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Mechanical Engineering Services Specification



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NPT New Industrial Units Seven Sisters

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Mechanical Engineering Services Specification

NPT New Industrial Units Seven Sisters

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Particular Specification

Specification Expert - Introduction

This document has been compiled using Specification Expert, which is joint copyright Barbour Index Limited and National Engineering Specification Limited.

The content incorporates that of the National Engineering Specification (NES).

NOTES FOR TENDERERS

Dependant on the nature of the works specified within this document, the specification shall contain some or all of the items below:-

1. PRELIMINARIES

The Preliminary clauses ('A' sections) included are those that relate to the Engineering Works in particular and must be read in conjunction with the "Preliminaries" of the "Main Contract".

2. SYSTEM SPECIFICATIONS

The system specifications are sub-divided into four parts:-

Part 1 System objectives:

The system objectives are clauses giving details of design information, system performance and description, together with lists of the system schematics and drawings.

Part 2 Selection schedules for the reference specifications:

These selection schedules specify items in the systems that are contained in the Reference Specifications (Y group). Required Y group clauses are invoked by reference.

Part 3 Clauses specific to the system:

These specification clauses are specific to the system concerned and in general make no reference to the Y group clauses.

BS Appendix

The BS Appendix contains a list of all the British and European Standards referred to in the particular system specification.

3. APPENDICES

The appendices shall consist of some or all of the following:-

Reference Specifications (Clauses from the Y Group).

All the reference specifications relevant to all the systems for the job. Required clauses are invoked in Part 2 (Selection schedules for the reference specifications) for each system.

4. NON-SPECIFICATION CLAUSES

User created, non Specification Expert, clauses may appear within the specification.

A64 GENERAL CONDITIONS FOR BUILDING SERVICES CONTRACTS

100.000 PROJECT PARTICULARS (M&E)

100.10 THE PROJECTS:

This specification is written as a general mechanical specification to accompany the tender drawings produced for Neath Port Talbot (NPT) Council New Industrial Units at the Seven Sisters (6No. Units) Site, listed below.

Particulars of the project as a whole are given in Main Contract Preliminaries.

This particular specification relates to the Mechanical Services element of works for the proposed new buildings. Full details of the building and working conditions shall be found in the main Contract Preliminaries.

Proposed layouts are shown to illustrate the extent of the works, which must be read in conjunction with all other tender documentation, particularly the architects tender drawings and specifications.

The contractor shall operate a Permit to Work and Authorised Person (AP) system, which complies with all current legislation and protects the Health and Safety of all building occupants, users, public, his employees and his sub-contractors. The AP shall be suitably qualified, trained and recognised by Local Authorities to work on live systems within the buildings. Copies of permits issued are to be kept in the Health and Safety file on site and a copy forwarded to the project manager (PM) within seven days of issue. A permit to work is required for, but not limited to:

1. LV Electrical Work
2. Pressure systems including heaters/vessels/pipework
3. Working with Hazardous Materials
4. Hot Working

The Mechanical Services include:

- All builders work elements and secondary supports associated with works.
- Installation of new water, ventilations and drainage systems complete with associated controls.
- Record drawings, O&M manuals and log book, Approved Document Part L documents and statutory health and safety documentation/management associated with the works

This Specification is written as a description of the Mechanical Services content of the overall Contract.

100.150 UTILITY SERVICE PROVIDERS

- Water Supply – Dwr Cymru Wels Water (DCWW)
- Electricity Supply – National Grid

General - Advise all Statutory Authorities of the intention to undertake new building works.

200.000 DEFINITIONS

200.010 GENERAL:

Where used in the documentation the following definitions shall apply and shall be interpreted as such:

- Works: All services shown on the drawings and described in the specification shall be deemed to be included in the contract.
- Drawings: The tender drawings.
- Elsewhere: Detailed or specified elsewhere in other clauses, sections, shown on the drawings or contained in the specification or conditions of contract.
- Services: Services means the inclusion of one or more system.
- System: All equipment, accessories, controls, supports and ancillary items, including supply, installation, connection, testing, commissioning and setting to work necessary for that section of the Works to function.
- Design process: All the activities necessary to convert design input into design output.
- Review: Give notice and submit details to the PM for his comment and review, which shall be granted in writing only. In the event of the PM not accepting that submitted, resubmit alternative details for review or modify that submitted in accordance with the PM comments. Review of any submittal by the PM shall not mean that the PM is responsible for the correctness of the submittal or its suitability for purpose and does not relieve any contract responsibilities.
- Competent person: A person, by reason of theoretical and practical training or actual experience or both, is competent to perform the task or function or assume the responsibility in question and is authorised to perform such a task or function.
- Duct: An enclosed space specifically intended for the distribution of services, with direct access for personnel.
- Trench: A covered horizontal service space in the floor or ground with access from above.
- Cavity: A space enclosed within the elements of a building within which services are installed, e.g. the space between ceiling and floor above. See Building Regulations.
- Service Areas: Includes areas within a building with limited finishes such as loading bays, car parks etc.
- Concealed Services: Includes installations within ducts, trenches or cavities.
- Exposed Services: Includes installations outdoors or unprotected within service or occupied areas.
- Terminal Units: Terminal units such as radiators, convectors, fan coil units, induction units, variable or constant volume air boxes and other like equipment.
- Ancillaries: All specified fittings, accessories, inserts, test points, bracketing, terminal equipment connected to and installed in the engineering services system.
- CIBSE: The Chartered Institution of Building Services Engineers
- BSRIA: The Building Services Research and Information Association
- IEE: The Institution of Electrical Engineers
- IOP: Institute of Plumbing

- LPC: Loss Prevention Council
- HSE: Health and Safety Executive

200.020 DEFINITIONS OF TECHNICAL TERMS

The definitions of technical terms associated with the engineering services installations are those included the latest edition of:

- CIBSE - Guides; Commissioning Codes; Technical Memoranda; Building Energy Codes; Lighting Guides; Application Manuals
- IOP - Plumbing Guide
- BSRIA - Technical Publications
- BS 7671 Requirements for Electrical Installations (IEE Wiring Regulations)
- British Standards, including Codes of Practice.
- Statutory Acts.
- DDA – Disability Discrimination Act

400.000 CONTRACT CONDITIONS

400.010 CONDITIONS OF CONTRACT:

The conditions of the Main Contract are as detailed in the Main Contract Preliminaries. The Mechanical works will be installed in accordance with the requirements of this Mechanical Services Specification and the tender drawings.

Any reference within this document to sub-contract(or) or sub-trader shall be deemed to mean the mechanical Contractors sub contractors.

Contractors installing Mechanical and Electrical services must be members of approved organisations and minimum requirements will be GAS SAFE or equivalent /BESA and/or NICEIC/ECA and any sub let work will require prior approval by the employer or PM.

410.000 PARTICULAR CONDITIONS

410.010 GENERAL:

This section details particular conditions and requirements for the project.

410.070 SUPPRESSORS:

Ensure all internal combustion engines used in the execution of the contract works are fitted with efficient suppressors in the ignition system in accordance with the recommendations of British Standards so as to prevent electrical interference to radio or television receiving equipment in the vicinity. All temporary electrical installations, such as motors or the like, shall be prevented from creating such interference and shall be fitted with suppressor equipment in accordance with British Standards and to the satisfaction of the PM.

410.240 MATERIALS USED:

No acoustic insulation or thermal insulation or sound attenuation materials shall be manufactured with any form of animal hair. All materials supplied shall be a type that will not support bacteria.

Deleterious materials shall not be utilised on any part of the Works. Deleterious materials include but not limited to:

- halon/CFC's
- asbestos or products containing asbestos
- urea formaldehyde or materials which may release formaldehyde
- materials comprised in whole or part of man-made and/or naturally occurring mineral fibres which have a diameter of 3 microns or less and a length of 200 microns or less or which contain fibres not sealed or otherwise not stabilised to ensure that fibre migration is prevented
- lead where the metal or its corrosion products may be directly ingested, inhaled or absorbed
- any other substances generally known to be deleterious at the time of installation

All jointing materials shall be of a type approved by the respective authority.

Warrant that deleterious materials are not incorporated in the Works.

410.280 DEFECTS LIABILITY (also see clause 910:000)

Liability for making good defects in the works shall be for a period of 12 months from the date of issue of the certificate of practical completion for the installations. Generally, it is necessary to attend site within 3 hours of notification and replace or renew any portion of the contract works as part of liability for defects. The defects liability period in respect of that portion of the contract works shall be deemed to commence from the date of such replacement or renewal. The PM may require that new tests be carried out to demonstrate that the plant is continuing to work satisfactorily if the replacement or renewal may affect the efficiency of the Works or any portions thereof.

In the remedying of defects in the contract works take all necessary precautions to minimise the risk of damage to the buildings, the decorations, the fittings and the equipment.

- In the event of such damage occurring bear the cost of replacement or making good, subject to the proviso of being granted the benefit of any settlement in respect of such damage accepted by the insurers under the insurance policies taken out in accordance with the requirements of the contract.
- Agree with the PM a programme for the carrying out and the completion of any work not finally finished at the time of the contract Works being offered for acceptance and which does not prejudice the issue of a practical completion certificate. This work may be requested to be executed out of normal hours and no additional costs will be accepted for this action.
- Prior to practical completion submit a method statement for the approval of the PM outlining how the defects which arise during the defects liability period will be rectified to ensure that disruption to the use of the building is kept to a practical minimum.
- No additional costs will be accepted for undertaking works executed out of normal hours.

410.290 RIGHT OF ACCESS DURING DEFECTS LIABILITY PERIOD:

Right of access will not be unreasonably withheld, at all reasonable working hours and at own risk and expense, to any part of the contract works for the purpose of inspecting the working of the installations or to the records of the working and the performance thereof. Subject to PM approval, that shall not be unreasonably withheld, undertake any tests considered necessary at own risk and expense.

During the defects liability period and all necessary remedial works and/or rectification of defective materials and equipment liaise closely with the Employer's staff. All such work shall be carried out in such a manner as to avoid or minimise shut-down time and inconvenience to the Employer.

410.300 RATIONALISATION OF COMPONENTS:

Similar items of apparatus and equipment shall be made and provided by the same manufacturer where practicable and corresponding parts of all apparatus and equipment shall be interchangeable to reduce the need for different attention and spares.

510.000 SUBMITTALS AND APPROVALS

510.050 EQUIPMENT PERFORMANCE DETAILS:

Details of the equipment selected for inclusion into the Works shall include the following information:

- Plant item description, reference identification and serial number.
- Electrical input rating - kVA, Volts, Phase.
- Operating mode - duty, standby, generator etc.
- Starting characteristics - starter type, current, starts/hour and starting time.
- Performance characteristics - (full load current and power factor).
- Noise level.
- Weight.

The format of the information shall be as agreed with the PM.

520.000 OBLIGATIONS AND RESPONSIBILITIES

520.010 GENERAL:

This section details the specific obligations, duties and responsibilities undertaken as part of the contract works.

520.020 OBLIGATIONS:

Undertake responsibility for all works defined in the work sections and shown on the drawings, and in particular the following:

- Undertake the responsibility for resolving final spatial co-ordination and producing stage 5 coordinated working drawings.
- Co-ordinating the engineering services, with each other and with the building structure and fabric
- Provide the following drawings as defined elsewhere:
 - Co-ordination
 - Installation
 - Manufacturing
 - Manufacturer's certified
 - Shop drawings
 - Installation wiring drawings
- Provide builders work details based on the installation, manufacturing and shop drawings.
- Negotiate with public and other authorities for provision of necessary incoming services.

- Obtaining final approvals of any appropriate authority.
- Undertake all on-site co-ordination with all other trades, disciplines, manufacturer's and suppliers
- Supply, deliver to site, unload, store, protect and co-ordinate movement of all plant, equipment and materials required for the works.
 - Including lifting and hoisting.
- Fix and install correctly all plant, equipment and materials and ensuring that all associated works are correctly executed
- Undertake the fire stopping of all holes associated with the works
- Install fire barriers where a fire rated partition is penetrated
- Preparation of the operating and maintenance manuals, planned maintenance schedules.
 - Appoint a specialist responsible for the preparation of the operating instructions and maintenance manual
- Preparation of log books in accordance with Building Regulations
 - Using CIBSE TM 31 template
- Undertake the testing and commissioning of the works.
 - Appoint an independent commissioning specialist responsible for the testing and commissioning of the works.
 - Providing a commissioning report in accordance with Building Regulations.

520.030 DESIGN RESPONSIBILITIES:

The contractor shall be responsible for the verification and detailing of the cable routes and pipework runs, coordination and issue of working drawings and builders work drawings.

520.040 ALTERNATIVE EQUIPMENT:

Where the PM has accepted proposed alternative equipment or materials prior to the award of the contract and which subsequently varies the main works and/or the works in any way whatsoever, then:

- Be responsible for meeting all the additional costs and technical requirements arising from such a change
- No claim for additional costs or delay to the completion of the works will be allowed.

Should any alternative item proposed not carry appropriate certification, ensure independent testing is carried out to confirm compliance at no additional cost.

520.050 CO-ORDINATION OF SERVICES:

All aspects of the works require detailed co-ordination to avoid any possible clash or conflict with other trades and disciplines. Undertake such co-ordination in relation to the works. No extra cost or claim will be allowed due to conflict of works or installations, where full liaison with other trades and disciplines would have prevented such an occurrence.

When any new, revised or updated architectural, structural or services information is issued by the PM under the authority of an instruction, examine such information and if necessary modify the works accordingly to prevent any clashes or abortive work due to such instruction. No extra cost or claim will be allowed to cover any clashes or abortive work that result from not requesting an explanation or seeking clarification in respect of any such revision. No extra cost or claim will be allowed due to conflict of works or installations, where full liaison with other trades and disciplines would have prevented such an occurrence.

The tender drawings for the Mechanical and Electrical Services are based on information available prior to tender. Until all suspended ceiling voids are exposed it will not be possible to determine finite information on void depths. Downstand beam dimensions, details of openings existing through beams etc.

The contractor shall make due allowance in the tender for taking site dimensions and preparing fully co-ordinated Mechanical and Electrical Service layouts with due regard to further information that will

become available once demolition works commence. Allowance shall be included for attendance at co-ordination meetings with the employer, PM and/or his representatives during the contractor's development of the installation and working drawings.

520.060 CO-ORDINATION OF SERVICES ON SITE:

Allow for co-ordinating the contract works with the works of other trades and installations which may be on site during the period of the contract either during or prior to their incorporation into the works. Where minor clashes of services occur on site that were not foreseeable at the design or co-ordination drawing stage then these clashes or minor co-ordination matters shall be resolved by discussion and agreement with other trades and disciplines. The PM shall be informed of the action to be taken by an approved means.

- No instructions will be issued to cover such minor clashes.

520.70 SURVEYS:

- Ascertain the nature of the site and all local conditions and restrictions likely to affect the execution of the Works.
- Before commencing work, carry out a survey and examination of buildings, structure and engineering services affected by the works.
- Examine all available drawings of the engineering services and report any discrepancies to the PM.

520.080 SITE DIMENSIONS AND LEVELS:

Install all engineering services using a laser levelling system wherever possible and co-ordinate the measurements with all other trades and disciplines to prevent any clashes. Obtain all dimensions and levels on site for the actual setting out of the works. As the development advances measure on site all works by others that may affect the works. These dimensions shall be incorporated into the installation drawings or marked up on revised drawings if already issued.

- No extra cost or claim will be allowed for any errors arising from inaccurate setting out or failure to check actual site dimensions.

520.090 MAINTAINABILITY:

Demonstrate that all plant and equipment incorporated into the works can be safely and easily maintained in full compliance with:

- Health and Safety legislation.
- CDM requirements.
- British Standards.

