



Galileo Energy Services

Unit A6, M4 Business Park,
Celbridge, Co. Kildare.
Tel: 01-6274103
www.galileoenergy.ie

**ST. CATHERINE'S NATIONAL SCHOOL,
RUSH,
CO. DUBLIN.**

MECHANICAL SERVICES SPECIFICATION

PARTICULAR SPECIFICATION FOR THE MECHANICAL INSTALLATION

TENDER ISSUE (T1)

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GENERAL ITEMS

Introduction

The intention of this specification and the drawings issued is to describe and provide for a complete installation. The Contractor is advised that the work to be executed as described in these documents shall be complete in every detail, notwithstanding that every item involved may not be specifically mentioned or described. The Contractor shall be held to allow for all materials and labour necessary for an entire and complete installation and shall not avail of any unmentioned error or omission should such exist.

The works entails 2-storey classrooms extension building to St. Catherine's National School, there shall also be refurbishment works carried out within the existing school building. The works includes for the supply and installation of new mechanical services in the new building. Refer to the drawings for further information, layout of the building and services/works required. All works shall be in compliance with all relevant Building Regulations, Irish Standards, British Standards, CIBSE Guidelines and Good Engineering Practices.

The Contractor shall be deemed to have carried out a site visit of the site prior to the completion of his tender and ensure that all factors, site conditions, and items are taken account and what items are necessary in order to complete the installation and to leave same in a complete working condition to the satisfaction of the Employer's Representative. No extras or variations shall be allowed for additional work that could have been ascertained by visiting the site. The Contractor shall contact the Main Contractor to arrange an appropriate appointment to visit the site during the tender period.

The Contractor shall be required to ensure all necessary flexibilities & resources are available to the project to meet the deadlines and programmes. The Contractor shall liaise with the Main Contractor regarding the programme and order of works and any concerns he may have over the completion date should be raised prior to the awarding of the contract.

The Contractor shall take all reasonable care to ensure all site workers and visitors are not endangered by any element of their works. The Contractor must ensure that the works are completed as soon as possible and/or within the agreed program time frame.

The Contractor shall also review all Architects and Structural Engineers drawings to familiarise themselves with the proposed development and scope of works involved. It is the Contractor's responsibility to raise any concerns over the proposed works with the Engineer prior to commencement of works. Failure to inform the Engineer of any such concerns will be deemed that the contractor has accepted the design and scope of works to be fault free.



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This specification will set out in general terms the design drawings and data to be used by the Contractor in order to submit a tender bid for the mechanical services installation and the works associated with the installation. The procurement, delivery, supply, handling, erection, installation and commissioning of the services as there under described as may be seen or inferred from the enclosed drawings and documents from the Consulting Engineer.

The Contractor shall satisfy himself that the installation is in accordance with all codes and standards. All works described shall comply with:

- i) The Safety, Health and Welfare Act, 1989.
- ii) Requirements of the Health and Safety Authority / SI 138.
- iii) Requirements of the Fire Officer.
- iv) All Irish Building Regulations including Building Control (Amendment) Regulations (BC(A)R), S.I. 9 of 2014.
- v) Factories Act / Statutory Instruments.
- vi) Client Safety Protocol.
- vii) Client Specifications.
- viii) Chartered Institute of Building Services Engineers.
- ix) The Tender Drawings.
- x) The Contract Preliminaries.
- xi) All relevant Irish, British and European Standards and Codes of Practice.

Please note that 'The Contractor' in this specification refers to the Mechanical Contractor.

The Contractor shall familiarise himself with the above and the obligations therein.

For any queries relating to this specification or related drawings, the Contractor shall contact the following:

*Mr. Barry Nolan,
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Standard and code of practice



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Unless specifically stated otherwise, or approved by the Engineer, installation, materials and equipment shall be in accordance with the relevant Irish, European International and British Standards and Codes of Practice and CIBSE Guidelines, whether indicated in this Specification or not.

Where stated in this document the British Standard Reference numbers shall be compatible with the I.E.C. reference numbers or vice versa.

Acts and regulations

The installation(s) shall comply with all Acts, relevant Statutory Instruments and Regulations including any special Regulations issued by the electricity, gas and/or water authorities. The tender shall be based on the Acts and Regulations current on the date for return of tenders. If these Acts and/or Regulations are amended or new Acts and/or Regulations are enacted after that date the Mechanical Contractor shall inform the Engineer immediately.

Specified equipment

The Contractor shall refer to the rear of this document for a schedule of the specified equipment on which The Company's price is based. The Tenderer may offer an alternative manufacturer, providing the equipment offered is equal in all aspects, i.e. aesthetic appearance, classification and performance.

Alternative equipment proposed to that specified shall only be accepted/installed with the expressed approval of the Engineers in writing prior to the completion of the tender documents.

Plant warranties

Where a manufacturer's warranty applies, the warranties on plant and equipment shall commence from the date of commissioning and acceptance of plant by the Engineers.

Form of tender

The Contractor will pay particular attention to the proper completion of the Form of Tender. Completion of the Form of Tender must be as per the item numbers listed and should note that any section heading may apply to one or more of the items listed 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 or specification.

The tenderer shall be deemed to have full knowledge of the Specification and Drawings supplied to him and to have made himself fully acquainted with all



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requirements and to have obtained clarification on any matter or detail, which may be obscure to him.

Should any matter arise which in the opinion of the tenderer is obscure, he shall submit the details for clarification in writing to the Employer's Representative Engineer within 7 days of expiration of the tender period. The Employer's Representative shall circulate a reply to all Tenderers before the tender period expires.

The tender price is to be based on the works being carried out at rates of pay during working hours and under conditions of labour not less favourable than those established for the trade or industry in the district where the works are to be carried out. Any non-productive time associated with the recruitment of additional staff by the Contractor during the execution of the contract shall be deemed to be included in the tender price.

Installation and setting out of works

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. All openings, plinths, bases and holes to be cut in the structure shall be positioned and marked by the Contractor.

The tender drawings are diagrammatic only and the Contractor shall allow for a practical installation allowing for the setting around obstructions and other minor modifications which may or may not be apparent from the Architectural, Engineering, Structural, or services drawings.

The exact courses and positions of all pipes, ducts, flues, cabling, conduit, trunking etc. 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 temperature and the proximity to other services plant.

The Contractor shall make good any incorrectly set out works and shall be liable for costs of making good any work incorrectly carried out. The Contractor shall furnish all materials, labour and instruments necessary to enable the setting out to be checked.

Conflict between drawings and specifications

In the event of there being a conflict between drawings and specification, the tenderer shall obtain clarification before submitting his tender.

Failure to do so will be deemed to imply that the most onerous requirements have been included for.



Materials and workmanship

All materials used in the works shall be fit for the use for which they are intended and for the conditions in which they are to be used in and includes materials which:

- a) Bear a CE mark in accordance with the provisions of the Construction Products Directive (89/106/EEC)
- b) Comply with an appropriate harmonized standard, European technical approval or national technical specification as defined in article 4(2) of the Construction Products Directive (89/106/EEC)
- c) Comply with an appropriate Irish Standard or Irish Agreement Board Certificate or with an alternative national technical specification of any member state of the European community, which provides in use an equivalent level of safety and suitability.

The installation shall be carried out and maintained in the best and most substantial and workmanlike manner. Workmanship shall comply with British or Irish Standards and the relevant codes of practice.

Only fully qualified and competent tradesman and helpers shall be employed on the works. Work shall not be sub-let or done by any other Contractors without the Employer's Representative permission.

No work shall be covered up prior to inspection by the Employer's Representative.

Wherever a proprietary name is used to specify a material or process it shall be deemed to have the term '**or equivalent**' appended to it.

Where a material or process is described by reference to its propriety name the name is used to indicate the standard of construction, appearance, ease of maintenance and durability acceptable to the Employer's Representative. The Employer's Representative will approve the use of alternatives where such alternatives are shown to equal or surpass the qualities of the product or process specified. Accordingly proprietary names wherever mentioned in the Specification, schedule of Rates or on the drawings shall be deemed to mean the provision of the named product or process or an approved alternative.

Notwithstanding the above no items shall be used for the works except those as specified in the contract documents except with the permission of the Employer's Representative. Any points, which differ in the contract documents to the Contractors normal practice, may receive consideration at tender stage if referred to the Employer's Representative.

If no reference is made at tender stage it will be assumed that the Contractor will proceed exactly according to this specification.



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Improper materials

The Employer's Representative shall have the power to order during the progress of the works the removal from site of any material, which in his opinion is not in accordance with this contract, the substitution of proper materials, and the removal and proper re-execution of any work, which in respect of materials and workmanship is not in accordance with the contract. This condition is not withstanding any previous tests or interim payments.

Liability for defects

Works showing defects or damage, whether caused by or as a consequence of negligence on behalf of the Contractor or not and regardless of whether the defects are discovered during the progress of the works or upon completion of the works, and regardless of whether the works have been approved or fully certified, the Contractor shall make good, at his own expense, such damage or defects discovered. On refusal to do so the Employer shall be entitled to carry out the work necessary and recover the expenses associated with such work.

Allow for maintaining the works in perfect condition for 12 months after the issue of the Employer's Representative's Certificate of Substantial Completion in accordance with the Conditions of Contract.

Conditions of building and site

The Contractor shall be responsible for making good any damage caused to the fabric or decor of the building or site by, or as a result of, his negligence or the negligence of his employees or contractors or others unnamed or otherwise. All rubble and waste shall be removed as it arises. Upon completion of the works, the site and building shall be thoroughly cleaned to the satisfaction of the Employer.

The Contractor shall pad ladders or similar equipment so that the building structure or finishes are not damaged in anyway. He shall also ensure that oil, grease or similar goods do not cause damage to the structure during the execution of the works.

Local authorities

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

Plant



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The Contractor shall supply all necessary slings, tackles, scaffolding, haulage, instruments, materials, apparatus, tools and labour for delivery and erection of the works, and for the completion and testing of the works to the entire satisfaction of the Employer's Representative.

Loss, theft, damage and injury

The Employer or Employer's Representative shall not bear any responsibility for the loss, theft or damage of equipment or materials associated with the works either during delivery or at any time during the execution of the works. All plant, equipment, tools, workmanship and materials shall comply with the relevant safety standards. The Contractor shall bear responsibility for the safety of his employees and agents throughout the execution of the works.

Copyright

Copyright is reserved on the Consulting Engineers' documents, which include all drawings, specifications, sketches and the like. These documents may only be used in relation to the works as outlined in this contract. Photocopying of documents is not permitted without prior permission of the Consultant Engineer. Any copies of documents made during the execution of the works shall be returned to the Consulting Engineer prior to final payment

Contractors drawings

The Contractor shall prepare if requested by the Employer's Representative any working drawings necessary for proper completion of the Contract. Two copies of each drawing shall initially be submitted to the Employer's Representative and upon approval the Contractor shall provide 6 no. copies of said drawings for distribution.

Working drawings shall show the final arrangement of all items of plant and their associated connections, all control assemblies and panels, as well as the routing of all pipework and ductwork. The Contractor shall consult with all relevant parties and in the preparation of his working drawings so as to ensure there is no conflict between the Mechanical, Electrical and other services, Architectural or structural elements.

Variations, extras and omissions

No variation shall vitiate this Contract or save as hereinafter provided or give rise to any claim for compensation.

Where an extra, variation, omission is required the Contractor shall submit a price for such variation, omission or extra to the Employer's Representative in writing within seven days of the request for such a price.



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He shall not proceed with such alteration, variation or extra until such a time as he has received a Variation Order in writing from the Employer's Representative.

No payment shall be made whatsoever to the Contractor for any variation, alteration, addition or extra unless a Variation Order is produced. Variations shall be priced at the rates submitted by the Contractor with his tender where such are applicable.

Pricing

Un-priced items

Any item left un-priced shall be deemed to be included for in the tender and the cost of the item shall be deemed to be spread across and included in the rates generally.

Currency

All prices and rates shall be deemed to be denominated in Euros (€).

Electricity supply, electric wiring and equipment

All electrical equipment is to be suitable for the standard ESB supply of 400/230V @ 50hz AC.

Where starters or controls are provided with any equipment included under the mechanical services contract, they shall be handed over to the Electrical Contractor together with their wiring diagrams, for erection and commissioning by him.

Electrical sub-systems certification

All electrical subsystems shall be certified as having been carried out in compliance with the requirements of the ETCI Wiring Regulations.

Copies of the ETCI Subsystems certificates, accompanied by the relevant test results, shall be included with the ETCI Completion Certificate in the Health and Safety File for the project.

In the event of the Contractor failing to secure subsystem certificates for all items of equipment then the Contractor shall be liable for the cost of having the system tested, remedied as necessary and certified.

The tender figure shall be deemed to include for all costs incurred by the Contractor in providing the appropriate documentation.



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Proprietary names

Wherever a proprietary name is used to specify a material or process it shall be deemed to have the term '**or equivalent**' appended to it. If applicable, if the Contractor proposes an alternative material or equipment, this material or equipment shall be approved by the Employer's Representative **prior the end of the tendering period.**

Where a material or process is described by reference to its proprietary name, the name is used to indicate the standard of construction, appearance, ease of maintenance and durability acceptable to the Client / Employer's Representative. The Client / Employer's Representative will approve the use of alternatives where such alternatives are shown to equal or surpass the qualities of the product or process specified. Accordingly proprietary names wherever mentioned in the Specification, Schedule of Rates or on the drawings shall be deemed to mean the provision of the named product or process or an approved alternative

'Safepass' accreditation

The Contractor shall comply with the requirements of the construction industry's safety accreditation scheme, known as the 'Safepass' scheme.

Decision of the Employers Representative

The decision of the Employer's Representative on all questions relating to the execution of the works, the meaning of the Drawings and Specification, the manner of the execution of the works or the quality of the materials, the nature, quality of the works executed or what amount was included in the Contract shall be final, conclusive and binding.

Works outside the contract

The contractor should note that claims for additional works will not be entertained unless specifically requested in writing by the Employer's Representative.

Waste management

The site shall at all times be kept as clean and tidy as possible and the contractor shall be responsible for removing debris and rubbish on a regular basis. Removal of waste from site shall comply with the statutory waste management requirements

Damage

External:



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The Contractor shall note that any damage to the existing yards, main entrance, grassed areas, access roads or paved areas that may arise during construction stage of the project and caused by the construction works or by the Contractor's vehicles or staff, is to be made good by him at no extra cost to the Client.

The Contractor should provide all necessary protection to existing paved, grassed and landscaped areas around the site and shall make good any damage caused by lack of such protection at no extra cost to the Client.

The work is not to interfere in any way with the public roads. In particular, the Contractor is to ensure that these areas are to be left free of all dirt and debris and builder's materials and parking of construction vehicles, etc and the roadways are to be thoroughly cleaned as and when required. Any damage caused to the surrounding public roadways shall be made good to the satisfaction of the Local Authority at the Contractor's expense. Any damage caused to the surrounding barracks roadways shall be made good to the satisfaction of the Client at the Contractor's expense.

Internal:

The Contractor shall note that any damage to the existing walls, windows, floor coverings, ceilings, doors, etc. that may arise during construction stage of the project and caused by the construction works or by the Contractor's plant or staff, is to be made good by him at no extra cost to the Client. Any damage caused to the internal building as listed above shall be made good to the satisfaction of the Client at the Contractor's expense.

Interpretation of this specification and drawings

This specification has been written using simple, direct language wherever possible. Imperative terms such as 'provide' and 'submit' mean that the Mechanical Contractor shall 'provide' or 'submit' the relevant samples, documentation or information. If any discrepancies exist or there is any doubt about the interpretation of the Documents, obtain clarification from the Project Manager.

Declaration of Performance/CE markings

General:

All materials, equipment and plant used in the works shall be fit for the use for which they are intended and for the conditions in which they are to be used in. All materials, equipment and plant shall adhere to the following:



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- Shall bear a CE mark in accordance with the provisions of the Construction Products Directive (89/106/EEC)
- Shall comply with an appropriate harmonized standard, European technical approval or national technical specification as defined in article 4(2) of the Construction Products Directive (89/106/EEC)
- Shall comply with an appropriate Irish Standard or Irish Agreement Board Certificate or with an alternative national technical specification of any member state of the European community, which provides in use an equivalent level of safety and suitability.

The Contractor shall provide a Declaration of Performances (DOP's) cert for all materials, equipment and plant used in the works.

Evidence:

The Contractor shall provide evidence of Declaration of Performances(DOP's) and CE markings for all equipment, plant and material used in this project upon request by the Employers Representative.

Trade union rates and agreements

The Contractor must be in compliance with all Trade Agreements and the Contractor shall pay all employee's connected with the project to current trade union rates. If the Contractor appoints Sub-Contractor's to complete work then they too shall be compliant with current trade union agreements.

This will be monitored on site to ensure that all the Contractors employees and subsequent Sub-Contractors are in compliance with all Trade Agreements and that all are paid current union rates.

All employee's and Sub-Contractors employed by the Contractor for the duration of the works shall have their union cards on them at all times.

NZEB/BER Compliance

This new extension building needs to be NZEB compliant.

An NZEB compliance report and calculation has been carried out for this project and the building is NZEB compliant based on all the plant, equipment, materials, etc. as specified below in the specification document.

The Contractor shall ensure that all items specified within this specification is installed as a preliminary NZEB/BER calculation has been carried out based on this specification.



