Don O'Malley & Partners

Consulting Engineers - Building Services

MECHANICAL SERVICES SPECIFICATION
TENDER DOCUMENT

FOR

REFURBISHMENT OF THE WILLOW UNIT

AT

ST. JOSEPH'S COMMUNITY HOSPITAL
ENNIS, CO. CLARE

Reference No. 7366 – Rev C0.
Date of Issue: 20th November 2026

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Tenderers are advised to read each and every part/section of this tender document carefully.

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SECTION 1

INTRODUCTION

1.0 INTRODUCTION

Description of Building

- St. Joseph's hospital is located on Lifford Road in Ennis.

The Hospital complex comprises a number of interconnected buildings, together with a number of free standing units.

The central Hospital Building comprises:

· Wards 1-7:
· Canteen/Chapel/Laundry
· Administration/Kitchen
· Central boiler houses
· Day hospital – single storey
· Maintenance Building
· Out-Buildings

The proposed works to willow ward is to include minor partition reorganisation, new kitchen upgrade, new sanitary ware and IPS panels, Replacement of doors, new flooring, general redecoration of the unit. Mechanical services upgrade work s to water services, alteration to heating installation, ventilation works and alterations to existing drainage system

1.1 DESCRIPTION OF MECHANICAL WORKs

The Mechanical installation will comprise of the supply, installation and commissioning of the following services

1. Detailed survey of existing installations namely cold and hot water services
2. Safe isolation and drain down of existing cold and hot water pipework to ward prior commencing of pipework alterations/ disconnections . Mains water to be isolated and tank drained during this sequence of works. Hot water storage calorifier will also be isolated.
3. Disconnection and strip out of existing concealed water services pipework timber bulkheads in each ward
4. Existing pipework alterations, disconnection and removal of same

5. New cold and hot water services pipework including extension of hot water loop and tying into existing
6. New supply and installation of Pipework insulation (foilback)
7. New supply and installation of new Timber boxouts for concealment of pipework services as per builders work drawings
8. Disconnection and strip out of existing indicated PVC waste pipework
9. New installation of PVC waste pipework where indicated on layouts
10. Disconnection of indicated mechanical wall mounted extract fans
11. Installation of new wall mounted extract fans
12. Alteration of existing heating pipework to make provision of a new radiator to new staff changing room.
13. Testing and Commissioning

1.2 SCOPE OF WORKS

See Section 1.1

NOTE TO TENDERING CONTRACTORS

Notwithstanding the contents of this specification and associated drawings, the Contractor shall be fully responsible for the complete installation of the works to ensure that they can be tested and handed over in fully operational mode.

The Contractor shall include in the tender for all necessary items not specifically mentioned or indicated, to achieve this objective.

The contractor shall also include for a site visit and carry out an inspection of the existing services installations as part of the tender process.

1.3 COMPLETION AND HANDOVER

GENERAL

This section details the requirements and procedures for completion and handover.

Handover Requirements

As a pre-requisite to Practical Completion in respect of the contract works or part thereof, demonstrate to the satisfaction of the engineer that:

- All the contract works are completed
- With the exception of minor snags or limited defects as agreed with the engineer that could be reasonably completed within an agreed programme without causing disruption to the Employer's use of the building or part thereof.
- All spares, keys, tools and other consumables as stated elsewhere have been supplied and handed over to the Employer
- The instruction of the Employer's staff in the use and correct operation of the installation has been completed satisfactorily. In particular, safety devices and controls demonstration
- All commissioning and testing completed including the issue of a final commissioning report signed by an approved competent person
- A complete demonstration of the contract works with fully functional operational controls tested has been undertaken in the presence and to the satisfaction of the engineer
- All necessary certification by the Employer's insurers has been completed

- All approved record documentation including record drawings, operation and maintenance manuals, etc., is issued
- All information required for the health and safety file is issued to the satisfaction of the Planning Supervisor.

The information shall include:

- A written description of plant operation
- Control strategy/logic diagrams recording the final version of configuration software installed at handover.
- Details of system application software configuration
- A points list including hard and soft-points (all points should have a unique mnemonic)
- A description of user adjustable points
- Commissioning record details
- Detailed data sheets for all control components and equipment
- Wiring circuit details including origin, route and destination of each cable
- Basic security access to the system
- Comprehensive instructions for switching on, operation, switching off, isolation, fault finding and procedures for dealing with emergency conditions
- Instructions for any precautionary measures necessary
- Instructions for the routine operation of the control system including simple day-to-day guidance for those with limited technical skill
- Instruction for servicing and system upkeep
- A provision for update and modification
- All necessary Statutory Authority approvals have been undertaken and written confirmation established
- Completion and issue of log books in accordance with Building Regulations. In accordance with CIBSE TM31 Building Log Book (Toolkit (standard templates)

Training of Employer's Staff

Prior to Practical Completion explain and demonstrate the purpose, function and operation of the installations including all items and procedures listed in the operation and maintenance manual

- To the Employer's maintenance staff
- To the operational staff

Submit to the Architect for approval a detailed programme for the training of the Employer's staff

Time scale – three weeks before commencement of training

- Employ the services of relevant specialists and suppliers for the purpose of training and instruction

- Provide each person with a comprehensive set of teaching notes and diagrams

- Be responsible for the correct operation and maintenance of the installation during such periods of instruction.

- All costs associated with the instruction of the Employer's personnel and required attendance following practical completion shall be included in the contract price

- Following practical completion and occupation be available for a period as agreed with the Architect to assist the Employer's personnel in the operation of the various system together with the

  - controls specialist
  - commissioning specialist

1.4 MAINTENANCE & SERVICING

The Tenderer shall be responsible for and shall repair, at his own expense, any equipment which proves to be defective – in the Engineer's opinion – with respect to materials, workmanship or design, which defects become apparent within 12 (twelve) months from the date of practical completion of the Main Contract.

The Contractor shall be responsible for full maintenance and servicing of all plant including bi-monthly, or as required under the codes and standards.

The Contractor shall be responsible for replacement parts or recommended by supplier for the first twelve months after handover to the Client.

Provide any additional work and materials necessary to maintain these services at all times during the duration of the contract works

1.5 MAINTENANCE MANUALS

The Contractor shall include in his tender for the supply of 1 No. sets of operating maintenance manuals and one electronic copy for all items of equipment supplied under this contract.

These manuals shall also indicate the manufacturer or his agent where spare parts etc. can be obtained.

1 No. complete sets of Record Drawings, A1 Drawings and Electronic Compact discs shall also be provided.

Refer to Part 6 of the specification for details regarding contents of the O & M Manuals.

SECTION 2

PRELIMINAIRES

PRELIMINARIES

The Mechanical Contractor shall review the full preliminaries included the Main Contract as set out by Quantity Surveyor

SECTION 3

GENERAL CONDITIONS OF TENDER

GENERAL CONDITIONS OF TENDER

3.1 FINAL TENDER

This tender is final-based on the final working drawings. This tender is not for approximate P.C. sum purposes. The successful tender will be nominated as contractor for this element.

3.2 AWARD OF CONTRACT

Contractors will not be remunerated for any trouble or expenses they may incur in making up their tenders. It is the responsibility of prospective tenderers to obtain for themselves, at their own expense, any additional information necessary for the preparation of their tender.

The award of contract will be made at the discretion of the client and will be made to the contractor whose tender has determined to be the most economically advantageous tender and who meets the required standards capability and financial responsibility.

Tender prices shall include for all labour and materials required for the execution of the works and shall include for all costs in connection therewith, such as freight and transport, insurance of goods and persons, taxes, duties and other such charges current at date of submission of tender and for all charges arising from statutory legislation effecting the cost of labour. The responsibilities regarding knowledge of the operation or amount of any of these charges shall lie with the tenders and no allowance shall be made for them after submission of tender.

The tender must comply fully with all the conditions set out in the contract documents and the services drawings as listed.

Quoted time of delivery of materials on site and time of completion of the contract together with the extent to which the materials are suitable for their purpose and otherwise acceptable as to performance will be taken into consideration in relation to acceptance of tender.

3.3 DISCLOSING TENDER

Acceptance of tender documents by a tenderer will be held to imply a guarantee that the amount of his tender will not be disclosed by the tenderer to any person or body prior the lodgement of the tender and that a wholly bona fide tender will be submitted, in default of which the tender shall be deemed invalid.

3.4 REGULATIONS

The services installation shall be carried out in accordance with this specification and shall comply with the following regulations, standards requirements insofar as they are applicable.

Refer to Section on Codes and Standards

The General Conditions of the Contract and the Standard and Particular Specification
of the Consulting Engineer.

Wherever the requirements of this specification and/or drawings exceed the requirements of the mentioned regulations, this specification and/or drawings shall govern.

Should any change in the drawings and specification be required to conform to these ordinances, the contractor shall notify the engineers at the time of submitting his bid. After entering into contract, the contractor will be held to complete all work necessary to meet the local requirements without extra expense to the owner.

The contractor shall obtain and pay for all necessary permits as required for all work.

3.5 BILL OF QUANTITIES

The successful contractor shall provide the engineer with a priced Bill of Quantities prior to being included as the Named Specialist in the Main Contractor Works Requirements. The bill shall list separately the material costs and labour costs with the number of man-hours included for in the tender.

The completed Bill of quantities shall be furnished by the successful tenderer within 10 days.

3.6 VARIATIONS

The Contractor's price is lump sum fixed price, there will be no variations to the Contract Sum, unless additional works are instructed by the Employer's Representative.
All variations to the contract shall be priced in accordance with the rates in the Bill Quantities.

The total cost of any variation shall be approved in writing by the engineer before work commences on the variation.

Extras outside the scope of the existing contract shall be carried out for a price to be negotiated and approved in writing by the architect before work is commenced.

3.7 PAYMENTS

Claims by the contractor for interim payment shall indicate separately:-

Percentages of the various works completed as scheduled in the Summary of Prices.