Ensure that adequate space is provided for future replacement of plant or parts and that all access panels/doors are unobstructed.

520.100 TERMINAL UNIT LOCATIONS:

The positions of all connection points, accessories, apparatus, equipment and other room terminals shown on the tender drawings are approximate and for guidance in the preparation of the tender. Agree, with the PM, which terminals are subject to final positioning on site.

Allow for the movement of all such terminals:

- Up to a radius of 1.5 m from the positions shown on the drawings.

Mounting heights indicated in the tender documents are for tender purposes only. Confirm mounting

heights with the PM before commencing work on site.

520.110 CO-OPERATE:

Co-operate with other contractors, suppliers, local authorities and statutory undertakings in the execution of their work.

520.120 STATUTORY AUTHORITIES:

Liaise with the Statutory Authorities and provide any test notices required to ensure final connections are made in accordance with the requirements of the programme.

600.000 THE SITE

600.010 GENERAL:

This section outlines information on the site.

600.020 SITE LOCATION:

The site is located at as detailed in main preliminaries.

600.40 RISKS TO HEALTH AND SAFETY:

The nature and condition of the site/building(s) cannot be fully and certainly ascertained before opening up.

The employer or the PM does not guarantee the accuracy and sufficiency of this information. Undertake responsibility to obtain any information required to ensure the safety of all persons and the Works. Comply with the requirements of the CDM Regulations by compiling risk assessments for the contract works.

610.000 EXISTING SERVICES

610.010 GENERAL:

This section provides information on existing services.

610.020 EXISTING MAINS/SERVICES:

The existing site has existing underground services, no works are to commence until certified safe by the main contractor.

610.40 RISKS TO HEALTH AND SAFETY:

Undertake responsibility to obtain any information required to ensure the safety of all persons and the Works.

Comply with the requirements of the CDM Regulations by:

- Compiling risk assessments for the contract works.
- Providing information on the contract works which might affect the health or safety of any person.
- Providing appropriate input to the health and safety plan and file for the works.

610.50 MAINTENANCE OF EXISTING SERVICES:

- n/a

610.060 REMOVAL OF EXISTING SERVICES:

- n/a

700.000 DESCRIPTION OF THE WORKS**700.010 GENERAL:**

This section outlines the extent of the works and provides a description in a brief manner of the scope of each of the building services installations.

700.020 SCOPE OF WORKS:

The engineering services included in the Works and covered by this contract comprise:

- Mechanical services.
- Automatic controls.
- Above ground drainage
- Hot and cold water services
- Wall mounted ventilation extract fans to tea point and WC.
- Electric panel heaters to the WC and office – supplied and installed by the electrical contractor.
- Sanitary ware installation

700.30 EXTENT OF THE WORKS:

The extent of the works is generally as follows: As scope of works plus:

- All builders work elements and secondary steelwork associated with works shown on drawings
- Builders work in Connection.
- Spares and tools.
- Testing and commissioning.
- Record drawings and O&M manuals and log book and part L docs and statutory health and safety documentation/management associated with the works.

700.040 DESCRIPTION OF THE WORKS:**Mechanical Ventilation**

Wall mounted local extract fans shall be installed, as detailed by the tender drawings, to serve the tea point and the WC. 2No. fans per unit.

The tea point extract fan is to be oversized to encourage air change within the unit and help with air movement and overheating.

Transfer grilles are to be installed as detailed in the WC.

PIR controls are to be installed to control the WC extract fans and fan speed controllers are required at the tea point location, wall mounted to control the tea point fan.

The fans are to be as follows:

Room: WC

Type: wall mounted

Controls: trickle and boost on ceiling mounted PIR sensor.

Design flow rates: 6 litres/second on trickle, 15 litres/second on boost

Make up air – through door transfer grille

Manufacturer: Nuaire or approved equivalent

Model ref: NA100XP-12

Accessories: wall extension kit and external class A weathered grille, colour to match façade installed in. Anodised aluminium external grille to be installed.

Room: Tea Point

Type: wall mounted

Controls: from wall mounted local speed controller

Design flow rates: 250 litres/second on high speed

Make up air – through external doors

Manufacturer: Nuaire or approved equivalent

Model ref: XS-12-WA

Accessories: wall extension kit and external class A weathered grille, colour to match façade installed in.

The fan shall be of the XS type and shall be supplied complete with integrated low loss radial backdraught shutter, silent operation via a thermo actuator, room side grille, connection kit and external louvre/ roof cowl to suit the particular application.

The high efficiency, low noise axial flow impeller shall be directly driven by an external rotor motor featuring enclosure protection to IP 44, class B winding insulation and maintenance free ball bearings. All models shall be suitable for air over motor temperatures of up to 25°C (occasionally 35°C) and 95% R.H (non-condensing).

The motor and impeller shall be dynamically balanced as an assembly. Fan casing, impeller and shutter shall be manufactured from UV stabilised ABS polymer.

All models shall include an economy/high efficiency setting facility.

The fan shall be provided complete with integrated or remote controls as detailed in the schedule and as described below. Where indicated the fans shall be interlinked and controlled from 1No. controller. Fans shall be reversible via reversing switch on XS-MFC fan controller.

Fans to be wired by the electrical contractor, including speed controllers and PIR sensors.

Hot and Cold Water Services

The hot and cold water pipework distribution is to be as detailed on the Tender Drawings, to suit the proposed toilet layouts, tea points & sanitaryware layouts.

New copper mains water is to be installed, as required, to serve the sanitary items, as detailed by the tender drawings.

A new incoming mains water supply shall be installed dedicated to each unit, entering via a duct under the tea point sink or other local location.

The incoming main shall be complete with stop cock, drain cock, DCWW utility meter, double check valve, strainer, pressure reducing valve and be thermally insulated throughout.

The mains water shall be from a new mains water supply brought onto the site boundary by the water authority, DCWW. Water meters for each unit shall be installed at the entry point to the site underground in meter boxes, with individual underground feed pipes to each unit.

The mains water pipework from the boundary to the units shall be installed by the mechanical contractor using blue MDPE pipework. Pipework to be protecta pipe material if required by SI survey. To be confirmed by main contractor.

The mains pipework externally is to be chlorinated throughout in accordance with this specification.

The hot and cold water pipework internally is to be chlorinated throughout in accordance with this specification, with certificates provided per unit.

New electric instantaneous point of use hot water unvented heaters are to be installed to provide and generate hot water to serve the kitchen sink and the WC wash hand basin.

The instantaneous electric hot water heaters are to be as follows:

Room: WC

Type: wall mounted below wash hand basin
Controls: built in controls to control water outlet temperature
Design flow rates: 2.8 litres/minute @ 40C
Manufacturer: ZIP or approved equivalent
Model ref: In line range ES6
Electrical capacity: 5.5kw
ErP Rating: Class A

Room: Tea Point

Type: wall mounted below sink in base unit
Controls: built in controls to control water outlet temperature
Design flow rates: 2.8 litres/minute @ 40C
Manufacturer: ZIP or approved equivalent
Model ref: In line range CEX-U
Electrical capacity: 8.8kw
ErP Rating: Class A

All new pipework shall be copper table X, and shall be installed in service voids or ducts where possible, surface mounted pipework shall be painted to new colour finish.

All new water services pipework shall be thermally insulated and chlorinated to BS6700 upon completion of the works.

Isolating valves to be installed to all outlets.

Above Ground Drainage

The above ground drainage is to be as detailed on the Tender Drawings, to suit the proposed new toilet areas, tea point and sanitary ware layouts.

A new PVC-C 110mm Soil vent pipe is to be installed to take waste from the WC room to the site foul waste system.

A foul waste floor socket shall be installed to connect to the 50MM waste from the tea point sink.

Waste pipes and traps are to be installed to drain the wash basin, WC, and sink to the underground drainage.

Fire collars are to be installed where pipework penetrates fire walls and compartments.

Auto Controls

New extract fans are to be complete with PIR controllers (WC's) with run on timer, and local on/off speed controller (tea point).

All wiring to controls and power supplies by the electrical contractor to fan and controllers, PIR detectors and wall mounted water heaters.

Water heaters to be c/w built in thermostatic controls.

710.000 GENERAL DESIGN CRITERIA AND STANDARDS

710.010 GENERAL:

This section outlines the general design criteria and definitions applicable to the engineering services forming the contract Works.

710.20 GENERAL DESIGN CRITERIA:

- The criteria listed in the following clauses apply to all work sections included in the contract unless specified otherwise.
- The design of the engineering services is based on the criteria and design data stated in the following clauses
 - Changes or amendments shall be by prior written notice from the PM.

710.030 OUTSIDE CONDITIONS:

External minus 5 deg C dry bulb 100%RH
Summer 30deg C dry bulb 21deg C wet bulb

710.040 INSIDE CONDITIONS:

Various (as detailed in relevant sections) and in-line with CIBSE Guide and subject to the employers agreement.

710.70 PLANT OPERATING CONDITIONS:

- Ensure all plant items are suitable for operation in the environment in which they are to be located.
- Ensure all plant, motors, starters and ancillary equipment etc. are suitable for operation at full capacity under the following conditions
 - Height above sea level not exceeding 1000m.
 - Air cooling at an average temperature over 24 hours not exceeding 35°C dry bulb.
 - Maximum conditions of 40°C dry bulb and 50 per cent relative humidity.
 - Supply voltage approximately sinusoidal

710.080 ELECTRICAL WIRING:

Where systems are specified as being maintained under fire conditions ensure wiring selected is suitable for the temperatures to be encountered.

710.090 ELECTRICAL SUPPLY CHARACTERISTICS:

The characteristics of the electrical supply or supplies:

- Nominal voltage(s) 400/230
- Nature of the current and frequency 50
- Confirm with the Supply Authority before ordering any equipment dependent upon voltage or frequency.
- Ensure all electrical equipment supplied and installed is suitable for the power supply indicated.

710.100 STANDARDS AND REGULATIONS:

- Unless stated otherwise the Works shall comply with the appropriate British Standard (BS) or Code of Practice (CP) and where no BS or CP is applicable comply with
 - The Agreement Certificate for the particular item.
 - CIBSE recommendations and guides to current practice.
 - IEE Regulations and guidance.
- Ensure all equipment and systems are designed and installed in accordance with the relevant standards and that operational compatibility exists between the systems and any other system installed in the same location.
- All product and materials shall have product conformity certification (e.g. BSI Kitemark, BSI Safety Mark or CARES scheme) or product approval (e.g. British Board or Agreement Certificate)
- All products must have the recognised 'CE' mark attached.
- Provide certificates of compliance with British Standards, BSI Certification Schemes, and/or other Quality Assurance Schemes
 - When requested by the PM.
- In the absence of specific design, performance or installation standards being stated seek the instructions of the PM prior to commencement of the Works and with adequate time so as not to cause delay.
- When new editions, versions and amendments are published during the construction, seek the instructions of the PM with respect to any modifications or changes necessary.
- References to BSI documents shall be to the versions and amendments listed in the British Standards Catalogue and in subsequent issues of BSI News up to
 - One month prior to the tender issue date.

710.110 METRIC AND IMPERIAL CONVERSIONS:

- Some dimensions and units in metric have been converted from imperial units and approximated to the nearest practical dimension, i.e. 12" has been converted to 300 mm.
- Metric sizes have been used for both metric and imperial components.
- Where only imperial components are available the imperial size has been converted to the metric equivalent size.
- Due allowance shall be made for metric and imperial conversions.

710.120 ELECTROMAGNETIC COMPATIBILITY:

- Ensure all equipment and systems are installed to provide electromagnetic compatibility within the system and with any other systems installed in the same area.
- Ensure all systems and buildings are assessed for protection to, and that such protection meets the requirements of, BS 6651.
- Ensure all equipment meets the requirements of the appropriate electromagnetic compatibility standard.

710.150 FACILITIES FOR REMOVAL OF EQUIPMENT:

- De-coupling facilities shall be provided for all services connections to equipment and plant and be located adjacent to the equipment such that any removable section, cover or the complete unit can be readily removed or withdrawn without the removal or disturbance to large sections of adjacent services.
- Ensure isolation and drain down of any item of equipment without isolating large sections of the remaining system.

710.160 SOFTWARE:

Obtain on behalf of the end user all appropriate licences, permissions, copyright waivers, rights of use and the like from the owners of the software rights. Ensure that the end user is properly registered with the software supplier for support and appropriate updating. Ensure that application software is written in compliance with BS 7649.

720.000 BUILDERS WORK**720.30 SCOPE OF BUILDER'S WORK:**

- The final extent and responsibility for the builders work shall be agreed between all Domestic Sub-Contractors and the Main Contractor prior to tender. All builders' work associated with the Mechanical and Electrical Services shall be included within the Contract.
- Provide the following as necessary for the complete installation (The list below is not exhaustive and is issued for guidance only.)
- General
 - all supporting steelwork
 - brackets, clamps and fixings
 - concrete plinths for plant
- Pipe, duct and cable sleeves through walls, floors, slabs etc.
 - Supply all sleeves and hand-over
 - Making good around sleeves to provide correct fire barrier shall be by Main Contractor unless agreed otherwise
- Puddle flanges
 - Supply all puddle flanges and hand-over to Main Contractor for fixing
- Pipe and duct penetrations through the building envelope
 - Carry out final weatherproof flashing over pipe or duct angle flange
- Sanitary fittings
 - Undertake water and waste final connections to all sanitary fittings
- Fire dampers
 - Supply fire damper frame
 - Undertake fixing as part of contract works
 - Supply and install fire damper
- Duct and louver connections to walls
 - Supply and installation of timber or angle iron frame and making good
 - Included in the contract works
 - Supply and install all louvres
- External louvres.
 - Agree fixing details with all parties prior to ordering louvres
 - Supply and fix louvres
- Concrete bases and plinths
 - Provide all necessary dimensions and details for work by Main Contractor.
- Secondary steelwork for support
 - Provide suitable secondary steelwork and undertake permanent fixing for the support of engineering services
- Ceiling grilles and diffusers
 - Undertake final connection of diffuser or grille to ductwork spigot and fix to structure

- Wall or floor grilles or diffusers
 - Preparation of holes or slots, fixing of timber frames and making good around frames for grilles or diffusers
 - Included in the contract works
- Roof or wall fixed fans
 - Undertake final fixing of fans
- Anti-vibration mountings
 - Install Anti-vibration mountings

720.40 MARKING OUT OF BUILDER'S WORK HOLES ON SITE:

- If approved by the PM, mark on site actual locations of minor non-structural holes through walls, partitions, floors etc and also chases in non fair-faced walls, etc for conduits, pipes and the like in preference to providing drawings of such builder's work requirements. The PM is to be given the opportunity to inspect prior to work being carried out.

720.60 STRUCTURAL STEELWORK:

- No steelwork shall be cut, drilled or welded without written approval from the PM.
- Fixings to steelwork shall be
 - the approved clamp type
- All fixings shall be of the correct size and type for the fixing load applied and the type shall be approved prior to commencement of the works.

740.000 COMMISSIONING AND TESTING

740.010 DEFINITIONS:

Where used in the documentation the following definitions shall apply and shall be interpreted as such:

- Commissioning: The advancement of an installation from the stage of static completion to working order to the specified requirements
- Testing: The measurement and recording of specified quantifiable characteristics of an installation or parts thereof and includes off site testing.
- Setting to work: The process of setting a static system in motion
- Regulation: The process of adjusting the rates of fluid flow in a distribution system to achieve specified values
- Environmental testing: The measurement and recording of internal environmental conditions
- System proving: the measuring, recording, evaluating and reporting on the seasonal performance of the systems against their design values
- System demonstration: Demonstrating the capability of the installation to achieve and maintain the specified performance criteria
- Fine-tuning: The adjustment of the system where usage and system proving has shown such a need and includes the re-assessment of design values and control set points to achieve the required system performance.