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If the Contractor is to deviate from the specified items within this specification and propose alternatives, the Contractor must ensure that these items match the specified criteria within this specification.

If in any case the Contractor takes the onus to install any item that isn't an equivalent to the specified items or isn't formally approved by the Engineer, then the Contractor shall be asked to carry out an individual NZEB/BER assessment to ensure it meets the desired NZEB/BER criteria. This shall be carried out at the Contractor's expense and any cost implications for this shall be at the expense of the Contractor.

Timescale, working hours, payment, etc.

Refer to the Main Contractor for specific details on these requirements.

Coronavirus (COVID-19)

The Contractor shall ensure that all workers on site collaborate on implementing the HSE's guidelines on social distancing for construction sites in order to protect themselves from the Covid-19 virus. The Contractor and all his Employees and Sub-Contractors shall comply with HSE guidance to protect themselves from the Covid-19 virus.



BUILDING CONTROL REGULATIONS

General:

All works shall be carried out to the new Building Control (Amendment) Regulations (BC(A)R), S.I. 9 of 2014.

Therefore, the Contractor shall allow for the following over the following stages of the contract:

Commencement Stage:

- Familiarise themselves with the drawings, specifications and documents lodged with the Commencement Notice.
- Ensure a competent person is assigned to oversee the Construction works.

During Construction:

- Install the services and construct the building in accordance with the plans and specifications.
- Ensure that the workmanship complies with the requirements of the Building Regulations.
- Ensure that materials which they select and for which they are responsible comply with the requirements of the Building Regulations.
- Co-operate with the design team, the Assigned Certifier and other certifiers.
- Co-operate with the Assigned Certifier for the implementation of the site inspection plan.

Upon Completion:

- Sign the Certificate of Compliance (completion).
- Provide to the Assigned Certifier, such documents for which they are responsible, as may assist the Assigned Certifier to collate particulars for the purposes of handover and certification, and/or for further submissions to the Building Control Authority.
- We will require Certificate of Compliance with the Building Regulations and relevant standards and manufacturers requirements at this stage.
- Ensure the coordination and provision of all test certificates and confirmations to the satisfaction of the Assigned Certifier or other designated inspectors or certifiers providing Ancillary Certificates;
- Maintain records.



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Inspections during the Construction Process:

The Contractor shall allow the following for inspections during the Construction Phase:

- Contractor to give the Engineer at least 5 days notice to carry out a necessary inspection.
- All services that are to be hidden or concealed shall be left exposed until inspected.
- Prior to closing up services in walls, ground, attics, etc., all tests shall be completed and sign off sheets shall be signed and witness signed. Test sheet to contain the name of the tested, name of the witness, type of test, duration of test and results recorded.
- No cost variations will be accepted for time delays or opening up for inspections if these procedures are not followed.

BUILDERS WORK

General:

All Builders work associated with the execution of this Contract shall be carried out under the main contract by the Main Contractor. The Contractor shall liaise with the Main Contractor on all builders work requirements relating to their installations and shall prepare detailed builders work drawings for the Main Contractor.

The Contractor shall prepare any working drawings if necessary, agree all details with the Employer's Representative, mark out and be responsible for correctness, and the cost of any unnecessary work due to the Contractor failing to comply with this condition shall be the Contractors responsibility. The Contractor shall ensure that cutting away and general attendance is reduced to a minimum and must not impede or delay the carrying out or completion of this work. The permission of the Employer's Representative shall be secured before cutting or chasing is commenced.

The Contractor shall be responsible for the preparation of the following:

- Builders work drawings, including all necessary opes for installation
- Technical submittals, for all items of plant and equipment that vary from the specified equipment herein.
- Ensuring that all services/installation details are completely integrated with all aspects of the building elements, to the satisfaction of the Client.



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Opes through Fire Barrier Membrane:

All services through fire barriers, fire walls or floor slabs shall be sleeved either side of the fire barrier/wall/slab. All opes shall be filled in and fire proofed by the Main Contractor after services is installed and commissioned. Allow for all necessary works. Liaise with Main Contractor in ensure that all opes for services are fire-proofed.

CO-ORDINATION

The Mechanical Contractor shall allow for liaising with all other trades in relation to coordination. Before any works are started on site, the Mechanical Contractor shall hold a meeting with the Electrical Contractor to co-ordinate the M&E installations in the building. The co-ordination of the electrical installations shall be the responsibility of the Electrical Contractor but the Mechanical Contractor shall allow for co-ordinating the mechanical installation with the Electrical Contractor.

The Mechanical Contractor shall provide all information necessary and on time to the Main Contractor for the proper discharge of this responsibility. The Mechanical Contractor shall agree all methods, sequences timing and all relevant details of the works within his contract with the Main Contractor in advance and shall not deviate from this agreement unless otherwise agreed in writing with the Contractor. No adjustments will be made to the mechanical contract sum where additional work is required due to poor co-ordination or where the Employer's Representative has not been informed in good time of a co-ordination difficulty that could have been resolved by a design decision had the issue and its full implications been advised to the Employer's Representative in good time. The Mechanical Contractor shall liaise with all other trades when co-ordinating their works.

The Mechanical Contractor shall mark out opes and holes on all floor and wall surfaces as required to the satisfaction of Services Engineer, Structural Engineer and Main Contractor in sufficient time to allow the Main Contractor complete his works to programme.



(5-) MECHANICAL WORKS

General

The Contractor shall be responsible for all mechanical works and shall ensure that the full price for this work is included in the tender price. This section of the Specification outlines the mechanical services installation and describes the particular requirements of the mechanical services to be installed. This section is intended to be read in conjunction with all other technical and non-technical sections of the specification and with the tender drawings. Where this section is at variance with any other sections of the tender documents, the tenderer shall obtain clarification from the Employers Representative before tendering. Failure to do so will be deemed to imply that the most onerous requirements have been included for.

50.0 MECHANICAL SITE SERVICES

Not applicable

51.0 HEATING CENTRE

General:

Existing heating centre to be retained and new radiator heating pipework shall be extended from existing radiator heating circuits and all existing heating equipment shall be retained.

52.0 DRAINAGE & REFUGE DISPOSAL

52.01 Soils & wastes pipework

General:

A system of uPVC soils and wastes pipework shall be provided for under this contract by the Mechanical Contractor as indicated on the drawings, for the removal of water-borne soil and waste matter from all sanitary fittings, sinks, equipment, etc. This contract includes for soils and wastes above the ground floor slab only, up to and including connection to the drain provided by others at ground level. All underground drainage by others.

All waste pop-ups/builders waste floor sockets for the toilet areas and the boilerhouse area in the building shall be provided by others. These waste pop-ups/builders waste floor sockets shall be installed in the Ground Floor slab and



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the Mechanical Contractor shall allow for connecting all the new waste pipework in the building to these new builders sockets.

The Mechanical Contractor shall extend all waste pipework from these waste pop-ups in the Ground Floor slab to all the sanitary ware fittings and items as indicated on the drawings. See drawings for the exact layout of the waste pipework installation in the building and the sizes of the pipework required.

Waste pipework:

All new soils and waste services pipework to be installed for the toilet areas and the boilerhouse area in the building shall be installed in uPVC plastic pipework. Refer to drawings for soils and waste routes and sizes.

Cleaning and access points:

The soils and wastes shall be designed as a single stack system. Rodding points for cleansing the soils and wastes system shall be provided throughout. Access points shall be provided at low level as indicated on the drawings all above the flood level of the lowest sanitary fitment. The Mechanical Contractor shall be responsible for including all access points required to safely clean and maintain the complete soils and wastes installation without requiring destructive intrusion into the system.

The Mechanical Contractor shall be responsible for including all access points required to safely clean and maintain the complete soils and wastes installation without requiring destructive intrusion into the system. Access points shall include access doors above flood level at each floor in all SVP's.

In the event that the Employer's Representative deems any part of the system to be provided with inadequate access for cleaning the Contractor shall fit additional cleaning doors without charge to the contract.

The exact setting out of ground sockets to suit the actual sanitary ware or any other equipment to be installed shall be the responsibility of the Main Contractor, however the Mechanical Contractor shall make a representative available to the Main Contractor to assist with the planning and setting out of all ground sockets and also all soils and wastes points throughout the building.

Soil vent pipes/soil stacks:

As indicated on the drawing, a number of soil vent pipes/soil stacks shall be installed for the waste pipework from the toilet areas. All vent pipes shall be installed in uPVC plastic pipework throughout. Refer to drawings soil vent pipes routes and sizes.



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New soil vent pipes shall be installed by the Mechanical Contractor as indicated on the drawings for the venting of the waste pipework from the toilets in the building. Soil vent pipes shall rise vertically through the building to terminate above roof level in locations indicated on the drawings. These vent pipes shall be fitted under this contract. Final locations to be agreed with the Employer's Representative.

All soil vent pipes/stacks shall exit the roof and shall extend 1000mm above the finished roof.

All soil vent pipes shall be complete with weathering sleeve and vermin guard.

52.02 Floor gully

The Mechanical Contractor shall also be responsible for the supply and installation of stainless steel floor gullies in parts of the building as indicated on the drawing. Floor gullies shall be manufactured from 316L stainless steel and be supplied complete with heel guards and foul air traps and connected to the local waste system. Gully positions to be agreed before installation commences.

Floor gullies shall be supplied by Kent Stainless, Richmond Trading or equivalent. Gullies shall be as follows:

- Vinyl Floors:

Gullies shall be as KVV225/110TP (or equivalent) with foul air trap KFT110, grade 316 stainless steel with Cover Plate



- Tiled /epoxy resin/concrete floors):

Gullies shall be as KVT170/110TPSQ (or equivalent) with foul air trap KFT110, grade 316 stainless steel with Square Perforated Cover Plate.





Refer to the drawings for locations and quantities of floor gullies required.

52.03 Connection to equipment

The Mechanical Contractor shall be responsible for the installation and connections of all sanitary fitments, WC's, WHB's, sinks, etc., as indicated on the drawings. All these items shall be supplied free issue by others to the Mechanical Contractor for fitting.

The Mechanical Contractor shall allow for connecting the new uPVC soils and wastes pipework for the new sanitary fitments, kitchen equipment, sinks, etc. to the waste pop-ups in the building as indicated on the drawing.

The Mechanical Contractor shall allow for all final uPVC waste connections to all WHB's, sinks, WC's, etc. as indicated on the drawings. All sanitary ware shall be supplied free issue to the Mechanical Contractor by the Main Contractor.

52.04 Fire collars

The Mechanical Contractor shall be responsible for the supply and installation of all fire collars for the soils and wastes pipework.

Waste pipes shall pop through the floor slab and fire walls in parts of the building as indicated on the drawings. Where these pipes pass through any fire compartment, intumescent fire collars shall be installed on the uPVC pipe and fixed to the floor.

Fire collars shall be installed on any plastic waste pipework over or equal to 50mm. Refer to the drawings for locations and quantities.

These collars shall seal the uPVC pipe in the event of a fire. Locations as indicated on the drawings. Where soils and wastes pipework passes through fire compartment walls, intumescent fire collars shall be installed on the uPVC pipe and fixed to the wall. Locations as indicated on the drawings.

Fire collars shall be installed on all uPVC waste pipework larger than 50mm diameter. The Mechanical Contractor shall be responsible for the supply and installation of all fire collars for the soils and wastes pipework. Fire collars shall adhere to the following specifications:

- Have a mild galvanised casing
- 2-hour fire rating metal shell produced in two hinged halves and lined with intumescent material. Fire rated for 120minutes.
- Surface mounted
- Lightweight and easy to install
- Design allows for thermal movement of the pipe.



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- Fixing brackets mechanically attached to the collar housing
- CE rated.
- Tested to BS476 Part 20 & EN 1366-3
- CE Marked
- Suitable for PVC, PVC-U, PE, HDPE, MDPE & PP pipes
- Can be retrofitted
- Performance unaffected by weathering (Type X Durability)

Fire collars shall be installed in accordance with manufacturer's instructions. See drawings for further information on location of fire compartment walls.



52.05 Insulation on waste pipework

General:

Insulation shall be applied to all internal soils and wastes pipework located in ceiling voids, service shafts, box-outs, etc.

The Mechanical Contractor shall allow for the supply and installation of the insulation on the required waste pipework in the ceiling voids, service shafts, box-outs, etc.

Insulation:

All new uPVC waste pipework above the ceiling, in service voids, box-outs, etc. shall be insulated using Isover Climpipe, Rocklap H&V, (or equivalent) foiled back mineral wool insulation, or equivalent. All insulation shall adhere to



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standards B.S. 5422:2009 and B.S. 5970:2012. The Contractor shall allow for the supply and installation of all insulation for the waste services pipework in the ceiling void, in service voids, box-outs, etc.

The insulation shall be of preformed sections of rigid mineral wool incorporating an aluminium foil laminate cover and fitted in accordance with the manufacturer's instructions.

The insulation shall also be applied to all connections, bends, tees and valves.



Insulation shall adhere to the following specifications:

- Type:

Reinforced foiled back mineral wool insulation with a self-adhesive overlap to ensure a strong vapour barrier as Isover Climpipe, Rocklap H&V, or equivalent.

- Thickness:

As highlighted above.

- Thermal conductivity:

- 0.033 W/mk at mean temperature of 10°C.
- 0.036 W/mk at mean temperature of 50°C.
- 0.043 W/mk at mean temperature of 100°C.

- Thermal performance:

To comply with B.S. 5422:2009.

- Fire performance:

To comply with Euroclass A2L, S1, d0 fire rating when classified with BS EN 13501-1



Class O compliance. The factory applied aluminium foil facing shall meet the highest standards required by BS476: Part 6 'Fire propagation' and B.S. 476: Part 7 'Surface spread of flame'.

- Service temperature:

The temperature on the aluminium facing should not exceed 80°C.

- Smoke and toxicity:

Shall achieve the criteria for smoke generation and toxicity as given in the IMO Resolution MSC 61 (67). (Smoke and Toxicity Test to Part 2, Annex 1 and 2 of the Fire Test Procedures Code)

- Certification:

CE Marked.
B.S. 5422:2009.
B.S. 476: Part 7
B.S. 5970:2012
CE 0402-CPD-SC0408-10.

52.06 Condensate pipework in boilerhouse

The Contractor shall allow for supplying condensate pipework from the necessary appliances in the plantroom and that pipework to the nearest, drain, gully or pop-up so that it safely discharges.

The Contractor shall allow for connecting condensate pipework to the following appliances and discharging that pipework to a local drain in the plantroom:

- Condensate from each boiler
- Condensate from each flue

All condensate pipework shall uPVC waste pipework and sizes shall be as indicated on the drawings, for the removal of water-borne soil and waste matter from all sanitary fittings and sinks.

The Contractor shall allow for installing a condensate neutraliser on the condensate from the boiler, flue and water heater. This neutraliser shall safely neutralise the acid waste from the items in question so that the condensate can be safely discharged to the drain.

The condensate neutraliser shall be fitting in line with the condensate discharge pipe.



52.07 Overflow pipework from water tank

New overflow pipework shall be installed for the new cold water storage tank as indicated on the drawings.

Once the new water tank has been installed, the Contractor shall allow for new overflow pipework from the water tank and its associated drip tray to the external as indicated on the drawings.

The Contractor shall ensure a neat installation and all pipework shall be installed parallel to walls etc. Sizes and routes as indicated on the drawing.

All new overflow pipework from the water tanks and drip trays shall be installed in uPVC plastic pipework.

All overflow pipework shall be fitted with mesh screens of maximum 0.65mm x 0.65mm holes to prevent the ingress of vermin. All overflow and drainage pipework shall be brought to an area of nuisance to ensure should there be an issue it can be easily noticed by the client.



53.0 WATER SERVICES

53.01 Mains water services pipework and installation

The existing mains water installation shall be retained. Allow for the connecting the new mains water services pipework for the new extension to the existing mains water services pipework in the existing Building and for all attendances and material in doing so. However, if the Contractor finds a more convenient route for pipework above the ceiling on site, then that will be acceptable.

New pipework:

New pipework for the internal mains water services pipework installation in the building shall be installed in light gauge copper. See Section 53.06 for further information on the copper pipework.

All the main runs of the mains water services pipework shall be installed above the ceiling in the ceiling void and as a result, shall be insulated. All the mains water services pipework in the building that will drop down the walls from the high level pipework shall be recessed and flush mounted. The Mechanical Contractor shall mark the size and location of the chasing required for the hidden pipework to the Main Contractor.

All mains water pipework within unoccupied areas (shafts, service voids, walls or false ceilings) shall be insulated. Allow for the fitting, installation and connection of mains water supply to all the sanitary ware and water storage tanks as indicated on the drawings. See Section 53.07 for further information on the insulation of the pipework.

See drawings for routes, sizes, etc. of pipework.

Isolation valves:

Allow for the supply and installation of all the necessary isolation valves on the new mains water services pipework to the certain areas in the building as indicated on the drawings. Main isolation valves shall be Crane gate valves, or equivalent.

Allow for the supply and local installation of ballofix isolation valves to all mains water supply pipework to the new sanitary ware fittings as indicated on the drawings so that the mains water supply to each sanitary ware fitment can be easily isolated. Ballofix valves are to be installed on all mains water supplies to all new sanitary ware fittings so that they are capable of independent isolation.

Labels:



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The Mechanical Contractor shall provide steel plate labels with the following inscribed 'Drinking Water' at each drinking water location.