3.8 FORM OF TENDER AND SUMMARY OF PRICES

The contractor must pay particular attention to the proper completion of the Summary of Prices included in the Form of Tender and must complete the Summary of Prices strictly under the item numbers listed and should note that any section heading in this specification may apply to one or more of the items in the Summary of Prices.

The contractor shall include in his tender under additional headings, if necessary, and irrespective of the items indicated for all work specified or implied by the drawings and specification.

3.9 GENERAL

It is the intention of this specification to provide for all work and materials necessary for the completion, testing and setting to work of the installation outlined in this specification and to provide for the supply and erection of all necessary or usual accessories for such an installation, whether such work, materials or accessories shall have been individually itemised or described in this specification or not and also to provide for the maintenance of the installation for twelve months after completion.

3.10 WORK TO BE DONE

The work to be done shall consist of laying on a complete installation for the services specified, the supply delivery to site, erection and testing of the entire installation as outlined in this specification and indicated on the drawings.

3.11 LOCAL AUTHORITIES

The contractor shall observe and comply with the requirements of all Statutes and Bye-Laws and serve notice on the Authorities or Owners of water, gas, electricity or other things which may be in any way affected by the execution of the works.

3.12 COMPLETION

The work under the contract shall commence as soon as the program for the works is agreed. The work generally shall be completed in all respects to the entire satisfaction of the engineer on or before the date allowed in the contract for completion

3.13 MAINTENANCE

At the completion of the works, the contractor shall thoroughly clean and clear up all materials, tools tackle and rubbish due to the work under the contract.

From the Date Of Practical completion as ascertained by the Consulting Engineer or Architect, the contractor shall fully maintain all part of the works in good working order, for a period of twelve calendar months. Refer to scope of work for detailed requirements

3.14 STORAGE

Buildings: The contractor shall provide lock-up and canteen facilities for his staff. The contractor shall also provide storage sheds and workshops as necessary for the smooth continuance of the works. Materials may not be stored and preparatory work may not be carried out within the building structure without the previously expressed agreement of the Consulting Engineer. Such agreement, if given, shall not absolve the contractor from liability for damage or injury or otherwise vitiate the contract.

Materials: All goods which are normally stored in the open shall be suitably and adequately protected from the weather and the ingress of dirt to the satisfaction

of the Engineer, any materials which are not, in the opinion of the Engineer, adequately protected shall be removed from site on receipt of instructions from the Engineer and replaced by new material, at the Contractors expense.

3.15 MATERIALS

Materials used in the work shall where possible be Irish manufacture.

When materials manufacturers or suppliers are named, the tender shall be based on one of the named manufacturers or suppliers. However, the tenderer may submit separately an alternative costing based on materials of equal quality and workmanship and subject to the Engineers approval.

3.16 SAMPLES

The Contractor when if required shall supply samples and prototypes of all materials or workmanship to the Engineer before the work is put in hand. The samples may be retained before work is put in hand.

The samples may be retained by the Engineer until the main bulk of the material shall be delivered to the site. Samples will be required by the Engineer only where reasonable and where examination of quality by drawings and description would be inadequate.

3.17 CONTRACTOR'S DRAWINGS

The contractor shall prepare as requested by the Engineer any necessary dimensioned working drawings for the proper completion of the Contract.

Two copies of each required drawing shall be submitted to the Engineer in the first instance.

The contractor shall make an allowance for the production of co-ordination drawings between electrical and mechanical services. The contractor shall produce co-ordination drawings before the installation of any services.

3.18 PLANT

The Contractor shall provide all necessary labour, materials, tools, tackle, slings, scaffolding, haulage, instruments and apparatus for delivery and erection for the works, and for the completion and testing of the works to the entire satisfaction of the Engineer.

3.19 SETTING OUT

Positioning: The Contractor shall set out the whole of the works and be responsible for the correctness of the positions, levels and dimensions of the several works according to the drawings and written instruction of the Engineer as well as for the positioning and marking of openings, plinths, bases and of holes to be cut in the structure.

Routing: The exact courses and positions of all services and other items of equipment shall be duly laid out and marked on the job by the Contractor and approved before execution as the best possible course and position, having regard to all considerations including that of temperature and the relation for these items to the other services plant.

Checking: The Contractor shall furnish all materials, labour and instruments necessary to enable the setting out to be checked.

Errors: The Contractor shall make good any incorrectly set out works and shall be liable for costs of making good any work incorrectly carried out.

3.20 PROTECTION

The Contractor shall pad ladders and similar equipment so that damage is not done to the building structure or the finishes thereof. The Contractor shall be liable for costs of making good should any damage be caused to the structure by oil, grease, or similar goods, or by ladders or like equipment.

3.21 BUILDER'S WORK

The Main Contractor shall provide the following attendance on the contractor, who shall give reasonable notice to the Main Contractor of his specific requirements.

- Distribution of materials around the site
- Forming of floor ducts and wall chases
- Forming and cutting of structural openings and recesses
- Grouting of brackets, supports and holding down bolts
- Making good after the above work

General Attendance : The contractor shall be provided with general attendance, free of charge, general attendance shall include only allowing use of scaffolding,

mess rooms, sanitary accommodation providing space only for office accommodation and for storage of plant and materials (offices, lock-up stores to be provided by the Named Specialist, if required), providing light and water, cleaning away rubbish.

- Use of temporary roads and approaches

- Provision of timberwork and frames

The contractor shall be responsible for providing the following:

- Setting out and marking of Builder's work.

- Preparation of drawings of Builder's work.

Special Attendance: The contractor shall be provided with special attendance as listed below:

- Taking delivery, unloading, taking on store
- Hoisting materials
- Power for fixing
- Scaffolding
- Protecting completed installation

NOTE: Anything not provided free of charge as above shall be deemed to be provided for in the contractor's tender sum.

Please note - The contractor shall fully list out and describe as part of their tender return any special attendance from the main contractor not listed above.
Omission to do so will be at the cost to the contractor

3.22 RECORDS

The Contractor shall, during the course of the works, maintain a fully detailed record of all changes from the Tender drawings to facilitate easy and accurate preparation of "As Built" drawings and to ensure that these drawings are in all respects a true record of the installation.

On completion of the contract the Contractor shall submit to the Engineer completed "As Built" drawings of the system for record purposes.

3.23 MAINTENANCE MANUALS

The Contractor shall supply to the Consultant Engineer 1 No. sets of Maintenance Manuals for all items of equipment supplied by him on the Contract. These manuals shall indicate clearly all areas where periodic maintenance is required and also full details of manufacturers of equipment or their agents.

3.24 TUITION

The Contractor shall allow for operating the completed works under full working conditions and for instructing the person or persons nominated by the Client in the correct and most efficient operation of the works for a minimum period of four weeks.

3.25 LOCAL LABOUR

Persons engaged upon the works should insofar as practicable and without affecting the efficiency of the work be recruited from the area.

3.26 VISITING THE SITE

The Contractor must visit the site at time of tendering to ensure that he has included for all items necessary to complete the installation and to leave same in a complete working condition to the satisfaction of the Consulting Engineer. No extras or variations shall be allowed for additional work that could have been ascertained by visiting the site.

3.27 PHASING –

N/A.

3.28 SPECIAL CONSIDERATION

The nominated contractor shall provide all necessary labour, plant and material required for satisfactory execution of the contract, including unloading, distributing, handling and hoisting of materials and fabricated units. All builder's work including making good and redecorating is to be included in the tender.

The contractor shall execute his works in conformity with a programme to be agreed with the Client, which enables the Contractor to complete the entire project within the contract period.

This tender should include for complying with the Safety, Health and Welfare at Work (Construction) Acts and Regulations current at the date of tender and any requirements of the Project Supervisor (Construction Stage).

The successful Contractor must also comply with the following:

- Be the holder of a current Tax Clearance Certificate
- Be a member of the CIF Pension/Sick Pay Scheme
- Freedom of Information Act

3.29 DEFINITIONS

Throughout this document the term "Client" shall be deemed to refer to:

Health Service Executive
Capital & Estates,
Holland Road,
National Technology Park,
Limerick

Throughout this document the term "Architect" shall be deemed to refer to:

Hassett Leyden & Associates
Roslevan Shopping Centre,
Tulla Road,
Ennis,
Co. Clare

Throughout this document the term "Engineer" shall be deemed to refer to:

Don O'Malley & Partners,
92 O'Connell Street,
Limerick

3.30 FREEDOM OF INFORMATION ACT

Information in relation to this tender may be made available on demand in accordance with Freedom of Information Act 1997 and 2003. You are asked to consider if any of the information supplied by you in the tender should not be disclosed because of its sensitivity. If this is the case, you should, when providing the information, identify same and specify the reasons for its sensitivity. The

Client will consult with you about sensitive information before making a decision on any Freedom of Information request received.

If you consider none of the information supplied by you as sensitive, please make a statement to that effect. Such information may be released in response to a "Freedom of Information Request".

3.31 CONTRACTORS LIABILITY

Employers' requirement for Contractor to effect insurance in respect of liability for risk

Note: It will be necessary before work commences on site for the Contractor to produce his insurance policies for inspection by the Employer to verify that he is insured in accordance with statutory requirements and the terms of the Contract. Failure on behalf of the Contractor to present such policies for inspection or failure on behalf of the Employer to inspect such policies will not relieve the Contractor of any of his liabilities in this respect.