740.020 PROGRAMME:

Prepare comprehensive programmes for the pre-commissioning checks, setting to work, testing, commissioning, system proving and environmental testing of the contract works.

Timescale:

- Within 2 weeks of contract appointment. Review and update the commissioning programme at agreed intervals and if necessary revise and amend the programme to suit the progress of the contract works.
- Due account shall be taken of any phasing requirements.

740.30 COMMISSIONING SPECIALIST:

- Employ an independent company who specialises in testing and commissioning of building services to undertake the following:
 - All commissioning and testing activities associated with the contract works
- The commissioning specialist shall be a member of The Commissioning Specialists Association (CSA).

740.40 COMMISSIONING AND TESTING:

When the contract works or parts thereof are ready for testing and commissioning notify the PM in writing. All necessary facilities shall be provided to enable tests to be witnessed and inspections carried out including all necessary instruments and recorders to monitor systems during commissioning system proving and environmental testing. Provide information where access is required into ceiling voids, service risers etc and ensure these points are not closed up until the commissioning and testing is complete.

Commissioning must be carried out as legislation and manufacturer's recommendations including BS 5655 and test results and certificates provided to PM. PM and HMCTS prior to handover must be introduced to the systems and the appropriate training provided on any new component or installation. This training must include a detailed description of the system's method of operation including control, repair and recommended maintenance philosophy.

Where commissioning, testing, balancing, adjustment, is undertaken in an area of the building taken over and occupied by the Employer, then take all necessary precautions against and be responsible for any damage caused whilst working in such areas for that purpose. Prior to witnessing and inspection by the PM the contract works shall be fully tested, commissioned and be fully operational. Where portions of the work are required to be commissioned and tested separately, then upon final completion, demonstrate to the PM that all the several portions are capable of proper simultaneous operation in accordance with the requirements of the specification.

If testing demonstrates that the plant and equipment is not properly installed and/or not functioning correctly carry out such remedial measures and adjustments as may be necessary and repeat the commissioning and testing procedure to the satisfaction of the PM. Complete all tests before any paint, cladding or similar materials are applied or before services are concealed. Ensure all requirements such as cleanliness, protection from harmful external and internal elements are provided prior to commencement of commissioning.

Undertake to:

- Commission, test, regulate and set to work the installations that form the contract works.
- Prepare comprehensive programmes, commissioning plans, schedules and method statements and procedures supported by risk assessments for the pre-commissioning checks, setting to work, commissioning, system proving and environmental testing of the contract works.
- Comply with the requirements of the Building Regulations (Approved Document Part L2) for the inspection and commissioning of the building services systems. Prepare all necessary submittals including commissioning plans and reports. Obtain all compliance approvals from the building control bodies.
- Provide all specialist personnel including manufacturer's representatives and coordinate their activities, together with providing any attendance required.
- Prior to commencement of the works submit to the PM for approval sample pro-forma for the various commissioning record and certification documentation.
- Provide reports detailing progress of testing and commissioning activities at intervals agreed with PM.
- Maintain a diary/log of significant commissioning and testing activities.
- Measure and reconcile noise levels at agreed locations to verify compliance with design criteria.
- Submit to the PM all certification documents prior to any system being offered for final acceptance
- Confirm in writing to the PM that each installation has been correctly tested and commissioned and

that the performance requirements can be achieved.

- Ensure all certification is attained and witnessed as necessary for inclusion in the record documentation.
- Submit a report for every test, demonstration, balance or commissioning activity witnessed, together with an engineering appraisal on the performance, either on or off-site.
- Co-ordinate and liaise with the Employer's representative.

Maintain on site full records of all testing, commissioning and performance testing.

The extent and proportion of results to be witnessed by the PM will be at the discretion of the PM.

- The PM will
 - Examine subsequent to setting to work and regulation of the contract works the results of the commissioning and the documentary records thereof.
 - Only witness test proceedings to establish a level of confidence in the commissioning results being presented.
 - confirm recorded results
 - Determine if the specified requirements have been satisfied.

740.50 STATIC TESTING:

Progressive static testing shall include the following tests, but other tests may be required and witnessed:

- Insulation resistance
- Earth fault loop impedance
- Earth continuity
- Pressure testing of hydraulic systems
- Air leakage testing of ductwork systems

The PM shall be given the opportunity to witness all static tests.

Advance notice of the tests shall be given to the PM.

Timescale - 7 working days prior to test.

740.60 PRE-COMMISSIONING CHECKS:

Ensure all pre-commissioning examinations and tests have been undertaken and that each system, including components, or item of equipment is complete and in a safe condition prior to start-up. All necessary notices shall be displayed.

740.70 FUEL FOR TESTING:

Fuel for testing and operating the contract works shall be

- as detailed in main preliminaries

740.80 SYSTEM DEMONSTRATION:

- Subsequent to the completion of all testing and commissioning to the satisfaction of the PM and when directed operate the plant and demonstrate that the overall systems function correctly in accordance with the requirements of the specification.
- Fully run and operate the following systems to demonstrate correct function in accordance with the requirements of the specification:
 - all services
- The period of operation shall be:
 - 2 weeks
 - Allowed in the programme.
- During this period be responsible for the recording of results and the operation and maintenance of the plant.
- Provide the following:

- An operational report of the demonstration
- Schedule of the conditions maintained within the space(s) for a period of 2 weeks

740.90 PLANT AND EQUIPMENT PERFORMANCE TESTING:

Where stated elsewhere plant and equipment shall be tested at the works of the manufacturer or in a recognised and approved testing facility to demonstrate the performance complies with the stated and specified duties.

These tests shall be in addition to works tests as stated elsewhere.

Performance testing shall demonstrate but not limited to the following:

- Full, partial and minimum load
- Response to load change
- Efficiency
- Noise levels

The tests shall be conducted to simulate design conditions and all ancillary plant and equipment needed to support the tests together with all instrumentation shall be provided and included in the contract cost.

Upon successful completion of the performance tests the plant and equipment shall be thoroughly cleaned and returned to its new condition and correctly packaged for delivery to site.

Test certificate records of the tests shall be issued to the PM as stated elsewhere.

740.100 INSPECTIONS AND TESTS:

Submit schedules indicating those parts of the contract works for which inspections and tests are required to substantiate conformity with the specification. Should any alternative item be proposed that does not carry appropriate certification, ensure independent testing is carried out at no expense to the contract works to confirm compliance. Provide method statements supported by risk assessments detailing the procedures for carrying out on site tests.

Agree in advance with all parties procedures for inspections and tests including periods of notice. Where a test indicates non-compliance with the specification submit immediately details of the non-compliance and details for corrective action. Maintain records of all specified inspections and tests performed including third party and works testing. Maintain all records on site for inspection.

740.110 TEST CERTIFICATES AND RECORDS:

Ensure that test certificates include:

- project title
- details and date of test
- instruments used, serial numbers, calibration dates
- signature of those witnessing test
- installers name
- specific location of the item in the contract works

The number of copies of each test certificate to be issued to the PM

- 3 nr. as detailed in section 810.000

Time scale

- within 7 working days of the test as detailed in section 810.000

740.140 ROTATING EQUIPMENT:

Immediately prior to practical completion adjust, ease and lubricate moving parts as necessary to ensure easy and efficient operation. Ensure that temporary electrical supplies are provided to enable rotating plant items delivered and/or installed to be run at regular intervals to avoid damage or deterioration. If temporary electrical supplies are not available ensure that rotating plant is hand-turned.

800.000 DRAWING DEFINITIONS

800.010 GENERAL:

800.160 AS-INSTALLED DRAWINGS:

Drawings/records retained on site to record the progress of and any site modifications to the Works including any changes to software.

800.170 PLANTROOM SCHEDULES AND SCHEMATICS:

Contractor to issue 1 week prior to practical completion a package of Plantroom schedules and schematics in the following numbers and format:

- 'White' prints - 3 Number of sets of complete record drawings.

Provide good quality plant and switch room drawings, schedules, schematics and instructions and hang in the respective plant room or any other appropriate location or where directed by the PM. Protect surfaces of such information by framing under glass or other rigid, transparent, cleanable and protective surface. Hang using suitable fixings and provide backboards if necessary. A sample shall be submitted for approval to the PM prior to commencing production.

- Schematic drawings of circuit layouts showing:
 - Location, identification and duties of equipment
 - Location of controls devices
 - Circuit layout
- Valve schedules in the form of printed sheets showing the number, type, location, application/service and symbol, and normal operating position of each valve.
- Control schematics.
- Location of mechanical and electrical plant and equipment items.
- First aid instructions for treatment of persons after electric shock.
- Location of isolating switch for electricity supply.
- Location of main incoming gas valve serving gas meter and isolation point.
- Location of main incoming water main and isolation point.
- Location of sprinkler fire main control valve.
- Emergency operating procedures and telephone numbers for emergency call out service applicable to any system or item of plant and equipment.
- All other items required under Statutory or other regulations.

810.000 RECORD DOCUMENTATION

810.010 STANDARDS:

Provide operating and maintenance manuals, system records and full documentation in accordance with the following standards

- BS 4737 - Intruder alarm systems.
- BS 5839 - Fire detection and alarms in buildings.
- BS 6651 - Protection of structures against lightning.
- BS 7671 - Requirements for electrical installations. (IEE Wiring regulations) including lighting installation, small power installation, public address system, sub main installation and all other electrical services installation.
- BS EN 12170 - Heating Systems with a trained operator
- BS EN 12171 - Heating Systems not requiring a trained operator

BSRIA Document Technical Note TN15/95 "Handover Information for Building Services".

BSRIA Document Application Guide 1/87.1 "Operating and Maintenance Manuals for Building Services Installations".

Produce documents to "Class D" standard.

- Comply with the requirements of the CDM Regulations in providing the appropriate input to the health and safety file for the contract works.

Provide detailed wiring drawings/diagrams/schedules for all systems, including controls, showing origin, route, cable/conduit size, type, number of conductors, length, termination size and identification, and measured conductor and earth continuity resistance of each circuit. Ensure routes indicate if cable/conduit is surface mounted, concealed in wall chase, in floor screed, cast in-situ, above false ceiling etc. Each distribution board shall be complete with an internal circuit chart clearly detailing the circuit numbers, cable size, area served and the respective circuit breaker rating. The charts shall be type written, glued to stiff cardboard covered with clear Perspex and fixed to the inside face of the door. All items of distribution equipment shall be fitted with external labels made from rectangular pieces of laminated plastic having white letters on a black background with bevelled edges and fixed by means of 3mm chrome screws, nuts and washers. Letters shall be not less than 6mm high with larger letters off the main switchboard. Each label shall detail the service of equipment controlled, voltage, phasing and frequency when different from normal mains supply and identification markings as detailed on the as built drawings.

810.020 RECORD DOCUMENTS:

Provide:

- Record drawings and schedules.
- Plant room and switch room drawings, schedules and schematics.
- Operating and maintenance manuals.
- Blank maintenance logs.
- Log books
 - in compliance with the Building Regulations (Approved Document Part L2)
 - in accordance with CIBSE Technical Memorandum TM 31.
- Ensure record documents clearly record the arrangements of the various sections of the Works as actually installed and identify and locate all component parts.
- Ensure record documents make it possible to comprehend the extent and purpose of the Works and the method of operation thereof.
- Ensure record documents set out the extent to which maintenance and servicing is required and how, in detail, it should be executed.
- Ensure record documents provide sufficient, readily accessible and proper information to enable spares and replacements to be ordered.
- Correlate record documents so that the terminology and the references used are consistent with those used in the physical identification of the component parts of the installations.
- Demonstrate as required throughout the execution of the contract works that complete and accurate records are being maintained and that the record documents are being progressively compiled as the work on site proceeds.
- Ensure that building log books contain all the information necessary to comply with the Building Regulations Part L2, Conservation of Fuel and Power 2000.

810.30 RECORD DRAWINGS AND SCHEDULES:

- Prepare record drawings and schedules based on the As Installed Drawings maintained on site during the progress of the contract works.
 - The scale of the drawings shall be not less than 1:50.
- Each record drawing shall show the following information:
 - The name of the contract and, where appropriate, the zone or floor designation.

- Description of drawing, drawing reference and scale.
- Name and address of the installer and the consultant.
- Endorse all such documents
 - As Installed
- Where agreed with the PM certain detailed information may be provided in schedule form.
- Where portions of the work are to be concealed, draft copies of record drawings shall be supplied to the PM before the work is concealed in order to facilitate checking and examination.
- Prepare electrical drawings in accordance with BS EN 61082.
- Issue at practical completion the complete approved package of record drawings in the following numbers and format:
 - CAD format on CD disk. Each CD shall be labelled and the CD jewel cases shall be labelled identifying project title, issue date and index of contents.
 - 3 Number of sets of complete record drawings as 'White' prints.
- Provide reduced scale copies for inclusion in the operating and maintenance manuals as stated elsewhere.

Record drawings and schedules must include, but are not limited to:

- Location, including level if buried, of utility service connections, including those provided by the appropriate Authority, indicating points of origin and termination, size and material of service, emergency shut-off isolation locations, pressure and/or other relevant information.
- Disposition and depth of all underground systems.
- Schematic drawings of each system indicating principal items of plant, equipment, zoning, means of isolation, etc. in sufficient detail to make it possible to comprehend the system operation and the inter-connections between various systems.
- Details of the principles of application of automatic controls and instrumentation.
- Diagrammatic dimensioned plans and sections of each system or service showing sizes and locations of all ancillaries, plant, equipment controls, test points, and means of isolation etc. including any items forming an integral part of the engineering systems provided by others (such as plenum ceilings, builders' work shafts, chimneys etc.).
- Identification of all terminals/cables etc. by size/type and duty/rating as recorded from the approved commissioning results.
- Detailed wiring drawings/diagrams/schedules for all systems, including controls, showing origin, route, cable/conduit size, type, number of conductors, length, termination size and identification, and measured conductor and earth continuity resistance of each circuit. Ensure routes indicate if cable/conduit is surface mounted, concealed in wall chase, in floor screed, cast in-situ, above false ceiling etc.
- Details of co-ordination of wiring and connections with cable core identification, notation of fire alarm, security, control and instrumentation and similar systems provided as part of the Works.
- Details to show inter-connections between the Works and equipment or systems provided by others to which wiring and connections are carried out as part of the Works.
- Location and identity of each room or space housing plant, machinery or apparatus.
- Dimensioned plans and sections of plantrooms, service subways, trenches, ducts and other congested areas where in the opinion of the PM smaller scale drawings cannot provide an adequate record. Indicate the location, identity, size and details of each piece of apparatus.
 - The scale of drawings to be 1:20
- Manufacturer's drawings of equipment indicating
 - General arrangement and assembly of component parts which may require servicing.
 - Internal wiring diagrams together with sufficient physical arrangement details to locate and identify component parts.
- Schedules as required to locate reference and provide details of ratings and duty of all items incorporated into the Works together with all fixed and variable equipment settings established during commissioning.
- For each programmable control item
 - schedules indicating for each input and output point connected
 - full data in respect of that point including reference
 - type of input/output
 - connected equipment reference

- set values of temperature or pressure etc
- set values of start/stop/speed change times etc
- alarm priority
- control specification reference
- any other such applicable parameters
- Each spare input and output point including reference, type of input/output and space for future entry of appropriate parameters as listed above.
- Logic flow diagrams for each individual control or monitoring specification and for each building services engineering system to illustrate the logical basis of the software design.
- Schedules setting out details of all initial values of user-defined variables, text statements for alarm messages etc.

