Contractors obligations.
- 3.2 Tools and spares shall be provided to a schedule to be agreed with the Contract Administrator, generally in accordance with the manufacturer's recommendations, including special tools required, sufficient to maintain the installation for 12 months.
- 3.3 In order to satisfy Health & Safety requirements, final as-fitted drawings and manuals shall be provided prior to the date of practical completion. They shall comprise three sets of plans of the installation printed at full scale.

NOTE: Drawings shall also be issued on CD-Rom Autocad format and in drawing format.

- 3.4 Operating and maintenance manuals must include:
- a. A full technical description and scope of works for each of the systems installed, written to ensure that the Employer's staff fully understand the scope and facilities provided.
 - b. A technical description of the mode of operation and control of all systems.
 - c. Diagrammatic drawings of each system indicating principal items of plant, equipment, valves etc.
 - d. A photo-reduction of all record drawings to A3 size, together with an index.
 - e. A Legend for all colour-coded services.
 - f. Schedules [system by system] of plant, equipment, valves, etc., stating their model reference, locations within the building, duties and performance figures. Each item of plant, equipment, valves, etc., installed shall have a unique code number cross-referenced to the record and diagrammatic drawings and schedules.
 - g. The name, address, telephone and fax number and website of the manufacturer of every item of plant and equipment together with catalogue list numbers.
 - h. 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.
 - j. A copy of all test certificates [including but not limited to electrical circuit tests, corrosion tests, type tests, works tests, start and commissioning tests] for the installations and plant, equipment, valves etc., used in the installations.
 - k. A copy of all manufacturer's guarantees or warranties.

- l. Starting up, operating and shutting down instructions for all equipment and systems installed.
 - m. Control sequences for all systems installed.
 - n. Schedules of all fixed and variable equipment settings established during commissioning.
 - o. Procedures for seasonal changeovers.
 - p. Detailed recommendations as to the preventative maintenance frequency and procedures which should be adopted by the Employer to ensure the most efficient operation of the systems.
 - q. Lubrication schedules for all lubricated items of plant and equipment.
 - r. A list of normal consumable items.
 - s. Procedures for fault finding.
 - t. Emergency procedures, including telephone numbers for emergency services and out-of-hours call out.
 - u. A list of involved parties.
- 3.5 Presentation of Manuals: the manuals are to be A4 size in plastic covered, loose leaf ring binders with hard covers, each indexed, divided and appropriately cover-titled. Drawings larger than A4 shall be folded and accommodated in the binders so that they may be unfolded without being detached from the rings.
- 3.6 Temporary Manuals: provisional record drawings and preliminary performance data will be made available at commencement of commissioning or four weeks prior to completion, whichever is sooner, to enable the Employer's staff to familiarise themselves with the installation. These manuals shall be of the same format as the final manuals with temporary insertions for items which cannot be finalised until the installations are commissioned and performance tested. Two copies will be made available. Practical completion will not be granted until the temporary manuals are available.
- NOTE: Manuals must also be issued on CD-Rom in "Word (.doc)" format and in PDF format.
- 3.7 All plant and apparatus shall be provided with nameplates giving the makers name, reference number, size, type, speed or any other relevant particulars. Valves shall be provided with a captive metal tag stamp numbered which shall refer to the valve chart to be provided with the as-fitted drawings.
- 3.8 As-installed drawings will indicate the as-installed routes of all relevant services including locations of equipment or accessories which will require checking or maintenance by service engineers which may be hidden by ceilings or finishes.

The drawings will indicate plant or equipment by name or reference which shall be cross-referenced to the schedules or charts included in the manuals or installed in plant rooms. Location of danger or special consideration shall be clearly indicated.

The as installed drawings are to include all details of the existing installation where necessary and relevant to provide complete and accurate record information.

- 3.9 The Contractor shall provide full instruction in the operation the maintenance of the completed installations and shall allow adequate time for attendance by a member of his staff fully conversant with the works and competent to instruct. These instructions are to be given at a time instructed by the Contract Administrator. The Contractor shall allow for at least 4 no testing/commissioning visits after completion in order to fine tune the installation and adjust settings.
- 3.10 Two sets of as-installed drawings and one copy of the maintenance manual will be forwarded to the Contract Administrator for approval. The procedure will apply to temporary manuals and as-installed manuals.

One set of as-installed drawings and the maintenance manual will be returned marked up with comments and amendments. The Contractor will incorporate the comments and amendments and issue three sets of the as-installed drawings and manuals to the Contract Administrator for distribution.