SECTION 4

SCHEDULE OF CODES AND STANDARDS

4.0 SCHEDULE OF CODES AND STANDARDS

Notwithstanding the details of the specification, the contractor must note that, where applicable, this installation must conform in every respect with the full requirements of the most current regulations in terms of health and safety, construction standards, industry guidelines and best work practices, including but not limited to the following standards:

- Safety, Health and Welfare at Work (Construction) Regulations, 2006;
- Safety, Health and Welfare at Work (General Application) (Amendment) (No. 2) Regulations 2021 (S.I. No. 619/2021)
- Safety, Health and Welfare at Work (General Application) (Amendment) Regulations 2021 (S.I. No. 610/2021)
- Safety, Health and Welfare at Work (Construction) (Amendment) Regulations 2021 (S.I. No. 528/2021)
- Safety, Health and Welfare at Work (Construction) (Amendment) Regulations 2020 (S.I. No. 102 of 2020)
- Safety, Health And Welfare At Work (Construction) (Amendment) Regulations 2019 (S.I. No. 129 of 2019)
- Safety, Health and Welfare at Work (General Application) (Amendment) (No.3) Regulations 2016 (S.I. No. 370 of 2016)
- Safety Health and Welfare at Work (Construction) Regulations 2013 (S.I. No. 291 of 2013)
- Code of Practice for Indoor Air Quality - HSA
- Safety, Health and Welfare Act 2005 - present;
- Safety, Health and Welfare at Work (General Application) Regulations 2007;
- Safety, Health and Welfare at Work (Construction) Regulations 2013 (S.I. No. 291 of 2013);
- Memorandum on Council Directive 92/57/EEC;
- Construction Industry Research and Information Association: "Control of Risk: A Guide to the Systematic Management of Risk from Construction";
- Building Regulations Technical Guidance Documents;
- Equipment Manufacturers Instructions / Recommendations;
- Relevant BESA Codes of Practice;
- NSAI Gas Standard IS820;
- The gas installation shall comply fully with NSAI IS820, IS 329, IS EN 1555 and IS EN 12327.
- The Chartered Institution of Building Services Engineers Guidance Documents and codes of practice;
  - CIBSE design codes A, B, C, D, E, F, L, and CIBSE doc: am14:2010
  - Commissioning Codes A, B, C, L, M, R and W
- Electro Technical Council of Ireland;
  - National Rules for Electrical Installations, Latest Edition.
- British Standards, including but not limited to,
  - EN 442-1&2:2014
  - BS 5422:2023
  - BS 6880-2:1988

  - EN 13831:2007
  - EN 303-2:2017
  - BS 8558:2015
  - BS 6644:2011
  - EN 1775:2007
- The Energy Efficiency Directive 2012/27/EU;
- European Commission (EC) and European Directives (ED);
- European Harmonisation Directives;
- Electro-Compatibility Regulations 2007;
- Local Authority Fire Safety Requirements;
- Equipment Manufacturers Instructions / Recommendations; and
- CE Marking of all Plant and Equipment.
- EU F-Gas Regulations
- SEAI Guidance Documents
- Harmonised standards for water heaters 2014/C 207/03
- EU energy labelling regulation for water heaters 812/2013
- Energy labelling for ventilation units (EU) No 1254/2014
- EU ecodesign regulation for water pumps (EU) No 547/2012
- Harmonised standards for circulators 2013/C 254/04
- Amendment to the Ecodesign for circulators 622/2012
- Current ESB Regulations
- Fire Officers Requirements and Fire Certificate.
- SEAI Triple E Register of Approved Products
- EU Commission Regulation (EC) 640/2009 – Energy Efficiency (Particularly with regard to Fans and Pumps).
- BS EN 378 Parts 1, 2 and 3: Refrigeration Systems and Heat Pumps.
- CIBSE Technical Memorandum TM13: 2013 Minimising the Risk of Legionnaires Disease.
- All other CIBSE Technical Memorandums and Application Manuals.
- HVCA Specifications TR20-Pipework Systems
- HVCA Specifications DW144 Code of Practice for Ventilation Ductwork.
- HVCA Specification TR19-cleanliness of Ventilation Systems.
- BS9999: 2008 Code of practice for Fire Safety.

The contractor must ensure that the installation is carried out to the codes of standards above and all other relevant Irish, British and European Standards.

SECTION 5

HEALTH AND SAFETY REGULATIONS

5.0 HEALTH & SAFETY REGULATIONS

The Contractor shall take account of the general principles of prevention as stated in the following:

(1) Safety Health and Welfare at Work (Construction) Regulations, 2006.

(2) Health and Safety Authority: "Guidelines to the Safety Health and Welfare at Work (Construction) Regulations, 2021".

(3) Architects Council of Europe: "Memorandum on Council Directive 92/57/EEC", January, 1994.

(4) Construction Industry Research and Information Association: "Control of Risk: A Guide to the Systematic Management of Risk from Construction", Report FR/CP/32, 1995.

Safety, Health and Welfare of Workpeople Safety Regulations

The Contractor shall note the Preliminary Safety and Health Plan prepared by the Project Supervisor for Design Stage, information included within this report and include all costs relating to compliance with that set out within the various Sections of the Preliminary Safety and Health Plan.

The Contractor shall include for complying with the Safety, Health and Welfare at Work Acts and Regulations current at the date of tender.

The Contractor shall include for providing all necessary information as requested by the Project Supervisor for the Construction Stage to enable the preparation and completion of the Safety File excluding drawings and specifications which shall be provided by the appropriate member of the design team and relevant nominated sub-contractors.

The Contractor shall include for providing assistance to the appropriate member of the design team and to relevant nominated sub-contractors in preparing "As Built" drawings for inclusion in the Safety File.

The Contractor shall hand over all documentation in connection with the Safety File and full information must be handed over for sign off, to the PSDP prior to Practical Completion Certificate been issued

Procure and maintain insurance cover and provide indemnity in respect of any claim incurred by reason of the performance of functions and duties of the project supervisor for the Construction Stage of the Project.

Assist in preparing and completing the Safety File.

The Contractor shall be required to provide full assistance in the implementation of the following duties:

a) Co-ordinate the Health & Safety aspects of the Construction Stage.

b) Prepare a Health & Safety Plan.

c) Continual updated Health & Safety Plan.

d) Full description on Health & Safety submitted with O.M. Manuals.

The operation and maintenance manuals shall contain the following information:

(All manuals shall be in ring binders format.).

1. Description on how to use O. & M. Manuals.
2. Content page.
3. Contractual and legal details.
4. Contact list including name, number and address.
5. Date of expiry of defects liability period.
6. Date of final completion.
7. Guarantee certificates for all components, elements and plant.
8. Warranties for all components, elements and plant.
9. Full description of utility services and their isolators, valves and switches.
10. Description of installed services.
11. Equipment schedule and commissioning data sheets.

    The equipment schedule should list the following:

    - Type
    - Model reference
    - Serial number
    - Location
    - Duty/performance
    - Name and address of manufacturer/supplier
    - M. & E. loads.
    - Dimensions

The commissioning date should list the following:

- Measured data and results
- Measured points
- Test equipment used
- Test equipment calibration test certificates and details.
- A statement of results against design.
- Commissioning test certificates.

12. Parts identification and recommended spares.
13. Spares policy
14. Operational description of all systems.
15. Recommended strategy for operation and control.
16. Maintenance schedules for plant and equipment as recommended by manufacturer/supplier.

    The maintenance schedule shall include:

    - Specific time intervals.
    - Parts for replacements.
    - Running hours for maintenance.
    - Required tools and training.

17. Name and address for all manufacturers.
18. Provide complete list of manufacturer's literature for all plant and equipment.
19. As installed drawings.
20. Drawing register.
21. Copies of demonstration attendance lists.
22. Laminated location charts.
23. Location of field controls.

5.1 PROJECT DESCRIPTION

The mechanical installation consists of the following:

1. Detailed survey of existing installations namely cold and hot water services
2. Safe isolation and drain down of existing cold and hot water pipework to ward prior commencing of pipework alterations/ disconnections . Mains water to be isolated and tank drained during this sequence of works. Hot water storage calorifier will also be isolated.
3. Disconnection and strip out of existing concealed water services pipework timber bulkheads in ward
4. Existing pipework alterations, disconnection and removal of same
5. New cold and hot water services pipework including extension of hot water loop and tying into existing
6. New supply and installation of Pipework insulation (foilback)
7. New supply and installation of new Timber boxouts for concealment of pipework services as per builders work drawings
8. Disconnection and strip out of existing indicated PVC waste pipework
9. New installation of PVC waste pipework where indicated on layouts
10. Disconnection of indicated mechanical wall mounted extract fans
11. Installation of new wall mounted extract fans
12. Alteration of existing heating pipework to make provision of a new radiator to new staff changing room.
13. Testing and Commissioning

5.2 DRAWING AND SPECIFICATION

The Mechanical installations is to be installed in accordance with the "Tender Documentation for Mechanical Installations" at Refurbishment to Willow Unit at ST. Josephs Community Hospital , Upgrade works".

5.3 PHASING OF THE WORKS

The Mechanical Contractor are required to carry out the works in line with the Main Contractors programme.

5.4 OTHER WORK ACTIVITIES

The Mechanical and Electrical Contractors are required to co-ordinate their works with the main contractors work on site.

The Contractor is required to visit the existing site and carry out a full and detailed site inspection/survey of locations and familiarise themselves with the existing building, building construction, existing services installations, incoming utilities, external plant and site surroundings etc. The contractor should allow for all necessary works, temporary works, out of hours works, weekend works etc to successfully complete the project

5.5 KNOWN EXISTING SERVICES

There are numerous underground services surrounding the site locations. Where excavation is required for any services the contractor shall ensure all excavations do not damage or interfere with existing utility services, or services supplies.

The contractors shall identify and familiarise themselves with same i.e., incoming mains, gas and E.S.B., and data/communication telecoms supplies and ensure these services are suitably protected.

Over ground Services

There are overhead cables on the Site Contractor to take due care

5.6 PARTICULAR RISKS

The general rules of health and safety should be applied when working on a building site. The contractor must adhere to the health and safety method statements as set out under the main contract.

5.7 PRINCIPLES OF DESIGN

The mechanical installation consists of the following:

Detailed survey of existing installations namely cold and hot water services

Safe isolation and drain down of existing cold and hot water pipework to ward prior commencing of pipework alterations/ disconnections . Mains water to be isolated and tank drained during this sequence of works. Hot water storage calorifier will also be isolated.

