

# **Watford Police Station Remodelling**

## **Mechanical, Electrical and Public Health Engineering Specification**

### **Section 4 - Schedules**

Hertfordshire Constabulary

Project reference: WPS

Project number: 60671544

Document Reference: WPS-ACM-XX-XX-SP-BS-000003

# Hertfordshire Police and Crime Commissioner

Watford Police Station Remodeling  
Scope of Works

June 2022

## Quality information

Prepared by	Checked by	Verified by	Approved by
Bill Day Darren Mott Pietro Di Maria	Bill Day	Michael Enstone	

## Revision History

Revision	Revision date	Details	Authorized	Name	Position
T1	23/06/2022	Tender Issue			

Client: Hertfordshire Constabulary  
Stanborough Road  
Welwyn Garden City  
Hertfordshire  
AL8 6XF

Architect: Vincent and Gorbing  
Sterling Court  
Norton Road  
Stevenage  
Hertfordshire, SG1 2JY

Quantity Surveyor: AECOM  
Marlborough Court  
10 Bricket Road  
St Albans  
Hertfordshire, AL1 3JX

Principal Designer: AECOM  
Aldgate Tower  
2 Leman Street  
London  
E1 8FA

MEP Engineer: AECOM  
Marlborough Court  
10 Bricket Road  
St Albans  
Hertfordshire, AL1 3JX

Project Manager: AECOM  
Marlborough Court  
10 Bricket Road  
St Albans  
Hertfordshire, AL1 3JX

# **NOTES FOR TENDERERS**

This document has been compiled using text from the National Engineering Specification (NES) which is copyright to Trimble. The format and content of the specification has, however being considerably re-arranged and amended from that provided by Trimble.

The technical content of this specification has been prepared using the Common Arrangement of Work Sections for Building Works and is in four sections. Where any British or other standard referred to in the specification is either out of date or superseded by another standard, the most recent version shall apply.

For reference each work section ends with clause 10000. Here is stated the latest revision of the raw NES on which the AECOM specification work section is based.

## **SECTION 1 – SCOPE OF WORKS (Issued under separate cover)**

A summary description of the Works by Work Section.

## **SECTION 2 – WORK SECTIONS (Issued under separate cover)**

The specification for each Work Section is generally sub-divided into two parts:

### **Part 1** System objectives

The system objectives are clauses giving details of the performance and/or design parameters.

### **Part 3** Clauses specific to the system

These clauses are specific to the Work Section concerned.

Where clauses contain "type" references, these are for cross referencing within the specification and do not necessarily relate to manufacturers types.

***NB: (Part 2 relates to the format used in the raw NES and selection schedules for the Y clauses. Part 2's are not used in AECOM specifications and are replaced by schedules in section 4)***

## **SECTION 3 – REFERENCE (WORKMANSHIP) SPECIFICATIONS – Y clauses (Issued under separate cover)**

These clauses specify items that are common to several systems (for example pipework, ductwork and cabling).

The individual clauses are generally arranged in the order of the Common Arrangement "Y" sections from which they originated.

Generally these specifications represent AECOM's standards, contain all contain clauses applicable to each particular category and are not project specific.

Where choices are required, they are made in the Schedules or Scope of Works; otherwise all of the clauses are applicable.

## **SECTION 4 – SCHEDULES (This Section)**

This section contains schedules of drawings, manufacturers, equipment duties and selections for plant, ancillaries and system components, specific to this project.

## **ENQUIRIES TO MANUFACTURERS**

Enquiries to manufacturers should include all relevant sections as well as any related contractual information. ie the relevant work section and Y clauses pertinent to the plant item in addition to the plant schedule.

## **NON-NES CLAUSES**

Clauses which are structurally different from NES from which they originated, or are AECOM originated clauses, are generally identified by the clause reference being underlined and/or the last digit of the clause number being increased e.g. 300.010 becomes 300.011.

# Contents

---

<b>FRONT PAGES .....</b>	<b>1</b>
Front Pages & Instructions to Tenderers .....	1
<b>SCHEDULES .....</b>	<b>6</b>
A11sch1 – Schedule of Drawings (A11) .....	7
A11sch4 – Analysis of Engineering Services Tender Sum(A11) .....	8
A11sch5 – Details of Manufacturers / Installers Selected (A11) .....	11
A11sch6 – Alternative Manufacturers / Installers (A11) .....	12
A11sch7 – Works to be Sublet (A11) .....	13
A12sch2 - Schedule of Building Services Survey Requirements (A12) .....	14
A13sch - Schedule of Common Design Criteria (A13) .....	15
A31sch - Schedule of Design Activities (A31) .....	18
R11sch - Schedule of Above Ground Foul Drainage (R11) .....	28
R20sch - Schedule of Sewage Pumping .....	29
S10sch1 - Schedule of Water Booster Sets (S10) .....	31
S11sch1 - Schedule of Electric/Gas Fired Water Heaters and Expansion Vessels (S11) .....	32
S63sch - Schedule of Sprinkler/Deluge Systems (S63) .....	34
T10sch1 - Schedule of Boilers (T10) .....	35
T31sch1 - Schedule of Radiators (T20) .....	38
T60sch1 - Schedule of Chillers (T60) .....	39
T70sch - Schedule of Local Cooling Units / Heat Pumps .....	43
U10sch6 - Schedule of Car Park Ventilation Facilities .....	46
U41sch - Schedule of Fan Coil Units (U30) .....	49
U70sch - Schedule of Air Curtains and Overdoor Heaters (T10) .....	52
W15sch - Schedule of Facilities for the Disabled .....	53
W50sch1 - Schedule of Fire Alarm Equipment (W50) .....	55
Y10sch - Schedule of Pipelines (Y10) .....	67
Y11sch2 - Schedule of Valves (Y11) .....	69
Y20sch - Schedule of Pumps (Y20) .....	73
Y20sch2 - Schedule of Pressurisation and Expansion Units (Y20) .....	76
Y21sch - Schedule of Tanks / Cisterns (Y21) .....	78
Y24sch - Schedule of Trace Heating of Piped Services and Vessels (Y24) .....	79
Y25sch - Schedule of Cleaning & Chemical Treatment (Y25) .....	80
Y30sch1 - Schedule of Air Ductlines (Y30) .....	82
Y30sch2 - Schedule of Dampers (Y30) .....	83
Y30sch3 - Schedule of Fire and Smoke Dampers (Y30) .....	84
Y30sch4 - Schedule of Smoke / Combination Smoke Fire Damper Control System .....	85
Y30sch5 - Schedule of Fire Resisting and Smoke/Heat Control Ductwork (Y30) .....	86
Y41sch - Schedule of Fans (Y41) .....	87
Y50sch – Schedule of Thermal insulation .....	91
Y52sch - Schedule of Vibration Isolation Mountings (Y52) .....	96
Y60sch1 - Schedule of Conduit (Y60) .....	97
Y60sch2 - Schedule of Trunking (Y60) .....	98
Y60sch4 - Schedule of Floor Cable Grommets (Y60) .....	100
Y63sch - Schedule of Support Components (Y63) .....	101
Y73sch - Schedule of Luminaires & Lamps (Y73) .....	102
Y74sch2 - Schedule of Electrical Equipment / Accessory Mounting Heights .....	107
Y81sch - Schedule of Testing and Commissioning for Electrical Services (Y81) .....	109

## Schedules

---

## A11sch1 – Schedule of Drawings

---

Please refer to AECOM standard Drawing Issue Register Sheet

## A11sch4 – Analysis of Engineering Services Tender Sum

Provide with the returned tender documents a completed copy of this annexure, indicating against each item the cost and totalling the sums carried forward to the form of tender.

### 1.0 Preliminaries (Work sections A10 – A50)

Preliminaries for the Contract contain information relating to the site, access, scope and extent of the works, special conditions affecting the manner of working and restrictions or obligations imposed by the Employer which will affect the cost of the Contract Works.

The tenderer is to insert below clause numbers from the General Engineering Technical Items contained in the Specification as required. Clause numbers and prices not detailed below are deemed to have been priced/included elsewhere.

Item	Description	Tender Sum
1	General Preliminaries	
	Work Section A31 Installation drawings	
	Work Section A37 Record drawings	
	Work Section A37 O & M Manuals	
	Work Section A37 Building Log Book	
	All other Services Preliminaries not identified above	
Total carried forward		

### 2.0 The Works

Item	Description / Work Section	Tender Sum
R10	Rain Water Pipework	
R11	Foul Drainage Above Ground	
R12	Drainage Below Ground	
R20	Sewage & Effluent Pumping /Treatment	
S10	Cold Water	
S11	Hot Water	
S32	Natural Gas	
S61	Dry Risers	
S63	Sprinklers	
T10	Boilers	
T20	Primary Heat Distribution	
T60	Central Refrigeration Plant	
T61	Primary & Secondary Cooling Distribution	
T70	Local Cooling/Heat Pump Units	
U10	Ventilation Supply/Extract	
U13	Car Park Ventilation	
U30	Air Conditioning	
U70	Overdoor Heaters	
V10	Emergency and Standby Generators	
V20	LV Distribution	



## A11sch4 – Analysis of Engineering Services Tender Sum

Item	Description / Work Section	Tender Sum
V21	General Lighting	
V22	General Power	
W12	Public Address/Sound Amplification	
W15	Facilities for the Disabled	
W40	Access Control	
W41	Security Detection & Alarm	
W50	Fire Detection and Alarm	
W51	LV Earthing and Bonding	
W52	Lightning and Surge Protection	
W60	Central Control /Building Management System	
W70	Structured Cabling System	
Any other items not included above (Contractor to detail below)		
Total carried forward		

### 3.0 Provisional Sums / PC sums

Item	Description	Tender Sum
	NOTE Inclusion of provisional Sums to be advised	
1.0		
2.0		
3.0		
Total carried forward		

### Totals

<b>Preliminaries</b>	
<b>The Works</b>	
<b>Provisional Sums</b>	
Total to form of tender	



# A11sch5 – Details of Manufacturers / Installers Selected

---

To be completed by the Tenderer and returned as part of their submission

We detail below the suppliers, installers and manufacturers of materials or equipment selected by ourselves from schedules A30E, A30M or A30X or as stated in the specification, as applicable, upon which we have based our tender.

Item	Manufacturers/Installer	Delivery Date

Signed: .....

Position: .....

For and on behalf of: .....

.....

.....

Date: .....

## A11sch6 – Alternative Manufacturers / Installers

---

To be completed by the Tenderer and returned as part of their submission

We wish to offer the following alternatives to the suppliers, installers and manufacturers of materials or equipment listed in schedules A30E, A30M A30X or elsewhere in the specification.

item	Suggested Alternative	Effect on Tender (State increase or reduction) £

Signed: .....

Position: .....

For and on behalf of: .....

.....

.....

Date: .....

Individually signed continuation sheets to be provided if required.

# A11sch7 – Works to be Sublet

---

To be completed by the Tenderer and returned as part of their submission

We would wish, subject to consent, to sub-let the following sections of the contract works and detail below the companies we propose as specialist contractors.

Section of Contract Works	Proposed Specialist

Signed: .....

Position: .....

For and on behalf of: .....

.....  
.....

Date: .....

Individually signed continuation sheets to be provided if required.

## A12sch2 – Schedule of Building Services Survey Requirements

A Specialist Contractor shall undertake a survey of the existing buildings as detailed below.

<b>Site Location:</b>	Refer to main Contract Preliminaries
<b>Programme:</b>	The contractor shall indicate completion time-scale for the survey works including lead-in, site works and issue of drawings Work to be undertaken during normal working hours (8.00 – 17.00 Mon – Fri)
<b>Survey type:</b>	Intrusive survey of all existing mechanical, electrical & public health services sufficient to establish the specific location of all mechanical electrical and public health services equipment and distribution routes to allow preparation of existing record drawings which are to be used in the contractors design development including the preparation of working drawings indicating both services to be removed and proposed installations. The working drawings to be developed into as installed/record drawings for handover at completion
<b>Record Information provided:</b>	There are no existing record drawings of the existing services installations
<b>Record Information to be obtained by specialist:</b>	None available
<b>Extent of areas to be surveyed.</b>	All areas of the existing building and external areas within the site boundary
<b>Scope of survey and services</b>	Identification of all high, mid & low level services (including services above ceilings and within floor voids), all risers & occupied areas. This should comprise identification, routes, invert levels & size of all services; Identification of electrical circuits & schedules; Identification & location of all incoming supplies; Locations of electrical switchboards & sub distribution equipment & circuits; Location of drainage stacks; Location of all services & plant on exterior of building; Location of roof mounted plant including areas served.
<b>Requirements for exposing services</b>	Any work on underground services shall be in accordance with the guidance in HSG 47 and PAS 128
<b>Survey presentation</b>	All services shall be plotted on 1:50 plans Format - AutoCAD

### Notes

1. The survey information shall include all service information irrespective of material construction and indicate whether services are “alive” or “dead”.
2. The contractor shall issue method statements and risk assessments prior to the survey works commencing

## A13sch – Schedule of Common Design Criteria

### EXTERNAL CONDITIONS / OUTDOOR AIR CATEGORY

Refer to RDS

The existing mechanical services reliant on external conditions are generally being retained. Therefore the proposed works can only reflect the capability of the existing system

### INTERNAL ENVIRONMENTAL DESIGN / COMFORT CONDITIONS

Refer to RDS

The existing mechanical services systems dependent on internal environmental design/comfort conditions are generally being retained. Therefore the proposed works can only reflect the capability of the existing system

### VENTILATION

Refer to RDS

The existing mechanical services systems dependent on internal environmental design/comfort conditions are generally being retained. Therefore the proposed works can only reflect the capability of the existing system

Design operating conditions of mechanical distribution systems are to be as provided by the existing systems

Illumination level : Refer to Room Data Sheets  
(Average illumination over area)

### Control Valves

Select and size Control Valves with a rangeability in excess of 40 and authority not less than the following:-

- Diverting & throttling applications - 0.5
- Mixing applications - 0.3
- 2 way valves - 0.25 to match system configuration

Select and size Control Valves on the index run to have maximum pressure losses not exceeding the figures quoted in clause Y20 schedule of pumps. Select and size other control valves to provide the appropriate control across the controlled device.