53.02 Cold water services pipework and installation

General:

Cold water services shall be provided throughout the building as indicated on the drawings.

The cold water services system shall be served via new gravity fed system. A gravity feed shall be supplied from the new cold water storage tank to supply the extension building.

The new cold water storage tank shall be located within attic space of the new extension as indicated on the drawings.

The existing cold water services throughout the existing school shall be retained.

New cold water services pipework:

All new internal water services pipework for the cold water services pipework to be installed in the building shall be installed in light gauge copper to I.S. EN 1057:2006.

It shall be suitable for bronze welding. Tubes shall be to uniform thickness, smooth, clean and free from internal and external defects. All ends shall be cut clean square with the tube axis.

All cold water services pipework shall be installed in copper.



Copper tube for all internal cold water services pipework shall be as follows:

- Irish copper tube
- CE marked



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- Complaint with BS EN 1057
- Material Analysis:
 - Material Grade Phosphorus de-oxidised copper; Cu-DHP or CW024A as defined in BS EN 1976.
 - Minimum Copper Content 99.90% (including silver)
 - Phosphorus 0.015-0.040%
 - Total Impurity Maximum 0.060% (excluding phosphorus and silver)

Where possible, all the main runs of the cold water services pipework shall be installed above the ceiling in the ceiling void and as a result, shall be insulated.

All the cold water services pipework in the building that will drop down the walls from the high level pipework shall be recessed. The Mechanical Contractor shall ensure a neat installation and all pipework shall be installed parallel to walls, ceilings and partitions.

All cold water services pipework shall be sleeved as they pass through floor slabs and internal blockwork walls.

The whole of the pipework shall be bronze welded with approved filler rods and flux. The filler rod shall contain a small amount of phosphorous or silicon to prevent any oxidation in the joint when made. Compression fittings shall not be used.

The composition of phosphor bronze and filler rod shall be typically as follows:

- Brass: 60% copper, 40% zinc (with silicon or phosphorous additives)
- Phosphor Bronze: 95% Copper, 4.5% tin, 0.5% phosphorous.

Flux having a borax base shall be used in paste form, which shall be uniformly spread over the surface to be jointed. If flux powder is to be used, it shall be wetted to form a paste prior to jointing. Flux shall not be used in powder form.

Bends shall be made from the pipework. Up to 38mm shall be made with spring bending tubes and the radii shall not be less than 3 times the diameters of tube. All exposed pipework shall be thoroughly cleaned and surfaces prepared to a smooth polish finish by using emery cloth. Surfaces scored or scratched or otherwise damaged shall not be acceptable.

Pipework fittings:

Pipe brackets shall be heavy G.M. screw-on type. Pipework shall be arranged neatly and shall have a clearance from finished floor level of 100mm. Any hot and cold pipework run in the attic space shall be supported as specified for heating pipework.



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Allow for a gradient of approximately 1:60 in the direction of the flow of water. 'U' bolts shall be fitted at intervals of 6m for controlling lateral movement. Brackets shall be fitted at the following spacings:

<u>Pipe bore</u>	<u>Support centres</u>
15mm	1.2m
22mm	1.2m
28mm	1.5m
35mm	1.5m
40mm	1.8m
54mm	1.8m

Labelling:

After insulating all new cold water services pipework in the building, all new cold water services pipework installed in the building shall be labelled with appropriate colour identification bands and flow indication arrows.

All labels must be neat, lined up with other labels, oriented for easy view, and securely fixed. Any labelling installed which does not fit this description shall be removed and replaced. Labels on pipework shall be provided at least once within the building compartment and every 10m on long runs within a single compartment such as a corridor.

Insulation:

All cold water services pipework within unoccupied areas (shafts, service voids, ceiling voids, furniture, walls or false ceilings) shall be insulated. Allow for the fitting, installation and connection of cold water supply pipework to all the sanitary ware and the water storage tank as indicated on the drawings.

See Section 53.06 for further information on the insulation of the pipework. See drawings for routes, sizes, etc. of pipework.

Main Isolation valves:

Allow for the supply and installation of all the necessary isolation valves on the new cold water services pipework to the water tank and certain areas in the building as indicated on the drawings. Main isolation valves shall be Crane D171 level valves, or equivalent.



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Local Ballofix Valves:

Allow for the supply and local installation of ballofix isolation valves to all cold water supply pipework to the new sanitary ware fittings as indicated on the drawings so that the cold water supply to each sanitary ware fitting can be easily isolated. Ballofix valves are to be installed on all cold water supplies to all new sanitary ware fittings so that they are capable of independent isolation.

Ballofix valves shall be as follows:

- Chrome plated brass isolation valve.
- Supplied with a simple screwdriver slot operation for isolation.
- Compression ends to BS EN 1254-3



53.03 Hot water services supply pipework and installation

General:

Hot water services supply pipework shall be provided throughout the building as indicated on the drawings.

The hot water services supply system shall be a gravity fed system.

A new hot water services supply shall be taken from the existing hot water services installation currently in operation within the existing school building.. The hot water is supplied from an existing in-direct hot water cylinder within the boilerhouse which shall be retained.

The existing hot water services throughout the existing school shall be retained.

New hot water services supply pipework:

All new internal water services pipework for the hot water services supply pipework to be installed in the building shall be installed in light gauge copper to I.S. EN 1057:2006.



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It shall be suitable for bronze welding. Tubes shall be to uniform thickness, smooth, clean and free from internal and external defects. All ends shall be cut clean square with the tube axis.

All hot water services supply pipework shall be installed in copper.



Copper tube for all internal hot water services supply pipework shall be as follows:

- Irish copper tube
- CE marked
- Complaint with BS EN 1057
- Material Analysis:
 - Material Grade Phosphorus de-oxidised copper; Cu-DHP or CW024A as defined in BS EN 1976.
 - Minimum Copper Content 99.90% (including silver)
 - Phosphorus 0.015-0.040%
 - Total Impurity Maixma 0.060% (excluding phosphorus and silver)

Where possible, all the main runs of the hot water services supply pipework shall be installed above the ceiling in the ceiling void and as a result, shall be insulated.

All the hot water services supply pipework in the building that will drop down the walls from the high level pipework shall be shall be recessed. The Mechanical Contractor shall ensure a neat installation and all pipework shall be installed parallel to walls, ceilings and partitions.

All hot water services supply pipework shall be sleeved as the pass through floor slabs and internal blockwork walls.

The whole of the pipework shall be bronze welded with approved filler rods and flux. The filler rod shall contain a small amount of phosphorous or silicon to prevent any oxidization in the joint when made. Compression fittings shall not be used.



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The composition of phosphor bronze and filler rod shall be typically as follows:

- Brass: 60% copper, 40% zinc (with silicon or phosphorous additives)
- Phosphor Bronze: 95% Copper, 4.5% tin, 0.5% phosphorous.

Flux having a borax base shall be used in paste form, which shall be uniformly spread over the surface to be jointed. If flux powder is to be used, it shall be wetted to form a paste prior to jointing. Flux shall not be used in powder form.

Bends shall be made from the pipework. Up to 38mm shall be made with spring bending tubes and the radii shall not be less than 3 times the diameters of tube. All exposed pipework shall be thoroughly cleaned and surfaces prepared to a smooth polish finish by using emery cloth. Surfaces scored or scratched or otherwise damaged shall not be acceptable.

Pipework fittings:

Pipe brackets shall be heavy G.M. screw-on type. Pipework shall be arranged neatly and shall have a clearance from finished floor level of 100mm. Any hot and cold pipework run in the attic space shall be supported as specified for heating pipework.

Allow for a gradient of approximately 1:60 in the direction of the flow of water. 'U' bolts shall be fitted at intervals of 6m for controlling lateral movement. Brackets shall be fitted at the following spacings:

<u>Pipe bore</u>	<u>Support centres</u>
15mm	1.2m
22mm	1.2m
28mm	1.5m
35mm	1.5m
40mm	1.8m
54mm	1.8m

Labelling:

After insulating all new hot water services supply pipework in the building, all new hot water services supply pipework installed in the building shall be labelled with appropriate colour identification bands and flow indication arrows.

All labels must be neat, lined up with other labels, oriented for easy view, and securely fixed. Any labelling installed which does not fit this description shall be removed and replaced. Labels on pipework shall be provided at least once within



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the building compartment and every 10m on long runs within a single compartment such as a corridor.

Insulation:

All hot water services supply pipework within unoccupied areas (shafts, service voids, ceiling voids, furniture, walls or false ceilings) shall be insulated. Allow for the fitting, installation and connection of hot water supply pipework to all the sanitary ware and the water heater as indicated on the drawings. See Section 53.06 for further information on the insulation of the pipework. See drawings for routes, sizes, etc. of pipework.

Main Isolation valves:

Allow for the supply and installation of all the necessary isolation valves on the new hot water services supply pipework to the water heater and certain areas in the building as indicated on the drawings. Main isolation valves shall be Crane D171 level valves, or equivalent.



Local Ballofix Valves:

Allow for the supply and local installation of ballofix isolation valves to all hot water supply pipework to the new sanitary ware fittings as indicated on the drawings so that the hot water supply to each sanitary ware fitting can be easily isolated. Ballofix valves are to be installed on all hot water supplies to all new sanitary ware fittings so that they are capable of independent isolation.

Ballofix valves shall be as follows:

- Chrome plated brass isolation valve.
- Supplied with a simple screwdriver slot operation for isolation.
- Compression ends to BS EN 1254-3



53.04 Hot water services return pipework and installation

General:



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Hot water services return pipework shall be provided throughout the building as indicated on the drawings.

The hot water services return system shall be returned to the hot water cylinder via a hot water return pump in the boilerhouse. Hot water return pipework shall be brought to within 200mm of the hot water supply pipework to a sanitary ware item. Therefore, the dead leg shall not be more than 200mm.

The existing hot water services return installation throughout the existing school shall be retained.

New hot water services return pipework:

All new internal water services pipework for the hot water services return pipework to be installed in the building shall be installed in light gauge copper to I.S. EN 1057:2006.

It shall be suitable for bronze welding. Tubes shall be to uniform thickness, smooth, clean and free from internal and external defects. All ends shall be cut clean square with the tube axis.

All hot water services return pipework shall be installed in copper.



Copper tube for all internal hot water services return pipework shall be as follows:

- Irish copper tube
- CE marked
- Complaint with BS EN 1057
- Material Analysis:
 - Material Grade Phosphorus de-oxidised copper; Cu-DHP or CW024A as defined in BS EN 1976.
 - Minimum Copper Content 99.90% (including silver)



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- Phosphorus 0.015-0.040%
- Total Impurity Maximum 0.060% (excluding phosphorus and silver)

Where possible, all the main runs of the hot water services return pipework shall be installed above the ceiling in the ceiling void and as a result, shall be insulated.

All the hot water services return pipework in the building that will drop down the walls from the high level pipework shall be recessed. The Mechanical Contractor shall ensure a neat installation and all pipework shall be installed parallel to walls, ceilings and partitions.

All hot water services return pipework shall be sleeved as the pass through floor slabs and internal blockwork walls.

The whole of the pipework shall be bronze welded with approved filler rods and flux. The filler rod shall contain a small amount of phosphorous or silicon to prevent any oxidation in the joint when made. Compression fittings shall not be used.

The composition of phosphor bronze and filler rod shall be typically as follows:

- Brass: 60% copper, 40% zinc (with silicon or phosphorous additives)
- Phosphor Bronze: 95% Copper, 4.5% tin, 0.5% phosphorous.

Flux having a borax base shall be used in paste form, which shall be uniformly spread over the surface to be jointed. If flux powder is to be used, it shall be wetted to form a paste prior to jointing. Flux shall not be used in powder form.

Bends shall be made from the pipework. Up to 38mm shall be made with spring bending tubes and the radii shall not be less than 3 times the diameters of tube. All exposed pipework shall be thoroughly cleaned and surfaces prepared to a smooth polish finish by using emery cloth. Surfaces scored or scratched or otherwise damaged shall not be acceptable.

Pipework fittings:

Pipe brackets shall be heavy G.M. screw-on type. Pipework shall be arranged neatly and shall have a clearance from finished floor level of 100mm. Any hot and cold pipework run in the attic space shall be supported as specified for heating pipework.

Allow for a gradient of approximately 1:60 in the direction of the flow of water. 'U' bolts shall be fitted at intervals of 6m for controlling lateral movement. Brackets shall be fitted at the following spacings:

Pipe bore

Support centres



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15mm	1.2m
22mm	1.2m
28mm	1.5m
35mm	1.5m
40mm	1.8m
54mm	1.8m

Labelling:

After insulating all new hot water services return pipework in the building, all new hot water services return pipework installed in the building shall be labelled with appropriate colour identification bands and flow indication arrows.

All labels must be neat, lined up with other labels, oriented for easy view, and securely fixed. Any labelling installed which does not fit this description shall be removed and replaced. Labels on pipework shall be provided at least once within the building compartment and every 10m on long runs within a single compartment such as a corridor.

Insulation:

All hot water services return pipework within unoccupied areas (shafts, service voids, ceiling voids, furniture, walls or false ceilings) shall be insulated.

Allow for the fitting, installation and connection of hot water return pipework to all the sanitary ware and the water heater as indicated on the drawings. See Section 53.06 for further information on the insulation of the pipework. See drawings for routes, sizes, etc. of pipework.

Main Isolation valves:

Allow for the supply and installation of all the necessary isolation valves on the new hot water services return pipework to the water heater and certain areas in the building as indicated on the drawings. Main isolation valves shall be Crane D171 level valves, or equivalent.



Local Ballofix Valves:

Allow for the supply and local installation of ballofix isolation valves to all hot water return pipework to the new sanitary ware fittings as indicated on the drawings so that the hot water return to each sanitary ware fitting can be easily isolated.



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Ballofix valves are to be installed on all hot water supplies to all new sanitary ware fittings so that it they are capable of independent isolation.

Ballofix valves shall be as follows:

- Chrome plated brass isolation valve.
- Supplied with a simple screwdriver slot operation for isolation.
- Compression ends to BS EN 1254-3



53.05 Dosing pot

The Contractor shall allow for the supply and installation of a 6litre dosing pot on the mains water pipework in the boilerhouse as indicated on the drawings.

The dosing pot shall adhere to the following specification:

- 6litre capacity
- Matt stainless steel finish
- Stainless steel vessel with inlet (return) and outlet (flow) valves
- Valve size 25mm BSP female
- Welded to BS EN 287
- Drain valve
- Filling valve.
- Stainless steel tundish
- Air release valve
- Wall mounting brackets
- Max operating pressure is 14 bar
- Min operating pressure is 0.5 bar
- Max operating temperature is +82°C
- Min operating temperature is +1°C
- Designed to PD 5500:2009 category 3
- CE marked



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53.06 Insulation on water services pipework

General:

All new water services pipework installed in the building (at high level exposed, in the ceiling void, in plantrooms, in walls, services, voids, service shafts, etc.) shall be insulated as described below. There is not a requirement to insulate the pipework exiting the wall at low level to the necessary sanitary ware fittings or any surface mounted pipework at low level.

Copper pipe work shall be insulated as follows:

- | | |
|----------------------------|-----------------------|
| • Pipes from 15mm to 42mm: | 30mm thick insulation |
| • Pipes from 42mm to 76mm: | 35mm thick insulation |
| • Pipes from 76mm: | 40mm thick insulation |

Insulation:

All copper pipework installed in the building for water services shall be insulated using Isover Climpipe, Rocklap H&V, (or equivalent) foiled back mineral wool insulation, or equivalent. All insulation shall adhere to standards B.S. 5422:2009 and B.S. 5970:2012. The Contractor shall allow for the supply and installation of all insulation for the water services pipework throughout the building.

All new pipework shall be insulated with foil backed insulation and shall be insulated as described above and clad in aluminium foil. The Contractor shall allow for the supply and installation of all insulation for the water services pipework.

The insulation shall be of preformed sections of rigid mineral wool incorporating an aluminium foil laminate cover and fitted in accordance with the manufacturer's instructions.

The insulation shall also be applied to all connections, bends, tees and valves.



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Insulation shall adhere to the following specifications:

- Type:

Reinforced foiled back mineral wool insulation with a self-adhesive overlap to ensure a strong vapour barrier as Isover Climpipe, Rocklap H&V, or equivalent.

- Thickness:

As highlighted above.

- Thermal conductivity:

- 0.033 W/mk at mean temperature of 10°C.
- 0.036 W/mk at mean temperature of 50°C.
- 0.043 W/mk at mean temperature of 100°C.

- Thermal performance:

To comply with B.S. 5422:2009.

- Fire performance:

To comply with Euroclass A2L, S1, d0 fire rating when classified with BS EN 13501-1

Class 0 compliance. The factory applied aluminium foil facing shall meet the highest standards required by BS476: Part 6 'Fire propagation' and B.S. 476: Part 7 'Surface spread of flame'.

- Service temperature:

The temperature on the aluminium facing should not exceed 80°C.

- Smoke and toxicity:



Shall achieve the criteria for smoke generation and toxicity as given in the IMO Resolution MSC 61 (67). (Smoke and Toxicity Test to Part 2, Annex 1 and 2 of the Fire Test Procedures Code)

- Certification:

CE Marked.
B.S. 5422:2009.
B.S. 476: Part 7
B.S. 5970:2012
CE 0402-CPD-SC0408-10.
'Part L' Compliant.

