FOWLER MARTIN

CHARTERED BUILDING SERVICES ENGINEERS

MECHANICAL SERVICES SPECIFICATION AND TENDER SUMMARY

UNIVERSITY COLLEGE LONDON
JOHN ADAMS HALL
FLOORS 1 TO 4, PART GROUND FLOOR AND BASEMENT REFURBISHMENT
SUMMER WORKS 2017

REF: SH-1629-MS-SPEC (VERSION 1.0)

10 MARCH 2017

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CIBSE LOW CARBON CONSULTANTS

BAFE Modular Scheme SP203 - Part 1
Modular Scheme SP203 - Part 4

THE BRITISH ASSESSMENT BUREAU ISO9001

THE BRITISH ASSESSMENT BUREAU ISO14001

DOCUMENT RECORD

UNIVERSITY COLLEGE LONDON
JOHN ADAMS HALL
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BASEMENT REFURBISHMENT
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SPECIFICATION AND TENDER SUMMARY
MECHANICAL SERVICES

Version	*Date*	*Description*	*Modified By:*	*Checked By:*
1.0	10-03-17	Tender Issue	SH	SA

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FORMAT OF THE SPECIFICATION

SCOPE OF WORKS

A brief outline of the works to be undertaken.

CONTENTS

A schedule of Parts, Sections and Clause headings as they appear in the Specification.

ABBREVIATIONS

A list of abbreviations which may be used in this Specification and on the Contract Drawings.

SITE SPECIFIC WORKS INFORMATION NEC

This part of the Specification details the Form of Contract and any other alterations required to the Contract together with additional general conditions that must be observed.

THE WORKS

This part of the Specification describes the extent of the works and general requirements applicable to all trades.

REFERENCE CLAUSES

This part of the Specification comprises detailed clauses that are to be cross referenced with ‘The Works’ clauses.

APPENDICES

Additional information as appropriate.

SCOPE OF THE WORKS

John Adams Hall is a six storey student residence building for University College London. This specification details the mechanical services works to be carried out on the basement, ground, 1st, 2nd, 3rd and 4th floors of the building during the summer shutdown.

Note that some works shall also be carried out within the 4th floor plantrooms and throughout all floors for extract ventilation cleaning.

In brief the mechanical services elements comprise:

- **Validations prior to any works commencing, as described on the contract drawing.**
- Basement ventilation adaptations serving Kitchen B34.
- Validate, service and set to work 3 No. existing supply ventilation systems serving basement kitchens.
- Validate, service and set to work 3 No. existing extract ventilation systems serving basement kitchens.
- Internal cleaning of all existing extract ductwork throughout the building, basement to 4th floor inclusive.
- Installation of extract fans within kitchens, WCs and wet rooms.
- Installation of all recirculative and ducted kitchen extract hoods and grease filters.
- Installation of new thermostatic mixing taps serving wash hand basins, set to 43°
- Installation of new shower panels and assemblies in place of existing showers.
- Installation of new TMVs to serve kitchen sinks set to 50°C and domestic water modifications.
- Installation of new extract grilles within wet rooms.
- Above ground drainage modifications/reconnections.
- Testing and commissioning.
- Production of UCL standard O & M manual.

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ABBREVIATIONS:

A	Ampere
AAV	Automatic air vent
ABS	Acrylonitrile budadiene styrene
AC	Alternating current
ad hoc	for this special purpose, improvised
ad lib	impromptu
ad libitum	impromptu
ac	air changes
ACE	Association of Consulting Engineers
ACOP	Approved Code of Practice
AS	Access door
ASHRAE	American Society of Heating, Refrigeration and Air Conditioning Engineers
ATD	Air terminal device
ASD	Atmospheric sensing device
AV	Air vent
AVCD	Automatic volume control damper
BE	Black enamel
BEAMA	British Electrical and Allied Manufacturers' Association
BEMS	Building Energy Management System
BESA	British Electrical Systems Association
BHWS	Blended hot water service
Bone fide	in good faith, genuine
BSRIA	Building Services Research and Information Association
BPV	Ball plug valve
BRE	Building Research Establishment
BRECSU	Building Research Establishment Conservation Support Unit
BS	British Standard
BSC	Biological safety cabinet
BSI	British Standards Institution
BSCP	British Standard Code of Practice
BSPT	British Standard Pipe Thread
BSRIA	The Building Services Research and Information Association
BZP	Bright zinc plated
CA	Contract Administrator
CD	Compact Disc
CFC	Chlorofluorocarbon
CI	Cast iron
CIBSE	Chartered Institution of Building Services Engineers
CIC	Construction Industry Council
CF	Cold feed
CFR	Constant flow regulator
CORGI	Council for Registered Gas Installers
COSHH	Control of Substances Hazardous to Health
CPC	Circuit protective conductor
CS	Commissioning set
CT	Constant temperature

CVS	Commissioning valve set
CWS	Cold water service (Cistern fed)
DC	Direct current
DCV	Double check valve
DIN	Deutsches Institut fut Normung
DN	Diamètre nominal (nominal bore)
DOE	Department of the Environment
DRV	Double regulating valve
DV	Drain valve (includes draw-off cocks and drain taps)
DZR	Dezincification resistant
EC(UK)	Engineering Council (UK)
ELCB	Earth leakage circuit breaker
EPBD	Energy Performance and Buildings Directive
EPSCR	Engineering, Physics and Science Research Council
ESI	Electricity Supply Industry
ESTA	Energy Systems Trade Association
ETB	Engineering and Technology Board
F	Flow
F&E	Feed and expansion
FA	From above
FB	From below
FC	Fume cupboard
FD	Fire damper
FEANI	Fédération Européen d'Associations Nationales d'Ingénieurs (European Federation of National Engineering Associations)
FFL	Finished floor level
FMD	Flow measurement device
FMV	Flow measurement valve
FOC	Fire Offices' Committee
FODRV	Fixed orifice double regulating valve
GC	Gauge cock
GPFC	General purpose fume cupboard
GRP	Glass reinforced polyester
GSS	Galvanised sheet steel
HCFC	Hydrochlorofluorocarbon
HDPE	High density polyethylene
HL	High level
HOFR	Heat resisting, oil resisting and flame retardant
HPHW	High pressure hot water
HRC	High rupture capacity
HSE	Health and Safety Executive
HTG	Heating
HU	Hose union
HV	High Voltage
HVAC	Heating Ventilating and Air Conditioning
HVCA	Heating and Ventilating Contractors Association
HWS	Hot water service
Hz	Hertz

IBV	Isolating ball valve
IEE	Institution of Electrical Engineers
IET	Institution of Engineering and Technology
ICEL	Industry Committee for Emergency Lighting
I Mech E	Institution of Mechanical Engineers
IR	Insulation resistance
IV	Isolating valve
J	Joule
JCT	Joint Contracts Tribunal
k	kilo
LFCDA	London Fire and Civil Defence Authority
LIF	Lighting Industry Federation
LL	Low level
LPHW	Low pressure hot water
LPV	Lubricated plug valve
LSF	Low smoke and fume
LSV	Lock shield valve
LV	Low Voltage
m	metre(s)
MCB	Miniature circuit breaker
MCCB	Moulded case circuit breaker
MEL	Maximum exposure limit
MICC	Mineral insulated copper covered
mm	millimetre(s)
MPHW	Medium pressure hot water
MSC	Microbiological safety cabinet
MTel	Mobile telephone number
MuPVC	Modified unplasticised polyvinylchloride
MWS	Mains water service
N	Newton
NB	Nota bene (note well)
nb	nominal bore
NICEIC	National Inspection Council for Electrical Installation Contracting
NRV	Non-return valve
od	outside diameter
ODD	Oxygen depletion device
OES	Occupational exposure standard
ODPM	Office of the Deputy Prime Minister (UK Government)
OV	Open vent
P	Primary
Pa	Pascal
PB	Polybutylene
PCB	Polychlorinated biphenyl
PCB	Printed circuit board
PE	Polyethylene
PE-X	Cross linked polyethylene
ph	phase
PHE	Plate heat exchanger
PP	Polypropylene
ppm	parts per million

PSA	Property Services Agency
PTFE	Polytetrafluoroethylene
PVC	Polyvinylchloride
PVC-C	Chlorinated polyvinylchloride
PVC-U	Polyvinylchloride (unplasticised)
PVDF	Polyvinylidenefluoride
PWC	Physical water conditioner
R	Return
RAEng	Royal Academy of Engineering
RAFC	Radio active fume cupboard
RCBO	Residual current breaker with over-load protection
RCCB	Residual current circuit breaker
RCD	Residual current device
REHVA	Federation of European Heating and Air Conditioning Associations
RIBA	Royal Institute of British Architects
RICS	Royal Institution of Chartered Surveyors
RSJ	Rolled steel joist
RV	Regulating valve
SAP	Standard Assessment Procedure
SC	Stop cock
SEC	Secondary
SBEM	Simplified Building Energy Model
SO	Socket outlet
SO	Supervising Officer
SV	Safety valve
TA	To above
TB	To below
Tel	Telephone number
TP	Test point
UPS	Uninterruptible power supply
uPVC	unplasticised polyvinylchloride
UCL	University College London
UV	Ultra violet
V	Volt
VAV	Variable air volume
VCD	Volume control damper
VIR	Vulcanized India rubber
VODRV	Variable orifice double regulating valve
VRF	Variable refrigerant flow
VRI	Vulcanized rubber insulated
VRV	Variable refrigerant volume
W	Watt
WHV	Wheel head valve
WRAS	Water Regulations Advisory Scheme
WRC	Water Research Company
XLPE	Cross linked polyethylene

A10 PROJECT PARTICULARS

110.000 THE PROJECT

Particulars of the project as a whole are:

University College London
Residents Summer 2017 Works

John Adams Hall - Building Services Modifications and Additions

120.000 THE EMPLOYER – (CLIENT)

University College London
Engineering, Maintenance & Infrastructure
UCL Estates
Bidborough House
20 Mabledon Place
London WC1H 9BF

125.000 THE CHIEF ENGINEER

The Deputy Head of EM&I
University College London
Engineering, Maintenance & Infrastructure
UCL Estates
Bidborough House
20 Mabledon Place
London WC1H 9BF

130.000 PRINCIPAL CONTRACTOR (CDM)

To Be Confirmed

140.000 EMPLOYER'S REPRESENTATIVE

Faithful & Gould
31st Floor
Euston Tower
286 Euston Road
London NW1 3AT

150.000 PRINCIPAL DESIGNER

Faithful & Gould
31st Floor
Euston Tower
286 Euston Road
London NW1 3AT

200.000 CONSULTANTS

MECHANICAL AND ELECTRICAL CONSULTANT

Fowler Martin Ltd
1-2 Grange Court
The Limes
Ingatestone
Essex
CM4 0GB

Tel: 01277 350 802

A11 TENDER AND CONTRACT DOCUMENTS

110.000 THE TENDER DRAWINGS

The tender drawings are listed in Appendix A.

120.000 THE CONTRACT DRAWINGS

The contract drawings are the tender drawings.

140.000 THE PRE-CONSTRUCTION INFORMATION

The ‘Pre-Construction Information’ is a separate document included in the tender package if the project is subject to the requirements of the Construction (Design and Management Regulations).

150.000 INSPECTION

Drawings and other documents relating to the Contract generally may be inspected, by appointment, prior to the submission of tender.

A12 THE SITE/ EXISTING BUILDINGS

110.000 THE SITE/EXISTING BUILDINGS

Drawings showing the site/existing buildings are listed in Appendix A.

130.000 EXISTING MAINS AND SERVICES

The existing services have been identified by visual inspection only and the precise routes/locations of some services cannot be established at this stage.

The Sub-Contractor is to inspect the existing services installation prior to tender and to establish any further information needed to programme and accurately price the works.

The Sub-Contractor's attention is drawn to the drawings showing known existing services and drainage within the site. No claims for want of knowledge of the location/depth of services shall be awarded.

The Sub-Contractor shall establish all necessary levels for the setting out of the works and the location of all services passing through the site, whether necessary for the Contract works or not.

The Sub-Contractor shall protect and maintain all pipes, ducts, sewers, service mains cables and the like until the completion of the works. If they are damaged due to any cause within the Sub-Contractor's control he shall arrange for their prompt reinstatement to the satisfaction of the authorities concerned and pay any costs or charges in connection therewith.

The Sub-Contractor shall not interfere with the operation of existing services.

140.000 HEALTH AND SAFETY FILE

The Health and Safety File for the site/ building may be seen by appointment during normal office hours at the office of Estates, UCL, by arrangement with the Employer.

160.000 ACCESS TO THE SITE

Access to the area of work will only be granted by prior arrangement with UCL Estates/Main Contractor.

The Sub-Contractor will not be given possession of any passenger lifts serving the building(s).

The Sub-Contractor will be given possession of the relevant plant rooms in the building under the UCL 'Permit to Work' procedure in order to carry out mechanical

and electrical work. Access is to be maintained and allowed at all times for UCL maintenance staff to those plant rooms.

Access for operatives will be available during normal working hours Monday to Friday (except Public Holidays) and at other times by special permission from the ER at least 72 hours in advance of commencement of works.

All rubbish debris and bulk materials to be bagged at its point of origin before being moved through the building.

161.000 PARKING

Restrictions on parking of the Sub-Contractors' and employees' vehicles:

The 'site' lies within the Congestion Charging Zone and the Sub-Contractor is deemed to have included all such costs from complying with the congestion charge with its tender.

Parking of the Sub-Contractor's vehicles will not be permitted other than for delivery and/or collection of materials.

Adequate arrangements for reception of materials and equipment shall be made with suppliers to ensure rapid unloading and to minimise time spent on UCL premises.

162.000 USE OF THE SITE

General: Do not use the site for any purpose other than carrying out the works.

The Sub-Contractor is to note that existing buildings will be occupied by staff and students at all times.

Entrances and exits are to be kept clear and unobstructed at all times.

163.000 SITE RESTRICTIONS

The playing of portable radios will not be permitted under any circumstances on UCL premises. The Sub-Contractor should make full provision for working safely within an occupied building.

The Sub-Contractor must also allow UCL Student Accommodation to carry out their summer business activities throughout the contract period in a safe and un-impeded manner.

All areas (other than specific work areas) will be fully occupied for the full duration of the works. Works hours are to be between 8.30am and 5.00pm with no noisy work prior to 10.00am and after 4.00pm Monday to Friday.

All staircases, corridors and entrances must be kept free of all plant, materials and rubbish during UCL hours.

The Sub-Contractor shall provide all his staff and visitors entering UCL property with means of identification to be produced when requested to do so by any member of UCL staff.

164.000 SURROUNDING LAND/ BUILDING USES

General: Adjacent or nearby uses or activities are as follows:

Restricted Areas: Where it is essential to work outside of his designated site area, it will be necessary for the Sub-Contractor to obtain a 'Permit to Enter/Work'.

This will include the following areas:
a) all plant rooms
b) all switch rooms
c) all lift motor rooms
d) all water tank rooms
e) all telephone exchange/Comms rooms

165.000 PERMIT TO WORK SYSTEMS

UCL operates a number of Permit to Work systems. The Sub-Contractor will require a permit to work for the following:

a) permit to work/enter a restricted area
b) entry into confined spaces
c) hot work - use of heat or flame producing equipment (welding/burning)
d) permit to work on specific system

Permit to Work procedures are attached at Appendix B. The Sub-Contractor shall allow in his tender for all costs associated with complying with these requirements.

The Sub-Contractor shall allow for co-ordinating all permits for sub Sub-Contractors and be responsible for signing for access keys. Access keys and permits shall be returned to issuing officer at expiry of the permit. Failure to return a key may result in the Sub-Contractor being charged £100 for its replacement.

170.000 SITE VISIT

Before tendering, ascertain the nature of the site, access thereto and all local conditions and restrictions likely to affect the execution of the contract Works. The Sub-Contractor may make site visits by prior arrangement with University College London, Estates.

A13 DESCRIPTION OF THE WORK

130.000 PREPARATORY WORK BY OTHERS

Prior to the Contract commencing the Employer will remove all items of loose equipment from the area. Fixtures and fittings will not be removed by the Employer.

140.000 THE WORKS

The works shall generally be as described under 'The Scope of Works' at the front of this Specification

240.000 ELECTRICAL SUPPLY

The definition of voltage levels used in this document are as follows:

High Voltage – Voltages exceeding low voltage, as defined in The Electricity Supply Regulations 1988.

Low Voltage – Voltages exceeding extra low voltage but not exceeding 1000V ac or 1500V dc between conductors, or 600V ac or 900V dc between conductors and earth, as defined in BS 7671.

Extra Low Voltage – Voltages not exceeding 50V ac or 120V ripple free dc whether between conductors or to earth, as defined in BS 7671.

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

Any electrical equipment supplied shall comply with the requirements of the Local Electricity Supplier and the limits for harmonics shall not exceed the limits stated in Engineering Recommendation G 5/4.

250.000 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^{o}C dry bulb.

- Maximum conditions of 40^{o}C dry bulb and 50 per cent relative humidity.
- Supply voltage approximately sinusoidal

Protect equipment to BS EN 60529:1992+A2:2013.

260.000 ROOM TERMINAL 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 ER, which terminals are subject to final positioning onsite.

Allow for the movement of all such terminals up to a radius of 2.0m from the positions shown on the drawings.

Mounting heights indicated in tender documents are for tender purposes only. Confirm mounting heights with the ER before commencing work on site.

270.000 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 EN 62305-1:2006, BS EN 62305-4:2006, BS EN 62305-2:2006, BS EN 62305-3:2006. Ensure all equipment meets the requirements of the appropriate electromagnetic compatibility standard.

Standard
Particular Scientific and Medical
- BS EN 61000-6-4
- BS EN 55011

Fluorescent lamps and Luminaires
- BS EN 55015:2013+A1:2015

Information and technology equipment
- BS EN 55032:2012

Broadcast receivers and associated equipment
- BS EN 55013 and BS EN 55020

Industrial process measurement and control
- BS EN 60801-2

Other equipment to generic standards
Emissions
Domestic, commercial and light industrial

- BS EN 61000-6-3
- BS EN 55014-1

Immunity

Domestic, commercial and light industrial

- BS EN 61000-6-1
- BS EN 55014-2

Ensure all apparatus covered by the Wireless Telegraphy Act meets regulations issued by the Radio communications Agency.

Ensure all equipment and systems meet the requirements of BS 6701 and BS EN 41003.

Ensure that all cable installations meet the minimum guidance separation in Recommended cable Separations to Achieve Electromagnetic Compatibility (EMC) in Buildings, current editions, published by the EPM.

280.000 PERFORMANCE CHARACTERISTIC DETAILS

Details of the equipment as selected for inclusion into the Works and shall include, in a format to be agreed, 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, start/hour and starting time.
- Performance characteristics - (full load current and power factor).
- Noise level.
- Weight.

290.000 SOFTWARE

Obtain on behalf of the end user all appropriate licenses, 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 7649:1993.

A20 THE CONTRACT

100.000 CONTRACT

Refer to Main Contract Site Specific Works Information.

110.000 DESIGN

The Sub- Contractor is required to undertake the design of the following part or parts of the Works:

- Preparation of builder's work drawings applicable to the services being installed.
- Design, selection, drawing and fabrication of brackets, supports, fixings, casings, enclosures, cabinets, cupboards, etc. associated with the services installation.
- Preparation of working and fabrication drawings, etc. associated with the services installation.
- The co-ordination of detailed services elements within the building fabric.
- The routing and sizing of conduits, trunking, etc. associated to the services installation.
- Provisions to prevent damage due to expansion of pipework and/or conduit.
- Selection of items specified by performance.

250.000 PRODUCT GUARANTEES AND WARRANTIES

Product guaranties and warranties provided by manufacturers, shall be valid or be extended up to the end of the Defects Liability Period.

Any product guaranteed or warranted by a manufacturer for a period of time which extends beyond the end of the defects Liability Period shall remain under guarantee or warranty up to the end of the extended period.

Copies of all guarantees or warranties include in each Operation and Maintenance Manual and hand over one additional set on or before Practical Completion.

A30 TENDERING/ SUBLETTING/ SUPPLY

280.000 SUB-CONTRACT SPECIFICATION WITHOUT QUANTITIES

Where and to the extent that quantities are not included in the specification, tenders must include for all work shown or described in the tender documents as a whole or clearly apparent as being necessary for the complete and proper execution of the Works.

332.000 A SCHEDULE OF RATES

A schedule of rates must be submitted:

- Within the tender return.
- It must include all items and materials included in the tender, together with their rates, extended and totalled. Price Preliminaries separately. Such totals shall agree with the Contract Sum and subtotals shall agree with the priced breakdown of the tender.
- Correction of errors in the quantification will not lead to adjustment of the Contract Sum.

360.000 PROGRAMME

To be agreed with the Main Contractor

370.000 TENDER STAGE METHOD STATEMENTS

Method statements must be submitted before the execution of the contract describing health and safety considerations and how and when the Sub-Contractor proposes and undertakes to carry out the following:

- Builders work
- Craning
- Testing and commissioning
- Temporary works
- Shut downs for changeover of plant

390.000 ALTERNATIVE MANUFACTURERS/SUPPLIERS

In addition to and at the same time as the tender for the Subcontract Works as defined in the tender documents, the Sub-Contractor may, at his discretion, submit alternative manufacturers or suppliers for consideration. Alternatives which would involve significant changes to other work will not be considered.

Such alternative(s) must include all additional costs arising from necessary changes to the details of the installation, including changes to the design and drawings, as well as any associated ancillary equipment items.

Such alternative(s) is/are deemed to be alternative tender(s) and each must include a complete and precise statement of the effects on cost and programme.

Full technical data for each such alternative must be submitted with the Tender together with details of any consequential amendments to the design and/or construction/installation of other parts of the Works.

505.000 SUB SUB-CONTRACTS

Where the Sub-Contractor proposes to sublet any portion(s) of the Sub-contract Works a list must be submitted with the Tender. The list will define such portion(s) and give, for each, the name and address of the proposed Sub Sub-Contractor.

A31 PROVISION, CONTENT AND USE OF DOCUMENTS

100.000 DEFINITIONS AND INTERPRETATIONS

120.000 DEFINITIONS

Meaning: Terms, derived terms and synonyms used in the preliminaries/ general conditions and specification are as stated therein or in the appropriate British Standard or British Standard glossary.

125.000 TERMS USED IN SPECIFICATION

Remove: Isolate, drain, make safe, disconnect, dismantle as necessary and take out the designated products or work and associated accessories, fastenings, supports, linings and bedding materials. Dispose of unwanted materials.

Fix: Unload, handle, store, place and fasten in position including all labours and use of site equipment.

Supply and fix: Includes all labour and site equipment for unloading, handling, storing and execution. All products to be supplied and fixed unless stated otherwise.

Keep for reuse: Do not damage designated products or work. Clean off bedding and jointing materials. Stack neatly, adequately protect and store until required by the Employer or for use in the Works as instructed.

Make good: Execute local remedial work to designated work. Make secure, sound and neat. Includes local redecoration and/ or replacement.

Replace: Supply and fix new products matching those removed. Execute work to match original new state of that removed.

Repair: Execute remedial work to designated products. Make secure, sound and neat. Excludes redecoration and/ or replacement.

Refix: Fix removed products.

Replace: Supply and fix new products matching those removed. Execute work to match original new state of that removed.

Ease: Adjust moving parts of designated products or work to achieve free movement and good fit in open and closed positions.

Match existing: Provide products and work of the same appearance and features as the original, excluding ageing and weathering. Make joints between existing and new work as inconspicuous as possible.

System: Equipment, accessories, controls, supports and ancillary items, including installation, necessary for that section of the work to function.

140.000 MANUFACTURE AND REFERENCE

Definition: When used in this combination:

- Manufacturer: The firm under whose name the particular product is marketed.
- Reference: The proprietary brand name and/ or reference by which the particular product is identified.
- Currency: References are to the particular product as specified in the manufacture's technical literature current on the date of the invitation to tender.

146.000 CURRENCY OF DOCUMENTS

Currency: References to published documents are to the editions, including amendments and revisions, current on the date of the Invitation to tender.

232.000 THE SPECIFICATION

Specification: All sections must be read in conjunction with Main Contract Preliminaries/General conditions.

240.000 DRAWINGS BY THE ENGINEER

The drawings show the general arrangement of the works and design intent but do not necessarily show the exact runs of the pipes, ducts, cables or conduits nor the exact number of fittings required. The Installation Sub-Contractor shall visit site prior to tender to assess the full extent of the work and shall include in his tender for every service and fitting necessary for the proper execution of the work. Dimensions are to be checked on site.

This Specification is to be read in conjunction with the Contract Drawings, one elucidation the other.

In the event of any discrepancy arising between the Drawings and the Specification the Engineer shall decide which is to be followed. Such discrepancies must be pointed out at the time of tendering and will not be accepted as a claim for extra works or materials costs.

315.000 INSTALLATION DRAWINGS BY THE SUB-CONTRACTOR

The Sub-Contractor shall provide co-ordinated installation drawings, builder's work details and comprehensive wiring diagrams in good time for perusal and comment by the Engineer before any installation work is commenced.

The Sub-Contractor shall bear any costs he may incur as a result of delay in providing such drawings, samples, patterns, models or information or as a result of

errors, omissions or discrepancies therein, for which the Sub-Contractor is responsible.

The Sub-Contractor shall at his own expenses carry out, or bear the reasonable cost of, any alterations or remedial work necessary for such errors, omissions or discrepancies for which he is responsible and modify the drawings, samples, patterns, models or information accordingly.

The Sub-Contractor shall at no extra cost to the Employer, amend Working Drawings during the course of the works to show the proposed works whether occasioned by additional works, omitted works, omitted works or for clarity.

Setting out of all works must be approved by the Engineer before final fixing.

Obtain all the information which Sub Sub-Contractors are required to provide in time to meet the programme. Thoroughly check, on the basis of the information available, that dimensions are correct, that account is taken of all related work and that construction is practicable. Note any comments on one copy of the design/production information then submit to the ER with the required number of additional unmarked copies. Such checking will not relieve the ER or the Sub Sub-Contractor(s) of their respective responsibilities for design, co-ordination and documentation.

The Employers Representative (ER) will note any comments on one copy, then return to the Sub-Contractor. Inspection and any comments made by the ER will not relieve the Sub Sub-Contractor(s) of responsibility for design and documentation.

A32 MANAGEMENT OF THE WORKS

140.000 MONITORING

- Progress: Record on a copy of the programme kept on site.

- Avoiding delays: If any circumstances arise which may affect the progress of the Works submit proposals or take other action as appropriate to minimize any delay and to recover any lost time.

The Sub-Contractor shall monitor the progress of the works by "marking up" at no more than monthly intervals a copy of the final agreed master programme to indicate the actual progress of all activities shown thereon. The "marked up" programme shall be kept on site.

160.000 COVERING-UP

Ensure no section of the Works are covered, concealed or insulated until completion of a witnessed satisfactory test.

Give notice when Works which are to be covered or concealed are ready for examination and/or measurement, not less than 7 days.

Give notice to ER.

A33 QUALITY STANDARDS/ CONTROL

110.000 GOOD PRACTICE

Where and to the extent that products or work are not fully documented, they are to be:

- of a kind and standard appropriate to the nature and character of that part of the Works where they will be used.
- suitable for the purposes stated or reasonably to be inferred from the project documents.

In accordance with good engineering practice.

111.000 WORKMANSHIP SKILLS

Operatives: Appropriately skilled and experienced for the type and quality of work.

Registration: With Construction Skills Certification Scheme.

Evidence: Operatives must produce evidence of skills/ qualifications when requested.

112.000 SUSTAINABLE RESOURCES

Materials to be used from sustainable resources where practicable.

113.000 QUALITY OF PRODUCTS

Generally: New.

Supply of each product: From the same source or manufacturer.

Whole quantity of each product required to complete the Works: Consistent in kind, size, quality and overall appearance.

Tolerances: Where critical, measure a sufficient quantity to determine compliance.

Deterioration: Prevent. Order in suitable quantities to a programme and use in appropriate sequence.

170.000 DELETERIOUS MATERIALS

No material generally known to be deleterious are to be used in, or incorporated into, any temporary or permanent Works forming part of the Project.

In particular none of the following items are to be used:

- Asbestos or asbestos based products
- Urea formaldehyde or materials which may release formaldehyde in quantities which may be hazardous with reference to the limits set by the HSE
- Material containing fibres less than three microns diameter or 200 microns long
- Lead or any material or product containing lead which may be ingested, inhaled or absorbed
- Polychlorinated biphenyl
- Fibres not sealed or otherwise stabilised to ensure that migration is prevented
- Vermiculite containing fibrous dust
- Polytetrafluoroethylene (IPTFE) except for pipework jointing
- calcium silicate bricks or materials

Any other products or materials which are generally known within the Building Industry to be deleterious or hazardous to health or safety or to the durability of the property in the circumstances in which they are used including:

- High alumina cement and/or concrete
- Woodwool slabs used as permanent shuttering
- Calcium chloride in admixtures for use in reinforced concrete
- Sea-dredged aggregates for use in reinforced concrete which do not comply with current British Standards
- Aggregates for use in concrete which do not comply with current British Standards
- Alkali reactive aggregates

The Sub-Contractor shall check with the manufacturers and/or suppliers of products and materials that any specified product contains such material. If any specified product contains such material, the Sub-Contractor shall request and alternative specification of product or manufacturer.

171.000 STANDARDS AND REGULATIONS

Provide all materials and works in accordance with the appropriate British Standard or Code of Practice and where no BS or CP is applicable the Agreement Certificate for the particular item.
Comply with all statutory instruments and regulations, relating to the area of the site current at

- the date of tender.

Comply with the requirements of the Local Authority Building Inspector.
Comply with all Statutory Obligations arising from current legislation and regulations, together with other requirements, including, but not limited to, the following:-

- Statutory Obligations
- Health and Safety at Work
- Management of Health & Safety at Work Regulations
- The Working Time Regulations
- Gas Safety, Management Regulations
- Gas Safety (Installation and Use) Regulations
- Building Regulations
- London Building Act and/or Building (Inner London) Regulations
- Public Health Acts
- Electricity Acts
- Electricity, Safety, Quality and Continuity Regulations Electricity at Work Regulations
- The Factories Act
- Clean Air Act
- Clean air (Arrestment Plant) (exemption) Regulations
- The Control of Pollution Act
- Control of Pollution (Amendment) Act
- Workplace (Health, Safety and Welfare) Regulations
- The Construction (Design and Management) Regulations
- Health and Safety (Display Screen Equipment) Regulations
- Control of Substances Hazardous to Health (COSHH) Regulations
- Control of Asbestos at work regulations
- Control of Asbestos at work Amendment, regulations
- Provision and Use of Work Equipment Regulations
- Personal Protective Equipment at Work Regulations
- The Construction (General Provisions) Regulations
- The Construction (Lifting Operations) Regulations
- The Docks Regulations
- Other relevant Safety Regulations
- Liquid Petroleum Regulations
- Public Utility Company and/or Statutory Authority regulations, specifications, and requirements.
- British Standards and Codes of Practice.
- BS 7671 - Requirements for Electrical Installations (IEE Wiring Regulations).
- Insurance Company Requirements.
- LDSA Fire Safety Code.
- IEC Standards.
- Notify all authorities in accordance with their regulations and obtain any required approvals for the installation.
- Where no specific design, performance or installation standards are quoted the following shall apply.
- C.I.B.S.E Guide Books
- Institute of Plumbing - Plumbing Engineering services design guide.
- C.I.B.S.E Technical Memoranda.

- 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 at the same location.
- Supply plant and equipment to achieve the specified design conditions and to provide stable control.

172.000 SERVICES REGULATIONS

New or existing services: Comply with the Bye Laws or Regulations of the relevant Statutory Authority.

173.000 WATER REGULATIONS/ BYELAWS NOTIFICATION

Requirements: Notify Water Undertaker of any work carried out to or which affects new or existing services and submit any required plans, diagrams and details.

Consent: Allow adequate time to receive Undertaker's consent before starting work. Inform immediately if consent is withheld or is granted subject to significant conditions.

174.000 WATER REGULATIONS/ BYELAWS SUB-CONTRACTOR'S CERTIFICATE

On completion of the work: Submit (copy where also required to the Water Undertaker) a certificate including:

- The address of the premises.
- A brief description of the new installation and/or work carried out to an existing installation.
- The Sub-Contractor's name and address.
- A statement that the installation complies with the relevant Water Regulations or Bylaws.
- The name and signature of the individual responsible for checking compliance.
- The date on which the installation was checked.

190.000 TEST CERTIFICATES

Where testing specific to the project is required, ensure test certificates include:

Project title.
Details and date of test.
Instruments used, serial numbers, calibration dates.
Signature of those witnessing test.
Sub-Contractor's name.
Specific location of the item in the Works.

191.000 GAS INSTALLATION CERTIFICATE

Before the completion date stated in the contract: Submit a certificate stating:

- The address of the premises.
- A brief description of the new installation and/or work carried out to an existing installation.
- Any special recommendations or instructions for the safe use and operation of gas appliances and flues.
- The Sub-Contractor's name and address.
- A statement that the installation complies with the Gas Safety (Installation and Use) Regulations.
- The name and signature of the Gas Safe (previously CORGI) registered individual responsible for checking compliance.
- The date on which the installation was checked.

220.000 TESTING AND COMMISSIONING OF SERVICES

Agree a programme for pre-commissioning checks, setting to work, commissioning and performance testing, and allow for all costs incurred.
Where required, provide formal method statements supported by risk assessments detailing all commissioning procedures.

Give notice to the ER and state any requirements for the attendance and co-operation of others.

- Not less than fourteen working days.

Provide all necessary facilities to enable tests to be witnessed and inspections carried out either on site or at manufacturer's works.

The ER will only witness test proceedings, confirm recorded results and determine if the specified requirements have been satisfied.

If following test or inspection any plant or part thereof is shown to be defective or not conforming to the specification the ER will reject such defective parts by written notice, within reasonable time, indicating area of dispute.

- Appoint an 'approved engineer', to supervise the whole of the testing, commissioning, performance testing and instruction of client's staff.

Provide all specialized personnel (including manufacturer's representatives) and co-ordinate their activities.

Test all equipment, material and systems as detailed in Sections. If an inspection or test fails, repeat the procedure, until satisfactory results are obtained.

- 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 etc. are provided prior to commencement of commissioning.

- Following satisfactory completion of testing and when the installations are in a safe and satisfactory condition, set to work, regulate and adjust, as necessary, to meet the specified design requirements.

- Provide all necessary instruments and recorders to monitor systems during commissioning and performance testing.

- Provide test equipment subject to a quality assurance procedure complying with BS EN ISO 10012.

- Do not start performance testing, including system demonstration, system proving or environmental and capacity testing, until commissioning of the system is completed to the satisfaction of the ER.

Maintain on site full records of all commissioning and performance testing, cross referenced to system components and on completion of the Works include a copy in each Operating and Maintenance Manual.

Provide all certification documents for approval by the ER before any system is offered for final acceptance.

- Gas, fuel oil, electricity and water for testing and commissioning will be provided by the client

300.000 OPERATION OF SYSTEMS BEFORE THE PRODUCTION OF DRAWINGS AND/OR OPERATION AND MAINTENANCE MANUALS

Provide attendance, at no expense to the Employer, to put into service, operate 24 hours a day and maintain the systems to the Employer's requirements, including the provision of suitable competent labour, in the event that the Record Drawings and/or Maintenance Manuals are not available when the Works would, in the opinion of the ER, otherwise qualify for Practical Completion.

In the event of the Sub-Contractor failing to provide this service satisfactorily the Employer shall be entitled to make his own arrangements and recover the full cost through the Contract.

A34 SECURITY/ SAFETY/ PROTECTION

111.000 PRE-CONSTRUCTION INFORMATION

'The Pre-Construction information' is integral with the Project Preliminaries including, but not restricted, to the following sections:

- Description of project: Sections A10 and A11.
- Client's consideration and management requirements: Sections A12 and A13.
- Environmental restrictions and on-site risks: Section A12 and A34.
- Significant design and construction hazards: Section A34.
- The health and safety file: Section A37.

154.000 OCCUPIER'S RULES AND REGULATIONS

Comply with the occupier's rules and regulations affecting the site.

Copies: "Safety Rules for Sub-Contractors Employed on UCL Premises"

- Location: from Richard Lukos, Safety Adviser (Construction and Maintenance) Safety Services, UCL Estates.
- Arrangements for inspection: Telephone Richard Lukos on 020 3108 8627.

180.000 MAINTENANCE OF EXISTING SERVICES

- Fully maintain all existing services to existing premises during the progress of the Works.
- Fully maintain the following services to existing premises during the progress of the Works.
- Gas
- Water
- Electricity
- Telephones
- Soil and Waste
- Rainwater
- Fire Alarms

Provide any additional work and materials necessary to maintain these services at all times during the duration of the Contract. Any existing services disturbed by the Works are to be reinstated fully in accordance with the standards of quality defined in the specification and to the satisfaction of the ER.

Make all connections to existing services out of normal working hours.

200.000 MOBILE TELEPHONES

Use: Not permitted in the following areas:

- All occupied areas and corridors.

220.000 NOISE

Standard: Comply generally with the recommendations of BS 5228 – 1, clause 9.3 to minimize noise levels during the execution of the Works.

Noise levels from the works: Maximum level:*70*dB(A) when measured from outside a window of any occupied building.

Equipment: Fit compressors, percussion tools and vehicles with effective silencers of a type recommended by manufacturers of the compressors, tools or vehicles.

Restrictions: Do not use:

- Pneumatic drills and other noisy appliances without consent during the hours of 00.00 to 16.00 Mondays to Fridays or Saturdays without prior permission.

- Radios or other audio equipment or permit employees to use in ways or at times that may cause nuisance.

260.000 FIRE PREVENTION

Duty: Prevent personal injury, death, and damage to the Works or other property from fire.

Standard: Comply with Joint Code of Practice 'Fire Prevention on Construction Sites', published by the Construction Confederation and The Fire Protection Association (The 'Joint Fire Code').

Remove rubbish from all areas of work as it arises.

The use of oil and gas heaters for anti-frost measures and drying out is only permitted away from combustible materials.

All fire exits and means of escape routes, including routes through the areas in the possession of the Sub-Contractor are to be kept clear and unobstructed at all times.

All fire fighting equipment is to be kept in a proper working order.

Plastic sheeting used in temporary screens is to be flame retardant.

The Sub-Contractor is to comply with UCL's Fire Safety requirements as displayed in the building or advised by UCL's Fire Officer and to make site operatives aware of these requirements.

Comply with UCL's hot work permit system.

270.000 SMOKING ON SITE

Smoking will not be permitted on site or in any UCL buildings.