### Control Dampers

## A13sch – Schedule of Common Design Criteria

Use opposed blade control dampers unless otherwise indicated. Select and size control dampers to provide authority as follows:-

Opposed blade	5% (ie the pressure loss across a fully open OBD is approximately 5% of the loss in the rest of the system)
Parallel blade	20%

### Fans

Quoted fan duties are based on pressure losses external to any air handling unit or distribution components and on the equipment airside pressure losses stated on the schedules.

Pressure loss allowance for air filters are to be based on the 'dirty' condition.

Quoted fan duties include the following commissioning allowances:-

	Low Pressure Systems	Medium & High Pressure Systems
On Flow Rates	10%	5%
On Head	20%	15%

Fans heads are based on the layout drawings and specified types of duct fittings and as appropriate system resistances stated in schedule of AHU's Y40 or schedule of fans Y41. If changes are made to the routes by the installer, fittings other than those specified are installed or the resistances of the components selected are different from those stated, adjust fan head to compensate and advise the S.O. of the adjustment.

### Pumps

Quoted pump duties include the following commissioning allowances:

Flow Rate 10%

Head 15%

Pump heads are based on the layout drawings and specified types of pipe fittings and as appropriate the system resistances stated in Y20 schedule of pumps. If changes are made to the routes by the installer, fittings other than those specified are installed or the resistances of the components selected are different from those stated, adjust pump head to compensate.

### Sprinkler Protection

Refer to Fire Strategy

### Drainage

The existing soil and waste systems are generally being retained with minor modification. Therefore the proposed works can only reflect the capability of the existing system.

### Electrical Supply

xx Voltage                      xx Phase                      xx Frequency

### Fire Detection System Classification

Category of detection in non-domestic premises (BS 5839-1)                      Category M & L2

### EC Harmonisation of supply voltage

This project has been designed for a normal voltage of 400/230v +10%, -6% in accordance with The Electricity Safety, Quality and Continuity Regulations 2002.

All equipment in the installation shall also operate at 415/240v ±6% as this is the likely initial supply voltage.

### Limitation of Harmonics



## A13sch – Schedule of Common Design Criteria

---

Equipment shall comply with the limits stated in Engineering Recommendation G 5/4-1.

For a.c motor control, d.c power supplies, variable voltage controllers, and UPS equipment provide details of harmonic distortion and confirm compliance prior to ordering.

### **Additional Protection**

Areas / Zones where the Electrical Installation **is not** under the supervision of skilled or instructed persons (where Additional Protection shall be provided in accordance with BS 7671 – IET Wiring Regulations):

**Notes:**

1. The following schedule has been developed from Appendix A in BSRIA BG 6/2014 (*This is licensed to AECOM*). The schedule is based on the tender documentation having been developed generally to part way through RIBA Plan of Work 2013 stage 3 (typically as BSRIA pro-forma 3A Developed Design Part 1) to a stage where a planning application can be submitted. The schedule therefore includes BSRIA Pro-forma 3B Developed Design Part 2)  
Where changes have been made to the standard wording in the BSRIA guide or additional items have been added they are indicated in underlined italics. Where item numbers are not consecutive this indicates where an original BSRIA item has not been used. New items have been allocated ref numbers that do not conflict with the standard BSRIA numbering.
2. The schedule shall be read in conjunction with the complete performance specification, schedules and drawings. In particular refer to work section A64D (A31) for definitions and interpretations of tender documents and schedule of design information required and A64D (A37) for details of record documentation required and operation and maintenance of the building.
3. The schedule does not detail every design activity required during the Contract and does not list all items from BSRIA BG6/2014. It is intended to highlight aspects of the design and construction process where there may be confusion over who is responsible for certain activities. The absence of a design activity does not imply it is not required on the project. Refer to clause A64D A31 300.006 for extent of design information to be provided for review by the Employers Representative.
4. The sequence of activities in each stage is not implied by the sub-heating order or the order of activities.
5. Should any activity clash with other contractual information, inform the Employers Representative (ER) during the tender period
6. In this schedule "Concept Designer" means AECOM. The RIBA stages refer to RIBA plan of works 2013

Ref	Design Activity	Allocated to ...			Comments
		Concept Designer / ER	Design and Build Contractor	Other (specify)	
	<b>General obligations, external liaison(statutory bodies, utilities)</b>				
<u>3b.1.1a</u>	<u>Carry out on-going checks for compliance with Regulations and Local Authority planning requirements.</u>		✓		
<u>3b.1.1b</u>	<u>Continue / develop negotiations with public and other utility authorities for the provision of incoming services and agree spatial requirements.</u>		✓		
3b.1.1	Monitor compliance of the developing design <u>with the design philosophies</u> and/or project brief.	✓			
<u>3b.1.3</u>	<u>Develop the strategy for fire safety provided as part of the performance specification in conjunction with Employer's Representative</u> (such as compartmentation, location of fire lifts, parameters for fire detection and suppression systems).		✓		
	<b>Client liaison (briefing, handover and surveys)</b>				
<u>3b.2.1</u>	<u>Give recommendations to the client in their development of an operating and maintenance strategy.</u>		✓		
<u>3b.2.2</u>	<u>Confirm design criteria, scope and extent of mechanical, electrical and public health services form.</u>	✓			Provided by Concept designer at tender stage

Ref	Design Activity	Allocated to ...			Comments
		Concept Designer / ER	Design and Build Contractor	Other (specify)	
	<b>Team liaison (builders work, spatial coordination, energy targeting)</b>				
3b.3.1	Review design against Building Regulations compliance in relation to energy performance and (if relevant) EPC criteria.		✓		Not Applicable
3b.3.2	Carry out calculations in relation to any energy-related planning conditions and advise team of implications to overall design.				Not Applicable
3b.3.3	Incorporate frozen primary building geometry in building services design		✓		
3b.3.4	<u>Provide primary building geometry (General Arrangement drawings or building information model)</u>	✓			
3b.3.5	<u>Provide room data.</u>	✓		Employer ✓	
3b.3.6	<u>Update</u> room data with building services information.		✓		Preliminary information provided with tender documentation
3b.3.7	Review architectural and structural designs to identify existing or potential conflicts with indicative plant sizes.		✓		
3b.3.8	Carry out initial overall spatial co-ordination.		✓		
3b.3.10	Team-wide design review to signal end of developed design stage.	✓	✓	✓	ALL
	<b>Selection of plant and specialist designers</b>				
3b.4.1	<u>Confirm plant room and risers sizes indicated in the tender documents are adequate</u>		✓		
3b.4.3	<u>Prepare a performance specification for plant items and systems. This will include the requirements for stand-by capacity, details of the quality of construction and finishes, any energy saving features, and acoustic performance.</u>		✓		Provided by Concept designer at tender stage where applicable
3b.4.4	<u>Prepare a schedule of preferred manufacturers of plant and equipment.</u>				Provided by Concept designer at tender stage
	<b>Mechanical design</b>				
3b.5.1	<u>Develop</u> principal metering strategy		✓		Concept strategy provided by Concept designer at tender stage
3b.5.2	Establish indicative plant sizes for mechanical systems; confirm plant room/riser locations/sizes <u>indicated on tender drawings are adequate; advise on access routes and plant size and weight in relation to future plant removal and replacement in compliance with current legislation</u>		✓		
3b.5.6	<u>Develop and confirm any</u> main duct and pipe routes around floors to and from risers <u>shown on tender drawings</u>		✓		
3b.5.8	Determine approximate duct sizes, pipe sizes, terminal sizes and locations, valve sizes and locations, fan sizes, pump sizes, locations and sizes of ancillary equipment (such as pressurisation units, and attenuators).		✓		
3b.5.9a	<u>Arrange and chair</u> design review.		✓		
3b.5.9b	<u>Attend design review.</u>	✓	✓	✓	<u>Concept Design Team if required</u>
	<b>Electrical design</b>				
3b.6.2	<u>Develop</u> principal metering strategy		✓		Concept strategy provided by Concept designer at tender stage
3b.6.3	Establish indicative plant <u>locations and</u> sizes for electrical systems and confirm plant room and riser locations/sizes <u>indicated on tender drawings are adequate; advise on</u>		✓		

Ref	Design Activity	Allocated to ...			Comments
		Concept Designer / ER	Design and Build Contractor	Other (specify)	
	<u>access routes and plant size and weight in relation to future plant removal and replacement</u>				
3b.6.4	Undertake daylight computer modelling required to support the design and obtain quantitative feedback		✓		
3b.6.5	Calculate the maximum demand for small power and lighting using approximate methods.		✓		
3b.6.6	Calculate the maximum demand for high voltage supply using approximate methods.		✓		
3b.6.7	<u>Develop and confirm</u> main distribution routes and circuits around floors to and from risers and main switchgear, and approximate sizes of containment and switchgear shown on tender drawings		✓		
<u>3b.6.8a</u>	<u>Arrange and chair</u> design review.		✓		
<u>3b.6.8b</u>	<u>Attend design review.</u>	✓			<u>Concept Design Team if required</u>
	<b>Public Health design</b>				
<u>3b.7.1</u>	<u>Develop</u> principal metering strategy		✓		Concept strategy provided by Concept designer at tender stage
3b.7.2	Establish indicative plant sizes for public health systems and confirm plant room and riser locations/sizes <u>indicated on tender drawings are adequate; advise on access routes and plant size and weight in relation to future plant removal and replacement</u>		✓		
3b.7.3	Calculate maximum demand for water supply and waste removal using approximate methods.		✓		
3b.7.4	Calculate approximate system capacities for hot and cold water central plant (tanks, cylinders, and pumps).		✓		
3b.7.5	<u>Develop and confirm</u> main pipe and drain routes around floors to and from risers shown on tender drawings		✓		
3b.7.6	Confirm main below-ground drainage routes and manhole locations.		✓		
<u>3b.7.7a</u>	<u>Arrange and chair design review.</u>		✓		
<u>3b.7.7b</u>	<u>Attend design review.</u>	✓			<u>Concept Design Team if required</u>
	<b>Commissioning</b>				
3b.8.1	Review commissioning requirements <u>outlined in the tender documentation and incorporate into design proposals and produce initial commissioning plan</u>		✓		
<u>3b.8.3</u>	<u>Comment on commissioning proposals</u>				
	<b>Deliverables – including drawings, specifications, and reports</b>				
3b.9.1	Provide an initial schedule of cast-in/formed builders' work openings that are structurally significant.		✓		
<u>3b.9.4</u>	Provide a refined cost plan for significant building services. . <u>Extent to be agreed with ER</u>		✓		
3b.9.5	Provide a report on building services issues as part of the developed design report.		✓		
3b.9.7	Provide developed design drawings <u>Ensure spatial allocation and strategy for maintenance &amp; replacement of plant in risers and floor / ceiling voids and plant rooms is adequately addressed</u>		✓		
3b.9.8	Provide developed schematics.		✓		

Ref	Design Activity	Allocated to ...			Comments
		Concept Designer / ER	Design and Build Contractor	Other (specify)	
<u>3b.9.8a</u>	<u>Produce calculations and energy strategy documents as defined in work section A64.</u>		✓		
3b.9.9	Sign-off the Developed design report			✓ Employer	

# **TECHNICAL DESIGN (RIBA STAGE 4) This schedule is a compilation of some items from BSRIA Pro-formas 4A, 4B and 4C in BG6/2014**

Some activities in this stage will continue after the start of the Construction stages (Stage 5 in RIBA plan of work 2013).

*NB The BSRIA standard activities for Mechanical, electrical and Public Health design in proformas 4A, 4B and 4C have not been repeated here but all those applicable to the specific project should be completed as part of the works.*

Items with underlined italic Ref No's are AECOM additions or modified versions of the BSRIA standard wording.