53.07 Connection to equipment and sanitary ware

The Mechanical Contractor shall be responsible for the installation and connections of all sanitary fittings, kitchen equipment, sinks, equipment in the Science Room, etc., which shall be supplied free issue by others to the Mechanical Contractor for fitting.

The Mechanical Contractor shall allow for connecting the new water services pipework to all the new sanitary fittings, kitchen equipment, sinks, equipment in the Science Room, etc. in the building as indicated on the drawing. Refer to the drawings for locations, sizes of pipework, types of pipework, etc.

All sanitary ware and equipment in the Science Room shall be supplied free issue to the Mechanical Contractor by the Main Contractor.

The Mechanical Contractor shall allow for connecting the new water services pipework to all the new sanitary ware as indicated on the drawing.

53.08 Internal cold water storage tank

A cold water storage tank shall be installed in the attic space of the new ASD Unit Extension building as indicated in the drawing. This tank shall provide all necessary storage of cold water for the new ASD Unit Extension building.

The Contractor shall include for the supply, installation, testing and commissioning of the following cold water storage tank on the roof above the stairwell (see drawings for locations and further information). This new water tank shall be a 909 litre capacity, 1650mm long x 1055mm wide x 765mm high G.R.P. sectional water tank. Include for a drip tray, lid and ladder with the tank. Include for the following accessories with the tank:

- Lid and cover
- Drip trap
- Allappings for mains supply, overflows, cold water supply.



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- Screened overflow connection.
- Screened air inlet vent on the top of the tank.

See below for specification of the water tank.

Specification of the new water tank:

- Tank shall be insulated to 'Format 30'. Water temperature shall not exceed 20°C.
- The cold water tank shall be sectional, constructed from panels which are 1000mm square using half and quarter panels where necessary.
- Water storage tank to be supplied with a lid and a drip tray.
- The whole of the tank installation shall be commissioned and maintained in accordance with BS 6700.
- The G.R.P. sectional water tank shall have a flanged thickness of 14.5mm and shall conform to BS 3692, BS 5252, BS 729, BS 3691, and DIN 53452, DIN 53455.
- Panels shall be hot pressed from specially formulated potable water grade of Glass Reinforced Plastic (G.R.P.)
- All corner angles, gussets, divider carriers and roof supports shall be of the same material.
- All underwater bolts, tie bars, joiners etc., shall be stainless steel grade 316 S16. External bolts shall be mild steel to BS 3692 and galvanized to BS 729.
- The tank shall be supplied with warning/overflow pipes with a slight gradient to the drainage channel.
- The tank shall be supplied with an access hatch on top of the tank for tank maintenance and access.
- The tank shall have an externally flanged base which allows the tank to be totally drained down.
- The tank shall be supplied with a lid and the lid shall be heavy duty, formed from panel as per base design, consist of vertical supports at each panel intersection, with supports fixed to both lid and base panels using stainless steel straps grade 316 S16 and be complete with a secure lockable hinged access hatch of minimum 610 square.



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- Tank sides and lids shall be insulated with rigid section cell polyurethane foam with a protective GRP skin securely fixed and sealed to the tank panel surface using a gasket type seal. All pipe cut outs shall have bessels of the same material securely fitted and sealed to both the outer skin and panel face. All insulation to Format 30 finish.
- It shall be the Contractor's responsibility to ensure that the base supports conform to the tank manufacturers recommendations and that the tank is placed under order in good time to allow easy assembly and positioning on site. All access and space requirements shall be finalised by the Contractor.
- All tanks shall be complete with all tappings for mains supply, overflows, cold water supply.
- All tanks shall be supplied with a 42mm screened overflow connection. All vents, warning pipes, overflows shall be fitted with mesh screens of maximum 0.65mm x 0.65mm holes to prevent the ingress of vermin.
- The tanks shall be supplied with a screened air inlet vent on the top of the tank. All vents, warning pipes, overflows shall be fitted with mesh screens of maximum 0.65mm x 0.65mm holes to prevent the ingress of vermin.
- If the tank depth is greater than 1.5m, the Contractor shall allow for the supply of internal and external ladders to be fitted on the tank, these ladders shall be stainless steel. The ladders shall have safety cages and conform to BS4211 2005.
- All tanks and drip trays shall be complete with all tappings for mains supply, overflows, cold water supply.
- Tank shall be supplied and installed by Tricel (Killarney), or equivalent.
- Tank shall be suitable for external environment.

53.09 Thermostatic mixing valves

Thermostatic mixing valves (TMV's) shall be fitted at all new wash hand basins and sinks (apart from the Cleaners Sink) throughout the building to prevent scalding as indicated on the drawings. The Mechanical Contractor shall allow for the supply and installation of all TMV's.

All TMV's shall be located such that a maximum dead leg of 200mm only is achievable on the blended water supply. All TMV's must adhere to the following specifications:

- Must be 'TMV 3' and WRAS approved.



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- Supplied with ½" flat faced union connectors terminating in 15mm compression connections.
- Suitable for a minimum dynamic supply pressure of 0.15 bar.
- TMV's must give a flow rate of least 0.1 litres/second at an inlet head of 1.5 metres.
- Limited to a maximum temperature of 43°C to prevent scalding
- Valve body shall be D7R brass and feature a locked temperature shroud with preset maximum temperature stop facility.
- Comply with BS EN 1111 and BS EN 1287 and be suitable for use with low pressure systems.
- Be suitable for under basin installation
- Provide safe thermostatic shutdown
- Be complete with isolation valves, check valves, easily removable strainers and service free cartridges
- Shall be suitable for low-pressure loss systems.
- TMVs must never be connected to the mains water supply. They must only be connected to the hot water distribution services and cold water distribution services.
- The body shall be DXR brass nickel plated with a white plastic locking shroud.

Suitable valves as Rada (low-pressure loss) 215-t3dk, or equivalent.



53.10 Control valves and ballofix valves

See sections 53.01, 53.02, 53.03 and 53.04 for information on control valves and ballofix valves.

53.11 In-Direct hot water heater

The existing shall be retained.

53.12 Electric Shower Unit

General:

1no. electric showers shall be installed as indicated on the drawings. The Contractor shall allow for the supply and installation of an electric shower as indicated on the drawings. See drawings for locations and quantities.



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The Contractor shall therefore allow for the supply and installation of a Mira Advance (or equivalent) 8.7Kw chrome thermostatically controlled electric shower (or equivalent) as indicated. Showers shall be supplied with Mira Response adjustable spray handset (or equivalent) and shall be complete with hose, clamp bracket, soap dish, slidebar and hose retaining ring/gel hook. Quantities as identified on the drawings:

- Quantity: 1no
- Brand: Mira Advance Flex Extra (8.7Kw)
- Control type: Thermostatically controlled electric shower
- Voltage: 230volt
- Amps: 40amp
- Min pressure: 1bar
- Approvals: WRAS, CE, BEAB
- Warranty: 2 years

Accessories:

Each shower shall be supplied with the following items accessories:

- Mira Response adjustable spray handset
- Hose
- clamp bracket
- soap dish
- slidebar
- hose retaining ring/gel hook.

Mounting height:

The control unit for the shower shall be mounted at a height between 750mm and 1000mm.

53.13 Hot Water Boiler

General:

For the kitchen areas the Mechanical Contractor shall allow for the supply and installation of a water boiler for tea making facilities as indicated on the drawings. See drawings for locations and quantities. See drawings for quantities and locations.

Each water boiler shall adhere to the following specifications:

- Quantity: 1no
- Brand: Zip Hydroboil Plus wall mounted boiler
- Capacity: 5.0 litres



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- Casing: Stainless steel
- Tap: Two-way touch tap.
- Thermostat: Thermostat controlled
- Control: Liquid crystal display timeclock which shows time, day, heater operation and energy saving mode status.
- Approvals: WRAS, CE
- Warranty: 2 years on site parts and labour.

Installation:

The Contractor shall liaise with the Electrical Contractor and provide all wiring as per the equipment specification.

Unit shall be fitted on a solid block wall only.

Install over a draining board, or work top fitted with a drip tray. Tap spout should be no higher than necessary to fill large pots.

Minimum tap height above draining board for on-wall fitting is 200mm.

53.14 Pressure test

The Mechanical Contractor shall hydraulic pressure test all new water services pipework in the building once all the pipework is installed. Pipework shall be tested prior to final connection to the sanitary ware items.

The pipework shall be pressure tested to 7 bar and shall remain drop tight for a period of at least 12 hours.

If pressure has dropped at all from noted mark, the installation cannot be regarded as sound and shall not be commissioned until the escape is repaired and the installation re-tested. If pressure remains stable, then installation can be deemed sound.

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

Advise appropriate personnel, in advance, of the time pressure tests may be witnessed. Keep record of pressure tests and issue them to the Employer's Representative, and include them within the handover documentation.

53.15 Sterilisation of the cold water tank and the water system

General:



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After satisfactory completion of the new water services installation, the whole of the cold, mains and hot water services system for the extension building shall be chlorinated and sterilised.

The Mechanical Contractor shall allow for all works involved in sterilising the cold water storage tanks and the water services pipework in the building as described below. It is not a requirement to chlorinate the rainwater storage tank or pipework.

The following sterilisation procedure shall be carried out for the cold, hot and mains water services in the building:

Sterilisation Procedure:

All mains, hot and cold water services and the cold water storage tank shall be sterilised as follows before the system is brought into use:

- i) The pipes etc. shall be cleaned by flushing through to remove all dirt and debris and then emptied prior to sterilisation.
- ii) The necessary quantity of sterilising chemical to give a chlorine concentration of 20mg per litre shall be prepared in accordance with the manufacturer's instructions. If hypochlorite having 35% available chlorine is used, the proportions shall be 145 kg to 1000 litres of water.
- iii) A contact time of 24 hours shall be allowed when each section is full. If less than 10mg/litre is residual the system shall be re-chlorinated. Should reserves still not be established the contamination shall be located and a method of cleaning recommended.
- iv) After successful chlorination the system shall be drained and refilled with mains water.

Disposal of Sterilising Water:

Sterilising water shall be disposed of into a foul sewer and never into a surface water sewer or water course.

Protective clothing and goggles shall be provided for the operatives carrying out this work in accordance with the Health and Safety at Work Act.

Bacteriological Test:

After the cold water storage tank has been emptied and the mains has been refilled to the tank, a sample of the water must be taken from the tank for bacteriological analysis. Great care must be taken when obtaining samples for



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testing and only sterile containers should be used. This sampling shall be carried out in the presence of the Engineer and/or his/her representative.

A copy of the Bacteriological test report must be submitted to Dublin Corporation, Water Division, Main laying Section.

Allow for taking a sample as described above from the new tanks and testing as described above.

Certificate of Sterilisation:

Detailed records shall be maintained for all sterilisation procedures carried out. A copy of Sterilisation Certificates for all parts of the system shall be submitted containing the following information:

Project Name:
Name of Contractor/Sub-contractor:
Service:
Method of Sterilisation:
Period of Sterilisation:
Signatures for Contractor/Sub-contractor:
Witness:
Date of Sterilisation:



54.0 GAS SERVICES

Not applicable

55.0 SPACE COOLING SERVICES

See section 57.0 for further information.

56.0 SPACE HEATING SERVICES

General:

This section covers the space heating installation extending from where the LPHW pipework leaves the plantroom, Section 51.0 deals with the heating centre. The Contractor shall include for the supply, installation, testing and commissioning of a LPHW heating system as shown on the drawings and described in this specification. New headers, fully modulating boiler, pipework, pumps, BMS controls, associated fittings, other heating equipment, etc. shall be fitted in the plantroom. Care is to be taken to avoid running pipe work runs over electrical services and distribution boards.

The space heating installation is a low-pressure hot water, accelerated and sealed system. The system is designed for a flow temperature of 80 degrees C and return temperature of 60 degrees C. Heat emitters have been sized to maintain an indoor temperature of 21 degrees C in permanently occupied areas and a temperature of 18 degrees C in transit areas and stores, when the outdoor air temperature is -4 degrees C.

Upon completion there shall be 5no. LPHW circuits within the boiler house, 4no. of which shall be existing. There shall be 3no. existing LPHW heating circuits serving the existing school, 1no. new circuit serving the new extension which shall be constructed and 1no. circuit feeding the existing hot water services circuit. The mechanical contactor shall allow for the extension of the existing flow and return header as set out in drawing and specification.

Control of heat emitter output shall be by weather compensation. The boiler shall be weather compensated to reduce the overall system temperature. Once the optimum start routine period is complete, weather compensation shall be provided by modulation of the boilers flow water temperature in proportion to the external air temperature.

Frost protection is also included. Spare tappings shall be provided on the main flow and return low loss header to serve any possible future expansion.



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Individual circuits shall be served from the new low loss flow and return header located in the plantroom. The installation shall be served by the new LPG gas supply as shown on the drawings.

The Contractor shall include for the testing and commissioning of the new LPHW heating system once all works are completed. All testing must be witnessed by Employer's Representative.

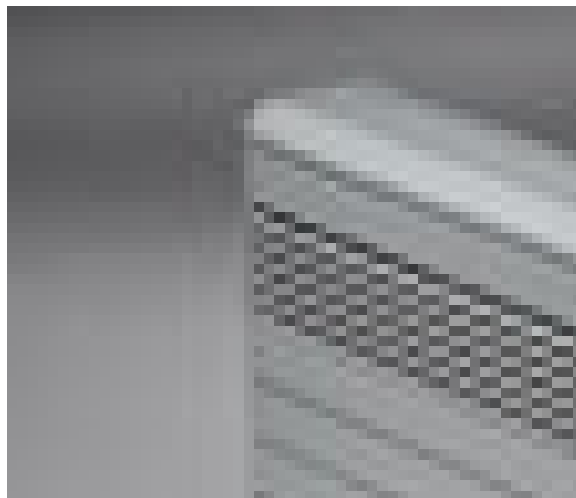
The mechanical contractor shall retain all existing heating services zones, heating service pipework and associated radiators throughout the school building.

56.01a. Radiators

The Mechanical Contractor shall allow for supplying and installing all radiators as indicated on the drawings. The Contractor shall also allow for all necessary LPHW (Low Pressure Hot Water) flow and return pipework to all radiators from the boilerhouse.

Supply, install and fit radiators as specified in the schedule as indicated on the drawings. New steel panel surface mounted Low-H₂O (low water content) radiators shall be supplied and installed by the Mechanical Contractor throughout the building indicated on the drawings. The Mechanical Contractor shall measure up on site and confirm to the Employer's Representative that the radiators scheduled are suitable in all respects for the locations indicated. Final locations of all radiators to be agreed on site. Radiators shall not be ordered until all locations and sizes have been agreed with the Employers Representative on site.

Radiators shall be fitted throughout the building as per drawings.



Radiator schedule is as follows:



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Radiator Schedule – Ground Floor								
Location	Ref	Style	Code	Type	Height	Length	Depth	Output at Δt 50
Classroom No.8	R1	Maxi WF	MAXW.059.203.11.233/WF	11	590	630	130	458
ACC WC 3	R2	Maxi WF	MAXW.059.203.11.233/WF	11	590	630	130	458
Quiet Room 3	R3	Maxi WF	MAXW.059.203.11.233/WF	11	590	1030	130	890
Storage 2	R4	Maxi WF	MAXW.059.203.11.233/WF	11	590	630	130	458
Changing Place	R5	Maxi WF	MAXW.059.163.11.233/WF	11	590	1230	130	1105
Lobby 2	R6	Maxi WF	MAXW.059.203.11.233/WF	11	590	1030	130	890
AMB WC 3	R7	Maxi WF	MAXW.059.203.11.233/WF	11	590	630	130	458
AMB WC 2	R8	Maxi WF	MAXW.059.203.11.233/WF	11	590	630	130	458
Sluice	R9	Maxi WF	MAXW.059.203.11.233/WF	11	590	630	130	458
Quiet Room 2	R10	Maxi WF	MAXW.059.163.11.233/WF	11	590	1230	130	1105
Storage 1	R11	Maxi WF	MAXW.059.203.11.233/WF	11	590	1030	130	890
ACC WC 2	R12	Maxi WF	MAXW.059.203.11.233/WF	11	590	630	130	458
ACC WC 1	R13	Maxi WF	MAXW.059.203.11.233/WF	11	590	630	130	458
AMB WC 1	R14	Maxi WF	MAXW.059.203.11.233/WF	11	590	630	130	458
Lobby 1	R15	Maxi WF	MAXW.059.203.11.233/WF	11	590	1030	130	890
Multi Activity Room	R16	Maxi WF	MAXW.059.123.11.233/WF	11	590	2030	130	1969
Shared Storage	R17	Maxi WF	MAXW.059.203.11.233/WF	11	590	1030	130	890
SEN Class Base 3	R18	Maxi WF	MAXW.059.203.11.233/WF	11	590	630	130	458
Quiet Room 1	R19	Maxi WF	MAXW.059.203.11.233/WF	11	590	1030	130	890
Lobby 3	R20	Maxi WF	MAXW.059.203.11.233/WF	11	590	1030	130	890
Multi purpose room	R21	Maxi WF	MAXW.059.123.11.233/WF	11	590	2030	130	1969
Mainstream Classroom 1	R22	Maxi WF	MAXW.059.123.11.233/WF	11	590	2030	130	1969
Mainstream Classroom 1	R23	Maxi WF	MAXW.059.123.11.233/WF	11	590	2030	130	1969
Mainstream Classroom 1	R24	Maxi WF	MAXW.059.163.11.233/WF	11	590	1430	130	1321
Mainstream Classroom 1	R25	Maxi WF	MAXW.059.203.11.233/WF	11	590	630	130	458
ACC WC 4	R26	Maxi WF	MAXW.059.203.11.233/WF	11	590	630	130	458
ACC WC 5	R27	Maxi WF	MAXW.059.203.11.233/WF	11	590	630	130	458