Disconnection and strip out of existing concealed water services pipework timber bulkheads in ward

Existing pipework alterations, disconnection and removal of same

New cold and hot water services pipework including extension of hot water loop and tying into existing

New supply and installation of Pipework insulation (foilback)

New supply and installation of new Timber boxouts for concealment of pipework services as per builders work drawings

Disconnection and strip out of existing indicated PVC waste pipework

New installation of PVC waste pipework where indicated on layouts

Disconnection of indicated mechanical wall mounted extract fans

Installation of new wall mounted extract fans

Alteration of existing heating pipework to make provision of a new radiator to new staff changing room.

Testing and Commissioning

5.8 COMPLIANCE

We can confirm that our design considers all the requirements as out lined in S.I No. 299 of 2007 and we have take every practical step ensuring that the installations we design can be safely installed, used and maintained.

5.9 GENERAL PRINCIPLES OF PREVENTION

a)	The avoidance of risk.
b)	The evaluation of unavoidable risks.
c)	The combating of risks at source.
d)	The adaptation of work to the individual, especially as regards the design of places of work, the choice of work equipment and the choice of systems of work, with a view, in particular, to alleviating monotonous work and work at predetermined work rate and to reducing their effect on health.
e)	The adaptation of the place of work to technical progress.
f)	The replacement of dangerous articles, substances or systems of work by non-dangerous or less dangerous articles, substances or systems of work.
g)	The development of an adequate prevention policy in relation to safety, health and welfare at work, which takes account of technology, organisation of work, working conditions, social factors and the influence of factors related to the working environment.
h)	The giving to collective protective measures priority over individual protective measures.
i)	The giving of appropriate training and instructions to employees.

We can confirm that our design considers all the requirements as out lined in S.I No. 299 of 2007 and we have take every practical step ensuring that the installations we design can be safely installed, used and maintained.

SECTION 6

GENERAL SPECIFICATION

TECHNICAL SPECIFICATION

C O N T E N T S

6.1	**PVC COLD WATER SUPPLY**
6.2	**FIRE FIGHTING & DRINKING WATER INSTALLATION**
6.3	**GLASS REINFORCED STORAGE TANKS**
6.4	**HOT & COLD WATER SERVICES INSTALLATION**
6.5	**LPHW HEATING INSTALLATION**
6.6	**BOILER PLANT FOR AUTOMATIC FIING**
6.7	**VENTILATION DUCTWORK INSTALLATION**
6.8	**AUTOMATIC CONTROLS**
6.9	**GAS INSTALLATION**
6.10	**FLUE INSTALLATION**
6.11	**SOILS & WASTES INSTALLATION**
6.12	**GAS SAFTEY SYSTEM INSTALLATION**
6.13	**STATIC TESTING**
6.14	**HEATING SYSTEM PRESSURISATION & EXPANSION PLANT**
6.15	**COMMISSIONING & PRESSURE REDUCING VALVES INSTALLATION**
6.16	**IDENTIFICATION & LABELLING**

6.1 PVC COLD WATER SUPPLY

6.1.1 Description

Cold-water services shall be provided as detailed and specified on the drawings. Connection on to mains shall be provided as indicated on the drawings. The Contractor shall run the supply pipe from the indicated position and shall terminate as indicated in P.V.C. pipework as described in these Clauses. The remaining part of the supply pipe together with any drinking water distribution pipework shall be provided by the Contractor and shall conform with the Clauses as specified to those sections.

6.2 DRINKING WATER INSTALLATION

Internal Mains

A distribution system of copper piping shall be run in accordance with Clause dealing with Cold Water installation as indicated on the drawings. Connections shall be taken from the existing main water supply to all drinking water points.

Insulation

The pipework insulation shall be as for the Hot and Cold Water Services Installation.

Tests

After the erection is complete, the whole of the pipework system shall be tested under hydraulic pressure to 7 bar. It shall then be examined by the Local Authority's Water Inspector to whom the Contractor shall give all the necessary facilities and assistance.

The contractor shall allow for flushing for the system and Chlorination of the completed water serves installation prior to hand

6.4 HOT AND COLD WATER SERVICE INSTALLATION

Description

Hot and cold water service installation shall be provided as indicated on drawings and specified herein.

Concealed pipework generally, shall be joined by bronze welding. Branch pipes shall be welded in and sets formed in tubing up to and including 51mm bore; branches shall be made with manufactured copper welding tees for branches 63mm bore or over. Changes in direction in tubing 63mm bore and over shall be made in manufactured short welding bends.

Manufactured bronze welding fittings shall be used on all pipework exposed to normal view.

Notwithstanding, the general requirements of this clause, manufactured bronze fittings shall be used on all pipework where indicated on the drawings, or where necessary either due to congested position or due to required high standard of appearance.

Compression joints (other than screwed female iron to copper compression couplings at entry to sanitary fittings) may be used on surface pipework within the various rooms. The fittings shall comply with BS 864. All fittings used shall be free from all mould markings and pittings, and when fitted shall not be scored from the use of a Stillson wrench similar tool used in pulling up. Alternatively capillary type fittings shall be used for all pipework on the surface.

Tubing

All tubing shall be half-hard copper BS 2871 table X.

Tubing shall be transported, handled and stored with care so that no damage shall be caused to the tubing. Damaged, flattened or kinked tuning shall not be accepted.

Tubing shall be cut to length by hacksaw and be reamed out and all burrs removed before tubing is bellied, welded and fixed.

Forming on Site

Site-formed tubing shall be of neat and good appearance as well as technologically sound as specified. Bronze-welded branches shall be taken into the main tube at a angle of deg. and both branch and main tubes shall be carefully cut and contoured to shape.

Site-made sets, including offsets, shall be made so that a steel ball 1:200 less in diameter than the internal diameter of tube may be freely drawn through the finished set. Distorted, flattened, mitred, gussetted or kinked sets shall not be accepted.

Butt-welds shall be formed by flaring the end of the tube to receive the abutting pipe inserting into female tube to a depth of 3mm and bronze welding.

Reducing bronze welds shall not be accepted when tubes to be joined have a difference in bore of more than size, or where size of larger main is 51mm bore greater; joint must then be made with manufactured bronze weldable reducers.

Bronze Welding

This clause deals with bronze welding of tubing; welding of other plant shall be in accordance with the relevant BS Specification or where BS does not apply, shall be of highest standard of workmanship and subjected successfully to any reasonable test required by the Consultants.

All pipework shall be bronze welded by skilled craftsmen, experienced in this class of work, and the Contractor shall ensure that all operatives engaged in bronze welding are normally capable of carrying out work of high quality. Traces of flux shall be thoroughly cleaned off with wire brush and water. Acceptable in-position test welds by individual welder shall be labelled and submitted to the Consultants before the welder is permitted to weld on Site. Welders currently approved for other similar contracts under the direction of the Consultants shall be automatically accepted for the Contract.

The Consultants may exempt from this preliminary test any welder holding certificates competency issued by an approved authority.
During the course of the installation the Contractor shall cut out, test, label and remake not more than 3% of all welds at his own expense in locations indicated by the Consultants.

Should any of these cut-out welds be unacceptable, the whole of the pipework installed by the welder responsible, shall be removed at the Contractors expense, except where the contractor shall prove to the Consultant's satisfaction by X-Ray photograph or other approved means that each and every weld on this pipework is acceptable. Tubing may only be re-used provided welds are cut away.

The Consultant's opinion shall be final and binding in defining the terms "satisfactory", acceptable" and "unacceptable".

The Consultants may allow the Contractor to substitute X-Ray or similar means of examination of 6% of all welds for cut-away tests specified above, if the Con-tractor so desires.

Bronze Welding Fittings

Bronze welding fittings shall be of copper to match the bore and wall thickness of light gauge copper tube specified herein and have internal annular shoulders to act as tube stops. The fitting shall be to B.S. 864 Part 5.

Weldable branches shall have a radius of not less than one and a half times of tube bore.

The bronze weldable reducers, which shall be of the eccentric type, shall be fitted with reduced ends towards ceiling in horizontal pipework and towards wall in vertical pipework. Weldable reducers shall be used in preference to reducing bronze welds as far as possible, but always where the difference in bores of tubes to be joined is greater than one size.

Flanges

Flanges shall be of gunmetal with machined faces, conforming to BS 10 Part 2 Table "D" and shall be installed with necessary brass nuts, brass bolts, corrugated brass joints rings and lightly applied compound.

Special flange welding clamps shall be used to ensure perfect alignment and care shall be taken that face of flange is not distorted by heat.

Flange joints shall be provided where indicated, at all control valves 63mm bore and over and at intervals, in concealed but accessible pipework, 63mm bore and over, not exceeding 30m.

Pipework Supports

In special instances pipework shall be supported on bracketing and supporting arrangements as scheduled on drawing, but in all other cases shall be as described in this clause.

Supporting arrangements shall be fixed securely to the structure but shall allow the
pipework to expand and contract in accordance with the whole temperature or pressure range. Ample clearance shall be allowed when setting out brackets to facilitate the larger. Intervals between brackets or supporting arrangements shall not be greater than scheduled elsewhere. All adjacent pipework following the same route shall be bracketed at the intervals specified for the smallest pipe in the run.

In locations where not more than two pipes will be installed and where the pipework is also exposed to normal view, brackets shall be long shank polished gunmetal built-in holder bat type or screw-on type in approved cases, otherwise brackets shall be gunmetal single or double split ring type, and complete with drop rod and supporting arrangements. Drop rods shall be threaded and shall not be welded or brazed at either end.

Supporting arrangements for all brackets shall be of mild steel angle or channel of ample height, formed, fabricated, ragged and built-in or otherwise firmly secured to the structure.

Flame boring or cutting other than or ragged ends shall not be accepted.

Prototypes of all supporting arrangements shall be approved by the Consultants on site before fabrication is commenced.

The Contractor shall not drill or weld on to any adjacent structural steel member without written authorisation from the Consultants.