Ref	Design Activity	Allocated to ...			Comments
		Concept Designer / ER	Design and Build Contractor	Other (specify)	
	<b>General obligations, external liaison(statutory bodies, utilities)</b>				
<u>4a.1.1 – 4a.1.3</u>	<u>Complete check for compliance with regulations and undertake full and formal submissions to building control and Planners.</u>		✓		
4a.1.4	Obtain final quotations for incoming services based on final agreed building loads.		✓		
4a.1.5	Seek utility company comments on the spatial requirements and builders work associated with the provision of incoming services.		✓		
	<b>Client liaison (briefing, handover and surveys)</b>				
4a.2.1	Advise on an appropriate method of procuring maintenance expertise.		✓		
4a.2.2	Define the scope and content of operating and maintenance manuals <u>and asset register</u> appropriate for the project.	✓			
4a.2.4	Define the requirement for record drawings.	✓			
4a.2.5	Specify form of delivery and the method of production of record drawings.	✓			
4a.2.6	Define what level of documentation, commissioning results and other information must be available prior to practical completion and handover. (Take into account possible implications of phased handover and partial possession).	✓			Refer to Performance Specificati/employer's Requirements
<u>4a.2.7</u>	<u>Undertake survey of existing services and prepare method statement (prior to commencement of works) for the maintenance <u>or diversions</u> of existing services <u>during the new works</u>.</u>		✓		
	<b>Team liaison (builders work, spatial coordination, energy targeting)</b>				
4b.3.1	Check the provision for and adequacy of the preliminary builders work information <u>previously issued by others</u> .		✓		Review of Architectural and structural engineering information required
4a.3.6	Confirm builders' work information for specified equipment or materials, or where alternatives to those provisionally or pre-selected are agreed.		✓		Bases, supports & structurally significant holes
4b.3.2	Select and detail sleeves, inserts, frames and fixing anchors, and any other items required to be cast or built into the structures by others, including coordination of		✓		<u>Provide anchor loads for pipework expansion anchors</u>

<b>TECHNICAL DESIGN (RIBA STAGE 4) This schedule is a compilation of some items from BSRIA Pro-formas 4A, 4B and 4C in BG6/2014</b> Some activities in this stage will continue after the start of the Construction stages (Stage 5 in RIBA plan of work 2013). <u>NB The BSRIA standard activities for Mechanical, electrical and Public Health design in proformas 4A, 4B and 4C have not been repeated here but all those applicable to the specific project should be completed as part of the works.</u> Items with <u>underlined italic</u> Ref No's are AECOM additions or modified versions of the BSRIA standard wording.					
Ref	Design Activity	Allocated to ...			Comments
		Concept Designer / ER	Design and Build Contractor	Other (specify)	
	positions to such extent and accuracy to allow structural design and / or construction to proceed.				
<u>4b.3.3a</u>	<u>Develop conceptual sketches of access facilities for plant maintenance / removal in accordance with current legislation and indicate requirement on drawings for construction for design team and client comment.</u>		✓		
4b.3.3	Detail and co-ordinate all access platforms, stairs, rails and protection elements required for future maintenance and operation of plant/equipment.		✓		<u>Structural engineer to comment</u>
4c.3.2	Detail all fire stopping and sleeving systems.		✓		
<u>4a.3.7</u>	<u>Develop / design weatherproofing details for all services passing through external elements of the building.</u>		✓		<u>Architect to provide concepts proposals for Contractor to develop into installation drawings</u>
4a.3.8	Detail all acoustic stopping for services penetrating builders work elements.		✓		
4a.3.11	Consider requirements for cable pulling (routes, and anchor points).		✓		
4c.3.4	Carry out final detailed spatial co-ordination between all trade contractors		✓		
4c.3.5	Carry out final detailed spatial co-ordination between the building services and the structure/architecture.		✓		
4b.3.4/ 4c.4.12	Carry out final detailed location and dimensioning of 2 <sup>nd</sup> fix equipment based on architectural information.		✓		
<b>Selection of plant and specialist designers</b>					
<u>4a.4.4</u>	Review that all plant and equipment incorporated into the works can be safely maintained in compliance with current legislation <u>and provide report to Concept Designer.</u>		✓		
<u>4c.4.1</u>	Select plant, equipment, components and material to meet the specified performance <u>and materials and workmanship standards.</u>		✓		
<u>4c.4.2</u>	<u>Where alternative plant, equipment, manufacturers and components to those specified are selected, advise whether the alternatives comply with the selection criteria and specification.</u>		✓		
4c.4.2	Advise whether the alternatives suggested are acceptable.	✓			
4b.4.1	Check plant and system sizing once full co-ordination of the works has been undertaken.		✓		
<u>4c.4.7</u>	<u>Provide schedule</u> of final equipment selections / costs and manufacturers.		✓		
4c.4.8	Monitor the specialists design input for compliance with the design intent.			Client team	
4c.4.11	Monitor the ongoing progress of the procurement, manufacture, installation and commissioning of all plant items.			Client team	
<b>Mechanical Design</b>					

<b>TECHNICAL DESIGN (RIBA STAGE 4) This schedule is a compilation of some items from BSRIA Pro-formas 4A, 4B and 4C in BG6/2014</b> Some activities in this stage will continue after the start of the Construction stages (Stage 5 in RIBA plan of work 2013). <i><u>NB The BSRIA standard activities for Mechanical, electrical and Public Health design in proformas 4A, 4B and 4C have not been repeated here but all those applicable to the specific project should be completed as part of the works.</u></i> Items with <u>underlined italic</u> Ref No's are AECOM additions or modified versions of the BSRIA standard wording.					
Ref	Design Activity	Allocated to ...			Comments
		Concept Designer / ER	Design and Build Contractor	Other (specify)	
4a.5	Undertake all appropriate design activities in BSRIA Pro-formas 4A, 4B and 4C		✓		
	<b>Electrical Design</b>				
4a.6	Undertake all appropriate design activities in BSRIA Pro-formas 4A, 4B and 4C		✓		
	<b>Public Health Design</b>				
4a.7	Undertake all appropriate design activities in BSRIA Pro-formas 4A, 4B and 4C		✓		
	<b>Commissioning</b>				
4a8.1	Review all designs to ensure that systems are commissionable <i><u>in accordance relevant codes</u></i>			Client Team	
4a.8.2	Identify and incorporate into system designs the essential components and features necessary to enable the proper preparation and commissioning of building services.		✓		
4b.8.1	Determine witnessing and commissioning requirements for off-site manufactured elements.		✓		
4c.8.1	Review proposals and method statements from prospective commissioning specialist(s)		✓	Client Team	
	<b>Deliverables – including drawings, specifications, and reports</b>				
4c.9.1	Update health and safety plan information.		✓		
4a9.8	Prepare schedules to cross-reference cables to containment systems		✓		
<i><u>4a.9.17a</u></i>	Produce <i><u>outline</u></i> commissioning specification.		✓		
<i><u>4a.9.17b</u></i>	Provide <i><u>detailed final</u></i> commissioning specification <i><u>including project particular method statements</u></i> .		✓		
4b.9.4	Provide co-ordinated working drawings.		✓		
4c.9.5	Provide final co-ordinated reflected ceiling plans based on latest architectural information for all components.		✓		
4c9.5a	Provide all details of ceiling mounted components and setting out dimensions for production of final co-ordinated reflect ceiling plans		✓		
4c.9.6	Provide updated technical design model with revised or new design details and actual plant selected.		✓		
4c.9.8	Provide a report in consideration of any alternative plant, equipment and component selections.		✓		

CONSTRUCTION STAGE (RIBA STAGE 5) Some activities that start in Technical Design stage will continue in parallel with this stage					
Items with <u>underlined italic</u> Ref No's are AECOM additions or modified versions of the BSRIA standard wording.					
BSRIA / AECOM Ref	Design Activity	Allocated to ...			Comments
		Concept Designer / ER	Design and Build Contractor	Other (specify)	
	<b>General obligations, external liaison(statutory bodies, utilities)</b>				
<u>5.1.1.a</u>	<u>Place orders with utility suppliers based on final quotations for incoming services</u>		✓		
<u>5.1.1b</u>	<u>Modify as necessary the spatial requirements and builders' work associated with the provision of incoming services to suit the utility suppliers requirements.</u>		✓		
5.1.1	Notify the necessary statutory bodies (Building Control, Fire Officer, and Environmental Health) in respect of all tests and demonstrations required.		✓		
5.1.3	Seek full Statutory Approval of the Works and arrange all necessary attendance and documentation.		✓		
	<b>Client liaison (briefing, handover, surveys)</b>				
5.2.1	Oversee the instruction of the client's staff in the use, operation and maintenance of the installations.		✓		
5.2.2	Instruct the client's staff (FM team and end-users as appropriate) in the use, operation and maintenance of the installations in advance of handover		✓		
5.2.3	Examine and comment on the contents of the operating and maintenance manuals in order to ensure compliance with the specified requirements.		✓		<u>D&amp;B Contractor to pre-edit before issue</u>
5.2.4	Modify and update operating details to reflect commissioning results.		✓		
5.2.5	Modify the record drawings as the works progress, so that all alterations from the installation drawings are recorded.		✓		
5.2.6	Inspect draft record drawings at agreed intervals and comment on their content with respect to the size and positions of installed systems and plant.			Client	
5.2.9	Provide recommendations for the commencement and carrying out of operation and maintenance during and after the defects liability period.		✓		<u>As specified in work section A64D</u>
	<b>Team liaison (builders work, spatial coordination, energy targeting)</b>				
5.3.1	Finalise location of test points				
	<b>Selection of plant and specialist designers</b>				
5.4	Add any project specific items or delete this section				
	<b>Mechanical design</b>				
<u>5.5.1</u>	Add any project specific items or delete this section				
	<b>Electrical design</b>				
<u>5.6.1</u>	Add any project specific items or delete this section				
	<b>Public Health design</b>				
<u>5.7.1</u>	Add any project specific items or delete this section.				
	<b>Commissioning</b>				
5.8.1	Comment on the adequacy of systems for commissioning as detailed on specialists' drawings and manufacturers' shop drawings prior to actual manufacture at works <u>and ensure comments are incorporated into finished products./ systems. Include any</u>	✓	✓	CS	<u>CS - Commissioning specialist</u>



CONSTRUCTION STAGE (RIBA STAGE 5) Some activities that start in Technical Design stage will continue in parallel with this stage					
Items with <u>underlined italic</u> Ref No's are AECOM additions or modified versions of the BSRIA standard wording.					
BSRIA / AECOM Ref	Design Activity	Allocated to ...			Comments
		Concept Designer / ER	Design and Build Contractor	Other (specify)	
	<u>specialists requirements into system designs</u>				
5.8.2	Attend commissioning meetings as necessary,		✓	CS	
5.8.3	Arrange and chair commissioning meetings as necessary.		✓		
<u>5.8.3a</u>	<u>Carry out site inspections, to ensure that the commissioning facilities are being installed.</u> <u>Check compliance with specified guides and standards.</u>				
<u>5.8.3b</u>	<u>Ensure that the instrumentation is periodically calibrated as necessary and records retained.</u>		✓	CS	
<u>5.8.3c</u>	<u>Produce a method statement for flushing, chemical cleaning and treatment of water systems and logic diagram for integration into the building contractor's construction, commissioning and finishes programmes.</u>			CS	
<u>5.8.3d</u>	<u>Produce a commissioning method statement for testing and commissioning all M &amp; E systems, including logic diagrams for integration into the building contractor's construction, commissioning and finishes programmes.</u>			CS	
<u>5.8.3f</u>	<u>Witness pre-commissioning activities.</u>		✓		
5.8.4	Monitor the progress of commissioning and testing of all systems and plant items, including assessment of whether installations meet the original (or amended) design intent.		✓		
5.8.5	Conduct mock-up performance tests		✓		
5.8.6	Conduct pre-commissioning works (verification of installation works and static tests)		✓		
<u>5.8.7</u>	Commission all systems to agreed method <u>statements</u> , logic and programme, and in accordance with the commissioning specification. Record the results.			CS	
<u>5.8.7a</u>	<u>Witness sample demonstrations of systems and commissioning results.</u>			Client Team	% of results to be witnessed to be confirmed
<u>5.8.7b</u>	<u>Witness a sample of the operation of the BMS on site to the specified requirements.</u>			Client Team	% of results to be witnessed to be confirmed
<u>5.8.7c</u>	<u>Demonstrate normal emergency, shut down and standby mode operation of plant and systems. Arrange attendance by Building Control / Fire Officer.</u>		✓		
<u>5.8.7d</u>	<u>Witness a sample demonstration and testing of plant items and systems including normal emergency, shut down and standby mode operation of plant and systems, specified requirements.</u>			Client Team	% of results to be witnessed to be confirmed
5.8.8	Attend witness testing and commissioning of off-site manufactured assemblies at manufacturers' premises.			Client Team	
5.8.9	Demonstrate that the overall and complete systems perform correctly in the required manner and as intended by the specification.		✓		
<u>5.8.9a</u>	<u>Ensure that all plant settings are recorded, including appropriate reference to plant items. The records are to be incorporated within the operating and maintenance manuals.</u>		✓		