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Radiator Schedule – First Floor								
Location	Ref	Style	Code	Type	Height	Length	Depth	Output at Δt 50
Corridor	R28	Maxi WF	MAXW.059.203.11.233/WF	11	590	1030	130	890
SET Room	R29	Maxi WF	MAXW.059.123.11.233/WF	11	590	2030	130	1969
Mainstream Classroom 2	R30	Maxi WF	MAXW.059.123.11.233/WF	11	590	2030	130	1969
Mainstream Classroom 2	R31	Maxi WF	MAXW.059.123.11.233/WF	11	590	2030	130	1969
Mainstream Classroom 2	R32	Maxi WF	MAXW.059.163.11.233/WF	11	590	1430	130	1321
Mainstream Classroom 2	R33	Maxi WF	MAXW.059.203.11.233/WF	11	590	630	130	458
ACC WC 6	R34	Maxi WF	MAXW.059.203.11.233/WF	11	590	630	130	458
ACC WC 7	R35	Maxi WF	MAXW.059.203.11.233/WF	11	590	630	130	458

Radiator Specification:

Casing –

1. Super strong profiled front plates in 1.5mm thick, Folded to 3.0mm steel. Soft-design: rounded angles, to avoid accidental injury.
2. Scratch-resistant surface coating with a satin gloss finish. High UV resistance.
3. Unit to Come with Chamfered corners.
4. 20mm profile front panels
5. traffic white RAL 9016 glossy (233)
6. Casing shall have a 10 year guarantee
7. Front panel built from 1.5mm sendzimir galvanised steel plate, folded into 'U' channels giving double profile strength
8. Side panels built from 1.5mm sendzimir galvanised steel plate, folded to provide rounded corners
9. Brackets built from 1mm sendzimir galvanised steel plate, to be installed with a maximum intermediate distance of 1050mm
10. Casing locks supplied to prevent unauthorised removal of the casing from the brackets
11. Casing finished with a scratch-resistant polyester powder coating with a satin gloss finish in colour RAL 9016
12. Heat outputs shall be certified and tested in accordance with EN 442 supported by a CE Declaration of Performance
13. Touch Temperature must not exceed 43 degrees and must be guaranteed by manufacturer at a flow of 75 degrees
14. Rounded angles to avoid injury.

The Low-H₂O emitter specification



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1. Emitter shall be constructed from pure copper and aluminium, totally non-corrosive as emitter – Brass Header Must be used in the emitter.
2. Emitter shall have a 30 year guarantee
3. Emitter shall be pressure tested: 20 bar
4. Emitter as standard with extended air vent with transparent synthetic drain tube
5. Low water content – .98 litres per metre or less
6. Heat Exchanger must be corrugated.
7. Low-H₂O heat exchanger with dirt-repellent and dust-proof lacquer in graphite grey (RAL 7024).
8. DHSS DN4 Compliant
9. Complies With the safety requirement of DHSS DN4
10. Low H₂O heat exchanger manufactured from round, seamless tubes made of pure red copper to EN12735-2, with corrugated pure aluminium fins and two brass collectors. Aluminium fins feature collars for maximum surface area contact between tubes and fins. Brass collectors complete with 2no. ½" BSP brass connections. Same end connections suitable for left and right hand installation.
11. To maximise heat transfer, aluminium fins must provide the following minimum surface area of aluminium per metre of finned tube: Type 10 (33000cm²), Type 15 (50000cm²), Type 11/20 (67000cm²), Type 16 (101000cm²), Type 21 (135000cm²)
12. To maximise heat transfer, aluminium fins must provide the following minimum surface contact area with the copper tubes per metre of finned tube: Type 10 (1800cm²), Type 15 (2800cm²), Type 11/20 (3700cm²), Type 16 (5600cm²), Type 21 (7500cm²)
13. Complete heat exchanger assembly pressure tested to 20 bar and guaranteed suitable for a maximum working pressure of 10 bar.
14. Complete heat exchanger assembly electrostatically lacquered with anthracite grey epoxy polyester powder coating to RAL 7024.
15. Radiators shall be as manufactured by Jaga Maxi (or equivalent).

56.01b. Radiant Panels

The Mechanical Contractor shall allow for supplying and installing all radiant panels as indicated on the drawings. The Contractor shall also allow for all necessary LPHW (Low Pressure Hot Water) flow and return pipework to all radiant panels.

LPHW radiant panels will be provided in the central activities space controlled via a 2-port valve arrangement. All radiant panels will be insulated and fixed to the ceiling, with no exposed chain suspension system visible. The radiant panels will be constructed from 1.25mm thick steel plate.



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Radiant Panel Schedule						
Location	Ref	Type	Width	Length	Output at Δt 50	Gripple Wire Qty per Unit
Classroom No.8	RP1	Carboline Grid	595	2992	863	8
	RP2	Carboline Grid	595	2992	863	8
	RP3	Carboline Grid	595	2992	863	8
	RP4	Carboline Grid	595	2992	863	8
	RP5	Carboline Grid	595	2992	863	8
	RP6	Carboline Grid	595	2992	863	8
Classroom No.6	RP7	Carboline Grid	595	2992	863	8
	RP8	Carboline Grid	595	2992	863	8
	RP9	Carboline Grid	595	2992	863	8
	RP10	Carboline Grid	595	2992	863	8
	RP11	Carboline Grid	595	2992	863	8
	RP12	Carboline Grid	595	2992	863	8
Central Activity Space	RP13	Carboline Grid	595	2992	863	8
	RP14	Carboline Grid	595	2992	863	8
	RP15	Carboline Grid	595	2992	863	8
	RP16	Carboline Grid	595	2992	863	8
	RP17	Carboline Grid	595	2992	863	8
	RP18	Carboline Grid	595	2992	863	8
SEN Class Base 3	RP19	Carboline Grid	595	2992	863	8
	RP20	Carboline Grid	595	2992	863	8
	RP21	Carboline Grid	595	2992	863	8
	RP22	Carboline Grid	595	2992	863	8
	RP23	Carboline Grid	595	2992	863	8
	RP24	Carboline Grid	595	2992	863	8

1. All radiant panels shall be manufactured in accordance with BS EN ISO 9001:2000.
2. Outputs are to be tested in accordance with EN14037. Outputs are based on 50K temperature differential between the mean water temperature (80oC Flow and 60oC Return) and the room temperature.
3. All radiant panels shall come with a $\frac{3}{4}$ " connection as standard to ensure the correct flow rate is achieved to give the required output.



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4. Radiant panels shall consist of a steel radiant 1.5mm minimum thickness plate with deep drawn lock beading for locating tubing (tubes Ø28x1.5mm). The precision steel tubes shall be continuously welded with the radiant plate in a double spot welding process for maximising heat transfer.
5. Radiant panels shall be statically self supporting due to strength tested top and side edges.
6. All hose connections shall contain annular corrugated stainless steel (to grade 304) tubes, with stainless steel braid cover complete with compression fittings. Hose connections must have a minimum life expectancy of 20 years operating under LPHW at 80°C and shall not contain EPDM rubber tubing.
7. All panels shall be manufactured to ensure all outputs are in accordance with EN14037
8. Prior to placing an order for radiators the Sub-contractor shall visit the site to reassure him/herself the dimensions of all radiant panels relative to co-ordination of same with building restrictions etc
9. Radiant panel shall be supplied and installed with type VSRK balancing valves.
10. This schedule must be read in conjunction with the relevant part of the Specification

56.02 LPHW Pipework and pipework supports

General:

New LPHW (Low Pressure Hot Water) heating flow and return pipework shall be installed throughout the building from the boilerhouse to all the radiators in the building as indicated on the drawings. Refer to the drawings for location, routes and sizes.

LPHW pipework:

All new LPHW (Low Pressure Hot Water) heating flow and return pipework to be installed throughout the building shall be black steel pipe Class B seamless medium gauge, Blue band to BS EN 10255.

All mild steel pipe and tube shall be dual certified to BS EN 10217-1:2002, fully traceable back to the manufacturer and shall be supplied with 3.1 mill test certification. All of our BS EN 10255:2004 steel pipe shall be compliant with the European Pressure Equipment Directive (PED) 2014/68/EU.

All new LPHW heating and flow services pipework shall be installed in gun barrel steel.



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New LPHW flow and return pipework shall be supplied throughout the building from the boilerhouse to all the new heat emitters throughout. Pipework shall be as specified in paragraph above. All LPHW flow and return pipework and the LPHW headers in the boilerhouse shall also be as specified above.

Where possible, the main runs of heating pipework shall be installed in the ceiling void above the suspended ceiling.

All LPHW flow and return heating services pipework shall be supplied, installed, tested and commissioned by the Mechanical Contractor.

LPHW pipework installed below the ceiling:

All new mild steel LPHW flow and return pipework installed below the ceiling shall have all joints welded, steel butt welding to B.S. 1965 to match pipe. Specification of pipework as highlighted above.

LPHW pipework installed above the ceiling:

All new mild steel LPHW flow and return pipework installed above the ceiling shall have all joints welded, steel butt welding to B.S. 1965 to match pipe or shall have threaded joints. Specification of pipework as highlighted above.

Painting of Heating Services Pipework:

All new LPHW (Low Pressure Hot Water) flow and return heating services heating distribution pipework installed throughout the building shall be provided with one coat of red oxide paintwork prior to fitting insulation. Failure to provide this paintwork prior to insulation will result in the removal of insulation for painting.

The Contractor shall allow to make good all surfaces before painting the heating services flow and heating services return pipework. The Contractor shall allow for the following to paint the heating services pipework.

- Step 1: Thoroughly clean the pipework and prepare for painting.
- Step 2: Prior to installing the insulation, paint the heating services pipework with one coat of red oxide paint.

All tubing fittings and supports shall be coated with application of lacquer or rust-inhibiting priming paint. Pipe-work which penetrates fire walls or floors shall be painted with one coat of rust inhibiting priming paint before fire stopping is applied. The Contractor shall ensure that fire stopping will not proceed prior to the piping being treated.

Bracketing and supports



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All new LPHW flow and return pipework in the building shall be adequately bracketed and supported.

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

Pipework run above suspended ceiling shall be fixed by adjustable hanger or brackets as BOSS Flamco or similar approved.

Pipework run in the attic space shall be run on suitable unistrut brackets that are either supported off the floor or off the wooden trusses.

Exceptional care shall be exercised when supporting and bracing pipework to ensure that no hammering or vibration takes place and that the complete system operates in a quiet manner even when valves are closed off quickly against full pressure.

Where pipework is installed, brackets shall be dimensioned and mounted so as to accommodate the insulation 15mm clear of the surface wall. Brackets shall allow for thermal expansion and ample clearance to be allowed when setting out brackets for large pipes. Supports shall be arranged to be as near as possible to changes in direction and joints.

Where pipework is exposed the Employers Representative approval shall be obtained as to the location and method of fixing of pipe supports before putting the work in hand, to ensure the required standard of neatness is achieved.

Where floor level pipes are likely to be subjected to abuse additional floor type brackets shall be used in locations to be decided by the Employers Representative. They shall comprise a split pipe ring, pipe nipple and backplate secured to the floor.

All adjacent pipework following the same route shall be bracketed at the intervals specified for the smallest pipe in the run.

The following are the bracket intervals depending on the material of pipework:

BORE (mm)	HORIZONTAL (m)	VERTICAL (m)
15	1.5	1.8
20	1.5	2.1



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25	1.8	3.0
32	1.8	3.0
40	2.4	3.0
50	2.4	3.5
65	2.7	4.0
80	3.0	4.0
100	3.0	4.6
125	3.7	5.5
150	4.5	5.5

Pipework sleeves

Pipe sleeves of appropriate diameter and of the same material as the pipe shall be fitted where pipes are installed through walls, duct covers, ceilings and floors. Sleeves shall be round out and free from burrs and project 5mm on either side of finished wall surfaces.

Adequate allowance shall be made for thermal expansion. Pipes passing through sleeves shall be positioned to allow for this movement. The sleeves shall be arranged to finish flush with the plaster or other wall finish and be of one length.

The following table shall be used as a guide for the size of sleeves.

PIPE BORE (mm)	BORE OF SLEEVE (mm)
15	25
22	32
28	38
35	51
42	51
54	63

Welding:

All pipeline welding shall be in accordance with the relevant BS specification or where BS does not apply shall be of the highest standard of workmanship and shall be subjected successfully to any test required by the Engineer. All pipework shall be welded in accordance with the requirements of BS 2640 and 2971, copies of which shall be retained on site during course of installation.

The Contractor shall ensure that all operatives engaged on welding are familiar with the requirements of this BS Specification and are normally capable of welding to the standards therein laid down.

Threading Fittings:



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Where threaded fittings are specified they shall be in black malleable iron, banded type, individually tested to BS 143 and 1256: 1986 and screwed to BS 21: 1985. All bends used shall be of the long radius type, elbows will not be allowed.

Jointing of threaded fittings for water carrying pipework shall be by means of carefully stranded flax evenly covered in jointing compound and wound on to the male thread so as to bind around the thread during the screwing of the fitting. Care should be taken to clean off all loose strands of flax after the joint is completed.

Supply and commissioning:

The Contractor shall allow for supplying and commissioning the entire LPHW system throughout the building. The Contractor shall employ a suitable commissioning company carry out the commissioning of the heating system.

Automatic Air Vents

Fit automatic air vents at all high points on all heating pipes at high level in the building as indicated on the drawings. Fit automatic air-vents on the highest point of the flow and return pipework in the building as indicated on the drawings.

The Contractor shall ensure that pipes are laid with the correct gradient to eliminate air locks and to allow for adequate venting. Automatic air-vent shall be as Honeywell Vent EA122, or equivalent. The valve shall have the following features:

- Integral stop valve. Enables seat to be cleaned without draining the system
- Vacuum break ensures air collection
- 3/8" BSP connections
- Expanding disc under cap.
- 1/8" to 1/2" adaptor



Circuit Valves:

Fit control valves on flow and return LPHW pipework to allow isolation of the LPHW heating flow and LPHW heating return pipework in the building. Valves



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shall be full-way pattern with gland surfacing boxes complete with iron hand wheels screwed or flanged as necessary with cast iron bodies, gunmetal wearing parts and bronze seatings.

Valves shall be as Crane D151 isolation valves for gate valves or Crane F611 for butterfly valves, or equivalent.



Regulating Valves:

The Contractor shall allow for the supply and installation of Flow measuring/Double Regulating Valves on all pipework and circuits as indicated on the drawings.

Commissioning Valves:

The Contractor shall include in his price for the supply and installation of fixed orifice double regulating valve commissioning sets on the heating circuits to each 2-port valve arrangement. The number and size of valves shall be as indicated on the drawings and where required for satisfactory commissioning, operation and maintenance.

The Contractor shall ensure that the valves are installed immediately before the two-port valve. Valves shall not be mounted with the test plugs pointing in a downward direction; otherwise they may act as dirt pockets. Measuring devices must provide flow measurement accuracy to within $\pm 5\%$ under the design service conditions and must be suitable for the application such that the differential pressure produced is consistent with achieving measurement accuracy.

Valves shall be as Crane D931 fixed orifice double regulating valves, or equivalent.

Fixed orifice double regulating valves shall be as Crane D931/D933/D934 and shall adhere to the following:

- Fixed orifice performance.



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- Hand wheel and pressure tappings oriented for maximum convenience.
- Insertion test points for quick connection.
- PN25 pressure rating.
- Adaptor kit for use with copper tube.



Strainers:

Strainers must be installed to protect to the two-port valves or circuits as indicated. Strainers shall be cast iron or bronze body, self cleaning 'Y' pattern full size, of connecting pipe, designed for 10 bars of water services and heating.

Strainers shall be 1/16" perforated SS on water services and 1/32" perforated SS on heating. Strainers 50mm and smaller shall be screwed; strainers larger than 50mm shall be flanged, with blow-down cocks. Strainers must be suitable for the pressures and service of the piping system in which they are to be installed. Strainer bodies for line sizes up to 50 mm must be of bronze to IS EN 1982: 1999. Strainer pressure ratings must be at least 150% of maximum service pressure in the application. See drawings for quantities required. Size of strainers shall match the pipe size of the circuit where the strainer is to be installed.

Strainers shall be as Crane D297, Crane FM276, or equivalent.



Labelling:



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All new LPHW flow and return pipework installed above the ceiling throughout the building shall be labelled with appropriate colour identification bands, flow indication arrows and zone numbers.

All labels must be neat, lined up with other labels, oriented for easy view, and securely fixed. Any labelling installed which does not fit this description shall be removed and replaced.

Labels on new pipework shall be provided at least once within the building compartment and every 10m on long runs within a single compartment such as a corridor.

All labels must be neat, lined up with other labels, oriented for easy view, and securely fixed. Any labelling installed which does not fit this description shall be removed and replaced. Labels on pipework shall be provided at least once within the building compartment and every 10m on long runs within a single compartment such as a corridor.