A37 OPERATION/ MAINTENANCE OF THE FINISHED INSTALLATIONS

101.000 SUBMISSION OF RECORD DOCUMENTS

To satisfy the provisions of the Health and Safety at Work Act the Employer will not accept handover of the installations until full and adequate information concerning the installations is in the possession of his operating and maintenance staff.

Provide Record Documents - being part of the Works - prior, and as a prerequisite, to Practical Completion to the satisfaction of the ER.

Prepare manuals in draft as the Works progress and make suitable arrangements where the Works are subject to Partial Possession or Sectional Completion.

Submit draft Record Documents to the ER for comment prior to commissioning.

Prepare two temporary Manuals with provisional record drawings and preliminary performance data available at commencement of commissioning to enable Employer's staff to familiarize themselves with the installation. These should be of the same format as the final Manuals with temporary insertions for items which cannot be finalized until the installations are commissioned and performance tested.

Provide the ER with copies of the final Manual TWO WEEKS prior to Practical Completion.

102.000 SUBMISSION OF DOCUMENTS FOR HEALTH AND SAFETY FILE

To satisfy the provisions of the Health and Safety at Work Act the Employer will not accept handover of the installations until full and adequate information concerning the installations is in the possession of his operating and maintenance staff.

Provide Record Documents - being part of the Works - prior, and as a prerequisite, to Practical Completion to the satisfaction of the ER.

Prepare manuals in draft as the Works progress and make suitable arrangements where the Works are subject to Partial Possession or Sectional Completion.

Submit draft Record Documents to the ER for comment prior to commissioning.
Prepare two temporary Manuals with provisional record drawings and preliminary performance data available at commencement of commissioning to enable Employer's staff to familiarize themselves with the installation. These should be of the same format as the final Manuals with temporary insertions for items which cannot be finalized until the installations are commissioned and performance tested.

Provide the ER with copies of the final Manual TWO WEEKS prior to Practical Completion.

Prepare electrical record drawings in accordance with BS EN 61082.

Prepare Operation and Maintenance Manuals for heating systems requiring a trained operator in accordance with BS EN 12170.

Prepare Operation and Maintenance Manuals for heating systems not requiring a trained operator in accordance with BS EN 12171.

110.000 RECORD DOCUMENTS

Provide:

- Record Drawings and Schedules
- Plant Room and Switch Room drawings, schedules and schematics
- Operation and Maintenance Manuals
- Blank Maintenance Logs
- Log book

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 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 the Building Log Book contains the information outlined in Section 3.2 of the Building Regulations Part L2, Conservation of Fuel and Power 2000.

120.000 RECORD DRAWINGS AND SCHEDULES

Prepare Record Drawings and Schedules to a scale not less than 1:50 from the 'As Installed' drawings maintained on site as the Works progress. Endorse all such documents 'RECORD DRAWINGS'. Where agreed with the ER certain detailed information may be provided in schedule form. Prepare electrical drawings in accordance with BS EN 61082.

Provide reduced scale copies for inclusion in the operating and maintenance manuals as detailed in clause A37.150.000

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, 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 at a scale of 1:20 of plantrooms, service subways, trenches, ducts and other congested areas where in the opinion of the ER smaller scale drawings cannot provide an adequate record. Indicate the location, identity, size and details of each piece of apparatus.
- Manufacturers' drawings of equipment indicting 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, alarm priority, control specification reference and any other such parameters as are applicable.
- 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.

130.000 PLANT ROOM AND SWITCH ROOM DRAWINGS, SCHEDULES AND SCHEMATIC DIAGRAMS

Provide good quality plant and switch room drawings, schedules and schematics.

Hang the following in each plant room and switch room, any other appropriate location or where directed by the ER.

- Schematic drawings of circuit layouts showing identification and duties of equipment, numbers and locations, controls and circuits.
- Schedules in the form of printed sheets showing the number, type, location, application /service and symbol, and normal operating position of each means of isolation.
- Control schematics.
- Location of all plant and equipment items including plans and elevations of main switchgear showing physical disposition of switches.
- First aid instructions for treatment of persons after electrical shock.
- All other items required under Statutory or other regulations.
- Location of all incoming service isolating and metering facilities.
- Emergency operating procedures and telephone numbers for emergency call out service applicable to any system or item of plant and equipment.
- Prepare electrical drawings in accordance with BS EN 61082.
- Protect surface of drawings by pressure lamination framing under glass or other rigid, transparent, cleanable and protective surface.

150.000 OPERATION AND MAINTENANCE MANUALS

The 'Operation and Maintenance Manuals' must include:

- A full description of each of the systems installed, written to ensure that the all members of 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.
- Details of how to re-commission so that complex plant services within the building can be re-commissioned by an engineer without any historic knowledge of the systems.
- A photo-reduction of all record drawings together with an index reduced size
- 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 the Risk Assessment and Method Statement for the maintenance requirements to control/eliminate legionella bacteria.
- 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 manufacturers' guarantees or warranties, together with maintenance agreements offered by Specialist Sub-Contractors and manufacturers.
- Copies of Insurance & 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 systems and lubrication schedules for all lubricated items.
- Details of regular tests to be carried out (e.g. water cooling towers etc.)
- 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.
- 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 programmes 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 Sub-Contractors and associated Specialist Sub-Contractors; 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.
- Water hygiene risk assessment method statement

152.000 BMS OPERATION AND MAINTENANCE MANUALS

Confirm that an initial draft of the 'Operation and Maintenance Manual' has been submitted for approval prior to commissioning. Ensure that the operation and maintenance (O&M) documentation is produced as the work proceeds and is updated when necessary. Ensure that this work commences at the start of the contract and is added to/updated as the contract progresses. Confirm that approved final copies of the O&M manuals are provided at handover. Ensure that the O&M manual is properly indexed. Ensure that terminology and references are consistent with the physical identification of component parts.

Confirm that the O&M manual includes the following and is included in the site health and safety file:

- A written description of plant operation.
- Control strategy/logic diagrams recording the final version of configuration software installed at handover.
- Details of system application software configuration.
- A points list including hard and soft-points (all points should have a unique mnemonic)
- A description of user adjustable points.
- Commissioning record details.
- Detailed data sheets for all control components and equipment.
- Wiring circuit details including origin, route and destination of each cable.
- Basic security access to the system.
- Comprehensive instructions for switching on, operation, switching off, isolation, fault finding and procedures for dealing with emergency conditions.
- Instructions for any precautionary measures necessary.

- Instructions for the routine operation of the control system including simple day-to-day guidance for those operating the control system with limited technical skill.
- Instructions for servicing and system upkeep.
- A provision for update and modification.

Confirm that the O&M manual includes comprehensive system operating instructions.

155.000 PRESSURE REGULATIONS

Where plant and equipment provided under this Contract falls in the scope of the 'Pressure Systems and Transportable Gas Containers Regulations 1989' then the following shall apply:

Regulation 5 states that "any person who.....supplies.....any pressure system or any such article shall provide sufficient written information concerning its design, construction, examination, operation and maintenance as may reasonably and foreseeably be needed to enable the provisions of these Regulations to be complied with".

A schedule of articles which shall be provided by the Sub-Contractor and returned to the Engineer at least 6 weeks before Practical Completion of the Contract.

Relevant articles include items such as steam traps, pressure reducing and safety valves, compressed air equipment, pressure vessels, chilling plant over 25kW, bottled gas systems, etc.

156.000 ASSET REGISTER

The appendices of this specification detail an asset register form on which the mechanical/electrical Sub-Contractor shall enter the full details of items of plant, its position and estimated cost of replacement. This form shall be returned to the Estates at least six weeks before practical completion of the contract to enable an asset number to be allocated. A copy of this form shall then be returned to the Sub-Contractor quoting the asset number, which shall be used on record drawings and in maintenance manuals.

UCL maintenance section will produce labels and affix them to the plant.

An item of plant as defined as any item of equipment that will require routine maintenance or is permanently connected to the electrical supply. The location of any item shall accord with the finally allocated room numbers shown on the Architects drawings or a brief description if no such number is allocated (e.g. plant room or roof area). The cost of replacement should be at current prices.

160.000 PRESENTATION OF THE OPERATING AND MAINTENANCE MANUALS

Agree format and contents with the ER.

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.

Final copies of the Manual:

- Number of copies: Provide two hard copies and one electronic copy typed in Word and saved in Adobe Acrobat PDF on a Compact Disk.

As-built drawings:

- Number of copies: Provide two hard copies and electronic AutoCAD copies in PDF and DWG format (to supplied as Compact Disks).

170.000 RECOMMENDED SPARE PARTS

Before practical completion submit to the ER a schedule of spare parts as called for in individual sections and any others that the Sub-Contractor recommends should be obtained and kept in stock by the Employer for maintenance of the services installations. Time scale: 2 weeks before Practical Completion
State against each item the manufacturer's current price, including packaging and delivery to site. Identify those items which are additional to those specified for inclusion in individual Sections.

180.000 TOOLS

General: Provide tools and portable indicating instruments for the operation and maintenance of all services plant and together with suitable means of identifying, storing and securing.

Quantity: Two complete sets.

Time of submission: At Completion.

190.000 TRAINING

Before Completion, explain and demonstrate to the Employer's maintenance staff the purpose, function and operation of the installations including items and procedures listed in the Services Manual.

211.000 PLANT MAINTENANCE

The first year maintenance of “primary plant” within the defects liability period shall be included within the contract. This is particularly relevant to plant where the guarantee is dependent upon a prescriptive maintenance schedule such as chillers, boilers, burners, compressors, pressurisation units, heat exchangers, water softeners, controls, etc.

C10 REMOVAL OF COMPLETE/PART SYSTEMS

PART 1 SYSTEM OBJECTIVES

100.030 SYSTEM DESCRIPTION

The Sub-Contractor shall remove all redundant systems within the contract areas. This shall include the following:

- **All validations are to be complete before any works commence.**
- Domestic water systems
- Above ground drainage
- Kitchen heating serving kick-heaters.
- Extract fans and cooker hoods serving kitchens
- Extract ventilation serving wet rooms

The building shall remain occupied throughout the works and no draining down will be permitted.

All extract hoods, fans, shower consoles etc. shall be given to UCL for storage/spares.

100.045 PLANT ASSET IDENTIFICATION

The Mechanical Sub-Contractor shall be responsible for completing all criteria contained within the 'UCL Asset Collection Form' (refer to appendices), along with obtaining all necessary UCL EQ reference tags from the UCL Maintenance Team, which shall be affixed to all the necessary plant items.

All EQ references for any existing plant which is to be removed shall be identified on the 'UCL Asset Collection Form'.

C14 BUILDING SERVICES SURVEY

PART 1 SYSTEM OBJECTIVES

100.030 SYSTEM DESCRIPTION

Services to be surveyed shall include:

- **(i)** **<u>All validations are to be complete before any works commence.</u> (including fans, wet room grilles, centralised air volumes, TMV pipe centres)**
- (ii) Heating systems
- (iii) Domestic water systems
- (iv) Above ground drainage
- (v) Centralised ventilation systems including roof plantrooms
- (vi) 3 No. dedicated supply and extract ventilation systems serving basement kitchens.

100.045 PLANT ASSET IDENTIFICATION

The Mechanical Sub-Contractor shall be responsible for completing all criteria contained within the 'UCL Asset Collection Form' (refer to appendices), along with obtaining all necessary UCL EQ reference tags from the UCL Maintenance Team, which shall be affixed to all the necessary plant items.

All EQ references for any existing plant which is to be removed shall be identified on the 'UCL Asset Collection Form'.

100.060 DRAWINGS

There are no record drawings available.

P31 BUILDER'S WORK

PART 1 SYSTEM OBJECTIVES

100.010 PERFORMANCE OBJECTIVES

The Main Contractor shall provide attendance on the Mechanical Services Sub-Contractor.

Attendance is deemed to include:

Providing the Mechanical Sub-Contractor with every facility to enable the Services Sub-Contractor to carry out his work in an acceptable manner and in proper sequence.

Providing, adapting and maintaining all temporary roads, pavings and paths, scaffolding, power operated hoisting plant, temporary lighting, cranes, power and water supplies with subsequent removal when these facilities are no longer required.

Clearing away rubbish from designated areas local to the tasks being undertaken.

Providing an area of land for the Services Sub-Contractor's own office and for storage of plant and materials.

The use of messrooms, sanitary accommodation and welfare facilities.

The Services Sub-Contractor will be required to make good the building fabric and seal against all weather conditions where flues, ducts, pipework, conduits, etc. penetrate the external building fabric.

The Services Sub-Contractor shall undertake general fixing of all surface mounted support arrangements i.e. screws, rawl bolts, shot bolts, etc. to ensure continuity of work. The setting-out of the services shall be approved by the Architect/Project Manager prior to the final fixing.

The Services Sub-Contractor must include for marking-out holes necessary for the passage of conduits, etc. and making the positions and dimensions for plant bases, chases, notches, recesses, holes, openings, perforations, trenches, etc. The accuracy of such positioning shall be the responsibility of the Services Sub-Contractor. Fully dimensioned drawings showing the details of the required builder's work must be provided by the Services Sub-Contractor to the Main Contractor in good time to procure plant and materials. Any consequences of failure to comply with this requirement will be remedied at the Services Sub-Contractor's expense and will not be accepted as a charge against the Employer.

R11 FOUL DRAINAGE ABOVE GROUND

PART 1 SYSTEM OBJECTIVES

100.030 SYSTEM DESCRIPTION

The Sub-Contractor shall undertake the supply, delivery, installation, testing and proving correct operation of all above ground drainage relating to this project and shall check that all drainage levels and routes are satisfactory as part of the tender process.

The Sub-Contractor shall liaise with the Local Authority to confirm that the method of connection to existing is acceptable and that the system meets their requirements prior to installation.

All sanitary pipework shall be installed with a minimum fall of 1:40 unless stated otherwise or required by BS EN 12056:2000.

All new kitchen sinks, wash hand basins and baths shall be modified to suitable reconnect to the existing drainage services, where applicable.

Refer to the contract drawings for all drainage requirements to suit the contract areas.

These works shall include:

- Disconnect and reconnect existing WHB wastes within all bedrooms and wet rooms. Basins to have new traps.
- Disconnect and reconnect existing kitchen sink wastes.
- New trapped upstand to serve new dish washer within G32.
- New waste to serving G32 sink and dishwasher, reconnects to existing within B34 kitchen below.

100.035 MAINTENANCE CONTRACT

The Sub-Contractor shall allow for carrying out the first years maintenance for all equipment associated with these systems

PART 2 SELECTION SCHEDULES FOR REFERENCE SPECIFICATIONS

210.000 PIPELINES

210.010 GENERAL

Comply with work section general clauses reference Y10.1000 and those detailed below.

210.050 PLASTICS PIPES AND FITTINGS

PVC-U to BS 4514:2001
- Reference Y10.2480A

PVC-U fittings to BS 4514:2001
- Reference Y10.2490A

Plastics piping systems with structured-wall pipes for soil and waste discharge within the building structure

210.080 GENERAL WORKMANSHIP

Appearance - reference Y10.4010
Spacing - reference Y10.4020
Gradients - reference Y10.4030
Air venting requirements
- Automatic air vents - reference Y10.4040B
- Pipe fittings
- Bends/swept tees - reference Y10.4070A

Pipe sleeves through fire barriers - reference Y10.4125
Manufacturer - Tel : 0161 928 7308
Reference - QWR (seals to be installed on all plastic pipework 50mm dia. and above which pass through floors, all in accordance with manufacturer's instructions)
Connections to equipment - reference Y10.4130
Support spacing - reference Y10.4220

210.120 WORKMANSHIP, PLASTICS PIPES

Solvent welded joints, PVC - reference Y10.8010

251.000 TESTING AND COMMISSIONING OF MECHANICAL SERVICES

251.030 STATIC TESTING

Pressure testing
- Soil, waste, ventilation, anti-siphon and rainwater pipework - reference Y51.2080
- Testing records - reference Y51.2110

290.000 FIXING TO BUILDING FABRIC

290.020 FIXINGS

Fixings - reference Y90.3100

PART 3 SPECIFICATION CLAUSES SPECIFIC TO R11

300.000 PRODUCTS/MATERIALS

310.010 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 cross flow, back fall, 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.

310.020 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.

310.040 INSTALLATION GENERALLY

Install pipes, fittings and accessories in accordance with BS 8000-13, BS EN 12056-2:2000 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 that 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.

310.070 WASTES

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

310.100 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.

310.110 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-siphon pipes above fitment flood level.

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

310.120 BEFORE COMMENCING WORK:

Before commencing work ensure that below ground drainage is ready to receive rainwater or that the discharge can be dispersed by approved means to prevent damage or disfigurement of the building fabric. Ensure any specific painting of surfaces which will be concealed or otherwise inaccessible, is completed.

310.130 ACOUSTIC TREATMENT

All horizontal rainwater stacks which are not installed in service riser cupboards shall be wrapped with acoustic insulation to reduce noise breakout.

All insulation to be carried out by skilled workmen and insulating materials and associated products shall be applied strictly in accordance with the manufacturer’s recommendations.

310.180 CONNECTIONS BETWEEN PIPES OF DIFFERENT MATERIALS:

- Plastic/Vulcathene

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

- Cast iron

Connect cast iron pipework to clay/concrete sockets with bituminized yarn and 1:3 cement: sand mortar, neatly finished, to form a watertight joint.
Connect cast iron pipework to clay pipework using super sleeve adapters.

- Copper

Connect copper pipework to clay/concrete sockets using a caulking bush (brazed on), bituminized yarn and 1:3 cement: sand mortar, neatly finished, to form a watertight joint.
Connect copper pipework to cast iron sockets using a caulking bush (brazed on), bituminized yarn and an approved caulking compound, neatly finished, to form a watertight joint.
Connect copper pipework to cast iron using purpose made copper to iron connectors.

- Galvanized steel

Connect galvanized steel pipework to cast iron sockets with bituminized yarn and molten lead, lead wool or an approved cold caulking compound.
Connect galvanized steel pipework to clay/concrete sockets with bituminized yarn and 1:3 cement: sand mortar, neatly finished, to form a watertight joint.

S12 HOT WATER AND COLD WATER

PART 1 SYSTEM OBJECTIVES

100.030 SYSTEM DESCRIPTION

The Sub-Contractor shall supply and install all domestic water services, as indicated on the contract drawings.

The building shall remain occupied throughout the contract works.

All outlets are to be isolated locally to complete the new installation.

The works shall comprise of the following:

- Supply and install all new stainless steel shower panels in locations of existing.
- Supply and install all new adjustable shower assemblies, in locations of existing percussive arrangements.
- Supply and install all monobloc thermostatic mixing taps to wash hand basins (no flexible connections permitted).
- Supply and install new TMVs to serve kitchen sinks (no flexible connections permitted).
- Local pipework modifications to suit the new installation.
- B34 and G32 installation serving new tea point including dishwasher.
- Pressure test, flush and chlorinate all pipework prior to final isolation.
- Testing and commissioning.
- Carry out water hygiene risk assessment.

100.035 MAINTENANCE CONTRACT

The Sub-Contractor shall allow for carrying out the first years maintenance for all equipment associated with these systems

PART 2 SELECTION SCHEDULES FOR REFERENCE SPECIFICATIONS

210.010 PIPELINES - GENERAL

Comply with work section general clauses reference Y10.1000 and those detailed below.

210.015 APPROVED MATERIALS

Any material, component or piece of apparatus described in this Specification by a brand name, manufacturer's name or figure number, has been assigned by the Engineer and complies with the requirements of the design intent. These items must be included in the bid. If the Tenderer considers that a cost reduction may be realized by the use of an alternative equivalent product he is at liberty to identify the product and the cost reduction in a separate letter attached to the bid. The acceptance of any such alternative will be subject to the Engineer's written approval after submission of full details.

Any reference to a supplier's quotation means that there has been discussion and an exchange of information. The Tenderer must ensure that the equipment priced, ordered and installed complies fully with the Specification which may not be as the supplier's quotation.

210.020 PRESSURE SYSTEMS SAFETY REGULATION

Following commissioning and prior to putting any pressurised system, that falls under the PSSR, into operation the Contractor/Sub Contractor shall engage a competent engineer to inspect and provide a WSE (Written Scheme of Examination) where needed to comply with the PSSR.

210.030 COPPER PIPES AND FITTINGS

Copper pipework is to be installed only where indicated on the Contract drawings.

Copper pipe, half hard (Table X) to BS EN 1057 R250 for above ground applications.
Copper pipe, soft (Table Y) to BS EN 1057 R220 for buried services

Capillary fittings for copper tubing
General potable range – refer to Clause Y10.2310A

Press fittings for copper tubing
Copper - refer to Clause Y10.2315A

Compression fittings for copper tubing
Type A compression fittings - refer to Clause Y10.2320A

Inaccessible joints to be silver soldered or brazed

Jointing materials

- Welding rods for Bronze welding to BS 1453.
- Brazed joints, use nickel bearing zinc free grades of filler metals to BS EN 1044
- Capillary joints shall be made using solder to BS EN 29453, alloy Nos. 28, 29 or 23 and flux to BS EN 29454-1 (for copper pipe).

210.080 GENERAL WORKMANSHIP

General Workmanship - refer to Clause Y10.9300
Expansion and contraction - refer to Clause Y10.4065

Pipe fittings
Bends/swept tees - refer to Clause Y10.4070A

Fabricated junctions - refer to Clause Y10.4080
Fabricated fittings - refer to Clause Y10.4100

Pipes through walls and floors - refer to Clause Y10.4110

Pipe supports - refer to Clause Y10.4215
Support spacing - refer to Clause Y10.4220

210.100 WORKMANSHIP FOR COPPER PIPEWORK

Copper pipework workmanship - refer to Clause Y10.9320
Bronze welded joints - refer to Clause Y10.6020
Compression joints - refer to Clause Y10.6030
Capillary joints - refer to Clause Y10.6040
Brazed joints - refer to Clause Y10.6050

210.200 PIPE SLEEVES

Pipe sleeves - refer to Clause Y10.9330

210.220 PROVISIONS FOR DRAINING, FLUSHING AND VENTING OF PIPEWORK

Draining, flushing and venting of pipework - refer to Clause Y10.9340

210.240 PIPEWORK BURIED EXTERNALLY

Pipework buried externally - refer to Clause Y10.9350

210.250 PIPEWORK IN CONCRETE FLOOR SCREEDS

Pipework in concrete floor screeds - refer to Clause Y10.9360

210.260 PIPEWORK UNDER TIMBER FLOOR BOARDS

Pipework under timber floor boards - refer to Clause Y10.9370

210.270 PREVENTION AGAINST DAMAGE BY FREEZING

Prevention against damage by freezing - refer to Clause Y10.9380

211.010 PIPELINE ANCILLARIES - GENERAL

Comply with work section general clauses reference Y11.1000 and those detailed below.

211.030 STOP VALVES

Application: To isolate mains water service, cold water service and hot water service on distribution pipework

Use only one manufacturer's range throughout the project

15mm(½") to 50mm (2")
●Stop valve to BS 1010-2 threaded to BS 21 or with compression ends for connecting to copper tube. WRAS approved.
Refer also to Clause Y11.2010A

●YORKSHIRE Kuterlite DZR brass K493L lever operated isolating ball valve, threaded to BS 21. WRAS approved..
Refer also to Clause Y11.2080D
●CRANE D171 lever operated isolating ball valve, threaded to BS 21. WRAS approved.
●CRANE D171LS lock-shield isolating ball valve, threaded to BS 21. WRAS approved.

65mm (2½") to 200mm (8")
●OVENTROP 104 84 EPDM lined, lever operated, fully lugged, drilled and tapped wafer valve. To be installed between BS EN 1092-2 PN 16 flanges.
●CRANE F624 EPDM lined, lever operated, fully lugged, drilled and tapped butterfly valve to BS EN 593. WRAS approved. To be installed between BS EN 1092-2 PN 16 flanges.

●HATTERSLEY 970 fully lugged lever operated ductile iron butterfly valve to BS EN 593 (padlock and ring as optional extra). WRAS approved. To be installed between BS EN 1092-2 PN 16 Flanges

250mm (10") to 300mm (12")
●CRANE F625 gear operated, EPDM lined butterfly valve to BS EN 593. WRAS approved. To be installed between BS EN 1092-2 PN16 flanges.
●HATTERSLEY 970 fully lugged gear operated ductile iron butterfly valve to BS EN 593 (padlock and ring as optional extra). WRAS approved. To be installed between BS EN 1092-2 PN16 Flanges
Application: To isolate mains water service, cold water service and hot water service (inside building) upstream of every outlet fitting.

Mains water outlets on baths, basins, sinks, showers, etc. shall be on the right hand side when viewed from the front.

15mm (½") and 22mm (¾")
●YORKSHIRE Kuterlite K480 DZR brass screw driver operated, isolating ball valve with compression ends for connecting to copper tube. WRAS approved.
Refer also to Clause Y11.2080B

211.050 DOUBLE REGULATING VALVES

Application: To isolate and regulate the flow of domestic hot water through the branch circuits.

To be installed on the return pipe of all circulation branches:

15mm (½") to 50mm (2")
●CRANE D921 bronze double regulating valve threaded to BS 21

211.080 TEST PLUGS

Application: Hot water
Manufacturer and reference:
Binder Twinlok test plug with extension piece threaded 8mm to BS21, Selfseal type EP8EX test points to BS 21

211.100 HOSE UNION BIB-TAPS

15mm (½")
●PEGLER BIBPLUS 142HU DZR brass hose union bib-tap incorporating test point and two check valves. WRAS approved.

20mm (¾")

●DZR brass hose union bib-tap incorporating test point and two check valves. WRAS approved.

211.130 FLOAT OPERATED VALVES

Float operated valves (Cold Water Storage Cisterns)

●Bronze Portsmouth type float operated valve conforming to BS 1212 (Part 2) complete with copper float.

Float operated valves (heating feed and expansion cisterns)

●Bronze Portsmouth type float operated valve conforming to BS1212 (Part 2) complete with modified drop arm and copper float.

211.135 PIPELINE STRAINERS

15mm (½") to 50mm (2")
Manufacturer and reference:
●CRANE D297 with standard copper screen having 0.84mm dia. perforations. Threaded to BS 21. WRAS approved

15mm(½") to 80mm (3")
●OVENTROP 112 00 bronze strainer threaded to BS 21. WRAS approved.

211.140 GAUGES

Application: Temperature gauges for HWS

BRANNAN heavy duty pipeline thermometer, product No. 94/646/0.
100mm diameter dial, 0-120°C scale, bottom entry complete with brass pocket. The gauges are available from S. Brannan and Sons Ltd (Tel: 01946 816600).

211.170 CHECK VALVES

Application: To prevent backflow of domestic hot water

To be mounted in horizontal or vertical upward flow pipelines only.
Use only one manufacturer's range throughout the project

15mm (½") to 80mm (3")
●CRANE D138 bronze swing check valve threaded to BS 21. WRAS approved.
●HATTERSLEY Fig. 47 bronze swing check valve threaded to BS 21.WRAS approved.

211.180 DOUBLE CHECK VALVES WITH TEST POINT

15mm (½") to 50mm (2")
●RELIANCE FLOGUARD DZR brass double check valve. WRAS approved. Compression ends for connecting to copper tube or threaded to BS 21 (female ends).

211.210 DRAIN VALVES/DRAIN TAPS

●CRANE D340 (BS 2879:Type 2). Threaded to BS 21. WRAS approved.

211.210 DRAIN COCKS/DRAIN TAPS

Application: Hot water supply
Manufacturer and reference:
Crane D340.
Threaded to BS21.
WRAS listed.
Kite mark certified.

211.220 VENT COCKS

Manufacturer and reference:
Crane D171 MHULS.
Threaded to BS 21
Fitted into an equal tee or 25/28mm branch connection at all high points.

225.120 STERILISATION

Application: The hot and cold water services in the new installations shall be disinfected immediately prior to hand-over of the building by a Specialist Sub-Contractor.

Disinfection must be undertaken strictly in accordance with BS EN 806 and BS 8558.

The Specialist Sub-Contractor must provide a 'Certificate of Disinfection' on satisfactory completion of the cleaning process. The Certificate must be included in the Health and Safety File.

- General – refer to Clause Y25.3040
- Mains water system - refer to Clause Y25.3050
- Water storage systems - refer to Clause Y25.3060

250.010 THERMAL INSULATION - GENERAL

Comply with work section general clauses reference Y50.1000 and those detailed below.

Ensure all thermal insulants for use in the building services are made using materials with zero ozone depletion potential and can be used.

250.020 SELECTION THERMAL INSULATION SUB-CONTRACTOR

Use a contractor specialising in the supply and installation of thermal insulation. All work shall be undertaken by operatives skilled in this particular trade and in accordance with BS 5970.

250.030 PIPEWORK INSULATION

All pipework which contains water, steam, condensate, etc. (including cold feeds and open vents) shall be insulated with rigid glass fibre or rock wool sections (not less than 120 kg/m^3 density and 0.038 W/mK thermal conductivity at 50°C mean temperature) faced with a factory applied glass reinforced aluminium foil.

All joints are to be neatly secured and sealed by means of 75mm wide self adhesive aluminium foil tape. All insulation must be maintained in a dry condition during storage and fixing.
Temperature of fluid in pipes (^{o}C) between 0°C and 20°C
European Classification for Reaction to Fire Performance

- Class A1 - reference Y50.1035A
- Class O (UK)
- Spread of flame as BS 476-7
- Refer to Clause Y50.1050A

Smoke emission characteristics

- Refer to Clause Y50.1055A

Vapour barrier permeance

- Refer to Clause Y50.2170A

Protection (Finish)

- Application: Pipework in floor ducts, service ducts, ceiling voids, roof spaces, casing, bulkheads and cold water storage chambers. Standard Finish: All pipework shall be left with the standard glass reinforced aluminium foil finish.

- Application: pipework in floor ducts, service ducts, ceiling voids, roof spaces, casings, bulkheads and cold water storage chambers. All pipework insulation shall be left with the standard glass reinforced aluminium foil finish.

- Application: Pipework within Plantrooms - Insulation on all pipework within plant rooms shall be left with the standard glass re-inforced aluminium foil finish. Care must be taken to ensure a vapour barrier is provided on chilled water and cold water services.

- Application: Pipework exposed to view at high level (above 2.3m AFFL) in areas heated for human or animal occupation-Pipework insulation shall be

finished with Isogenopak rigid PVC cladding applied strictly in accordance with the manufacturer's instructions using Isogenopak rolls, elbows, bends, tee sections and end cappings.

- Application: Pipework, valves and flanges in external trenches, ducts and crawlways or exposed to rain, sleet, snow etc-All pipework insulation must be wrapped in polyisobutylene sheet (not less than 0.8mm thick) with over-lapped joints. Ends and terminations shall be carefully sealed with the appropriate proprietary solvent to form a watertight seal.

- Application: New pipework connected to existing pipework. Where new pipework is extended from existing pipework the existing thermal insulation shall be finished neatly with a terminal and capping and the new insulation shall start with a terminal end capping.

- Application: All valves, flanges etc : All valves, flanges, etc. shall be thermally insulated with purpose made STC re-usable flexible grey silicon glass cloth jackets filled with rockwool to a thickness of 50mm. The jackets shall be complete with velcro fastenings and draw strings. Insulating material to be applied beneath the jackets to maintain the vapour barrier on chilled water and cold water services.

Thickness table

- Chilled and cold water supplies to prevent condensation
  - Low emissivity - reference Y50.2370

- Non-domestic hot water supply services – refer to Clause Y50.2290

250.090 WORKMANSHIP - PIPEWORK INSULATION

General - refer to Clause Y50.3010
Installation of foil faced mineral wool insulation - refer to Clause Y50.3020
Flanges and valves - refer to Clause Y50.3210

Where pipework changes direction, the insulation shall be neatly cut into mitre joints or lobster back segments. **All pipes and ducts must be insulated separately.**

Where new pipework connects to existing pipework the existing thermal insulation shall be finished neatly with a terminal and capping and the new insulation shall start with a terminal end capping.

251.010 TESTING AND COMMISSIONING OF MECHANICAL SERVICES - GENERAL

Comply with work section general clauses reference Y51.1000 and those detailed below.

The Engineer reserves the right to demand that any equipment, materials or any part

of the installation be tested to prove quality, performance, efficiency or soundness at no extra cost to the Employer.

All plant items must be correctly oiled and greased, valve and pump glands packed as recommended by the manufacturer, and all plant maintained in operational condition until handover.

The pipework systems shall be thoroughly flushed through before any pump is set into operation.

251.030 STATIC TESTING

Hydraulic pressure/leakage tests will be required on all new water carrying installation pipe work, prior to fixing of insulation and/or concealment in a duct, floor space, ceiling void, builder's work casing, etc.

These tests shall be performed in sections as the work proceeds and hold the test pressure for a period of not less than 2 hours duration; any leaks or failures shall be remedied and the test repeated until a satisfactory result is achieved.

Water for testing will be supplied free by the Employer, but flushing, filling, draining, cleaning operations, inspections, protection of equipment and total reinstatement as necessary must be included in the tender sum.

Seven days written notice is required by the Engineer prior to any site test; duplicate test certificates are required and shall be counter-signed by the Engineer or his representative.

All apparatus, plant, measuring instruments or meters required for testing, commissioning or verification with any special arrangements or connections must be provided by the commissioning technician and included in the tender sum.

- Full commissioning records to be included in the Operation and Maintenance Manuals

251.040 COMMISSIONING

Commissioning codes - refer to Clause Y51.3020
Commissioning
* Water distribution
  * Including BSRIA pre-commissioning check list

  Refer to Clause Y51.3030A
Instruments and gauges
* Refer to Clause Y51.3090A

Commissioning records
* Distribution : Full commissioning records to be included in the Operation and Maintenance Manuals
* For water systems

251.100 WATER HYGIENE RISK ASSESSMENT AND MAINTENANCE METHOD STATEMENT

To satisfy the provisions of the Health and Safety at Work Act and specifically L8 – The control of Legionella bacteria in water systems - the Employer will not accept handover of the installations until full and adequate information concerning the installations is in the possession of his operating and maintenance staff.

The contractor shall employ a specialist to carry out a risk assessment of the water systems and to prepare a method statement, for inclusion in the O&M manual, for maintenance of the control of Legionella bacteria.

The assessment shall be undertaken in two stages:

Stage 1 – Desktop assessment of contract documentation.
Stage 2 – Survey of the installation.

The specialist shall be:
Assurity Consulting
26 Redkiln Way
Horsham
West Sussex
RH13 5QH

Contact: Kim Sim
Tel: 01403 269 375
Mob: 07787 524 179
Email: info@assurityconsulting.co.uk

The risk assessment shall cover the whole of the systems in new build situations and where dedicated systems are installed to serve a refurbished area.

In refurbishments where the existing systems are adapted then the risk assessment shall comprise a review/revision of the current assessment and method statement for the building. This requirement shall not apply should the works be limited to relocation of one or two draw-offs unless such minor works include a shower or similar atomizing spray device when this requirement shall apply.

254.020 IDENTIFICATION OF PIPEWORK

Pipework identification - refer to Clause Y54.2015

254.040 IDENTIFICATION OF PLANT AND EQUIPMENT

Plant and equipment identification - refer to Clause Y54.2035

254.050 IDENTIFICATION OF VALVES AND COCKS

Valve and cock identification - refer to Clause Y54.2045

254.100 WARNING NOTICES

Danger and warning notices - refer to Clause Y54.2095

254.110 SYSTEM INSTALLATION CHARTS

System installation charts - refer to Clause Y54.2110

290.020 FIXINGS TO BUILDING FABRIC

Fixings - refer to Clause Y90.3100

291.040 PAINTING AND PROTECTION AGAINST CORROSION

Painting and protection against corrosion - refer to Clause Y91.3100

PART 3 SPECIFICATION CLAUSES SPECIFIC TO S12

300.000 GENERAL

300.100 THERMOSTATIC MIXING VALVES

The Sub-Contractor shall supply and install thermostatic mixing valves in the positions indicated on the contract drawings and as detailed below:

Type 1	:	Kitchen - Sinks
Manufacturer	:	Arrow Valves
Type	:	15mm TMV 5213 -kit 6 (set to maintain 50°C)
Quantity	:	*Refer to contract drawings*

All valves shall incorporate check valves, strainers and automatic flow limiting.

Manufacturer	:	Arrow Valves
Contact	:	Neil Weston E: neil@hurlstoneassociates.co.uk T: 07973 481 469

300.150 THERMOSTATIC MIXING TAPS

The Sub-Contractor shall supply and install all WRAS approved thermostatic mixing taps and new isolation valves to serve the wash hand basins as indicated on the contract drawings (no flexible connections permitted).

Manufacturer	:	Kohler Mira Ltd.
Specification	:	Rada TMV3 Thermotap -3s copper, short lever control
Setting	:	43°C
Quantity	:	*Refer to contract drawings*

Contact: Michelle Devadas
E: michelle.devadas@mirashowers.com
M: 07860 690 523
T: 0844 5711 155

300.200 THERMOSTATIC SHOWER CONSOLES

The Sub-Contractor shall supply and install all WRAS approved TMV3 approved shower panel, in place of the existing stainless panels (no flexible connections are permitted).

Manufacturer : Kohler Mira Ltd.
Specification : TMV3 Rada PA-V8F shower stainless steel panel assembly

- Set to 43°C
- Top-entry hot and cold pipe connections
- Integral TMV
- Flexible hose and shower head
- Robust adjustable shower rail
- Combined manual on/off and temperature control

Quantity : *Refer to contract drawings*

Contact: Michelle Devadas
E: michelle.devadas@mirashowers.com
M: 07860 690 523
T: 0844 5711 155

300.250 THERMOSTATIC SHOWER ASSEMBLY

The Sub-Contractor shall supply and install all WRAS approved TMV3 shower assemblies, in place of the existing percussive showers.

Manufacturer : Kohler Mira
Specification : TMV Rada V12 Exposed shower valve (combined on/off and temperature control)

- Set to 43°C
- Flexible hose and showerhead (WRAS approved)
- Robust chrome EV heavy duty grab rail and accessories

Quantity : *Refer to contract drawings*

Contact: Michelle Devadas
E: michelle.devadas@mirashowers.com
M: 07860 690 523
T: 0844 5711 155

T31 LOW TEMPERATURE HOT WATER HEATING

PART 1 SYSTEM OBJECTIVES

100.030 SYSTEM DESCRIPTION

The Sub-Contractor shall carry out the minor heating works as indicated on the contract drawings.

The heating system will remain fired throughout the project works.

Local valves shall be located and used to complete the removal works.

All existing radiators, pipework, TRVs, etc. are to remain.

The works include:

- Isolate, disconnect, cut back, valve and cap off all existing 20mm heating flow and return connections serving kitchen kick-heaters.