Bore of Pipe:	13mm	19mm	25mm	32mm	38mm	51mm	63mm
Bracket Intervals:	1.5m	1.5m	1.5m	1.5m	1.8m	1.8m	2m

Bore of Pipe:	76mm	76mm	102mm	127mm	152mm
Bracket Intervals:	2.1m	1.4m	2.7m		

Sleeves

Copper sleeves cut from tubing shall be fitted over all pipework passing through any part of the structure other than timber. Sleeves shall project 3mm from wall or ceiling surface and shall be reamed out free from burrs.

Temporary timber wedges shall be used to hold sleeves in a concentric position and when grouting is completed by Builder, the Contractor shall inspect each sleeve to ensure it is properly fixed free from dirt and shall remove all wedges.

Sleeve sizes shall conform to the following table.

Bore of Pipe:	15mm	19mm	15mm	32mm	38mm	51mm
Bore of Sleeve:	25mm	32mm	38mm	51mm	51mm	63mm

Bore of Pipe:	63mm	76mm	102mm	127mm	152mm	177mm

Bore of Sleeve: 76mm 102mm127mm 152mm 177mm 203mm

Surface Plates

Polished chromium plated surface plates or similar to approval shall be fitted around pipework at all points where indicated on the drawings.

Isolating Valves

Isolating valves shall be of the gunmetal body, split wedge type non-rising spindle, asbestos packing and cast iron hand wheel of Crane manufacture or similar to approval. Valve shall be suitable for working hydraulic pressure of 14 bar to B.S. 2879.

During installation, valves shall be kept closed and care shall be taken that valves are not distorted by undue pressure of spanner or that the tube connection is not forced home. Jointing compound shall be removed from line before adjacent welding is carried out.

Misaligned, distorted or leaking valves shall be re-seated or re-placed at the Contractors expense on receipt of instructions from the Consultants.

All valves shall be fitted with engraved brass or plastic numbered tags chained on.

Male tail unions, as elsewhere specified, shall be installed at all isolating valves.

Drain cocks, as elsewhere specified, shall be installed on the sub-circuit side of all mainland isolating valves.

Drain Cocks

Lever-operated gunmetal cocks of the angle plug type with 13mm ribbed tail for hose connection, shall be provided on the sub-circuit of each main isolating valve, to enable each section controlled by those valves to be emptied down and refilled if necessary. A number of keys for lock shield valves and drain cocks shall be provided and mounted on timber racks which shall be screwed to wall in approved position. One key shall be provided for every ten of each size and type of valve or cock in the with a minimum of three of each size and type.

Stopcocks

Stopcocks shall be provided where indicated or required to control supply for the renewal of washers etc. Where possible, they shall be so arranged as to control a

group of fittings, and shall be mounted in such a position as to be screened by the fitting. No stopcock shall be fitted in an exposed position except with the Consultant's approval Stopcocks, shall be of the screw down pattern with brass bodies arranged for brazing connections to light gauge copper, "Yorkshire" fig. No. 301. Where exposed, stopcocks shall be fitted with CP easy-clean shield "Yorkshire" fig. No. 512, or similar to approval.

Connections to Sanitary Fittings

Branch connection to sanitary fittings off mains, shall be located in the position shown the drawings and listed in the Schedule.

All branches from the mains to fittings, shall generally be carried out on the surface, except where otherwise indicated, or where concealed by wall fitments, and made by bronze pipe saddles, multiple or single according to location, rawl-plugged or fixed to wall. Connections to fittings shall be made with copper to iron female adapter "Instantor" Fig. 312 or similar to approval.

Contractors shall allow in their tenders for supplying and fitting gunmetal plugs to connections to allow the entire concealed pipe installation to be tested before the chases are made good, and covers placed on ducts. Upon completion of satisfactory tests, the plugs shall be removed and shall remain the property of the Contractor.

Contractor shall allow for connection of waste and water services to all sanitary ware. Penny valves to be fitted to all piped connections to sanitary ware.

Thermostatic mixing valves shall be provided at all hot water connections to whb and sinks as detailed on the drawings and scheduled in this document.

Insulation

All insulation in the building shall comply with the requirements of BS 1334 and 1588. Surfaces to be lagged shall be thoroughly cleaned free from grease, oil and foreign matter.

Pipework to be insulated is indicated on the drawings and all insulation shall be of rigid glass wool sections carried over brackets to the thickness as later specified. Each run of piping shall be insulated separately.

At bends and branches, the insulation shall be closed mitred, joined with adhesive or packed with loose wool in all gaps and surfaced evenly with china clay paste.

Heating and hot water service pipes up to and including

51mm bore	25mm thick

63mm bore & over	38mm thick
Cold water pipework	13mm thick
Tanks, calorifiers, heat exchangers	38mm thick

The finished covering of glass wool sections shall be as follows:

"Internal Lagging Concealed" shall be finished with 0.113 Kg white cotton canvazs pasted down overall, secured with metal bands and sized and painted two coats to approval and fitted with plastic identifying bands at 6m intervals.

"Internal Lagging Exposed" shall be finished in scrim cloth, lacing wiring, 19mm thick cold drying hard setting plastic composition, alkali resisting sealer, painted two coats of paint to approval and fitted with plastic identifying bands at 6m intervals.

"External Lagging Concealed" shall be finished in scrim cloth with two layers of rubberoid covering with all joints sealed with a bituminous adhesive and secured with 19mm x 1mm mesh galvanised wire netting. The whole surface including the netting shall be painted with two coats of heavy bituminous emulsion.

The sheeting should be drilled on the edge and fixed with patent self tapping screws. "Paker Kalon" or similar to approval.

The Consultants shall attend on site to approve samples of insulation materials and workmanship. No insulation shall be applied until all pipework is hydraulically tested and passed as satisfactory by the Consultants.

Balancing and Testing

The contractor shall adjust, regulate, set, proportion and balance all components of the installation. The contractor shall provide use of all instruments required by the Consultants to ensure that the installation is working correctly and efficiently in all respects.

After the installation is complete, but before the insulation is applied, the pipework and valves shall be hydraulically tested to 7 bar, and shall remain drop tight at that pressure for a period of eight hours. Should any leakage occur, the contractor shall make good at his own expense, notwithstanding that previous tests may have been satisfactory.

Finishing and Painting

All exposed pipework shall be thoroughly cleaned free from all foreign matter and all surplus bronze welds filled smooth and even. Exposed tubing, fittings and supports shall be polished and coated with one application of lacquer of good sound priming paint. Painting of insulation, where this is required, shall be carried

out by others, but the contractor shall ensure that it is carried out in the manner specified and to the colours for identification of pipelines, B.S 1710 as set out in Table C10.8 Standard Symbols Notation of the C.I.B.S.E.

6.5 LPHW HEATING INSTALLATION

Description of Work

This section covers the L.P.H.W. heating installation, including pipework, heating surfaces, valves, supports, insulation etc.

Piping

All piping for the new L.P.H.W. heating installation shall be class "B" seamless mild steel of medium gauge standard and blue band marked, conforming in all respects with the approved quality, tolerances, tests and other requirements of BS 1387.

Pipework shall be joined by welding. Branch pipes shall be welded in and sets formed in tubing up to and including 50mm bore, branches shall be made with manufactured welding tees for branches 65mm bore and over. Changes in direction in tubing 65mm bore and over shall be made in manufactured short radius welding bends.

Tubes for welding shall have plain ends and in no instance shall butt welding of screwed tubing be accepted. Where screwed joints are used with the Consultants permission, tubes shall be screwed with taper threads in accordance with BS 21.

Tubing shall be cut to length by pipe cutters or by hacksaw only. Oxy-acetylene flame shall not be used for this purpose. Cut ends shall be reamered out and all burrs removed before tube is screwed or welded.

Forming on Site

Welded-in branches shall be swept in direction of flow and both main and branch pipe shall be correctly cut and contoured to shape. Tubes may be cut and shaped with oxy-acetylene torch, provided flame-out edges are completely filed away, dressed and cleaned out before welding is commenced.

Site made sets, including offsets, shall be made cold in bending machine up to and including 50mm bore. Distorted or flattened sets shall be rejected and quality of sets shall be such that a steel ball 1:200 less in diameter than internal diameter of tube may be freely drawn through the finished set.

Mitred, gussetted or kinked sets shall not be accepted.
Reducing welds shall be formed by tapering larger tube to diameter of smaller tube and butt welding. Tapering, the angle of which shall not be greater than ten degrees, shall be carried out on bottom of tube only, tops of tubes shall be retained in line. Reducing welds shall not be accepted when tubes to be joined have a difference in bore or greater Joint must then be made with manufactured weldable, eccentric reducers.

Weldable Mild Steel Tubing

This clause deals with welding of pipework. Welding of other plant shall be in accordance with the relevant BS.

All welding and testing shall be in accordance with the conditions, methods and techniques laid down by Technical Memorandum No. R/121/8 for butt welds issued by the Welding Research Council of the Institute of Welding. Fillet welds shall be carried out with similar care and to the same high standard. The Contractor shall ensure that all workmen engaged on welding are properly qualified. Acceptable in-position test welds by each individual shall be labelled and submitted to the Consultants before the welder is permitted to weld on site. Welders currently approved for other similar contracts under the direction of the Consultants shall be automatically accepted for this Contract.

The Consultant may exempt from this preliminary test any welder holding certificate competency issued by an approved authority.

Particular care shall be taken in welding, so that oxidation and inclusions are reduced to a minimum. The welding wires shall be free from oxides of phosphorus or sulphur and shall be specially made for the oxy-acetylene process.

They should conform approximately to the following analysis:

Carbon	0.05%
Manganese	1.50%
Sulphur	0.05%
Silicon	0.20%

The Contractor shall be obliged to cut out, test, label and remake not more than three present of all welds at his own expense in locations indicated by the Consultants. Should any of these cut-out welds be unacceptable the whole of the pipework installed by the welder responsible, shall be removed and renewed at the Contractors expense, except where the Contractor shall prove to the Consultants satisfaction by X-Ray, photograph or other approved means that each

and every weld on this pipework is acceptable. Tubing may only be re-used provided all welds are cut away.