An appropriate sum of money will be withheld from payment to the Contractor until approved documentation is received.

- 3.11 The Contractor shall prepare a maintenance schedule for approval in sufficient time to have this incorporated into the instruction manual prior to practical completion.

4 MAINTENANCE AND DEFECTS LIABILITY

- 4.1 Final examination shall be carried out at the end of the defects liability period. The comprehensive examination shall be carried out in conjunction with the Contract Administrator. Retention will not be released until the examination and items arising out of the examination are completed to the satisfaction of the Contract Administrator. If, in the opinion of the Contract Administrator, an adequate completion of defects cannot be attained, the right is reserved to have those works completed by others at the Contractor's expense.
- 4.2 All faults reported within the 12 months defects period shall be actioned within a 2-week period. Failure to do so will result in the works being completed by others and costs deducted accordingly.

DIVISION 05

PIPEWORK

1 SCOPE

- 1.1 The work covered by this section of the specification consists in providing all plant, labour, equipment appliances and materials and in performing all operations for pipework installation, in strict accordance with this section of the specification and the applicable drawings and subject to the terms and conditions of the contract.

2 APPLICABLE PUBLICATIONS

- 2.1 Pipework installations shall be done in accordance with the current British Standards, Codes of Practice and Standards required by the relevant Institution and shall comply with the latest edition of the Water Supply Undertakers Byelaws.

3 MATERIALS, STORAGE AND HANDLING BEFORE USE

- 3.1 Dry covered storage shall be provided for all materials which shall be handled in a manner to prevent damage and in accordance with the manufacturers recommendations.
- 3.2 Maker's identification and trademarks shall be kept on all stored materials and fittings.
- 3.3 Threads not fitted with sockets shall be fitted with end cap protectors during transit. These shall only be removed immediately prior to installation.

4 MATERIALS

- 4.1 Pipes shall be free from imperfections and deformations as supplied by the manufacturer.
- 4.2 Mild steel fittings for welded joints shall be to BS.1965.
- 4.3 Screwed joint fittings shall be to BS.143.
- 4.4 Incoming water mains: underground pipework shall be medium density polyethylene pipe to BS.6572 and water industry specification 4-32-04. All fittings shall be of the Electrofusion type.
- 4.5 Incoming water mains: underground pipework shall be uPVC pipe to BS.3506 "Class D" - 12 Bar.

5 TESTING AND COMMISSIONING

- 5.1 Water pipework hydraulic pressure testing: shall be to the specified pressure. The test shall be applied for 30 minutes with the pump disconnected with no detectable drop in pressure. This test shall be applied to each section of pipework before it is covered up and to the whole system before it is lagged and commissioned. The Contractor shall provide the Contract Administrator / Architect / Supervising Officer with the opportunity to witness such tests.

Equipment to be installed in the system not designed to these pressures shall be excluded from the tests. On completion of the test the system shall be drained rapidly to remove dirt and waste.

External water main	-	test pressure 1200kN/m ²
Rising main	-	test pressure 1200kN/m ²
Cold Water Down Service	-	test pressure 700kN/m ²
Hot Water & Heating Water Service	-	test pressure 700kN/m ²
Chilled Water	-	test pressure 700kN/m ²
Hose Reel Service	-	test pressure 1200kN/m ²
Gas Services	-	to be tested to latest regulation

- 5.2 Pseudomonas bacteria control: The Contractor shall exercise care to reduce the risk of

contamination e.g.:

- a. Hoses and temporary equipment used for filling the system should be chlorinated before use and where possible stored in a clean environment.
- b. Pipework should be prevented from debris contamination when stored or on site and ends should be capped.
- c. The system should be designed to allow easy and complete flushing of all the pipework.
- d. Use only clean mains water for filling or testing the systems.

- 5.3 Washing out: before being put into regular service, all water pipework shall be washed out to the Contract Administrator's / Architect's / Supervising Officer's satisfaction. The Contractor shall allow for disconnection and re-connection of the pipework.

- 5.4 Partial test: unfavourable conditions - if these exist at the time of testing, partial tests as agreed with the Contract Administrator / Architect / Supervising Officer shall allow practical completion. Full operational tests shall be carried out as soon as conditions make it possible.

- 5.5 Sterilisation: the complete installation of pipework and tanks involved with the domestic water services, including the incoming water main, shall be thoroughly sterilised, by a specialist contractor, to BS Code of Practice BS6700 Section 3, Clause 3.1.10.