100.035 MAINTENANCE CONTRACT

The Sub-Contractor shall allow for carrying out the first years maintenance for all equipment associated with these systems.

U10 GENERAL VENTILATION

PART 1 SYSTEM OBJECTIVES

100.030 SYSTEM DESCRIPTION

The Sub-Contractor shall supply and install all ventilation works, as detailed on the contract drawings:

- Internally clean and certify all existing general extract systems (8 No. risers – Basement to Fourth Floor) including all plenums, louvres and grilles.
- Internally clean and certify all 3 No. supply and extract systems serving basement kitchens (4 No. risers –Basement to Fourth Floor) including all plenums, louvres and grilles.
- Validate and service 3 No. existing supply and 3 No. existing extract systems serving basement kitchens.
- Installation of new Vent-Axia extract fans including all associated accessories: PIRs, timers, shutters, wall kits, transformers etc to serve WCs, wet rooms and kitchens.
- Local duct modifications to suit new fans, where applicable.
- Installation of new Vent-Axia cooker Genova hoods (recirculative and ducted), along with new extract ductwork.
- All existing wall fans are to be site measured and all fans ordered to suit.
- **All ductwork and fans to reuse existing ait terminals.**
  All works to take place internally only.
- New fired rated extract grilles within wet rooms. Existing sizes to be site verified prior to ordering new valves.
- New kitchen extract grilles within bulkheads
- B34 Kitchen supply and extract ventilation modifications.
- Clean existing ductwork, air terminals and grilles along with replacing filters where existing fans are to be retained.
- Testing and commissioning.

100.035 MAINTENANCE CONTRACT

The Sub-Contractor shall allow for carrying out the first years maintenance for all equipment associated with these systems.

100.040 CONTROL REQUIREMENTS

The kitchen hoods shall be switched via a cooker miser system (by others). Each hood shall be free-issued to the electrical sub-contractor for all necessary wiring modifications.

100.045 PLANT ASSET IDENTIFICATION

The Mechanical Sub-Contractor shall be responsible for completing all criteria contained within the ‘UCL Asset Collection Form’ (refer to appendices), along with obtaining all necessary UCL EQ reference tags from the UCL Maintenance Team, which shall be affixed to all the necessary plant items.

All EQ references for any existing plant which is to be removed shall be identified on the ‘UCL Asset Collection Form’.

PART 2 SELECTION SCHEDULES FOR REFERENCE SPECIFICATIONS

230.010 AIR DUCT LINES AND ANCILLARIES - GENERAL

Comply with Work Section general clauses reference Y30.1000 and those detailed below.

230.020 SELECTION OF DUCTWORK SUB-CONTRACTOR

Use a member of the HVCA specialising in the manufacture and installation of ductwork.

230.040 SHEET METAL DUCTWORK

Material
- Mild steel - refer to Clause Y30.2040B

Protective finishes
- Galvanising - refer to Clause Y30.2050A

Construction
- Rectangular - refer to Clause Y30.2060A
- Circular - refer to Clause Y30.2060B

230.060 PLASTIC DUCTWORK

Application	:	Extract from all Laboratories.
Materials	:	Unplaticised Polyvinyl Chloride (UPVC)
Construction	:	Rectangular UPVC – reference Y30.2100A Circular UPVC – Reference Y30.2100G

230.100 ACCESSORIES

Access Panels for Inspection and Cleaning
Application: To be installed in positions on Contract Drawings and in accordance with DW 144.
Construction and finishes – refer to Clause Y30.3010
Inspection/servicing access openings
- Metal ductwork – refer to Clause Y30.3020A

Flexible ducts
- Coated steel – refer to Clause Y30.3100A

230.180 AIR DUCT LINES & ANCILLARIES WORKMANSHIP

General - refer to Clause Y30.4010
Ductwork supports - refer to Clause Y30.4020
Internal cleanliness - refer to Clause Y30.4090A
Method of cleaning

- Dry method - refer to Clause Y30.4090D
- Positioning - refer to Clause Y30.4170

240.140 WORKMANSHIP

Access - refer to Clause Y40.4020
Duct connections - refer to Clause Y40.4040
Services connections - refer to Clause Y40.4050
Isolation of units - refer to Clause Y40.4060

241.050 WORKMANSHIP

Location - refer to Clause Y41.4010
Attitude - refer to Clause Y41.4020
Alignment - refer to Clause Y41.4030

246.070 GRILLES/DIFFUSERS/LOUVRES WORKMANSHIP

Grille/Diffuser location - refer to Clause Y46.4010
Louvre location - refer to Clause Y46.4020
Accessories - refer to Clause Y46.4030
Connection to ductwork - refer to Clause Y46.4040

250.010 THERMAL INSULATION - GENERAL

Comply with work section general clauses reference Y50.1000 and those detailed below.

250.020 SELECTION OF A THERMAL INSULATION SUB-CONTRACTOR

Use a contractor specialising in the supply and installation of thermal insulation.

Use thermal insulation materials supplied by a manufacturer assessed and registered in accordance with BSI.

250.060 DUCTWORK INSULATION

Application Supply ductwork carrying fresh air and warm air
European Classification for Reaction to Fire Performance

- Class A1 – refer to ClauseY50.1035A
- Class O (UK)

- Spread of flame as BS 476-7:1997
- Refer to ClauseY50.1050A

Smoke emission characteristics

- Reference Y50.1055A

Thermal conductivity - refer to ClauseY50.2010
Mineral fibre duct insulation

- Foil faced - refer to ClauseY50.2040A

Adhesives - refer to ClauseY50.2190
Finishes to ductwork – refer to ClauseY50.3300

250.065 THICKNESS OF INSULATION

Thickness of insulation 50mm

250.100 WORKMANSHIP DUCTWORK INSULATION

General - refer to ClauseY50.3010
Installation on ductwork – refer to ClauseY50.3300

251.010 TESTING AND COMMISSIONING OF MECHANICAL SERVICES - GENERAL

Comply with Work Section General Clauses reference Y51.1000.

251.040 COMMISSIONING

Commissioning codes - refer to Clause Y51.3020
Commissioning
* Air distribution
    * Including BSRIA pre-commissioning check list
    Refer to Clause Y51.3040A

Instruments and gauges
* Reference Y51.3090A

Commissioning records
* Distribution: Full commissioning records to be included in the Operation and Maintenance Manuals

254.010 IDENTIFICATION OF MECHANICAL SERVICES- GENERAL

Comply with work section general Clauses reference Y54.1000 and those detailed below.

Provide identification – mechanical as specified in work section.

254.030 DUCTWORK IDENTIFICATION

Refer to ClauseY54.2020

Y10 PIPELINES

Y10.1000 GENERAL

Y10.1010 PRE-FABRICATED PIPEWORK

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

Y10.1020 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.

Y10.1030 FABRICATED FITTINGS

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

Y10.1040 PIPE JOINTS

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

Y10.2010A HEAVY BLACK STEEL PIPES TO BS EN 10255:2004

Material – Steel
Standard – BS EN 10255:2004
Dimensions – Heavy. Random single lengths, 4m to 7m
Ends – Screwed to BS 21:1985 and BS EN 10266-1:2004, taper thread or plain
Finish – Varnished.

Y10.2010E HEAVY BLACK STEEL PIPES TO BS 1387 GROOVED ENDS

Material – Steel
Standard – BS 1387
Dimensions – Heavy. Random single lengths, 4m to 7m
Ends – Grooved for mechanical joints
Finish – Varnished.

Y10.2060A HEAVY WEIGHT CARBON STEEL FITTINGS, BUTT WELDED TO BS EN 10253

Material
Carbon steel, grade 430, electric resistance welded.
Standard - BS EN 10253-1 or BS EN 10253-2
Size range - 25mm to 400mm.
Dimensions - BS EN 10253-1 or BS EN 10253-2 Heavy
Ends - Bevelled.
Finish - Varnished.

Y10.2070A MALLEABLE CAST IRON FITTINGS, SCREWED

Material - Cast iron to BS EN 1562:2012.
Standard - BS 143 and 1256:2000 or BS EN 10242:1995.
Size range - 10mm to 164mm.
Dimensions - BS 143 and 1256:2000 or BS EN 10242:1995.
Ends - screwed to BS 21:1985 and BS EN 10266-1
Finish - Black

Y10.2070B GALVANISED MALLEABLE CAST IRON FITTINGS, SCREWED

Material - Cast iron to BS EN 1562:2012.
Standard - BS 143 and 1256:2000 or BS EN 10242:1995.
Size range - 10mm to 164mm.
Dimensions - BS 143 and 1256:2000 or BS EN 10242:1995.
Ends - screwed to BS 21:1985.
Finish - Galvanized.

Y10.2080A CAST IRON FITTINGS, GROOVED FOR MECHANICAL JOINTS

Material – Ductile cast iron to BS EN 1564:2011.
Standard – Manufacturer’s
Size range – 20mm to 600mm
Ends – Grooved for mechanical joints
Finish - Black

Y10.2310A CAPILLARY FITTINGS FOR COPPER TUBING, GENERAL POTABLE RANGE

Material - Copper or dezincifiable resistant copper alloy.
Standard - BS EN 1254-1:1998.
Size range - 6mm to 67mm.
Dimensions - BS EN 1254-1:1998 table 2
Ends - Integral (lead-free) solder ring.
Finish - Natural.

Y10.2315A COPPER CRIMP FITTINGS FOR COPPER TUBING

Material - Copper or dezincifiable resistant copper alloy.
Standard - Manufacturer's standard.
Size range - 15mm to 108mm.
Dimensions - to suit copper tube to BS EN 1057:2006+A1:2010.
Ends - With EPDM O ring for use with water.
Finish - Natural.

Y10.2320A TYPE A COMPRESSION FITTINGS FOR COPPER TUBING

Kite marked.
Material - Dezincifiable resistant copper alloy
Standard - BS EN 1254-2:1998, type A, non-manipulative.
Size range - 6mm to 54mm.
Dimensions - BS EN 1254-2:1998, table 2 and 3,
Ends - Socket.
Finish - Natural.

Y10. 2450A UNPLASTICISED PVC PIPES TO BS 3505:1986

Material – Unplasticised PVC. Class C, D or E to suit working pressure.
Standard – BS 3505:1986.
Dimensions – BS 3505:1986, Table 1 – lengths 6m or 9m.
End – Plain.
Finish – Blue.

Y10.2470 UNPLASTICISED PVC FITTINGS, SOLVENT WELDING TO BS 4346-1:1969

Material – Unplasticised PVC.
Standard – BS 4346-1:1969.
Size Range – 10mm to 300mm.
Dimensions – BS 4346-1:1969.
Ends – Spigot/Socket.
Finish – Natural self colour.

Y10.2480A UNPLASTICISED PVC TO BS 4514:2001

Material – Unplasticised PVC
Standard – BS 4514:2001
Dimensions – BS 4514:2001
Ends – Plain
Finish – Black, grey or white.

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

Material – Unplasticised PVC
Standard – BS 4514:2001 Table 2
Size Range – 82mm, 110mm or 160mm
Dimensions – BS 4514:2001 tables 3 and 5
Ends – Spigot/plain
Finish – Black, grey or white.

Y10.2705B PLASTICS PIPES TO BS 7291-4:1990:

Material - Chlorinated polyvinyl chloride (PVC-C) and solvent cement BS 7291-4:2001.
Standard - BS 7291.Classification H unless otherwise indicated.
Dimensions - BS 7291-4:1990 (PVC-C), or Table 1 in accordance with BS ISO 11922-1:1997, BS ISO 4065:1996 or to BS 2782-11:Method 1121B :1997, ISO 161-1:1996.
Ends - Plain.
Finish - Natural.

Y10.3010A CIRCULAR FLANGES FOR PIPES, PN DESIGNATED - WELDED FLANGE

Material - BS EN 1092-1:2007+A1:2013.
Flange type - Weld neck flange or hubbed slip-on flange for welding.
Flange facings - Raised face - type B.
Bolting - In accordance with BS EN 1092-1:2007+A1:2013.

Y10.3010B CIRCULAR FLANGES FOR PIPES, PN DESIGNATED - THREADED FLANGE

Material to BS EN 1092-1:2007+A1:2013.
Facings - Raised face type B.
Bolting - in accordance with BS EN 1092-1:2007+A1:2013.
Threaded flanges - BS 21:1985 and BS EN 10266-1:2004 parallel thread.

Y10.3010P CIRCULAR FLANGES FOR PIPES AND FITTINGS

Material
- BS EN 1092-1:2007+A1:2013, ferretic steel.

Flange type
- Hubbed threaded flange.

Flange facings
- Raised face - type B.

Ancillaries
- Weld neck plate on collar.
- Lapped pipe end.
- Weld neck collar.

Bolting
- In accordance with BS EN 1092-2:1997.

  Flange bolts to stand clear of nuts by two clear threads with washers installed between flange and nut. Bolts, nuts and washers to be of a compatible material with the parent material of the flange.

Threaded flanges
- BS 21:1985 parallel thread.

Y10.3020A JOINTING RINGS - NON-METALLIC FLAT GASKETS

Non-metallic flat gaskets for flanges to BS EN 1092-4:2002.
Standard - BS EN 1514-1:1997.
Gasket type - Full face for type B.

Y10.3030A SCREWED JOINTS TO BS 21:1985

Use PTFE tape to BS 7786:2006 or use hemp and jointing compound to BS 6956-5:1992, or BS EN 751-2:1997.

Y10.3040B NAVY UNION CONNECTIONS

Seating - Spherical seating bronze to bronze, navy pattern.

Y10.3050A WELDED JOINTS, WELDING RODS FOR STEEL PIPES

Gas welding, BS 1453 type A2 or A3; or electric arc welding BS 2971:1991.

Y10.3060B ZINC FREE BRAZED JOINTS

Use nickel bearing zinc free grades of filler metals to BS EN 1044.

Y10.3140A MECHANICAL JOINTS, GROOVED STEEL PIPES

Material – Ductile cast iron to ASTM A-536, Grade 54-45-12.
Joint – Standard, flexible or rigid: or reducing joint
Size range – 20mm to 600mm
Gaskets – Grade 'E' EPDM
Finish – Painted to manufacturer's standard

Y10.3150A MECHANICAL JOINTS, PLAIN END STEEL PIPES

Material – Malleable cast iron to BS EN 1562:2012 or ductile cast iron to BS EN 1564:2011
Size range – 40mm to 400mm
Gaskets – Grade 'E' EPDM
Finish – Manufacturer's standard

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 - Insulated or Uninsulated	wall finish	25
	ceiling finish or soffit	50
	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.

Y10.4040B AUTOMATIC AIR VENTS

Provide a means of venting the pipe system at all high points.
Provide an automatic air vent valve with a copper outlet pipe from the valve to a tundish in an adjacent drain line or to another suitable location.

Y10.4065 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.

Adequate provision must be made to accommodate the expansion of pipework without damage to any plant or the building fabric. Should any damage result through non-observance of this provision, making good shall be undertaken at no extra cost to the Employer. Provision for expansion of pipework shall be made by changes in the direction of the pipes wherever possible with pairs of weld-neck flanges to provide an appropriate amount of 'cold draw'.

Threaded fittings must not be used in making up bends taking expansion. Where change in direction of pipework is not possible, provision for expansion shall be made by bellows expansion joints.

Bellows expansion joints shall be opened to the extent of their 'cold draw' and have purpose-made pipe guides of an approved type on each side of each expansion joint to ensure correct alignment. When ordering bellows it must be ensured that the supplier is notified of the working pressure and temperature to which they will be subjected and the amount of expansion which must be accommodated.

To prevent uncontrolled expansion of the pipework special mild steel anchor brackets shall be provided between expansion joints and/or loops and elsewhere as necessary. These anchors shall be rigidly fixed to the structure, and pipework guide brackets shall be provided to prevent distortion of the pipe runs. At points in plant rooms and floor ducts where anchors are required, purpose-made mild steel brackets shall be welded to the pipe and rigidly fixed to the supporting member of building fabric. Sketches of the anchor and guide details must be submitted to the Engineer for perusal prior to installation.

Y10.4070A PIPE FITTINGS, BENDS/SWEPT TEES

Use eccentric type reductions and enlargements on horizontal pipe runs to allow

draining and venting, concentric on vertical pipes, with easy transition and an included angle not exceeding 30 degree. Do not use bushes, except at radiators and at fittings where required size is not of standard manufacture. Where required, use eccentric bushes to allow draining or venting; maximum aspect ratio not to exceed two pipe sizes; above this ratio use reducing fittings. Use square tees at venting and draining points. Square elbows are not acceptable. Use bends and swept tees where practical.

Y10.4070B PIPE FITTINGS, ELBOWS/SQUARE TEES:

Use eccentric type reductions and enlargements on horizontal pipe runs to allow draining and venting, concentric on vertical pipes, with easy transition and an included angle not exceeding 30 degree. Do not use bushes, except at radiators and at fittings where required size is not of standard manufacture. Where required, use eccentric bushes to allow draining or venting; maximum aspect ratio not to exceed two pipe sizes; above this ratio use reducing fittings. Use square tees at venting and draining points. Square elbows are not acceptable. Use elbows and square tees.

Y10.4080 FABRICATED JUNCTIONS

Form by inserting a branch section of a pulled bend into the main pipe. Develop the profiles of both the branch section and the hole in the main pipe, to ensure minimum protrusion into the main pipe. Weld or braze into position.

Y10.4090 FABRICATED FITTINGS - FERROUS

Supply pipe material and end connections to the specification of the associated straight pipe runs.

Pattern - Bends, springs, offsets and branches.

Technique - Pipe bore 50mm or less - machine cold bend.

Pipe bore greater than 50mm - machine hot bend.

Ensure that fabricated branch bends of welding saddles are to the fitting proportions in BS EN 10253-1 and BS EN 10253-2.

Y10.4100 FABRICATED FITTINGS - NON-FERROUS

Provide pipe material and end connections to the specification of the associated straight pipe runs.

Pattern - Bends, springs, offsets and branches.

Technique - 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.

Fabricate branch from a section of pulled bend, profiled to match the contour of the main to avoid overlap and protrusion into the main. Cut and swage the main to form a raised cup to accept the spigot end of the branch. Limit angle of the branch to 60^{o}.

Join by bronze welding on site. Apply reinforcement by plates, collars or shoes.

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.

Y10.4125 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.

Y10.4180 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.

Y10.4215 PIPE SUPPORTS

Arrange supports and accessories for equipment, appliances or ancillary fitments in pipe runs, so that no undue strain is imposed upon pipes.
Ensure that materials used for supports are compatible with pipeline materials.
All steel tube shall be supported in mild steel or malleable iron brackets which shall be galvanised for supporting galvanised tube or any steel tube fixed externally.
Galvanised brackets shall be complete with sherardised screws, nuts, bolts and washers.

Water, oil and natural gas service pipework in the boiler house, services ducts and ceiling voids must be supported from specially designed mild steel channel or angle

iron brackets with single socket ring clips and l0mm diameter mild steel drop rods on spherical washers. Tube 80mm n.b. and above shall be supported in steel straps formed in two halves to suit the pipe diameter, secured together by nuts, bolts and washers.

The British Steam Specialties Ltd 'Boss Flamco' railed hanging pipe support system will be accepted as an alternative method of support (rubber caps must be fitted to the drop rods) as will the Unistrut Pipe Support system (P5790 hanger clamps).

If hanging support is not practical roller supports and 'U' bolt arrangements may be permitted at the Engineer's discretion.

All brackets and cantilevers fabricated at works must be cleaned and painted before despatch. Site fabrication may be permitted at the discretion of the Engineer. All fabricated brackets shall be coated with Finnigan's 'Hammerite' grey paint before and after fixing.

All holes through mild steel angles etc., must be mechanically drilled. No holes shall be 'flame blown'.

Exposed pipework within the building shall be supported from walls, ceilings and floors in an approved manner with single socket ring clips, back plates and rods except at skirting level where steel tube shall be supported by Crane Fig. 50l brackets (or Fig. 5l4 in approved Application: s). Pipes at skirting level must be 100mm clear of the finished floor level.

Copper tube and stainless steel tube shall be supported in Yorkshire Fig. l05 or equivalent style, brass brackets secured to the structure by means of suitable brass round head screws.

Y10.4220 SUPPORT SPACING

Space supports as tables.

PIPE BORE (mm) Nominal	MAXIMUM SUPPORT SPACING (M)			
	STEEL		COPPER	
	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
65	3.7	4.6	3.0	3.6
80	3.7	4.6	3.0	3.6
100	3.7	4.6	3.0	3.6
125	3.7	5.4	3.0	3.6
150	4.5	5.4	3.6	4.2
200	5.6	6.0	-	-
250	5.0	6.0	-	-
300	6.1	10.0	-	-
350	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	MAXIMUM SUPPORT SPACING (M)			
	UPVC PIPE		POLYETHYLENE PIPE	
	Class O, B, C Horizontal	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
50	1.1	1.2	0.55	0.85
65	1.2	1.4	0.55	0.85
80	1.4	1.5	0.6	0.9
100	1.5	1.7	0.7	1.1
125	1.7	1.9	-	-
150	1.8	2.1	-	1.3
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 3505:1986 are for 20^0C. Support continuously for temperatures 60^0C and above.

Y10.4230A ISOLATION AND REGULATION:

Provide valves, cocks and stop taps for isolation and/or regulation where indicated, and on:-

mains to isolate major sections of distribution;
the base of all risers and drops except in cases where one item of apparatus only is served which has its own local valve or stop tap;
points of pipe connection of all items of apparatus and equipment except where the item could conveniently be isolated or regulated by valves provided for other adjacent items;
draw-off fittings except where ranges of fittings are served by a common float, the isolator then being fitted with the float.

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.

Y10.6020 BRONZE WELDED JOINTS, COPPER PIPES

Use filler rod not subject to dezincification and suitable for application.

Y10.6030 COMPRESSION JOINTS, COPPER PIPES, LIGHT GAUGE

Preparation for fittings to BS EN 1254-2:1998

Type `A' fitting

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.

Type `B' fitting

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 comply with manufacturer's instructions.

Making and Sealing - As manufacturer's instructions.

Y10.6040 CAPILLARY JOINTS, COPPER PIPES, LIGHT GAUGE

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.

Y10.6050 BRAZED JOINTS, COPPER/COPPER ALLOY PIPES

Preparation - Prepare for brazing in accordance with BS EN 14324:2004. Use manufactured fittings not subject to dezincification and suitable for Application: .
Making and Sealing - Use flame heat and make in accordance with BS EN 14324:2004, Section 1. Use silver brazing filler alloy suitable for Application: .

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.

Y10.8020 FUSION JOINTS, POLYETHYLENE PIPES

Preparation – Square cut plain ends. Form pipe ends for socket type joints.
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 over straps, or clamps and with a polypropylene strip between pipe and mild steel section.

Y10.9300 GENERAL WORKMANSHIP

All pipework shall be installed so that it is fully accessible for subsequent repairs or replacements; unions or flanges shall be installed at intervals not exceeding l5m for ease of dismantling.

Final connections to all items of plant and equipment shall be made with union or flanged joints, as appropriate, to ensure that the item of plant or equipment can be easily removed and replaced without disturbing any other connections or part of the pipework assembly.

All pipework must be cut off squarely and all internal and external burrs and irregularities completely removed to the satisfaction of the Engineer.

Precautions must be taken to ensure that no dirt or obstruction enters the pipe system during the course of the works. Adequate purpose made plugs or caps must be fitted over all open ends of pipe or plant; plugs of wood, paper or similar materials must not be used.

The routes and setting out of all pipework must be carefully considered before final fixing with particular attention to access (for maintenance), spacing (to permit pipes to be insulated separately) and to avoid clashes with other services, equipment, constructions, etc.

Pipework must not be installed within l50mm of electrical cables or conduits and at least 75mm above the finished surface of the floor. Any pipework fitted in an unreasonable or unsightly manner and not to the satisfaction of the Engineer shall be removed and refitted as required at no extra cost to the Employer.

Where pipework is to be installed in floor ducts and risers, it shall be fitted ensuring adequate access for maintenance and removal without disturbing any adjacent pipework.

At the time of installation consideration must be given to the access necessary to maintain/replace equipment and components.

All connections to plant items, whether electric, air, water, gas, oil etc. shall be made in such a manner to allow subsequent removal without the need to dismantle any other part of the installation.

All motors and actuators must be positioned to allow easy inspection and removal.

Nuts, bolts, washers, brackets, supports, rods, clips, bands and other fixing devices exposed to rain, snow, condensation, etc. must be galvanised, sherardised or similarly treated to prevent corrosion. Alternatively, the component may be manufactured from brass or gun-metal provided it is of sufficient strength.

All methods of fixing shall be selected to be of such a type and construction to carry the load safely. Screws and bolts must be of ample size to suit the purpose.

Where sensors are required, if a 100mm immersion pocket can not be accommodated within the pipework size, the contractor shall either:
inset a cross piece with a minimum diameter of 50mm or increase the pipework to 50mm diameter and insert an end tee.

Pipework crosspieces and tees shall be mounted horizontally to avoid the formation

of air pockets.

Clip capillary lines to a suitable surface, and line up horizontally and vertically to give a neat appearance. Fix multiple lines to a cable tray, secured to the structure or a rigid framework.

Under no circumstances will mixing galvanised steel tube with copper tube be permitted on domestic hot water circulating pipework. Pipework must not be fixed in contact with any material which may cause electrolytic action or corrosion to take place.

Joints are not to be made within the thickness of any structure, wall, floor or ceiling.

Flanges:

Fit slip on bossed flanges, welded internally, to straight lengths of tube not shorter than half diameter of flange or 100mm, whichever is the greater.
Where there is no alternative, and with the agreement of the Engineer, weld neck flanges may be used for connections to elbows, bends, reducers and similar fittings ensuring insulation and insulation boxes/jackets do not foul flange bolts.

Sub-divide pipework systems into self draining sections. Fit each section with a straight - through type drain.

Provide full bore dirt pockets at least five diameters in length, complete with full bore isolating valves, at the base of each riser. Each dirt pocket shall have a drain of at least 25mm diameter. Fit drain cocks with connections for hose unions, but left capped and complete with retaining strap

Y10.9310 WORKMANSHIP - WELDING

When jointing is to be made by the welding technique all fittings must be proper welding types with chamfered ends and only proprietary welding elbows shall be used; all welded tees shall be either weld shoes with profiles to suit the various main sizes or proprietary complete tee pieces.

Where changes of pipe size are not achieved at branches and tees, proprietary welding reducers must be utilized, being concentric on vertical pipework and eccentric on horizontal pipework.

If welding is to be undertaken by the electric arc process it will be necessary to check that an electrical supply is available and that it is adequate. If there is no adequate electrical supply available, a diesel generator, which shall be suitably muffled and silenced to prevent noise nuisance or discomfort to any third party, shall be utilised. All costs incurred for provision of a generator, silencing, extension leads, etc., shall be at no extra cost to the Employer.

The welding of steel pipework may be carried out by the oxyacetylene or the electrical arc process and shall be executed in accordance with the relevant British

Standards for Class II welding. The welders employed shall be City and Guilds trained and certified or qualified to an equivalent standard and shall have at least twelve months experience of site welding.

During the course of the works, any one or all welders may be required to undergo, in the presence of the Engineer. Before the commencement of the tests the welder must produce his welding Diplomas and Certificates for inspection by the Engineer. Any welder who fails these tests shall not be permitted to execute any pipe welding on the works. Testing of welders shall be undertaken at no extra cost to the Employer.

The Engineer reserves the right to select up to 10 welds to be cut out and be examined during the course of the works. Removal, testing and reinstatement shall be at no extra cost to the Employer.

The welds for test will be selected at random by the Engineer from the finished welds and test pieces obtained by cutting through the pipes 100mm each side of the weld.

Each test piece will be cut diagonally through the weld at an angle between 30□ and 45□ after which one half of the test piece will be slit the length of the tube in two places to provide a tongue l2mm wide for pipes up to 6mm wall thickness and twice the wall thickness wide for pipes with wall thickness over 6mm. The tongues will then be bent through an angle of 90□ with the internal surface of the weld in tension over a former having a diameter no greater than three times the tube wall thickness.

The bending will be carried out by blows or by steady pressure with the weld positioned on the crown of the bend.

Each specimen shall withstand this test without sign of fracture or damage and in the event of failure by any cause, two additional welds made by the same operative will be selected for re-test, both of which must be successful.

If either of the re-tests fails then all welds made by this operative shall be cut out and re-welded at no extra cost to the Employer.

Each test piece will also be examined to see that proper penetration of the weld through the thickness of the tube has been obtained and no serious excess of penetration shall be present.

The alignment of the tubes at the weld junction shall be accurate and pipe ends truly matched with an equal gap, suited to the welding process. The pipe shall be set back by its own thickness inside a flange, and shall have one arc welded fillet run internally and two fillet welds on the external joint. Tube for butt welding shall be chamfered and have a route run, fillet run and capping run. All internal burrs shall be removed prior to welding.

Tack welds must fully penetrate the pipe walls; the use of properly constructed welding clamps to ensure correct alignment for welding is considered essential, whilst special attention is to be given to the removal by chipping (or flame gouging if necessary) of all slag and oxide residues.

If welding must be undertaken in the proximity of inflammable materials or fabrics, precautions must be taken to minimize any risk of propagation of fire. Correct types of fire extinguisher must be retained at hand during the course of any welding process.

When an oxy-acetylene flame is used for cutting, care shall be taken to avoid unnecessary damage to the tube. After cutting, the ends must be dressed with a file or mechanically ground until smooth and square.

Upon completion of a weld, the joint shall immediately be thoroughly cleaned with a stiff wire brush and coated with red oxide paint.

Threaded Joints

It is essential that paste, putty, grease or sealing compounds are not used for making connections directly to polythene or polypropylene cisterns.

All malleable iron unions shall be spherical bronze to bronze seat, navy pattern.

Reducing bushes will not be permitted other than for gauge, thermostat, detector, etc. pockets; malleable iron reducers shall be eccentric where fitted in horizontal pipework and concentric elsewhere. Long screw connectors also will not be permitted other than for making tank/cistern connections.

The Engineer reserves the right to select up to 10 threaded joints to be dismantled and inspected, if any joint is proven to be unsatisfactory or not conforming to BS EN 10226-1:2004, BS EN 10226-2:2005 and BS EN 10226-3:2005, the whole works or any part shall be dismantled as directed by the Engineer, and re-assembled correctly. The inspection and all making good shall be at no extra cost to the Employer.

General

Pulled bends shall not be used in galvanised mild steel pipework.

Bolts, nuts and washers shall be pre-treated by an anticorrosion process (ie. sherardised) for black pipework, galvanised for galvanised pipework, or in the case of gunmetal flanges, be of compatible material with the parent metal of the flange.

Break flanges or unions shall be installed every 12 to 18 metres within pipework runs, or as shown on the drawings.

Y10.9320 WORKMANSHIP, COPPER PIPEWORK

All solder must be 'lead free' and all joints shall be made strictly in accordance with the manufacturer's instructions.

Soft soldered joints shall be made with 'passive' fluxes such as Delcop, Yorkshire,

Fluxite or Templars.

Fluxes for silver brazing alloy shall be Johnson Mathey's 'Easy Flo' or 'Silver Flo'.

Y10.9330 PIPE SLEEVES

All pipes installed through internal walls or floors are to pass through mild steel, copper or uPVC sleeves, which must project 2mm beyond the finished faces of the walls, and are to have clearance of no more than 5mm anywhere around the pipes. The pipes must be free to expand without causing damage to finishes, and all sleeves must be set concentric with the pipes. Where the use of standard tube would give more than 6mm clearance all round, sleeves are to be formed from 2mm thick sheet steel, rolled and welded along the seam.
All sleeves passing through external walls and roofs to outside atmosphere must be sealed watertight to the satisfaction of the Engineer.

All sleeves required to be built into or embedded in reinforced or other concrete parts of the structure must be placed in position before the concrete is poured and precautions must be taken to ensure that the sleeves remain in the correct position while the concrete sets.

Gas pipework that passes through unventilated or mechanically ventilated voids or ducts shall be enclosed in a continuous sleeve, in accordance with the Institution of Gas Engineers publication IGE/UP/2.

Spacers or internal supports between the gas pipework and the sleeve shall be non-metallic, there must be no metal to metal contact between the inner pipe and the outer sleeve and internal supports shall be designed to ensure an airway is maintained between pipe and sleeve.
Isolating valves and test points shall be provided at both ends of the enclosed pipe to ensure soundness teats can be completed.

Y10.9340 PROVISIONS FOR DRAINING, FLUSHING AND VENTING OF PIPEWORK

Draining

Drain valves shall be provided at all accessible low points and on the 'dead side' of all valves. Particular attention is drawn to the requirement to install drain valves at the low points on both flow and return pipes which serve heat emitters from above.

The drawings do not show all positions where air release valves and drain valves will be necessary but these must be included for the proper operation and maintenance of the systems.

Drain valves and air release valves shall be as scheduled under ‘VALVES’ unless stipulated otherwise elsewhere in this Specification or on the Contract Drawings.

Flushing

A 25mm BSP socket on the common flow pipe from the boilers and a 25mm BSP socket on the common return pipe to the boilers (and the secondary side flow and return of heat exchangers) shall be installed to enable proper flushing of the circuits. Flushing shall be undertaken on completion of the installation and prior to setting into operation.

All valves shall be fully open on all circuits before thorough flushing with clean water is allowed to commence. All strainers, filters and mesh screens (installed to protect valves and plant items) shall be removed and cleared of all sediment after each flush through. This procedure shall be repeated until the system is free of all foreign matter.

Venting

Pipework shall be set out as neatly as possible with minimum number of high points.

All high points on pipework up to 50mm steel/54mm copper shall be fitted with a square equal tee branch (vertically upwards) to collect any air in that part of the system. On pipes larger than 50mm steel/54mm copper, the air collection branch shall be a minimum size of 50mm steel/54mm copper (vertically upwards).

Air shall be removed by means of a manual air vent arrangement which shall be formed by extending a pipe off the top of the air collection branch to a male hose union isolating valve in an easily accessible position approved by the Engineer unless directed otherwise or indicated on the Contract Drawings.

In certain Application: s automatic air release valves may be stipulated in preference to manual air vents e.g. in plant rooms. Approved automatic air vents shall be installed in the top of the air collection branch and be complete with a 15mm discharge pipe from the outlet connection. The discharge line shall be extended to terminate at a convenient position outside the building or over a gully as approved by the Engineer

Y10.9350 PIPEWORK BURIED EXTERNALLY

Services buried externally shall be laid as follows:

Gas

- Form a trench 1000 deep for pipework exceeding 50mm n.b. (800 deep under paved footpath) or 525 deep for pipework less than 50mm n.b.
- Lay 100mm deep bed of sharp sand, pea shingle, MOT 1 or MOT2 granular backfill.
- Fill with sharp sand to a depth of 100mm above pipe and compact into place by hand.
- Back fill with sharp sand or sieved earth (18mm mesh) hand compacted at

100mm layers.
- At 300mm below ground level lay a metallic detection warning tape.
- Back fill to ground level with well compacted sieved earth (18mm mesh).
- Note that gas and water carried in plastic pipework must be no less than 350mm apart.

Water

- Form a trench depth 1000mm deep.
- Lay 100mm deep bed of sharp sand or pea shingle.
- Lay the pipe and fix a 2.5mm^2 insulated solid copper conductor or proprietary metallic trace tape to the pipe. Clamp the copper conductor/trace tape to the steel tube above ground at each of the tube ensuring a good electrical conductive path. This conductor will be used to trace the service pipe, if necessary, in the future.
- Fill with sharp sand to a depth of 100mm above pipe and compact into place by hand
- Back fill with sharp sand or sieved earth (18mm mesh) hand compacted at 100mm layers.
- At 300mm below ground level lay polythene marker tape.
- Backfill to ground level with well compacted sieved earth (18mm mesh).
- Note that gas and water carried in plastic pipework must be no less than 350mm apart.

Refer to BS 6700 for details of the pipe entries into buildings.
All buried services must be colour coded in accordance with BS 1710:2014, continuously or at 1.0m. intervals.

Steel or copper tube shall be protected against chemical attack or corrosion by means of a double wrapping of Winn and Coales (Denso) Ltd. 'Denso tape' spirally wound with a minimum 15mm. overlap. Where copper tube to BS EN 1057:2006+A1:2010 is specified 'Kite' marked tube pre-wrapped in a polyethylene coat to BS 3412:1992 and the correct colour code will be accepted.

Unavoidable joints in pre-wrapped copper, polyethylene or polythene tube shall be protected in a double wrap of Winn and Coales (Denso) Ltd. 'Denso tape'.

Y10.9360 PIPEWORK IN CONCRETE FLOOR SCREEDS

Pipework will only be laid in screed where there is no acceptable alternative, and if so there must be no joints unless absolutely unavoidable.

Unavoidable joints on copper pipework shall be made with Yorkshire High Duty capillary end feed fittings bonded with silver brazing alloy (neither compression fittings nor soft solder capillary fittings will be permitted in this situation).

Unavoidable joints on black steel pipework shall be made by the welding technique.

Tube and fittings are to be pre-wrapped against corrosion or protected by wrapping in Winn and Coales (Denso) Limited. 'PPS' tape spirally wound with minimum 15mm overlap.

Vertical risers from floor screeds shall also be sleeved in 'PPS' tape as a protection against floor cleaning solvents.

Provision must be made for the expansion of the pipework by air spaces, flexible insulation or other methods, to be approved by the Engineer.

Y10.9370 PIPEWORK UNDER TIMBER FLOORBOARDS

If it is necessary to notch timber joints to allow the passage of copper, lead, uPVC, polythene pipework (or similar materials) under floorboards, the notch over the pipe(s) must be fitted with a suitable steel joist insert to protect the pipe(s) from penetration by nails, screws, etc. The steel joist inserts are available from Tyne Joist Insert Co. Limited. (Tel: 0181 954 5666).

Y10.9380 PREVENTION AGAINST DAMAGE BY FREEZING

During the course of the works precautions must be taken to prevent damage to any of the plant, pipework or equipment due to freezing ambient conditions. In the event of such damage occurring during hydraulic testing or otherwise, it shall be made good at no extra cost to the Employer and to the entire satisfaction of the Engineer. The installation shall be handed over either in operation or completely drained as may be directed by the Engineer.

Y11 PIPELINE ANCILLARIES

Y11.1000 GENERAL

Y11.1010 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.

Y11.1020 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.

Y11.1030 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 12266-1:2012 and BS EN 12266-2:2012.

Y11.2010A THREADED ENDS STOP TAPS TO BS 1010-2

Material - Bronze or DZR copper alloy body. Washer material suitable for service fluid and operating temperature.
Ends - Threaded to BS 21:1985.
Pattern - Straight pattern.