The term "satisfaction", "acceptable", shall be as shown, described or defined in the relevant BS. Should the Contractor dispute the decision of the Consultants, he shall notify the Consultants to this effect and submit the welds in question for a ruling on its acceptability to an approved independent authority at his own expense.

Where galvanised is specified or scheduled, the component shall be hot dip galvanised internally and externally after welding has been completed.

Weldable Fittings

Weldable fittings shall be mild steel with bevelled edges, and shall be of similar actual bore and gauge to medium gauge standard blue band, steel tube and shall be in accordance with BS 1965 where applicable. The fittings shall be to BS 143/1256 Standard.

Weldable branches shall be manufactured branch bend pieces, swept, bevelled and contoured for welding to mains. Hole required in main tube may be cut with oxy-acetylene torch provided that flame-cut edge is filed away completely, dressed and cleaned out before welding is commenced.

Weldable bends shall have a radius of not less than one and a half times the tube bore.

Weldable reducers, which shall be of the eccentric type, shall be fitted with reduced towards the top in horizontal pipework and towards wall in vertical pipework.

Weldable reducers shall be used in preference to reducing welds as far as possible but always where the deference in bore of tubes to be joined is greater than one size or where size of larger main is 50mm bore or greater.

Screwed Fittings

Screwed fittings, other than unions and hexagon nipples, shall not be used without the Consultants previously written permission. Should this permission be granted in certain cases, the works (including the allowed installation of unions and nipples) shall comply with the requirements of this clause.

All screwed fittings, black varnish coated or galvanised to suit tubing shall be malleable cast iron beaded type, to the Consultants approval, having parallel internal and tapered external threads to BS 143 and 1256. External threads on pipes shall be cut with dies giving a tapered thread. All threads must be smooth and full, and each thread cut, shall be tested with screwed gauge and must be of

correct size before being fitted. No jointing material (such as red lead or hemp) will be permitted to be used for pipe joints. The Contractor shall however, use an approved lubricant. Fittings shall be free from tool marks.

Tees shall be of the swept or twin-elbow type according to direction of flow. sizes shall be integrally reduced or shall be equal tees with eccentric reducing sockets and nipples to avoid unsightliness in exposed locations. Use of sharp, unswept elbows not be approved in any location.

Reducers shall be of the eccentric type, fitted with reduced end towards the top in horizontal pipework and towards wall in vertical pipework.

Unions

Unions shall be of malleable cast iron, beaded type with hexagon ends and with two spherical gunmetal seats. Rebated or conical seats shall not be accepted. Unions shall be provided where indicated and at all control valves, 50mm bore and under and at intervals in exposed pipework, 50mm bore and under not exceeding 15mm. Lond screws and backnuts will not be accepted in any location.

Flanges

Flanges shall be of forged steel with machined faces, conforming to BS 10 Part 2 E" and shall be installed with necessary nuts, bolts, washers, corrugated brass joint rings and lightly applied manganese paste.

Flanges for welding shall also have extended neck-piece or boss to which tubing shall be welded. Special flange welding clamps shall be used to ensure perfect alignment and care shall be taken that the face of the flange is not distorted by heat.

Flanged joints shall be provided where indicated and at all control valves 65mm bore and over - not exceeding 30m.

Pipework Supports and Guides

In special instances, pipework shall be supported on bracketing and supporting arrangements as scheduled on drawings, but in all other cases shall be as described in this clause.
Supporting arrangements shall be fixed securely to the structure but shall allow the pipework to expand and contract in accordance with the whole temperature or pressure range. Ample clearances shall be allowed when setting out brackets to facilitate the scheduled below, all adjacent pipework following the same route shall be bracketed at the intervals specified for the smallest pipe in the run.

Bore of pipe	15mm	20mm	25mm	32mm	50mm	65mm	80mm
Bracket Interval	1.8m	2.1m	2.4m	2.7m	3m	3.3m	
Pipe bore	100mm	150mm					
Bracket Interval	3.65m	3.95m					

In locations where not more than two pipes will be installed, and where the pipework is also exposed to normal view, brackets shall be malleable cast iron single or double split ring type and complete with drop rod supporting arrangements. Drop rods shall be threaded and shall not be welded or brazed at either end. Pipework in vertical ducts or where run on the surface shall be supported by means of school board type brackets, built-in or screwed-on according to location.

Guiding brackets or guides shall be installed complete with supporting arrangements in the positions shown or where necessary to control movement of pipework and shall be manufactured from 102mm wide, 3mm thick steel straps and formed closely around pipework. Three pieces of flat iron 227mm long shall be welded to the wall of this pipe for form fins. 1.5mm proud of the finished insulation giving 1.5mm clearance between the fin and the strap.

Flame boring or cutting other than of ragged ends, shall not be approved and prototypes of all supporting arrangements shall be submitted for the approval to the Consultants site before fabrication is commenced.

The Contractor shall not drill, cut or weld on to adjacent to any structural steel member, without written authorisation from the Consultants.

Precautions shall be taken to ensure that the building finishes and furnishings are not damaged by the welding or cutting process.

Where pipework is carried in floor ducts it shall be supported on purpose-made roller supports consisting of a length of 20mm bore piping, ragged both ends over which a 152mm length of 32mm bore pipe shall be threaded to act as a pipe roller for each pipe to be carried. Each roller being positioned by short spuds welded to the 20mm pipe to prevent it wandering, the whole being built-in each end to the 75mm x75mm vertical slot formed in the side of the duct.

All pipework supported by channels shall be carried on 152 mm length of 80 bore pipe resting on the channel and acting as a roller. For mains in sizes of 65mm and over, a 102mm length of channel be welded to the bottom of the pipe, to provide a flat surface sitting on the roller.

The following sizes shall apply:

Pipe Size	Channel Size
65mm	75mm x 38mm
80mm	75mm x 38mm
100mm	102mm x 51mm
125mm	102mm x 51mm

For pipes smaller than 65mm bore, patent roller pipe brackets Crane Fig. 591 or similar, shall be used except that the rollers shall remain as for the larger sizes. Sizes 25mm and under shall rest directly on the rollers.

Anchors

In special instances, pipework shall be rigidly held in anchors constructed as shown on the drawings but in all cases be as described in this clause.

Anchors shall be installed complete with supporting arrangements in the positions shown or where necessary to prevent pipework from creeping and shall consist of double U straps with curved saddle pieces of mild steel or gunmetal, formed to saddle the pipe and securely bolted down to the mild steel support.

A 152mm length of channel shall be welded to the underside of the pipe as provided for pipe supports, and this should be tack-welded to the R.S.J. Anchors may be welded, bolted or U bolted to approved supporting arrangements after final alignment checks and the whole shall be capable of withstanding stress imposed on it by expanding or contracting pipework over the temperature or pressure range plus one hundred per cent safety margin.

Sleeves

Mild steel sleeves cut from tubing shall be fitted over all pipework passing through any part of the structure other than timber. Sleeves shall project 3mm from wall or ceiling surface of 15mm from finished surface and be reamered out and free from burrs.

Temporary timber wedges shall be used to hold sleeves in concentric position and when grouting is completed by Builder, The Contractor shall inspect each sleeve to ensure it is concentrically fixed and free from dirt and shall remove wedges.

Sleeve sizes shall conform to the following sizes :

Bore of Pipe	15mm	20mm	25mm	32mm	38mm	50mm
Bore of Sleeve	32mm	38mm	50mm	50mm	65mm	80mm
Bore of Pipe	65mm	80mm	100mm	125mm	150mm	175mm
Bore of Sleeve	1 00mm	100mm	125mm	150mm	175mm	200mm

Surface Plates

Surface plates of zinc alloy or ferrous metal, shall be fitted around pipework at all points exposed to normal view, where pipework passes into or through walls, floors and ceilings. Where it is necessary to shape plates to fit building details, cutting and shaping shall be done neatly and accurately.

Self-colour plates shall be used generally, except where scheduled and on space-heater connections, where they shall be supplied to match heater control valves.

Space Heaters

Heaters or space heaters, shall mean radiators. Existing radiators to be reused or relocated/removed as indicated on heating layouts. New radiators shall be as indicated on mechanical heating layout drawing.

Isolating Valves

All valves up to and including 50mm bore shall be of the gate or wedge type screwed female with heavy gunmetal body and split wedge, with non-rising spindle suitable for a test pressure of 10 bar.

Valves shall be complete with cast iron hand wheel and screwed valves shall be complete with male tail union as elsewhere specified.

All valves 65mm bore and over shall be flanged cast iron body inside screw pattern with gunmetal wedge and nut, removable gunmetal seats and high tensile bronze spindle all suitable for a test pressure of 14 bar. Flow valves shall have cast iron wheel and non return valves shall have lock shield regulations, unless otherwise directed. Flanged shall be to BS Table "D" and be complete with counter flanges, joint rings, nuts, bolts and washers.

During the installation, valves shall be kept closed and care taken that valves are not distorted by undue pressure of spanner of that the tube connection is not forced home. Jointing compound shall not be applied to valve thread but to tube

only. Valves shall be removed from line before adjacent welding is carried out. Missaligned distorted or leaking valves shall be re-seated, re-packed or re-placed at the Contractors expense on receipt of instructions thereon from the Consultants.

Drain Cocks

Gunmetal drain cocks of the angle plug type with 15mm ribbed tail for hose shall be installed on sub-circuit side of each main isolating or regulating valve, and at all low points to allow for draining. Cocks shall be fitted in screwed tees or screwed socket welded to main with screwed or welded pipework respectively

Valve Keys

A number of keys for lock shield valves, drain cocks and air vent cocks shall be provided and mounted on timber rack, which shall be screwed to wall in approved position. One key shall be provided for every fifty of each size and each type of valve or cock in the installation with a minimum of three of each size and type.

Insulation

All insulation shall comply with the requirements of BS 1334 and 1588. Surface to be lagged shall be thoroughly cleaned free from grease, oil and foreign matter.

Pipework to be insulated as indicated on the drawings, and all insulation shall be of rigid glass wool sections carried over brackets to the thickness as later specified.