810.040 PLANT ROOM AND SWITCH ROOM DRAWINGS, SCHEDULES AND SCHEMATICS:

Provide good quality plant and switch room drawings, schedules, schematics and instructions and hang in the respective plant room or any other appropriate location or where directed by the PM.

- Protect surfaces of such information by
 - Framing under glass or other rigid, transparent, cleanable and protective surface
- Hang using suitable fixings and provide backboards if necessary
- A sample shall be submitted for approval to the PM prior to commencing production.
- Schematic drawings of circuit layouts showing:
 - Location, identification and duties of equipment
 - Location of controls devices
 - Circuit layout
- Valve schedules in the form of printed sheets showing the number, type, location, application/service and symbol, and normal operating position of each valve.
- Control schematics.
- Location of mechanical and electrical plant and equipment items.
- First aid instructions for treatment of persons after electric shock.
- Location of isolating switch for electricity supply.
- Location of main incoming gas valve serving gas meter and isolation point.
- Location of main incoming water main and isolation point.
- Location of sprinkler fire main control valve.
- Emergency operating procedures and telephone numbers for emergency call out service applicable to any system or item of plant and equipment.
- Location of metering facilities.
- All other items required under Statutory or other regulations.
- Prepare electrical drawings in accordance with BS EN 61082.

810.50 OPERATING AND MAINTENANCE MANUAL SPECIALIST:

- Employ a specialist to prepare the operating and maintenance manuals.

810.60 PRESENTATION OF THE OPERATING AND MAINTENANCE MANUALS:

- Agree format and contents with the PM.
- Provide the operating and maintenance manuals in the following form:
 - Encase the manuals in A4 size, plastic-covered, loose leaf, four ring binders with hard covers, each indexed, divided and appropriately cover- titled. Fold drawings larger than A4 and include in the binder so that they may be unfolded without being detached from the rings.
- Provide copies of the operating and maintenance manual as follows:
 - Draft copies for comment 1nr
 - Final copies for Client use 3nr in white copy and one copy CD format.
- Provide a draft copy of the operating and maintenance manual to the PM for comment

Timescale:

- 2 weeks before the contract completion date.
- The draft copy of the manual shall conform to the final format required by the specification to enable all relevant comments to be made by the PM.

810.070 OPERATING AND MAINTENANCE MANUALS:

The operating and maintenance manuals must include:

- A full description of each of the systems installed, written to ensure that the Employer's staff fully understand the scope and facilities provided.
- A description of the mode of operation of all systems including services capacity and restrictions.
- Diagrammatic drawings of each system indicating principal items of plant, equipment, valves etc.
- A photo-reduction of all record drawings together with an index. Reduced size of drawings to be A3
- Legend of all colour-coded services.
- Schedules (system by system) of plant, equipment, valves, etc., stating their locations, duties and performance figures. Each item must have a unique number cross-referenced to the record and diagrammatic drawings and schedules.
- The name, address and telephone number of the manufacturer of every item of plant and equipment together with catalogue list numbers.
- Manufacturer's technical literature for all items of plant and equipment, assembled specifically for the project, excluding irrelevant matter and including detailed drawings, electrical circuit details and operating and maintenance instructions.
- A copy of all test certificates, inspection and test Records, commissioning and performance test records including, but not limited to, electrical circuit tests, corrosion tests, type tests, start and commissioning tests, for the installations and plant, equipment, valves, etc., used in the installations.
- A copy of all manufacturer's guarantees or warranties, together with maintenance agreements offered by subcontractors and manufacturers.
- Copies of insurance and inspecting Authority certificates and reports.
- Starting up, operating and shutting down instructions for all equipment and systems installed.
- Control sequences for all systems installed.
- Schedules of all fixed and variable equipment settings established during commissioning.
- Procedures for seasonal change-overs and/or precautions necessary for the care of apparatus subject to seasonal disuse.
- Detailed recommendations for the preventative maintenance frequency and procedures which should be adopted by the Employer to ensure the most efficient operation of the systems.
- Details of lubrication for lubricated items including schedules of lubricant type, frequency, etc.
- Details of regular tests to be carried out (e.g. water analysis for pseudonomas.)
- Details of procedures to maintain plant in safe working conditions.
- Details of the disposal requirements for all items in the works.
- A list of normal consumable items.
- A list of recommended spares to be kept in stock by the Employer, being those items subject to wear or deterioration and which may involve the Employer in extended deliveries when replacements are required at some future date.
- A list of any special tools needed for maintenance cross-referenced to the particular item for which required.
- Procedures for fault finding.
- Emergency procedures, including telephone numbers for emergency services.
- Hospital Operational Policy.
- Back-up copies of any system software.
- Documentation of the procedures for updating and/or modifying software operating systems and control programmes.
- Instructions for the creation of control procedure routines and graphic diagrams.
- Details of the software revision for all programs provided.
- Two back-up copies of all software items, as commissioned.
- Copies of relevant HSE/CIBSE/IEE Guidance notes etc.

- Contractual and legal information including but not limited to
 - details of local and public authority consents
 - details of design team, consultants, installation contractors and associated subcontractors
 - start date for installation, date of practical completion and expiry date for the defects liability period
 - details of warranties for plant and systems including expiry dates, addresses and telephone numbers.

810.80 PROVISION OF INFORMATION:

- Co-operate with the specialist firm in the compilation of the manuals and provide them with copies of the following:
 - Diagrammatic drawings of each system indicating principal items of plant, equipment, valves etc.
 - Record drawings, together with an index.
 - Plant room and switch room drawings, schedules and schematics, together with an index.
 - Legend for all colour-coded services.
 - Schedules (system by system) of plant, equipment, valves etc, stating their locations within the building, duties and performance figures.
 - All Test Certificates, Inspection and Test Records, Commissioning and Performance Test Records (including, but not limited to, electrical circuit tests, corrosion tests, type tests, start and commissioning tests) for the installations and plant, equipment, valves, etc., used in the installations.
 - All manufacturer's guarantees or warranties.
 - Copies of insurance and inspecting Authority certificates and reports.
 - Schedules of all fixed and variable equipment settings established during commissioning.
 - Back-up copies of any system software.
 - Two back-up copies of all software items, as commissioned.

900.000 COMPLETION AND HANDOVER

900.010 GENERAL:

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

900.020 HANDOVER REQUIREMENTS:

An official handover is to be organised by the contractor for SCO, PM, HMCTS and maintenance term contractor. Provide 2 set of as fitted drawings plus two electronic copy of each element of the above works as ordered including full as fitted schematic drawings AutoCAD + PDF wiring diagrams, description of scope, purpose and operation component of any installation, spare list with names and addresses of suppliers, record of test certificates, fire certificates, site waste management plan and maintenance manuals. One set to form part of a log book on site with 1 further set plus 2 electronic copies handed to the PM within 2 weeks of practical completion on site.

During the 12 months warranty period the installer must provide a full support service of a 3 hour response from receipt of call to site time for breakdown.

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

- All the contract works are complete.
 - With the exception of minor snags or limited defects as agreed with the PM that could be reasonably completed within an agreed programme without causing disruption to the

Employer's use of the building or part thereof.

- All spares, keys, tools and other consumables as stated elsewhere have been supplied and handed over to the Employer.
- The instruction of the Employer's staff in the use and correct operation of the installation has been completed satisfactorily. In particular, safety devices and controls demonstration.
- All commissioning and testing completed
 - including the issue of a final commissioning report signed by an approved competent person
- A complete demonstration of the contract works with fully functional operational controls tested has been undertaken in the presence and to the satisfaction of the PM.
- All necessary certification by the Employer's insurers has been completed.
- All approved record documentation including record drawings, operation and maintenance manuals, etc is issued
- All information required for the health and safety file is issued to the satisfaction of the Planning Supervisor.
- All necessary Statutory Authority approvals have been undertaken and written confirmation established
- Completion and issue of log books in accordance with Building Regulations.
 - in accordance with CIBSE TM 31 Building Log Book Toolkit (standard templates)
- Should adequate record documentation not be available Practical Completion will not be granted.

900.030 READING OF METERS:

Record readings of all water, gas, and electricity meters immediately on completion of the Works and forward to the PM.

900.040 RECOMMENDED SPARE PARTS:

Before Practical Completion submit to the PM a schedule of spare parts as stated elsewhere and recommend any that should be obtained and kept in stock by the Employer for maintenance of the installations included in the Works.

Time scale

- 2 weeks before

State against each item the manufacturer's current price, including packaging and delivery to site. Identify those items that are additional to those specified for inclusion as stated elsewhere.

900.090 TRAINING OF EMPLOYER'S STAFF:

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

- To the Employer's maintenance staff.
- Or to the operational staff.

Training

Include for the training of 4 personnel for:-

2 hours for Mechanical Services.

0.5 day for Electrical Services.

Practical completion shall only be deemed acceptable on completion of the requirements detailed in the HMCTS design brief for building hand over.

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

Time scale

- 2 Weeks before commencement of training.
- All costs associated with the instruction of the Employer's personnel and required attendance following practical completion shall be included in the contract price.
- Following practical completion and occupation be available for a period as agreed with the PM to

assist the Employer's personnel in the operation of the various systems together with the

- controls specialist
- commissioning specialist

Training

- Number of persons to be included for training is 4 – as detailed above
- Provide training for the operation of the controls, monitoring or BMS installations as follows.
 - Carry out initial training at the works of the controls supplier.
 - Include hands on experience of equipment and software similar to the installation.
 - Include instruction on the procedures for testing and routine inspection of sensors and actuators to enable the operator to assess the nature of faults and extent of remedial action required.
 - Provide all appropriate reference and training manuals.
 - Provide site instruction on the installed system.
 - Include for training 4 operating staff - as detailed above
 - Include for not less than indicated number of operating days for this purpose and demonstrate the safe day to day running and maintenance of all systems, plant and equipment. – as detailed above

910.000 MAINTENANCE

OBLIGATIONS DURING DEFECTS LIABILITY PERIOD:

Prepare and submit records of failures or malfunctions of any part of the Contract Works during the Defects Liability Period, together with details of remedial action taken, subsequent re-testing and the results. Notify the PM of damage, failures or malfunctions to the Contract Works demonstrably caused by incorrect operation of the installations, vandalism or other actions by a third party. Inform the PM in writing when all defects are finally rectified so that an inspection may be carried out prior to the issue of a Final Certificate.

Allow for 12 Months parts and labour warranty on the complete installation from date of practical completion. Prepare and submit records of failures or malfunctions of any part of the Contract Works during the Defects Liability Period, together with details of remedial action taken, subsequent re-testing and the results.

Notify the PM of damage, failures or malfunctions to the Contract Works demonstrably caused by incorrect operation of the installations, vandalism or other actions by a third party. Inform the PM in writing when all defects are finally rectified so that an inspection may be carried out prior to the issue of a Final Certificate.

GENERAL MAINTENANCE

Daily and weekly checking and testing of the systems, including periodic testing of the Fire Alarm and Emergency lighting systems will be undertaken by the Employer.

EMERGENCY ATTENDANCE TO FAULTS (DURING 12 MTHS DEFECTS PERIOD)

The contractor shall attend to faults within the following time periods depending on the severity of the fault:

Emergency Call Out to attend to major water leaks causing damage to the structure or resulting in total loss of water supply or gas leaks - Within 3 hours of reported fault.

Emergency Call Out to attend to major electricity failure causing loss of lighting and power to the building or large areas of the building - Within 3 hours of reported fault.

Emergency Call Out to attend to failure of the fire alarm system or panic alarm system -
Within 3 hours of reported fault.

General Fault Conditions such as local circuit failure, minor leaks and similar non critical items
- Within 48 hours of reported fault.

The Building Occupier, Employer or Managing Agent will notify the Contractor by telephone, fax or email of reported faults. The contractor must advise the Building Occupier of all 24 hour telephone numbers for Emergency Assistance. All faults must be logged by the Building Occupier and Contractor with details of fault, action taken to report fault, contractors response to repair fault, and fault cleared or problems still occurring. If the contractor fails to complete repair work within the specified period the employer reserves the right to have the works undertaken by a third party and any costs incurred will be deducted from the final account

R11 FOUL DRAINAGE ABOVE GROUND

PART 1 SYSTEM OBJECTIVES

1010 PERFORMANCE OBJECTIVES

Provide an above ground waste disposal system to remove domestic waste water from WC's, wash hand basins, sinks as detailed by the tender drawings.

1020 DESIGN PARAMETERS

Refer to BS EN 12056-2 - Gravity drainage systems inside buildings. Sanitary pipework, layout and calculation, for the design of sanitary pipework.

Refer to Building Regulations, Approved Document H Drainage and Waste disposal, as well as the Local Authority.

1030 SYSTEM DESCRIPTION

The above ground drainage is to be as detailed on the Tender Drawings, to suit the proposed new toilet areas, tea point and sanitary ware layouts.

A new PVC-C 110mm Soil vent pipe is to be installed to take waste from the WC room to the site foul waste system. SVP Pipework to terminate to atmosphere through roof.

A foul waste floor socket shall be installed to connect to the 50MM waste from the tea point sink.

Waste pipes and traps are to be installed to drain the wash basin, WC, and sink to the underground drainage.

Fire collars are to be installed where pipework penetrates fire walls and compartments.

Provide anti-syphon traps or venting pipes where necessary to protect traps on appliances from loss of water/seal.

Falls on soil waste and vent pipes shall not fall below the minimum stated in BS EN 12056-2 Gravity drainage systems inside buildings.

Sanitary pipework, layout and calculations shall be undertaken in compliance with BS EN 12056-2 utilizing demand units and frequency factors appropriate to this particular project.

Anti-syphon pipework and vent pipes must be installed in such a manner as to not create a trap.

Access must be provided at all changes of direction and above the connection point to the below ground drainage.

Generally, main soil/waste vent pipes at the head of drainage runs shall rise to roof level and terminate with a vent cowl before discharge to atmosphere.

1040 CONTROL REQUIREMENTS

The systems shall be designed so as to minimise pressure variations in the system which could cause a loss of water seal.

1050 SYSTEM SCHEMATICS

To be prepared by Contractor as part of the design process

1060 SYSTEM DRAWINGS

To be prepared by Contractor as part of the design process

PART 2 SELECTION SCHEDULES FOR REFERENCE SPECIFICATIONS**2100 PIPELINES****2105 PLASTICS PIPES AND FITTINGS:**

- Application all above ground waste systems
- Manufacturer Marley, Key Terrain
- Or approved equivalent
 - Fluid conveyed Domestic Waste Water
- Working pressure nominal 25mm wg
- Working temperature up to 95 deg C but generally at or below 55 deg C
 - Jointing materials
- Large diameter pipework shall be light grey PVC-u complying with BS 4514:1983 with solvent welded joints generally and push fit ring seal where necessary to accommodate expansion, thermal movement or to assist in ease of removal and replacement for maintenance and inspection. Ring seal joints shall be avoided wherever possible on pipes located directly above high profile areas (i.e. Reception, Dining, Foyer etc
- Small diameter pipework shall generally be black muPVC complying with BS5255:1989 with solvent welded joints. Accommodate expansion, contraction, facilities for removal and replacement utilising seal ring joints although these shall be limited to where only absolutely necessary.)

PART 3 SPECIFICATION CLAUSES SPECIFIC TO R11**3000 PRODUCTS/MATERIALS****3030 TRAPS:**

- Application to maintain an effective water seal during operation
- Manufacturer and reference Marley, Key Terrain
- Or approved equivalent.
 - Appliance
- W.C. pan P or S trap
- Urinal 40mm bottle
- Sink 40mm deep seal
- Wash basin 32mm bottle
- Wash fountain or trough 32mm bottle
- Bath 40mm tubular trap
- Shower unit 40mm
 - Standard
- Plastic to BS EN 274-1, BS EN 274-2, BS EN 274-3.
 - Characteristics
- Finish and colour white

3150 SINGLE STACK PLUMBING:

- Application for internal waste systems
- Manufacturer and reference Marley, Key Terrain

- Or approved equivalent.