CONSTRUCTION STAGE (RIBA STAGE 5) Some activities that start in Technical Design stage will continue in parallel with this stage					
Items with <u>underlined italic</u> Ref No's are AECOM additions or modified versions of the BSRIA standard wording.					
BSRIA / <i>AECOM</i> Ref	Design Activity	Allocated to ...			Comments
		Concept Designer / ER	Design and Build Contractor	Other (specify)	
<i>5.8.9b</i>	<i>Examine the commissioning results and comment on same and agree with the client any excursions from the original design.</i>			Client Team	
5.8.10	Record all plant settings form commissioning		✓		
5.8.11	Accept completed systems.			✓	
	<b>Deliverables – including drawings, specifications, reports</b>				
5.9.1	Provide final installation details, including dimensions of electrical switchgear to ensure that cable entry is acceptable in the selected location and that safe operating and maintenance clearances are provided.		✓		
6.9.2	Provide final installation details, including dimensions of automatic control panels to suit the detailed requirements of the agreed supplier of the controls equipment.		✓		
5.9.3	Provide detailed BMS point schedules, wiring schematics, control panel labelling details and equipment schedules for the complete works.		✓		By controls specialist
5.9.4	Provide detailed electrical wiring diagrams of all equipment supplied showing all interconnections between equipment to enable all necessary wiring to be undertaken.		✓		
5.9.6	Provide installation drawings		✓		
5.9.7	Provide builders work details.		✓		
5.9.8	Provide shop and fabrication drawings.		✓		
5.9.9	Provide a final commissioning report detailing the results of the commissioning and commenting on the performance of systems signed by a competent person.		✓		
<i>5.9.9a</i>	<i>Produce and submit to the local authority a notice / declaration confirming that the building services have been commissioned in accordance with the requirements of Part L of the Building Regulations Approved Document L2.</i>		✓		
<i>5.9.10</i>	Provide schedule of activities / works <i>outstanding. To be completed before handover.</i>		✓		
5.9.11	Provide all necessary calculations, drawings, information and logs for the Health and Safety File.		✓		Designer to comment
5.9.12 & 5.9.13	Provide a schedule of all spare parts and tools required for the works including recommendations of any others not stated in the specification		✓		
5.9.16	Provide record drawings		✓		<i>As specified in work section A64D</i>
5.9.17	Provide <i>final</i> log book(s) in accordance with the requirements of the specification and the Building Regulations		✓		Including system completion certificates
5.9.19	Provide operation and maintenance information in accordance with the specified requirements.		✓		
5.9.20	Provide technical guide for the facilities management team.		✓		
5.9.21	Provide recorded water, gas and electricity meter readings on completion of the works.		✓		
5.9.22	Provide building users' guide, including instructions on controls, energy saving and water saving features.		✓		
5.9.23	Prepare pre-handover defects schedule			Client Team	

<b>HANDOVER AND CLOSE OUT STAGE (RIBA STAGE 6)</b>					
Items with <u>underlined italic</u> Ref No's are AECOM additions or modified versions of the BSRIA standard wording.					
<b>BSRIA /AECOM Ref</b>	<b>Design Activity</b>	<b>Allocated to ...</b>			<b>Comments</b>
		<b>Concept Designer</b>	<b>Design and Build Contractor</b>	<b>Other (specify)</b>	
	<b>General obligations, external liaison(statutory bodies, utilities)</b>				
<u>6.1.1</u>	Add any project specific items or delete this section				
<u>6.1.2</u>	<u>Replace components or equipment which fail within the defects liability period, inclusive of re-commissioning testing and provision of documentation.</u>				
	<b>Client liaison (briefing, handover, and surveys</b>				
	<b>Team liaison (builders work, spatial coordination, energy targeting)</b>				
	<b>Commissioning</b>				
	<b>Deliverables – including drawings, specifications, reports</b>				

## R11sch – Schedule of Above Ground Foul Drainage

---

For details of pipework refer to Schedule of Pipelines No Y10.

For details of pipework refer to Schedule of Pipelines No Y10.

<b>Tubular Traps</b>	-	For use with sanitary fittings
Material	-	Copper BS EN 1254 Polypropylene to BS EN 274-1, BS EN 274-2, BS EN 274-3
Sanitary Fitting	-	Basin 32mm deep seal two-piece 'P' trap Sink 40mm deep seal two-piece 'P' trap Shower Tray 40mm deep seal two-piece 'P' trap
Finish (copper traps)	-	Chromium plated Self colour
<b>Bottle Traps</b>	-	For use with sanitary fittings
Material	-	Copper BS EN 1254 Polypropylene BS EN 274-1, BS EN 274-2, BS EN 274-3
Sanitary Fitting	-	Basin 32mm deep seal 'P' trap Sink 40mm deep seal 'P' trap Urinal 32/40mm deep seal 'P' trap
Finish (copper traps)	-	Chromium plated Self colour

Ref	Location	Type	Application	Chamber Req'ments	Working Volume (litres)	Pump Unit Duty - Flow rate/Head/ Velocity (l/s, metres, m/s)	Pump Arrangement (number of Pumps)	Pump Type/ Material	Control panel	Notes / Ancillaries
FWDP1	Basement Cycle Store	Submersible	Wastewater from showers in GF locker room	GRP chamber	160L	1.2/sec @ 3m/head	2	Vortex / Cast Iron	Local Wall mounted	<p>Packaged twin pump sewage pump unit. Mounted on slab and pumps accessible for maintenance. As Edincare "Autoflush twin HT" or similar and approved Unit.</p> <p>1No 100mm outlet vent connection terminate with carbon filter or micro vent.</p> <p>1No 50mm inlet waste pipe connection. 1No 40mm pump discharge pipe connection.</p> <p>Power supply 1 Ph 240V / 3.9A / 0.5Kw</p> <p>Include local wall mounted control and alarm panel with visual beacon and audible sounder.</p>

**Notes**

- Waste water lifting plants to comply with:  
BS EN 12050-1 - Wastewater containing faecal matter.  
BS EN 12050-2 - Faecal-free wastewater.  
BS EN 12050-3 - Applications for domestic non-commercial wastewater containing or not containing faecal matter (where the number of users is small).  
Non-return valves to be in accordance with BS EN 12050-4

2. Pump unit to be supplied complete with the following:

Controls –

Details of all the controls for this Work Section associated with the central control system are described in Work Section W 60 - Central Controls

Specify local control requirements in schedule or Scope of Works

Provide level switches for the following functions:

Start selected pump when effluent reaches predetermined level.

High level switch to raise alarm.

Arrange controls to change pumps on a weekly basis.

Alarms

Acoustic

Visual > <

Control Panel:

Provide control panel complete with isolators, starters etc, for mounting adjacent to unit.

Panel to contain –

Provide volt free contacts.

Mains Indicator.

Pump run indicator.

3. Level Controls –Float Switches

4. Power Supply –240V, 1Ph

5. Allow for on-site commissioning by manufacturer.



# S11sch1 - Schedule of Electric/Gas Fired Water Heaters and Expansion Vessels

Ref	Location	Type	Service	Water Supply l/s	Water storage Capacity (l)	Continuous rated output at 10–65°C	Heating Element (electric) Or gas input kW	Limiting gross thermal efficiency (gas fired) %	Notes / Ancillaries
HWS-01	EXISTING ROOF LEVEL BOILER ROOM	Direct Gas Fired Water Heater	Single point	N/A	145  (Direct Replacement model of size/capacity to match the existing heater)	158L/HR  (Direct Replacement model of size/capacity to match the existing heater)	12.9  (Direct Replacement model of size/capacity to match the existing heater)	77%	Based on Andrews Water Heaters Model No: 10/145 or similar and approved. To be supplied with full expansion vessel and unvented system kit. Unit to be provided with replacement 100 dia conventional flue. Utilise existing roof penetration / flue terminal.
Ground Floor Shower	Ground Floor Locker Room Showers	Direct Electric	Single point Shower supply	0.15	NA	N/A  Up to 41 degrees C Max.	8.5	N/A	Based on Triton "Amore" or similar and approved. Surface mounted with surface mounted services, Includes handspray and rail/fixings. Finish/Colour to suit Architects Preference.

## Notes

- Heater to be supplied complete with the following:  
Unvented Supply Kit to comply with The Building Regulations Approved Document G3 with Pressure Regulating Valve set to provide a discharge pressure at 2.0 Bar at the outlet. Units shall be comply with BS EN 12897  
Expansion vessel
- Power Supply 230 V, 1 ph, 50 Hz
- Refer to Specification Work Section S11 and Y23 for further details.
- Units to be WRAS approved
- In addition to controls requirements detailed elsewhere in the specification, provide the minimum controls package for compliance with Part L as defined in the Non Domestic Heating, Cooling and Ventilation compliance guide
- Standards:  
Electric instantaneous water heater to BS EN 60335-2-35.



## **S11sch3 - Schedule of Thermostatic Mixing Valves**

---

## S63sch – Schedule of Sprinkler/Deluge Systems

---

### SPRINKLER SYSTEMS FOR COMMERCIAL AND INDUSTRIAL BUILDINGS TO THE LPC RULES PLUS THEIR TECHNICAL BULLETINS (*NES 300.030 and 300.040*)

#### **Area to be covered - Basement Car Park**

##### **Type of system**

Existing Dry valve installation. ( Specialist contractor to determine following initial survey)

Standard - BS EN 12845

Occupancy -

##### **Hazard class**

Ordinary Hazard - OH

Group 2.( Existing hazard classification believed to be OH2 suitable for car parking space however existing system classification to be confirmed by Specialist Contractor.)

##### **Water source / type of water supply**

Existing main fed system

Mains water supply details:

Pressure (average) barg – To be confirmed on site.

Max working pressure barg - To be confirmed on site.

Minimum outlet pressure barg - To be confirmed on site.

Type of water supply

Single supply

Existing Town main

##### **Installation control -Main control valve sets**

Valve type -

Existing Single alarm and bypass arrangement

##### **Existing Sprinkler Heads**

Pattern

Conventional pattern

Upright pattern

Sprinkler Head details

Element type (Frangible bulb,)

Finish (Natural, chrome plated, corrosion resistant, wax coated, polyester powder paint, other)

Sprinkler guard (Y or N)

All heads to be checked and surveyed. Specialist Contractor to confirm all works necessary to bring the existing system back to full working order and operation.

## T10sch1 – Schedule of Boilers

The Contractor shall be responsible for completion of the For details of the plant upon which this specification is based refer Clause T10 within Section 1 Scope of Work of the MEP Specification.

following schedule detailing the proposed equipmentf or submission to the Client as part of their Technical Submission

Reference				
System				
Location				
Boiler Type				
Heat exchanger				
Standard:				
Normal Operating Pressure (bar g)				
Maximum standing loss %				
Limiting dimensions including burner (mm)				
Limiting operating weight (kg)				
Maximum Operating Pressure (bar g)				
Hydraulic Test Pressure (bar g)				
Static Head (m)				
Water content (l)				
<b>Duty</b>				
Output capacity at design conditions (kW)				
Number of return water connections				
Water On [low temp water return] (°C)				
Water On [higher temp water return] (°C)				
Water Off Design (°C)				
Maximum operating temperature (°C)				
Maximum water flow (l/s)				
Minimum water flow (l/s)				
Boiler Turn Down Ratio				
Maximum water side $\Delta p$ (kPa)				
Guaranteed full load operating gross efficiency (%)				
Guaranteed gross efficiency at 30% of maximum heat output				
Max Standing loss at rated output (%)				
Max NO <sub>x</sub> emission (mg/kWh) at full load output, measured on a dry basis with 0% excess O <sub>2</sub>				
Flue gas flow rate (m <sup>3</sup> /h)				
Flue gas temp at max output (°C)				
Flue gas temp at minimum output (°C)				
Elec details:	phase			
	voltage (v)			
	frequency (Hz)			
	Full load current (A)			
Fuel	Primary Fuel / pressure available at burner pipework inlet			
	Standby Fuel / pressure available at burner pipework inlet (if applicable)			
Burner type (Forced draught- Pressure jet/ Pre-mix / induced / atmospheric)				
Burner Control (High/Low or Modulating)				
Burner firing arrangement		Vertically down or horizontal		

## T10sch1 – Schedule of Boilers

Limiting Noise level (dB A) @ xx m from boiler				
Acoustic Shroud required (Yes/No)				

### Notes

1	Boiler selections based on xxxxxxxxxxxxxxxx	
2	Provide as part of boiler the required safety facilities against exceeding maximum temperature and pressure in accordance with BS EN 12828	
3	Accessories to be provided by boiler manufacturer	
4	Installation work required by the boiler manufacturer	
5	Boiler Off Site Testing Requirements (Refer to Y51 for detail requirements)	Specify here
6	Boiler on Site Testing Requirements (Refer to Y51 for detail requirements)	
7	Fit high-density insulation to all exposed surfaces to limit surface temperature to xxx °C	
8	BMS Interface Requirements	Provide volt free contacts as follows: High Temperature Lockout Boiler Lockout Boiler common fault Normal Run signal
9	<p><b>Flue Requirements</b></p> <p>A flue specialist shall undertake the detail design and supply and install the boiler flues in accordance with the boiler manufacturer's requirements. Final flue design shall be in accordance with the flue specialist recommendations.</p> <p>Boiler flues to be twin wall, stainless steel (316 inner) and (304 outer) with mineral wool insulation as required to suit the operating parameters. Inner liner to be fully welded for condensing boilers, oil fired boilers and biomass boilers</p> <p>Flues for condensing boilers shall include proprietary joint seals to ensure the system is pressure tight and moisture resistant and drained suitably.</p> <p>Flues shall carry a relevant fire rating for the application and have a minimum</p> <p>The flue specialist shall provide test certification of independent testing to BS EN 1856-1</p> <p>Refer to clause T10.310.090 for technical specification, inner and outer skin materials and wall thicknesses and T10.320.060 for installation.</p> <p><u>DETAILS</u></p> <p>Fuel sulphur content – xx %</p> <p>Flue gas maximum temperature: xxx °C</p> <p>Flue gas minimum temperature: xxx °C</p> <p>Hot flue gas volume xxx m³/s</p> <p>Gas velocity in flue xx m/s</p> <p>Maximum outer surface temperature of flue: xx °C</p> <p><i>see typical manufacturer's detail in guidance notes for outer surface temperature with and without insulation</i></p> <p>Boiler connections size: xxx mm dia</p> <p>Rising stack size: xxx mm dia</p> <p>Overall flue height xx m</p> <p>Flue height above building xx m</p> <p>Flue draught at operating temperature xx Pa</p> <p>Flue terminal details: xxxxxxxxxxxxxxxx</p> <p>Draught stabiliser: xxxxx</p> <p>Terminal efflux velocity xx m/s</p> <p>Cleaning access requirements: xxx</p> <p>Drain requirements: xxx</p>	

## T10sch1 – Schedule of Boilers

---

10	Water Treatment Requirements (Refer to Y25 for detail requirements)	
11	Condensate disposal and neutralisation facilities for condensing boilers	

For details of the design intent of radiators upon which this specification is based refer Clause T31 within Section 1 Scope of Work of the MEP Specification.