Each run of piping shall be insulated separately.

At bends and branches, the insulation shall be closely mitred, joined with adhesive or packed with loose wool in all gaps and surfaced evenly with china clay paste.

The insulation shall be supplied in the following thicknesses.

Heating and Hot Water Service pipes up to and including

50mm bore 25mm thick.

Cold water pipework 13mm thick

Tanks, Calorifiers, 40mm thick

Heating pipework will be insulated as follows:

Plantrooms Rigid section fibreglass with aluminium cladding.

Service Ducts
& Ceiling voids Foil backed rigid section fibreglass.

Testing and Commissioning

After the installation is complete the entire installation shall be tested to 14 bar and shall remain drip-tight and without any appreciable loss in pressure for a period of two hours.

Commissioning shall cover the setting in operation, regulation and balancing of water quantities to give correct and satisfactory operation of all plant, running at maximum ratings and also operating to give the design conditions.

The Contractor shall also carry out any reasonable tests at the Engineers request, so that the Engineers may satisfy themselves as to the complete and satisfactory operation of the entire installation.

Labelling

All valves, whatsoever, supplied and fitted by the Contractor under any section of this contract, shall be provided with numbered circular chromium plated brass discs which shall be fixed to the valve between the valve hand-wheel and the nut securing hand-wheel to the spindle. The Contractor shall also supply, in duplicate and mounted on a hard cardboard backing, a series of schedules subdivided into calorific or plant room locations stating exactly what services each valve controls. One of these schedules shall be framed in a hardboard frame with glass front and shall be mounted on the wall in appropriate calorific or plant room in a position to be indicated. The remaining copy shall be handed over to the Client.

Finishing and Painting

All pipework shall be thoroughly cleaned free of all foreign matter and all surplus slag on welds filled smooth and even. Exposed tubing, fittings and supports shall be cleaned down and coated with one application of good sound priming paint.

Painting of Insulation where this is required, shall be carried out by others but the Contractor shall ensure that it is carried out in the manner specified and to the colours identification of Pipelines, British Standard 1710 as set out in Table C10.8 Standard Symbols and Notation of the C.I.B.S.E.

6.7 VENTILATION DUCTWORK INSTALLATION

Scope

The Contractor shall supply and install all supply extract ventilation, fans and ductwork systems as detailed in drawings. All fans are scheduled in ventilation Layout drawings.

Description

A complete ductwork installation shall be provided and installed as indicated on the drawings, in accordance with DW144, HVCA specifications and BS5588: Part 9.

Ductwork, generally, shall be manufactured from galvanised sheet steel stiffened as necessary and fixed in purpose-made mild steel supports.

The installation shall be left complete in all respects.

Ducting

All ducting shall be manufactured from galvanised mild steel formed longitudinal joints and 50mm deep circumferential slip joints, riveted or bolted with rust-proofed bolts and nuts. All joints shall be fully sealed and air-tight and finished with at least 25mm wide pressure adhesive Polyvinyl-Chloride tape.

No stiffeners will be required on ducting up to 300 mm. On wider sides, circumferential stiffeners size 32mm x 32mm x 3mm of mild steel angle riveted on at 1.8m centres shall be provided. On ducts with wider sides of 300mm to 800mm circumferential stiffeners 38mm x 38mm x 4.5 mm of mild steel angle riveted on at 914 centres shall be provided on ducts with wider sides over 800mm.

In addition to circumferential stiffeners, diagonal bracing of 38mm x 38mm x 65mm mild steel angle shall be provided on all sides of ducts wider than 1.8m. The oxy-acetylene welding process shall be used in fabricating stiffeners and hen finished all over with an approved rust-inhibiting solution.

Notwithstanding the requirements of this clause, the installation shall be so fabricated that no component shall vibrate audibly during operation.

The above Specification refers to ducting which is rectangular or square in section, for ducting is circular in section read "diameter where reference is made to "wider sides".

Sizes of ductwork are internal dimensions. Where applicable make allowances for any internal lining. Ductwork will be fabricated to meet the low pressure classification in accordance with DW 144 Part 2 section 5.1 and the leakage classification in accordance with DW 144 Part 2, section 6.3. Special attention will be given to ductwork to

eliminate sagging or flexing of ductwork during plant operation. Where ducts connect to builders work, comply with DW 144 Part 7, section 29

All ductwork will be air leakage tested to DW 144. Acoustic lining will be retained by an approved material to prevent hygroscopic migration. All ducting in Plantrooms will be lined internally with 25mm thick sound insulation. Plenum boxes will be lined with 75mm thick acoustic material.

Ducting Fittings

Bends, branches and transition pieces shall be as manufactured to correspond in all aspects with the ducting specified above.

Unless impossible due to special location conditions, bends, twin bends and branches shall have a radius to centre line of not less than the width of the trunking.

Taper of transition pieces and reducing pieces shall not be greater than 20 degrees.

All bends will have multiple single skin turning vanes. Turning vanes will be fastened as described in DW 144 Part 3, section 15. Flexible joints will be used to make connections to all fans. All vibration plant flexible connections will be designed and installed to prevent duct noise breakout, vibration transmission along the duct walls and excessive turbulence in the duct.

Flexible connections to plant will be heavy duty type for maximum performance and will have flanged connections.

Ducting Supports

Supports shall be provided on ducting at 1.8m centres. Supports shall be purpose made from mild steel angles, flats, and bars and shall be complete with all necessary nuts, bolts, washers, eyes, turnbuckles and lugs. All steel components shall be treated before installation with an approved rust-inhibiting solution and painted two coats to selected colour.

The Consultant will attend on site to inspect prototypes of all supports before the main works are commenced.

The Contractor shall not drill out weld to any structural steel member without authorisation from the Consultants.

The spacing of supports will comply with DW 144 part 6. The contractor will ensure that the ductwork does not come in direct contact with the building fabric except in cases of fire dampers, silencers and builders frames. Isolate all

supporting members from ductwork, secure to supports by means of adhesive lining of 6mm thick rubber.

Access Doors

Access doors shall be provided to ductwork where shown, and near the bottom of all vertical ducts longer than 914mm

Access doors shall have clear openings not less than 75% of the cross sectional area of the associated ducting, shall be manufactured from 2mm reinforced galvanised mild steel sheet and shall be complete with fireproof felt airtight seals and cam lock fasteners. Duct walls at access doors shall be adequately reinforced with galvanised mild steel angle stiffeners.

Access doors will be provided to all fire damper locations.

Dampers

Dampers in main ducting 0.37M2 or greater in cross sectional area shall be of multi- pattern, dampers in smaller ducting may be of the single-leaf type.

All dampers shall be complete with steel shafts, nylon sleeve bearings, quadrant arm, winged locknuts and indicator plates.

Manual balancing dampers will have low profile aerofoil blades and concealed linkage. Damper casing will be of roll formed steel construction with reinforced corners. Hand operated controllers will be provided on the damper assembly to enable easy system balancing and indicate blade positions.

Shut off type dampers at each reheat coil and main return air grille will be as above but will have a pressure sensitive low friction blade edge seal of silicone rubber. Shut off dampers will be electrically driven and have extended shafts for actuator mountings.

Fire Dampers

Fire dampers shall be provided where ducting passes through fire compartment walls and through floors. All fire dampers to be properly secured to building fabric as per DW144 standard details.

Fire damper blades shall be cut from 20mm thick galvanised steel sheet and shall be mounted off centre on steel shaft set in lubricated sleeve bearings. The long

end of blade shall be heavily weighted. An approved type flexible linkage shall be provided in the duct to hold the fire damper open in normal circumstances. The linkage shall be designed to fuse and allow the damper to close when the air temperature in the duct rises above 65.6 degrees C. The linkage shall be designed so that it is impossible components to be thrown between the damper blade and the duct wall when the linkage fuses.

An access door as previously specified shall be provided adjacent to all fire dampers and a labelled indicator arm shall be provided to show if the fire damper is open or closed

Fire dampers will be provided to all air ducts penetrating the enclosing walls of vertical service ducts. Ducting passing through floors outside of service shafts will be fire stopped. For details of fire damper construction comply with DW 142 part 7, section 30. Fire dampers will be shutter type with stainless steel springs.

Fire dampers will have resetable link mechanisms for periodic testing. Dampers will be certified to BS 476 part 20 and have similarly passed specific and independent tests for salt spray (corrosion), closing reliability and dust loading. The free area of the open damper will be not less than 90%. Dampers will have HVCA/HEVAC installations frames as appropriate.

Grilles

A full schedule of required grilles is indicated on drawings M900

Balancing and Adjusting

The Contractor shall adjust, regulate, set, proportion and balance all components of the installation and shall submit to the Consultants readings of velocities averaged over face of each grille.

The Contractor shall provide use of all instruments required by the Consultants to ensure that the installation is working correctly and efficiently in all respects.

Test holes will be provided in the ductwork to allow complete testing and commissioning of the systems in accordance with CIBSE Commissioning Codes Series A. Test holes will be drilled on site in accordance with DW 142 part 7, section 21.4. Test holes will be provided on each side of all equipment and at least 1.5 duct diameters upstream of all dampers. Holes will be provided in ductwork to accommodate thermostats and other control sensors. All control sensors will be fitted in accordance with the manufacturers recommendations.

All testing and commissioning will be carried out by a suitably qualified commissioning engineer.

6.11 SOILS & WASTES INSTALLATION

Description

This section comprises the following:

a) Wastes pipework installation
b) Soils pipework installation
c) Overflows installation.

Connections to Fixtures

The contractor shall connect to all soils and wastes outlets from sanitary fixtures and shall extend all soils and wastes pipework systems to connect to 100mm and 150mm Builder's upstands at ground floor level.

Contractor to supply and install all necessary sanitary pipework, fittings and ware to complete sanitary ware installation in fully compliance with sanitary ware supplies recommendations.

All vents shall be carried to 600mm above roof level.