Ensure that there is a change of gradient at stack connections. Use swept branches on small diameter pipes. Use swept inlet or 45 degree branch connections for pipe 75 mm diameters or over.

- Details Contractor Design

3100 WORKMANSHIP

3110 PERFORMANCE CRITERIA:

Install pipework fittings and accessories to ensure that:

- appliances drain quickly, quietly and completely at all times without nuisance or risk to health.
- discharge is conveyed without crossflow, backfall, leakage or blockage.
- air from drainage system does not enter building.
- pressure fluctuations in pipework do not vary by more than plus or minus 38mm water gauge and traps retain a water seal of not less than 25mm.
- system can be adequately tested, cleaned and maintained.

3120 ROUTES:

Ensure pipe routes are shortest practicable, with as few bends as possible and no bends in wet portion of soil stacks, unless indicated otherwise on drawings.

3130 COATED PIPES:

Make good damaged coatings and cut ends, or recoat, as recommended by manufacturer.

3140 INSTALLATION GENERALLY:

Install pipes, fittings and accessories in accordance with BS 8000-13, BS EN 12056-2 and manufacturer's recommendations.

- Obtain all components for each type of pipework from the same manufacturer, unless otherwise indicated.

Inspect components carefully before fixing and reject any which are defective.

Ensure cut ends of pipes to be clean and square with burrs removed.

Allow for thermal and building movement when jointing and fixing.

Form junctions using fittings intended for the purpose, ensuring that jointing material does not project into bore of pipes, fittings and appliances.

Avoid contact between dissimilar metals and other materials which would result in electrolytic corrosion.

Provide access covers and cleaning eyes as necessary in convenient locations, to permit adequate testing and cleaning of pipework.

Prevent entry of foreign matter into any part of system by sealing openings during construction. Fit all access covers and cleaning eyes as work proceeds.

3150 CONNECTIONS BETWEEN PIPES OF DIFFERENT MATERIALS:

- Plastic
- Connect plastics pipework to pipework of other materials using approved connectors and methods in accordance with plastics pipework manufacturer's recommendations, to form a watertight joint.

3170 WASTES:

Bed in waterproof jointing compound and fix with resilient washer between appliance and backnut.

31 80 WASTE CONNECTORS:

Join to traps as manufacturer's recommendations.

3190 WC PANS:

- Plastic
- Connect all soil pipe spigots with plastic connectors in accordance with manufacturer's recommendations.

3110 TRAP TEST REQUIREMENTS:

Ensure there is retention of 25mm water seal in every trap, and that no air is blown through the trap seal when performance is tested.

3111 ACCESS POINTS:

Provide rodding and access points at all changes of direction to enable whole system to be maintained.

Provide square door type access points as indicated on drawings at foot of all soil and ventilation pipes. Where practicable, locate access points and horizontal anti-syphon pipes above fitment flood level.

In general make WC connections to drain points and soil pipes via flexible connectors.

S12 HOT AND COLD WATER

100.000 SYSTEM DETAILS:

100.010 SYSTEM DESCRIPTION:

The hot and cold water pipework distribution is to be as detailed on the Tender Drawings, to suit the proposed toilet layouts, tea points & sanitaryware layouts.

New copper mains water is to be installed, as required, to serve the sanitary items, as detailed by the tender drawings.

A new incoming mains water supply shall be installed dedicated to each unit, entering via a duct under the tea point sink or other local location.

The incoming main shall be complete with stop cock, drain cock, DCWW utility meter, double check valve, strainer, pressure reducing valve and be thermally insulated throughout.

The mains water shall be from a new mains water supply brought onto the site boundary by the water authority, DCWW. Water meters for each unit shall be installed at the entry point to the site underground in meter boxes, with individual underground feed pipes to each unit.

The mains water pipework from the boundary to the units shall be installed by the mechanical contractor using blue MDPE pipework. Pipework to be protecta pipe material if required by SI survey.

The mains pipework externally is to be chlorinated throughout in accordance with this specification.

The hot and cold water pipework internally is to be chlorinated throughout in accordance with this specification, with certificates provided per unit.

New electric instantaneous point of use hot water unvented heaters are to be installed to provide and generate hot water to serve the kitchen sink and the WC wash hand basin.

The instantaneous electric hot water heaters are to be as follows:

Room: WC

Type: wall mounted below wash hand basin
Controls: built in controls to control water outlet temperature
Design flow rates: 2.8 litres/minute @ 40C
Manufacturer: ZIP or approved equivalent
Model ref: In line range ES6
Electrical capacity: 5.5kw
ErP Rating: Class A

Room: Tea Point

Type: wall mounted below sink in base unit
Controls: built in controls to control water outlet temperature
Design flow rates: 2.8 litres/minute @ 40C
Manufacturer: ZIP or approved equivalent
Model ref: In line range CEX-U
Electrical capacity: 8.8kw
ErP Rating: Class A

All new pipework shall be copper table X, and shall be installed in service voids or ducts where possible, surface mounted pipework shall be painted to new colour finish.

All new water services pipework shall be thermally insulated and chlorinated to BS6700 and HSG (70) upon completion of the works.

Isolating valves to be installed to all outlets.

100.020 DESIGN PARAMETERS:

To be inline with current British Standards and the CIBSE Design Guide.

600.000 PIPELINES AND ANCILLARIES - MATERIALS:

600.14 UNDERGROUND WATER PIPES

Underground cold water pipework shown on drawings. Shall be run in blue polyethylene (MDPE) to BS 6572 and WIS (Water Industry Specification) 4-24-01. Specification for blue polythene pipes for below ground use for potable water.

Joints shall either be fusion welded or made using DZR compression fittings.

Pipework to be protecta pipe material if deemed necessary, refer to SI report by main contractor.

600.15 PIPES - COPPER TO BS EN 1057:

- Application Domestic water services
- Kitemark certified
- Material - Copper to BS EN 1057.
 - R220 annealed.
 - R250 half hard.
- Finish - Uncoated.
- Jointing
 - Capillary fittings as clause 600.040.
 - Compression fittings for connections to equipment - as clause 600.050.

600.40 COPPER FITTINGS - CAPILLARY, FOR COPPER TUBING:

- Kitemark certified.
- Material
 - Copper/copper alloy (lead- and cadmium-free).
- Standard
 - BS EN 1254-1.
 - BS 864-2
- Jointing materials - capillary joints.
 - Solder - BS EN 29453 alloy nos. 28 or 29 or 23.

600.50 COPPER FITTINGS - COMPRESSION, FOR COPPER TUBING:

- Kitemark certified.
- Material
 - Copper/copper alloy (lead- and cadmium-free).
- Standard

- BS EN 1254-2.
- BS 864-2.
- Type
 - Type A - non-manipulative.
 - Type B - manipulative.
- Ends - Socket.
- Finish - cast.

600.70 STOP VALVES TO BS 1010-2:

- Manufacturer and reference Hattersley
 - Or approved equivalent
- Kitemark certified.

Material - Bronze or DZR copper alloy body.

- Ends
 - Threaded to BS 21.

600.80 STOP VALVES TO BS 5433:

- Manufacturer and reference Hattersley
 - Or approved equivalent
 - Kitemark certified.
- Material - Bronze or DZR copper alloy body.
- Ends - Threaded to BS 21.

600.81 STOP VALVES - GATE TYPE TO BS 5154:

- Manufacturer and reference Hattersley
 - Or approved equivalent
- Kitemark certified.
- Series - B.
- Gate valve type - Solid or split wedge.
- Ends
 - Threaded to BS 21.
- Trim material - Manufacturer's standard.
 - Suitable for potable water supply.
- Operation
 - Handwheel.

600.84 ANTI BACK SYPHONAGE VALVES - COMBINED CHECK AND ANTI-VACUUM TYPE:

- Manufacturer and reference Hattersley
 - Or approved equivalent
- Kitemark certified.
- Bronze or DZR copper alloy body assembly.
- Water Research Centre approval.
- Pattern - In-line pattern.
- Components
 - Stainless steel domed air inlet. Non-return valve with plastic body, rubber actuator and stainless steel to plastic seal.

600.85 STOP VALVES - BALL TYPE:

- Manufacturer and reference Hattersley
 - Or approved equivalent
- Bronze or DZR copper alloy body; chrome or nickel plated sphere.
- Ends

- Threaded to BS 21.
- Operation
 - Lever operated.

600.90 CHECK VALVES - SWING CHECK TYPE TO BS 5154:

- Manufacturer and reference Hattersley
 - Or approved equivalentStraight lift pattern.
- Material
 - Suitable for potable water.
- Ends
 - Threaded to BS 21.

600.100 DRAIN COCKS - SCREWDOWN COCK TYPE TO BS 2879, TYPE 1:

- Manufacturer and reference Hattersley
 - Or approved equivalentBronze body threaded male to BS 21.
Screw down plug with square shank for loose lever.
Serrated outlet to accept hose pipe, fixed or union pattern.

600.120 WALL, FLOOR AND CEILING MASKING PLATES:

- Application all exposed pipework penetrations
- Material
 - Copper alloy, chromium plated.
- Style
 - Heavy, split on the diameter.
- Fixing
 - Chrome raised head fixing screws.

600.130 VALVE LABELS:

Supply and fit engraved plastic labels to all valves (except isolating and regulating valves on heat emitters).

Engrave with

- description of function, service and reference number

600.140 PIPEWORK IDENTIFICATION:

- Application domestic water services
Colour code and label to BS 1710.
- Apply 300mm wide colour bands to each pipe at intervals not exceeding fifteen metres.
- Apply 50mm wide colour bands and superimpose a legend identifying circuit and direction of flow.
Apply legends to colour bands by transfers of an approved type.

700.000 PIPELINE WORKMANSHIP:

700.10 INSTALLATION GENERALLY:

Install, test and commission systems to comply with BS 6700, Water Supply (Water fittings) Regulations 1999 and equipment manufacturers' recommendations.

- Install thermoplastics pipework in accordance with BS 5955-8.

700.020 APPEARANCE:

Arrange all exposed pipe runs to present neat appearance, parallel with other pipe or service runs and building structure, subject to gradients for draining or venting.
Ensure all vertical pipes are plumb or follow building line.

700.030 SPACING:

Space pipe runs in relation to one another, other services runs and building structure, allow for thermal insulation and ensure adequate space for access to pipe joints, etc.
Minimum clearances to pipe or pipe insulation:

FROM	MINIMUM CLEARANCE (mm)
Wall	25
Ceiling	50
Floor	150
Other pipes	25
Electrical cables, conduit, switchgear, etc	150

700.040 GRADIENTS:

Install pipework with gradients to allow drainage and air release.

700.050 EXPANSION AND CONTRACTION:

Arrange supports and fixings to accommodate pipe movement caused by the thermal changes. Isolate pipes from structure to prevent noise or abrasion due to thermal movement / changes in direction.

700.060 BENDS, SPRINGS AND OFFSETS:

Machine bend and ensure that machine guides and formers are smooth and clean, free from any scores, or other damage. Deformed bends will not be accepted.

700.070 PIPES THROUGH WALLS AND FLOORS:

Enclose pipes passing through building elements, (walls, floors, partitions, etc.) concentrically within purpose made sleeves.

700.080 PIPE SLEEVES:

Cut sleeves from material same as pipe one or two sizes larger than pipe. Do not use sleeves as pipe supports. Install sleeves flush with building finish.

700.090 TEMPORARY PLUGS AND CAPS:

Seal all open ends as installation proceeds by metal, plastic or wooden plugs or caps, to prevent ingress of foreign matter.

700.100 CAPILLARY JOINTS, COPPER/STAINLESS STEEL PIPES:

Preparation

Ensure that plain ends are cut square. Reamer out bore at plain ends to full bore size. Clean plain ends with fine steel wool.

Making and sealing

Use specified flux ensuring no excess material used. Make joint in accordance with manufacturer's instructions. Clean off traces of flux when joint is completed. Protect building fabric from heat when forming joints.

- Polyethylene sheathed pipe

Follow manufacturer's recommendations to avoid damage to plastic coating. Make good with PVC tape of matching colour.

700.110 COMPRESSION JOINTS, COPPER/STAINLESS STEEL/POLYETHYLENE PIPES:

Preparation

Ensure that plain ends are cut square. Reamer out bore at plain ends to full bore size. Clean plain ends with fine steel wool or fine sandpaper. Then if using:

Type 'A' fitting - no further preparation.

Type 'B' fitting - in accordance with fitting manufacturer's instructions.

Making and Sealing

In accordance with fitting manufacturer's instructions.

700.120 SCREWED JOINTS TO BS 21:

Preparation

Ensure that plain ends are cut square. Reamer out bore at plain ends. Screw plain ends, taper thread.

Making and Sealing

Coat male pipe threads with PTFE tape, connect with female end of socket or fitting, and tighten ensuring that coating does not intrude into pipe. Leave joint clean.

700.130 PIPE RINGS AND CLIPS:

Select type according to the application and material compatibility.

700.140 PIPE SUPPORTS:

Arrange supports and accessories for equipment, appliances or ancillary fittings in pipe runs, so that no undue strain is imposed upon pipes.

Ensure that materials used for supports are compatible with pipeline materials.

700.150 PIPE SUPPORT SPACING COPPER/STAINLESS STEEL PIPE:

PIPE BORE (mm) nominal	MAXIMUM SUPPORT SPACING (mm)	
	horizontal	vertical
Up to 15	1200	1800
22	1400	2100
28	1800	2400
35	2400	3000
42	2400	3000
54	2700	3000

700.170 MAINTENANCE AND RENEWAL:

Arrange pipework, valves, drains, air vents etc., for convenient routine maintenance and renewals.

700.190 CLEANING:

Remove cement and clean off all pipework and brackets.

800.000 THERMAL INSULATION:

800.10 THERMAL INSULATION TO PIPELINES:

- All pipework services (excluding exposed pipework in room) to be insulated to the following standards with external finish as detailed in protection clause. Pipework exposed within room to be painted.
- Use mineral wool insulation, preformed pipe sections with nominal density 80 kg/m³. Thermal conductivity not exceeding 0.04 W/mK.

Finish

- Reinforced aluminium foil with at least 25mm overlap.

Protection

Ensure that where protection is applied to insulation, the joints fall blind side and that all joints are made to shed water and sealed with waterproof tape, adhesive or joint sealant where appropriate.

Identification and valve numbers to be applied to complete works in line with British standard.

800.030 THERMAL INSULATION WORKMANSHIP:

Do not apply thermal insulation until installation has been fully tested and all joints proved sound.

Ensure that all materials are kept dry.

Ensure clearance between insulated pipes.

Apply insulants, facings, coatings and protection strictly in accordance with manufacturer's instructions.

Neatly finish joints and corners, and ensure continuity over fittings and supports, with longitudinal split concealed.

Arrange insulation of feed and expansion cistern to allow removal of access covers.

800.040 NON-DOMESTIC HOT AND COLD WATER SERVICE AREAS - MINERAL WOOL:

Environmental insulation thickness for non-domestic hot and cold water service areas to control heat loss / gain.

OUTSIDE DIAMETER STEEL PIPE (mm)	THICKNESS OF MINERAL WOOL (mm)
17	30
21	30
27	30
34	35
42	35
48	35
60	40
76	40
89	40
Flat surfaces	50

900.000 COMMISSIONING AND TESTING:**900.010 PRESSURE TESTING:**

Advise appropriate personnel, at least 3 days in advance, of the time that pressure tests may be witnessed.