Expansion and Contraction

Arrange supports and fixings to accommodate pipe movement caused by the thermal changes. Generally allow the flexure at changes in direction. Allow for movement at branch connections. Select pipe rings and clips appropriately to allow axial movement due to expansion.

Provide expansion loops in all straight heating pipework runs with a length of greater than 20m. Use expansion bellows where the installation of loops is not possible due to space constraints. Expansion devices shall only be employed where it is found to be impossible to take up expansion within the system.



56.03 Insulation

General:

All new LPHW flow and return heating services pipework installed in ceiling voids, box-outs, etc. shall be insulated as described in section 51.05 above.

Refer to section 51.05 for information on insulation required on all internal LPHW heating flow and return services pipework installed in ceiling voids, box-outs, etc.

Painting of Pipework prior to insulating:

Refer to section 56.02.

56.04 Radiator valves

The Mechanical Contractor shall allow for all necessary radiator control valves for all radiators. Control valves for radiators shall be of the easy clean pattern chromium plated with grey grip moulded hand wheels on the flow and lock shield chromium plated valves on the return. Radiator valves are shall be Scanflow (F.F.) type, or equivalent.

56.05 Two-port valves & associated thermostat

General:

All the radiators in the classrooms as indicated on the drawings shall be provided with individual room temperature control by means of two-port motorised valves that are fed from a digital room temperature stat. Quantities as indicated on the drawings.

Where applicable, the two-port valve shall be installed at high level in the ceiling void in the adjoining corridor as indicated on the drawings.

See specific detail on the heating services drawing for the specific piping arrangement for each two-port valve installation. In total there are 4no rooms where the two-port valve and thermostat arrangement shall be installed. See drawings to confirm quantities, locations and pipe sizes.

Digital Room Stats:

All rooms stats as indicated that are to be installed in conjunction with the two-port valve to control the heating within the specified rooms shall be digital stats as specified and indicated below. See drawing for quantities and locations.



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These digital room stats shall provide the following functions

1. Clearly display the room temperature.
2. Clearly display the room set point temperature
3. Allow the user to easily adjust the set point temperature
4. Operate on a 230V mains power supply (battery stats are not acceptable)
5. Provide a 230V power control to a two-port motorized valve
6. If alternative makes are proposed, they must run on mains power and be as robust as the above. If an alternative is proposed, provide a sample.

The stats shall adhere to the following specifications:

- Temperature range: 0°C - 35°C
- Mounting type: Surface
- Digital display: Yes
- Dial lock: Yes
- Built-in sensor: Yes
- Accuracy: +/- 1.0°C
- Electrical supply: 230VAC
- Electrical rating: 3amp
- IP rating: IP30
- Dimensions (approx.): 92mm high x 92mm wide x 34mm deep.
- Guarantee: 2years

The Mechanical Contractor shall hand over all necessary items to the Electrical Contractor for wiring complete with any wiring diagrams or instructions as supplied by the specialist supplier. Wall mounted digital/electronic room thermostats shall be as EPH CDT, Heatmiser DS1-L, Seitron TAD 02M, or equivalent. The Contractor shall include for the supply and fitting of these valves and thermostats.



Two-port Valves:

Two-port valves shall be installed on the pipework into classrooms to control the heating within the room. See drawing for quantities, locations and piping arrangements. Two-port valves shall have the following specifications:



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-
- | | | |
|---|---------------------------------|--|
| ○ | Motor Supply Voltage: | 230 V AC |
| ○ | Frequency: | 50 Hz |
| ○ | Power Consumption: | 6 W |
| ○ | Motor Insulation Rating: | Class 'F' |
| ○ | Maximum Working Pressure: | 10 Bar |
| ○ | Maximum Water Temperature: | 95° C |
| ○ | Maximum Ambient Temperature: | 52° C |
| ○ | KV value: | 7.3 |
| ○ | Switch Rating: | 3(0.5) A |
| ○ | High Temperature Silicon Cable: | 1100mm |
| ○ | Actuator head: | Yes. Supplied with valve. |
| ○ | Valve Body: | Brass with spring loaded
Mica filled PTFE shoes |
| ○ | Actuator: | Power to Open
Spring to Close |
| ○ | Approvals: | Valve to be VDE approved, ISO
9002 compliant. |

Two-port valves shall be as Myson, Honeywell, EPH, (or equivalent). Valve shall be 15mm/22mm Zone Valve and shall be supplied with and actuator head. The Contractor shall include for the supply and fitting of these valves as indicated on the drawings.



56.06 Flush out and pressure test

Flush out of new pipework:

Upon completion of the LPHW flow and return pipework installation in the building but before fitting any radiators; all pipework shall be thoroughly flushed out with clean water until water flows clear from the system. Once that is completed, all new pipework shall then be pressure tested as highlighted below.

Pressure testing of new pipework:

The Mechanical Contractor shall hydraulic pressure test all new flow and return LPHW pipework in the unit to 7 bar and shall remain drop tight for a period of at least 12 hours. If pressure has dropped at all from noted mark, the installation cannot be regarded as sound and shall not be commissioned until the escape is



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repaired and the installation re-tested. If pressure remains stable, then installation can be deemed sound.

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

Advise appropriate personnel, in advance, of the time pressure tests may be witnessed. Keep record of pressure tests and issue them to the Employer's Representative, and include them within the handover documentation.

Test certificates for the testing of all pipework shall be provided by the Contractor for the testing of the pipework.

Power flushing:

The entire heating pipework system shall be power flushed using 'Ferno Powerflush II', or equivalent.

56.07 Below ground pipework

All underground pipework feeding radiator shall be multi-layer composite pipe shall be a non-crossed linked polyethylene pipe. The multi-layer composite pipe (MLCP) shall be 100% diffusion-resistant multi-layer composite pipe, five-layer (PE-RT – adhesive agent – continuously overlapped welded aluminium adhesive agent PE-RT) as Uponor MLCP pipe, or equivalent. The pipe shall be WRAS Scheme approved.



56.08 Heating Manifold

Heating manifolds:

The Contractor shall install a suitably sized flow and return manifolds with all necessary outlets on the manifolds for all underfloor heating circuits in the Building as indicated on the drawings (connections to suit the number of circuits). The manifolds shall supply all the circuits via underground F&R (flow and return) pipework so all areas shall be individually connected back to the



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F&R manifolds. The flow and return manifolds shall be supplied with a drain valve on the header and all connections to the F&R manifold shall have isolation valves.

Underfloor heating manifolds to be constructed from Nickel plated brass with pin operation valve to return manifold and mechanical valve to flow manifold with lock shield and set valve facility to each heating loop.

Isolation valves, union valve and temperature gauges to all manifold connections on both flow and return connection.

All manifolds to be fitted with flushing points, valve and cap to both flow and return.

Manifolds for the underfloor heating system shall be fitted inside white powdered coated galvanized steel cabinets with flush or surface mounting. Manifold cabinets shall be sized to hold electrical smart box control and EuroFast floor mechanical manifold.

Mainifolds shall be as Eurotech Eurofast manifolds as supplied by Eurotech Group, or equivalent.

The contractor shall allow for restriction valves on the flow pipework to manifolds 1 & 2 to reduce the temperature of the water passing through the pipework. This will ensure that the new concrete floor don't crack.

Automatic air vents

Fit automatic air vents at all high points on all heating pipes at high level within the building. The Contractor shall ensure that pipes are laid with the correct gradient to eliminate air locks and to allow for adequate venting.

56.09 Commissioning

The Mechanical Contractor shall allow for commissioning the entire new flow and return pipework throughout the building and the boilerhouse once all works are completed within the building. The Contractor shall employ a suitably qualified company to carry out the commissioning of the LPHW heating and flow pipework.



57.0 VENTILATION SERVICES

General

The Mechanical Contractor shall be responsible for all ventilation works and shall ensure that the full price for this work is included in the tender price. This section of the Specification outlines the ventilation services installation and describes the particular requirements of the relevant services to be installed. This section is intended to be read in conjunction with all other technical and non-technical sections of the Specification and with the tender drawings. Where this section is at variance with any other sections of the tender documents, the tenderer shall obtain clarification from the Employers Representative before tendering. Failure to do so will be deemed to imply that the most onerous requirements have been included for.

Ductwork materials, construction and installation must comply with the relevant parts of the following publications:

- HVCA DW/144: Specification for sheet metal ductwork - low, medium and high pressure/velocity systems
- HVCA DW/143: A practical guide to ductwork leakage testing
- HVCA DW/154: Specification for plastics ductwork
- HVCA DW/171/172: Guide to good practice for kitchen ventilation systems
- HVCA DW/191: Guide to good practice for glass fibre ductwork
- HVCA TR/17: Guide to good practice, cleanliness of ventilation systems
- HVCA DW/TM2: Internal cleanliness of new ductwork installations
- BS 5588 & BS 476: Fire resisting ductwork and fittings construction.

57.01 Extract ductwork

General:

The Mechanical Contractor shall allow for the supply, installation, testing and commissioning of the complete extract ventilation systems as indicated on the drawings. The extract systems shall comprise of associated ductwork and in-line extract fans as indicated on the drawings.

Ductwork:

All extract air ductwork as highlighted on the drawings shall be installed in galvanised steel ductwork. Routes and sizes as indicated on the drawings.

All new extract ductwork shall exit the building horizontally through the external wall as indicated on the drawings. Routes and sizes as indicated on the drawings.



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All new extract ductwork shall be galvanised sheet metal. See section 57.05 below for specification below on ductwork required for the extract ventilation systems.

All of extract ductwork shall be circular.

Installation:

All of extract ductwork shall be circular. Allow for all necessary connections in order to connect the ductwork to the internal grilles and external louvres for the extract systems in the building.

The Mechanical Contractor shall allow for the supply and installation of all internal grilles and external louvres for the extract ventilation systems. Refer to items 57.08 and 57.09 for further information.

All main runs of new extract ductwork shall be situated within the false ceiling where possible. All ductwork shall be installed above the ceiling in the ceiling void. Allow for all necessary, materials, ductwork, ductwork drops, bracing, etc. for installing the extract ductwork.

The main runs of extract ductwork shall be installed at approximately 3200mm above finished floor level on the Ground Floor. The grilles from the main runs of ductwork (which shall be installed in the suspended ceiling) shall be installed at approximately 3000mm. Therefore, allow for a maximum ducting drop of 400mm.

The Mechanical Contractor shall liaise with all other trades on site during installation and also for briefing staff on the correct operation of all aspects of the installation.

57.02 Extract ductwork for the chemical store

Not Applicable.

57.03 Passive supply air ductwork

General:

The Mechanical Contractor shall allow for the supply, installation, testing and commissioning of passive supply ductwork to certain areas in the building as indicated on the drawings. The passive supply ventilation systems shall comprise of passive supply ductwork, external louvres and internal grills as indicated on the drawings.



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Ductwork:

All passive supply ductwork for the areas as highlighted on the drawings shall be installed in galvanised steel ductwork. Routes and sizes as indicated on the drawings.

All new passive supply ductwork shall exit the building horizontally through the external wall as indicated on the drawings. Routes and sizes as indicated on the drawings.

All new passive supply ductwork installed in the building shall be galvanised sheet metal. See section 57.05 below for specification below on ductwork required for the passive supply ventilation systems.

All of passive supply ductwork shall be circular.

Installation:

All of passive supply ductwork shall be circular. Allow for all necessary connections in order to connect the ductwork to the internal grills and external louvres for the passive supply ventilation systems in the building.

The Mechanical Contractor shall allow for the supply and installation of all internal grills and external louvres for the passive supply ventilation system for the building. Refer to items 57.08 and 57.09 for further information.

All main runs of new passive supply ductwork in the building shall be situated within the false ceiling where possible. All ductwork shall be installed above the ceiling in the ceiling void. Allow for all necessary, materials, ductwork, ductwork drops, bracing, etc. for installing the passive supply ductwork.

The main runs of passive supply ductwork shall be installed at approximately 3200mm above finished floor level on the Ground Floor. The grilles from the main runs of ductwork (which shall be installed in the suspended ceiling) shall be installed at approximately 3000mm. Therefore, allow for a maximum ducting drop of 400mm.

The Mechanical Contractor shall liaise with all other trades on site during installation and also for briefing staff on the correct operation of all aspects of the installation.

57.04 Chemical resistant ductwork from the fume cupboard

Not Applicable.

57.05 Galvanised sheet metal ductwork



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All new ventilation ductwork throughout the building for the passive supply and extract ductwork shall be of the best quality galvanized sheet steel fabricated in accordance with good practice in a neat and workmanlike manner, true to size and internally free from sharp edges and obstructions.

It shall comply with the provisions of DW/ 144 - Specification for Sheet Metal Ductwork - published by the HVCA in 1982, and when erected be free from vibration and damping, rigid and truly air tight under operating conditions.

Standards:

- | | |
|---|---|
| a) Pressure Classification: | Class B medium pressure |
| b) Leakage Classification: | Class B medium pressure |
| c) Positive and Negative Pressures: | 1,000Pa Positive. 500Pa Negative. |
| d) Materials: | Galvanised ductwork shall be made from continuously hot-dipped zinc coated wide strip sheet/plate and slit wide strip to BS.EN10142. GradeDX51D+Z, coating type Z275. The material shall be suitable for profiling and bending. |
| e) Negative Pressure Classification: | Class B medium pressure. |

Special Requirements:

Air Leakage Testing:

All low pressure supply and extract ductwork is to be leakage tested in accordance with DW/143 and the leakage limits in table B16.15 of the CIBSE Guide and DW/144. Air leakage limits shall be 0.009 x p^{0.65} litres / m² of duct surface area.

Protective Finishes:

Where galvanised ductwork is located outdoors and un-insulated, or where the galvanising is broken during the manufacturing process and installation, it shall be treated in accordance with Clause 2.20 of Section 2. All steel ductwork supporting members and flanges shall also be protected in accordance with Clause 2.20. Outdoor ductwork must be protected, whether insulation or any other covering is applied or not, with two coats of chlorinated rubber paint. The surface must be properly degreased and prepared for the paint. Colour of paint to be selected.

Hanging of ductwork from ceiling



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The Contractor shall allow for installing the ductwork in the ceiling void. In order to complete this, the Contractor shall allow for hanging the containment for the ductwork from the existing purlins for the roof and installing suitable supports in order for the unitstrut to be installed in the ceiling void.

The brackets and unistrut for the ductwork shall be installed at approximately 3200mm above finished floor level on the Ground Floor.

In order to install the ductwork at high level, the Contractor shall allow for the following:

- Dropping 10mm threaded rod from the roof/ceiling slab at 500mm distances over the length of the ductwork run. Allow for a drop of approximately 2000mm.
- The threaded rod shall be hung from the roof/ceiling slab via 10mm G-Clamps or supports shall be drilled into the ceiling for supports.
- The base supports for the ductwork shall be 41mm double channel unistrut. Supports shall be placed at 500mm distances over the length of the ductwork run. Allow for a drop of approximately 2000mm.
- Allow for connecting the threaded rods to the double-channel unistrut.

57.06 Flexible ducting

Flexible ducting shall be used to connect the circular ductwork to each grille, fan and any other ventilation unit. Flexible ducting shall be of the acoustic type, SONADEC 25 AA3 (or equivalent) as supplied by 'Ventac'. Lengths of flexible ducting to grilles shall not exceed 1000mm.

57.07 Fire dampers and access panels

Fire Dampers:

The Contractor shall supply and fit fire dampers on ductwork as indicated on the drawings. All new 'ES' rated fire dampers as indicated on the drawings.

The 'ES' rated fire damper must leak no more than 200m³/hr/m² at any point during the fire test. This also applies to the largest and smallest size of damper to be offered for sale at ambient temperature for the ES criteria to be applicable.

Unless otherwise indicated, each fire damper shall be held in the open position by a corrosion-resistant retaining device incorporating a replaceable fusible element. The fusible element shall operate at a temperature of 72°C.

Fire dampers shall be of proprietary manufacture and constructed from a corrosion resistant material such as stainless steel, or be galvanised or otherwise treated to minimise corrosion. The dampers shall be housed in a rigid frame,



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stainless steel corrosion resistant casing which shall not distort under fire conditions and stainless steel blades with minimum 6-hour integrity fire rating.

Fire dampers shall be located in such a position and be of a type that facilitates manual testing and re-setting. Fire dampers which are supported only by the ductwork in which they are located, or by combustible battens, frames or other methods that do not provide the fire resistance required are not acceptable.

Each fire damper casing shall be clearly marked with a permanent indicated of the correct fixing attitude of the damper, the direction of air flow and the side at which access or maintenance openings shall be located.

Fire dampers provided in fire resistant ceilings shall be adequately supported either by the ceiling or from the structural soffit. It is not acceptable to form an opening, install a diffuser or grille and fit a fire damper above, if the gap between the ceiling opening and the fire damper does not achieve the fire resistance. Fire dampers shall be provided complete with installation frames. The Contractor shall provide details of fixings and supports to the Engineer for approval.