Y11.2080B COMPRESSION END BALL TYPE VALVES - SCREW DRIVER/KEY OPERATED

Materials - Bronze or DZR copper alloy body.
Ends - Compression fittings to BS EN 1254-2:1998.
Chrome or nickel plated DZR sphere with full bore flow aperture. PTFE seats and stem seals. Anti-blow-out stem.
Operation - Screw driver operated or key operated.

Y11.2080D COMPRESSION END BALL TYPE VALVES - LEVER OPERATED

Materials - Bronze or DZR copper alloy body.
Ends - Compression fittings to BS EN 1254-2:1998.
Chrome or nickel plated DZR sphere with full bore flow aperture. PTFE seats and

stem seals. Anti-blow-out stem.
Operation - lever operated.

Y11.2110A STOP VALVES - KEY OPERATED SLUICE TYPE A TO BS 5163

Seat - Resilient or metal seated.
Stem seal - Stuffing box and gland; injector packing foil; or toroidal sealing rings (O-rings).
Operation - T key.
Materials - Manufacturer's standard and WRAS approved.
Options - Stem cap.

Y11.2120A STOP VALVES TO BS 5433:1976

Bronze or DZR copper alloy body threaded to BS 21:1985.
Washer material suitable for service fluid and operating temperature.

Y11.2690A TUNDISHES, COPPER

Provide tundishes located adjacent to equipment, as indicated.

Use 3mm minimum thickness copper sheet. Form sheet into a tapered reducing cone with a minor diameter to suit drain line.

Major diameter nominally 50 mm larger than minor diameter, tapering at approximately 30 degrees.

Y20 PUMPS

Y20.1000 GENERAL

Y20.1010 PUMPS

Provide pumps manufactured and tested in accordance with appropriate British Standard, in particular BS EN 809:1998+A1:2009, BS EN 60335-2-41:2003+A2:2010 and BS EN 60335-2-51:2003+A2:2012 where applicable.

Y20.1020 PUMP SELECTION

Select pump at or near most efficient part of performance curve for duty required.

Y20.1030 SAFETY GUARDS

Fit safety guards around revolving parts on close coupled and belt drive pumps.

Y20.1040 PUMP TESTING

Ensure pumps comply with BS EN ISO 5198:1999 and BS EN ISO 9906:2012 as appropriate.

Y20.4010 GENERAL

Comply with manufacturer's recommendations for installation of pumps. For in-line pumps ensure that motor is positioned in accordance with manufacturer's requirements.

Y20.4020 PIPELINE CONNECTIONS

Support pumps independently from connecting pipework to ensure no load is transmitted from pipework to pump casing on pump suction and discharge.

Y20.4030 MOUNTINGS

Mount motors and pumps for belt drive pumps resiliently.

Y20.4040 ALIGNMENT

Align pump to prevent undue restraint and thrust on interconnecting pipework. Align drives to prevent undue wear and restraint on pump shaft. For belt drives, align pulleys and tension belts to prevent undue wear and out of balance forces.

Y20.4050 ACCESS

Locate pump within the system with adequate space around it for service and maintenance.

Y21 WATER TANKS/CISTERNS

Y21.1000 GENERAL

Y21.1010 TANK DESIGN

Design and fabricate tanks/cisterns in accordance with British Standards.

Y21.1020 DOMESTIC STORAGE WATER CISTERNS

Ensure storage cisterns for domestic water purposes comply with the Water Supply (Water Fittings) Regulations 1999.

Y25 CLEANING AND CHEMICAL TREATMENT

Y25.1000 GENERAL

Y25.1010 CONDITIONS FOR CLEANING AND CHEMICAL TREATMENT

Ensure treatment complies with statutory authority and health and safety regulations.
Notify manufacturer's 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.

Y25.1015 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.

Y25.3010A FLUSHING

Temporary connection from mains in compliance with the Water Supply (Water Fittings) Regulations 1999, and the Water Supply (Water Fittings) (Amendment) Regulations 1999.
Carry out flushing of water systems in accordance with BSRIA Application Guide 1/01 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.

Y25.3040 STERILISATION - GENERAL

After flushing process, carry out sterilisation 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.

Y25.3050 STERILISATION - MAINS WATER SYSTEM

Carry out the following operations in accordance with BS 6700.

Flush system and introduce sterilisation chemical.

Take samples from all sentinel points to ensure correct chlorine concentration.

Leave system to stand for period of time indicated.

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.

Certificate of conformity

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

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

Y25.3060 STERILISATION - 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 operations on all water storage tanks and cisterns, cold and hot.

Carry out procedures as for mains water systems.

Y30 AIR DUCT LINES AND ANCILLARIES

Y30.1000 GENERAL

Y30.1010 DUCTWORK INSTALLATION STANDARDS

Carry out construction and installation of ductwork in accordance with DW 144, DW 154, DW 177, DW 191 and BS 5588 as appropriate.

Y30.1020 DUCTWORK DIMENSIONS

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

Y30.2040B MILD STEEL DUCTWORK MATERIAL

DW 144 Part 2 - Standards, paragraph 7, mild steel.

Y30.2050A PROTECTIVE FINISHES - GALVANIZING

DW 144 Part 7 - General, Section 27, galvanizing after manufacture.

Y30.2060A RECTANGULAR CONSTRUCTION

Rectangular ductwork - DW 144 Part 3.

Y30.2060B CIRCULAR CONSTRUCTION

Circular ductwork - DW 144 Part 4, spirally wound or straight seamed.

Y30.2100A RECTANGULAR CONSTRUCTION

Rectangular ductwork DW 154 Part 3.

Y30. 2100G CIRCULAR CONSTRUCTION

Circular ductwork DW 154 Part 4.

Y30.3010 CONSTRUCTION AND FINISHES

Ensure that materials of accessories are compatible with ductwork and that finishes

of accessories comply with any special requirements for ductwork.
Ensure casing losses of components are compatible with ductwork in which they are incorporated.

Y30.3020A METAL DUCTWORK INSPECTION/SERVICING ACCESS OPENINGS

Provide access/inspection openings in accordance with DW 144 Part Seven Section 20 and Appendix M Table 25 Level 1.

Y30.3100A COATED STEEL FLEXIBLE DUCTS

Supply and fasten coated steel flexible duct connections as DW 144 Part Seven Section 25. Use flexible duct connections in applications listed in DW 144 paragraph 25.1.
Comply with BS EN 13180:2002.
Maximum length 600mm.

Y30.4010 GENERAL WORKMANSHIP

Install ductwork in accordance with DW 144, DW 154 and DW 191 as appropriate.

Ensure that there are no sharp edges or corners on cut edges on ductwork, flanges and supports.

Install pre-insulated ductwork in accordance with manufacturer's instructions.

Y30.4020 DUCTWORK SUPPORTS

Support ductwork in accordance with DW 144 Part Six Section 19; DW 154 Part 5; or DW 191 Section 7 as appropriate. Install supports to ensure insulation can be applied unless otherwise indicated.

Y30.4090A INTERNAL CLEANLINESS - BASIC

Provide the basic level of cleanliness and protection as defined in HVCA document DW/TM2.

Y30.4090D DRY METHOD OF CLEANING

Method of cleaning in accordance with the HVCA Guide to Good Practice, Cleanliness of Ventilation Systems TR/17 - Dry cleaning, Table 6.

Y30.4170 POSITIONING

Position components as indicated and in accordance with manufacturer's instructions as shown on the following drawings.

- Contract drawings
- Manufacturer’s drawings
- Specialist supplier’s drawings
- Specialist contractor’s drawings

Y40 AIR HANDLING UNITS

Y40.1000 GENERAL

Y40.4020 ACCESS

Ensure air handling units are positioned to allow adequate space for maintenance and access.

Y40.4040 DUCT CONNECTIONS

Ensure air is straightened as it leaves unit discharge. Ensure ductwork connection is long enough to ensure the aerodynamic performance of the fan is not affected.

Y40.4050 SERVICES CONNECTIONS

Ensure panels are sealed around electrical cable and pipework service entry points to prevent air leakage.

Provide flexible cables between fan motor and local isolator.

Y40.4060 ISOLATION OF UNITS

Provide means of isolating air handling units electrically to allow maintenance and repairs to be carried out.

Provide means of isolating pipework to air handling units to allow maintenance and repairs to be carried out.

Provide means of isolating steam to humidifier when access door is opened.

Y41 FANS

Y41.4010 LOCATION

Install fans in positions indicated, in accordance with manufacturer's instructions and recommendations in the HEVAC Fan Application Guide.

Y41.4020 ATTITUDE

Mount impeller shaft horizontally unless otherwise indicated.

Y41.4030 ALIGNMENT

Ensure fan is installed aligned to allow optimum air flow path.

Y46 GRILLES/DIFFUSERS/LOUVRES

Y46.4010 GRILLE/DIFFUSER LOCATION

Fit at terminal air supply, extract and transfer points indicated, in accordance with the HEVAC.
Air Diffusion Guide.

Y46.4020 LOUVRE LOCATION

Fit at system main air intake and discharge points, as indicated.

Y46.4030 ACCESSORIES

Fit accessories to each grille and diffuser in accordance with manufacturer's instructions and as indicated.

Y46.4040 CONNECTION TO DUCTWORK

When connecting directly to duct spigot, secure grille mounting frame or flange with screws, or bolts and nuts, to returned flange, with filled in corners, at end of duct spigot.

Y50 THERMAL INSULATION

Y50.1000 GENERAL

Y50.1010 TEMPERATURE RANGE

Surface temperature within range -40ºC to 230ºC.

Y50.1020 STANDARDS

Comply in general with BS 5422:2009, BS 5970:2012 and BS EN ISO 12241:2008.
Use the description of terms as BS 3533:1981.

Y50.1030 MATERIALS

Employ materials that comply with BS 476-4:1970, non-combustibility test, or obtain a Class 'O' fire rating to Building Regulations when tested to
BS 476-6:1989+A1:2009 and BS 476-7:1997.
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.

Y50.1032 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.

Y50.1034 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.

Y50.1050A SPREAD OF FLAME

When completed, ensure surface-finish complies with BS 476-7:1997 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 5659-2:2012.

Y50.2010 THERMAL CONDUCTIVITY

Ensure values are in accordance with BS EN 12664:2001, BS EN 12667:2001, BS EN 12939:2001 and BS EN ISO 8990:1996.

Y50.2040A FOIL FACED MINERAL FIBRE RIGID DUCT INSULATION

Standard - BS 3958-5:1986.
Nominal density - 45 - 48 kg/m^3.
Thickness - 25mm to 100mm.
Thermal conductivity - Not exceeding 0.04 W/mK at a mean temperature of 50^oC.
Finish - Reinforced aluminium foil.

Y50.2170A VAPOUR BARRIER PERMEANCE

Do not exceed the following permeance values for vapour barriers.
Permeance values
- Cold water pipework - 0.05g/sMN.
- Chilled water pipework - 0.015g/sMN.
- Refrigeration pipework - 0.010g/sMN.

Y50.2190 ADHESIVES

Comply with the recommendations of clause 8.2 of BS 5970:2012, section 2 for insulation bonding adhesives, lagging adhesives; and facing and film attachment adhesives.

Y50.2290 NON-DOMESTIC HOT WATER SERVICE AREAS - MINERAL WOOL

Secondary domestic hot water service pipework
Based on BS 5422:2009 Table 18 – contents at 60ºC

Steel pipe NB (mm)	Copper pipe NB(mm)	Thickness of insulation (mm)
15	15	30
20	22	30
25	28	35
32	35	35
40	42	35
50	54	40
65	63	40
80	76	45
100	108	45
125	133	45
150	159	45
200	-	45
225	-	50
250	-	50
300	-	50

Y50.2310 NON-DOMESTIC HEATING INSTALLATIONS - MINERAL WOOL

Low pressure hot water service pipework
Based on BS 5422:2009 Table 16 – contents at 75ºC

Steel pipe NB (mm)	Copper pipe NB (mm)	Thickness of insulation (mm)
15	15	30
20	22	35
25	28	40
32	35	40
40	42	40
50	54	45
65	63	50
80	76	50
100	108	50
125	133	60
150	159	60
200	-	60
225	-	60
250	-	60
300	-	70

Y50.2340 STEAM AND CONDENSATE SYSTEMS – MINERAL WOOL

Steel pipe NB (mm)	Thickness of mineral wool insulation (mm)	
	Condensate	Steam
15	40	60
20	40	60
25	45	70
32	45	70
40	50	70
50	50	70
65	50	80
80	60	80
100	60	80
125	60	80
150	60	90
200	60	90
225	60	90
250	60	90

Y50.2370 CHILLED AND COLD WATER SUPPLIES TO PREVENT CONDENSATION - MINERAL WOOL, LOW EMISSIVITY

Cold water (mains, pressurised, cistern fed, etc.) and chilled water pipework
Based on BS 5422:2009 Table 8 – contents at +5ºC

DN steel pipe (mm)	OD copper pipe (mm)	Thickness of insulation (mm)
15	15	25
20	22	25
25	28	30
32	35	30
40	42	30
50	54	35
65	63	35
80	76	40
100	108	40
125	133	45
150	159	45
200	-	50
225	-	50
250	-	50
300	-	60

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 '0' 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 '0' foil tape to continue vapour barrier or containment.

Y50.3060 INSTALLATION OF FOIL FACED SEMI-RIGID SLAB INSULATION ON DUCTWORK

Secure the insulation with adhesive in accordance with manufacturer's recommendations. Use insulation hangers spaced at maximum 300mm centres on the underside of ducts.

Cut slabs so that the top and bottom pieces overlap the sides. Seal joints and pin penetrations using 100mm wide class '0' aluminium foil tape.

Where cut outs for test holes, etc occur tape over insulation membrane and return to the duct surface.

Where insulation abuts duct support inserts that have integral vapour barriers seal using class '0' foil tape to continue vapour barrier.

Y50.3210 FLANGES AND VALVES

Cut back to allow removal of bolts and nuts, finish with neat bevel or use end caps.

Where boxes are used fit over insulation on adjacent piping. Ensure operation of valve remains unimpaired with box in place.

Y50.3300 INSTALLATION OF INSULATION ON DUCTWORK

Ductwork in plant-rooms, in walkways or on view.

All ductwork carrying warm supply air, chilled supply air, fresh air, extracted air that may be recirculated and air for energy recovery shall be insulated with 50mm thick Fibreglass Rigid Duct Insulation having a factory applied Class '0' facing. All joints must be completely sealed by means of Class '0' tape. The insulation shall be supported on the underside by means of insulation support pins - the punctured facing shall be repaired and the integrity of the vapour barrier re-instated by means of Class '0' sealing tape. Points of the support pins must be turned back into the insulation.

All volume control dampers shall be thermally insulated up to the operating lever where the insulation shall be left short to enable full operation of the mechanism (the cut edges of the insulation shall be sealed with aluminium band or duct tape as appropriate) unless the ductwork carries chilled air or fresh air when the whole mechanism shall also be insulated and vapour sealed.

All heater batteries are to be thermally insulated.

All attenuators shall be thermally insulated.
All grille/diffuser plenum boxes shall be thermally insulated.

Access panels/doors smaller then 300 x 300 shall be left uninsulated unless the ductwork carries chilled air or fresh air when the whole door shall be insulated and vapour sealed. Insulation on larger access panels/doors shall be secured to the centre of the panel leaving full access to the securing device(s).

If the ductwork system carries chilled air or fresh air the complete arrangement must be carefully sealed to form a total vapour batter and the supports must be separated from the duct by 50mm x 50mm hardwood battens.

Where vapour seals are punctured for fittings, test holes, etc. the vapour barrier must be re-established by the application of ‘Foamseal 30/45’ mastic manufactured by Atlas Products & Services Limited.

The insulation shall be finished with stucco embossed Aluzinc steel cladding secured by means of self tapping screws – care must be taken not to damage the vapour barrier. The insulation shall be sealed to the duct supports to maintain the

integrity of the vapour barrier.

Aluzinc coated steel cladding is available from Dobelshield (Tel: 01384 74660).

Ductwork concealed in ceiling voids, services ducts, etc.

All square/rectangular ductwork carrying warm supply air, chilled supply air, extracted air for recirculation and air for energy recovery shall be insulated with 50mm thick Fibreglass Rigid Duct Insulation having a factory applied Class '0' facing. Circular/oval ductwork for the same application shall be insulated with 50mm thick Fibreglass Flexible Duct Insulation also having a Class '0' factory applied facing. All joints shall be completely sealed by means of Class '0' tape.

The insulation shall be supported by means of insulation support pins - the punctured foil facing shall be repaired and the integrity of the vapour barrier re-instated by means of Class '0' sealing tape. Points of the support pins must be turned back into the insulation.

If the ductwork conveys chilled air the complete arrangement must be carefully sealed to form a total vapour barrier and the supports must be separated from the duct by 50mm x 50mm hardwood battens.

Ductwork exposed to rain, snow, etc.

All ductwork carrying warm supply air, chilled supply air, recirculation air, and/or air for energy recovery must be insulated with 50mm thick Rocksil slabs (not less than 80 kg/m^3 density). If the ductwork conveys fresh air or chilled air the complete arrangement must be carefully sealed to form a total vapour barrier and the supports must be separated from the ducts by 50mm x 50mm hard wood battens. The Rocksil slabs must be secured into place with the appropriate adhesive and support pins as necessary. Points of the support pins shall be turned back into the insulation.

The surface contour of the insulation must be even and if the duct is carrying fresh air or chilled air it must be vapour tight and all seams sealed with 'Venture Tape 1517' foil tape prior to the application of the protective finish. Note that the thermal insulation on the top horizontal surface of the duct shall be formed into an apex along the centre line to shed water from the finished surface. If the duct is likely to be subjected to foot traffic a 0.5mm thick aluminium plate must be placed on the thermal/acoustic insulation before the protective finish is applied.

The insulation shall be protected from the rain, sleet, snow, etc. by the application of Venture Clad Embossed five ply laminate (Product No. 577CW-E) installed strictly in accordance with the manufacturer's recommendations. The Venture Clad covering shall have at least 75mm overlap at all joints. Venture Clad products are available from Venture Tape Europe (Tel: 01327 876555).

Any dampers, damper motors, damper mechanisms, access panels/doors, test hole

positions, etc. that are located on external ductwork shall be protected from rain, sleet, snow, etc. by means of purpose designed galvanised sheet steel removable covers.

Ductwork and flexible connections between air handling units and attenuators

The flexible connection and ductwork between each air handling unit and its upstream/down stream attenuator must be acoustically insulated (and vapour sealed) using Salex Mufti-lag Prima 1030 cut and sealed in accordance with the manufacturer's instructions.

Note: The flexible connection to all air handling units must be wrapped in Salex TB5 Barrier Mat cut and sealed in accordance with the manufacturer's instructions prior to wrapping with Mufti-lag Prima 1030.

Salex TB5 and Mufti-lay are available from Salex Interiors Limited (01206 508111).

Y51 TESTING AND COMMISSIONING

Y51.1000 GENERAL

Y51.2080 PRESSURE TESTING - SOIL, WASTE, VENTILATION, ANTI-SIPHON 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 12056-2:2000.

Normally this test is carried out to confirm that all pipes and fittings are airtight. It should be completed in one operation but for large multi-storey systems testing in sections may be necessary.

The water seals of sanitary appliances should be fully charged and test plugs or bags inserted into the open ends of the pipework to be tested. To ensure that there is a satisfactory air seal at the base of the stack, or at the lowest plug or bag in the stack if only a section of the pipework is to be tested, a small quantity of water sufficient to cover the plug or bag can be allowed to enter the system.

One of the remaining test plugs should be fitted with a tee piece, with a cock on each branch and one branch being connected by means of a flexible tube to a manometer. Alternatively a flexible tube from a tee piece fitted with cocks on its other two branches can be passed through the water deal of a sanitary appliance. Any water trapped in this tube should be removed and then a manometer can be connected to one of the branches.

Air is pumped into the system through the other branch of the tee piece until a pressure equal to 38mm water gauge is obtained. The air inlet cock is then closed and pressure in the system should remain constant for a period of not less than 3 min.

Note: defects revealed by an air test may be located by the methods given below

1. A smoke producing machine may be used which will introduce smoke under any pressure into the defective pipework. Leakage may be observed as the smoke escapes. Smoke cartridges containing special chemicals should be used with caution, taking care that the ignited cartridge is not in direct contract with the pipework and that the products of combustion do not have a harmful effect upon the materials used for the discharge pipe system.

   Smoke testing of plastics pipework should be avoided due to naphtha having a detrimental effect, particularly on ABS, PVC-U and MUPVC. Rubber jointing components can also be adversely affected.

2. With the pipework subject to an internal pressure using the smoke machine method as described in above, soap solution can be applied to the pipes and

joints. Leakage can be detected by the formation of bubbles.

3. There is no justification for a water test to be applied to the whole of the plumbing system. The part of the system mainly as risk is that below the lowest sanitary appliance, and this may be tested by inserting a test plug in the lower end of the pipe and filling the pipe with water up to the flood level of the lowest sanitary appliance, provided that the static head does not exceed 6m.

All appliances, whether discharged singly or in groups, should drain speedily, quietly and completely.

After each test a minimum of 25mm of water seal should be retained in every trap. Each test should be repeated at least three times, the trap or traps being recharged before each test. The maximum loss of seal in any one test, measured by a dip stick or small diameter transparent tube, should be taken as the significant result.

To test for the effect of self-siphonage the appliance should be filled to overflowing level and discharged by removing the plug; WC pans should be flushed. The seal remaining in the trap should be measured when the discharge has finished. Ranges of appliances, connected to a common discharge pipe, should also be tested for induced siphonage in a similar way. The seal remaining in all the traps should be measured at the end of the discharge. The worst conditions usually occur when the appliances at the upstream end of the discharge pipe are discharged.

Y51.2110 TESTING RECORDS

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

Y51.3020 COMMISSIONING CODES

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

Y51.3030A COMMISSIONING WATER DISTRIBUTION SYSTEMS INCLUDING BSRIA PRE-COMMISSIONING CHECKLIST

Preliminary checks

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

Setting to work and regulation

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

Measurement

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

Y51.3040A PRELIMINARY CHECKS

Carry out checks and procedures as detailed in CIBSE Commissioning Code A, Section A1. Ensure system is statically complete as defined in section B4 of BSRIA Application Guide 3/89 Commissioning of air systems in buildings.

Use pre-commissioning checklist in BSRIA Application guide 3/89.

Setting to work and regulation

Set to work and regulate air distribution systems in accordance with CIBSE Commissioning Code A, Section A2, and sections C3, C4 and C5 in BSRIA Application Guide 3/89.

Measurement of air flow

Use instruments for measurement and methods of measurement detailed in BSRIA Application Guide 3/89 and CIBSE commissioning guide, section A3.

Y51.3060 COMMISSIONING REFRIGERANT SYSTEMS

Follow the procedures given for use and handling of refrigerants, pressure and leak testing, evacuation and dehydration, charging and lubrication of refrigerating systems in CIBSE Commissioning Code R and manufacturer's instructions.

Pre-commissioning:

Carry out the procedures for pre-commissioning detailed in CIBSE Commissioning Code R, Section R5.

Combined pressure and leak testing:

Carry out the procedures for combined pressure and leak testing, including refrigerant charging, detailed in CIBSE Commissioning Code R, Section R6.

Setting to work and adjusting:

Carry out the procedures for setting to work and adjusting detailed in CIBSE Commissioning Code R7.

Absorption Systems:

Carry out the procedures for Preliminary Checks, Testing and Charging, and Setting to Work and adjusting detailed in CIBSE Commissioning Code R, Section R10.

Apparatus and Instruments:

Use Apparatus and Instruments detailed in CIBSE Commissioning Code R,

Section R8. Apply tolerances defined in Section R8.6.

Y51.3090A INSTRUMENTS AND GAUGES

Ensure instruments are correctly calibrated. Record details of instruments on record sheets.

Submit evidence of correct calibration of instruments to be used in connection with commissioning and testing.

Y51.3100A AIR SYSTEMS COMMISSIONING RECORDS TO BSRIA AG 3/89.3

Keep a systematic record of commissioning results and distribute as indicated.

For air systems:
Use record sheets as described in BSRIA Application Guide 3/89.3
Commissioning air systems in buildings.

Y51.3100B WATER SYSTEMS COMMISSIONING RECORDS TO BSRIA AG 2/89.3

Keep a systematic record of commissioning results and distribute as indicated.

For water systems
Use record sheets as detailed in BSRIA Application: Guide 2/89.3
Commissioning water systems in buildings.

Y54 IDENTIFICATION - MECHANICAL

Y54.1000 GENERAL

Y54.1010 REQUIREMENTS

Identify all pipework, ductwork, equipment, appliances and ancillaries comprising the various systems.

Y54.1020 NEW SYSTEMS

Comprehensively label and colour code throughout works as indicated.

Y54.1030 EXISTING SYSTEMS

Where identification details are incompatible with those required for new systems, obtain approval to mode of cross referencing.

Y54.1040 COLOURS

As indicated to colour ranges given in BS 381C:1996 and BS 4800:2011.

Y54.2010 PIPEWORK IDENTIFICATION

All piped services shall be colour coded in accordance with the current edition of BS 1710:2014 at stipulated intervals on pipework in Plant Rooms and at access covers where pipework is located in service ducts.

Gas installation pipework shall be colour coded BS 4800:2011 colour reference 08 C 35 (Yellow Ochre) over the entire length from the outlet of the gas meter to the appliance(s) (except in domestic premises).

Y54.2020 DUCTWORK IDENTIFICATION

Standards

Generally colour code and label to HVCA Specification DW144 (Appendix B).

Primary Identification

Apply colour bands, 300mm wide, to each duct at least
Once in every room or enclosed area.
At intervals not exceeding fifteen metres.
At every junction.
At every damper.
At every inspection and access position into service shafts, false ceilings,

bulkheads etc.

Secondary Identification

For ducts with longest side or diameter up to and including 225mm. Paint colour bands 50mm wide and superimpose legends.

For ducts with longest side or diameter over 225mm. Paint or apply transfers to identification triangles, or triangular plates. Superimpose or incorporate legends.

Triangular Plates

Attach to buckle bands or stool pieces and fix to ducting, with apex indicating direction of airflow. Submit details of plates and fixings for approval before painting and marking. Use equilateral triangle of side 150mm minimum.

Legends

Apply transfers of an approved type to colour bands or triangles or triangular plates. Identify floor and space served, associated equipment reference and direction of airflow.

Y54.2035 PLANT AND EQUIPMENT IDENTIFICATION

All plant and equipment shall be fitted with durable nameplates bearing the maker's name, product reference/serial number, size, type, duty, test pressure etc. and shall also be provided with engraved traffolyte identification labels, compatible with the control panel switch identification. Note that multiple plant items must be numbered from left to right when viewed from the front.

Y54.2045 VALVE AND COCK IDENTIFICATION

Every valve in every Plant Room shall be identified by means of a consecutively numbered 38mm dia. brass disc attached to the spindle of each valve. The discs shall be attached to the spindles of the valves by means of brass jack chain. The numbers shall be 6mm high. The discs and chains are available from Seton Limited (Tel: 0800 585501).

Valves in trenches, service ducts, ceilings voids, etc. shall be fitted with a luggage tag protected in a plastic sleeve. The tag shall be clearly marked with details of the type of valve, service, purpose and, if appropriate, the volume flow rates (design and actual).

Y54.2070 AIR VOLUME REGULATING AND CONTROL DAMPER IDENTIFICATION

Standards

Identify each regulating and control damper. Except where exposed in occupied areas. On ductwork dampers, clearly indicate commissioning set point.

Identification colours

Use primary and secondary identification colours of associated system for painted or self colour discs.

Discs

Securely attach metal or laminated plastic discs, minimum diameter 35mm, to each item.

Legends

Engrave discs with permanent characters, minimum height 6mm.

Y54.2095 DANGER AND WARNING NOTICES

HSE 'Electric Shock' posters shall be mounted on rigid boards, encapsulated in plastic lamination and fixed to the wall adjacent to all control panels in all Plant Rooms and Boiler Rooms.

Colour code and label hazardous systems and equipment to requirements of Health and Safety Executive Guidance Notes

Y54.2110 SYSTEM IDENTIFICATION INSTALLATION CHARTS

The valve numbers shall be listed on a chart with the valve size, description of the function and the normal operating position, also included on the chart shall be a flow diagram marked with the valve numbers and showing their relative positions.

A copy of this valve chart/scheme diagram shall be reproduced, encapsulated in plastic lamination and secured in an approved position on the wall of the Plant Room/Boiler Room.

In schemes with terminal units controlled from a central remote panel a sketch plan marked with the identification reference must be provided. This plan shall be reproduced and secured in an approved position on the wall of the Plant Room/Boiler Room adjacent to the control panel.

In accordance with the Gas Safety (Installation and Use) Regulations 1994 a line diagram of the gas installation pipework indicating the position of primary meters, emergency control valves, pressure test points, condensate receivers electrical bonding, etc. must be provided. Two copies of this line diagram must be encapsulated in plastic lamination. One copy shall be secured to the wall adjacent to the primary meter and the other copy secured to the wall in the Boiler Room. A third copy of the line diagram must be included in the Health and Safety File/Operating and Maintenance Instruction Manual.

Y90 FIXING TO BUILDING FABRIC

Y90.1000 GENERAL

Y90.3100 FIXINGS

All clips, brackets, supports, foundation bolts, fixing bolts, assembly bolts, including nuts, anchor plates, washers and plugs, etc., for all equipment and materials supplied under this Contract must be included.

All radiator brackets and other fixings which are not drilled countersunk, shall be secured with steel round-head screws or countersunk screws with cup washers. The length and diameter of the screws shall be selected to suit the bracket and composition of the material to which the bracket shall be secured. The number and type of brackets shall be as recommended by the manufacturer of the particular item.

Heat emitters shall be fixed with a minimum clearance of 175mm above the finished floor level. A greater distance may be required if pipework is to be encased below the emitters.

Acceptable fixings:

MATERIAL	FIXING
Brickwork and blockwork	Rawl plugs for lightweight equipment and Rawl bolts or anchor bolts for heavy equipment
Concrete	Rawl bolts for light equipment and Rawl bolts or anchor bolts for heavy equipment
Aerated concrete	As recommended by manufacturers
Structural steel	Lindapter clamps or similar
Hollow sections	Toggle or gravity bolts
Clay hollow pot construction	Rawl nuts and battens

Care must be exercised in selecting the fixing and deciding the best position. It is also important that the base material is not damaged and does not suffer any detrimental effect by the fixing. Consideration must be given to proximity of other services particular with respect to water leaks, gas leaks and electro magnetic fields.

The proposed design of any special bracket shall be submitted to the Engineer for comment prior to manufacture.

Structural steel shall not be drilled for any purpose without the written consent of the Engineer.

Alignment and levelling of plant, provision of any shims necessary and supervision of grouting in holderbats and rag bolts must be included.
All pumps, fans and other moving machinery must be provided with anti-vibration mounting brackets, flexible connections, lined supports, etc. to prevent the transmission of noise and vibration through the structure and connecting pipework

and/or ducting.

The fixing screws for all front face border fixed air terminal devices must match the colour of the border. These screws may be supplied by the manufacturer of the air terminal device but, if not, suitable screws must be purchased and be treated/painted by a specialist as necessary.

Y91 OFF SITE PAINTING AND ANTI-CORROSION TREATMENTS

Y91.1000 GENERAL

Y91.3100 PAINTING AND PROTECTION AGAINST CORROSION

Black mild steel tube and joints.

All steel tubes, cut threads and welded joints shall be thoroughly cleaned to remove all traces of rust, dirt, grease, oil, mill scale, slag, etc. as soon as reasonably practicable.

When dry and clean, these surfaces must be coated immediately with red oxide primer paint.

Any black steel tube and brackets that are being retained or not being concealed under thermal insulation shall be prepared and coated with Hammerite paint to an approved colour.

Any pipework routed externally exposed to rain, snow, etc. shall be protected by means of Winn and Coales (Denso) Ltd. 'Densotherm' spirally wound, heated and smoothed-over in accordance with the manufacturer's instructions.

Black steel flanged joints, pipe brackets, duct brackets, supports and cast iron valves.

All black steel flanged joints, pipe brackets, duct brackets, supports, etc. and cast iron valves shall be thoroughly cleaned to remove all traces of rust, dirt, grease, oil, mill scale, slag, etc. as soon as reasonably practicable.

When dry and clean, these surfaces must be painted immediately with Hammerite paint to an approved colour.

Galvanized mild steel ducts, tube, joints, brackets, supports, etc.

Generally galvanizing shall be executed after manufacture, but if it is necessary to disturb the finish e.g. cut edges of ductwork, cut threads of tube, etc. the exposed steel shall be thoroughly cleaned and generously coated with zinc rich paint.

All new galvanized steel cisterns shall be coated internally with Wailes Dove Bitumastic Ltd. 'Bituros' solution.

Any pipework routed externally exposed to rain, snow, etc. shall be protected by means of Winn and Coales (Denso) Ltd. 'Densotherm' spirally wound, heated and smoothed-over in accordance with the manufacturer's instructions.

Any ductwork located externally, but left uninsulated shall be generously coated with Hammerite paint to an approved colour.

Plant and equipment

To remain unpainted.

Pumps and finished plant items

To remain with the factory applied paint finish.

Copper, Gun metal, brass, bronze, Ametal and dezincification resistant alloy valves

To remain unpainted self-finish.

APPENDIX A - SCHEDULE OF DRAWINGS

The following drawings show the extent of the works and shall be termed ‘The Contract Drawings’.

1629-MS-101	BASEMENT FLOOR PLAN MECHANICAL SERVICES LAYOUT
1629-MS-102	GROUND FLOOR PLAN MECHANICAL SERVICES LAYOUT
1629-MS-103	FIRST FLOOR PLAN MECHANICAL SERVICES LAYOUT
1629-MS-104	SECOND FLOOR PLAN MECHANICAL SERVICES LAYOUT
1629-MS-105	THIRD FLOOR PLAN MECHANICAL SERVICES LAYOUT
1629-MS-106	FOURTH FLOOR PLAN MECHANICAL SERVICES LAYOUT

APPENDIX B - TENDER SUMMARY

TENDER SUMMARY

UNIVERSITY COLLEGE LONDON
JOHN ADAMS HALL
FLOORS 1 TO 4, PART GROUND FLOOR AND BASEMENT REFURBISHMENT
SUMMER WORKS 2017

MECHANICAL SERVICES

1	Preliminary Costs	£
2	C10 Removal of Existing Services	£
3	C14 Survey and Validations	£
4	R11 Drainage Modifications	£
5	S12 Domestic Water Modifications	£
6	T31 Heating Modifications	£
7	U10 Ventilation Systems, including new fans and kitchen hoods	£
8	Sub-Total	£
9	Add 1/39th Main Contractor's Discount	£
10	TOTAL (Excluding V.A.T.)	£

Note: £5,000.00 will be withheld pending provision of Operating and Maintenance Instruction Manuals and 'as installed' drawings.

Contractor: ……

Address: ……

Signed: ……

(Name in capitals)……

Date: ……

APPENDIX C - PERMIT TO ENTER/WORK PROCEDURES

APPENDIX C

PERMIT TO ENTER/WORK PROCEDURES

Permit Types

B	KEY ISSUE (PLANT ROOM, ROOF ACCESS ETC.)	To authorise the issue of keys for entry to rooms/areas controlled by EFD
C	INSTRUCTION TO DISCONNECT	Instruction to electrician/engineer to disconnect plant/equipment/systems/area and to provide confirmation of the disconnection before work on the plant/equipment/systems/area takes place.
D	ENTER RESTRICTED AREAS	To authorise the entry into restricted areas under the control of UCL departments e.g. laboratories, and BSU.
E	CONFINED SPACE	To authorise work in a confined space. This permit requires confirmation of the isolation of electrical/mechanical systems air monitoring and rescue equipment.
F	HOT WORK	To authorise hot work. This permit requires specified safety checks to be carried out by the person carrying out the hot work.
G	WORK ON SPECIFIC SYSTEMS	To authorise work on a specific system (plant or equipment). This permit requires confirmation of isolation or safety checks of electrical and mechanical systems.
H	LABORATORY CLEARANCE CERTIFICATE	Laboratory Clearance Certificates are for the use of Project Officers/Managers to obtain, from the occupying department, confirmation of laboratory clearance or adequate safety control measures before the area is handed over to a contractor.

EFD PERMIT ISSUE SYSTEM

Contractors should report to the EFD Customer Services Centre for permit issue or collection.

In some instances the contractor will be instructed to report to a Maintenance Manager to arrange a permit issue.

Contractors must comply with the requirements of the permit.

NB. Where a contractor is a Principal Contractor under the definitions of the CDM regulations the Principal Contractor may operate the Hot Work permit system.

Customer Service Centre – Location

UCL Estates
Customer Service Centre
Foster Court
London
WC1E 7HB

NOTES ON PERMIT USE

Before starting work the contractor must carry out any checks required by the permit and satisfy themselves that area is safe to work, and then sign the permit on acceptance of the work area.

The contractor must obtain the signature of other persons that may be specified on the permit before starting work.

The Contractor is expected to adopt good working practice, comply with UCL Safety Rules for Contractors and to follow any safety requirements specified on the permit.

Permits must be displayed at the place of work

Once the work is finished permits must be returned to the Customer Services Centre for closure.

NB. A fine of £100 will be made for the non-return of keys issued with a permit.

Sample permits follow:

UCL ESTATES & FACILITIES DIVISION

PERMIT B: KEY ISSUE FOR EFD CONTROLLED AREAS

Part A. Project Officer / Authorising Officer

Project Officer		Permit. No.	
Building / UGC No.		Job No.	
Room No. or area			
Task / System			
Contractor Company			

The contractor/UCL Maint. staff is authorised to draw keys and enter the EFD controlled area (Plant Rooms, Roofs etc.) specified above.
This Permit is issued for the work specified above to be carried out on or between the following dates

Permit valid from:		Permit valid to:	

Issuing Officer		Issue date	

To be signed by contractor/UCL Maint. at time of issue

Name (Block Letters) Include company if different from above	Signature	Date

Part B. Contractor/UCL Maint. Staff: on acceptance.

At the work area and before starting work the contractor must read the following requirements and sign below:

If a specific work permit (e.g. Hot Work or Work on a Specific System) is required for the designated task it must be in place before starting work

Before starting work the contractor should satisfy themselves that the area is safe to work and report any problems or defects to the Project Officer.

The contractor must abide by "UCL Safety Rules for Contractors" when carrying out the work.