The Contractor shall be responsible for completion of the following schedule detailing the proposed equipment for submission to the Client as part of their Technical Submission

[illegible]

Notes:

1	Finish: powder coat to an RAL colour as agreed with the architect.
2	Low Surface Temperature type covers to incorporate silver based anti-microbial agent in powder coating and be suitable for "Deep Cleaning" (Refer to specification clause T20 310.022 )
3	Maximum pressure drop 2Kpa
4	Refer to specification section T20 for materials and workmanship clauses and standards

## T60sch1 – Schedule of Chillers

For details of the design intent of chiller upon which this specification is based refer Clause T60 within Section 1 Scope of Work of the MEP Specification.

The Contractor shall be responsible for completion of the below schedule detailing the proposed chiller for submission to the Client as part of their Technical Submission

CHILLER REFERENCE	C1	C2	C3
System			
Location			
Type –			
Limiting Dimensions l x w x h (m)			
Refrigerant			
External Design Conditions for air cooled chillers			
Evaporator type			
Fluid to be cooled			
Compressor type			
Compressor motor detail / efficiency limit			
Condenser type / materials			
Condenser fan motor type / efficiency limit			
<b>DUTY</b>			
Cooling capacity at design conditions (kW)			
Min No of compressors / refrigerant circuits			
Min No of control stages / machine			
Capacity control method			
<u>Electrical</u> <ul style="list-style-type: none"> <li>Power input (kW)</li> <li>Total fan power (kW)</li> <li>Limiting full load current drawn (A)</li> <li>Limiting current at any point of the starting / loading cycle (A)</li> <li>Electrical supply- (phase /volts / Hz)</li> </ul>			
<u>Chilled Water</u> <ul style="list-style-type: none"> <li>Flow rate maximum (l/s)</li> <li>Flow rate minimum (l/s)</li> <li>Evaporator maximum pressure drop (kPa)</li> <li>Evaporator maximum working pressure (kPa)</li> <li>Entering temperature (°C)</li> <li>Leaving temperature (°C)</li> <li>Outlet control band ( +/- °C)</li> </ul>			
<u>Condenser fan duty</u>			
<u>Limiting Fouling factors:</u> <ul style="list-style-type: none"> <li>Evaporator</li> <li>Condenser</li> </ul>			
<b>ENERGY EFFICIENCY / SEASONAL ENERGY EFFICIENCY</b>			
Min EER	Min at 100% cooling output		
For Part L	Min at 75% full cooling output		
BS EN 14511	Min at 50% full cooling output		
	Min at 25% full cooling output		

## T60sch1 – Schedule of Chillers

CHILLER REFERENCE		C1	C2	C3
ESEER For Part L	Minimum overall seasonal energy efficiency ratio for chiller at std Eurovent conditions / weighting factors			
Min EER For EU2016/2281 BS EN 14825 (Ecodesign)	Part load ratio - 100% (outdoor air dry bulb temperature 35°C)			
	Part load ratio - 74% (outdoor air dry bulb temperature 30°C)			
	Part load ratio - 47% (outdoor air dry bulb temperature 25°C)			
	Part load ratio - 21% (outdoor air dry bulb temperature 20°C)			
SEER	Minimum Seasonal Energy Efficiency Ratio (SEER) for Ecodesign Regulations compliance			
SSCE	Minimum Seasonal Space Cooling Energy Efficiency (SSCE) for Ecodesign Regulations compliance (%)			
Limiting sound pressure level (dB re $2 \times 10^{-5}$ Pa) @ xx m from machine.  <div style="text-align: right;">             63 Hz              125 Hz              250 Hz              500 Hz              1 kHz              2 kHz              4 kHz              8 kHz               or               (dB A)           </div>				
ANCILARIES / ACCESSORIES				
<u>Buffer vessel:</u>  <div style="text-align: right;">             Storage Capacity (l)              Max working pressure (kPa)              Working temperature (°C)           </div>				
<u>Hydronic Unit</u> Components: duty / stby pumps, expansion tank and pressurisation facilities, pressure relief valve. <div style="text-align: right;">             Pump Flow rate (l/s)              Pump Head (kPa)           </div>				
<u>Heat Recovery facilities / duty</u>				
<u>Accessories</u>				

### European Regulations

The table below is published by Eurovent

Chillers to comply with EU Regulation 2016/2281 with regard to ecodesign requirements, including seasonal space cooling (or heating), energy efficiency (SSCEE / SSHE) and product information. Minimum EER at part load, for calculation of SEER (Seasonal Energy Efficiency Ratio) to EU 2016/2281 (Ecodesign requirements) and BS EN 14825. Evaporator temperatures in accordance with BS EN 14825:2016 table 4 (air cooled)



## T60sch1 – Schedule of Chillers

Table of applicable regulations in Europe on A/C, VRF, rooftops, chillers and heat pumps (each cell is hyperlinked to the corresponding text):

				Heating Heat Pump, Hybrid		Cooling Air conditioner, Chiller															
				COP, SCOP or $\eta_{s,h}$		EER, SEER(SEPR) or $\eta_{s,c}$															
				MEPS	Labelling	MEPS	Labelling														
Air cond., VRF, Rooftop and HP				$\leq 12 \text{ kW}$	206/2012	626/2011	206/2012	626/2011													
				12 kW-1MW <sub>h</sub> /2MW <sub>e</sub>	2016/2281		2016/2281														
Chillers and HP	Process	-25°C	/																		
		-8°C																			
		+7°C																			
	Comfort	+7°C	$\leq 2\text{MW}_e$				2015/1095														
		+18°C																			
		+35°C							$\leq 70 \text{ kW}_h$ $\leq 400 \text{ kW}_h$ $\leq 70 \text{ kW}_h$ $\leq 400 \text{ kW}_h$		813/2013		811/2013								
		+55°C																			
		Domestic Hot water													Single		814/2013		812/2013		
		Combination heater													813/2013		811/2013				

### Refrigerant Leak detection system

To comply with the F-Gas Regulations, plants which have a refrigeration circuit containing 500 tonnes CO<sub>2</sub>e or more of HFC refrigerant must be fitted with fixed leak detection (Ref F-Gas regulations 2015)

Examples of automatic leak detection systems include:

- A “direct” fixed multi-point gas detector system, sampling air in a number of locations using a gas detector
- An “Indirect” system that monitors parameters in the refrigeration system (eg pressures, temperatures and liquid levels) that would be part of the chiller controls

The alternative is a fluorescent dye added to the oil in the refrigeration system

### CONDENSER COIL MATERAILS

The industry standard is Copper tubes with Aluminium fins (see note 19).

However for applications where corrosion is considered a risk care needs to be taken when specifying the fin material ref exposure to corrosive environments including coastal locations, swimming pools, airports, inner cities.

Eg Aluminium where corrosion is not considered a risk.

Copper or Electro –tinned copper to BS 1872, or epoxy coated aluminium or a proprietary coating such as

[Blygold](#) or [Bronz-glow](#) Should be specified for coils in corrosive environments including coastal locations, swimming pools, airports, inner cities

### Notes:

1. Units to be installed strictly in accordance with manufacturer's instructions.
2. The EER of the unit at full load output shall be determined in accordance with BS EN 14511.
3. Provide electronic expansion valve, modulating head pressure control to control condenser fan speed, crank case heaters, flow switches, pre-wired control panel with all necessary controls and safety devices, terminal connections and auxiliary relays. All controls to be fully electronic.
4. Controls to be capable of external load shedding via BMS.
5. Provide modem for full BMS interrogation of all chiller set points, temperatures, pressures, alarms etc and adjustment of all main set points and , configure the modem to download plant logs to the BMS once a day.
6. Provide the client with an option for the inclusion of a refrigerant leak detection system  
Refer to clause T60 300.077 for further details.

Alarm signal actions required from fixed system – xxxxxxxxxxxxxxxxxxxx @xxxxppm

Interface with BMS: xxxxxx

## T60sch1 – Schedule of Chillers

---

This is only mandatory on systems containing 500 tonnes CO<sub>2</sub>e or more of HFC refrigerant must be fitted with fixed leak detection (Ref F-Gas regulations 2015) An automatic leakage detection system is a calibrated mechanical, electrical or electronic device for detecting leakage of F-gases which, on detection, alerts the operator

**NB** automatic fixed direct type will not be suitable for external air cooled chillers unless located inside a sealed compressor / evaporator enclosure

7. Provide integral controls to start compressors in stepped manner (both in morning start up and restart after power failure) to prevent surges on mains supply.
8. Units to be provided with integral power factor correction to achieve xx lagging (0.95 recommended min).
9. Power cable terminal to receive xx mm<sup>2</sup> stranded copper conductors.  
Limiting dimensions are:- xx  
Provide separate door interlocking mechanism for each mains compartment
10. The chiller shall not exhibit any tonal character. This is defined as “no 1/3 octave band sound pressure level measured at 1m shall differ from its two adjacent 1/3 octaves by more than 5dB”. This shall be demonstrated prior to installation on site.
11. The sound pressure level specification is the maximum noise level around all sides of the chiller, not the average level.
12. Provide complete automatic refrigerant pump down facilities to a heat exchanger (or dedicated storage tanks) with isolation valves equipment to recover evacuated refrigerant for reuse.
13. All chillers shall have dual safety valves complete with 3-way cock so that each valve can be removed without pumping-down or non-operation of the chiller
14. Undertake works testing as detailed in the specification (T60) and as detailed in schedule Y51sch1.
15. Comply with the requirements of reference sections Y72 & Y92 for motors and starters and W60 for controls.
16. Units to be commissioned by manufacturer.
17. Provide volt free contacts for each chiller to signal the following alarms and any others listed on the Controls drawings: Common fault; low chilled water flow; high pressure fault.
18. For multi chiller installations, provide a chiller sequence controller to allow sequence control of xx chillers. In addition to each chiller's outlet temperature control and protection sensor, provide common chiller inlet and outlet temperature sensors and incorporate capacity control sensor selection at the sequence control panel. Ensure the chiller sequence controller allows control in all possible sequence permutations. Ensure the control system optimises chiller and compressor run and load sequence by varying control parameters to maintain common fluid outlet temperature. Incorporate the facility to carry out automatic compressor and chiller lead/lag selection to balance compressor and chiller run hours.
19. Contactors / Starters / for chilled primary water pumps shall be hard wire interlocked with chiller controls to prevent operation of the chiller if the pump is not operating.
20. Air cooled Condenser Coil material - Copper tubes with Aluminium fins or Copper or Electro –tinned copper to BS 1872, or epoxy coated aluminium or a proprietary coating such as [Blygold](#) or [Bronz-glow](#) should be specified for coils in corrosive environments including coastal locations, swimming pools, airports, inner cities

For details of the design intent of local cooling units upon which this specification is based refer Clause T70 within Section 1 Scope of Work of the MEP Specification.

The Contractor shall be responsible for completion of the schedule below detailing the proposed equipment for submission to the Client as part of their Technical Submission

## Indoor Units

[illegible]

### Schedule of Outdoor units

Ref	Location	Noise Level	Power supply details	Cooling Minimum EER	Heating COP	Seasonal coefficient of performance SCOP (for building NCM)	Refrigerant, Compressor type and motor details
		Sound pressure level (dB re 2x10 <sup>-5</sup> Pa) 63 Hz xx 125 Hz xx 250 Hz xx					

		500 Hz xx 1 kHz xx 2 kHz xx 4 kHz xx 8 kHz xx  or dB(A) @ xx m from machine.					

#### Notes

##### Applicable to indoor units:

- Room air temperature in occupied zone xx °C  
Return Air Condition: xx °C db xx % rh.  
Minimum supply air temperature to room: xx °C.
- Fresh air supply condition xx<sup>0</sup> C db xx % rh
- Supplier to calculate mixed air on to coil condition and size cooling coil taking account of any fan gain.
- Units shall be supplied with three speed controller and return air sensor (as indicated on controls schedule) all fitted, wired and tested and compatible with building's control system. The controls specialist shall supply the appropriate controller to the fan coil unit manufacturer free issue.
- Electrical supply to BS EN 60038
- Loads are scheduled with fans running at medium speed.
- Ensure manufacturer's ratings comply with relevant part of BS 4856.
- Fabricate from galvanised mild steel sheets and stiffeners without sharp edges.
- The units shall be rigid enough to ensure quiet operation.
- Units shall incorporate fixing lugs.
- Protect units from corrosion internally and externally.
- Do not use self-tapping screws.
- Provide drip tray under coil and under control valve where fitted, fabricated from noncorrosive material or protected against corrosion with external faces insulated to prevent condensation. The tray shall be degreased before applying anti-condensation insulation to the external surfaces. Tray to be laid to fall in the direction of the drain connection.
- Ensure connection to drip tray is flush with the bottom of the tray.
- Fix heating and cooling coils to prevent air leakage around coils. On air side control units "carry over" from heating coil to be no greater than 100W when the unit is in full cooling and the heating coil has the design heating water flow rate
- Form heating and cooling coils from copper tube and aluminium fins.
- Provide adequate access to remove components in one piece. Filter to be easily withdrawn from installed position.
- Provide access to moving parts with airtight doors.
- Provide duct connections upstream and downstream.
- Provide factory fitted acoustic and thermal lining to boxes with all edges sealed and finished to prevent material migration. Insulation to be Class O