6 LABELS, NAMEPLATES AND PAINTING

- 6.1 Visible services: shall be colour coded over all their length.

- 6.2 Painting: shall be applied to all services in:

- a. Areas without ceilings
- b. Below all ceilings
- c. Above 'open cell' [e.g. Formalux] ceilings

The above applies whether the services are insulated or not.

- 6.3 Painting of Uninsulated Materials: one coat primer, one coat undercoat and one coat of gloss shall be applied to all metalwork including pipework fittings, valves, flanges, supports etc. Colours to be in accordance with CP231 unless directed otherwise.

- 6.4 Valves shall be marked with a captive metal tag stamped with the valve number, which shall be shown on the as-fitted drawings.

7 BRACKETS, SUPPORTS, HANGERS, SLEEVES AND FLOOR PLATES

- 7.1. Fixing: pipe brackets shall be securely fixed to the structure in such a manner as to carry the pipework when fully operational.

- 7.2 Expansion: pipework brackets and supports shall be designed to allow expansion and contraction of movement freely, either:

- a. in the direction of the pipeline
- b. laterally, in the same plane as the pipeline

- 7.3 Spacing of supports:

Nom. Size of pipe	Max support spacing (metres)					
	STEEL		COPPER		PLASTIC	
	Horiz	Vert	Horiz	Vert	Horiz	Vert
150mm	3.6	5.4	2.7	5.4	1.2	3.6
125mm	3.6	4.5	2.7	4.5	1.0	3.0
100mm	3.6	4.5	2.7	4.5	0.8	2.4
90mm	3.6	4.5	2.7	4.5	0.7	2.1
65mm	3.6	4.5	2.7	4.5	0.5	1.5
50mm	3.0	3.6	2.4	3.6	0.4	1.2

40mm	3.0	3.6	2.1	3.6	0.3	0.9
32mm	2.7	3.0	2.1	3.0	0.3	0.7
25mm	2.4	3.0	1.5	3.0	0.3	0.6
20mm	1.8	2.4	1.2	2.4	0.2	0.3

Where more than one pipe is carried, the spacing of the hangers shall be that required by the smaller pipe.

- 7.4 Fittings Supports: pipework to all valves, cocks and other components shall be supported to prevent undue strain and allow component removal.
- 7.5 All hangers and supporting metalwork shall be prefabricated.

The Contract Administrator's approval shall be sought before manufacturing on site.
- 7.6 Sleeves of floor plates shall be fitted where pipes go through the building fabric.
- 7.7 Sleeves shall be of sufficient internal diameter to allow free movement of the pipe. Where the pipe is to be lagged the sleeves shall allow for the thickness of the lagging.
- 7.8 Sleeves through walls shall be finished flush with the faces of the finished structure. Sleeves through floors shall extend above the floor finish by 12.5mm and shall finish flush to the soffits
- 7.9 Cover plates: where requested cover plates shall be provided and fixed to the structure and not to the pipework.
- 7.10 Sleeved pipework that is unlagged shall have the joint between the pipe and the sleeve caulked at either end.

8 MATERIALS, STORAGE AND HANDLING BEFORE USE

- 8.1 Dry covered storage shall be provided for all materials which shall be handled in a manner to prevent damage and in accordance with the manufacturers recommendations.
- 8.2 Maker's identification and trademarks shall be kept on all stored materials and fittings.
- 8.3 All pipe work shall be fitted with end cap protectors during transit. These shall only be removed immediately prior to installation. Copper pipe work delivered to site without end cap protection shall be rejected.

9 MATERIALS/INSTALLATION

9.1 Pipe work shall be copper:

- a. 6.4mm OD to 9.5mm OD – Soft Tempered
- b. 12.5mm OD to 18.5mm OD – Half Hard

9.2 Pipes shall be free from imperfections and deformations as supplied by the manufacturer.

9.3 All pipe work shall be cut with a proprietary pipe cutter and shall be deburred at an angle below the horizontal to ensure that all particles fall away from the pipe.

10 TESTING AND COMMISSIONING

10.1 On completion of pipe work installation but prior to opening service valves, a full and comprehensive leak test programme shall be carried out. This test shall be applied to each section of pipework before it is covered up and to the whole system before it is lagged and commissioned. The Contractor shall provide the Contract Administrator / Architect / Supervising Officer with the opportunity to witness such tests.