I have read, understood and agree to abide by the above requirements

Name (Block Letters)	Signature

Part C. Contractor/UCL Maint. Staff: on completion

I have completed the above task. The area is in a safe and tidy condition.
I have returned all keys issued with this Permit to the Estates & Facilities Help desk.

Name (Block Letters)	Signature

This Permit and any keys drawn with this permit, must be returned to the Estates & Facilities Help Desk for closure

The following keys were issued with this Permit	

Part D. UCL Estates & Facilities Section: To Close this Permit

Estates & Facilities Help Desk Signature	Date	
		A copy may be retained by the contractor as receipt of closure

KEYS MUST BE RETURNED TO THE CUSTOMER SERVICES CENTRE
BY 17:15 ON FRIDAY OF THE WEEK OF ISSUE

UCL ESTATES & FACILITIES DIVISION	UCL

PERMIT C: INSTRUCTION TO DISCONNECT ELECTRICAL/
MECHANICAL EQUIPMENT OR INSTALLATION

Part A. Project Officer / Authorising Officer

Project Officer		Permit. No.	
Building / UGC No.		Job No.	
Room No. or area			
Task / System			
Contractor Company			

This Permit is issued for the work specified above to be carried out on or between the following dates

Permit valid from:		Permit valid to:	
Issuing Officer		Issue date	

Part B. Contractor/UCL Maint.Staff: on acceptance

The Contractor must read the following requirements and sign below:

The named contractor/UCL Maint. staff is instructed to disconnect the equipment/instillation identified above and ensure that the disconnected equipment/instillation does not present a risk to those working in the area.

Work must be carried out in accordance with the "UCL Safety Rules for Contractors".

Any problems or defects are to be reported to the Project Officer who originated this instruction.

I have read and understood the requirements above.

Name (Block Letters) Include company if different from above	Signature	Date

Part C. Contractor/UCL Maint.Staff: after disconnection

Once the disconnection work has been carried out the contractor/UCL Maint. Staff must sign this section

I have disconnected and isolated the equipment/installation identified in Part A, in accordance with the instructions of the Project Officer and the "UCL Safety Rules for Contractors". Warning notices have been posted where appropriate.

Name (Block Letters)	Signature	Date

Use this space to supply any additional information about the disconnection or conditions that apply:

When complete this Permit must be returned to the Project Officer / Authorising Officer who issued the instruction

Part D. UCL Estates & Facilities Section: To Close this Permit

The Project Officer / Authorising Officer who issued the instruction should sign below and close this permit on the Permit Issue Database system.

Estates & Facilities Signature	Date	A copy may be retained by the contractor as receipt of closure.

UCL ESTATES & FACILITIES DIVISION

PERMIT D: TO WORK / ENTER RESTRICTED AREAS

Part A. Project Officer / Authorising Officer

Project Officer		Permit. No.	
Building / UGC No.		Job No.	
Room No. or area			
Task / System			
Contractor Company			

This Permit is issued for the work specified above to be carried out on or between the following dates

Permit valid from:		Permit valid to:	
Issuing Officer		Issue date	

To be signed by contractor at time of issue

Name (Block Letters) Include company if different from above	Signature	Date

Part B. Client Department — To be completed by a person designated by the client department

The laboratory */ Biological Services Unit is safe to work in */ safe to work under the following conditions (*/ delete as appropriate)

Signature: Date:

Where the work necessitates the closure of the whole (or large area) of a laboratory that is to be handed over to the control of the contractor an E&F Laboratory Clearance Certificate will be required.

Part C. Contractor/UCL Maint. Staff: on acceptance of work area

The contractor/UCL Maint. staff should be satisfied that the area is safe to work and report any defects to the Project Officer.

I accept the work area, am able to carry out the designated task and will abide by the "UCL Safety Rules for Contractors"

Name (Block Letters)	Signature

Part D. Contractor/UCL Maint. Staff: on completion

I have completed the above task and notified the UCL Project Officer. The area is in a safe and tidy condition.
I have returned all keys issued with this Permit to the Estates & Facilities Help desk.

Name (Block Letters)	Signature

This Permit should be returned to the Estates & Facilities Help Desk for closure

The following keys were issued with this Permit	

Part E. UCL Estates & Facilities Section: To Close this Permit

Estates & Facilities Help Desk Signature	Date	
		A copy may be retained by the contractor as receipt of cancellation

UCL ESTATES & FACILITIES DIVISION

PERMIT E: TO ENTER A CONFINED SPACE

Part A. Project Officer / Authorising Officer

Project Officer		Permit. No.	
Building / UGC No.		Job No.	
Room No. or area			
Task / System			
Contractor Company			

This Permit is issued for the work specified above to be carried out on or between the following dates

Permit valid from:		Permit valid to:	
Issuing Officer		Issue date	

To be signed by contractor at time of issue

Name (Block Letters) Include company if different from above	Signature	Date

Part B. Electrical Supervisor I have isolated and locked off all Electrical Services on the above system

Name (Block Letters)	Signature	Date

Part C. Mechanical Supervisor I have isolated and locked off all Mechanical Services on the above system

Name (Block Letters)	Signature	Date

Part D. Safety Manager I have tested the air in the confined space, identified above, for oxygen level, SO_2 and flammable gases.

The above-mentioned area is safe to work in */ safe to work under the following conditions. (*/ delete as appropriate)

Name (Block Letters)	Signature	Date

Part E. Contractor/UCL Maint. Staff: on acceptance.. The contractor/UCL Maint. Staff should only accept the task after sections B, C, & D have been signed

The contractor/UCL Maint. staff should be satisfied that the area is safe to work and report any defects to the Project Officer.

I accept the work area, am able to carry out the designated task and will abide by the "UCL Safety Rules for Contractors"

Name (Block Letters)	Signature

Part F. Contractor/UCL Maint. Staff: on completion. I have completed the above-mentioned task. The area is in a safe and tidy condition. I have returned all keys to the E&F Help desk and notified the Project Officer.

Name (Block Letters)	Signature	Date

This Permit should be returned to the Estates & Facilities Help Desk for closure

The following Keys were issued with this Permit

Part G. UCL Estates & Facilities Section: To Close this Permit

Estates & Facilities Help Desk Signature	Date

A copy may be retained by the contractor as receipt of closure.

UCL ESTATES & FACILITIES DIVISION

Part A. Project Officer / Authorising Officer

PERMIT G: WORK ON A SPECIFIC SYSTEM

Project Officer		Permit. No.	
Building / UGC No.		Job No.	
Room No. or area			
Task / System			
Contractor Company			

This Permit is issued for the work specified above to be carried out on or between the following dates

Permit valid from:		Permit valid to:	
Issuing Officer		Issue date	

To be signed by contractor at time of issue

Name (Block Letters) Include company if different from above	Signature	Date

Part B. System Manager — To be completed by the Manager (departmental or E&F) of the specific system

The system is ready and safe for electrical and mechanical isolation

Name (Block Letters)	Signature	Date

Valid from (date & time)		Valid to (date & time)	

Part C. Electrical Supervisor / Project Electrician

I have isolated and locked off all Electrical Services to the above-mentioned system. Warning notices have been posted and the necessary safety barriers positioned. The above-mentioned system is safe to work on */ safe to work on under the following conditions (*/ delete as appropriate)

Name (Block Letters)	Signature	Date

Part D. Mechanical Supervisor / Project Engineer

I have isolated and locked off all Mechanical Services to the above-mentioned system. Warning notices have been posted and the necessary safety barriers positioned. The above-mentioned system is safe to work on */ safe to work on under the following conditions (*/ delete as appropriate)

Name (Block Letters)	Signature	Date

Part E. Contractor/UCL Maint. Staff: on acceptance

I accept the work area and will carry out the task in accordance with "UCL Safety Rules for Contractors"..

Name (Block Letters)	Signature	Date

Part F. Contractor/UCL Maint. Staff: on completion

I have completed the above-mentioned task. The area is in a safe and tidy condition. I have returned all keys and notified the Project Officer.

Name (Block Letters)	Signature	Date

This Permit should be returned to the Estates & Facilities Help Desk for closure

The following Keys were issued with this Permit

Part G. UCL Estates & Facilities Section: To Close this Permit

Estates & Facilities Help Desk Signature	Date

A copy may be retained by the contractor as receipt of closure

UCL ESTATES & FACILITIES DIVISION

LABORATORY SAFETY CLEARANCE CERTIFICATE (Permit H)

Building:

Floor: Room(s

Occupying

Date for commencement of

Please fill in all the boxes with a tick if actioned or N/A if not applicable.

HAZARD		EXPECTED ACTION	CHECKED
1.0 MICROBIOLOGICAL CONTAMINATION			
1.1	General surfaces of benches, walls and floors	All hard surfaces to be disinfected by spraying or wiping	
1.2	Sinks and drainage	Washed down with disinfectant and flushed for half an hour and traps cleaned out	
1.3	Microbiological Storage areas	All stores to be cleared and disinfected or (mobile stores) removed from the area	
1.4	Microbiological Safety Cabinets	Cabinets and ductwork to be fumigated and where possible removed from the area	
1.5	Containment Level 3 Laboratories	Whole room(s) to be fumigated	
2.0 RADIOACTIVE CONTAMINATION			
2.1	General surfaces of benches, walls and floors	All hard surfaces to be monitored and found clear of contamination	
2.2	Sinks and drainage	All sinks free from radiation and scintillation fluids and flushed for half an hour and traps cleaned out	
2.3	Radioactive sources	All removed from area	

Use the following to check and comment on the clearance or control of hazards in the laboratory.

FUME CUPBOARDS		**COMMENTS AND DETAILS**
l)	Have hazardous substances likely to leave a residue been used in the cabinet over the last 2 years? (in particular the use of perchloric acid) Please list!	
ll)	Have hazardous substances likely to leave a residue been used in the cabinet or flue over a longer period of time	
lll)	Has the Fume Cupboard been cleared of residual hazardous substances?	
HAZARDOUS SUBSTANCE STORAGE		
l)	Has the work area been cleared of all hazardous substances?	
ll)	Have all hazardous substance spillages been cleaned up?	
SINKS AND WASTE WATER DISPOSAL		
l)	Have the sinks been flushed through with running water continuously for a minimum of ½ hour?	
ll)	Is there any residual radiation or scintillation fluid left in sinks or drainage stacks?	
lll)	Have the traps immediately under the sinks or drip cups been cleaned out and made clear of obstructions? Eg Mercury, phenol, glass and sharps.	
LABORATORY BENCHES GENERALLY		
l)	Have benches been decontaminated and cleared of hazardous substances and sharps?	
ADDITIONAL PROVISIONS		
Have you:		
l	Removed all hazard signs:- including those on freezers, drawers, cupboards?	
ll	Isolated all departmental hazard warnings - i.e laser warning lights?	
lll	Removed all sharps and waste sharps containers?	
lV	Removed all chemical containers, glassware and general rubbish?	
V	Disposed of all unwanted Equipment eg. Centrifuges, freezers, stills and apparatus?	
Vl	Removed all unwanted furniture eg. stools, bins?	
Vll	Removed all cleaning and disinfection materials?	

On completion of all Safety and hazard checks the Head of Department or Department Safety Officer is required to sign the following statement. "The above laboratory has been checked as thoroughly as is reasonably practicable and is free from hazards generated by this department".

Signatory		Laboratory Manager / Supervisor
You should pass this certificate to your Departmental Safety Officer for information and comment. Signed		Departmental Safety Officer

On completion of the above certificate will the signatory please return to the Project Officer, Estates & Facilities by the date indicated:

Project Officer _____ Date to be returned _____

FAILURE TO RETURN THE CERTIFICATE BY THE ABOVE DATE MAY INVOLVE THE COLLEGE IN EXTRA EXPENSE WHICH MAY BE LEVIED AGAINST YOUR DEPARTMENT.

APPENDIX D – PLANT/EQUIPMENT REFERENCE NUMBER REQUEST FORM

University College London - Data Collection Template

Controlled Copy Version 3 - Issued 15th October 2013

Assessment date (eg '01-Jan-2013)	Building Name	Building Number e.g. - 001 and EXT_001 for external assets	Floor	Room Number	Existing EQ Number	New EQ Number	(I) FAMIS_EQUIP. PARENT	FAMIS_EQUIP. ASSET_CLASS_CODE	(J) FAMIS_EQUIP. KEYWORD	(H) FAMIS_EQUIP. TYPE	Element and/or System	Sub-Element	Component	Reference	Full Description (64)	Manufacturer	"Other" Manufacturer	Model No.	Manufacturer Part Number	Serial No.	Replacement Cost (£)	Manufacturer Anticipated Life	No. Off	Year of Installation	Specification	Condition Ranking	Life Exp	Priority	Photo I/D (Building Number then three digit sequentional number) e.g. 001 - E001 and 001 M001	Comments
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								#N/A	#N/A	#N/A					-															
								#N/A	#N/A	#N/A					-															
								#N/A	#N/A	#N/A					-															
								#N/A	#N/A	#N/A					-															
								#N/A	#N/A	#N/A					-															
								#N/A	#N/A	#N/A					-															
								#N/A	#N/A	#N/A					-															
								#N/A	#N/A	#N/A					-															
								#N/A	#N/A	#N/A					-															

Condition and Remaining Life Rules

Condition Code	Description	Definition
A	New	Within first 12 months of installation
B	Servicable	Operating within normal conditions, requires infrequent repairs, spares readily available
C	Major Repair	Requires major repair to bring up to normal operating condition
D	Replace	Replacement of the asset is advised, is broken / not working or not performing it's intended job
X	Unknown	Access to asset restricted

Field Heading	Input Type	Notes
Assessment date (eg '01-Jan-2013)	Free text	Enter the data the Survey was carried out. This need to be in the following format as the character "/" cannot be uploaded to FAMIS. The date format to be used is "12-Jul-2013"
Building Name	Free text	Enter the building Name here. This is not need in the Famis upload but is necessary As a QA check that the correct Building number has been entered.
Building Number e.g. - 001	Free text	The building number should be inputted as a three digit figure. For building 1 there should be preceeding zero's. E.g building 1 is 001
Floor	**Dropdown**	**This is not a free text field and the relevent floor should be picked from the dropdown menu.**
Room Number	Free text	Enter the room number as indicated on the CAD drawings, **IF NO drawing are avilable then DO NOT SURVEY**
Existing EQ Number	Free text	Enter the existing EQ number
New EQ Number	Free text	If this is new or the EQ number is not present then a new number is to be allocated
(I) FAMIS_EQUIP. PARENT	Free text	Enter the assert parent EQ number here
FAMIS_EQUIP. ASSET_CLASS_CODE	**Auto**	**This field is Auto Pupulated**
(J) FAMIS_EQUIP. KEYWORD	**Auto**	**This field is Auto Pupulated**
(H) FAMIS_EQUIP. TYPE	**Auto**	**This field is Auto Pupulated**
Element and/or System	**Dropdown**	**Choose from the dorpdown list the appropriate Element/System**
Sub-Element	**Dropdown**	**Choose from the dropdown list the appropriate Sub-Element/System**
Component	**Dropdown**	**Coose from the dropdown list the relevent component**
Reference	Free text	Enter here the System the asset is associated with. i.e Boiler is on Heating system 1. or if you have three boilers then just enter Nr 1.
Full Description (64)	**Auto**	**This is an auto populated field generated from the Component and the reference fields**
Manufacturer	**Dropdown**	**Choose the manufacturer from the drop down list. If the manufacturer you require is NOT in the list then select "OTHER" and then enter the details in the specification column.**
Manufacturer "Other"	Free text	**If the manufacturer is not available in the Manufacturer field then use this field**
Model No.	Free text	Enter the model name or number if available
Manufacturer Part Number	Free text	Enter Manufacturer Part Number if available
Serial No.	Free text	Enter Serial Number if avalable
Replacement Cost (£)	Free text	Enter estimated cost of replacement. Just Enter this as a number with NO £ sign or Commas. The cell is preformatted
Manufacturer Anticipated Life	Free text	Enter the manufacturers Anticipated life if available suggest use CIBSE Guide M
No. Off (Quantity)	Free text	Enter the quantity of the assets if grouped together
Year of Installation	**Dropdown**	**From the dropdown select year of installation. If this is not available then estimate approximate year. This curently goes back to 1950.**
Specification	Free text	This is free text and should contain any additional information about the asset if not already collected in other fields. Typically this will be capacity, output rating,
Condition Ranking	**Dropdown**	**From the Dropdown select the appropriate condition code. (see rules above)**
Life Exp	**Dropdown**	**Select the expected replacement time frame from the dropdown selection**
Photo I/D (Building Number then three digit sequentional number) e.g. 001 - 001	Free text	Two formats have been suggested here building number then the photo id or Photo ID is prefixed with the relevant discipline (as done previously) instead of just a number eg. 001 - E001 / 001 - M001.
Comments	Free text	Any additional comments about the asset, particularly around immediate health and safety issues or defects/repairs urgently required

UCL

Asset survey Protocol

Description	Method of Collation
BMS Headend	One asset per item (Desk Top PC)
Water Detector System	One asset per item
BMS Outstation	One asset per item
Pneumatic Controls	One asset per System
Control Panel	One asset per item
BMS supervisor	One asset per item
Motor Control Centre (MMC)	One asset per item (Panel controlling Multiple motors)
Distribution Boards	One asset per item / Riser
Trace Heating	One asset per system
Power Distribution Unit (PDU)	One asset per item
Electricity Meter	One asset per item (Sub Meters only)
Lightning Protection	One asset per system
LV Switchgear	One asset per item
Earthing	One asset per system
Busbar System	One asset per system
UPS System Rotary Hybrid	One asset per item
UPS System Static Inverter	One asset per item
Motor Generator Set	One asset per item
Auto Transfer Switch	One asset pet item (auto Changeover Switch)
PF (Power Factor Correction)	One asset per item
HV Switchgear	One asset per item
HV/LV Transformer	One asset per item
Fixed Workshop Tools	One asset per item
Battery System	One asset per item
Fixed Electrical Appliances	One asset per building or for large buildings one per floor.
Electrical Hygiene Disposal	One asset per item
Underfloor Electric Heater	One asset per system
Fire Alarms & Ancillaries	One asset per system
Sprinklers	One asset per system
Booster Pumps	One asset per item
Hose reels	One asset per item
Smoke Sampler (Vesda)	One asset per item
Hydrants	One asset per system
Dry Risers	One asset per system
Gas Meter	One asset per item
Gas Space Heaters	One asset per item
Gas Booster Pumps	One asset per item
Gas Safety Shut of Equipment	One asset per item
LPG Installation	One asset per system
Gas Water Heater	One asset per item
Generator	One asset per item
Generator Panel	One asset per item
Fuel Tank & System	One asset per system
Boiler LTHW	One asset per item
Pumps	One asset per item
Chillers	One asset per item
Pressurisation Units	One asset per item
Fan Coil Units	One asset per item
Radiators	One asset per system.
Door Curtain Heaters	One asset per item
Split A/C units	One asset per item
Windows A/C Units	One asset per item
Pressurisation Fans	One asset per item
Air Handling Unit	One asset per item
Extract Fans	One asset per item
Supply Fans	One asset per item
Fire Dampers	One asset per item
Cooling Towers	One asset per item
Fuel Tanks	One asset per item
Flues	One asset per item
Unit Heaters	One asset per item
Expansion Tanks	One asset per item
Humidifiers	One asset per item
Heat Pumps	One asset per item
Buffer Tanks	One asset per item
Plate Heat Exchangers	One asset per item
Temperature Recorders	One asset per building.
Steam Boilers	One asset per item
Pressure Reducing Valve	One asset per system
Steam Traps	One asset per system
Shell & Tube Heat Exchanger	One asset per item
VAV Boxes	One asset per building or for large Building One asset per floor.
Induction Units	One asset per building or for large Building One asset per floor.
Filters	One asset per building or for large Building One asset per floor.
Heat recovery Equipment	One asset per item
Ductwork Systems General	One asset per system
Incinerator	One asset per item
Drainage System	One asset per system
Water Mains	One asset per system
Gas Mains	One asset per system
Fire Mains	One asset per item
Autoclaves	One asset per item
Fume Cupboards	One asset per item
General Lighting	One asset per building or for large Building One asset per floor.
Emergency Lighting	One asset per building or for large Building One asset per floor.
External Lighting	One asset per installation
Security Lighting	One asset per installation
Lighting Control System	One asset per system
LTHW/MTHW Heating Pipework	One asset per system this will include all Valves.
Chilled Water Pipework	One asset per building or for large Building One asset per floor.
Condenser Water Pipework	One asset per building or for large Building One asset per floor.
Refrigerant Pipework	One asset per building or for large Building One asset per floor.
Cold Water Mains Pipework	One asset per building or for large Building One asset per floor.
Dom. Hot Water Service Pipework	One asset per building or for large Building One asset per floor.
Cold water Down Service Pipework	One asset per building or for large Building One asset per floor.
Boosted Cold Water Main	One asset per building or for large Building One asset per floor.
Compressed Air Pipework	One asset per building or for large Building One asset per floor.
Gas Pipework	One asset per building or for large Building One asset per floor.
Fuel Oil Pipework	One asset per building or for large Building One asset per floor.
Cold Water Tanks	One asset per item
Electric Water Heaters	One asset per item
Domestic Pumps	One asset per item
Calorifiers	One asset per item
Sump Pumps	One asset per item
Shower Units	One asset per item
Internal Sewage & Drainage (Soil)	One asset per system
Water Saving Devices	One asset per building.
Water Softeners	One asset per item
Water Treatment	One asset per item

System Group	System and / or Element	Sub-Element	Component	UOM NRM	Estimated Useful Life (EUL)	Maintain Schedule	SFG20 Task Description	Applicable
2.5 EXTERNAL WALLS (EWAL)	2.5.6 Façade access / cleaning systems	2.5.6.M.1 Window / façade cleaning cradles	Window / façade cleaning cradles	nr		NCT - RCS	NON CORE TASK - ROOF CLEANING SYSTEM	Y
		2.5.6.M.2 Combined façade/roof cleaning system	Combined façade/roof cleaning system	nr		NCT - RCS	NON CORE TASK - ROOF CLEANING SYSTEM	Y
2.6 WINDOWS AND EXTERNAL DOORS (WIN & EDR)	2.6.2 External doors	2.6.2.M.1 External doors (ED)	Pedestrian Auto Doors - Folding	nr		NCT - AD	NON CORE TASK - AUTO DOORS	Y
			Pedestrian Doors - Auto Sliding	nr		NCT - AD	NON CORE TASK - AUTO DOORS	Y
			Pedestrian Doors - Auto Swing	nr		NCT - AD	NON CORE TASK - AUTO DOORS	Y
		2.6.2.M.2 Revolving doors	Pedestrian Doors - Revolving	nr		NCT - AD	NON CORE TASK - AUTO DOORS	Y
		2.6.2.M.4 Roller / sliding shutter	Roller Shutter Doors - Electric	nr		NCT - RSD	NON CORE TASK - ROLLER / SLIDING SHUTTER	Y
			Roller Shutter Doors - Manual	nr		NCT - RSD	NON CORE TASK - ROLLER / SLIDING SHUTTER	Y
4.1 FITTINGS, FURNISHINGS AND EQUIPMENT (FFE)	4.1.6 Non-mechanical and electrical equipment (NMEE	4.1.6.M.2 Non-mechanical and electrical equipment (NMEE	Ladders and the like	nr		NMEE PI	NON-MECHANICAL AND ELECTRICAL EQUIPMENT - PLANNED INSPECTION	Y
5.1 SANITARY INSTALLATIONS	5.1.1 Sanitary Appliances	5.1.1.M.1 Sanitary appliances	Cistern (WC/Urinal) - Abestos	nr	20	48-05	SANITARY APPLIANCES, WASTE WATER PLUMBING and DRAINS	Y
			Cistern (WC/Urinal) - Cast Iron	nr	40	48-05	SANITARY APPLIANCES, WASTE WATER PLUMBING and DRAINS	Y
			Cistern (WC/Urinal) - Ceramic	nr	20	48-05	SANITARY APPLIANCES, WASTE WATER PLUMBING and DRAINS	Y
			Cistern (WC/Urinal) - Galvanised Metal	nr	40	48-05	SANITARY APPLIANCES, WASTE WATER PLUMBING and DRAINS	Y
			Cistern (WC/Urinal) - Hidden/Recessed	nr	20	48-05	SANITARY APPLIANCES, WASTE WATER PLUMBING and DRAINS	Y
			Cistern (WC/Urinal) - Mild Steel	nr	40	48-05	SANITARY APPLIANCES, WASTE WATER PLUMBING and DRAINS	Y
			Cistern (WC/Urinal) - Plastic	nr	20	48-05	SANITARY APPLIANCES, WASTE WATER PLUMBING and DRAINS	Y
			Sink - Cast iron and stainless steel	nr	40	48-05	SANITARY APPLIANCES, WASTE WATER PLUMBING and DRAINS	Y
			Sink - Vitreous china/ /fireclay/ uPVC	nr	20	48-05	SANITARY APPLIANCES, WASTE WATER PLUMBING and DRAINS	Y
			Urinal - Cast iron and stainless steel	nr	40	48-05	SANITARY APPLIANCES, WASTE WATER PLUMBING and DRAINS	Y
			Urinal - Vitreous china/ /fireclay/ uPVC	nr	20	48-05	SANITARY APPLIANCES, WASTE WATER PLUMBING and DRAINS	Y
			WC - Cast iron and stainless steel	nr	40	48-05	SANITARY APPLIANCES, WASTE WATER PLUMBING and DRAINS	Y
			WC - Vitreous china/ /fireclay/ uPVC	nr	20	48-05	SANITARY APPLIANCES, WASTE WATER PLUMBING and DRAINS	Y
			WHB - Cast iron and stainless steel	nr	40	48-05	SANITARY APPLIANCES, WASTE WATER PLUMBING and DRAINS	Y
			WHB - Vitreous china/ /fireclay/ uPVC	nr	20	48-05	SANITARY APPLIANCES, WASTE WATER PLUMBING and DRAINS	Y
		5.1.1.M.2 Showers	Shower tray - Cast iron and stainless steel	nr	40	51-01	SHOWERS	Y
			Shower tray - Vitreous china/ /fireclay/ uPVC	nr	20	51-01	SHOWERS	Y
		5.1.1.M.3 Shower units	Chemical Spills / Drench Shower	nr	25	51-01	SHOWERS	Y
			Shower unit – including shower head and hose	nr	5	51-01	SHOWERS	Y
		5.1.1.M.4 Shower booster pump	Shower Booster Pump	nr	20	51-02	SHOWERS BOOSTER PUMPS	Y
		5.1.1.M.5 Shower valve	Shower Mixer & Head	nr	15	61-05	SHOWER VALVES	Y
		5.1.1.M.6 Drinking fountain	Drinking fountain	nr	10	48-09	DRINKING FOUNTAINS	Y
			Mains Water Dispenser	nr	10	48-09	DRINKING FOUNTAINS	Y
		5.1.1.M.7 Tap and outlet fitting	Taps and waste fittings	nr	20	61-02	TAP AND OUTLET FITTINGS	Y
		5.1.1.M.8 Water saving device	Cistermiser/Water Saver	nr	20	48-08	SANITARY AND WASTE WATER PLUMBING - WATER SAVING DEVICES and METERS	Y
		5.1.1.M.9 Control and sensors	PIR - Auto Flush	nr	8	50-09	OCCUPANCY and LIGHT SENSORS	Y
			PIR - Auto Tap	nr	8	50-09	OCCUPANCY and LIGHT SENSORS	Y
	5.1.2 Sanitary Ancillaries	5.1.2.M.1 Shower cubicles	Shower cubicles, including shower curtains and rails	nr	NLC	NCT	NON CORE TASK	Y
		5.1.2.M.2 Curtain rail / Screen	Bath/ shower curtain rails, screens and the like	nr	NLC	NCT	NON CORE TASK	Y
		5.1.2.M.3 Grab / support rail	Grab/ support rails	nr	NLC	NCT	NON CORE TASK	Y
		5.1.2.M.4 Towel rail	Towel rails and holders - (not connected to a heating or hot water supply installation).	nr	NLC	NCT	NON CORE TASK	Y
		5.1.2.M.5 Hand dryer	Hand Dryers	nr	5	48-11	HAND DRYERS	Y
		5.1.2.M.6 Paper towel dispensers	Paper towel dispensers	nr	5	48-12	PAPER TOWEL DISPENSERS - ELECTRIC OPERATED	Y
		5.1.2.M.7 Sanitary Incinerators	Incinerator - Sanitary Towel Disposal	nr	15	05-46	SANITARY INCINERATOR	Y
		5.1.2.M.8 Macerators	Macerator - Sanitary	nr	10	48-02	MACERATORS	Y
			Macerator - Sewage	nr	10	48-02	MACERATORS	Y
		5.1.2.M.9 Other Sanitary fittings	IPS Panel	nr	15	NCT	NON CORE TASK	Y
			PIR - Scent Dispersal	nr	8	50-09	OCCUPANCY and LIGHT SENSORS	Y
			Scent Dispersal Unit	nr	25	NCT	NON CORE TASK	Y
5.2 SERVICES EQUIPMENT	5.2.1 Services equipment	5.2.1.M.1 Catering Equipment	Absorption chillers - Water Cooled	nr	15	NCT	NON CORE TASK	Y
			Auto Dispense Font	nr	8	NCT	NON CORE TASK	Y
			Bake-Off - Electric	nr	15	NCT	NON CORE TASK	Y
			Bake-Off - Gas	nr	15	NCT - Gas Safe Check	NCT - Gas Safe Check	Y
			Beverage Machine	nr	8	NCT	NON CORE TASK	Y
			Boiling Pans - Gas	nr	15	NCT - Gas Safe Check	NCT - Gas Safe Check	Y
			Bratt Pan - Electric	nr	15	NCT	NON CORE TASK	Y
			Bratt Pan - Gas	nr	15	NCT - Gas Safe Check	NCT - Gas Safe Check	Y
			Catering Burner Range	nr	15	NCT	NON CORE TASK	Y
			Catering Equipment - General (Electric)	nr	15	NCT	NON CORE TASK	Y
			Chargrill	nr	15	NCT	NON CORE TASK	Y
			Cutter	nr	15	NCT	NON CORE TASK	Y
			Dishwasher	nr	15	NCT	NON CORE TASK	Y
			Dryer	nr	15	NCT	NON CORE TASK	Y
			Dryer Gas	nr	15	NCT - Gas Safe Check	NCT - Gas Safe Check	Y
			Fryer	nr	15	NCT	NON CORE TASK	Y
			Fryer Gas	nr	15	NCT - Gas Safe Check	NCT - Gas Safe Check	Y
			Griddle	nr	15	NCT	NON CORE TASK	Y
			Griddle Gas	nr	15	NCT - Gas Safe Check	NCT - Gas Safe Check	Y
			Grill	nr	15	NCT	NON CORE TASK	Y
			Grinder	nr	15	NCT	NON CORE TASK	Y
			Heated Food Trolley	nr	8	NCT	NON CORE TASK	Y
			Hot Plate	nr	15	NCT	NON CORE TASK	Y
			Hot Tap	nr	8	NCT	NON CORE TASK	Y
			Ice Maker	nr	15	34-01	ICE MAKING MACHINES	Y
			Induction Hob	nr	15	NCT	NON CORE TASK	Y
			Induction Hob Gas	nr	15	NCT - Gas Safe Check	NCT - Gas Safe Check	Y
			Insect Killer	nr	8	NCT	NON CORE TASK	Y
			Juice Dispenser	nr	8	NCT	NON CORE TASK	Y
			Microwave	nr	15	NCT	NON CORE TASK	Y
			Mincer	nr	15	NCT	NON CORE TASK	Y
			Mixer	nr	15	NCT	NON CORE TASK	Y
			Oven - Boilerless	nr	15	NCT	NON CORE TASK	Y
			Oven - Boilerless Gas	nr	15	NCT - Gas Safe Check	NCT - Gas Safe Check	Y
			Oven - Combination	nr	15	NCT	NON CORE TASK	Y
			Oven - Combination Gas	nr	15	NCT - Gas Safe Check	NCT - Gas Safe Check	Y
			Oven - Convection	nr	15	NCT	NON CORE TASK	Y
			Oven - Convection Gas	nr	15	NCT - Gas Safe Check	NCT - Gas Safe Check	Y
			Oven - Fan Assisted	nr	15	NCT	NON CORE TASK	Y
			Oven - Fan Assisted Gas	nr	15	NCT - Gas Safe Check	NCT - Gas Safe Check	Y
			Pastry Roller/Dough Divides	nr	15	NCT	NON CORE TASK	Y
			Peeler	nr	15	NCT	NON CORE TASK	Y
			Plate Warmer	nr	15	NCT	NON CORE TASK	Y
			Pot Wash	nr	15	NCT	NON CORE TASK	Y
			Pressure Steamer	nr	15	NCT	NON CORE TASK	Y
			Processor	nr	15	NCT	NON CORE TASK	Y
			Salamander	nr	15	NCT	NON CORE TASK	Y
			Salamander Gas	nr	15	NCT - Gas Safe Check	NCT - Gas Safe Check	Y
			Sink - Stainless Steel	nr	40	NCT	NON CORE TASK	Y
			Slicer	nr	15	NCT	NON CORE TASK	Y
			Tilting Kettle	nr	15	NCT	NON CORE TASK	Y
			Tilting Kettle Gas	nr	15	NCT - Gas Safe Check	NCT - Gas Safe Check	Y
			Toaster	nr	15	NCT	NON CORE TASK	Y
			Vegetable Preparation Unit	nr	15	NCT	NON CORE TASK	Y
			Waste Disposal Unit	nr	15	NCT	NON CORE TASK	Y
			Water Boiler - Electric	nr	15	NCT	NON CORE TASK	Y
			Water Boiler - Gas	nr	15	NCT - Gas Safe Check	NCT - Gas Safe Check	Y
		5.2.1.M.2 Food Storage equipment	Bainemarie - Electric	nr	15	NCT	NON CORE TASK	Y
			Bainemarie - Gas	nr	15	NCT - Gas Safe Check	NCT - Gas Safe Check	Y
			Chilled Display Cabinet	nr	15	10-02	REFRIGERATED DISPLAY CABINETS	Y
			Chilled Drinks Cabinet	nr	15	10-02	REFRIGERATED DISPLAY CABINETS	Y
			Chilled Servery Unit	nr	15	10-02	REFRIGERATED DISPLAY CABINETS	Y
			Freezer - Chest	nr	15	NCT	NON CORE TASK	Y
			Freezer - Under Counter	nr	15	NCT	NON CORE TASK	Y
			Freezer - Upright	nr	15	NCT	NON CORE TASK	Y
			Freezer - Walk In	nr	15	10-01	COLD ROOMS	Y
			Fridge - Under Counter	nr	15	NCT	NON CORE TASK	Y
			Fridge - Upright	nr	15	NCT	NON CORE TASK	Y
			Fridge - Walk In	nr	15	10-01	COLD ROOMS	Y