Dampers shall comply with the following:

- 'ES' rated fire and smoke dampers
- Single 430 stainless steel blade incorporating patented seal to provide both ambient and fire rated low leakage.
- Outer casing manufactured from galvanised steel with continuously welded corners and spigot connections comply with DW 144 class A B and C.
- E120 - Fire rated for 120minutes.
- Factory fitted 230v electrical actuator with thermal sensing to provide Fail-Safe-Closed operation. Electrical actuators are fitted with halogen free low smoke and fume cables.
- Electrical actuators shall have a 60 second reset time and a 20 second release time. Each actuator has a 72°C rated electrical thermal release (ETR). The ETR incorporates a safety electrical interlock that only permits actuator operation when correctly fitted. A green healthy indication lamp is built into the ETR to give a simple and clear visual check that the actuator is receiving power, the ETR is correctly fitted and the thermal fuse is intact.
- A manual test switch allowing periodic operation of the damper for testing purposes simulates actuator fail-safe release under fire/smoke conditions. End switches are provided with each mode for reset and release monitoring
- When the power is switched on – Damper motors open.
- When power is switched off – Spring closure



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- Fire dampers to be complete with factory fitted appropriate installation system, suitable for masonry wall, concrete floor or dry wall partition. (as specified)
- CE marked fulfilling the requirements of EN 15650
- Approved by LPCB and conforms to LPS1162 issue 4
- Fire tested to EN 1366-2
- Classified to EN 13501-3 (S120 vertical and horizontal)
- Corrosion tested to EN60068-2-52
- Tested Installation Method to suit Concrete/ Masonry Floors & Walls and Dry Walls
- Unique Self-Latching & removable thermal release mechanism cassette tested to ISO 10294-4
- Easy Single Handed Reset
- ASFP Grey book listed
- Nominal voltage 230V
- Power consumption in operation: 5 W
- Power consumption in rest position: 2.1 W
- Power consumption for wire sizing: 10 VA
- Auxiliary switch: 2 x SPDT
- Switching capacity auxiliary switch: 1 mA...3 (0.5 inductive) A, AC 250 V
- Ambient temperature normal operation: -30 to 55°C
- 24-month warranty period starting on the date of expedition.

Fire smoke dampers to be of type 'Swegon CSS' for circular ducts or equivalent.

Dampers shall be installed in accordance with manufacturer's instructions. Size of damper shall match size of duct as indicated on the drawings, where ducts range from sizes of 100mm diameter to 250mm diameter. Locations, sizes and quantities as indicated on the drawings.

Size of damper shall match size of duct as indicated on the drawings, where ducts range from sizes of 200mm diameter to 1000mm diameter. Locations, sizes and quantities as indicated on the drawings.

The Contractor shall supply and fit the fire dampers:

<u>Fire Damper Schedule</u>					
-					
<u>Ref. No.</u>	<u>Location and/or Area Served</u>	<u>Diameter (mm)</u>	<u>Length (mm)</u>	<u>Width (mm)</u>	<u>Type</u>
FD-01	Storage 2	100	-	-	Fusible link Fire Damper (FDC) c/w HVAC frame



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FD-02	Lobby 2	200	-	-	Fusible link Fire Damper (FDC) c/w HVAC frame
FD-03	AMB WC 3	100	-	-	Fusible link Fire Damper (FDC) c/w HVAC frame
FD-04	AMB WC 2	100	-	-	Fusible link Fire Damper (FDC) c/w HVAC frame
FD-05	Sluice Room	100	-	-	Fusible link Fire Damper (FDC) c/w HVAC frame
FD-06	ACC WC 2	100	-	-	Fusible link Fire Damper (FDC) c/w HVAC frame
FD-07	ACC WC 1	100	-	-	Fusible link Fire Damper (FDC) c/w HVAC frame
FD-08	AMB WC 1	100	-	-	Fusible link Fire Damper (FDC) c/w HVAC frame

Access doors:

The Contractor shall install rigid frames access doors in the ductwork for access to the fire dampers for maintenance. In total, the Contractor shall allow for the following access doors in ductwork:

- 1no access doors in 125mm diameter ductwork.

Access doors shall be complete with air tight gasket covers designed for easy removal and refitting and be of the type that is complete with a sub-frame for fixing to the duct with a door that can be completely removed from this frame. The door of each access assembly must be secured to the frame with a heavy-duty stainless steel retaining wire.

All doors shall be constructed from galvanised sheet metal and incorporate easy to use hand operated securing devices. Hardware for doors should be heavy-duty type construction with the minimum number of quick release fastening devices suitable for the load shall be used.

Access openings and inspection covers for the inspection and servicing of plant and equipment must be provided in accordance with DW/144. Unless otherwise indicated, access openings and clean out doors for the internal cleaning of ductwork must be provided in accordance with the requirements of TR/19 and must be located and sized as detailed in tables 2, 3 and 4.

The Contractor must ensure that access openings are not obstructed by pipework, cable trays or any other obstacle and that they are fully accessible for future use.



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Where practical, openings must be arranged so that they are accessible from circulation areas to minimise disruption in occupied rooms.



57.08 Internal grilles

Supply and install all internal grilles, diffusers and disc valves as indicated on the drawings.

Supply grilles:

The Contractor shall allow for the supply and installation of the following internal supply air grilles:

SUPPLY AIR GRILLES (TYPE 'PG')					
Ref No.	Qty	Type	Volume (m ³ /s)	Neck Size (mm)	Overall Size (mm)
PG.01, PG.03, PG.04	3no	Disc valve as KI 125 supply valve	-	125mm diameter	160mm diameter
PG.02	1no	Disc valve as KI 200 supply valve	-	160mm diameter	200mm diameter
- Grilles shall have RAL 9010 colour finish. - Samples of all grille / diffuser types to be provided on request - All grilles shall be manufactured from sheet metal with a stove enamelled white finish. - The outer body is fitted with a gasket to form an airtight seal with the mounting ring					

Extract grilles:



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The Contractor shall allow for the supply and installation of the following internal extract air grilles:

EXTRACT GRILLES (TYPE 'EG')					
Ref No.	Qty	Type	Volume (m ³ /s)	Neck Size (mm)	Overall Size (mm)
EG.01 to EG.12	12no	Disc valve as KSU exhaust valve	-	125mm diameter	160mm diameter
- Grilles shall have RAL 9010 colour finish. - Samples of all grille / diffuser types to be provided on request - All grilles shall be manufactured from sheet metal with a stove enamelled white finish. 					



57.09 External louvres

Supply and install all external louvres as indicated on the drawings.

EXTERNAL EXTRACT LOURVES (TYPES 'EEG')					
Ref No.	Qty	Type	Ductwork connection to louver (mm)	Nominal size of grill (mm)	Overall size of grill (mm)
EEG.01 to EEG.12,	12no	WL38 rectangular cast external louver with 45° degree blade slope	160mm diameter	212mm high by 212mm wide	257mm high by 257mm wide
EXTERNAL PASSIVE SUPPLY AIR LOURVES (TYPES 'EPG')					
EPG.01, EPG.03 and EPG.05	3no	WL38 rectangular cast external louver with 45° degree blade slope	150mm diameter	212mm high by 212mm wide	257mm high by 257mm wide
EPG.02 and EPG.04	2no	WL38 rectangular cast external louver with 45° degree blade slope	200mm diameter	262mm high by 262mm wide	307mm high by 307mm wide
Notes: ○ Louvres shall have a metal aluminium finish. ○ Louvres shall have a stainless steel bird mesh. ○ Suitable for external use. ○ Samples of all grille / diffuser types to be provided on request ○ All louvres shall be spray painted to a RAL colour to match the external cladding on the building. The grilles shall be finished with a polyester					



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powder coating to RAL colour to match the external cladding on the building. Therefore, the Contractor shall allow for the powder coating of the grilles to a the selected RAL colour which is to be approved by the architect/client. Include for spray painting the grilles as highlighted above.



Power coating and spraying of all external louvres:

All louvres shall be spray painted to a RAL colour to match the colours selected by the architect.

The louvres shall be finished with a polyester powder coating to RAL colour to match the external cladding on the building.

Therefore, the Contractor shall allow for the powder coating of the grilles to a the selected RAL colour which is to be approved by the architect/client. Include for spray painting the grilles as highlighted.

57.10 Cooker Hoods

A wall mounted Stainless Steel extract canopy c/w light, washable metal grease filter, duct, speed controller, lights, external grill & transition pieces as required shall be installed in the Kitchen as indicated on the drawings. Cooker Extractor hood shall be as 600mm 'Milano' as supplied by Vent Axia, or equivalent.

In total, there shall be 2no. extract hood installed in the building. **The extract hoods shall have the incorporated fan replaced with an extract fan which is mounted on the roof of the building.**



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57.11 Extract fans

General:

Extract fans shall be installed as indicated on the drawings. These fans shall be supplied and installed by the Mechanical Contractor under the provision of this contract.

The Mechanical Contractor shall allow for all necessary accessories and connections. Supply & fit all extract fans as indicated in the drawings.

The Mechanical Contractor shall liaise with the Electrical Contractor for extract fan power supply locations and wiring details for the wall mounted fan controllers.

Extract fans:

The Mechanical Contractor shall allow for the supply and installation of the following extract fans for the toilets:

Ref No.	Location	Type	Duty	CAT No.	Control	Specific fan power
EF.01	ACC WC 3	In-line Duct Mounted Extract Fan	300m ³ /hr @ 100Pa	TD-500/150 SILENT ECOWATT T	Controlled by remote PIR Sensor as CPFL-S c/w 15 min overrun timer	0.2 W/l/sec



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EF.02	Changing Place	In-line Duct Mounted Extract Fan	450m ³ /hr @ 100Pa	TD-1000/200 SILENT ECOWATT T	Controlled by remote PIR Sensor as CPFL-S c/w 15 min overrun timer	0.2 W/l/sec
EF.03	AMB WC 3	In-line Duct Mounted Extract Fan	300m ³ /hr @ 100Pa	TD-500/150 SILENT ECOWATT T	Controlled by remote PIR Sensor as CPFL-S c/w 15 min overrun timer	0.2 W/l/sec
EF.04	AMB WC 2	In-line Duct Mounted Extract Fan	300m ³ /hr @ 100Pa	TD-500/150 SILENT ECOWATT T	Controlled by remote PIR Sensor as CPFL-S c/w 15 min overrun timer	0.2 W/l/sec
EF.05	Sluice	In-line Duct Mounted Extract Fan	300m ³ /hr @ 100Pa	TD-500/150 SILENT ECOWATT T	Controlled by remote PIR Sensor as CPFL-S c/w 15 min overrun timer	0.2 W/l/sec
EF.06	ACC WC 2	In-line Duct Mounted Extract Fan	300m ³ /hr @ 100Pa	TD-500/150 SILENT ECOWATT T	Controlled by remote PIR Sensor as CPFL-S c/w 15 min overrun timer	0.2 W/l/sec
EF.07	ACC WC 1	In-line Duct Mounted Extract Fan	300m ³ /hr @ 100Pa	TD-500/150 SILENT ECOWATT T	Controlled by remote PIR Sensor as CPFL-S c/w 15 min overrun timer	0.2 W/l/sec



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EF.08	AMB WC 1	In-line Duct Mounted Extract Fan	300m ³ /hr @ 100Pa	TD-500/150 SILENT ECOWATT T	Controlled by remote PIR Sensor as CPFL-S c/w 15 min overrun timer	0.2 W/l/sec
EF.10	ACC WC 4	In-line Duct Mounted Extract Fan	300m ³ /hr @ 100Pa	TD-500/150 SILENT ECOWATT T	Controlled by remote PIR Sensor as CPFL-S c/w 15 min overrun timer	0.2 W/l/sec
EF.11	ACC WC 5	In-line Duct Mounted Extract Fan	300m ³ /hr @ 100Pa	TD-500/150 SILENT ECOWATT T	Controlled by remote PIR Sensor as CPFL-S c/w 15 min overrun timer	0.2 W/l/sec
EF.12	ACC WC 6	In-line Duct Mounted Extract Fan	300m ³ /hr @ 100Pa	TD-500/150 SILENT ECOWATT T	Controlled by remote PIR Sensor as CPFL-S c/w 15 min overrun timer	0.2 W/l/sec
EF.12	ACC WC 7	In-line Duct Mounted Extract Fan	300m ³ /hr @ 100Pa	TD-500/150 SILENT ECOWATT T	Controlled by remote PIR Sensor as CPFL-S c/w 15 min overrun timer	0.2 W/l/sec

All the extract fans shall adhere to the following specification:

- In-line mixed flow fan with sound-absorbent insulation
- Extremely quiet
- Fan casing manufactured in plastic material
- Fan fitted with flexible rubber seals on the inlet and outlet to absorb vibrations
- Fan fitted with an external connection box
- Fan shall have a body that can be removed without dismantling the adjacent ducting



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- Brushless EC motor
- Suitable for single phase supply 230V $\pm$ 15%/50-60Hz
- IP44 rated
- Fan shall have thermal overload protection. Analogue input with terminals in the terminal box to control the fan with 0-10V input signal.
- Operation within ambient air temperatures between -20°C up to +40°C.
- All fans to be controlled by a remote PIR sensor. The PIR sensor shall be sensitive to infrared radiation emitted by bodies in movement, with a 360° detecting angle as CPFL-S (Surface mount model) or equivalent. The Contractor shall ensure that the remote PIR sensor is suitable for the extract fan to be installed.
- All fans to have a run-off-timer incorporated into the fan.
- The Contractor shall allow for supplying fans to suit the ducting installation, layout and sizes.
- **All extract fan must comply with the NZEB/BER assessment. The fan shall have a SFP (Specific Fan Power) of 0.2w/l/s as outlined in Table 6 from TGD Part L.**
- Extract fans to be as supplied by Ventac, Vent Axia, Systemair or equivalent.

PIR sensor for toilet extract fans:

All fans for the toilets shall be controlled by a remote PIR sensor. The PIR sensor shall be sensitive to infrared radiation emitted by bodies in movement, with a 360° detecting angle as CPFL-S (Surface mount model) or equivalent.



Speed Controller for multi-sensory room extract fans:

Extract fan for the multi-sensory room shall be controlled by a single phase speed controller.



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Extract fan for Cooker extract hood:

The Mechanical Contractor shall allow for the supply and installation of the following extract fan for the 1no. cooker extract hoods:

EF.09	Fan for Cooker Hood	Roof mounted Extract Fan	460m ³ /hr @ 250Pa	Systemair DVN 355EC ROOF FAN	By remote switch
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57.12 Roof termination cowl

Not applicable

57.13 Volume control/balancing dampers

Supply and install volume control damper valves on the branches of ductwork as indicated on the drawings. Sizes shall match the size of the duct where the damper is indicated to be located.

Dampers shall be manufactured from aluminium and shall be complete with spigot connections as required. Balancing dampers shall be opposed blade type balancing dampers, complete with operating lever, quadrant and locking device. Manual dampers shall include a device for positioning and locking the damper blades. The positions of all manual dampers, as set after final regulation, shall be indelibly marked at the adjusting devices.

Standard volume control dampers for rectangular ductwork shall be as 'HVC-NCA Series 900 (Model B)' for rectangular duct (or equivalent) as supplied by Lindab, or equivalent.



Standard volume control dampers for circular ductwork shall be as 'HVC-NCA Series 900 (Model C)' for circular duct (or equivalent) as supplied by Lindab, or equivalent.



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All dampers shall adhere to the following specifications:

- Shall be tested to DW144 Class D at a static pressure of 2000Pa for a minimum time of 15 minutes with negligible leakage recorded.
- Aluminium blades
- Stainless steel jamb seals.

57.14 Heat recovery units

General:

The Contractor shall allow for the supply, installation, testing and commissioning of a number of heat recovery system for the building. All the heat recovery units shall be installed in the wall as shown on the drawings.

The Contractor shall allow for the supply, installation, testing and commissioning of all the heat recovery units as indicated on the drawings. This includes the heat recovery unit (HRU), associated controls, associated works, ductwork, etc.

All heat recovery units shall be supplied, installed and commissioned as part of this contract. Include for the supply and return air filters in the unit.