11 LABELS, NAMEPLATES AND PAINTING

11.1 Visible services: shall be colour coded over all their length.

11.2 Painting: shall be applied to all services in:

- a. Areas without ceilings
- b. Below all ceilings
- c. Above 'open cell' [e.g. Formalux] ceilings

The above applies whether the services are insulated or not.

11.3 Painting of Uninsulated Materials: one coat primer, one coat undercoat and one coat of gloss shall be applied to all metalwork including pipework fittings, valves, flanges, supports etc. Colours to be in accordance with CP231 unless directed otherwise.

11.4 Valves shall be marked with a captive metal tag stamped with the valve number, which shall be shown on the as-fitted drawings.

12 BRACKETS, SUPPORTS, HANGERS, SLEEVES AND FLOOR PLATES

12.1 Fixings: pipe brackets shall be Mupro insulated clamp type and fixed to the structure in such a manner as to carry the pipe work when fully operational. The support shall allow the pipe work movement in the expansion plane and shall not be used as anchor points. The supports shall not allow any vibration to be transmitted to the structure.

12.2 Where flexible vibration eliminators are to be installed in half hard (full-drawn) copper pipe work, they shall be installed in pairs, 90degrees opposed and as close to the vibration source as possible and anchored on the opposite side to the source.

12.3 Spacing of supports:

Max support spacing (metres)

SOFT TEMPERRED COPPER

Nom. Size of pipe	Horiz	Vert
1/4in	0.8	1.0
3/8in	1.0	1.2
1/2in	1.2	1.5
65mm	3.6	4.5

Max support spacing (metres)

HARD DRAWN COPPER

Nom. Size of pipe	Horiz	Vert
1/2in	1.2	1.5
5/8in	1.2	1.5
3/4in	1.5	1.8
7/8in	1.5	1.8
11/8in	1.5	1.8

Where more than one pipe is carried, the spacing of the hangers shall be that required by the smaller pipe.

13 CONDENSATE DRAINS

13.1 Copper tube or plastic tube and fittings may be used subject to the suitability of the installation condition. Clear plastic tube is not to be used for any installations.

13.2 All condensate drains shall be laid to fall with a minimum gradient of 2.5 degrees and terminated in an agreed stack. Trap to be dray type as by Hepworth (HepVo) or equal and approved.

DIVISION 09

THERMAL INSULATION

1 SCOPE

- 1.1 The work covered by this section of the specification consists in providing all plant, labour, equipment, appliances and materials and in performing all operations for thermal insulation installations in strict accordance with this section of the specification and the applicable drawings and subject to the terms and conditions of the contract.

2 PUBLICATIONS

- 2.1 Installation shall be done in accordance with current British Standards, Codes of Practice and the Standards of the relevant institution, including BS.3958: Thermal Insulating Materials.
- 2.2 Manufacturers requirements and recommendations shall be adhered to.

3 MATERIAL STORAGE AND HANDLING BEFORE USE

- 3.1 Dry and covered storage shall be provided for all materials, which shall be stored and handled in such a manner as to prevent damage and in accordance with the manufacturers recommendations.
- 3.2 Makers identification and trademarks shall be kept on all stored materials and fittings.

4 MATERIALS

- 4.1 Pipework insulation shall be Class 'O' Armaflex.
- 4.2 Adhesive Tape: for Armaflex shall be Armaflex Class 'O' Insulation Tape.
- 4.3 Plantroom pipework insulation finish shall be 20SWG bright aluminium sheets.
- 4.4 Cold water storage tanks and cisterns: shall be factory insulated.
- 4.5 Hot water cylinders and calorifiers shall be factory insulated.

5 MATERIALS IN USE, WORKMANSHIP

- 5.1 Thermal insulation shall be applied to all surfaces where it is necessary to conserve heat, prevent condensation or prevent damage by frost, including the boxing in of controls.
- 5.2 The minimum thicknesses for pipework insulation shall be as the following table for insulation with a maximum thermal conductivity of 0.042W/m²°C.

Nom. Dia. Pipe [mm]	Heating Pipework [mm]	Cold Water Pipework [mm]
15	25	20
20	25	20
25	32	20
32	32	25
40	32	25
50	32	25
65	40	40
80	40	40
100	40	40
125	40	40
150	50	32
200	50	32
250	50	32

All insulation material shall be in close contact with the surface which it is insulating. All joints shall be sealed.

Adjacent pipes shall be individually insulated with a minimum of 20mm space between lagged pipework.