System Group	System and / or Element	Sub-Element	Component	UOM NRM	Estimated Useful Life (EUL)	Maintain Schedule	SFG20 Task Description	Applicable
			Hot Cupboard - Electric	nr	15	NCT	NON CORE TASK	Y
			Hot Cupboard - Gas	nr	20	NCT - Gas Safe Check	NCT - Gas Safe Check	Y
			Hot Display Cabin	nr	15	NCT	NON CORE TASK	Y
			Refrigeration equipment	nr	15	NCT	NON CORE TASK	Y
			Servery Counters - Chill Well	nr	15	10-02	REFRIGERATED DISPLAY CABINETS	Y
5.3 DISPOSAL INSTALLATIONS	5.3.1 Foul drainage above ground	5.3.1.M.1 Waste pipework	Grease Traps	nr	20	48-05	SANITARY APPLIANCES, WASTE WATER PLUMBING and DRAINS	Y
		5.3.1.M.1	Soil & Vent Pipe - Aluminium	m2	35	48-05	SANITARY APPLIANCES, WASTE WATER PLUMBING and DRAINS	Y
		5.3.1.M.1	Soil & Vent Pipe - Asbestos	m2	NLC	48-05	SANITARY APPLIANCES, WASTE WATER PLUMBING and DRAINS	Y
		5.3.1.M.1	Soil & Vent Pipe - Cast Iron	m2	40	48-05	SANITARY APPLIANCES, WASTE WATER PLUMBING and DRAINS	Y
		5.3.1.M.1	Soil & Vent Pipe - Copper	m2	35	48-05	SANITARY APPLIANCES, WASTE WATER PLUMBING and DRAINS	Y
		5.3.1.M.1	Soil & Vent Pipe - UPVC	m2	20	48-05	SANITARY APPLIANCES, WASTE WATER PLUMBING and DRAINS	Y
		5.3.1.M.1	Waste Water Pipework - Cast Iron	m2	40	48-05	SANITARY APPLIANCES, WASTE WATER PLUMBING and DRAINS	Y
		5.3.1.M.1	Waste Water Pipework - Copper	m2	40	48-05	SANITARY APPLIANCES, WASTE WATER PLUMBING and DRAINS	Y
		5.3.1.M.1	Waste Water Pipework - Plastic	m2	30	48-05	SANITARY APPLIANCES, WASTE WATER PLUMBING and DRAINS	Y
		5.3.1.M.1	Discharge stacks - Cast Iron	m2	20	48-05	SANITARY APPLIANCES, WASTE WATER PLUMBING and DRAINS	Y
		5.3.1.M.1	Discharge stacks - Copper	m2	30	48-05	SANITARY APPLIANCES, WASTE WATER PLUMBING and DRAINS	Y
		5.3.1.M.1	Discharge stacks - Plastic	m2	40	48-05	SANITARY APPLIANCES, WASTE WATER PLUMBING and DRAINS	Y
		5.3.1.M.1 Pipeline assemblies	Pipeline assemblies - PVC	nr	20	NCT - 5.3.1	NCT - PIPE ASSEMBLIES	Y
		5.3.1.M.1	Pipeline assemblies - Plastic	nr	30	NCT - 5.3.1	NCT - PIPE ASSEMBLIES	Y
		5.3.1.M.1	Pipeline assemblies - Cast Iron	nr	40	NCT - 5.3.1	NCT - PIPE ASSEMBLIES	Y
		5.3.1.M.1 Floor channels / gratings	Floor channels / gratings - PVC	nr	20	NCT - 5.3.1	NCT - FLOOR CHANNELS / GRATINGS	Y
		5.3.1.M.1	Floor channels / gratings - Plastic	nr	30	NCT - 5.3.1	NCT - FLOOR CHANNELS / GRATINGS	Y
		5.3.1.M.1	Floor channels / gratings - Cast Iron	nr	40	NCT - 5.3.1	NCT - FLOOR CHANNELS / GRATINGS	Y
		5.3.1.M.4 Sump Pump	Sump Pump	nr	10	45-10	SUMP PUMPS: EXTENDED SHAFT	Y
		5.3.1.M.5 Sundry items	Sewage Ejector Pump	nr	15	45-07	SEWAGE OR DRAINAGE PUMPS SUBMERSIBLE	Y
	5.3.2 Chemical, toxic and industrial liquid waste drainage	5.3.2.M.1 Pipelines and fittings	Pipework - Glass	nr	10	NCT	NCT - PIPELINES AND FITTINGS (CHEMICAL, TOXIC WASTE)	Y
			Pipework - uPVC	nr	20	NCT	NCT - PIPELINES AND FITTINGS (CHEMICAL, TOXIC WASTE)	Y
			Pipework - Plastic	nr	30	NCT	NCT - PIPELINES AND FITTINGS (CHEMICAL, TOXIC WASTE)	Y
			Pipework - Cast Iron	nr	40	NCT	NCT - PIPELINES AND FITTINGS (CHEMICAL, TOXIC WASTE)	Y
		5.3.2.M.2 Traps, access points and rodding eyes	Traps - Glass	nr	10	NCT	NCT - TRAPS (CHEMICAL, TOXIC WASTE)	Y
			Traps - uPVC	nr	20	NCT	NCT - TRAPS (CHEMICAL, TOXIC WASTE)	Y
			Traps - Plastic	nr	30	NCT	NCT - TRAPS (CHEMICAL, TOXIC WASTE)	Y
			Traps - Cast Iron	nr	40	NCT	NCT - TRAPS (CHEMICAL, TOXIC WASTE)	Y
		5.3.2.M.3 Gullies	Gullies - Glass	nr	10	NCT	NCT - GULLIES (CHEMICAL, TOXIC WASTE)	Y
			Gullies - uPVC	nr	20	NCT	NCT - GULLIES (CHEMICAL, TOXIC WASTE)	Y
			Gullies - Plastic	nr	30	NCT	NCT - GULLIES (CHEMICAL, TOXIC WASTE)	Y
			Gullies - Cast Iron	nr	40	NCT	NCT - GULLIES (CHEMICAL, TOXIC WASTE)	Y
		5.3.2.M.4 Tanks	Chemical Storage Tank	nr	10	NCT	NON CORE TASK	Y
		5.3.2.M.5 Settlement tanks	Septic Tank	nr	10	NCT	NON CORE TASK	Y
		5.3.2.M.6 Effluent treatment plant	Sewage Treatment Works	nr	10	71-02	SEWAGE TREATMENT WORKS - PACKAGE SYSTEMS	Y
		5.3.2.M.7 Dosing equipment	Dosing equipment	nr	10	65-10 & 65-14	CHEMICAL DOSING	Y
		5.3.2.M.8 Steriliser	Sterilisation equipment	nr	10	NCT	NCT	Y
		5.3.2.M.10 Thermal insulation	Thermal insulation	m^2	30	35-01	THERMAL INSULATION	Y
		5.3.2.M.11 Control components	Control components located externally	nr	10	NCT	NCT	Y
		5.3.2.M.12 Monitoring equipment	Monitoring equipment locate externally	nr	10	NCT	NCT	Y
	5.3.3 Refuse Disposal	5.3.3.M.1 Refuse collection and disposal equipment	Compactor	nr	10	NCT	NON CORE TASK	Y
			Bailing Machine	nr	25	NCT	NON CORE TASK	Y
			Refuse collection equipment	nr	25	NCT	NCT	Y
			Paper Shredders - Commercial	nr	15	NCT	NCT	Y
			Paper Shredders - Industrial	nr	20	NCT	NCT	Y
		5.3.3.M.2 Incineration plant and ancillaries	Incinerator - Gas or Oil Fired Furnaces	nr	20	05-41	GAS INCINERATOR	Y
		5.3.3.M.3 Safety devices	Emergency Shut Off button	nr	10	14-18	EMERGENCY STOP BUTTONS	Y
5.4 WATER INSTALLATIONS	5.4.1 Mains water supply	5.4.1.M.1 Pipelines and fittings	Pipework - Mains - Copper	m2	45	40-01	PIPEWORK SYSTEMS - General	Y
			Pipework - Mains - Plastic	m2	20	40-01	PIPEWORK SYSTEMS - General	Y
			Pipework - Mains - Steel	m2	35	40-01	PIPEWORK SYSTEMS - General	Y
			Pipework - Mains - Steel galvanised	m2	35	40-01	PIPEWORK SYSTEMS - General	Y
		5.4.1.M.2 Valves	Valves - gate	nr	25	61-01	VALVES	Y
			Valves - float operated valve	nr	15	61-01 part	VALVES	Y
			Valves - automatic control	nr	15	62-01	VALVES	Y
			Rotary valves - shoe or slipper	nr	20	62-02	TAP AND OUTLET FITTINGS	Y
			Butterfly and ball valves	nr	25	62-03	SERVICE VALVES	Y
		5.4.1.M.3 Meters	Meter - Water	nr/m2	NLC	48-08	SANITARY AND WASTE WATER PLUMBING - WATER SAVING DEVICES and METERS	Y
		5.4.1.M.4 Rising main to storage tanks	Rising main	nr	25	40-17	WATER MAINS - ABOVE GROUND	Y
		5.4.1.M.4 Thermal insulation	Thermal insulation.	m^2	30	35-01	THERMAL INSULATION	Y
		5.4.1.M.5 Trace heating	Trace Heating	m2	20	40-03	PIPEWORK SYSTEMS-TRACE HEATING	Y
	5.4.2 Cold water distribution	5.4.2.M.1 Pipelines and fittings	Expansion Bellows - Flue Dilution	TBD	TBD	TBD	TO BE DECIDED	Y
			Expansion Bellows - Rubber	TBD	TBD	TBD	TO BE DECIDED	Y
			Expansion Bellows - Steel	TBD	TBD	TBD	TO BE DECIDED	Y
			Pipework - Cold Water - Copper	m2	45	40-01	PIPEWORK SYSTEMS - General	Y
			Pipework - Cold Water - Plastic	m2	20	40-01	PIPEWORK SYSTEMS - General	Y
			Pipework - Cold Water - Steel	m2	35	40-01	PIPEWORK SYSTEMS - General	Y
			Pipework - Cold Water - Steel galvanised	m2	35	40-01	PIPEWORK SYSTEMS - General	Y
		5.4.2.M.2 Valves	Valves - Check	nr	25	61-01	VALVES	Y
			Valves - gate	nr	25	61-01	VALVES	Y
			Valves - Strainers	nr	25	61-01	VALVES	Y
			Valves - Thermostatic Mixer	nr	15	61-04	COMBINATION TAP ASSEMBLIES, MIXING VALVES/TAPS	Y
		5.4.2.M.3 Water saving devices	Water saving devices	nr	NLC	48-08	SANITARY AND WASTE WATER PLUMBING - WATER SAVING DEVICES and METERS	Y
		5.4.2.M.4 Taps	Taps - Service valve	nr	15	61-03	SERVICE VALVES	Y
		5.4.2.M.5 Pumps	Pumps - Floor mounted	nr	20	45-02	CIRCULATING PUMPS-general	Y
			Pumps - Floor mounted Twin Head	nr	20	45-02	CIRCULATING PUMPS-general	Y
			Pumps - Accelerator pipe mounted	nr	10	45-02	CIRCULATING PUMPS-general	Y
			Pumps - Domestic	nr	10	45-11	DOMESTIC HOT WATER ACCELERATORS	Y
			Pumps - HWS circulator	nr	20	45-02	CIRCULATING PUMPS-general	Y
		5.4.2.M.6 Pressurisation expansion units	Pressurisation Unit	nr	20	32-12	EXPANSION VESSELS	Y
		5.4.2.M.7 Pressure booster sets	Domestic Booster set	nr	15	45-12	WATER PUMPING PRESSURE BOOSTING SETS	Y
			MCWS Booster set	nr	15	45-12	WATER PUMPING PRESSURE BOOSTING SETS	Y
		5.4.2.M.8 Tanks	Purified Water Tank	nr	20	56-02	COLD WATER STORAGE TANKS and CISTERNS	Y
			Water Storage Tanks - Fibreglass	nr	20	56-02	COLD WATER STORAGE TANKS and CISTERNS	Y
			Water Storage Tanks - Galvanised Metal	nr	15	56-02	COLD WATER STORAGE TANKS and CISTERNS	Y
			Water Storage Tanks - GRP	nr	20	56-02	COLD WATER STORAGE TANKS and CISTERNS	Y
			Water Storage Tanks - Polypropylene	nr	20	56-02	COLD WATER STORAGE TANKS and CISTERNS	Y
			Water Tank Potable - Fibreglass	nr	20	56-02	COLD WATER STORAGE TANKS and CISTERNS	Y
			Water Tank Potable - Galvanised Metal	nr	15	56-02	COLD WATER STORAGE TANKS and CISTERNS	Y
			Water Tank Potable - GRP	nr	20	56-02	COLD WATER STORAGE TANKS and CISTERNS	Y
			Water Tank Potable - Polypropylene	nr	20	56-02	COLD WATER STORAGE TANKS and CISTERNS	Y
		5.4.2.M.9 Trace heating	Trace Heating	m2	20	40-03	PIPEWORK SYSTEMS-TRACE HEATING	Y
		5.4.2.M.10 Instrumentation and controls	Control Panel - Cold Water Services	nr	10	14-11	MULTI-INPUT CONTROLLERS	Y
		5.4.2.M.11 Thermal insulation	Thermal insulation	m2	30	35-01	THERMAL INSULATION	Y
		5.4.2.M.12 Rainwater harvesting systems	Rainwater Harvesting System	m2	30	40-01, 56-02	PIPEWORK SYSTEMS - General	Y
		5.4.2.M.13 Grey water collection systems	Grey Water Collection System	m2	30	40-01, 56-02	PIPEWORK SYSTEMS - General	Y
	5.4.3 Hot water distribution	5.4.3.M.1 Pipelines and fittings	Expansion Bellows - Flue Dilution	TBD	TBD	TBD	TO BE DECIDED	Y
			Expansion Bellows - Rubber	TBD	TBD	TBD	TO BE DECIDED	Y
			Expansion Bellows - Steel	TBD	TBD	TBD	TO BE DECIDED	Y
			Pipework - DHWS	m2	25	32-02	HOT WATER SERVICES general	Y
			Pipework - DHWS - Copper	m2	45	32-02	HOT WATER SERVICES general	Y
			Pipework - DHWS - Plastic	m2	15	32-02	HOT WATER SERVICES general	Y
			Pipework - DHWS - steel galvanised	m2	25	32-02	HOT WATER SERVICES general	Y
			Plant Room Pipework	m2	35	32-02	HOT WATER SERVICES general	Y
		5.4.3.M.2 Valves	Valves - Check	nr	25	61-01	VALVES	Y
			Valves - gate	nr	25	61-01	VALVES	Y
			Valves - Strainers	nr	25	61-01	VALVES	Y
			Valves - Thermostatic Mixer	nr	15	61-04	COMBINATION TAP ASSEMBLIES, MIXING VALVES/TAPS	Y
		5.4.3.M.3 Water saving devices	Water saving devices	nr	NLC	48-08	SANITARY AND WASTE WATER PLUMBING - WATER SAVING DEVICES and METERS	Y
		5.4.3.M.4 Taps	Taps - Service valve	nr	15	61-03	SERVICE VALVES	Y
		5.4.3.M.5 Pumps	Pumps - Floor mounted	nr	20	45-02	CIRCULATING PUMPS-general	Y
			Pumps - Floor mounted Twin Head	nr	20	45-02	CIRCULATING PUMPS-general	Y
			Pumps - Accelerator pipe mounted	nr	10	45-02	CIRCULATING PUMPS-general	Y
			Pumps - Domestic	nr	10	45-11	DOMESTIC HOT WATER ACCELERATORS	Y
			Pumps - HWS circulator	nr	20	45-02	CIRCULATING PUMPS-general	Y
		5.4.3.M.6 Heat exchangers	Plate Heat Exchanger	nr	15	29-06	PLATE HEAT EXCHANGERS	Y

System Group	System and / or Element	Sub-Element	Component	UOM NRM	Estimated Useful Life (EUL)	Maintain Schedule	SFG20 Task Description	Applicable
			Shell & Tube Heat Exchanger	nr	25	29-01	HEAT EXCHANGERS - COILS	Y
		5.4.3.M.7 Storage cylinders and calorifiers	Hot Water Calorifier - Indirect	nr	20	32-05	CALORIFIERS HEATED BY LTHW	Y
			Hot Water Calorifier - Storage	nr	20	32-05	CALORIFIERS HEATED BY LTHW	Y
			Hot water cylinders – domestic type	nr	NLC	32-09	HOT WATER CYLINDERS	Y
			Non Storage Calorifier	nr	20	32-05	CALORIFIERS HEATED BY LTHW	Y
			Unvented Storage Heater	nr	15	32-11	THERMAL STORAGE CYLINDER (individual dwellings for DHWS)	Y
		5.4.3.M.8 Trace heating	Trace Heating	m2	10	40-03	PIPEWORK SYSTEMS-TRACE HEATING	Y
		5.4.3.M.10 Immersion heaters	HW cylinder with immersion heater	nr	NLC	32-09	HOT WATER CYLINDERS	Y
		5.4.3.M.11 Expansion tank	Insulated Combination Units	nr	25	32-09	HOT WATER CYLINDERS	Y
		5.4.3.M.12 Water softeners	Chemical Dosing pot	nr	NLC	65-06	FILTRATION and CONDITIONING - POINT OF USE	Y
			Chemical Dosing Systems	nr	NLC	65-05	FILTRATION, CONDITIONING and pH CORRECTION - central plant	Y
			Computerised Water Conditioner	nr	20	65-04	SPECIAL WATER TREATMENT SYSTEMS	Y
			De-Alkalisation Plant	nr	15	65-04	SPECIAL WATER TREATMENT SYSTEMS	Y
			De-Alkalisation Plant	nr	20	65-04	SPECIAL WATER TREATMENT SYSTEMS	Y
			Demineralisation Plant	nr	20	65-04	SPECIAL WATER TREATMENT SYSTEMS	Y
			Electrolytic Chlorine Ion Generation	nr	20	65-04	SPECIAL WATER TREATMENT SYSTEMS	Y
			In-Line Water Filter	nr	15	65-04	SPECIAL WATER TREATMENT SYSTEMS	Y
			Ionisation Softener - Comercial	nr	30	65-02	ION EXCHANGE PLANT - BASE EXCHANGE SOFTENING - commercial	Y
			Ionisation Softener - Domestic	nr	20	65-03	ION EXCHANGE PLANT - BASE EXCHANGE SOFTENING - domestic (capacity usually below 50 litres)	Y
			Reverse osmosis softener	nr	NLC	65-07	REVERSE OSMOSIS	Y
			UV Water Treatment	nr	15	65-08	ULTRA VIOLET DISINFECTION UNIT	Y
			Water Conditioner - Magnetic	nr	20	65-04	SPECIAL WATER TREATMENT SYSTEMS	Y
			Water Purification Unit (Lab)	nr	15	65-04	SPECIAL WATER TREATMENT SYSTEMS	Y
		5.4.3.M.13 Instrumentation and controls	Indicator and displays	nr	10	14-12	INDICATORS AND DISPLAYS	Y
		5.4.3.M.14 Thermal insulation	Thermal insulation	m^2	30	35-01	THERMAL INSULATION	Y
	5.4.4 Local Hot Water	5.4.4.M.1 Instant water heaters	Refreshment point water dispensers	nr	8	32-15	PACKAGED ELECTRIC WATER HEATERS-cistern type (non drinks)	Y
		5.4.4.M.1	Water Heater - Gas Fired	nr	15	32-13	DIRECT FIRED WATER HEATERS	Y
		5.4.4.M.1 Instantaneous under sink, multipoint and over sink units	Water Heater - Electric	nr	12	32-14	INSTANTANEOUS ELECTRIC WATER HEATERS (non drinks type)	Y
	5.4.5 Steam and condensate distribution	5.4.5.M.1 Pipelines and fittings	Expansion Bellows - Flue Dilution	TBD	TBD	TBD	TO BE DECIDED	Y
			Expansion Bellows - Rubber	TBD	TBD	TBD	TO BE DECIDED	Y
			Expansion Bellows - Steel	TBD	TBD	TBD	TO BE DECIDED	Y
			Steam Pipework	m2	30	40-11	STEAM SERVICES	Y
		5.4.5.M.2 Valves	Pressure Release Valves	nr	20	62-07	SEAT VALVES	Y
		5.4.5.M.3 Steam reduction stations	Steam reduction stations - Mild Steel	m^2	20	40-11	STEAM SERVICES	Y
			Steam reduction stations - Steel, galvanised	m^2	35	40-11	STEAM SERVICES	Y
		5.4.5.M.4 Condensate receivers	Condensate receivers and storage tanks	nr	12	NCT	NCT	Y
		5.4.5.M.5 Condensate pump sets	Condensate Pump	nr	20	45-03	CENTRIFUGAL PUMPS	Y
		5.4.5.M.6 Steam connection outlets	Taps and outlet fittings	nr	20	61-02	TAP AND OUTLET FITTINGS	Y
		5.4.5.M.7 Taps	Taps - Service valve	nr	15	61-03	SERVICE VALVES	Y
		5.4.5.M.8 Heat exchangers	Plate Heat Exchanger	nr	15	29-07	WATER TO WATER PLATE HEAT EXCHANGERS	Y
		5.4.5.M.9 Steam Calorifier	Steam Calorifier - Copper	nr	25	32-06	HOT WATER CALORIFIERS HEATED BY MTHW, HTHW or STEAM	Y
			Steam Calorifier - Mild Steel	nr	20	32-06	HOT WATER CALORIFIERS HEATED BY MTHW, HTHW or STEAM	Y
		5.4.5.M.10 Instrumentation and controls	Indicator and displays	nr	10	14-12	INDICATORS AND DISPLAYS	Y
		5.4.5.M.11 Thermal insulation	Thermal insulation	m^2	30	35-01	THERMAL INSULATION	Y
5.5 HEAT SOURCE	5.5.1 Heat Source	5.5.1.M.1 Boiler – biomass	Biomass - Conveyor	nr	20	05-38	BIOMASS BOILER	Y
			Biomass - Hopper	nr	20	05-38	BIOMASS BOILER	Y
			Boiler Unit - Bio Mass	nr	20	05-38	BIOMASS BOILER	Y
		5.5.1.M.2 Boiler - gas/oil	Boiler Unit - Atmospheric gas burner, boiler, free standing boiler - (domestic type)	nr	15	05-03	ATMOSPHERIC GAS BURNER - FREE STANDING BOILER	Y
			Boiler Unit - Atmospheric gas burner – condensing boiler - (domestic type)	nr	20	05-04	ATMOSPHERIC GAS BURNER - CONDENSING BOILER	Y
			Boiler Unit - Gas fired boiler - shell type, water tube & sectional units MTHW	nr	25	05-03	ATMOSPHERIC GAS BURNER - FREE STANDING BOILER	Y
			Boiler Unit - Gas fired boiler - shell type, water tube & sectional units LTHW	nr	25	05-23	BOILERS LTHW UP TO 95ºC	Y
			Boiler Unit - Blown gas burner - condensing boiler	nr	15	05-10	BLOWN GAS BURNER CONDENSING BOILER	Y
			Boiler Unit - Blown gas burner - modular boiler	nr	15	05-11	BLOWN GAS BURNER MODULAR BOILER	Y
			Boiler Unit - Forced draught gas burner condensing boiler	nr	15	05-12	FORCED DRAUGHT GAS CONDENSING BOILER	Y
			Boiler Unit - Forced draught (pressure jet) oil condensing boiler	nr	15	05-13	FORCED DRAUGHT [PRESSURE JET] OIL CONDENSING BOILER	Y
			Boiler Unit - Gas fired boiler – MTHW up to 120OC	nr	20	05-14	BOILERS MTHW UP TO 120o C	Y
			Boiler Unit - Gas fired boiler – LTHW up to 95OC	nr	20	05-23	BOILERS LTHW UP TO 95ºC	Y
			Boiler Unit - Atmospheric gas burner – small and/or wall hung	nr	10	05-28	ATMOSPHERIC GAS BURNER BOILER - SMALL AND/OR WALL HUNG FOR DOMESTIC/LIGHT COMMERCIAL INSTALLATION	Y
			Boiler Unit - Combination atmospheric burner gas boiler	nr	10	05-29	COMBINATION ATMOSPHERIC BURNER GAS BOILER	Y
			Boiler Unit - Atmospheric gas burner/ condensing combination boiler	nr	20	05-30	ATMOSPHERIC GAS BURNER/CONDENSING COMBINATION BOILER	Y
			Boiler Unit - Atmospheric gas burners	nr	20	07-01	ATMOSPHERIC GAS BURNERS	Y
			Boiler Unit - Blown gas burner	nr	15	07-02	BLOWN GAS BURNER	Y
			Boiler Unit - Forced draught gas burner	nr	15	07-03	FORCED DRAUGHT GAS BURNER	Y
			Boiler Unit - Forced draught (pressure jet) oil burner	nr	15	07-05	FORCED DRAUGHT [PRESSURE JET] OIL BURNER	Y
			Boiler Unit - Light oil vaporising pot burner	nr	15	07-06	LIGHT OIL VAPORISING POT BURNER	Y
			Boiler Unit - Gas/ oil burners - dual fuel	nr	15	07-07	GAS/OIL BURNERS - Dual fuel	Y
		5.5.1.M.3 Boiler – coal fired	Coal fired coal distribution equipment - Bunkers and conveyors	nr	20	05-05	COAL FIRED BOILERS Bunkers and Conveyors.	Y
			Coal fired boilers - ash storage handling and feed mechanisms, automatic	nr	15	05-06	COAL FIRED BOILERS - Coal storage handling and feed mechanisms, automatic ash removal (where fitted)	Y
			Coal feed mechanisms - under feed stokers	nr	15	05-07	COAL FEED MECHANISMS - Under feed stokers	Y
			Coal feed mechanisms - chain gate stokers	nr	15	05-08	COAL FEED MECHANISMS - Chain grate stokers	Y
			Ash handling system	nr	15	05-09	ASH HANDLING SYSTEM	Y
			Solid fuel burners	nr	15	05-08 & 05-27	COAL FEED MECHANISMS - Chain grate stokers	Y
			Coal fired boiler plant and ancillary items	nr	20	05-06 to 05-09	COAL FIRED BOILERS - Coal storage handling and feed mechanisms, automatic ash removal (where fitted)	Y
		5.5.1.M.4 Boiler – electric	Boiler Unit - Electrode mthw / lthw	nr	15	05-21, 05-22	ELECTRIC BOILERS	Y
			Boiler Unit - Electrode Steam / hthw	nr	15	05-21, 05-22	ELECTRIC BOILERS	Y
		5.5.1.M.5 Packaged steam generators	Packaged Steam Generators	nr	25	05-34	PACKAGED STEAM GENERATORS	Y
			Packaged steam generator – electric	nr	25	05-35	PAKAGED STEAM GENERATORS - ELECTRIC	Y
			Boiler super heater	nr	25	05-37	BOILER SUPERHEATER	Y
			Flash steam vessel	nr	25	40-12	FLASH STEAM VESSEL	Y
		5.5.1.M.6 Boiler - wood pellet	Boiler Unit - Wood Pellet	nr	10	05-27	WASTE AND WOOD BURNING APPLIANCES (including boilers) - BOILER (if fitted)	Y
			Fire and safety circuits	nr	12	05-25	WASTE AND WOOD BURNING APPLIANCES (including boilers) - Fire And Boiler Safety Circuits	Y
			Combustion chamber	nr	10	05-26	WASTE AND WOOD BURNING APPLIANCES (including boilers) - Combustion Chamber	Y
		5.5.1.M.7 Central (combined) heat and power (CHP) boiler plant	CHP Plant	nr	15	43-02	POWER GENERATION--STAND-BY GENERATOR	Y
		5.5.1.M.8 Heat pumps	Heat pumps	nr	TBD	(45-01 to 45-06)	PUMPS - General	Y
		5.5.1.M.9 Ground source heating	Ground Source Heat Pump	nr	20	NCT	NON CORE TASK	Y
		5.5.1.M.10 Pumps, valves	Pressure Reducing Valves	nr	15	40-15	PRESSURE REDUCING VALVES	Y
			Pressure Release Valves	nr	20	62-07	SEAT VALVES	Y
		5.5.1.M.11 Non-storage calorifiers	Step down/non-storage calorifiers	nr	25	32-07	HOT WATER SUPPLY CALORIFIERS	Y
		5.5.1.M.12 Solar thermal panels	Solar Panels - Hot Water	nr	25	53-01	SOLAR HOT WATER PANELS and similar COLLECTING DEVICES	Y
		5.5.1.M.13 Other heat sources	Other heat sources - Air source heating	nr	15	NCT	NCT	Y
		5.5.1.M.14 Tanks	F&E Closed Storage Tank - Copper	nr	45	56-02	COLD WATER STORAGE TANKS and CISTERNS	Y
			F&E Closed Storage Tank - Fibreglass	nr	25	56-02	COLD WATER STORAGE TANKS and CISTERNS	Y
			F&E Closed Storage Tank - Polypropylene	nr	25	56-02	COLD WATER STORAGE TANKS and CISTERNS	Y
			F&E Closed Storage Tank - Steel	nr	30	56-02	COLD WATER STORAGE TANKS and CISTERNS	Y
		5.5.1.M.16 Instrumentation and controls	Control Panel - Heat Pump	nr	10	14-07	UNIT CONTROLLERS AND SENSOR CONTROLLERS	Y
			Control Panel - Heating System	nr	10	05-15	MULTIPLE BOILERS - sequence controls	Y
			Fuel/Shut off (Thermal Link/Weight)	nr	15	05-24	BOILERS - FIRE AND SAFETY CIRCUITS	Y
			Gas Detection	nr	10	23-15,50-11, 82-01	GAS DETECTOR SENSORS	Y
			Time clock	nr	10	14-08	CONTROLLER TIMERS	Y
			Emergency Shut Off button - Boiler	nr	10	14-18	EMERGENCY STOP BUTTONS	Y
			Emergency Shut Off button - Radient Heater	nr	10	14-18	EMERGENCY STOP BUTTONS	Y
		5.5.1.M.17 Burner	Force Draft Burner to Boiler	nr	15	07-03	FORCED DRAUGHT GAS BURNER	Y
			Force Draft Burner to Radiant Heater	nr	15	07-03	FORCED DRAUGHT GAS BURNER	Y
		5.5.1.M.18 Gantries	Gantries	nr	30	NCT	NCT	Y
		5.5.1.M.19 Flue system	Flue - Domestic Through Wall	nr	20	24-01	FLUES (all combustible fuels)	Y
			Flue - Mild Steel	nr	15	24-01	FLUES (all combustible fuels)	Y
			Flue - Stainless Steel	nr	30	24-01	FLUES (all combustible fuels)	Y
5.6 SPACE HEATING & AIR CONDITIONING	5.6.1 Central Heating	5.6.1.M.1 Pipelines and fittings	Pipework - Heating System (copper)	m2	45	40-01	PIPEWORK SYSTEMS - General	Y
		5.6.1.M.2 Pipelines and fittings	Bellows flexible - Rubber	TBD	TBD	TBD	TO BE DECIDED	Y
		5.6.1.M.2	Bellows flexible - Stee	TBD	TBD	TBD	TO BE DECIDED	Y
		5.6.1.M.2	Expansion Bellows - Flue Dilution	TBD	TBD	TBD	TO BE DECIDED	Y
		5.6.1.M.2	Expansion Bellows - Rubber	TBD	TBD	TBD	TO BE DECIDED	Y
		5.6.1.M.2	Expansion Bellows - Steel	TBD	TBD	TBD	TO BE DECIDED	Y
		5.6.1.M.2	Pipework - Heating System (Plastic)	m2	20	40-01	PIPEWORK SYSTEMS - General	Y
		5.6.1.M.2	Pipework - Heating System (steel galv)	m2	35	40-01	PIPEWORK SYSTEMS - General	Y
		5.6.1.M.2	Pipework - Heating System (steel)	m2	35	40-01	PIPEWORK SYSTEMS - General	Y
		5.6.1.M.3 Heat emitters	Fan Convector - Electric	m2	15	28-01	HEAT EMITTERS	Y
			Fan Convector - Hot Water	m2	15	28-01	HEAT EMITTERS	Y
			Natural convector	m2	20	28-01	HEAT EMITTERS	Y
			Natural convectors - electric	m2	20	28-01	HEAT EMITTERS	Y

System Group	System and / or Element	Sub-Element	Component	UOM NRM	Estimated Useful Life (EUL)	Maintain Schedule	SFG20 Task Description	Applicable
			Natural convectors - water	m2	20	28-01	HEAT EMITTERS	Y
			Radiator - Aluminium	m2	20	28-01	HEAT EMITTERS	Y
			Radiator - Cast Iron	m2	25	28-01	HEAT EMITTERS	Y
			Radiator - Steel	m2	20	28-01	HEAT EMITTERS	Y
			Space Unit Heater - Steam / Hot Water	m2	15	28-01	HEAT EMITTERS	Y
			Radiant strip heater systems - Steam and hot water	m2	20	28-01 or 28-03	HEAT EMITTERS	Y
			Radiant strip heater systems - Electric	m2	10	28-01	HEAT EMITTERS	Y
		5.6.1.M.4 Under-floor heating	Under Floor Heating - Steel pipes	m2	25	63-01	UNDERFLOOR HEATING including VEHICLE ACCESS RAMPS	Y
			Under Floor Heating - Electric	m2	20	63-01	UNDERFLOOR HEATING including VEHICLE ACCESS RAMPS	Y
			Under Floor Heating - plastic pipes	m2	30	63-01	UNDERFLOOR HEATING including VEHICLE ACCESS RAMPS	Y
		5.6.1.M.5 Heated ceiling panels	Heated Ceiling Panel	m2	20	28-01	HEAT EMITTERS	Y
		5.6.1.M.6 Warm air heating	Warm air heating	m2	20	03-01	AIR HANDLING UNITS - general	Y
		5.6.1.M.7 Convection systems	Gas Space Unit Heater	m2	10	28-04	GAS FIRED NATURAL AND FAN ASSISTED HEATERS - Conventional and Balanced Flue.	Y
			Convection systems (CS)	m2	20	28-01	HEAT EMITTERS	Y
		5.6.1.M.8 Cable heating systems	Cable heating systems	m2	20	40-03	PIPEWORK SYSTEMS-TRACE HEATING	Y
		5.6.1.M.9 Plenum air heating system	Plenum air heating system	m2	35	03-01	AIR HANDLING UNITS - general	Y
		5.6.1.M.10 Off-peak heating system	Off-peak heating system	m2	10	28-01	HEAT EMITTERS	Y
		5.6.1.M.11 Heated towel rails	Heated towel rail	nr	20	28-01	HEAT EMITTERS	Y
		5.6.1.M.12 Valves and fittings	Commissioning Valves	nr	15	62-06, 90-01	PRESSURE CONTROL VALVES	Y
			Dirt Separators	nr	TBD	TBD	TO BE DECIDED	Y
			Valves - Check	nr	25	61-01	VALVES	Y
			Valves - gate	nr	25	61-01	VALVES	Y
			Valves - Strainers	nr	25	61-01	VALVES	Y
			Valves - Thermostatic Mixer	nr	15	61-04	COMBINATION TAP ASSEMBLIES, MIXING VALVES/TAPS	Y
		5.6.1.M.13 Ductwork	Ductwork - Flexible	m2	15	16-02	DUCTWORK SYSTEM - GENERAL	Y
			Ductwork - Galvanised	m2	40	16-02	DUCTWORK SYSTEM - GENERAL	Y
			Ductwork - Plastic	m2	15	16-02	DUCTWORK SYSTEM - GENERAL	Y
		5.6.1.M.14 Grilles and diffusers	External louvres - Anodised Aluminium	nr	25	26-02	LOUVRES, BIRD AND INSECT SCREENS	Y
			External louvres - Steel Painted	nr	20	26-02	LOUVRES, BIRD AND INSECT SCREENS	Y
			Grilles and diffusers - Aluminium	nr	25	26-01	GRILLES AND DIFFUSERS	Y
			Grilles and diffusers - Painted Metal	nr	30	26-01	GRILLES AND DIFFUSERS	Y
			Slot Diffusers	nr	20	26-01	GRILLES AND DIFFUSERS	Y
		5.6.1.M.15 Plate recuperator	Heat Exchanger - Air to Air	m2	20	29-03	PLATE RECUPERATOR	Y
			Plate recuperator	nr	20	29-03	PLATE RECUPERATOR	Y
		5.6.1.M.16 Thermal wheel	Thermal Wheel	nr	15	29-04	THERMAL WHEELS - ROTARY HEAT REGENERATORS	Y
		5.6.1.M.17 Duct heater battery - electric	Duct heater battery - electric	nr	10	29-01, 29-02	HEAT EXCHANGERS - COILS	Y
		5.6.1.M.19 Instrumentation and controls	Instrumentation and control components	nr	10	14-12	INDICATORS AND DISPLAYS	Y
		5.6.1.M.20 Thermal insulation	Thermal insulation	m^2	30	35-01	THERMAL INSULATION	Y
	5.6.2 Local Heating	5.6.2.M.1 Room heaters or fires	Down Flow Heater	nr	8	29-02	ELECTRIC/AIR HEATER	Y
			Gas Radiant Heater	nr	10	28-03, 28-07	GAS RADIANT TUBE HEATERS	Y
			Space Unit Heater - Electrical Storage	nr	8	29-02	ELECTRIC/AIR HEATER	Y
			Space Unit Heater - Gas / Electric	nr	10	28-02	GAS FIRED CERAMIC PLAQUE INFRA RED HEATERS	Y
			Space Unit Heater - Oil	nr	15	05-46	OIL FIRED SPACE HEATERS	Y
			Space Unit Heater- Electrical Cont Flow	nr	8	29-02	ELECTRIC/AIR HEATER	Y
			Tubular Heaters	nr	8	29-02	ELECTRIC/AIR HEATER	Y
			Gas Fire	nr	8	28-05	GAS FIRES	Y
		5.6.2.M.2 Chimneys and flues	Flue - Domestic Through Wall	nr	20	24-01	FLUES (all combustible fuels)	Y
			Flue - Mild Steel	nr	15	24-01	FLUES (all combustible fuels)	Y
			Flue - Stainless Steel	nr	30	24-01	FLUES (all combustible fuels)	Y
		5.6.2.M.3 Instrumentation and controls	Controller - Underfloor Heating	nr	10	14-07	UNIT CONTROLLERS AND SENSOR CONTROLLERS	Y
	5.6.3 Central Cooling	5.6.3.M.1 Chilled beams	Chilled Beams	m2	20	59-08	CHILLED BEAM	Y
			Chilled Beams Ceiling Panel	m2	20	59-08	CHILLED BEAM	Y
		5.6.3.M.2 Fan coil units	Fan Coil Units	m2	20	59-06	TERMINAL UNITS - FAN COIL	Y
		5.6.3.M.3 VAV cooling system	Expansion Bellows - Flue Dilution	TBD	TBD	TBD	TO BE DECIDED	Y
			VAV terminal units (box type) - With Silencer	m2	15	59-01	TERMINAL UNITS VAV - self powered	Y
			VAV terminal units (box type) - With Silencer and Heat Coil	m2	15	59-01	TERMINAL UNITS VAV - self powered	Y
			VAV terminal units (box type) - Fan Assisted with Silencer	m2	15	59-01	TERMINAL UNITS VAV - self powered	Y
			Refrigeration evaporators	m2	20	19-01	REFRIGERATION EVAPORATORS	Y
			DX split systems – with gas, electric or hot water heaters	m2	20	54-02	REFRIGERATION EVAPORATORS	Y
			Split systems /heat pumps - air cooled with direct expansion evaporator	m2	20	54-03	REFRIGERATION EVAPORATORS	Y
			Evaporators – shell and tube	m2	20	19-01	REFRIGERATION EVAPORATORS	Y
		5.6.3.M.4 VRV systems	Variable refrigerant volume (VRV) systems	m2	20	NCT	NON CORE TASK	Y
		5.6.3.M.5 Chillers	Chillers - Air Cooled	nr	15	05-31	AIR TO WATER HEAT PUMP	Y
			Chillers - Water Cooled	nr	15	05-32	WATER TO WATER HEAT PUMP	Y
			Close Control AC Condenser	nr	20	13-01	CONDENSERS - water cooled	Y
			Condensor Unit Evaporative	nr	20	13-01	CONDENSERS - water cooled	Y
			Dry Cooler - Epoxy	nr	20	30-03	DRY COOLERS	Y
			Dry Cooler - Galvanised	nr	20	30-03	DRY COOLERS	Y
			Dry Cooler - Plastic Coated	nr	20	30-03	DRY COOLERS	Y
			Packaged Chiller units - Air Cooled	nr	20	09-02	PACKAGED CHILLER UNITS	Y
			Packaged Chiller units - Water Cooled	nr	20	09-02	PACKAGED CHILLER UNITS	Y
			Packaged Chiller units - Absorption type	nr	25	09-03	LITHIUM BROMIDE/WATER ABSORPTION CHILLERS	Y
			Gas fired absorption chillers	nr	25	09-04	GAS FIRED ABSORPTION CHILLER UP TO 18 KW COOLING CAPACITY	Y
			Condensers - water cooled	nr	20	13-01	CONDENSERS - water cooled	Y
			Condensers - air cooled	nr	20	13-02	CONDENSER - air cooled	Y
		5.6.3.M.6 Central refrigeration plant	Central refrigeration plant	nr	20	Add	(blank)	Y
		5.6.3.M.7 Cooling towers	Cooling Tower - Epoxy Treated	nr	15	30-02	COOLING TOWERS - Precautions against Legionnaires disease (legionella pneumophila)	Y
			Cooling Tower - Galvanised Metal	nr	12	30-02	COOLING TOWERS - Precautions against Legionnaires disease (legionella pneumophila)	Y
			Cooling Tower - Non Stainless Steel	nr	25	30-02	COOLING TOWERS - Precautions against Legionnaires disease (legionella pneumophila)	Y
			Cooling Tower - Plastic Coated Metal	nr	20	30-02	COOLING TOWERS - Precautions against Legionnaires disease (legionella pneumophila)	Y
			Cooling Tower - Plastic construction	nr	20	30-02	COOLING TOWERS - Precautions against Legionnaires disease (legionella pneumophila)	Y
			Cooling Tower - Stainless steel	nr	30	30-02	COOLING TOWERS - Precautions against Legionnaires disease (legionella pneumophila)	Y
			Free cooling adiabatic cooler system	nr	20	65-12, 77-01	ADIABATIC COOLING SYSTEMS	Y
		5.6.3.M.8 Pipelines and fittings	Expansion Bellows - Rubber	TBD	TBD	TBD	TO BE DECIDED	Y
			Expansion Bellows - Steel	TBD	TBD	TBD	TO BE DECIDED	Y
			Pipework - Aircon/Chilled beam (Steel Gal)	m2	35	40-01, 40-02	PIPEWORK SYSTEMS - General	Y
			Pipework - Aircon/Chilled beam (Copper)	m2	45	40-01, 40-02	PIPEWORK SYSTEMS - General	Y
			Pipework - Aircon/Chilled beam (Plastic)	m2	20	40-01, 40-02	PIPEWORK SYSTEMS - General	Y
			Pipework - Aircon/Chilled beam (Steel)	m2	35	40-01, 40-02	PIPEWORK SYSTEMS - General	Y
			Pipework - Aircon/Fan coil (Copper)	m2	45	40-01, 40-02	PIPEWORK SYSTEMS - General	Y
			Pipework - Aircon/Fan coil (Plastic)	m2	20	40-01, 40-02	PIPEWORK SYSTEMS - General	Y
			Pipework - Aircon/Fan coil (Steel Gal)	m2	35	40-01, 40-02	PIPEWORK SYSTEMS - General	Y
			Pipework - Aircon/Fan coil (Steel)	m2	35	40-01, 40-02	PIPEWORK SYSTEMS - General	Y
			Pipework - Refrigeration Plant (Steel Gal)	m2	30	40-01	PIPEWORK SYSTEMS - General	Y
			Pipework - Refrigeration Plant (Copper)	m2	30	40-01	PIPEWORK SYSTEMS - General	Y
			Pipework - Refrigeration Plant (Plastic)	m2	30	40-01	PIPEWORK SYSTEMS - General	Y
			Pipework - Refrigeration Plant (Steel)	m2	30	40-01	PIPEWORK SYSTEMS - General	Y
			Plant Room Pipework	m2	35	40-01, 40-02	PIPEWORK SYSTEMS - General	Y
		5.6.3.M.9 Cold and treated water feeds	Cold and treated water feeds	m2	20	40-01	PIPEWORK SYSTEMS - General	Y
		5.6.3.M.10 Valves	Valves - Check	nr	25	61-01	VALVES	Y
			Valves - gate	nr	25	61-01	VALVES	Y
			Valves - Strainers	nr	25	61-01	VALVES	Y
			Valves - Thermostatic Mixer	nr	15	61-04	COMBINATION TAP ASSEMBLIES, MIXING VALVES/TAPS	Y
		5.6.3.M.11 Pumps	Pumps - Floor mounted	nr	20	45-02	CIRCULATING PUMPS-general	Y
			Pumps - Floor mounted Twin Head	nr	20	45-02	CIRCULATING PUMPS-general	Y
			Pumps - Accelerator pipe mounted	nr	10	45-02	CIRCULATING PUMPS-general	Y
			Pumps - Domestic	nr	10	45-11	DOMESTIC HOT WATER ACCELERATORS	Y
			Pumps - HWS circulator	nr	20	45-02	CIRCULATING PUMPS-general	Y
			Heat pump - Air to water (Rev. cycle chillers, e.g. Air source heat pump)	nr	15	05-31	AIR TO WATER HEAT PUMP	Y
			Heat pump - Water to water (Rev cycle chillers e.g. water source heat pump)	nr	15	05-32	WATER TO WATER HEAT PUMP	Y
			Pump - Brine to water (Rev. cycle chillers e.g. brine source heat pump)	nr	15	05-33	BRINE TO WATER HEAT PUMP	Y
		5.6.3.M.12 Distribution ductwork and fittings	Ductwork - Flexible	m2	15	16-02	DUCTWORK SYSTEM - GENERAL	Y
			Ductwork - Galvanised	m2	40	16-02	DUCTWORK SYSTEM - GENERAL	Y
			Ductwork - Plastic	m2	15	16-02	DUCTWORK SYSTEM - GENERAL	Y
		5.6.3.M.13 Grilles, and diffusers	External louvres - Aluminium	nr	25	26-02	LOUVRES, BIRD AND INSECT SCREENS	Y
			External louvres - Steel Painted	nr	20	26-02	LOUVRES, BIRD AND INSECT SCREENS	Y
			Grilles and diffusers - Aluminium	nr	15	16-02	DUCTWORK SYSTEM - GENERAL	Y
			Grilles and diffusers - Painted Metal	nr	30	26-01	GRILLES AND DIFFUSERS	Y
			Slot Diffusers	nr	20	26-01	GRILLES AND DIFFUSERS	Y
		5.6.3.M.14 Air handling units	Air Handling Unit - DX - external	nr	15	03-01	AIR HANDLING UNITS - general	Y