All outlets from shower trays shall be connected by the contractor. All soil connections from wcs at ground floor level shall be connected to the upstands by the contractor.

Soils and Waste Pipework

The contractor shall connect to the waste outlet from traps serving wash hand basins and sink units and shall supply and install the waste pipework from each outlet to connect to the 100mm Builder's upstand at ground floor level. He shall extend all vents to 600mm above roof level.

All soil pipework shall be UPVC to BS 4514. Ring seal joints shall be used. The connections to w.c. outlets shall be made using SA 42 adapters. All pipework fittings shall be included.

All wastes pipework systems shall be UPVC, solvent cement jointed. Pipework and fittings shall be installed strictly in accordance with the manufacturer's specification and requirements. All necessary rodding and cleaning eyes and access doors shall be included, whether shown on the drawings, or otherwise, to facilitate cleaning an access. All supports and fixing shall be included.

Overflows

The contractor shall include for the supply, installation and connection of 19mm overflows in copper pipework from all w.c. cisterns, to discharge to atmosphere, clear of the building.

Condensate Drains

Contractor to include for all condensate drain pipeworks systems as detailed on drawings including running traps. Pipework to be installed strictly in accordance with air conditioning unit manufactures guidelines.

6.13 STATIC TESTING

Pressure Testing - General

Comply with procedures give in HVCA to Good Practice for Site Pressure Testing of pipework. Ensure safety precautions detailed in HSE Guidance note GS 4 Safety in Pressure Testing are adopted.

The commissioning of the heating and ventilation services shall be carried out by an approved commissioning contractor.

Provide a blanked connection to accommodate a check gauge in addition to the accurate gauge fitted to section under test.

Test concealed and buried pipework before any permanent covering is applied.

Advise appropriate personnel, in advance, of the time pressure tests may be witnessed.

Pressure Testing – Water Circulating & Supply Systems

Carry out hydraulic pressure testing as described in HVCA Guide to Good Practice for pressure testing of pipework. Test section by section for one hour, as the work proceeds and prior to application of thermal insulation as follows:

1. operating gauge pressure less that 3.5 bar, test gauge pressure 7.0 bar.

2. operating gauge pressure 3.5 - 7.0 bar, test gauge pressure twice operating pressure.

3. operating gauge pressure greater that 7.0 bar, test gauge pressure 14.0 bar or one and a half times operating pressure whichever is the greatest.

6.13.03 Pressure Testing Underground Pipework

Test to a gauge pressure twice the operating pressure or 7 bar, whichever is the greater for four hours.

6.13.04 Pressure Testing – Water Mains

Test to Local Authority requirements. Ensure the provisions laid down in HVCA guide to good practice for site pressure testing of pipework for testing underground COWS mains are carried out.

Cleaning Ductwork Systems

Clean ductwork before plant is first run, using access openings in ductwork.

Commissioning Codes

Carry out commissioning of installation in accordance with the procedures, checks and tolerances given in the CIBSE Commissioning codes and BSRIA Manual for regulations water system section 4.4.

Preliminary Checks – Air Distribution

Carry out checks and procedures as detailed in CIBSE commissioning codes A section A1, and use check list in BSRIA manual for regulating air conditioning installations, section 5.7.

Setting to Work and Regulation – Water Distribution

Set to work and regulate water distribution systems in accordance with CIBSE commissioning code W section W2 and procedures detailed in BSRIA application guide 1/79, manual for regulating water systems

Measurement : Use instruments for measurements, detailed in BSRIA application guide 1/79 manual for regulating water system, section 2

Setting to Work and Regulation – Air Distribution

Set to work and regulate air distribution systems in accordance with CIBSE commissioning code A section A2 and procedure detailed in BSRIA application guide 1/75 manual for regulating air conditioning installation section 4.

Measurement of air flow : use instruments for measurement and methods of measurement detailed in CIBSE commissioning code A. Appendix A3.1, and in BSRIA application guide 1/75 manual for regulating air conditioning installations Section 3.

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.

Commissioning Records

Keep a systematic record of commissioning results and distribute as indicated. For air systems use record sheets as described in BSRIA application guide1/77 documents for air system regulation

For air systems use record sheets as described in BSRIA application guide 1.77 documents for air system regulation.

For water systems use record sheets as detailed in BSRIA application guide 1/79 manual for regulating water system section 5.

Performance Test Records

Keep a systematic record of tests. Distribute records as indicated.

6.16 IDENTIFICATION AND LABELLING

General

The mechanical contractor shall provide identification/labelling of plant items, piped and ducted services within suspended ceilings and plantrooms. Identification shall be in accordance with BS1710 and BS1319.

Colours for identification purposes shall be in accordance with BS 381C.

Pipework Identification

Primary identification shall be achieved using colour bands, 300mm wide to each pipe at:

- intervals not exceeding fifteen metres

Secondary identification shall be achieved by applying colour bands 50mm wide and superimposing a legend identifying circuit, direction of fluid or gas flow, nominal pipe bore. Legends shall be applied to colour bands by transfer of an approved type.

Ductwork Identification

Colour coding and labelling of ductwork shall conform to HVCA specification DW 142 (Appendix c). Primary Identification shall be achieved by apply colour bands 300mm wide to each duct at intervals not exceeding fifteen metres at least once in every room or enclosed area. Secondary Identification shall be achieved by using triangular plates with apex indicating direction of airflow. Details of plates and fixings shall be submitted for approval before painting and marking. Legends shall be applied to triangular plates identifying floor and space served.

Plant & Equipment Identification

Each item of equipment shall be identified by name and where appropriate by agreed reference characters. Rectangular engraved metal or laminated plastic plates shall be securely fixed to each item of equipment.

Valve & Cock Identification

Each valve, cock, stop valve, and air vent shall be identified with engraved metal or laminated plastic disc. Discs shall have a minimum diameter of 35mm.

Air Volume Regulating & Control Damper Identification

All air volume regulating and control dampers shall be identified with an engraved metal or laminated plastic disc securely attached

Instrumentation Identification

Each instrument shall be identified by name using engraved rectangular metal or laminated plastic discs.

System Identification Installation Charts

A referenced schematic diagram of all system as installed shall be supplied identifying all items by appropriate reference characters.

Diagrams and charts shall be contained in surrounding frames with mounting attachments and Perspex sheet glazing and fixed

SECTION 7

SCHEDULES

CONTENTS

7.1 SCHEDULE OF PIPEWORK FITTINGS
7.2 SCHEDULE OF VALVES
7.3 SCHEDULE OF INSULATION
7.4 EXTRACT FAN SCHEDULE
7.5 EXTRACT GRILLE SCHEDULE

7.1 SCHEDULE OF PIPEWORK FITTINGS

Service	Material	Joints	Fittings
LTHW Heating Installation	Black mild steel heavy grade BS1387	Welded up to 50mm BS4504 table 10 and welded over 50mm	Malleable iron screwed to BS1256 and BS21 or steel welding fittings to BS1965
Mains Cold Water Service (MWS)	Light gauge copper tube to BS2871 Part 1 Table X	Capillary soldered up to 54mm	Capillary BS864 Pt. 2 1971. Hard solder silver brazing type to BS2845 type AG 1
Tanked Cold Water Service (CWS)	Light gauge copper tube to BS2871 Part 1 Table X	Capillary soldered up to 54mm	Capillary BS864 Pt. 2 1971 Hard solder silver brazing type to BS1845 type AG.1
Hot Water Service (HWS)	Light gauge copper tube to BS2871 Part 1 Table X	Capillary soldered up to 54mm	Capillary BS864 Pt. 2 1971 Hard solder silver brazing type to BS1845 type AG.1
Drainage Pipework	UPVC	UPVC solvent welding	

7.2 SCHEDULE OF VALVES

Service	Duty	Size	Type	Joints
Heating LTHW	Flow isolation	Up to 50mm	Copper alloy gate valve BS5154 Hattersley: Fig 33X Crane: D151 or approved equal	Screwed

Service	Duty	Size	Type	Joints
Main water service (MWS) Cold water service (CWS) Hot water service (HWS)	Isolation	Up to 50mm	Copper allow gate valve Hattersley: Fig 33X Crane: D151 or approved equal	Screwed
Domestic water service	Stop valve	Up to 50mm	Copper alloy screw down stop valve BS1010 Lockshield type	Compression
Mains water	Supply to WC's showers, basins, sinks etc.	15/22mm	Ballofix valves copper alloy to isolate each outlet. Chromium plated where exposed	Compression
Mains water	Supplies to vending machines, water storage tanks etc.	15/28mm	Double non-return valve	Compression
Strainers		Up to 50mm	Copper alloy pipeline type oblique. Hattersley: Fig 807 Crane: D297 or approved equal	Screwed
		65mm and above	Cast iron pipeline type oblique Hattersley: Fig 807 Crane: D297 or approved equal	Flanged

Mains water services (MWS)	Supply to tanks	15-28mm	Copper allow lever operated float valve to BS1212 Pt. 2	

Note: All valves to be full line size unless specifically noted otherwise on the drawings.

Orifice valves and commissioning stations to be selected at line size for tender purposes. However, the final size to be installed shall be confirmed prior to ordering.

7.3 SCHEDULE OF INSULATION

Service	Location	Insulation Materials	Vapour Barrier	Finish
HWS	**Concealed**	**H&V preformed mineral fibre section**	**No**	**Aluminium foil**
LTHW/ water	Concealed	H&V preformed mineral fibre sections	No	Aluminium foil
MWS, CWS	Concealed	H&V performed mineral fibre section	Yes	Aluminium foil
Ductwork	Concealed	H&V duct slab semi-right	Yes	Aluminium foil

7.4 EXTRACT FAN SCHEDULE

Extract Fans - Please refer to drawings M400 for Extract Fans schedule details. (or equal to engineer's approval)

7.5 EXHAUST DISC VALVE SCHEDULE

Please refer to drawings M400 for Extract Valve for schedule details.

7.5 RADIATOR SCHEDULE

Please refer to drawings M200 for radiator schedule details.

End of Particular specification