- 5.3 Insulation work shall not be commenced until the installation to be insulated has been tested to the Contract Administrator's /Architect's /Supervising Officer's satisfaction.
- 5.4 Pipework insulation sections shall be held in place by bands at 600mm intervals.
- 5.5 Pipework insulation sections shall be carefully mitred around bends and other obstructions and suitably fixed
- 5.6 The following services shall be insulated:
- Rising Cold Water Main
 - Hot Water Service
 - Chilled Water Pipework

- d. Primary Heating Pipework
- e. Secondary Heating Pipework
- f. Hot & Cold Domestic Pipework
- g. Heating Pipe work
- h. Boxed-in Services

5.7 The following services shall not be insulated:

- a. Secondary Heating Pipework Exposed in Heated Spaces
- b. Heating Pipework Exposed in the Area in which it Serves
- c. Exposed Final Connections to Radiators and Appliances

DIVISION 14

DOMESTIC HOT AND COLD WATER SUPPLIES

1 SYSTEM DESCRIPTION AND DESIGN CONDITIONS

- 1.1 The work covered in this section of the specification consists in providing all plant, labour, equipment appliances and materials and in performing all operations necessary for the proper installation of the domestic hot water supply system in strict accordance with this specification and the applicable drawings and subject to the terms and conditions of the contract.
- 1.2 Hot and cold water services shall be installed as shown on the drawings and shall include:
- a. Incoming water main
 - b. Hot and cold water distribution throughout the unit
 - c. Connections to all outlets
- 1.3 NOTE: MIXING VALVES (TO REDUCE OUTLET TEMP) TO BE INSTALLED AT ALL OUTLETS.
- 1.4 All sanitary appliances and fittings are to be retained and mixer valves, where required, fitted.
- 1.5 All mounting positions and heights for fittings, mixer and control valve shall be agreed before installation.

2 PUBLICATIONS

- 2.1 Installation shall be done in accordance with current British Standards, Codes of Practice and the standards of the relevant institution.

3 EQUIPMENT HANDLING BEFORE INSTALLATION

- 3.1 Dry covered storage shall be provided for all materials which shall be handled in a manner to prevent damage and in accordance with the manufacturers recommendations.
- 3.2 Makers identification and trademarks shall be kept on all stored materials and fittings.

4 EQUIPMENT SELECTIONS AND SCHEDULES

- 4.1 Thermostatic Mixing Valves (TMV)
- Horne Heatstat T2 or similar approved

5 EQUIPMENT INSTALLATION

- 5.1 Overflow pipes shall be installed to current codes and best practice.
- 5.2 Proximity detection shut off valve (where required) shall be installed to the water supplies to all toilet areas. Plant shall be installed to allow access for the proper maintenance or replacement of all equipment.
- 5.3 Equipment shall be installed in accordance with manufacturers recommendations.

6 TESTING AND COMMISSIONING

- 6.1 Installation shall be pressure tested in accordance with Division 05 of this specification.
- 6.2 Installation shall be sterilised in accordance with Division 05 of this specification.
- 6.3 For general commissioning and system flow tests refer to Division 05 of this specification.

7 LABELS, NAMEPLATES AND PAINTING

- 7.1 All plant and apparatus shall be provided with nameplates bearing makers name, shop or reference number, size, type, speed or any other relevant particulars contained thereon.
- 7.2 All valves shall have captive metal tags and panels in plant rooms shall be labelled with clearly legible numbers and script on engraved plastic laminate. A valve identification chart, together with summary of operating instructions, shall be mounted on a glazed card and securely fixed to the plant room wall.
- 7.3 Painting: shall be as detailed in Divisions 05 and 09 of this specification.

DIVISION 19

CONTROL PANELS AND CONTROLS

1 GENERAL DESCRIPTION

- 1.1 The thermostat will provide manual setting for room temperature.
- 1.2 The programme will provide time control setting for the heating and a manual over ride.

2 PUBLICATIONS

- 2.1 The installation shall be in accordance with current British Standards, Codes of Practice and the Standards of the relevant institutions.

2 EQUIPMENT HANDLING BEFORE INSTALLATION

- 3.1 Dry covered storage shall be provided for all material, which shall be stored and handled in a manner to prevent damage and distortion.

4 CONTROLS SELECTION AND SEQUENCING

- 4.1 The boiler plant shall be enabled via a simple time clock which can be accessed and used by the occupants.