System Group	System and / or Element	Sub-Element	Component	UOM NRM	Estimated Useful Life (EUL)	Maintain Schedule	SFG20 Task Description	Applicable
			Air Handling Unit - DX - internal	nr	20	03-01	AIR HANDLING UNITS - general	Y
			Air Handling Unit - externally located	nr	15	03-01	AIR HANDLING UNITS - general	Y
			Air Handling Unit - internally located	nr	20	03-01	AIR HANDLING UNITS - general	Y
			Belt drives	nr	NLC	04-01	BELT DRIVES	Y
		5.6.3.M.15 Emission units	Emission units	nr	15	20-03,29-02	FANS -CENTRIFUGAL	Y
		5.6.3.M.16 Instrumentation and controls	Control Panel - Cooling Plant	nr	10	14-11	MULTI-INPUT CONTROLLERS	Y
		5.6.3.M.17 Thermal insulation	Thermal insulation	m2	30	35-01	THERMAL INSULATION	Y
		5.6.3.M.18 Sundry items	Expansion Bellows - Flue Dilution	TBD	TBD	TBD	TO BE DECIDED	Y
	5.6.4 Local Cooling	5.6.4.M.1 Local cooling units	Dry Cooler - Epoxy	nr	25	30-03	DRY COOLERS	Y
			Dry Cooler - Galvanised	nr	25	30-03	DRY COOLERS	Y
			Dry Cooler - Plastic Coated	nr	25	30-03	DRY COOLERS	Y
			High Density CO2 Air Conditioning	nr	25	59-06	TERMINAL UNITS - FAN COIL	Y
		5.6.4.M.2 Pipelines and fittings	Pipework - Cooling System (copper)	m2	45	40-01, 40-02	PIPEWORK SYSTEMS - General	Y
			Pipework - Cooling System closed (steel galv)	m2	35	40-01, 40-02	PIPEWORK SYSTEMS - General	Y
			Pipework - Cooling System open (steel galv)	m2	25	40-01, 40-02	PIPEWORK SYSTEMS - General	Y
			Pipework - Cooling System (Plastic)	m2	20	40-01, 40-02	PIPEWORK SYSTEMS - General	Y
		5.6.4.M.3 Valves	Valves - Check	nr	25	61-01	VALVES	Y
			Valves - gate	nr	25	61-01	VALVES	Y
			Valves - Strainers	nr	25	61-01	VALVES	Y
			Valves - Thermostatic Mixer	nr	15	61-04	COMBINATION TAP ASSEMBLIES, MIXING VALVES/TAPS	Y
		5.6.4.M.4 Ductwork and fittings	Ductwork - Flexible	nr	15	16-02	DUCTWORK SYSTEM - GENERAL	Y
			Ductwork - Galvanised	nr	15	16-02	DUCTWORK SYSTEM - GENERAL	Y
			Ductwork - Plastic	nr	40	16-02	DUCTWORK SYSTEM - GENERAL	Y
		5.6.4.M.5 Grilles, diffusers fans	Grilles and diffusers - Aluminium	nr	15	26-01	GRILLES AND DIFFUSERS	Y
			Grilles and diffusers - Painted Metal	nr	15	26-01	GRILLES AND DIFFUSERS	Y
			Slot Diffusers	nr	20	26-01	GRILLES AND DIFFUSERS	Y
		5.6.4.M.6 Instrumentation and controls	Controller - Air Conditioning	nr	10	14-07	UNIT CONTROLLERS AND SENSOR CONTROLLERS	Y
	5.6.5 Central heating and cooling	5.6.5.M.1 Fan coil units1	Fan coil units1	m2	20	59-06	TERMINAL UNITS - FAN COIL	Y
		5.6.5.M.2 VAV systems	VAV Boxes - Fan Assisted with Silencer	m2	15	59-01	TERMINAL UNITS VAV - self powered	Y
			VAV Boxes - With Silencer	m2	15	59-01	TERMINAL UNITS VAV - self powered	Y
			VAV Boxes - With Silencer and Heat Coil	m2	15	59-01	TERMINAL UNITS VAV - self powered	Y
		5.6.5.M.3 Reverse cycle heat pump systems	Reverse cycle heat pump systems	m2	TBD	TBD	TBD	Y
		5.6.5.M.4 Chillers	Absorption chillers	nr	25	09-03, 09-04	LITHIUM BROMIDE/WATER ABSORPTION CHILLERS	Y
			Vapour compression chillers	nr	20	12-01, 12-02, 12-03	COMPRESSORS REFRIGERATION - Reciprocal - (includes hermetic, semi-hermetic and open)	Y
			Solar thermal absorption chillers	nr	25	32-17	TBD	Y
		5.6.5.M.5 Pipelines and fittings	Expansion Bellows - Flue Dilution	TBD	TBD	TBD	TO BE DECIDED	Y
			Expansion Bellows - Rubber	TBD	TBD	TBD	TO BE DECIDED	Y
			Expansion Bellows - Steel	TBD	TBD	TBD	TO BE DECIDED	Y
			Pipework - Central heating and cooling System (copper)	m2	45	40-01, 40-02	PIPEWORK SYSTEMS - General	Y
			Pipework - Central heating and cooling System closed (steel galv)	m2	35	40-01, 40-02	PIPEWORK SYSTEMS - General	Y
			Pipework - Central heating and cooling System open (steel galv)	m2	25	40-01, 40-02	PIPEWORK SYSTEMS - General	Y
			Pipework - Central heating and cooling System (Plastic)	m2	20	40-01, 40-02	PIPEWORK SYSTEMS - General	Y
		5.6.5.M.6 Valves	Valves - Check	nr	25	61-01	VALVES	Y
			Valves - gate	nr	25	61-01	VALVES	Y
			Valves - Strainers	nr	25	61-01	VALVES	Y
			Valves - Thermostatic Mixer	nr	15	61-04	COMBINATION TAP ASSEMBLIES, MIXING VALVES/TAPS	Y
		5.6.5.M.7 Pumps	Pumps - Floor mounted	nr	20	45-02	CIRCULATING PUMPS-general	Y
			Pumps - Floor mounted Twin Head	nr	20	45-02	CIRCULATING PUMPS-general	Y
			Pumps - Accelerator pipe mounted	nr	10	45-02	CIRCULATING PUMPS-general	Y
			Pumps - Domestic	nr	10	45-11	DOMESTIC HOT WATER ACCELERATORS	Y
			Pumps - HWS circulator	nr	20	45-02	CIRCULATING PUMPS-general	Y
		5.6.5.M.8 Distribution ductwork and fittings	Ductwork - Flexible	m2	15	16-02	DUCTWORK SYSTEM - GENERAL	Y
			Ductwork - Galvanised	m2	40	16-02	DUCTWORK SYSTEM - GENERAL	Y
			Ductwork - Plastic	m2	15	16-02	DUCTWORK SYSTEM - GENERAL	Y
		5.6.5.M.9 Grilles, diffusers, fans, filters	Grilles and diffusers - Aluminium	nr	15	26-01	GRILLES AND DIFFUSERS	Y
			Grilles and diffusers - Painted Metal	nr	30	26-01	GRILLES AND DIFFUSERS	Y
			Slot Diffusers	nr	20	26-01	GRILLES AND DIFFUSERS	Y
		5.6.5.M.10 Air handling units	Air Handling Unit - DX - external	nr	15	03-01	AIR HANDLING UNITS - general	Y
			Air Handling Unit - DX - internal	nr	20	03-01	AIR HANDLING UNITS - general	Y
			Air Handling Unit - externally located	nr	15	03-01	AIR HANDLING UNITS - general	Y
			Air Handling Unit - internally located	nr	20	03-01	AIR HANDLING UNITS - general	Y
		5.6.5.M.11 Fan coil units2	Fan Coil Units	nr	25	59-06	TERMINAL UNITS - FAN COIL	Y
		5.6.5.M.13 Instrumentation and controls	Control Panel	nr	10	14-11	MULTI-INPUT CONTROLLERS	Y
		5.6.5.M.14 Thermal insulation	Thermal insulation	m2	30	35-01	THERMAL INSULATION	Y
	5.6.6 Local heating and cooling	5.6.6.M.1 Local heating and cooling	Split Comfort Cooling - Indoor Unit	nr	15	54-02	DX SPLIT SYSTEMS - with gas, electric or hot water heaters	Y
		5.6.6.M.2 Pipelines and fittings	Pipework - Local heating and cooling System (copper)	m2	45	40-01, 40-02	PIPEWORK SYSTEMS - General	Y
			Pipework - Local heating and cooling System closed (steel galv)	m2	35	40-01, 40-02	PIPEWORK SYSTEMS - General	Y
			Pipework - Local heating and cooling System open (steel galv)	m2	25	40-01, 40-02	PIPEWORK SYSTEMS - General	Y
			Pipework - Local heating and cooling System (Plastic)	m2	20	40-01, 40-02	PIPEWORK SYSTEMS - General	Y
		5.6.6.M.3 Valves	Valves - Check	nr	25	61-01	VALVES	Y
			Valves - gate	nr	25	61-01	VALVES	Y
			Valves - Strainers	nr	25	61-01	VALVES	Y
			Valves - Thermostatic Mixer	nr	15	61-04	COMBINATION TAP ASSEMBLIES, MIXING VALVES/TAPS	Y
		5.6.6.M.4 Pumps	Pumps - Floor mounted Twin Head	nr	20	45-02	CIRCULATING PUMPS-general	Y
			Pumps - Accelerator pipe mounted	nr	10	45-02	CIRCULATING PUMPS-general	Y
			Pumps - HWS circulator	nr	20	45-02	CIRCULATING PUMPS-general	Y
		5.6.6.M.5 Ductwork, fittings and ancillaries	Ductwork - Flexible	m2	15	16-02	DUCTWORK SYSTEM - GENERAL	Y
			Ductwork - Galvanised	m2	40	16-02	DUCTWORK SYSTEM - GENERAL	Y
			Ductwork - Plastic	m2	15	16-02	DUCTWORK SYSTEM - GENERAL	Y
		5.6.6.M.6 Grilles, diffusers, fans, filters	Grilles and diffusers - Aluminium	nr	15	26-01	GRILLES AND DIFFUSERS	Y
			Grilles and diffusers - Painted Metal	nr	30	26-01	GRILLES AND DIFFUSERS	Y
			Slot Diffusers	nr	20	26-01	GRILLES AND DIFFUSERS	Y
		5.6.6.M.8 Instrumentation and controls	Control Panel	nr	10	14-11	MULTI-INPUT CONTROLLERS	Y
		5.6.6.M.9 Thermal insulation	Thermal insulation	m2	30	35-01	THERMAL INSULATION	Y
	5.6.7 Central air conditioning	5.6.7.M.2 Air conditioning systems	VAV Boxes - Fan Assisted with Silencer	m2	15	59-01	TERMINAL UNITS VAV - self powered	Y
			VAV Boxes - With Silencer	m2	15	59-01	TERMINAL UNITS VAV - self powered	Y
			VAV Boxes - With Silencer and Heat Coil	m2	15	59-01	TERMINAL UNITS VAV - self powered	Y
			Dual-duct air induction conditioning systems	m2	40	03-01, 16-02	AIR HANDLING UNITS - general	Y
			Multi-zone conditioning systems	m2	40	03-01	AIR HANDLING UNITS - general	Y
			Induction air conditioning systems	nr	40	TBD	TBD	Y
			Hybrid air conditioning systems	nr	40	TBD	TBD	Y
		5.6.7.M.2 TBD	Coils - Galvanised for Heating	m2	12	03-01	AIR HANDLING UNITS - general	Y
		5.6.7.M.2 TBD	Coils - In Duct Unit	m2	10	16-02	DUCTWORK SYSTEM - GENERAL	Y
		5.6.7.M.2 TBD	Dehumidifier	nr	15	Add Task	ADD TASK	Y
		5.6.7.M.2 TBD	Fins - Aluminium for Cooling	m2	15	03-01	AIR HANDLING UNITS - general	Y
		5.6.7.M.2 TBD	Fins - Aluminium for Heating	m2	15	03-01	AIR HANDLING UNITS - general	Y
		5.6.7.M.2 TBD	Fins - Copper for Cooling	m2	25	03-01	AIR HANDLING UNITS - general	Y
		5.6.7.M.2 TBD	Fins - Copper for Heating	m2	25	03-01	AIR HANDLING UNITS - general	Y
		5.6.7.M.2 TBD	Humidifiers - Electrode Bottle	nr	10	33-03	ELECTRODE BOILER HUMIDIFIER	Y
		5.6.7.M.2 TBD	Humidifiers - Pan type	nr	10	33-03	ELECTRODE BOILER HUMIDIFIER	Y
		5.6.7.M.2 TBD	Humidifiers - Spinning Disk	nr	10	33-03	ELECTRODE BOILER HUMIDIFIER	Y
		5.6.7.M.2 TBD	Humidifiers - Spray type	nr	10	33-08	SPRAY HUMIDIFIER	Y
		5.6.7.M.2 TBD	Humidifiers - Steam Direct	nr	8	33-02	HUMIDIFIER - Direct steam injection type.	Y
		5.6.7.M.2 TBD	Humidifiers - Steam Electric Generated	nr	8	33-02	HUMIDIFIER - Direct steam injection type.	Y
		5.6.7.M.2 TBD	Humidifiers - Ultrasonic	nr	10	33-05	HUMIDIFIERS- Ultra sonic	Y
		5.6.7.M.2 TBD	Spray cooler coils	m2	15	03-01	AIR HANDLING UNITS - general	Y
		5.6.7.M.4 Air handling units	Air Handling Unit - DX - external	nr	15	03-01	AIR HANDLING UNITS - general	Y
			Air Handling Unit - DX - internal	nr	20	03-01	AIR HANDLING UNITS - general	Y
			Air Handling Unit - externally located	nr	15	03-01	AIR HANDLING UNITS - general	Y
			Air Handling Unit - internally located	nr	20	03-01	AIR HANDLING UNITS - general	Y
		5.6.7.M.5 Terminal units/emitters	Fan Coil Units	nr	20	59-06	TERMINAL UNITS - FAN COIL	Y
			Induction Units	nr	20	59-05	TERMINAL UNITS - INDUCTION UNITS	Y
		5.6.7.M.9 Ductwork and fittings	Ductwork - Flexible	m2	15	16-02	DUCTWORK SYSTEM - GENERAL	Y
			Ductwork - Galvanised	m2	40	16-02	DUCTWORK SYSTEM - GENERAL	Y
			Ductwork - Plastic	m2	15	16-02	DUCTWORK SYSTEM - GENERAL	Y
		5.6.7.M.10 Grilles, diffusers, fans, filters	External louvres - Aluminium	nr	15	26-02	LOUVRES, BIRD AND INSECT SCREENS	Y
			External louvres - Steel Painted	nr	20	26-02	LOUVRES, BIRD AND INSECT SCREENS	Y
			Grilles and diffusers - Aluminium	nr	25	26-01	GRILLES AND DIFFUSERS	Y
			Grilles and diffusers - Painted Metal	nr	30	26-01	GRILLES AND DIFFUSERS	Y
			Slot Diffusers	nr	20	26-01	GRILLES AND DIFFUSERS	Y

System Group	System and / or Element		Sub-Element	Component	UOM NRM	Estimated Useful Life (EUL)	Maintain Schedule	SFG20 Task Description	Applicable
		5.6.7.M.11	Instrumentation and controls	Controller - Air Conditioning	nr	10	14-11	MULTI-INPUT CONTROLLERS	Y
		5.6.7.M.12	Thermal insulation	Thermal insulation	m2	30	35-01	THERMAL INSULATION	Y
		5.6.7.M.1	Plenum air heating systems	Plenum air heating systems	m2	Building Life	03-01	AIR HANDLING UNITS - general	Y
		5.6.7.M.3	Chillers	Chillers - Lithium bromide water/ absorption chillers	nr	25	09-03	LITHIUM BROMIDE/WATER ABSORPTION CHILLERS	Y
				Chillers - Gas fired absorption chillers up to 18 kW cooling capacity	nr	25	09-04	GAS FIRED ABSORPTION CHILLER UP TO 18 KW COOLING CAPACITY	Y
				Chillers - Compressor refrigeration - reciprocating	nr	20	12-01	COMPRESSORS REFRIGERATION - Reciprocal - (includes hermetic, semi-hermetic and open)	Y
				Chillers - Compressor - screw	nr	20	12-02	COMPRESSOR - SCREW	Y
				Chillers - Compressor - screw	nr	25	12-02	COMPRESSOR - SCREW	Y
				Chillers - Compressors refrigeration - centrifugal using R123/134a	nr	20	12-03	COMPRESSORS REFRIGERATION - CENTRIFUGAL	Y
				Chillers - Solar thermal absorption chillers	nr	25	32-17	TBD	Y
		5.6.7.M.6	Pipelines and fittings	Plant Room Pipework	m2	25	40-01 40,02	PIPEWORK SYSTEMS - General	Y
		5.6.7.M.7	Valves	Valves - Check	nr	25	61-01	VALVES	Y
				Valves - gate	nr	25	61-01	VALVES	Y
				Valves - Strainers	nr	25	61-01	VALVES	Y
				Valves - Thermostatic Mixer	nr	15	61-04	COMBINATION TAP ASSEMBLIES, MIXING VALVES/TAPS	Y
		5.6.7.M.8	Pumps	Pumps - Floor mounted	nr	20	45-02	CIRCULATING PUMPS-general	Y
				Pumps - Floor mounted Twin Head	nr	20	45-02	CIRCULATING PUMPS-general	Y
				Pumps - Accelerator pipe mounted	nr	10	45-02	CIRCULATING PUMPS-general	Y
				Pumps - Domestic	nr	10	45-11	DOMESTIC HOT WATER ACCELERATORS	Y
				Pumps - HWS circulator	nr	20	45-02	CIRCULATING PUMPS-general	Y
	5.6.8 Local air conditioning	5.6.8.M.1	Air conditioning units	Close Control AC Condenser	nr	15	47-01	ROOM AIR CONDITIONERS	Y
				Unitary A/C / CRAC Unit (DX Type)	nr	15	47-01	ROOM AIR CONDITIONERS	Y
				Split System - Heat Pump	nr	15	54-03	SPLIT SYSTEMS/ HEATPUMPS – air-cooled with direct expansion evaporator (DX)	Y
				Separate clean room air conditioner	nr	20	NCT - 5.6.8.2	NCT - Separate clean room air conditioner	Y
		5.6.8.M.4	Pumps	Pumps - Floor mounted	nr	20	45-02	CIRCULATING PUMPS-general	Y
				Pumps - Floor mounted Twin Head	nr	20	45-02	CIRCULATING PUMPS-general	Y
				Pumps - Accelerator pipe mounted	nr	10	45-02	CIRCULATING PUMPS-general	Y
				Pumps - Domestic	nr	10	45-11	DOMESTIC HOT WATER ACCELERATORS	Y
				Pumps - HWS circulator	nr	20	45-02	CIRCULATING PUMPS-general	Y
		5.6.8.M.5	Ductwork, fittings and ancillaries	Ductwork - Flexible	m2	15	16-02	DUCTWORK SYSTEM - GENERAL	Y
				Ductwork - Galvanised	m2	40	16-02	DUCTWORK SYSTEM - GENERAL	Y
				Ductwork - Plastic	m2	15	16-02	DUCTWORK SYSTEM - GENERAL	Y
		5.6.8.M.6	Grilles, diffusers, fans, filters	Grilles and diffusers - Aluminium	nr	15	26-01	GRILLES AND DIFFUSERS	Y
				Grilles and diffusers - Painted Metal	nr	30	26-01	GRILLES AND DIFFUSERS	Y
				Slot Diffusers	nr	20	26-01	GRILLES AND DIFFUSERS	Y
		5.6.6.M.2	Pipelines and fittings	Pipework - Local air conditioning System (copper)	m2	45	40-01, 40-02	PIPEWORK SYSTEMS - General	Y
		5.6.6.M.2		Pipework - Local air conditioning System closed (steel galv)	m2	35	40-01, 40-02	PIPEWORK SYSTEMS - General	Y
		5.6.6.M.2		Pipework - Local air conditioning System open (steel galv)	m2	25	40-01, 40-02	PIPEWORK SYSTEMS - General	Y
		5.6.6.M.2		Pipework - Local air conditioning System (Plastic)	m2	20	40-01, 40-02	PIPEWORK SYSTEMS - General	Y
		5.6.6.M.3	Valves	Valves - Check	nr	25	61-01	VALVES	Y
		5.6.6.M.3		Valves - gate	nr	25	61-01	VALVES	Y
		5.6.6.M.3		Valves - Strainers	nr	25	61-01	VALVES	Y
		5.6.6.M.3		Valves - Thermostatic Mixer	nr	15	61-04	COMBINATION TAP ASSEMBLIES, MIXING VALVES/TAPS	Y
		5.6.6.M.7	Instrumentation and controls	Control Panel	nr	10	14-11	MULTI-INPUT CONTROLLERS	Y
		5.6.6.M.8	Thermal insulation	Thermal insulation	m2	30	35-01	THERMAL INSULATION	Y
		5.6.6.M.9	Air curtains	Air curtains	nr	15	20-03, 29-02	FANS -CENTRIFUGAL	Y
5.7 VENTILATION SYSTEMS	5.7.1 Central ventilation	5.7.1.M.1	Air extract systems	Air Handling Unit - external (extract)	nr	15	20-08	FANS-EXTRACT - including fire/smoke extracts units	Y
				Air Handling Unit - internal (extract)	nr	20	20-08	FANS-EXTRACT - including fire/smoke extracts units	Y
		5.7.1.M.2	Air supply and extract systems	Air Handling Unit - external (supply and extract)	nr	15	20-02	FANS - VENTILATING - general	Y
				Air Handling Unit - internal (supply and extract)	nr	20	20-02	FANS - VENTILATING - general	Y
		5.7.1.M.3	Extract unit/terminal units	Extract unit/terminal units	nr	40	20-02	FANS - VENTILATING - general	Y
		5.7.1.M.4	Fan units	Fan - 2 Stage Axial	nr	15	20-04	FANS- AXIAL	Y
				Fan - Axial	nr	15	20-04	FANS- AXIAL	Y
				Fan - Extract	nr	15	20-08	FANS-EXTRACT - including fire/smoke extracts units	Y
				Fan - Flue Dilution	nr	20	20-02	FANS - VENTILATING - general	Y
				Fan - Roof Mounted	nr	15	20-02	FANS - VENTILATING - general	Y
				Fan - Smoke Extract	nr	15	20-08	FANS-EXTRACT - including fire/smoke extracts units	Y
				Fan - Toilet Extract	nr	15	20-08	FANS-EXTRACT - including fire/smoke extracts units	Y
		5.7.1.M.5	Pipelines and fittings	Pipework - Central ventilation System (copper)	m2	45	40-01, 40-02	PIPEWORK SYSTEMS - General	Y
				Pipework - Central ventilation System (steel galv)	m2	25	40-01, 40-02	PIPEWORK SYSTEMS - General	Y
				Pipework - Central ventilation System (steel galv)	m2	35	40-01, 40-02	PIPEWORK SYSTEMS - General	Y
				Pipework - Central ventilation System (Plastic)	m2	20	40-01, 40-02	PIPEWORK SYSTEMS - General	Y
		5.7.1.M.6	Grilles, diffusers, fans, filters	External louvres - Aluminium	nr	25	26-02	LOUVRES, BIRD AND INSECT SCREENS	Y
				External louvres - Steel Painted	nr	20	26-02	LOUVRES, BIRD AND INSECT SCREENS	Y
				Grilles and diffusers - Aluminium	nr	25	26-01	GRILLES AND DIFFUSERS	Y
				Grilles and diffusers - Painted Metal	nr	30	26-01	GRILLES AND DIFFUSERS	Y
				Slot Diffusers	nr	20	26-01	GRILLES AND DIFFUSERS	Y
		5.7.1.M.7	Ductwork, and fittings	Ductwork - Flexible	m2	15	16-02	DUCTWORK SYSTEM - GENERAL	Y
				Ductwork - Galvanised	m2	40	16-02	DUCTWORK SYSTEM - GENERAL	Y
				Ductwork - Plastic	m2	15	16-02	DUCTWORK SYSTEM - GENERAL	Y
		5.7.1.M.8	Valves	Valves - Check	nr	25	61-01	VALVES	Y
				Valves - gate	nr	25	61-01	VALVES	Y
				Valves - Strainers	nr	25	61-01	VALVES	Y
				Valves - Thermostatic Mixer	nr	15	61-04	COMBINATION TAP ASSEMBLIES, MIXING VALVES/TAPS	Y
		5.7.1.M.9	Pumps	Pumps - Floor mounted	nr	20	45-02	CIRCULATING PUMPS-general	Y
				Pumps - Floor mounted Twin Head	nr	20	45-02	CIRCULATING PUMPS-general	Y
				Pumps - Accelerator pipe mounted	nr	10	45-02	CIRCULATING PUMPS-general	Y
				Pumps - Domestic	nr	15	45-01	PUMPS - General	Y
				Pumps - HWS circulator	nr	20	45-02	CIRCULATING PUMPS-general	Y
		5.7.1.M.10	Instrumentation and controls	Time clock	nr	10	14-08	CONTROLLER TIMERS	Y
	5.7.2 Local and special ventilation	5.7.2.M.1	Extract Fans	Fan - Extract	nr	15	20-08	FANS-EXTRACT - including fire/smoke extracts units	Y
				Fan - Toilet Extract	nr	15	20-08	FANS-EXTRACT - including fire/smoke extracts units	Y
		5.7.2.M.2	Kitchen ventilation	Kitchen Hood extract	nr	NLC	20-08	FANS-EXTRACT - including fire/smoke extracts units	Y
		5.7.2.M.3	Safety cabinet and fume cupboard extracts	Downflow Cabinet	nr	15	20-02	FANS - VENTILATING - general	Y
		5.7.2.M.4	Fume extracts	Fume Cupboard	nr	15	20-08	FANS-EXTRACT - including fire/smoke extracts units	Y
		5.7.2.M.5	Dust collection	Dust Collection Unit	nr	15	64-04	MOBILE DUST SEPARATOR FOR SPOT EXTRACTION	Y
		5.7.2.M.6	Anaesthetic gas extract	Anaesthetic gas extract	nr	15	NCT	NCT	Y
		5.7.2.M.7	Cyclone systems	Cyclone systems	nr	15	NCT	NCT	Y
		5.7.2.M.8	Fans	Fan - 2 Stage Axial	nr	15	20-04	FANS- AXIAL	Y
				Fan - Axial	nr	15	20-04	FANS- AXIAL	Y
		5.7.2.M.9	Rotating ventilators	Rotating Ventilators	nr	20	20-05	FANS - PROPELLER	Y
		5.7.2.M.10	Fans	Fan - Roof Mounted	nr	15	20-02	FANS - VENTILATING - general	Y
		5.7.2.M.11	Car Park Ventilation	Vehicle Exhaust	nr	20	64-06	VEHICLE EXHAUST RAIL SYSTEM	Y
				Local car exhaust ventilation	nr	15	64-03	SPRING RECOIL HOSE REEL	Y
		5.7.2.M.12	Ductwork, and fittings	Ductwork - Flexible	m2	15	16-02	DUCTWORK SYSTEM - GENERAL	Y
				Ductwork - Galvanised	m2	40	16-02	DUCTWORK SYSTEM - GENERAL	Y
				Ductwork - Plastic	m2	15	16-02	DUCTWORK SYSTEM - GENERAL	Y
		5.7.2.M.13	Grilles, diffusers, fans, filters	Grilles and diffusers - Aluminium	nr	15	26-01	GRILLES AND DIFFUSERS	Y
				Grilles and diffusers - Painted Metal	nr	30	26-01	GRILLES AND DIFFUSERS	Y
				Slot Diffusers	nr	20	26-01	GRILLES AND DIFFUSERS	Y
		5.7.2.M.14	Instrumentation and controls	Controller - Ventilation	nr	10	14-07	UNIT CONTROLLERS AND SENSOR CONTROLLERS	Y
				PIR - Fan	nr	8	50-09	OCCUPANCY and LIGHT SENSORS	Y
	5.7.3 Smoke extract / control	5.7.3.M.1	Automatic smoke extract systems	Ductwork Smoke Dampers - Interated	m2	30	52-02	SMOKE RELIEF - Natural smoke and heat exhaust ventilators	Y
				Ductwork Smoke Dampers - Stand Alone	m2	30	52-02	SMOKE RELIEF - Natural smoke and heat exhaust ventilators	Y
				Fan - Smoke Extract	m2	15	20-08	FANS-EXTRACT - including fire/smoke extracts units	Y
				Smoke / Fire Curtain	m2	20	52-04	SMOKE CURTAINS	Y
				Smoke Relief Ventilators	m2	30	52-02	SMOKE RELIEF - Natural smoke and heat exhaust ventilators	Y
				Smoke Relief Ventilators - Powered	m2	30	52-03	SMOKE RELIEF - Powered smoke and heat exhaust ventilators	Y
		5.7.3.M.2	Automatic smoke compartmentalisation systems	Automatic smoke compartmentalisation systems	nr	20	20-08	FANS-EXTRACT - including fire/smoke extracts units	Y
		5.7.3.M.3	Fans	Fan units	nr	40	20-02	FANS - VENTILATING - general	Y
		5.7.3.M.4	Ductwork and fittings	Ductwork and fittings	nr	15	20-02	FANS - VENTILATING - general	Y
		5.7.3.M.5	Grilles, diffusers, fans, filters	Grilles and diffusers - Aluminium	nr	15	26-01	GRILLES AND DIFFUSERS	Y
				Grilles and diffusers - Painted Metal	nr	30	26-01	GRILLES AND DIFFUSERS	Y
		5.7.3.M.7	Instrumentation and controls	Instrumentation and control components	nr	10	14-07	UNIT CONTROLLERS AND SENSOR CONTROLLERS	Y
5.8 ELECTRICAL INSTALLATIONS	5.8.1 Electrical mains and sub-mains distribution	5.8.1.M.1	LV Distribution	Consumer Units	m2	20	44-08	ELECTRICAL INSTALLATION - GENERALLY	Y
				Distributed Amplifier Unit	m2	20	44-05	POWER DISTRIBUTION UNIT (PDU)	Y
				Inverter	m2	15	44-08	ELECTRICAL INSTALLATION - GENERALLY	Y
				LV Panel	m2	20	44-02	MAIN SWITCH PANEL AT SUPPLY INTAKE	Y
				PFC & MD Transformer	m2	20	44-03	MAXIMUM DEMAND and POWER FACTOR CORRECTION	Y
				Power Distribution Unit	m2	20	44-05	POWER DISTRIBUTION UNIT (PDU)	Y