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

Complete pressure testing before applying thermal insulation.

Thoroughly flush out the whole system, fill system, vent all air from system and check for leaks, repair any leaks and re-check.

- Pressure test the system for a period of one hour, and check for and repair any leaks. Repeat pressure test if leaks have been found.
 - Test at twice the working pressure.
- Disconnect incoming service pipe from mains, fill with potable water, pressure test for a period of one hour, and check for and repair any leaks. Repeat pressure test if leaks have been found.
 - Test at twice the working pressure.
- Test and purge gas pipelines in accordance with BS 6891 and IGE/UP/1A.

900.020 STERILIZATION - GENERAL:

After flushing process, carry out sterilization in accordance with BS 6700.

Prior to sterilization ensure each system is flushed, cleaned and drained.

Provide temporary connections to system terminal points suitable for introduction of sterilization chemicals and fluids and 22mm minimum

valved drain connection on incoming main immediately downstream of mains isolating valve.

Fill system with clean, fresh water.

900.030 STERILIZATION - MAINS WATER SYSTEM:

Carry out the following operations in accordance with BS 6700.

Flush system and introduce sterilisation chemical, take samples to ensure correct chlorine concentration.

Leave system to stand for 2 hours

Repeatedly flush system with clean water until all traces of chlorine have been removed - leave system filled.

- Submit samples to registered laboratory for microbiological analysis and report.

900.040 STERILIZATION - WATER STORAGE SYSTEMS:

Carry out the following operations in accordance with BS 6700 and Health and Safety Executive Approved Code of Practice and Guidance - Legionnaires' disease - control of legionella bacteria in water systems.

Carry out procedures as for mains water systems on potable water storage tanks and cisterns, cold and hot.

- Certificate of conformity

Immediately prior to handover, retake samples and submit for analysis and report.

Where necessary repeat sterilisation of potable water systems immediately prior to handover.

U19 MECHANICAL VENTILATION

1000 SYSTEM DETAILS

1010 SYSTEM DESCRIPTION

Wall mounted local extract fans shall be installed, as detailed by the tender drawings, to serve the tea point and the WC. 2No. fans per unit.

The tea point extract fan is to be oversized to encourage air change within the unit and help with air movement and overheating.

Transfer grilles are to be installed as detailed in the WC.

PIR controls are to be installed to control the WC extract fans and fan speed controllers are required at the tea point location, wall mounted to control the tea point fan.

The fans are to be as follows:

Room: WC

Type: wall mounted

Controls: trickle and boost on ceiling mounted PIR sensor.

Design flow rates: 6 litres/second on trickle, 15 litres/second on boost

Make up air – through door transfer grille

Manufacturer: Nuaire or approved equivalent

Model ref: NA100XP-12

Accessories: wall extension kit and external class A weathered grille, colour to match façade installed in. Anodised aluminium external grille to be installed.

Room: Tea Point

Type: wall mounted

Controls: from wall mounted local speed controller

Design flow rates: 250 litres/second on high speed

Make up air – through external doors

Manufacturer: Nuaire or approved equivalent

Model ref: XS-12-WA

Accessories: wall extension kit and external class A weathered grille, colour to match façade installed in.

The fan shall be of the XS type and shall be supplied complete with integrated low loss radial backdraught shutter, silent operation via a thermo actuator, room side grille, connection kit and external louvre/ roof cowl to suit the particular application.

The high efficiency, low noise axial flow impeller shall be directly driven by an external rotor motor featuring enclosure protection to IP 44, class B winding insulation and maintenance free ball bearings. All models shall be suitable for air over motor temperatures of up to 25°C (occasionally 35°C) and 95% R.H (non-condensing).

The motor and impeller shall be dynamically balanced as an assembly. Fan casing, impeller and shutter shall be manufactured from UV stabilised ABS polymer.

All models shall include an economy/high efficiency setting facility.

The fan shall be provided complete with integrated or remote controls as detailed in the schedule and as described below. Where indicated the fans shall be interlinked and controlled from 1No. controller. Fans shall be reversible via reversing switch on XS-MFC fan controller.

Fans to be wired by the electrical contractor, including speed controllers and PIR sensors.

1020 DESIGN PARAMETERS

CIBSE Design Guide and see above flow rates.

1030 CONTROL REQUIREMENTS

see above and remainder of specification.

1040 SYSTEM DRAWINGS

see tender drawings.

Fans General

All fans required shall be in accordance with the requirements of the following general specification and the detailed specification stated elsewhere and shall have the performance and duty as required to satisfy the design.

All fan resistances stated have been calculated based on a particular selection of equipment. The final selection of plant duties by the Contractor, such as filters, coils, attenuators, diffusers, etc., and the actual ductwork fabrication drawings may produce different pressure drops and therefore the Contractor shall recalculate the total system resistances based upon his selection of plant and revise the fan resistance as necessary to achieve the design air volume flow. Similarly, if the fan power requirements and sound power level changes, he shall reselect the necessary motor size, wiring and suitable attenuators to achieve the designed Noise Rated Level stated elsewhere. Approval shall be required before any orders are finalised for fans and equipment.

All fan impellers shall be statically and dynamically balanced before despatch from the Works and the test certificates issued to the Engineer. All fans shall be tested in accordance with BS 848 Parts 1 and 2 at works and the fan sound Power and Sound Pressure levels shall be submitted for Approval.

Fans to be manufactured by Nuaire or Vent Axia or approved equivalent.

NOISE AND VIBRATION CONTROL SECTION

General Requirements.

Supply equipment to meet insertion losses, isolation efficiency or acoustic performances indicated with resistance to air flow indicated and with any specific requirements or limitations as indicated.

Fire Properties Acoustic Materials.

Ensure that all insulation or attenuating materials are non-combustible and covered with a material that complies with flame spread requirements of BS 476, Part 7, class 1. Non-flammable adhesives shall be used.

Vibration Isolation General.

Supply equipment indicated to ensure that vibration from plant is not transmitted to the building, other supporting structure, pipework or ductwork. Select spring mounts with an overload capacity of 50% and with an outside diameter of at least 75% of the operating height. Mark mounts permanently with load capacity.

2060

see tender drawings and plant schedules

2080

GRILLES AND DIFFUSERS:

- Type: anodised aluminium type 150x150mm non vision in WC doors
- Application Transfer
- Manufacturer and reference: Trox UK or approved equivalent

see tender drawings and plant schedules

2090

PLANT AND EQUIPMENT WORKMANSHIP:

Install all plant and equipment in accordance with manufacturer's instructions.

2100

ELECTRICAL SUPPLY:

- Incoming power to BS 7697
 - Single phase.
- Electrical installation to be carried out
 - Under main contract.
- Requirements
 - As Work Section V90 Electrical installation.

3000 DUCTLINES AND ANCILLARIES

3010

DUCTWORK FABRICATION:

Carry out fabrication of ductwork in accordance with DW 144 and DW 154 as appropriate.

3020

DUCTWORK DIMENSIONS:

Sizes of ductwork are internal dimensions. Where applicable make allowance for any internal lining.

3030

INSTALLER SELECTION:

- Use a member of the HVCA specialising in the trade of manufacturing and installing ductwork.

3040

DUCTWORK AND FITTINGS:

- Design Information
 - Supply ductwork in accordance with classification in DW144 Table 1.
 - Ductwork Classification and Air Leakage limits
 - Low pressure - Class A - Positive.
 - Low pressure - Class A - Negative.
- Ductwork air leakage testing

- Carry out ductwork air leakage testing on high pressure ductwork in accordance with DW 144 as procedures set out in DW 143.
- Test medium pressure ductwork in accordance with DW144, A5.
- Test low pressure ductwork
- Testing plant items, DW 144, Part 8, A.8.
- Plant connections.
Make connection between air handling assembly and ductwork system in accordance with DW 144.
- Flanged connections.
Provide bolted flanged joints for connecting ductwork to flanged items of plant, builder's work frames and where removable sections of ductwork are required.

3050 DUCTWORK TO DW 144:

- Material, DW 144 Part 2 - Standards, paragraph 7.
 - Zinc-coated steel.
 - Mild steel.
- Construction
 - Rectangular ductwork - DW144 Part 3.
 - Circular ductwork - DW144 Part 4.
 - Spirally wound.
 - Straight seamed.

3060 FLEXIBLE DUCTS:

- Supply and fasten flexible duct connections as DW144 Part 7 Section 25. Use flexible duct connections in applications listed in DW144 paragraph 25.1.
- Material
 - Metal
 - Coated steel.
 - Aluminium.
 - Fabric
 - P.V.C/Polyester laminate.
 - Aluminium/Polyester laminate encapsulating high tensile steel wire helix.

3080 ACCESSORIES - METAL DUCTWORK:

- Flexible Joints
 - Supply and install flexible joints as detailed in DW 144 Part 7 Section 26.
 - Comply with BS 476-6, BS 476-7, BS 476-20, BS 476-21, BS 476-22, BS 476-23 and BS 476-24.
 - Position
 - On fan inlet/outlets.
 - To make connections to air conditioning units.
 - To make connections to air diffusers, grilles and air registers.
- Access openings
 - Provide access openings in accordance with DW 144 Part 7 Section 20.
 - Provide access for cleaning in accordance with DW 144 Part 7, paragraph 20.8 and
- Appendix M Table 25 Level 2.
- Appendix M Table 25 Level 3.
 - Provide hangers and supports throughout in accordance with DW 144 Part 6.
 - Use proprietary system of ductwork supports
 - Regulating dampers
 - Provide regulating dampers in accordance with DW 144 Part 7 Section 21.
 - Function
 - Balancing damper.
 - Control damper.

- Supply and install fire dampers in accordance with DW 144 Part 7 section 22.
- As required to maintain fire integrity of structure.
 - Fusible links
 - Supply spare fusible links for fire dampers. Supply links to fuse at (°C) manufacturers standard
- Fit bird screens of 13mm square mesh wire on all intake and extract louvres to atmosphere. Wire gauge to be not less than 1mm.

3100 DUCTWORK WORKMANSHIP:

Install ductwork in accordance with DW 144, and DW 154 as appropriate. Ensure that there are no sharp edges or corners on cut edges on ductwork, flanges and supports. Arrange ductwork to drain any entrained moisture and ensure the lapping of joints minimises moisture leakage.

Connection to builder's work. Comply with DW 144 Part 7 Section 28.

Space supports in accordance with DW 144 Part 6 or DW 154 Part 5 as appropriate.

- Internal cleanliness
 - Provide the level of cleanliness and protection as defined in HVCA document DW/TM2.
 - Basic.
- Weatherproofing
 - Fit ductwork with trimming angle and weather cravat, skirt, flashing plate and cowl where ductwork passes through or terminates in roof, to ensure a weatherproof seal to building structure
- Enclose ducts passing through building elements, (walls, floors, partitions, etc.) within purpose made sleeves. Cut sleeves of the same material as the duct and pack with mineral fibre or similar non-flammable and fire resistant material to form a fire/smoke stop of adequate rating and to prevent air movement and noise transmission between duct and sleeve.
- Provide test holes in ductwork system to allow complete testing and balancing of system in accordance with CIBSE Commissioning Code Series A.
- Site drill test holes on site in accordance with DW144 Part 7 Section 20.6.
- Provide holes in metal ductwork, in accordance with DW144 Part 7, paragraph 20.7, to accommodate thermostats, humidistats and other control sensors in positions and sizes indicated on drawings.
- Install sensors and test points in plastics ductwork to suit specialist control and sensing equipment in positions and fixing configurations shown on drawings.
- Fit sensors, damper motors and other control equipment as indicated on drawings.
- Provide instrument connections where indicated on drawings.

Appendices

Appendix 1 - Y References

Y10 PIPELINES

Y10.1000 GENERAL

1010 PRE-FABRICATED PIPEWORK:

Supply pre-fabricated pipework in accordance with relevant materials and workmanship clauses.

1020 FITTINGS:

For changes in direction use centreline radius/nominal bore of not less than 1.5 unless otherwise directed. For reductions and enlargements use easy transition type with inclined angle not exceeding 30 degrees.

1030 FABRICATED FITTINGS:

Use only with approval, if manufacturer's standard fittings are not available.

1040 PIPE JOINTS:

Obtain approval from Local Water Authority or Water Research Centre for materials used in water supplies.

Y10.2450A UNPLASTICISED PVC PIPES TO BS 3505:

Material - Unplasticized PVC. Class C, D or E to suit working pressure.

Standard - BS 3505.

Dimensions - BS 3505, table 1 - lengths 6m or 9m.

Ends - Plain.

Finish - Blue.

Y10.2470 UNPLASTICIZED PVC FITTINGS, SOLVENT WELDING TO BS 4346-1:

Material - Unplasticized PVC.

Standard - BS 4346-1.

Size range - 10mm to 300mm.

Dimensions - BS 4346.

Ends - Spigot/Socket.

Finish - Natural self colour.

Y10.2480A UNPLASTICIZED PVC TO BS 4514:

Material - Unplasticized PVC.

Standard - BS 4514.

Dimensions - BS 4514.

Ends - Plain.

Finish - Black, grey or white.

Y10.2490A UNPLASTICIZED PVC FITTINGS, SOLVENT WELDING TO BS 4514:

Material - Unplasticized PVC.

Standard - BS 4514, table 2.
Size range - 82mm, 110mm or 160mm.
Dimensions - BS 4514 tables 3 and 5.
Ends - Spigot/plain.
Finish - Black, grey or white.

Y10.2495A PLASTICS PIPING SYSTEMS TO BS EN 1453:

Plastics piping system with structured wall pipes for soil and waste discharge (low and high temperature) within the building structure.
Material - Unplasticised polyvinyl chloride (PVC-U).
Standard - BS EN 1453.
Dimensions - Length - manufacturer's standard range. BS EN 1453 tables 1, 2 and 3.
Ends - Plain; elastomeric ring seal socket and spigot; or socket and spigot for solvent cement.
Finish - Grey, black, or white.

Y10.2496A PLASTICS PIPING SYSTEMS TO BS EN 1329 - FITTINGS:

Plastics piping systems for soil and waste discharge (low and high temperature) within the building structure.
Material - Unplasticised polyvinyl chloride (PVC-U).
Standard - BS EN 1329.
Size range - 32mm to 315mm.
Dimensions - BS EN 1329 tables 5 - 14.
Ends - Plain; elastomeric ring seal socket and spigot; or socket and spigot for solvent cement.
Finish - Grey.

Y10.2545A PLASTICS PIPING SYSTEMS TO BS EN 1451 - PIPES:

Plastics piping systems for soil and waste discharge (low and high temperature) within the building structure.
Material - Polypropylene (PP).
Standard - BS EN 1451.
Dimensions - Length - manufacturer's standard range. BS EN 1451 tables 1, 2, 3 and 4.
Ends - Plain; elastomeric ring seal socket and spigot; or socket and spigot for solvent cement.
Finish - Grey, black, or white.

Y10.2555A PLASTICS PIPING SYSTEMS TO BS EN 1451 - FITTINGS:

Plastics piping systems for soil and waste discharge (low and high temperature) within the building structure.
Material - Polypropylene (PP).
Standard - BS EN 1451.
Size range - 32mm to 315mm.
Dimensions - BS EN 1451 tables 5 - 8.
Ends - Plain; elastomeric ring seal socket and spigot; or socket and spigot for solvent cement.
Finish - Grey, black, or white.