- surface.
21. The motor frame shall be totally enclosed and fitted with maintenance free sealed for life bearings. Motors shall be insulated to BS EN 60085.
  22. Fan and motor assembly shall be fitted with a continuously rated motor.
  23. All fan and motor assemblies shall be statically balanced to prevent the transmission of vibration and the complete assembly shall be fitted with neoprene rubber mounts.
  24. Provide a return air filter of nylon galvanised steel mesh
  25. The electrical contractor shall connect the flex (provided as part of the FCU, 2m long) into the fuse connector unit. The flex shall be adequately supported so as to not impose and strain on the cable terminals.
  26. Install in accordance with the manufacturer's recommendations to give a neat appearance with supports out of view. Ensure equipment is firmly fixed and level.
  27. For ducted units discharge ducts have been sized as follows:
 

Each discharge branch volume up to and including 40 l/s	–	160 diameter (mm)
Each discharge branch volume 40 l/s to 80 l/s inclusive	–	200 diameter (mm)
Each discharge branch volume exceeding 80 l/s	–	250 diameter (mm)

It is the responsibility of the contractor to ensure the final units selected are provided with plenum spigots sized in accordance with the parameters listed above.
  28. All discharge spigots which are not utilised shall be fitted with removable caps with material and lining to match the discharge plenum.
  29. Refrigerant pipework to be seamless copper tube to BS EN 12735 Parts 1 or 2 as applicable refrigerant quality copper, fully annealed and internally degreased and cleaned
  30. Comply with EU Regulations 206/2012 or 2016/2281 with regard to ecodesign requirements including information on disassembly, recycling and/or disposal.
  31. Where applicable, comply with BS EN 14825 for testing and rating at part load conditions and calculation of seasonal performance

Limiting sound power levels dB re  $10^{-12}$  Pa: (Determine sound power levels in accordance with BS EN 12102-1)

Frequency (Hz)	63	125	250	500	1k	2k	4k	8k
----------------	----	-----	-----	-----	----	----	----	----

For details of the design intent of car park ventilation upon which this specification is based refer Clause U10 within Section 1 Scope of Work of the MEP Specification  
 The Contractor shall be responsible for completion of the schedule below detailing the proposed equipment for submission to the Client as part of their Technical Submission

MAIN EXTRACT PLANT DETAILS											
SYSTEM			FAN DUTY / ARRANGEMENT				MOTOR / DRIVE / ELECTRICAL DATA				
Fan Ref	Location	Description / type	Air Volume  (m³/s)	External Static Resistance  (Pa)	Limiting SFP  W/(l/s)	Installation arrangement to BS EN ISO 5801	Drive type / Speed control method	Overall efficiency of fan and motor/drive combination  %	Motor type / Efficiency  Ph / IE	Motor rating  kW	Full load running current  A
EF1											
	Limiting Sound Power Levels (dB re 10 <sup>-12</sup> W) at design air flow										
	Hz	63	125	250	500	1k	2k	4k	8k	8k	
	In duct										
	Casing Radiated										
EF2											
	Limiting Sound Power Levels (dB re 10 <sup>-12</sup> W) at design air flow										
	Hz	63	125	250	500	1k	2k	4k	8k	8k	
	In duct										
	Casing Radiated										

IMPULSE FANS DETAILS											
Fan Ref	location	Type / materials	Air Volume at full speed m³/s	External Static Resistance Pa	Max thrust at full speed N	Limiting SFP W/l/s	Drive type / Speed control method	Overall efficiency of fan and motor/drive combination %	Motor type / Details / Efficiency grade Ph / IE	Motor rating kW	Full load running current A
EF											

Limiting Sound Power Levels for all impulse fans (dB re 10 <sup>-12</sup> W) at design air flow									
Hz	63	125	250	500	1k	2k	4k	8k	8k
In duct									
Casing Radiated									

#### NOTES

1. System to comprise: \*\*\*\*\*
2. In addition to requirements in this schedule and scope of works, comply with relevant clauses and standards - U10 100.010, 310.005, 310.006, 310.012, 310.015, 320.022.
3. Operation - Sequential impulse fan and main extract fan operation on demand from bespoke control system.
4. Design requirements: To meet ith the requirements of the Fire Strategy
5. CFD requirements To meet ith the requirements of the Fire Strategy See clause U10 310.012
6. Time / Temperature classification to BS EN 12101-3: 300°C for 60mins
7. Fire alarm interface requirements:-
8. Fire Control Unit / Panel requirements:  
Standard - BS EN 54-4

Mounting - Surface

Materials of enclosure - Metal, Minimum degree of protection to BS EN 60529 -IP43

Accessibility - by special key

Enclosure finish - xxxxxxxxxx

Power Supply -Integral

Location - xxxxxxxxxx

Ensure that the Smoke and Heat Control Unit includes the following facilities built into the hinged front cover of the module, being clearly visible at all times.

- Visual and audible indication of the relevant zones.
- Visual and audible indication of alarms and faults.
- Push button switches for the following functions:
  - Sounder silence
  - Zone fault indication
  - Reset
  - Mute fault
  - Lock-off control. Include for this facility via a key-switch to enable the automatic operation of the system to be locked off where required.

Coincidence Operation - Ensure the interface between the fire detection system triggers the required ventilation/heat control based on the operation of relevant coincident cause and effect events.

Provide the following visual indicators.

- System mode of operation.
- Amber indicator to show that the system is on automatic control.
- Green indicator to show that the system is on manual control.
- White indicator to show that the system is isolated.

Permanent Mimic Diagram

- Provide a repeater panel either as a part of or adjacent to, the control panel.
- Ensure the repeater panel shows a plan showing the location of each relevant detector together with the locations of all doorways.
- Provide light emitting diode (LED) indicators to show the detection status of each detector.
- Ensure that the orientation of the plan is correct with the room when facing the panel.

9. BMS interface requirements:

10. Accessories: Directional outlet diffuser, safety inlet guard, anti-vibration mounts

11. Electrical requirements:



Generally the design intent is that the existing fan coil units are retained within Section 1 Scope of Work of the MEP Specification

If the detailed design dictates the provision of new fan convectors the Contractor shall be responsible for completion of the schedule below detailing the proposed equipment for submission to the Client as part of their Technical Submission

Design Data										Offered FCU selection data (by manufacturer)										
Ref	Type	Room Served	Room Cooling load (kW)		Room Htg Load (kW)	Air Data				Cooling coil					Heating coil			Fan data		
			Sens	Lat		Fresh Air (l/s)	Total l (l/s)	N° supply spigots	Ext. Pa	Sens duty kW	Total duty kW	Air off db °C	Coil data		kW	Coil data		Total air vol l/s	SPF W/l/s	Ext Static Pa
													l/s	Kpa		l/s	kPa			

Design Conditions applicable to all units (unless noted otherwise)		Notes
Chilled water flow temperature	xx °C	
Chilled water return temperature	xx °C	
Heating water flow temperature	xx °C	
Heating water return temperature	xx °C	
Room air condition – summer	xx °C xx % RH	
Room air condition – winter	xx °C xx % RH	
Return air condition – summer	xx °C xx % RH	
Return air condition – winter	xx °C xx % RH	
Minimum summer supply air temperature to space	xx °C db	
Maximum winter supply temperature to space	xx °C db	
Summer fresh air supply condition	xx °C xx % RH	
Winter fresh air supply condition	xx °C xx % RH	
Maximum fan coil unit external static	Xx Pa	
Maximum cooling coil waterside pressure drop	Xx kPa	
Maximum heating coil waterside pressure drop	Xx kPa	
Minimum water flow rate (for commissioning purposes)	0.02 l/s	

Maximum specific fan power (SFP)	Xx W/(l/s)	
Fan motor type		
Number of fans / motors in unit	Xx/xx	
Maximum room noise rating	NR xx	

Limiting sound power levels dB re 10 <sup>-12</sup> Pa: (if ceiling void mounted)									
FCU Ref /type		Frequency (Hz)							
		63	125	250	500	1K	2K	4K	8K
FCU 1	Casing radiated & Inlet								
	In duct								
FCU 2	Casing radiated & Inlet								
	In duct								

- 1 Roles and responsibilities: Describe roles below or cover in scope of works eg the control valves  
Fan coil unit manufacturer –  
M&E installation contractor –  
BMS specialist -
- 1 Manufacturer to calculate mixed air on coil condition based on the return air and fresh air conditions and size cooling and heating coils taking account of any heat carry over from the heating coil and fan gain. Supplier shall calculate the chilled water and heating flow rates to limit the supply air temperature to the figure stated above at the total air volume scheduled.
- 3 Electrical supply to BS EN 60038
- 4 Loads are scheduled with fans running at medium speed.
- 5 Ensure manufacturer's ratings comply with
  - Relevant part of BS4856.
  - BS 4856-4 or BS EN 16583 for determination of sound power levels
  - BS EN 1397 for the thermal and volumetric performance of air free delivery and air ducted heating and cooling units..
- 6 Fabricate from galvanised mild steel sheets and stiffeners without sharp edges.
- 7 The units shall be rigid enough to ensure quiet operation.
- 8 Units shall incorporate fixing lugs.
- 9 Protect units from corrosion internally and externally.
- 10 Do not use self-tapping screws.
- 11 Provide drip tray under coil and under control valve where fitted, fabricated from non-corrosive material or protected against corrosion with external faces insulated to prevent condensation. The tray shall be degreased before applying anti-condensation insulation to the external surfaces. Tray to be laid to fall in the direction of the drain connection. Ensure connection to drip tray is flush with the bottom of the tray.
- 12 Fix heating and cooling coils to prevent air leakage around coils. On air side control units "carry over" from heating coil to be no greater than 100W when the unit is in full cooling and the heating coil has the design heating water flow rate
- 13 Form heating and cooling coils from copper tube and aluminium fins. Provide manual air vent and drain cock on each coil.

- 14 Provide adequate access to remove components in one piece. Filter to be easily withdrawn from installed position.
- 15 Provide access to moving parts with airtight doors.
- 16 Provide supply plenum with quantity / size of spigots as indicated on the drawings.
- 17 Provide factory fitted acoustic and thermal lining to boxes with all edges sealed and finished to prevent material migration. Insulation to be Class O surface to relevant part of BS 476 and BS ISO 5660-1.
- 18 The motor frame shall be totally enclosed and fitted with maintenance free sealed for life bearings. Motors shall be insulated to BS EN 60085.
- 19 Fan and motor assembly shall be fitted with a continuously rated motor. Electronically commutated direct current type EC / DC to be rated for continuous operation with inbuilt overload protection devices, and shall be capable of performance control via a 0 to 10 Volt dc signal to give infinitely variable speed control.
- 20 All fan and motor assemblies shall be statically balanced to prevent the transmission of vibration and the complete assembly shall be fitted with neoprene rubber mounts.
- 21 Provide a return air filter classified to BS EN ISO 16890-1 as coarse 50%. Polyester fibre or galvanised steel woven wire mesh (coarse 40%).
- 22 The FCU shall be provided with a 2m long flex and the electrical contractor shall connect the flex into the fuse connector unit The flex shall be adequately supported so as to not impose and strain on the cable terminals
- 23 Install in accordance with the manufacturer's recommendations to give a neat appearance with supports out of view. Ensure equipment is firmly fixed and level.
- 24 The fan coil unit plenum discharge ducts have been sized as follows:
 

Each discharge branch volume up to and including 40 l/s	–	160 diameter (mm)
Each discharge branch volume 40 l/s to 80 l/s inclusive	–	200 diameter (mm)
Each discharge branch volume exceeding 80 l/s	–	250 diameter (mm)
Each discharge branch volume exceeding 125 l/s	–	300 diameter (mm)

It is the responsibility of the contractor to ensure the final fan coil units selected are provided with plenum spigots sized in accordance with the parameters listed above.
- 25 All fan coil unit discharge spigots which are not utilised shall be fitted with removable caps with material and lining to match the discharge plenum. Refer to drawings for quantity and locations of spigots.
- 26 All motor/fan assemblies shall be suitably isolated from the unit casing using anti vibration mounts.
- 27 Commissioning information required:  
Air volumes, Motor input power, (which for an EC motor must be read from a meter which calculates the real power from the harmonics present), power factor and SPF for EPC calculations
- 28 Provide product information / instruction manuals in accordance with EU Regulation 2016/2281 with regard to ecodesign requirements including information on disassembly, recycling and/or disposal.

## U70sch – Schedule of Air Curtains and Overdoor Heaters

The design intent is that a new overdoor heater is provided as detailed within clause 70 Section 1 Scope of Work of the MEP Specification

The Contractor shall be responsible for completion of the schedule below detailing the proposed equipment for submission to the Client as part of their Technical Submission

	Overdoor Heater Ref			
	ODH 1	ODH 2	ODH 2	ODH 2
Location				
Type	Electric			
Inside air temperature (°C)				
Outside air temperature (°C)				
Mounting arrangement	Horizontal above door			
Mounting Height (m)				
Door width (m)				
Door height (m)				
Heating Duty @ max air volume (kW)				
N° of fan speeds				
Fan motor type	EC			
Fan speed control method				
Casing finish				
Heating Medium	electricity			
Hot water flow temperature (° C)				
Hot water return temperature (° C)				
Max heating coil pressure drop (kPa)				
Power Supply	1ph			
Electrical load (A)				
Room Noise level	NR xx			
Ancillaries:				
Controls:				
BMS interface requirements:				

### Notes

1. Provide a totally enclosed, sealed for life, continuously rated induction motor in accordance with BS 4999, BS EN 50347 or BS EN 60034 as applicable complete with overload protection.
2. Provide fans, motor and drive assembly mounted on base frame, isolated to prevent transmission of vibration to unit.
- 3.