System Group	System and / or Element	Sub-Element	Component	UOM NRM	Estimated Useful Life (EUL)	Maintain Schedule	SFG20 Task Description	Applicable
			Voltage Optimisation Unit	m2	20	44-03	MAXIMUM DEMAND and POWER FACTOR CORRECTION	Y
			Distribution boards	m2	20	44-08	ELECTRICAL INSTALLATION - GENERALLY	Y
			Final circuits and outlets	m2	20	44-08	ELECTRICAL INSTALLATION - GENERALLY	Y
			Circuit breakers	m2	20	44-08	ELECTRICAL INSTALLATION - GENERALLY	Y
		5.8.1.M.2 HV Main Incomer and Panel	HV Main Incomer / Panel	m2	30	44-02, 44-08	MAIN SWITCH PANEL AT SUPPLY INTAKE	Y
		5.8.1.M.3 Distribution Board	Distribution Boards	m2	20	44-07	DISTRIBUTION BOARDS	Y
		5.8.1.M.4 Mains Cabling	Mains Cabling	m2	35	44-08	ELECTRICAL INSTALLATION - GENERALLY	Y
			Sub-Mains Distribution Wiring - mineral insulated	m2	35	44-08	ELECTRICAL INSTALLATION - GENERALLY	Y
			Sub-Mains Distribution Wiring - thermoplastic	m2	35	44-08	ELECTRICAL INSTALLATION - GENERALLY	Y
			Sub-Mains Distribution Wiring - thermosetting	m2	35	44-08	ELECTRICAL INSTALLATION - GENERALLY	Y
		5.8.1.M.5 Conduits and trunking	Conduits and trunking	m2	30-35	44-08	ELECTRICAL INSTALLATION - GENERALLY	Y
		5.8.1.M.6 Busbar trunking	Busbar Chamber	m2	35	44-08	ELECTRICAL INSTALLATION - GENERALLY	Y
			Busbar trunking	m2	35	44-08	ELECTRICAL INSTALLATION - GENERALLY	Y
			Mains Busbar	m2	35	44-08	ELECTRICAL INSTALLATION - GENERALLY	Y
		5.8.1.M.7 Transformers	110v Transformer	nr	30	70-07	CAST RESIN TRANSFORMER	Y
			Transformer (Dry type)	nr	30	70-07	CAST RESIN TRANSFORMER	Y
			Transformer (Oil Type)	nr	30	70-06	FLUID FILLED TRANSFORMER	Y
		5.8.1.M.8 Feeder Pillar	Feed Pillar	nr	30	44-08	ELECTRICAL INSTALLATION - GENERALLY	Y
		5.8.1.M.9 Electricity Monitoring System	Electricity Monitoring System	item	TBD	TBD	TO BE DECIDED	Y
		5.8.1.M.9 Surge Protection	Surge Protection	item	TBD	TBD	TO BE DECIDED	Y
		5.8.1.M.9	Hazardous area (Electrics) - Flame proof equipment	item	20	27-01 & 27-02	Hazardous areas - FLAME PROOF EQUIPMENT	Y
		5.8.1.M.9	Hazardous area (Electrics) – Lighting	item	15	27-01 & 27-03	Hazardous areas - LIGHTING	Y
	5.8.2 Power Installations	5.8.1.M.1 LV Distribution	Power Supply Unit	m2	20	TBD	TO BE DECIDED	Y
		5.8.2.M.1 General LV power installations	General LV power installations	m2	25	44-08	ELECTRICAL INSTALLATION - GENERALLY	Y
		5.8.2.M.2 Extra LV supply installations	Extra LV supply installations	m2	25	44-08	ELECTRICAL INSTALLATION - GENERALLY	Y
		5.8.2.M.3 DC installations	DC installations	m2	25	NCT	NCT	Y
		5.8.2.M.4 Distribution Board	Distribution boards -20yrs	m2	20	44-07	DISTRIBUTION BOARDS	Y
			LV main switchgear - 30 yrs;	m2	30	44-02	MAIN SWITCH PANEL AT SUPPLY INTAKE	Y
		5.8.2.M.5 UPS System	Reciprocating Engine	nr	20	NCT	POWER DISTRIBUTION UNIT (PDU)	Y
			Turbine Engine	nr	20	NCT	NON CORE TASK	Y
			UPS - Battery / Inverter	nr	20	43-03	BATTERIES - LEAD ACID - unsealed	Y
			UPS Inverter	nr	20	43-05	UNINTERRUPTIBLE POWER SUPPLIES	Y
			UPS - Batteries - Sealed	nr	5	43-04	BATTERY CHARGING EQUIPMENT	Y
			UPS - Capacitors	nr	5	43-05	BATTERIES - LEAD ACID - unsealed	Y
			UPS Diesel (DRUPS)	nr	20	NCT	NON CORE TASK	Y
		5.8.2.M.6 Cables and wiring	Cables and wiring - Armoured cables and conduits	m2	35	44-04	ARMOURED CABLES AND CONDUITS	Y
			Cables and wiring - Ring main / sub-circuits - general	m2	20	44-08	ELECTRICAL INSTALLATION - GENERALLY	Y
			Cables and wiring - Ring main/ sub-circuits - spur outlets	m2	15	44-08 part	ELECTRICAL INSTALLATION - GENERALLY	Y
			Cables and wiring - Three phase circuits - Power outlets	m2	15	44-09	THREE PHASE CIRCUITS	Y
		5.8.2.M.8 socket outlets	Fuse switches - Single phase	nr	15	44-10	ISOLATORS/STARTERS/FUSESWITCHES	Y
			Fuse switches - Three phase	nr	15	44-10	ISOLATORS/STARTERS/FUSESWITCHES	Y
			LV Protection System - MCB	nr	15	44-10	ISOLATORS/STARTERS/FUSESWITCHES	Y
			LV Protection System - MCCB	nr	15	44-10	ISOLATORS/STARTERS/FUSESWITCHES	Y
			LV Protection System - RCB	nr	15	44-10	ISOLATORS/STARTERS/FUSESWITCHES	Y
			LV Protection System - RCD / RCCB	nr	15	44-10	ISOLATORS/STARTERS/FUSESWITCHES	Y
			LV Protection System - SSOs	nr	15	44-10	ISOLATORS/STARTERS/FUSESWITCHES	Y
		5.8.2.M.10 Sundry items	Emergency Shut Off button - Electrical Equip	nr	10	14-18	EMERGENCY STOP BUTTONS	Y
		5.8.2.M.11 PAT testing	PAT testing	nr	1	42-01	PORTABLE APPLIANCE TESTING (PAT)	Y
		5.8.2.M.12 Fixed wiring test	Fixed wiring test	%	5	44-08	ELECTRICAL INSTALLATION - GENERALLY	Y
	5.8.3 Lighting installations	5.8.3.M.1 Light fittings - general	Light fittings Ext - Bulkhead	m2	15	36-04	EXTERNAL LIGHTING including ILLUMINATED SIGNS	Y
			Light fittings Int - Batten Fluorescent	m2	20	36-03	LIGHTING FITTINGS including LUMINAIRES general	Y
			Light fittings Int - Domestic	m2	20	36-03	LIGHTING FITTINGS including LUMINAIRES general	Y
			Light fittings Int - Fluorescent	m2	20	36-03	LIGHTING FITTINGS including LUMINAIRES general	Y
			Light fittings Int - High Bay Sodium	m2	20	36-03	LIGHTING FITTINGS including LUMINAIRES general	Y
			Light fittings Int - Modular Fluorescent	m2	20	36-03	LIGHTING FITTINGS including LUMINAIRES general	Y
			Light fittings Int - Office modular	m2	20	36-03	LIGHTING FITTINGS including LUMINAIRES general	Y
			Light fittings Int - Tungsten	m2	20	36-03	LIGHTING FITTINGS including LUMINAIRES general	Y
			Light fittings Int - Vapour Sealed	m2	20	36-03	LIGHTING FITTINGS including LUMINAIRES general	Y
			Light fittings Int - Workshop/low spec	m2	20	36-03	LIGHTING FITTINGS including LUMINAIRES general	Y
			Light fittings Internal - Halogen	m2	20	36-03	LIGHTING FITTINGS including LUMINAIRES general	Y
		5.8.3.M.2 Emergency lighting	Emergency Lighting -	M2/nr	25	37-01	EMERGENCY LIGHTING self contained	Y
			Emergency Lighting - Bulkhead	M2/nr	25	37-01	EMERGENCY LIGHTING self contained	Y
			Emergency Lighting - Office	M2/nr	25	37-02	EMERGENCY LIGHTING externally powered	Y
			Emergency Lighting - Workshop	M2/nr	25	37-02	EMERGENCY LIGHTING externally powered	Y
			Light fittings Ext - Bulk - emergency	M2/nr	25	37-01	EMERGENCY LIGHTING self contained	Y
		5.8.3.M.3 External lighting	Light fittings Ext - Floodlight	m2	15	36-04	EXTERNAL LIGHTING including ILLUMINATED SIGNS	Y
		5.8.3.M.4 Distribution boards	LV switchgear and Distribution boards	m2	25-30	44-07	DISTRIBUTION BOARDS	Y
		5.8.3.M.5 Cables and wiring	Lighting Distribution Wiring	m2	15-20	44-04	ARMOURED CABLES AND CONDUITS	Y
		5.8.3.M.6 Conduits and cable trunking	Conduits and cable trunking	m2	25-30	44-04	ARMOURED CABLES AND CONDUITS	Y
		5.8.3.M.7 Light fittings	Fittings to lighting points	nr	10	36-03	LIGHTING FITTINGS including LUMINAIRES general	Y
		5.8.3.M.8 Lighting Switches	Lighting Switches	nr	10	36-02	LIGHTING-SWITCHES-INTERNAL AND EXTERNAL	Y
		5.8.3.M.9 Luminaires / lamps	Luminaires / lamps	M2/nr	TBD	36-01	INTRODUCTORY PROCEDURES	Y
		5.8.3.M.10 Lighting control equipment	PIR - Lighting	nr	8	50-09	OCCUPANCY and LIGHT SENSORS	Y
			Time clock	nr	10	14-08	CONTROLLER TIMERS	Y
	5.8.4 Specialist lighting installations	5.8.4.M.1 Illuminated display signs	Illuminated Signage	nr	20	36-04	EXTERNAL LIGHTING including ILLUMINATED SIGNS	Y
		5.8.4.M.2 Studio Lighting	Specialist lighting - Studio	m2	20	NCT	NON CORE TASK	Y
		5.8.4.M.3 Auditorium lighting	Specialist lighting - Auditorium	m2	20	NCT	NON CORE TASK	Y
		5.8.4.M.4 Arena lighting	Specialist lighting - Arena	m2	15	NCT	NON CORE TASK	Y
		5.8.4.M.5 Operating theatre and other specialist lighting	Specialist lighting - Infra Red	m2	20	NCT	NON CORE TASK	Y
			Specialist lighting - Operating Theatres	m2	20	NCT	NON CORE TASK	Y
			Specialist lighting - Other	m2	20	NCT	NON CORE TASK	Y
		5.8.4.M.6 Distribution boards	LV switchgear and Distribution boards	m2	25-30	44-07	DISTRIBUTION BOARDS	Y
		5.8.4.M.7 Cables and wiring	Lighting Distribution Wiring	m2	15-20	44-04	ARMOURED CABLES AND CONDUITS	Y
		5.8.4.M.8 Conduits and cable trunking	Conduits and cable trunking	m2	25-30	44-04	ARMOURED CABLES AND CONDUITS	Y
		5.8.4.M.9 Light fittings	Fittings to lighting points	nr	10	36-03	LIGHTING FITTINGS including LUMINAIRES general	Y
		5.8.4.M.10 Lighting Switches	Lighting Switches	nr	10	36-02	LIGHTING-SWITCHES-INTERNAL AND EXTERNAL	Y
		5.8.4.M.11 Luminaires / lamps	Luminaires / lamps	m2	TBD	36-01	INTRODUCTORY PROCEDURES	Y
		5.8.4.M.12 Lighting gantries	Lighting gantries	nr	TBD	NCT	NCT	Y
		5.8.4.M.13 Lighting control equipment	Lighting control equipment	nr	10	14-08	CONTROLLER TIMERS	Y
	5.8.5 Local electricity generation systems	5.8.5.1.M.1 Stand by generator	Batteries - Sealed	nr	5	43-03	BATTERIES - LEAD ACID - unsealed	Y
			Batteries - Unsealed	nr	20	43-03	BATTERIES - LEAD ACID - unsealed	Y
			Battery Charger	nr	20	43-04	BATTERY CHARGING EQUIPMENT	Y
			Closed Transfer Switch (LTM)	nr	NLC	NCT	NCT	Y
			Control Panel - Electrical Generator	nr	10	14-11	MULTI-INPUT CONTROLLERS	Y
			Open Transfer Switch (ATS)	nr	20	43-02	POWER GENERATION--STAND-BY GENERATOR	Y
			Standby Generator	nr	30	43-02	POWER GENERATION--STAND-BY GENERATOR	Y
			Generator portable	nr	30	43-02	POWER GENERATION--STAND-BY GENERATOR	Y
		5.8.5.1.M.2 Ancillary components	Ancillary components	nr	15-20	44-04	ARMOURED CABLES AND CONDUITS	Y
		5.8.5.5.M.2 Photovoltaic devices	Solar Panel - Photovoltaic	nr	25	43-06	PHOTOVOLTAIC DEVICES, INCLUDING CELLS, PANELS, MODULES AND THE LIKE	Y
		5.8.5.4.M.7 Sundry items	Battery Monitoring Equip.	nr	20	43-03	BATTERIES - LEAD ACID - unsealed	Y
			Battery Monitoring Equip.	nr	20	43-03	BATTERIES - LEAD ACID - unsealed	Y
	5.8.6 Earthing and bonding systems	5.8.6.M.1 Earthing and bonding cables	Earthing Bonding - Major	m2	30	44-06	EARTHING	Y
		5.8.6.M.2 Lightning Conductor and Earth	Earthing and bonding components - protective conductors	m2	30	Part of 44-06	EARTHING	Y
			Earthing and bonding components - earth clamps and tapes	m2	NLC	Part of 44-06	EARTHING	Y
			Earthing and bonding components - clean earth bars	m2	NLC	Part of 44-06	EARTHING	Y
			Earthing and bonding components - earth electrodes	m2	30	Part of 44-06	EARTHING	Y
			Earthing and bonding components - earthing bus bars	m2	30	Part of 44-06	EARTHING	Y
			Earthing and bonding components - earthing rod covers and boxed	m2	30	Part of 44-06	EARTHING	Y
			Earthing and bonding components - equipotential bonding	m2	NLC	Part of 44-06	EARTHING	Y
5.9 FUEL INSTALLATIONS	5.9.1 Fuel storage	5.9.1.M.1 Fuel systems	Fuel systems - Biomas	nr	30	56-05	STORAGE TANKS - OIL	Y
			Fuel systems - Oil	nr	30	56-05	STORAGE TANKS - OIL	Y
			Fuel systems - Diesel	nr	30	56-05	STORAGE TANKS - OIL	Y
			Fuel systems - LPG	nr	30	56-04	STORAGE TANKS - LIQUEFIED PETROLEUM GAS (LPG)	Y
		5.9.1.M.2 Fuel storage tanks	Oil Storage Tank - Mild Steel	nr	30	56-05	STORAGE TANKS - OIL	Y
			Oil Storage Tank - Plastic	nr	30	56-05	STORAGE TANKS - OIL	Y
			Oil fuel handling plant	nr	15	NCT	NCT	Y
			Diesel storage system	nr	30	NCT	NCT	Y
	5.9.2 Fuel distribution systems	5.9.2.M.2 Pipelines and fittings	Gas Pipework	m2	30	40-10	PIPEWORK FOR LOW PRESSURE NATURAL GAS, LIQUEFIED PETROLEUM GAS (LPG) OR OIL	Y
			Oil Pipework	m2	30	40-10	PIPEWORK FOR LOW PRESSURE NATURAL GAS, LIQUEFIED PETROLEUM GAS (LPG) OR OIL	Y
		5.9.2.M.3 Pumps	Oil Pump	nr	20	45-01	PUMPS - General	Y

System Group	System and / or Element	Sub-Element	Component	UOM NRM	Estimated Useful Life (EUL)	Maintain Schedule	SFG20 Task Description	Applicable
		5.9.2.M.3	Rotary Hand pump	nr	20	45-05	ROTARY HAND PUMPS	Y
		5.9.2.M.3 Valves	Fuel Valves - Check	nr	25	61-01	VALVES	Y
		5.9.2.M.3	Fuel Valves - Gate	nr	25	61-01	VALVES	Y
		5.9.2.M.4 Gas distribution components	Gas Booster Set	m2	20	05-39	GAS BOOSTER SETS	Y
			Meter - Fuel	m2	20	NCT	NON CORE TASK	Y
			Regulator / Gas Valves	nr	30	05-40	GAS GOVERNOR OR GAS REGULATOR	Y
		5.9.2.M.5 Terminal control equipment	Terminal control equipment	m2	10	NCT	NO PPM	Y
		5.9.2.M.6 Thermal insulation	Thermal insulation	m2	30	35-01	THERMAL INSULATION	Y
		5.9.2.M.7 Monitoring equipment	Monitoring equipment.	m2	10	NCT	NO PPM	Y
5.10 LIFT & CONVEYOR INSTALLATIONS	5.10.1 Lifts and enclosed hoists	5.10.1.M.1 Lifts	Lifts - Electric Traction	nr	20	NCT	NON CORE TASK	Y
			Lifts - Hydraulic	nr	15	NCT	NON CORE TASK	Y
			Lifts - Pulley	nr	15	NCT	NON CORE TASK	Y
		5.10.1.M.2 Fire fighting lifts	Lifts - Fire Fighters	nr	20	NCT	NON CORE TASK	Y
		5.10.1.M.3 Wall climbing lifts	Lifts - Wall Climbing	nr	20	NCT	NON CORE TASK	Y
		5.10.1.M.4 Gantries	Atrium Gantry	nr	30	NCT	NON CORE TASK	Y
		5.10.1.M.5 Lift Controls	Controller - Lift	nr	20	NCT	NON CORE TASK - CONTROLLER LIFT	Y
			Emergency Shut Off - Lift	nr	10	88-01	New Task	Y
		5.10.1.M.6 Hoists	Dumb Waiter	nr	20	NCT - 5.10.1.6	NON CORE TASK - DUMB WAITER	Y
			Complete hoist installation	nr	20	NCT - 5.10.1.7	NON CORE TASK - COMPLETE HOIST INSTALLATION	Y
		5.10.1.M.7 Lift Controls	Controller - Lift	nr	20	NCT	NON CORE TASK	Y
		5.10.1.M.8 Sundry items	Lift Motor	nr	15	39-01	MOTORS- DRIVE ELEMENTS	Y
	5.10.2 Escalators	5.10.2.M.1 Escalator	Escalator	nr	30	NCT	NON CORE TASK	Y
		5.10.2.M.2 Ancillary components	Ancillary components - Under step lighting	nr	20	NCT	NON CORE TASK	Y
			Ancillary components - Under handrail lighting	nr	20	NCT	NON CORE TASK	Y
			Ancillary components - Balustrades	nr	20	NCT	NON CORE TASK	Y
			Ancillary components - Cladding (to sides and soffits)	nr	20	NCT	NON CORE TASK	Y
			Ancillary components - Chairs	nr	20	NCT	NON CORE TASK	Y
		5.10.2.M.3 Escalator Controls	Controls and electrical works	nr	20	NCT	NON CORE TASK	Y
	5.10.3 Moving Pavements	5.10.3.M.3 Stair lifts	Stair lifts	nr	20	NCT	NON CORE TASK	Y
		5.10.3.M.4 Escalator Controls	Controls and electrical works	nr	20	NCT	NON CORE TASK	Y
	5.10.4 Powered stair lifts	5.10.4.M.1 Stair lifts	Lifts - Wheelchair	nr	20	NCT	NON CORE TASK	Y
			Stair Lift	nr	20	NCT	NON CORE TASK	Y
		5.10.4.M.2 Stair-lift Controls	Controls and electrical works	nr	20	NCT	NON CORE TASK	Y
	5.10.5 Conveyors	5.10.5.M.1 Conveyor systems	Conveyor systems	nr	20	NCT	NON CORE TASK	Y
		5.10.5.M.2 Specialist conveyor systems	Specialist systems	nr	20	NCT	NON CORE TASK	Y
		5.10.5.M.3 Controls components	Controls and electrical works	nr	20	NCT	NON CORE TASK	Y
	5.10.6 Dock levellers and scissor lifts	5.10.6.M.1 Dock levellers	Loading Platforms	nr	25	NCT	NON CORE TASK	Y
		5.10.6.M.2 Scissor lifts	Scissor Lift	nr	25	NCT	NON CORE TASK	Y
		5.10.6.M.3 Dock Leveller Controls	Controls and electrical works	nr	20	NCT	NON CORE TASK	Y
	5.10.7 Cranes and unenclosed hoists	5.10.7.M.3 Unenclosed Hoists and Cradles	Fork Lift	nr	20	NCT	NON CORE TASK	Y
			Hoists & Cradles	nr	30	NCT	NON CORE TASK	Y
			Lifting Beam	nr	20	NCT	NON CORE TASK	Y
			Pallet Truck	nr	20	NCT	NON CORE TASK	Y
		5.10.7.M.4 Hoist controls	Controls and electrical works	nr	20	NCT	NON CORE TASK	Y
	5.10.10 Other transport systems	5.10.10.M.1 Paternoster lifts	Paternoster lifts	nr	20	NCT	NON CORE TASK	Y
		5.10.10.M.2 Hoists for moving people with disability	Hoists for moving people with disability	nr	20	NCT	NON CORE TASK	Y
		5.10.10.M.3 Other transport systems	Other transport systems	nr	20	NCT	NON CORE TASK	Y
		5.10.10.M.4 Control components	Control components	nr	20	NCT	NON CORE TASK	Y
5.11 FIRE & LIGHTNING PROTECTION	5.11.1 Fire fighting systems	5.11.1.M.1 Fire Hose reels	Hose Reel Booster set	nr	20	23-02	HOSE REELS PRESSURE BOOSTING SETS	Y
			Hose Reels	nr	15	23-03	HOSE REELS - Static or Swinging	Y
		5.11.1.M.2 Dry riser	Dry Riser (incl Landing Valves)	nr	25	23-04	RISING FIRE MAINS and HYDRANTS	Y
		5.11.1.M.3 Wet riser	Wet Riser incl Landing Valves	nr	20	23-04	RISING FIRE MAINS and HYDRANTS	Y
		5.11.1.M.4 Pipelines and fittings	Pipelines and fittings	m^2	20	40-01	PIPEWORK SYSTEMS - General	Y
			Pipelines and fittings - Pressure measurement sensor	m^2	10	50-02	PRESSURE MEASUREMENT SENSORS - static and differential	Y
		5.11.1.M.5 Thermal insulation	Thermal insulation	m^2	20	35-01	THERMAL INSULATION	Y
		5.11.1.M.6 Control components	Control components	nr	20	14-12	INDICATORS AND DISPLAYS	Y
		5.11.1.M.7 Fire and smoke protection curtains	Fire and smoke protection curtains	m^2	20	NCT	NON CORE TASK	Y
	5.11.2 Fire suppression systems	5.11.1.M.1 Fire Hose reels	Sprinkler Booster set	nr	20	23-14	SPRINKLER SYSTEMS	Y
		5.11.1.M.1	Sprinkler System - Alternate	m2	25	23-14	SPRINKLER SYSTEMS	Y
		5.11.2.M.1 Sprinkler system	Kitchen Hood Fire Supression	nr	20	23-16	KITCHEN HOOD FIRE SUPPRESSION	Y
			Sprinkler System - Wet	m2	25	23-14	SPRINKLER SYSTEMS	Y
		5.11.2.M.2 Deluge system	Sprinkler System - Deluge	m2	20	23-14	SPRINKLER SYSTEMS	Y
		5.11.2.M.3 Gas Fire Fighting Injection	Gas Injection System	m2	15	23-05	Gas Extinguishing systems	Y
		5.11.2.M.4 Foam Dispensing Fire Fighting System	Foam Dispensing System	m2	15	23-07	EXPANSION FOAM SYSTEMS	Y
		5.11.2.M.5 Pipelines and fittings	Pipelines and fittings	nr	20	40-01	PIPEWORK SYSTEMS - General	Y
		5.11.2.M.6 Tanks	Water Storage Tanks - Fibreglass	nr	25	56-02	COLD WATER STORAGE TANKS and CISTERNS	Y
			Water Storage Tanks - Galvanised Metal	nr	25	56-02	COLD WATER STORAGE TANKS and CISTERNS	Y
			Water Storage Tanks - GRP	nr	25	56-02	COLD WATER STORAGE TANKS and CISTERNS	Y
			Water Storage Tanks - Polypropylene	nr	25	56-02	COLD WATER STORAGE TANKS and CISTERNS	Y
		5.11.2.M.7 Thermal insulation	Thermal insulation	m^2	20	35-01	THERMAL INSULATION	Y
		5.11.2.M.8 Control components	Control components	nr	20	14-12	INDICATORS AND DISPLAYS	Y
	5.11.3 Lightning protection	5.11.3.M.1 Lightning protection	Lightning protection and other tape based systems	m2	60	38-01	LIGHTNING CONDUCTOR AND EARTH	Y
			Lightning conductor & earth protection	m2	30	38-01	LIGHTNING CONDUCTOR AND EARTH	Y
			Finials.	m2	30	38-01	LIGHTNING CONDUCTOR AND EARTH	Y
			Conductor tapes.	m2	30	38-01	LIGHTNING CONDUCTOR AND EARTH	Y
			Grounding/ earthing	m2	30	38-01	LIGHTNING CONDUCTOR AND EARTH	Y
5.12 COMMUNICATION, SECURITY & CONTROL INSTALLATIONS	5.12.1 Communication systems	5.12.1.M.1 Telecommunication systems	General communication and PA systems	m2	10	NCT	NON CORE TASK	Y
		5.12.1.M.2 Data transmission systems	Computer networking, modems etc	m2	10	NCT	NON CORE TASK	Y
			Multiplexes data terminals	m2	10	NCT	NON CORE TASK	Y
			data bus systems	m2	10	NCT	NON CORE TASK	Y
		5.12.1.M.3 Paging and emergency call systems	Deaf Alerter	m2	5	NCT	NON CORE TASK	Y
			Disabled Alarm - Refuge	m2	10	NCT	NON CORE TASK	Y
			Disabled Alarm - Toilet	m2	10	NCT	NON CORE TASK	Y
			Aerials, radio and paging equipment	m2	5	NCT	NON CORE TASK	Y
			Emergency call buttons, pull cords etc	m2	5	NCT	NON CORE TASK	Y
			Personal Receivers	m2	5	NCT	NON CORE TASK	Y
		5.12.1.M.4 Public Address System	Hearing Loop Systems - Induction Type	m2	10	NCT	NON CORE TASK	Y
			Hearing Loop Systems - Infra Red Type	m2	10	NCT	NON CORE TASK	Y
			Public Address System	m2	20	11-01	COMMUNICATIONS - PUBLIC ADDRESS SYSTEMS	Y
			Background noise systems	m2	10	NCT	NON CORE TASK	Y
			Microphones, amplifiers and speakers	m2	10	NCT	NON CORE TASK	Y
			Indicator boards	m2	10	NCT	NON CORE TASK	Y
		5.12.1.M.5 Radio systems	Radio systems	m2	10	NCT	NON CORE TASK	Y
		5.12.1.M.6 Projection systems	Cinematographic Equipment	nr	10	NCT	NON CORE TASK	Y
			Rolling Ticker Tape Display	nr	10	NCT	NON CORE TASK	Y
			Fixed and portable projectors	nr	10	NCT	NON CORE TASK	Y
			Screens & back projection equipment	nr	10	NCT	NON CORE TASK	Y
			Sound equipment	nr	10	NCT	NON CORE TASK	Y
		5.12.1.M.7 Fire detection and alarm systems	Fire Alarm Local Display Warning Panel	m2	15	22-01, 22-02	FIRE ALARM SYSTEM	Y
			Fire Alarm Panel	m2	15	22-01, 22-02	FIRE ALARM SYSTEM	Y
			Fire Alarm Repeater Panel	m2	15	22-01, 22-02	FIRE ALARM SYSTEM	Y
			Fire Alarm Wiring	m2	15	22-01, 22-02	FIRE ALARM SYSTEM	Y
			Carbon Dioxide Sensor	m2	15	22-01, 22-02	FIRE ALARM SYSTEM	Y
		5.12.1.M.8 Smoke detection	Heat Detectors	m2	10	50-10	SMOKE DETECTORS	Y
			PIR - Intruder	nr	8	50-09	OCCUPANCY and LIGHT SENSORS	Y
			Smoke Detector - Infrared Beam	m2	10	50-10	SMOKE DETECTORS	Y
			Smoke Detectors	m2	10	50-10	SMOKE DETECTORS	Y
		5.12.1.M.9 Liquid detection alarms	Leak Detection	m2	10	NCT	NON CORE TASK	Y
		5.12.1.M.10 Clock	Clock	nr	15	NCT	NON CORE TASK	Y
		5.12.1.M.11 Radios	Radios	m2	NLC	NCT	NON CORE TASK	Y
		5.12.1.M.12 Television systems	Aerial and Dish	m2	10	NCT	NON CORE TASK	Y
		5.12.1.M.14 Other communication systems	Batteries - Unsealed	m2	5	43-03	BATTERIES - LEAD ACID - unsealed	Y
			Battery Charger	m2	20	43-04	BATTERY CHARGING EQUIPMENT	Y
			Lone Working System	m2	15	NCT	NON CORE TASK	Y
			Radios	m2	10	NCT	NON CORE TASK	Y
			TV Monitors	m2	NLC	NCT	NON CORE TASK	Y
	5.12.2 Security systems	5.12.2.M.1 Surveillance equipment	Security Cameras - PTZ	nr/m2	15	NCT	NON CORE TASK	Y
			Security Cameras - PTZ Dome	nr/m2	15	NCT	NON CORE TASK	Y
			Security Cameras - Static	nr/m2	15	NCT	NON CORE TASK	Y
			Security Cameras - Static Dome	nr/m2	15	NCT	NON CORE TASK	Y

System Group	System and / or Element	Sub-Element	Component	UOM NRM	Estimated Useful Life (EUL)	Maintain Schedule	SFG20 Task Description	Applicable
			Surveillance equipment (e.g. CCTV)	nr/m2	15	NCT	NON CORE TASK	Y
		5.12.2.M.2 Security detection equipment	Electric Locking	nr/m2	10	NCT	NON CORE TASK	Y
			Intruder Alarm	nr/m2	15	NCT	NON CORE TASK	Y
			Metal Detector Portal	nr/m2	10	NCT	NON CORE TASK	Y
			Panic Alarm	nr/m2	15	NCT	NON CORE TASK	Y
			RedCARE' system or similar	nr/m2	15	NCT	NON CORE TASK	Y
			Security detection equipment	nr/m2	10	NCT	NON CORE TASK	Y
			X Ray Machine	nr/m2	10	NCT	NON CORE TASK	Y
		5.12.2.M.3 Security alarm equipment	Tamper Alarms	nr/m2	15	NCT	NON CORE TASK	Y
		5.12.2.M.4 Access Control systems	Access Control - Fob or Card	nr	15	NCT	NON CORE TASK	Y
			Access Control - Keypad	nr	15	NCT	NON CORE TASK	Y
		5.12.2.M.5 Burglar and security alarms	Burglar and security alarms	nr	15	NCT	NON CORE TASK	Y
		5.12.2.M.6 Door entry systems	Access Control - Video Comm	nr	15	NCT	NON CORE TASK	Y
			Intercom	nr	10	NCT	NON CORE TASK	Y
		5.12.2.M.7 Security lights and lighting systems	Security Lighting	nr/m2	20	NCT	NON CORE TASK	Y
	5.12.3 Central control / building management systems	5.12.3.M.1 Control Panels	Control Panels	m2	15	14-02, 14-16	CONTROL PANELS - electrical services (excluding electrical controllers and pneumatic relays)	Y
		5.12.3.M.2 BMS Central operating station systems	BMS - Central operating station	m2	5	06-03	BUILDING MANAGEMENT SYSTEMS - Central Operator Station	Y
			BMS - Automatic Lighting Control System	m2	5	06-03	BUILDING MANAGEMENT SYSTEMS - Central Operator Station	Y
			BMS - Communications	m2	25	06-04	BUILDING MANAGEMENT SYSTEMS - COMMUNICATIONS	Y
			BMS - Software functions.	m2	5	06-06	BUILDING MANAGEMENT SYSTEMS - SOFTWARE FUNCTIONS	Y
			BMS - Sensors	m2	10	06-05	BUILDING MAINTENANCE SYSTEMS - OUTSTATIONS	Y
			BMS - Actuators	m2	5	06-05	BUILDING MAINTENANCE SYSTEMS - OUTSTATIONS	Y
		5.12.3.M.4 Controlling terminal units and switches	Plant Controller	item	5	14-07	UNIT CONTROLLERS AND SENSOR CONTROLLERS	Y
		5.12.3.M.5 Control cabling and containment	Control cabling and containment	item	10	06-03, 06-06	BUILDING MANAGEMENT SYSTEMS - Central Operator Station	Y
		5.12.3.M.6 Compressed air and vacuum operating controls	Compressed air and vacuum operating controls	item	30	06-03, 06-06	BUILDING MANAGEMENT SYSTEMS - Central Operator Station	Y
5.13 SPECIALIST INSTALLATIONS	5.13.1 Specialist piped supply systems	5.13.1.M.1 Medical and laboratory gas supply systems	Nitrogen Generator	nr/m2	30	NCT	NON CORE TASK	Y
		5.13.1.M.2 Centralised vacuum cleaning systems	Centralised vacuum cleaning systems	nr/m2	20	NCT	NON CORE TASK	Y
		5.13.1.M.3 Treated water systems	Treated water systems	nr/m2	NLC	NCT	NON CORE TASK	Y
		5.13.1.M.5 Compressed air systems	Inter Cooler/After Cooler - Pnuematics	nr/m2	20	NCT	NON CORE TASK	Y
		5.13.1.M.6 Vacuum systems	Vacuum systems	nr/m2	20	60-02	VACUUM TUBES - cash handling	Y
		5.13.1.M.7 Other specialist piped supply systems	Other specialist piped supply systems	nr/m2	NLC	NCT	NON CORE TASK	Y
		5.13.1.M.8 Pipelines ancillaries and fittings	Pneumatic Pipework	m2	25	NCT	NON CORE TASK	Y
		5.13.1.M.9 Air duct lines, duct line ancillaries and fittings	Air duct lines, duct line ancillaries and fittings	nr/m2	25	NCT	NON CORE TASK	Y
		5.13.1.M.10 Thermal insulation	Thermal insulation	nr/m2	30	35-01	THERMAL INSULATION	Y
		5.13.1.M.11 Silencers and acoustic treatment	Silencers and acoustic treatment.	nr/m2	25	NCT	NON CORE TASK	Y
		5.13.1.M.12 Control components	Control components	nr	20	NCT	NON CORE TASK	Y
	5.13.2 Specialist refrigeration systems	5.13.2.M.1 Cold rooms	Cold rooms	nr/m2	15	NCT	NON CORE TASK	Y
		5.13.2.M.2 Ice pads	Ice pads	nr/m2	15	34-01	ICE MAKING MACHINES	Y
		5.13.2.M.3 Other specialist refrigeration systems	Fridge - Laboratory	nr/m2	15	NCT	NON CORE TASK	Y
			Ice Storage Tank	nr/m2	15	56-03	ICE STORAGE SYSTEMS	Y
			Ultra Low Temp (Lab) Freezer	nr/m2	15	NCT	NON CORE TASK	Y
	5.13.4 Specialist electrical/ electronic systems	5.13.4.M.3 Television aerial and satellite systems	Television aerial and satellite systems	nr/m²	15	NCT	NON CORE TASK	Y
		5.13.4.M.5 Multi-room audio and video	Multi room audio and video	nr/m²	NLC	NCT	NON CORE TASK	Y
		5.13.4.M.6 Automated curtains and blinds	Automated curtains and blinds	nr/m²	NLC	NCT	NON CORE TASK	Y
		5.13.4.M.7 Other specialist electrical and electronic systems	Autoclave	nr/m²	15	NCT	NON CORE TASK	Y
			Incubators	nr/m²	15	NCT	NON CORE TASK	Y
			Oven - Laboratory	nr/m²	15	NCT	NON CORE TASK	Y
			Steriliser	nr/m²	15	NCT	NON CORE TASK	Y
	5.13.5 Water features	5.13.5.M.1 Water features	Water features	nr/m²	15	25-01, 25-02	FOUNTAINS - ORNAMENTAL	Y
		5.13.5.M.2 Water filtration equipment	Pond Filter	nr/m²	15	25-01, 25-02	FOUNTAINS - ORNAMENTAL	Y
		5.13.5.M.3 Nutrient treatment and equipment	Nutrient treatment and equipment	nr/m²	15	NCT	NON CORE TASK	Y
		5.13.5.M.4 Control components	Control components	nr	15	14-07	UNIT CONTROLLERS AND SENSOR CONTROLLERS	Y
8.4 FENCING, RAILINGS AND WALLS (FRW)	8.4.2 Walls and Screens	8.4.2.M.4 Security gates	Security gates and gate posts	nr		FRW PI	FENCING, RAILINGS AND WALLS - PLANNED INSPECTION	Y
8.6 EXTERNAL DRAINAGE (ED)	8.6.1 Surface water and foul water drainage	8.6.1.M.1 Surface water and foul water drainage (SWFWD)	Interceptors - Petrol and Oil	nr		48-03	INTERCEPTORS - Petrol and Oil	Y

APPENDIX E - PRESSURE EQUIPMENT REGULATIONS 1999
SCHEDULE OF EQUIPMENT

PRESSURE EQUIPMENT REGULATIONS 1999 SCHEDULE OF EQUIPMENT

Articles within the scope of the 'Pressure Equipment Directive (PED) 97/23/EC implemented through the Pressure Equipment Regulations 1999'.

PROJECT: _____ FILE REF: _____

BUILDING NAME: _____ BUILDING NO: _____

DATE: _____

ARTICLE	LOCATION	MANUFACTURER	DETAILS, OR REFERENCE OF ATTACHED MANUFACTURER'S DETAILS / CERTIFICATES

APPENDIX F - COMMISSIONING WITNESSING SCHEDULE

Our Ref: SH-1629-TC-001
Date: 09 March 2017
Version: 1.0

UCL JOHN ADAMS HALL
FLOORS 1 TO 4, PART GROUND FLOOR AND BASEMENT REFURBISHMENT
SUMMER WORKS 2017
COMMISSIONING WITNESSING SCHEDULE

System	Test required	Extent to be Witnessed	Objective	Witnessing Status/Comments
LIFE SAFETY SYSTEMS				
Emergency lighting	Full battery endurance	100%	Maintained design illuminance levels for 3 hours.	
Emergency lighting	Mains failure	100%	Automatic changeover to emergency mode.	
Emergency lighting	Status monitoring	25%	Demonstrate communication of individual luminaires via control panel and prove status report and correct location.	
Emergency lighting	Self-test address recognition	25%	Demonstrate fault free status by monitoring through clients remote head end PC and complete graphics.	
Fire alarm	Detector in fire mode	25%	Activate first stage alarm.	
Fire alarm	Detector in fault mode	25%	1. Demonstrate device in fault has recognition by indication on control panel. 2. LED flash on device.	

System	Test required	Extent to be Witnessed	Objective	Witnessing Status/Comments
Fire alarm	Manual call point in fault	4 No.	1. Demonstrate device in fault has recognition by indication on control panel. 2. LED flash on device.	
Fire alarm	Main Plant interfaces	100%	Shutdown on first stage fire.	
Fire alarm	Sounder pressure level to internal areas	100%	Demonstrate the sound levels meet the design.	
ELECTRICAL SERVICES				
General wiring systems lighting	Circuit impedance	20% of lighting circuits	As BS7617 recommendation.	
General wiring systems lighting	Insulation resistance	20% of lighting circuits	As BS7617 recommendation.	
General wiring systems lighting	Measured earth loop impedance (dead test)	20% of lighting circuits	As BS7617 recommendation.	
General wiring systems power	Circuit impedance	20% of small power circuits	As BS7617 recommendation.	
General wiring systems power	Insulation resistance	20% of small power circuits	As BS7617 recommendation.	

System	Test required	Extent to be Witnessed	Objective	Witnessing Status/Comments
General wiring systems power	Measured earth loop impedance (dead test)	20% of small power circuits	As BS7617 recommendation.	
Lighting control system	Functional test	50%	1. Demonstrate automatic control of the lighting forced by presence detection. 2. Demonstrate automatic control of lighting forced by switch.	
Lighting control system	Illuminance level	50%	Verify correct illuminance level on working plane/task area.	
Energy Sub-metering	Functional test	100%	Demonstrate functional circuit metering at riser position.	
Energy Sub-metering	Remote monitoring	100%	Demonstrate system is reporting back to head end PC and graphics have been updated to reflect installation amendments.	
MECHANICAL SERVICES				
General ventilation	Air balance	20%	As design requirements.	
Toilets Ventilation	Air Balance	100%	As design requirements.	
Heating	Water balance	20%	As design requirements.	

System	Test required	Extent to be Witnessed	Objective	Witnessing Status/Comments
Controls	Prove operating and network connection	40%	Prove operation and interfaces with lighting controls. Demonstrate graphics. Demonstrate all systems operate in accordance with Des Ops. Demonstrate point to point for field device.	
Domestic water risk assessment	Compliance with Regulations and Specification	By external consultant	Compliance with regulations.	
Domestic Water	Chlorination	N/A	Compliance with regulations.	
Domestic Water	TMV Operation	100%	Outlet temperatures.	
Domestic Water	HWS balance and CWS.	100%	Outlet temperatures comply with L8.	
Heating	Boiler operation and sequencing of plant.	100%	As design requirements.	