Y10.2580A PVC-U PIPING SYSTEMS - PIPES:

Plastics piping systems for soil and waste discharge (low and high temperature) within the building structure.
Material - Unplasticised polyvinyl chloride (PVC-U).
Standard - PVC-U to BS EN 1329.
Dimensions - Length - manufacturer's standard range. BS EN 1329 tables 1, 2, 3 and 4.
Ends - Plain; elastomeric ring seal socket and spigot; or socket and spigot for solvent cement.
Finish - Grey, black, or white.

Y10.2585A PVC-U PIPING SYSTEMS TO BS EN 1329 - FITTINGS:

Plastics piping systems for soil and waste discharge (low and high temperature) within the building structure.

Material - Unplasticised polyvinyl chloride (PVC-U).

Standard - PVC-U to BS EN 1329.

Size range - 32mm to 315mm.

Dimensions - BS EN 1329 tables 5-14.

Ends - Plain; elastomeric ring seal socket and spigot; or socket and spigot for solvent cement.

Finish - Grey, black, or white.

Y10.3095C JOINTING MATERIALS FOR PLASTICS PIPES TO BS 7291 - SOLVENT CEMENT:

Plastics fittings to BS 7291.

Method of jointing to BS 5955-8 - Solvent cement joints.

Y10.3095D JOINTING MATERIALS FOR PLASTICS PIPES TO BS 7291 - THERMAL FUSION:

Plastics fittings to BS 7291.

Method of jointing to BS 5955-8 - Thermal fusion joints.

Y10.3190A WALL, FLOOR AND CEILING CHROMIUM PLATED MASKING PLATES:

Material - Copper alloy, chromium plated.

Type - Heavy, split on the diameter, close fitting to outside of pipe.

Fixing - Chrome raised head fixing screws.

Y10.4010 APPEARANCE:

Arrange all exposed pipe runs to present neat appearance, parallel with other pipe or service runs and building structure, subject to gradients for draining or venting.

Ensure all vertical pipes are plumb or follow building line.

Y10.4020 SPACING:

Space pipe runs in relation to one another, other services runs and building structure, allow for specified thickness of thermal insulation and ensure adequate space for access to pipe joints, etc.

The following are recommended as minimum clearances in spacing of pipe runs:-

Between	and	Clearance (mm)
Pipeline -	wall finish	25
insulated or	ceiling finish or soffit	50
uninsulated	floor finish	150
insulated pipeline	adjacent service runs	25
uninsulated pipeline	adjacent service runs	50
adjacent pipelines	both uninsulated	150
	one uninsulated	75
	both insulated	25

Y10.4030 GRADIENTS:

Install pipework with gradients to allow drainage and/or air release, and to the slopes where indicated.

Y10.4060 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.

Y10.4110 PIPES THROUGH WALLS AND FLOORS:

Enclose pipes passing through building elements, (walls, floors, partitions, etc.) concentrically within purpose made sleeves. Fit masking plates where visible pipes pass through building elements, including false ceilings of occupied rooms.

Y10.4120A PIPE SLEEVES:

Where pipe insulation is not carried through pipe sleeve, cut sleeves from material same as pipe one or two sizes larger than pipe to allow clearance. Do not use sleeves as pipe supports. Install sleeves flush with building finish. In areas where floors are washed down install with a 100mm protrusion above floor finish.

Y10.4125 PIPE SLEEVES THROUGH FIRE BARRIERS:

Pack annular space between pipe and sleeve or insulation and sleeve with non-flammable and fire resistant material to form a fire/smoke stop of required rating. Apply 12mm deep cold mastic seal at both ends within sleeve.

Y10.4130 CONNECTIONS TO EQUIPMENT:

Make final connections to equipment in accordance with manufacturer's instructions and as indicated.

Y10.4150A TEMPORARY PLUGS, CAPS AND FLANGES:

Seal all open ends as installation proceeds by plugs, caps or blank flanges, to prevent ingress of foreign matter.

Use plugs of metal, plastic or wood to suit pipework material.

In the event of such precautions not being taken, strip out pipework adjacent to open ends to demonstrate that fouling of bores has not occurred.

Y10.4170 DISSIMILAR METALS:

Take appropriate means to prevent galvanic action where dissimilar metals are connected together.

Y10.4180 PIPE RINGS AND CLIPS:

Select type according to the application and material compatibility; give particular attention where pipes are subject to axial movement due to expansion or contraction.

Y10.4210 PIPE SUPPORTS:

Arrange supports and accessories for equipment, appliances or ancillary fittings in pipe runs, so that no undue strain is imposed upon pipes.

Ensure that materials used for supports are compatible with pipeline materials.

Y10.4220 SUPPORT SPACING:

Space supports as tables.

PIPE BORE (mm) Nominal	MAXIMUM SUPPORT SPACING (M)					
	STEEL PIPE			COPPER PIPE		
	IRON PIPE		vertical			horizontal
	horizontal	vertical		horizontal	vertical	
up to 15		1.8	2.4	1.2	1.8	-
20	-	2.4	3.0	1.4	2.1	-
25	-	2.4	3.0	1.8	2.4	-
32	-	2.7	3.0	2.4	3.0	-
40	-	3.0	3.6	2.4	3.0	-
50	-	3.0	3.6	2.7	3.0	1.8
65	1.8	3.7	4.6	3.0	3.6	-
80	-	3.7	4.6	3.0	3.6	2.7
100	2.7	3.7	4.6	3.0	3.6	2.7
125	2.7	3.7	5.4	3.0	3.6	-
150	-	4.5	5.4	3.6	4.2	3.7
200	3.7	5.6	6.0	-	-	3.7
250	3.7	5.0	6.0	-	-	4.5
300	5.4	6.1	10.0	-	-	8.0
350	10.0	10.0	12.0	-	-	-
400	-	10.5	12.6	-	-	-
450	-	11.0	13.2	-	-	-
500	-	12.0	14.4	-	-	-
600	-	14.0	16.8	-	-	-
-	-					

PIPE BORE (mm) Nominal	GLASS PIPE		MAXIMUM SUPPORT SPACING (M)			
	horizontal	UPVC PIPE		POLYETHYLENE PIPE		
		Class O,B,C horizontal vertical	Class D,E,6,7 horizontal	Type 32 horizontal	Type 50 horizontal	
up to 10	-	-	0.6	0.3	0.45	
15	-	-	0.6	0.4	0.6	-
20	-	-	0.65	0.4	0.6	-
25	-	-	0.75	0.4	0.6	-
32	-	-	0.8	0.45	0.7	-
40	-	-	0.9	0.45	0.7	0.9
50	1.7	1.1	1.2	0.55	0.85	1.2
65	1.7	1.2	1.4	0.55	0.85	-
80	-	1.4	1.5	0.6	0.9	1.2
100	1.7	1.5	1.7	0.7	1.1	1.2
125	-	1.7	1.9	-	-	-
150	1.7	1.8	2.1	-	1.3	1.2
175	-	2.0	2.3	-	-	-
200	-	2.1	2.5	-	-	-
225	-	2.3	2.7	-	-	-
250	-	2.4	2.9	-	-	-
300	-	2.6	3.1	-	-	-
350	-	2.9	3.4	-	-	-
400	-	3.1	3.7	-	-	-
450	-	3.4	3.7	-	-	-
above 450	-	3.7	3.7	-	-	-

Maximum horizontal support spacing for grooved steel pipe 6 metres.

Vertical support spacing

Check total self-weight and pressure loading against manufacturer's recommendations when using mechanical joints or end load capable flexible couplings. Ensure adequate pipe support when using non-end load capable flexible couplings.

Space vertical support intervals for plastics pipe at not greater than twice horizontal intervals tabulated.

Where multiple pipe runs of differing bores are supported from a common point, use support spacing of pipe requiring closest spacing.
Spacings give for PVC-U pipe to BS 3505 are for 20°C. Support continuously for temperatures 60°C and above.

Y10.4240 MAINTENANCE AND RENEWAL:

Arrange pipework, valves, drains, air vents, demountable joints, supports, etc., for convenient routine maintenance and renewals. Provide all runs with a regularly spaced pattern of demountable joints in the form of unions, flanges, etc., and also at items of equipment to facilitate disconnection.
Locate valves, drains, flanges etc. in groups.

Y10.4250 CLEANING:

Remove cement and clean off all pipework and brackets.

Y10.4260 NON-FERROUS COMPONENTS:

Thoroughly clean and degrease.

Y10.8010 SOLVENT WELDED JOINTS, PVC PIPES:

Use solvent welded joints generally, ring seal joints at expansion joints and elsewhere as necessary.
Preparation - Ensure that plain ends are cut square. Reamer out bore at plain ends. Clean plain ends with solvent cleaner.
Making and Sealing - In accordance with fitting manufacturer's instructions.

Y10.8040 ANCHORS - PVC PIPES:

Clamp pipework to mild steel channel section attached to or grouted into building structure, using PVC coated overstraps, or clamps and with a polypropylene strip between pipe and mild steel section.

Y11 PIPELINE ANCILLARIES

Y11.1000 GENERAL

1010 SAFETY AND RELIEF VALVES, SELF OPERATED, APPLICATION:

Safety - To discharge with rapid opening action to prevent pre-determined safe pressure being exceeded.

Relief - To discharge with opening action proportional to increase in pressure above set pressure.

1020 EXPOSED VALVES:

Fit easy-clean covers over glands and bonnets to small copper alloy valves exposed in areas other than plant rooms. Fit thermoplastic valve wheels. Fit dust caps to lockshield valves.

1030 TESTING:

Ensure that valves and cocks are pressure tested at manufacturer's works, in accordance with appropriate British Standards specification. Test valves in accordance with BS EN 12266-1 and BS EN 12266-2.

Y11.4010 INSTALLATION:

Install pipeline ancillaries in accordance with manufacturer's recommendations and BS 6683.

Y11.4020 LOCATION:

Install valves, cocks, traps, strainers, test plugs, tundishes and other ancillary equipment in positions indicated.

Y25 CLEANING AND CHEMICAL TREATMENT**Y25.1000 GENERAL****1010 CONDITIONS FOR CLEANING AND CHEMICAL TREATMENT:**

Ensure treatment complies with statutory authority and health and safety regulations. Notify manufacturers and suppliers of equipment of proposed system cleaning and chemical treatment processes. Establish if any manufacturer or supplier of equipment requires any particular cleaning and chemical treatment process due to size of waterways or materials used.

All chemicals used are to be compatible with the metallurgy of the systems.

1015 METHOD STATEMENT:

Provide a method statement covering the sequence of events, chemicals to be used etc. Statement to be provided at least two months prior to the start of any flushing and/or chemical cleaning works.

Y25.2030A PRELIMINARY CHECKS:

- Prior to carrying out cleaning or chemical treatment process, ensure that
 - All foreign matter is removed.
 - Certified pressure tests have been carried out in the parts of the system to be cleaned. Carry out further pressure tests on the isolated sections of the system independently.
 - All water used for pressure testing is inhibited. Leave remaining pipework sections full after testing.
 - Where there is a risk of freezing inhibited mono-ethylene glycol is used.
 - Circulation has been demonstrated and approval obtained on all parts of the system. Manipulate and leave fully open all valves other than those used to isolate sections. Carry out balancing and certification after the flushing, cleaning and passivation operations.
 - No damage can occur to any item of plant or equipment due to cleaning and chemical processes.
 - Chemicals used are compatible with system materials.
 - All items of plant and equipment subject to damage or blockage due to cleaning and chemical treatment processes are isolated or removed.
 - Permanent or temporary by-passes are provided as indicated on drawings.
 - Dirt pockets are installed at low points to facilitate solids removal. Supply dirt pockets with drain valves sized to pipework size.
 - All drains provided have been tested and approved and that any pumping equipment associated with the drainage system is fully commissioned.
 - Dead legs that are more than 3 pipe diameters in length are looped to allow effective cleaning.
 - Strainer baskets and filter media, incorporated within systems, are removed; and where necessary spool or stool pieces are installed.
 - Temporary strainers and filters are installed as required for removal of solids during cleaning and chemical treatment processes.
 - Strainers are clean prior to the start of the cleaning process, throughout the cleaning and on completion.
 - Suitable supply and drainage points are provided with 50mm minimum connections, properly sited and installed, either valved or plugged.
 - All automatic/manual air vents are fully commissioned.

- All requirements of COSHH regulations are complied with during the chemical cleaning and chemical treatment of the system.
- Where required by local water authority, provide effluent tanks for storage of all waste products of cleaning and chemical treatment processes.
- Following local water authority approval, either neutralize or dispose to drain of all waste products; or ensure authorised disposal at registered sites.
- Comply with Waste Management Duty of Care: A Code of Practice and Control of Pollution (Special Waste) Regulations 1980 where appropriate.

Y25.2040A PROCEDURAL PRECAUTIONS FOR CLEANING AND CHEMICAL TREATMENT:

- Carry out tests to ensure that cleaning and chemical treatment processes are operating as required.
- Carry out tests to ensure that cleaning and chemical treatment processes are operating as required. and detailed in the Method Statement.
- Submit all test and sample results for certification and approval.

Y25.2040B PROCEDURAL PRECAUTIONS FOR CLEANING AND CHEMICAL TREATMENT INCLUDING TAKING SAMPLES:

- Take samples during and following chemical treatment and/or cleaning.
- Submit samples to an independent analyst.
- Use sterile containers to take samples.
- Carry out tests to ensure that cleaning and chemical treatment processes are operating as required.
- Submit all test and sample results for certification and approval.

Y25.3010A FLUSHING:

Carry out flushing of water systems in accordance with BSRIA Application Guide 1/2001 Pre-commission cleaning of pipework systems.

Section 2 Installation considerations

2.1 Management

2.2 Pipework installation

2.3 Preparation for flushing and cleaning

2.4 Procedure for filling, pressure testing and static flushing.

Section 3 System dynamic flushing.

C1 Flushing objectives

C2 Dynamic flushing procedure.

Inspection and witnessing, as section 1.4.

Y25.3010B FLUSHING:

All water used for pressure testing, flushing and system filling is of good quality. Leave remaining pipework sections full and treated after pressure testing.

Install all necessary pipework ancillaries to enable a specialist to carry out flushing, inspection and witnessing of water systems in accordance with BSRIA Application Guide AG 1/2001. Pre-commission cleaning of water systems.

Temporary connection from the mains must be in compliance with the Water Supply (Water fittings) Regulations 1999, or by installation of a temporary tank and pump arrangement.

Domestic water systems are to be flushed and disinfected in accordance with the requirements of BS 6700, and to the satisfaction of the local water supply authority. Flush systems using mains water until the water is clear.

Y25.3090 DOCUMENTATION:

Provide number of copies as indicated of hard cover binders containing details of

Programme outlines.
Purpose of chemical treatment.
Chemicals used and quantity.
On site testing procedures.
Control limits of tests.
Equipment data and drawings.
Product notes and material safety data sheets for all chemicals used.
Provide a complete training programme for site operatives covering
Methods of basic water testing.
Explanation of results obtained.
Actions to be taken on test results.

Y50 THERMAL INSULATION

Y50.1000 GENERAL

1010 TEMPERATURE RANGE:

Surface temperature within range -40°C to 230°C.

1020 STANDARDS:

Comply in general with BS 5422, BS 5970 and BS EN ISO 12241. Use the description of terms as BS 3533.

1030 MATERIALS:

Employ materials that comply with BS 476-4, non-combustibility test, or obtain a Class 'O' fire rating to Building Regulations when tested to BS 476-6 and BS 476-7.

Ensure metals and materials that cause galvanic corrosion are not installed in contact.

Do not use galvanized or zinc coated steel jacketing and accessories on austenitic stainless steel and austenitic nickel steel/alloy equipment and piping.

1032 PRE-INSULATED EQUIPMENT:

Where fire and surface spread of flame certificates relate to factory made products, ensure that certificates are still valid where products are incorporated in pre-insulated equipment.