In total, there are 6no heat recovery units to be supplied and installed as part of this contract. The Contractor shall allow for the supply and installation of the following heat recovery units for the building:

Heat Recovery Unit 01 to 06:

Unit & Construction:

- Number of units: 6no
- Reference: HRU-01, HRU-02, HRU-03, HRU-04, HRU-05, HRU-06
- Model: KERS 50 Heat recovery unit, or equivalent.
- External Grille: VTGF03 Flexible outdoor grille (White)

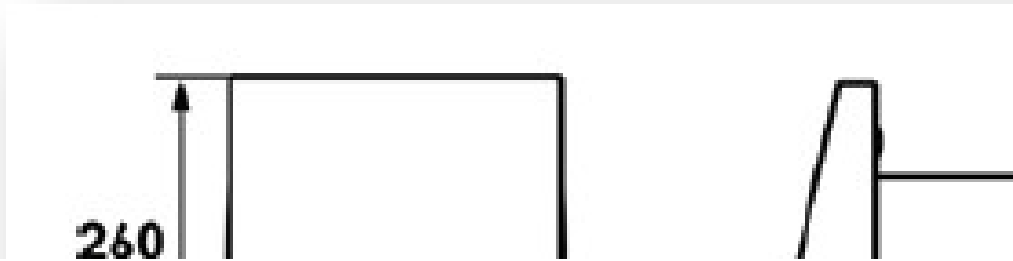
Main Technical Data:



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- Air flow at max speed: 50 mc/hr
- Air Exchange: 25 mc/hr
- Heat Recovery Efficiency: 97%
- Noise level at max speed: 30db
- Noise level at max speed @3m: 11db
- Temperature working range: -20 / +50
- Electrical power consumption: 5.2W
- Electrical current: 0.031A
- On board filters: 2
- Filter Class EN 779: G3 (F7 as optional)
- Power: 230/1/50 V/ph/Hz
- Protection: IP24



Running of the unit:

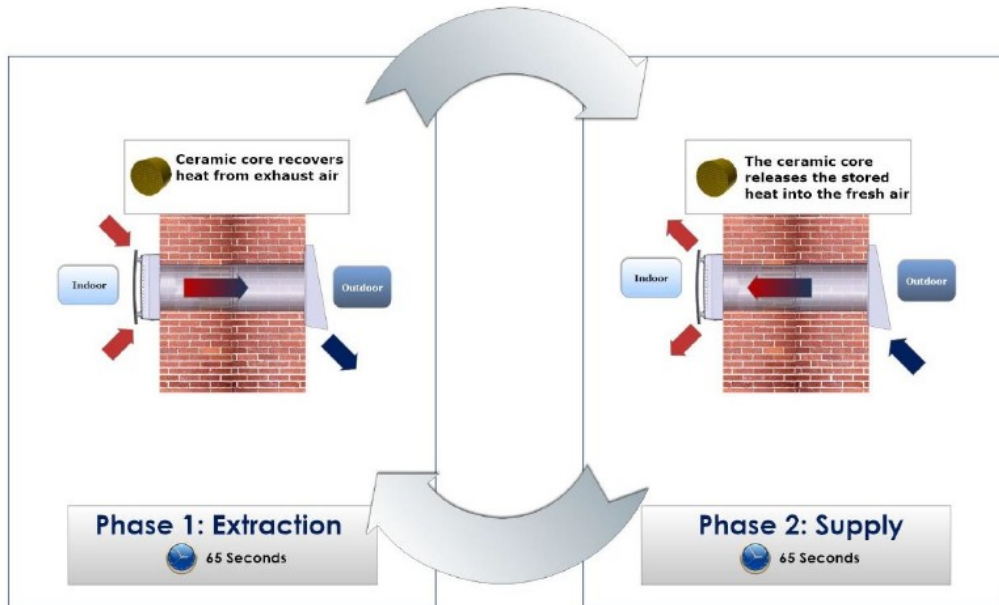
Phase 1: Stale and hot air is extracted from the room. While flowing through the heat exchanger ceramic, heats it. So it moves up to 97% of the thermal energy. In 65 seconds the heat exchanger is heated and the unit switches to the second phase.

Phase 2: The fresh air from the outside flows through the heat exchanger ceramic that heats the air to room temperature. In 65 seconds the ceramic exchanger cools and the units switches to 'Phase 1'.



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57.15 Classroom Heat recovery units

General:

The Contractor shall allow for the supply, installation, testing and commissioning of a number of semi recessed ceiling hung heat recovery units for the building. All the heat recovery units shall be installed within the new ceiling installation as shown on the drawings.

The Contractor shall allow for the supply, installation, testing and commissioning of all the heat recovery units as indicated on the drawings. This includes the heat recovery unit (HRU), associated controls, associated works, ductwork, etc.

All heat recovery units shall be supplied, installed and commissioned as part of this contract. Include for the supply and return air filters in the unit.

The Contractor shall allow for the supply and installation of the following heat recovery units for the building:

Heat Recovery Unit (01, 02, 03, 04, & 05):

Unit & Construction:

- Number of units: 5no
- Reference: CHRU-01, CHRU-02, CHRU-03, CHRU-04 & CHRU05
- Model: Sense SNH 1000-H-OE1



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Main Technical Data:

- | | |
|------------------------------------|-------------------------|
| ○ <u>Nominal Airflow:</u> | 1000 m ³ /hr |
| ○ <u>Frequency:</u> | 50 Hz |
| ○ <u>Voltage:</u> | 230V |
| ○ <u>Phases:</u> | 1-/3- |
| ○ <u>Speed Regulation:</u> | Stepless |
| ○ <u>Product Type:</u> | Heat Recovery Unit |
| ○ <u>Input power, supply fan:</u> | 500W |
| ○ <u>Input power, extract fan:</u> | 500W |
| ○ <u>Exchanger Type:</u> | Counter flow |
| ○ <u>Installation placement:</u> | Horizontal |
| ○ <u>Weight:</u> | 200kg |

Dimensions:

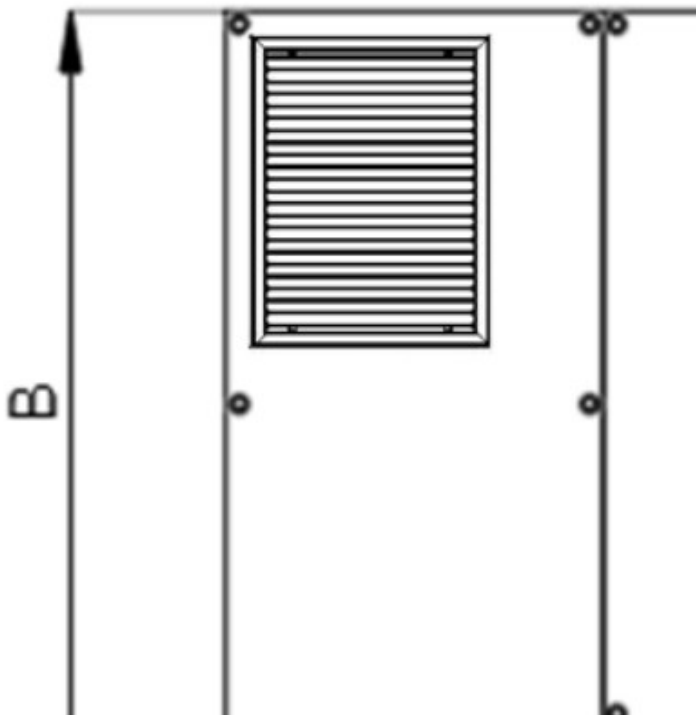
W 2300mm

B 1150mm

H 570mm

V 1800mm

N 630mm





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57.16 Labelling and identification

All new ductwork (including above ceilings) shall be labelled with appropriate colour identification bands and flow indication arrows. Labels shall be provided on all ductwork indicating the function of each duct, the air quantity being carried, the air velocity and the direction of flow.

Where access doors into ducting are provided, these shall be labelled to indicate their function. The labels shall consist of laminated plastic tape 19mm high with self-adhesive backing and block capital lettering 12 mm high.

The Contractor shall identify and label in a clear and legible manner all ductwork services runs in accordance with DW / 144 Appendix B.

All identification shall be by means of self-adhesive flexible plastic labels, engraved plastic labels or stencilled lettering with permanent paint. All identification label colours to BS 4800 shall be in accordance with Table 18 of Appendix B.

All items of equipment such as heat recovery units, fans, dampers, etc. whatsoever, supplied and fitted by the Contractor under this section of the contract shall be provided with labels of approximate size 150 mm x 80 mm x 1.63 mm s.w.g. In general, all labels on equipment shall be engraved on rigid plastic plates and secured to the item of equipment by means of screws.

57.17 Commissioning

The Contractor shall allow for commissioning the entire ventilation once all works are completed within the building. The Contractor shall employ a suitably qualified company to carry out the commissioning. This shall include flow rates for each grill and the balancing of the dampers and fans to achieve the required flow rate in each room as indicated on the drawings.



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The ventilation systems shall be regulated by proportional balancing as specified in the codes. The Contractor shall obtain from the Engineer a list of design flow rates and acceptable tolerances before commencing balancing operations.

The Contractor shall provide a commissioning report confirming the actual flow rate of each gill to the design flow rate and the reason for any discrepancies.



58.0 PROTECTIVE SERVICES

58.01 Fire extinguishers

Supply and fit the fire extinguishers and fire fighting equipment for the building as indicated on the drawings. Exact locations to be decided on site in conjunction with the Employer's Representative. All fire extinguishers shall conform to the relevant standards. Allow for supplying the suitable and relevant wall signage for each fire extinguisher which indicates what type of extinguisher it is. Fire extinguishers shall be as follows (refer to drawings for quantities and locations):

Types of fire extinguishers are as follows:

- **Type A:** 6litre Foam
- **Type B:** 6kg Dry Powder
- **Type C:** 2kg CO2
- **Fire Blanket:** Fire Blanket to BS 6575

The Contractor shall also allow for the following:

- Providing wall brackets for all extinguishers and allow for mounting all extinguishers
- Providing and install wall mounted signage above all fire extinguishers identifying fire point, and extinguisher usage.
- Providing a fire assembly appoint sign and mount externally in the location indicated by the clients representative
- Agreeing exact locations and mounting heights with client's representative prior to mounting extinguishers.



59.0 COMMISSIONING AND HANDOVER

59.01 Commissioning of the systems

Extent Of Works

This section covers the commissioning of all services.

Order Of Commissioning

The Contractor shall allow for the commissioning of the services in the following order:

- a) Domestic cold water
- b) Mains water
- d) Boiler, gas services, LPHW services and heating controls
- e) Hot water
- f) Ventilation
- g) BMS

Principles And Procedures Of Commissioning

The Contractor shall carry out tests in accordance with C.I.B.S.E. commissioning codes and the following B.S.R.I.A. Application guides:

- Commissioning of Pipework systems: design considerations.
- Pre-commissioning cleaning of water systems.
- The commissioning of water systems in buildings.
- The commissioning of air systems in buildings.

Cleaning And Flushing Out

Before the Engineers authority to commence filling the system prior to commissioning is given, the Contractor shall satisfy the Engineer by means of a written report that the procedures as laid down in the Commissioning Codes as to system cleanliness have been complied with. The report shall set out in detail the procedures adopted in flushing out, cleaning by forced circulation, or chemical cleaning and inhibiting should this be decided. The report should set out, separately for each service, the personnel involved, locations dealt with and dates and times of operations, the flow rates and pressures involved, and other such matters as the Engineer may deem pertinent.

Mechanical Checkout

The Contractor shall submit a list of all plant items and ductwork and of the physical and mechanical checks, as set out in the codes, that have been carried



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out before system filling, and shall certify to the Engineer that these checks have been carried out.

Filling Of Systems

When the Engineer is satisfied as to the physical and mechanical checks that have been carried out, the Contractor shall fill the system with treated water to a prepared plan agreed by the Engineer, filling from the bottom upwards, where possible, so that air is moved to the appropriate points at a higher level in the system for venting.

Electrical Checkout

Before the Engineers' permission is granted to run pump sets, fans and other rotating equipment, or to apply heat, the Contractor shall satisfy the Engineer by means of a report that all electrical checks have been carried out, as set down in the Codes, and that all checks prior to pump and fan start up have also been completed.

Initial Setting To Work

When the Contractor has indicated to the Engineer that all checks have been carried out, he shall arrange to operate the systems generally in the order. Initial setting to work shall be carried out before heat is applied to the system so that design primary rates of circulation shall be established and any likelihood of primary flow rate variations due to modulation of unbalanced secondary systems have been eliminated. Before start up of the plant the Contractor shall report to the Engineer on the start up of each system and shall assure the Engineer of their satisfactory operation before start up of the plant.

Regulation of Flow

Circulating flow systems shall be regulated by proportional balancing as specified in the codes. The Contractor shall obtain from the Engineer a list of design flow rates and acceptable tolerances before commencing balancing operations.

Commissioning Records And Reports

All checks, measurements and adjustments must be recorded in writing at the time they are made by the commissioning staff, and copies made available immediately to the Engineer. The form that this report will take shall be agreed with the Engineer prior to commissioning.

When the Contractor is satisfied that the plant and systems have been correctly commissioned, he shall submit a final report to the Engineer, setting out all matters relevant, including all modifications and modifications to the systems



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and their controls, and listing all valve, damper and control settings, and normal operating flows, pressures, temperatures, running and starting currents and other operating characteristics. The final format of this report shall be agreed with the Engineer before completion.

Handover Of Systems

When the Contractor has satisfied the Engineer that all commissioning has been completed satisfactorily, that the Clients staff have been adequately briefed on all plant and in all maintenance procedures, that all spares have been duly handed over and placed in stores, and that all instruction and maintenance manuals, together with all record drawings, have been delivered to the Client and the Engineer, the Engineer shall issue Completion Certificates to the Contractor. Each section of the plant shall then be handed over to the Clients representative in the presence of the Engineer.

59.02 O&M manuals

The Contractor shall provide a Class D Operating & Maintenance manual.

To facilitate submission of record drawings, the Contractor shall keep on site a complete set of all drawings used on the Contract Works, on which he shall mark alterations to the designs shown thereon as such alterations are carried out. THIS PROCEDURE SHALL BE STRICTLY ADHERED TO.

Three prints shall be supplied of each drawing in addition to 3no compact disks containing all drawings in AutoCAD 2008 Format.

All operation and maintenance manuals along with their associated record drawings shall be prepared in accordance with the requirements of BSRIA document 1/ 871 Operating and Maintenance Manuals for Building Services Installations.

Three complete sets of Operating and Maintenance Manuals and record drawings shall be supplied to enable the Employer to operate and maintain the systems correctly. The manuals must therefore contain all necessary technical information on each item of equipment and the associated components which have been used to assemble and construct the system(s). Three no. hard copies and three no. soft copies of the final approved O&M documentation will be required.

In addition, manuals for each system must contain information on the design intent of the system, commissioning and testing results and reports of how the components of the system are adjusted to achieve the design intent, line diagrams to show how the system is arranged in the building giving the location of all equipment and components, its control system, how the system must be set in the normal operating mode and in the event of any emergency, routine check



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that must be made and a list of spares which should be kept and a list of any special tools which may be required.

The manuals must be prepared in such a way that an Engineer without any previous knowledge of the Project may use them to operate and maintain the system.

Contents of Manual

The Operating and Maintenance Manual shall be specific in respect of the complete Contract Works and shall include the following sections:

- Section 1 Description
- Section 2 Plant and Engineering Systems
- Section 3 Operating and Maintenance Procedures
- Section 4 Commissioning and Testing
- Section 5 As-Built drawings

Section 1 – Description

This section shall comprise:

- A detailed description of each building services system
- General description of all plant and equipment
- Design data for the system and for each item of plant which affects the performance of the system

Section 2 - Plant and Engineering Systems

This section shall comprise:

- Detailed technical information as published.
- Manufacturers drawings (where applicable) showing all components of the plant item with each component number in accordance with the parts list
- Parts list for each item of plant
- Manufacturers addresses and telephone numbers
- Complete instructions for ordering replacement parts in a manner that will prevent errors or misunderstanding including order number for each plant
- Installation instructions as provided by manufacturer
- Colour coding identification schedule for each building services system



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Section 3 - Operating and Maintenance Procedures

- A step-by-step method of starting, operating and shutting down a system and how this affects other systems. The procedure for an emergency shut-down.
- A list of routine checks that should be made and the frequency of the checks.
- A comprehensive schedule of routine maintenance based on Manufacturer's recommendations for items of plant etc. This program should state clearly what work should be done for each day, week, month, year or given number of hours.
- A list of tools and keys which will be required in the operation and maintenance of the systems.
- Fault finding procedures.

Section 4 - Commissioning and Test Report

The report for each system shall contain a record of all the parameters which affect the performance of the system at the time of commissioning. A similar report shall be prepared for tests which have been made. The report shall be comprehensive and shall contain a record of the settings of all valves and controls and any other adjustable components so that the system may be reset to the commissioned state by reference to the report.

Presentation

- Indexing System

Each volume shall be numbered and shall be divided into sections using an appropriate numbering system

- Paper Sizes

The manual will contain manufacturer's literature which will be different sizes. Large pages will be folded and small pages will be fitted in plastic pockets with a reinforced edge punched for filing in A4 lever arch files. The page size shall be standardised for all volumes using A4 paper (210 x 297mm) with four holes punched centrally in the longer side 80mm apart

Diagrams shall be prepared on A4 or A3 (297 x 420mm) paper

- Section Dividers

Stiff cardboard section dividers with extended tabs shall be used; these shall be SUMMIT Ring Book Guides or equivalent.



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- Files for Manual

A4 lever arch files with rigid plastic coated covers shall be used which shall be EMGEE or equivalent

Inlaid lettering on the front cover shall indicate the title, i.e. Operating and Maintenance Manual, the Name of the Project and Volume Number. A label shall be fitted in the window on the spine of the file listing its contents.

The Trade Contractor is advised that all Record Drawings and O & M Manuals in the form described herein must be handed over to the Engineer prior to the issue of a Practical Completion Certificate for the Trade Contract Works. Failure to issue these Record Drawings and O & M Manuals will also defer the issue of the Practical Completion Certificate until such time as they are received.

If the Trade Contractor fails to issue such documentation on time, then the Engineer will have the right to engage such other third parties to prepare these Record Drawings and O & M Manuals and any resultant cost incurred by him shall be borne and set against the Contract.

Identification of Services and Plant

All cable trays and trunking shall be labelled clearly with colour coded bands which identifies its content.

Section 5 – As-built Drawings

The Contractor shall include for a complete set of as-built drawings which shall incorporate all works carried out and completed by the Contractor. All services, trunking/tray, routes and circuits within the building shall be identified on these drawings.

To facilitate submission of record drawings, the Contractor shall keep on site a complete set of all drawings used on the Contract Works, on which he shall mark alterations to the designs shown thereon as such alterations are carried out.