# W15sch – Schedule of Facilities for the Disabled

---

## Standards

Combine the following systems to provide an integrated system

Refer to all relevant Part 1 and Part 3 clauses in W15 and scope of works / system description and any specific standards in this schedule.

\* Fire detection and alarm.

\* Public address.

## Disabled Alarm Control

Standards

Toilet Alarm Indicators – Building regulations Approved Document M Section 4.

Type

Application

Method of displaying calls

Indicators

Individual lamp for each call point.

Combination of lamps

Normal calls steady

Emergency flashing

LED

Filament lamps

No lamps

Yes/No

Type of lamps

Display of attendant presence

Mimic diagram

Audible warning of calls

Control unit speech system

Type

Duplex system

Simplex system with push to talk switch

Loudspeaker and microphone

Telephone handset

Lamp.

>

Receiver type

Call identification

Cancellation of calls

Connection of control unit to paging system

Physical requirements

Dimensions (mm)

Weight (kg)

Mounting

## Disabled Alarm Control Power Supply Unit

Type

Application

Input

Mains

Standby power supply

230V 50Hz ac

Integral battery

Separate battery - Battery, enclosure and charging system to comply with BS EN IEC 62485-1 and BS EN IEC 62485-2

Duration

Type

Trickle charged battery

Floating secondary battery

Output

Voltage

Nominal 24 Volts DC

Current rating

Smoothing

Physical requirements

Dimensions (mm)

Weight (kg)

Mounting

Battery

Dimensions (mm)

Weight (kg)

Mounting

## W15sch – Schedule of Facilities for the Disabled

---

### Call and Reset Unit

Type

Application

Mounting

Ceiling mounted pull cord

Wall mounted

Ceiling mounted pull cord, bangles as AD M 4.30e.

Flush.

Surface

Facilities

Call push

Push button

Colour

Illuminated by LED

LED amber or red lens

Reassurance lamp

Integrated loudspeaker and microphone

Two way communications

Handset

Reset

Integral with unit

Separate

With reassurance lamp

Attendance present signal

At control unit

### Slave Indication Units

Type

Application

Mounting

Panel mounting

Wall mounting

Flush.

Surface

Facilities

Indication of calls

### Over Door/Corridor Lamp and Local Sounder

Type

Application

Mounting

Wall

Ceiling

Indications

Twin lamps

Lamp type

Minimum 2.5 Watts

Lens

Material

Polycarbonate

Colour

Amber

Sounder

## System

Standards

BS5839-1, relevant parts of BS EN 54

System Category (area by area)

Connection to Brigade or Central Monitoring Station

Form of Communication

Interface for communication

Type of control system

Yes – CMS

BT Line

Fire alarm panel – Separate terminals

Analogue addressable

**Manual Call Points** (W50/310.011)

### Mode of operation

Indication of operation

Fault indication

Protection against accidental operation

Mounting

Degree of protection to BS EN 60529

Hazardous area classification

### Automatic Detectors:

Point Detectors – General (W50/310.021):

Mechanical device to restrict detector type

Detector locking device

Visible fault indication

Colour of devices

Combined sounder / detector:

Separate address

White

Heat Detectors (W50.310.031):

Point Type:

Rate of rise and fixed element temperature detectors:

Applications:

Heat response category to BS EN 54-5 :

Non-resettable line type to BS EN 54-28

Applications

General Use

(Ambient

temperatures < 25°C)

A2R

High Temperature

((Ambient

temperatures < 55°C)

CS

Smoke Detectors (W50/310.041)

Point Type:

Aspirating Type:

Optical beam type:

Duct type:

Video analysis type:

Combined smoke and heat detector:

Application

Radiation (Flame) Detectors (W50/310.051)

Point Type:

None

Radiation sensitive cells:	
Ultra violet detector:	
Applications	
Wavelength	190 to 260nm
Performance	0.2m natural gas flame at 12m
Response time	<15s
Infra-red detector:	
Applications	
Wavelength	4.1 to 4.8m
Cone of vision	90°
Range for 2MW fire	25m
Multi-sensor detectors (W50/310.061)	Application
Point detectors with combination of smoke and heat sensors	
Point detectors with a combination of carbon monoxide and heat sensors	
Point detectors with a combination of smoke, carbon monoxide and heat sensors	
<b>Sounders (W50/310.071)</b>	
<b>First coincidence</b>	Bell / Electronic Sounder /Klaxon/Siren
<b>Second coincidence</b>	Bell / Electronic Sounder /Klaxon/Siren
<b>Addressable</b>	
Colour of devices	Signal Red
Combined sounder / detector:	
Separate address	
Degree of protection to BS EN 60529	
Hazardous area classification	
<b>Automatic Release Mechanism (W50/310.171)</b>	
Type	
Manufacturer and reference	
Door release	
Category (BS 7273-4)	
Type and characteristics:	
Door holder:	
Mounting	
Door closer:	
Mounting	
Operation	
Actuator	
Nominal holding force	
Residual force	
Power supply	
<b>Fire Alarm Control and Indicating Equipment (CIE) (W50/310.081)</b>	
Standards	BS 5839-1, BS EN 54-2, BS EN 54-4
Standard functions	Yes
Additional functions	Interface for additional features only



Mounting	Flush / Surface / Semi Flush
Assembly Construction	
Material of Enclosure	
Display components	
Degree of Protection to BS EN 60529	Mounted on hinged front cover / Behind hinged front panel
Accessibility	IP43
Enclosure material / finish / Legend Types	By a special tool / Key lock etc,...
Colour	
Mains Supply Characteristics	230V ac 50Hz
Protective Device	MCB 20 Amps
Power Supply (Charger and Batteries)	Integral, Partially integral / Separate
Backup duration (24 hours is BS requirement)	24 hours, (measured at the end of cell life)
Future Expansion	Allow charger and cell capacity for 20% additional devices on each zone or loop
Indication of origin of alarms	
Zone indication	
Alpha numeric display	
Fields	
Number of characters	
Détection zone location	
Visual display	Integral with CIE
Backup display	Separate panel
Repeat display	Graded series of displays
Printer	LED backlight
Panel Mounted	
Number of characters / output size	32 / 80 characters
Columns	- Numbered list
	- Specially prepared plan of building, permanently mounted adjacent to the indicator panel.
	- Mimic diagram permanently mounted adjacent to indicator panel.
	VDU / LCD and size / resolution
	Yes / Remote / None
	20,24,40,80
General	
System processor	Microprocessor based with Modular Software and Deadlock prevention
Execution monitoring in accordance with BS EN 54-2	1 hour cycle
Execution failure safe state	
One man walk test and commissioning feature	Yes
Monitoring circuit	
Configuration data	Non-volatile memory
	Volatile memory
	Alterable memory, programmable at Levels 1 and 2. Manual action to be provided at Level3 prior to data change.
	1 hour
	24 hours
	Read write programming protection
	Battery backed ROM / RAM
Automatic check	
EEPROM	
Configuration updates performed on site	
Configuration data copied on to floppy disc	
System fault protection	No more than 512 detectors affected by the first fault

Maximum number of addressable points controlled by a single processor	200
Key switch positions	<ul style="list-style-type: none"> <li>- Normal, key free Level 1</li> <li>- Normal, key trapped Level 1</li> <li>- Enable Level 2</li> <li>- Test Display</li> <li>- Scroll</li> <li>- Silence</li> <li>- Sound Alarm</li> <li>- Sound Alert</li> <li>- Reset</li> <li>- Evacuate</li> <li>- Silence Alarm</li> <li>- Reset</li> <li>- Alert</li> <li>- Class change</li> <li>- Programmable ....</li> </ul>
Remote Inputs to CIE	
System Configuration	
Capable of operating	<ul style="list-style-type: none"> <li>- Conventional detectors</li> <li>- Addressable two state detectors</li> <li>- Multi-state addressable detectors</li> <li>- Analogue addressable detectors</li> </ul>
Division of addressable loops into zones	One fault not to disable more than 32 detectors
Capacity of addressable loop	
Number of zones	
Minimum No of Devices (capacity)	
Maximum Number of fully loaded detection loops	
Fault protection by line isolators	
Line isolator operation time	99
Address allocation	<ul style="list-style-type: none"> <li>- At zone boundaries</li> <li>- At each addressable device</li> <li>- At each addressable sensor</li> </ul>
Distributed CIE	Within 2s of fault
Interfacing	Independent of physical arrangement of loops.
	<ul style="list-style-type: none"> <li>- Other CIE/Systems</li> <li>- Standardise input/output interface for Fire Brigade Panel</li> <li>- Electronic paging systems</li> <li>- Repeater panel (with / without essential controls)</li> <li>- Public Address System</li> <li>- Voice alarm system (control and indicating equipment to BS EN 54-18)</li> </ul>
Basic System Functions	
Monitor status	<ul style="list-style-type: none"> <li>- All devices on addressable loops.</li> <li>- Short circuit and Open circuit faults.</li> <li>- Incorrect addressing.</li> <li>- Unauthorised device removal or exchange.</li> <li>- Pre alarm condition.</li> <li>- Detector contamination.</li> <li>- Internal connections.</li> <li>- Interfaces.</li> <li>- Chargers.</li> </ul>

Audible indication Visual Indication Lamps / LED's	<ul style="list-style-type: none"> <li>- Battery.</li> <li>- Remote signaling.</li> <li>-</li> <li>- Power on - Green.</li> <li>- Quiescent condition [.....]</li> <li>- Fire Alarm - Red.</li> <li>- Fault Warning - Yellow.</li> <li>- Disabled/Isolated - Yellow.</li> <li>- Fire zones - Red per zone.</li> <li>- Test condition - Yellow.</li> <li>- Output to fire alarm routing equipment - Red.</li> <li>- Output to fire protection equipment - Red.</li> <li>- Output to fault warning routing equipment - Yellow.</li> <li>- Flashing [.....]</li> <li>- Steady [.....]</li> <li>- Sound Alarms/Evacuate.</li> <li>- Silence Alarm</li> <li>- Audible signal if not reset.</li> <li>- Silence Control Sounder.</li> <li>- Test Alarms.</li> <li>- Reset fire.</li> <li>- Level 1.</li> <li>- Combined with control sounder silence at Level 2.</li> <li>- Lamp Test.</li> <li>- Cancel Fault Buzzer.</li> <li>- Keypad.</li> <li>- QWERTY keyboard and function keys</li> <li>- Level 1 - No restriction.</li> <li>- Level 2 - Operator <ul style="list-style-type: none"> <li>- By key.</li> <li>- By code</li> </ul> </li> <li>- Level 3 - Servicing <ul style="list-style-type: none"> <li>- By key.</li> <li>- By code</li> </ul> </li> <li>- Level 4 - Engineering <ul style="list-style-type: none"> <li>- External device</li> </ul> </li> <li>- Alarm</li> <li>- Fault</li> <li>- Isolated</li> </ul>
Push Buttons or Switch Controls	
Access, levels	
Zone status indicators	
Alarm Monitoring Functions: Interrogate addressable devices	<ul style="list-style-type: none"> <li>- Order of scanning.....</li> <li>- Every 2 seconds</li> <li>- Fire conditions</li> <li>- Pre-fire conditions</li> <li>- Super fire conditions</li> <li>- Multiple fire conditions</li> <li>- Coincidence detection</li> </ul>
Analysis of sensor output against fire algorithms to differentiate between	

Response to alarm conditions	
Alarm Output Functions	
Monitored output circuits	
Two stage programmable alarm sounder	
Logic outputs	
Audible indication of alarm	
Alarm controls	
Output to fire protection equipment	
Disable warning at level 3	
Sound outputs	
Alert	
Evacuate	
Special Event	
Time delay sequences for alarm response	
Silent to alert	
Alert to evacuate	
Silent to user defined tone	
Delay sounder output	
Delay override	
Delay transmission to central station for;	
Alarm Zone Location	
Supervision and Fault Reporting	
Faults to be reported	
Short circuit and Open Circuit;	
Others	
	<ul style="list-style-type: none"> <li>- Transient contamination</li> <li>- Permanent contamination</li> <li>- Sensor condition</li> <li>- Non-fire events</li> <li>- For detectors; not to exceed 10 seconds, with output not more that 2 seconds later</li> <li>- For Manual Call Points not to exceed [1, 2 or 3] seconds.</li> </ul>
	<ul style="list-style-type: none"> <li>- Silenced at Level 1</li> <li>- Silenced at Level 2</li> <li>- Alarm reset</li> <li>- Alarm output silence</li> <li>- Alarm Acknowledge</li> </ul>
	<ul style="list-style-type: none"> <li>- Pulsed tone</li> <li>- Continuous tone</li> <li>-</li> </ul>
	<ul style="list-style-type: none"> <li>- 2 minutes</li> <li>- Inhibit delay if building occupied</li> <li>- No delay on activation of manual call point</li> <li>- A numbered list.</li> <li>- Specially prepared plan of build, permanently mounted adjacent to the indicator panel.</li> <li>- Mimic diagram mounted adjacent to indicator panel.</li> <li>- Integrated with Detection Zone display</li> </ul>
	<ul style="list-style-type: none"> <li>- Detection loops</li> <li>- Sounder cables</li> <li>- Conventional Detector Circuits</li> <li>- MCP Circuits</li> <li>- Ancillary devices circuits</li> <li>- Voice alarm system</li> <li>- Emergency Communication System (EVS)</li> <li>- Repeat or Secondary Indicators</li> <li>- Un-configured device</li> <li>- Addressable device failure</li> <li>- Device not responding</li> </ul>

Fault Sounder  
 Fault Indication  
     Silence Fault Warning  
  
     Reset  
  
 Fault Output  
  
 Zone fault Indicator  
 Test Message to define and locate fault  
 Monitor status of auxiliary units  
 Fault response time  
 Processor fault count  
 Auxiliary fault output  
 Delay generation of event

System Management System (available at Levels as required by BS EN 54-2)  
 Management Facilities  
     Isolate and re-connect

- Double Address
- Incorrectly configured device
- Detector condition
- Detector removed
- Sounder condition
- Repeater or Remote printer failure
- Repeater or Secondary indicators fault
- Earth fault
- Main Power fault
- Standby Power fault.
- PSU fault.
- Charger fault.
- Battery fault.
- Battery critical.
- Mains failure.
- Auxiliary PSU failure.
- Total loss of power [.....]
- Fuse failure.
- Relay Output fault.
- System fault [.....]
- Signaling fault.
- Scanning or interrogation failure.
- Processor failure.
- Memory check error.
- Memory configuration data loss.
- Processor failure
  - Re-initialise, record and reset.
  - Re-initialise, reset and indicate fault.
  