1034 PROTECTION APPLIED IN SITU:

Where fire and surface spread of flame certificates relate to factory made products, ensure that the certificate remains valid when the finish is site applied.

Y50.1035A CLASS A1 EUROPEAN CLASSIFICATION FOR REACTION TO FIRE PERFORMANCE:
Supply insulating materials that comply with Euroclass A1.

Y50.1035B CLASS A2 EUROPEAN CLASSIFICATION FOR REACTION TO FIRE PERFORMANCE:
Supply insulating materials that comply with Euroclass A2.

Y50.1035C CLASS B EUROPEAN CLASSIFICATION FOR REACTION TO FIRE PERFORMANCE:
Supply insulating materials that comply with Euroclass B.

Y50.1035D CLASS C EUROPEAN CLASSIFICATION FOR REACTION TO FIRE PERFORMANCE:
Supply insulating materials that comply with Euroclass C.

Y50.1040A CFC'S AND HCFC'S:

Ensure all thermal insulants for use in the building services are made using materials with zero ozone depletion potential (CFC and HCFC free).

The following generic insulation products have not been known to contain ozone depleting substances and can be used.

- Mineral fibre/wool.
- Glass fibre/wool.
- Cellular glass.
- Expanded polystyrene.
- Expanded nitrile rubber.
- Recycled cellulose.

The following materials can be used if the manufacturer supplies written confirmation that they are CFC and HCFC free.

- Polyurethane.
- Urethane foams.
- Extruded polystyrene.
- Phenolic foam.
- Polyisocyanurate foam.
- Polyethylene foam.

The following materials must not be used.

- Polyurethane.
- Urethane foams.
- Extruded polystyrene.
- Phenolic foam.
- Polyisocyanurate foam.
- Polyethylene foam.

Y50.1050A SPREAD OF FLAME:

When completed, ensure surface-finish complies with BS 476-7 Class 1 spread of flame.

Y50.1055A SMOKE EMISSION CHARACTERISTICS:

Supply materials classified as less than 5% smoke obscuration rating when tested in accordance with BS EN ISO 5659-2.

Y50.1080 ELECTRICAL BONDING TERMINAL:

Ensure an electrical bonding terminal suitable for connection of 6mm² maximum conductor is provided where indicated.

Y50.1090 INSPECTION AND TESTING:

Arrange performance test of thermal conductivity on materials selected, carried out at manufacturer's works or at an approved laboratory and in accordance with appropriate British Standard.

Y50.2010 THERMAL CONDUCTIVITY:

Ensure values are in accordance with BS 874 and BS 2972.

Y50.2015A THERMAL PERFORMANCE LIFE EXPECTANCY FOR PLANT DESIGN LIFE:

Ensure the insulation will maintain its thermal performance for a minimum of the plant design life.

Y50.2020 RESTRICTIONS ON USE OF MATERIALS:

Protect insulated stainless steel surfaces from the risk of stress corrosion in accordance with the recommendations in BS 5970.

Y50.2030A FOIL FACED MINERAL FIBRE PIPE INSULATION:

Standard - BS 3958-4.

Nominal density - 80 kg/m³ to 120 kg/m³.

Thickness - 20mm to 100mm.

Thermal conductivity

Not exceeding 0.038 W/mK at a mean temperature of 50°C.

Finish - Reinforced aluminium foil with at least 25mm overlap.

Y50.2190 ADHESIVES:

Comply with the recommendations of clause 8.2 of BS 5970, section 2 for insulation bonding adhesives, lagging adhesives; and facing and film attachment adhesives.

Y50.3010 GENERAL:

Carry out thermal insulation work using one of the scheduled firms employing skilled craftsmen conversant with class of work.

Do not apply thermal insulation until installation has been fully tested and all joints proved sound.

Ensure all materials are kept dry.

Ensure all pipework surfaces are dry before the installation of thermal insulation.

Insulate each unit separately. Do not enclose adjacent units together.

Ensure there is clearance between insulated pipes.

Application

Apply insulants, facings, coatings and protection strictly in accordance with manufacturer's instructions.

Finish

Neatly finish joints, corners, edges and overlaps and, where possible, arrange overlaps to fall on blind side. Ensure overlaps are neat and even and parallel to circumferential and longitudinal joints.

Y50.3020 INSTALLATION OF FOIL FACED MINERAL WOOL INSULATION ON PIPEWORK:

Ensure joints are close butted together. Secure overlaps with adhesive or matching class 'O' tape, a minimum of 50mm wide, on both longitudinal and circumferential butt joints. Insulate fittings to same standard as adjacent pipework and use mitred segments where necessary, taped as above.

Where a vapour seal or fibre containment is required tape exposed insulation membrane and return to pipe surface.

Where insulation abuts pipe support inserts that have integral vapour barriers seal using class 'O' foil tape to continue vapour barrier or containment.

Y50.3230A INSTALLATION WHERE INSULATION IS CARRIED THROUGH PIPELINE SUPPORT:

For load bearing insulation, carry through insulation and finish.

For non-load bearing insulation on hot pipework close butt to a section of load bearing finished material 100mm long.

For non-load bearing insulation on cold pipework, close butt to high density phenolic foam pipe supports. Ensure the vapour barrier is maintained.

Y50.3240 INSTALLATION WHERE INSULATION IS NOT CARRIED THROUGH PIPELINE OR DUCTLINE SUPPORT:

Provide end caps to match applied finish.

Y51 TESTING AND COMMISSIONING

Y51.1000 GENERAL

Y51.2010 PRESSURE TESTING - GENERAL:

Comply with procedures given in HVCA Guide to Good Practice for Site Pressure Testing of Pipework. Ensure safety precautions detailed in HSE Guidance Note GS4 Safety in Pressure Testing are adopted. Provide a blanked connection to accommodate a check gauge in addition to the accurate gauge fitted to section under test.

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

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

Y51.2080 PRESSURE TESTING - SOIL, WASTE, VENTILATION, ANTI-SYPHON AND RAINWATER PIPEWORK:

Test section by section as the work proceeds and subsequently on completion with all sanitary fittings fixed and working. Submit systems to two separate tests, Air test and Hydraulic Performance test in accordance with BS EN 12056-2.

Y51.2100 VACUUM TESTING:

Test vacuum mains in accordance with HVCA Guide to Good Practice for Site Pressure Testing of Pipework, Table 1.

Y51.2110 TESTING RECORDS:

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

Y51.4010 SYSTEM PERFORMANCE TESTING:

Demonstrate the performance of installations including single, standby, multi-duty plants and systems, and of plants specified for future use.

Y51.4040B SANITARY SYSTEMS:

Comply with performance tests given in BS EN 12056.

Y51.4050 PERFORMANCE TEST RECORDS:

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

Y90 FIXING TO BUILDING FABRIC

Y90.1000 GENERAL

1010 PREPARATION:

Mark-out, set-out and firmly fix all equipment, components and necessary brackets and supports.

1020 MANUFACTURER'S DRAWINGS:

Use manufacturer's drawings and templates for purposes of marking and setting out.

1030 FIXINGS:

Ensure structure and fixings are suitable for items to be fixed.

1040 LOADING DETAILS:

Provide loading details for all fixing types.

1050 BUILDING-IN BY OTHERS:

Provide all necessary assistance to enable any item of building-in type to be built in by others.

1060 SIZE OF FIXING:

Use largest size of bolt, screw or other fixing permitted by diameter of hole in item to be fixed.

1070 GREASING OF FIXINGS:

Ensure all bolts, screws or other fixings used are greased or lubricated in accordance with manufacturer's instructions.

Y90.2010 STANDARDS:

Comply with BS 3974-1 for fixings. Ensure that fixings such as expanding anchors are tested for tensile loading in accordance with BS 5080-1.

Y90.2020 PLUGS:

Use plugs of suitable size and length for fixings. Use plastic, fibrous or soft metal non-deteriorating plugs to suit application. Do not use wood plugs.

Ensure that when screw is in place, threaded length is in plug. Ensure plugs used for screw fixing are set-in to correct depth prior to final tightening.

Y90.2030 SCREWS:

Use screws to BS 1210. Generally use sherardized steel wood screws for fixing to concrete, brickwork or blockwork.

In damp or exposed situations use greased brass wood screws.

Y90.2070 PROPRIETARY CHANNEL INSERTS:

Provide proprietary channel inserts for casting in where indicated.

Y90.3010 DRILLING:

Drill holes squarely. Use drills of requisite size and depth, and appropriate to fabric. Do not flame-cut holes in metal work.

Y90.3020 PROPRIETARY FIXINGS:

Comply with manufacturer's instructions for all fixings.

Y90.3030 FIXING TO REINFORCED CONCRETE:

Take precautions to avoid fixing through reinforcement.

Y90.3040 FIXING TO BRICKWORK:

Do not fix to unsound material or mortar between brickwork courses.

Y90.3050 FIXING TO TIMBER RAILS:

Fix equipment, brackets and supports by drilling hole through timber rail and fixing with bolt, back plate, washer and loose nut.

Y90.3060A FIXING TO HOLLOW STUD/TILE/BLOCK WALLS:

Fix equipment, brackets and supports where there is access at rear of wall, by drilling hole through wall and fixing with bolt, back-plate, washer and loose nut.

Fix equipment, brackets and supports where there is no access at rear of wall, drill hole and use screw anchor type fixing or gravity type toggle fixing.

Y90.3070A FIXING TO CONCRETE, BRICKWORK OR BLOCKWORK:

Fix equipment, brackets and supports using wood screws in plugs.

Drill holes and fix using steel bolts of grouted bolt type or expanding bolt type fixing.

Y90.3080A FIXING TO METALWORK:

Fix equipment, brackets and supports by drilling holes and fixing using set screws or bolts complete with washers, shakeproof washers and loose nuts.

Y90.3090A FIXING TO STRUCTURAL STEELWORK AND CONCRETE STRUCTURES:

Provide manufacturer's information on recommended fixing. Obtain approval for any fixing to structure steel work and concrete structures.

Generally use proprietary fixings to structural steelwork and concrete structures.

Obtain approval to cut holes in structural steelwork or concrete structures or weld to structural steelwork.

Y91 OFF-SITE PAINTING AND ANTI-CORROSION TREATMENTS**Y91.1000 GENERAL:****1010 GENERAL REQUIREMENTS:**

Where particular methods of finish and painting are not specified, ensure following requirements are met.

Protect all metal work, plant, equipment, pipelines, ductlines, ancillaries, brackets and supports against corrosion and oxidization.

Provide ferrous metals, machined or otherwise with protective coatings at manufacturer's works.

Ensure all items requiring on-site decorative finishes are provided primed to suit base material and required finish.

1020 DAMAGED FINISHES:

Following delivery to site, storage on site and installation make good any damage to finishes, by cleaning, degreasing and re-furbishing.

Y91.2010A PAINT MATERIALS:

Use the following materials as appropriate

Solvent borne priming paint to BS 7956 for bare woodwork.

Red Oxide priming paint for bare iron and steelwork.

Zinc Chromate priming paint for bare ferrous and non-ferrous metals.

Calcium Plumbate priming paint to BS 3698 for galvanized steel or composite wood/metal components.

Undercoating paint for previously primed or painted surfaces before the application of finishing coats.

Gloss finishing paint for previously primed or painted/undercoated surfaces.

Epoxy resin paint for specialist coatings requiring resistance to acids, alkalis, oils, solvents, abrasion or high humidity.

Aluminium paint to BS 388 for structural steelwork, storage vessels, heated metallic surfaces and similar applications where moisture and heat resistant properties are required.

Cold galvanizing paint for making good damage to previously galvanized surfaces and protection to galvanized materials modified during installation.

Zinc-rich metallic to BS 4652 for bare iron and steelwork where electrical conductivity has to be assured.

Black tar-based paint to BS 1070 for moisture resistant protection to metal surfaces where decorating appearance is not important.

Bitumen based coatings for cold application to BS 3416 protection to iron and steel, particularly pipelines and fittings for use in contact with potable water.

Bitumen based coatings for cold application to BS 6949 not to be used in contact with potable water.

Y91.2020 PAINT QUALITY:

Ensure paints used are of quality and type to suit application and that:-

primers have good adhesion, covering power, rust-inhibiting and grain filling properties.

gloss finishing paints are of machine finish grade having high adhesion and high resistance to solvents, mineral oils, cutting oils, detergents, chipping and impact damage.

Y91.3010 GENERAL:

Ensure paints are applied in accordance with manufacturer's instructions and to BS 6150.

Y91.3020 WEATHER AND OTHER CONDITIONS:

Do not apply paints where weather, temperature, humidity or other conditions may have a damaging effect upon finish or paint.

Y91.3030A CLEANING AND PREPARING STEEL SURFACES FOR PAINTING:

Ensure metal surfaces are thoroughly cleaned, all mill and weld scale removed and finally degreased. Clean steel surfaces in accordance with BS EN ISO 8503 and prepare surfaces for painting in accordance with BS EN ISO 4618-3.

Y91.3030B CLEANING AND PREPARING SURFACES FOR PAINTING:

Ensure metal surfaces are thoroughly cleaned, all mill and weld scale removed and finally degreased. Prepare surfaces for painting in accordance with BS EN ISO 4618-3.

Y91.3040 APPLICATION OFF-SITE:

Wherever possible ensure paint finishes applied by component manufacturers are spray applied.

Y91.3050 APPLICATION:

Apply paint evenly and ensure finish shows no excessive brush marks, grinning, runs, sagging, ropiness or other application defects.

Y91.3060 COLD GALVANIZING:

Repair damage to galvanized components due to installation process, i.e. following cutting, drilling or welding, by applying 2 no. substantial coats of cold galvanizing paint.

Y91.3070 PROTECTION OF BRIGHT MACHINE PARTS:

Apply a protective coating to all bright machined parts before despatch from works.

Do not remove protective coatings unless required for installation, testing or commissioning purposes and in such cases reinstate upon completion.

Repair any damaged protective coating or bright machined part, or where necessary replace damaged component.

Use and apply metal coatings in accordance with manufacturer's instructions.

Complete where possible all welding, drilling, bending and other work before metal coating.

Appendix 2 – Mechanical Services Tender Drawings:**Drawing No.****Drawing Title**

ISU-HTP3332-SS-00-DR-M701	Prop Seven Sisters Abv grd drainage sht 1 of 2
ISU-HTP3332-SS-00-DR-M702	Prop Seven Sisters Abv grd drainage sht 2 of 2
ISU-HTP3332-SS-00-DR-M801	Prop Seven Sisters H&C Water Services sht 1 of 2
ISU-HTP3332-SS-00-DR-M802	Prop Seven Sisters H&C Water Services sht 2 of 2
ISU-HTP3332-SS-00-DR-M901	Prop Seven Sisters Ventilation Services sht 1 of 2
ISU-HTP3332-SS-00-DR-M902	Prop Seven Sisters Ventilation Services sht 2 of 2
ISU-HTP3332-SS-00-DR-ME103	Proposed Seven Sisters Water Services Site Layout

Appendix 3 Risk Assessments

Refer to separate document

Part 2

Sub-Tender Cost Break Down

NPT Industrial Units – Seven Sisters Site – 6No. Units**Mechanical Services Summary of Tender:**

Mechanical Ventilation Services	£.....
Hot and Cold Water Services	£.....
Underground Mains Water Services	£.....
Above Ground Drainage Services	£.....
Sanitary Ware (Installation Only)	£.....
Builders Work	£.....
Commissioning/Testing	£.....
Operational and Maintenance Manuals	£.....
TOTAL MECHANICAL SERVICES (EX VAT)	£.....

TO BE BROUGHT FORWARD TO MAIN TENDER SUMMARY