- Level 1
- Level 2
- Automatic
- Manual
- On de-energising
- Suppress during fire
  
- Less than 100seconds
- 1000
  
- Normal de-bounced contacts 6 seconds
- Fluctuation contacts (e.g. sprinkler valve flow switches) 40 seconds
  
- Addressable point

- Detector zone
- Sounder zone
- Remote center signaling
- Cleanliness
- Condition
  - First zone alarm top of field
  - Most recent zone alarm
  - Total number of alarms
  - Alarm scrolling
  - Alarm display reversion
- Event log
- Event log capacity
- Analysis of sensor data
- Interrogation of sensor cleanliness
- Loop map connections
- Enabled and disabled sensors
- Fire plan configuration
- Address locations
- Initialisation log
- Fault Status
  - Fault log
  - Fault indication suppression override
  - Disablement
- Point Isolated status
- Zone isolated status
- Point address status
  - Address displayed/printed
    - As numerals
    - As alphanumeric code
- Non-fire event status
  - Non-fire log.
- Zone alarm status.
- Zone fault status.
- Clear display function for non-fire events.
- Cycle or scroll display
- Alarm status
  - Alarm log.
- System events
  - Event log.
  - Event log capacity
- Current fault and warning logs
- Analysis of sensor data
- Interrogation of sensor cleanliness
- Loop map connections.
- Enabled and disabled sensors.

Walk-test of zones to verify detectors and sounders  
Interrogate sensor

Display on alphanumeric display via menu system  
Alarm log

System events

Print, via menu system

Weekly system audible and visible warning test (BS 5839-1). Disable/re-enable at level 2	
Isolated devices reset after pre-set time Co-incidence detection setting zone by zone Real time clock adjustment] Event counter	
Test facilities	
Site configuration updating	
Division of addressable loops into zones CIE programmable Communications with remote center	
Communications link	
CIE Networking	
<b>Repeater Panel (W50/310.091)</b>	
Standards	

Fire plan configuration.	
Address locations.	
Initialisation log	
Fault status	
- Fault log.	
Point isolated status.	
Zone isolated status	
Point address status	
- Address displayed/printed	
- As numerals	
- As alphanumeric code	
Non-fire event status	
- Non-fire log	
- Zone	
- Fire detection equipment output	
- Fault warning routing equipment.	
- Sounder.	
- Fire alarm routing equipment.	
- Addressable points	
?? Minutes	
- Manual display	
- Automatic display	
Memory check	
- Manual	
- Automatic	
- Cycle 7 days or less	
- Loop map connections	
- Addressable device label change.	
- Address allocation.	
-	
Signals	
- Alarm.	
- Fault.	
- Zone indications.	
- RS 232	
- RS 485	
- Voice over Internet Protocol (VoIP)	
- Ethernet	
- Intranet	
- Internet	

Functional Requirements

Visual display

Controls

Printer  
Mounting

Mounting

Assembly Construction

Material of Enclosure

Display components

Degree of Protection to BS EN 60529

Accessibility

Enclosure material / finish / Legend Types

Colour

Power Supply

Mains Supply Characteristics

Protective Device

Power Supply (Charger and Batteries)

Backup duration (24 hours is BS requirement)

**Mimic Panel (W50/310.101)**

Standards

Functional Requirements

Visual display

Fire Brigade Panel

– Standardised input/output interface to CIE

Repeat indication within 5 seconds of CIE indications

CIE Indication

CIE Display

Clock

Alarm

Faults

Zone alarms

Zone faults

Transmission to fire alarm routing equipment.

Transmission to fire protection equipment

Disablement

– Sounder.

– Fire alarm routing equipment.

Sound Alarm.

Silence audible indication

Disable/re-enable sounders

Disable/re-enable signals to fire alarm routing equipment.

Silence Alarm.

Reset fire.

– Flush.

– Surface

Flush / Surface / Semi Flush

Mounted on hinged front cover / Behind hinged front panel

IP43

By a special tool / Key lock etc,..

To match main control and indicating panel

From Detection Loop or Local / Integral Power Supply

230V ac 50Hz

MCB 20 Amps

Integral, Partially integral / Separate

24 hours, (measured at the end of cell life)

BS EN 54-2

CIE Indication

CIE Display

Clock

Alarm

Faults



Controls	Sound Alarm. Silence audible indication Reset fire.
Site Plan	
Hardware	Laminated plastic colour coded Engraved stainless steel Site re-programmable Illuminate; - Sensor in fire - Zone in fire LED in each area & each zone LED for each device
Software	
Mimic Construction	
Printer	Fireman's Emergency Ventilation Controls Fire Officer's Microphone Flush / Surface / Semi Flush
Ancillaries	
Mounting	
Assembly Construction	
Material of Enclosure	
Display components	
Degree of Protection to BS EN 60529	
Accessibility	
Enclosure material / finish / Legend Types	
Colour	
Power Supply	
Mains Supply Characteristics	
Protective Device	
Power Supply (Charger and Batteries)	
Backup duration (24 hours is BS requirement)	

Mounted on hinged front cover / Behind hinged front panel IP43 By a special tool / Key lock etc,..  From detection addressable loop or Local / Integral Power Supply 230V ac 50Hz MCB 20 Amps Integral, Partially integral / Separate 24 hours, (measured at the end of cell life)
--

Fire Alarm System Ancillaries (W50/310.181)

### EN 54-5 Classification of Point Heat Detectors:

Table 1 — Detector classification temperatures

Detector Class	Typical Application Temperature °C	Maximum Application Temperature °C	Minimum Static Response Temperature °C	Maximum Static Response Temperature °C
A1	25	50	54	65
A2	25	50	54	70
B	40	65	69	85
C	55	80	84	100
D	70	95	99	115
E	85	110	114	130
F	100	125	129	145
G	115	140	144	160

In addition to the basic classification, a detector may be given an 'R' or 'S' suffix. The 'R' suffix indicates that the detector has been shown to have a rate-of-rise characteristic. Such a detector will still give a rapid response even when starting from an ambient temperature well below its typical application temperature. This type of detector is therefore suitable for areas such as unheated warehouses in which the ambient temperature may be very low for long periods.

The 'S' suffix on the other hand indicates that the detector will not respond below its minimum static response temperature even exposed to high rates of rise of air temperature. This type is therefore suitable for areas such as kitchens and boilers rooms where large, rapid temperature changes are considered normal

Service	Material	Finish	Joints	Fittings	Notes
Natural Gas (internally) LPG Fuel Oil Gaseous fire fighting Foam fire fighting	Up to 150mm Carbon Steel to BS EN 10255 or BS EN 10217-1 (Heavy).  200mm & above to BS EN 10216-1 (seamless) or BS EN 10217-1 (Welded)	Black, varnished	Up to 50mm screwed or welded	Malleable cast iron to BS 1562 or wrought steel to BS EN 10242 to suit the application	On natural gas systems carry out non destructive testing on 10% of butt welds and on 5% of welded flanges including pre-fabricated works. Gas pipework installation to be in accordance with IGEN / UP / 2 edition 3 and IGEN / G / 5 (for gas in flats and Multi-dwelling buildings)  Ensure that there are flanges adjacent to all items of equipment to allow removal and maintenance.  Oversize insulation to be provided to the adjacent pipework where required to maintain the surface when insulating the fittings.
			65mm and above Welded and Flanged	Carbon Steel to BSEN 10253	
			Up to 50mm screwed or grooved	Malleable cast iron	
			65mm and above Welded and Flanged or grooved	Carbon Steel to BSEN 10253	
Chilled Water LTHW LTHW cold Feeds Condenser water					
Sprinkler	Steel to BS EN 10255 up to 150mm, medium 200mm & above to BS EN 10216 / BS EN 10217	Black, varnished	Welded, grooved or screwed	Carbon steel to BSEN 10253	Comply with BS EN 12845
			65mm and above Flanged	Carbon steel to BSEN 10253	
Equipment Drain and vent Lines other than for water services. Vacuum (non medical)	As above, up to 150mm Galvanised, 175mm and above GAM	Galvanised	Up to 50mm screwed	Malleable cast iron	Bends and Tees to be long radius type.
			65 to 100mm Flanged	Galvanised wrought steel	
			125mm flanged	Galvanised malleable cast iron	
Dry Risers Wet Risers					
Mains Cold Water Cold Water Down Services Hot Water Services HWS Cold Feed Overflows Warning Pipes Condense drains Hose reel service LTHW final connections Chilled water final connections ASPs Waste and vent lines 54mm Equipment vent and drain lines for water services	Copper to BS EN 1057 R250	Uncoated	Up to 108mm lead free integral solder ring  133mm to 159mm Brazed/Flanged	To match system used	Fittings for waste installations shall be waste type, swept in the direction of flow. Grease-based flux shall not be used Fittings / joints for domestic waster systems to be as this schedule. However compression joints which form only an integral part a system valve or terminal apparatus may be considered where system pressures do not exceed the pressure ratings of the proposed fittings.

Service	Material	Finish	Joints	Fittings	Notes
Boosted Cold Water Residential Rising Mains	Thin wall stainless steel grade 316L/1,444. Stainless steel pressued collars in accordance with BS EN 1092-1 used with metric bore mild steel Akzo Noble Resicoat R4 green coated backing flanges	Uncoated / coated flanges	Flanged	-	Working pressure – 16barg Include foil faced insulation to complete system
Refrigeration and air conditioningg	Copper to BS EN 12735-1 (BS EN 12735-2 for tubes for equipment)	uncoated	brazed	capillary	cleaned, nitrogen-purged and capped.
Waste pipes and anti siphon pipes	Up to 80mm, copper to BS EN 1057 R250	uncoated	lead free integral solder	capillary	Acceptable Alternative – plastic PVC-U to BS EN 1329-1 / BS 4514 for for system components or requirements not covered by EN 1329-1 socket and spigot for solvent welding
Soil floats and associated anti siphon pipes	100mm and above, copper to BS EN 1057 R250	uncoated	lead free integral solder	capillary	Acceptable Alternative – plastic PVC-U to BS EN 1329-1 / BS 4514 for for system components or requirements not covered by EN 1329-1 socket and spigot for solvent welding
Discharge stacks	80mm and above Cast iron to BS EN 877 / BS 416	Hot dipped	Mechanical	Cast Iron to BS 416	
Internal rainwater	Up to 67mm Copper to BS EN 1057 R250 80mm & above Cast Iron to BS 416 / BS EN 877	CI Hot dipped	Mechanical		
Below ground foul and surface water					Repair works to suit existing materials

#### Notes

1. Steel fittings for use in applications covered by the Pressure Equipment Regulations 2016 to be seamless type B to BS EN 10253-2, suitable for full service pressure.
2. Plastic coated copper tube to be manufactured in accordance with BS EN 13349 (ref clause Y10.2272)

Service	Operating temp (°C)	Duty	Size	Type (The number in brackets after description refers to Y11 specification clause number)	Accessories & Notes
LTHW CHW Condenser water		Regulation and Commissioning	15mm - 50mm	Bronze Single valve measuring station/ commissioning set (2230A)	
			65mm & above	Cast Iron Single valve measuring station/ commissioning set (2230C) for globe valve type or 2210 + 2230C for butterfly valve type	
		Differential pressure control	20mm & above	In-line direct acting (2422)	
		Isolation	15mm – 50mm	DZR lever operated ball valve (2081)	
			65mm & above	Semi lugged butterfly valve (2090z)	EPDM seat. 250mm to be geared
		Radiator isolation	Up to 22mm	Bronze radiator valve with wheelhead (2260 A)	Polished chrome finish
		Radiator regulator	Up to 22mm	As above with lockshield (2260A)	Polished chrome finish
		Radiator temperature control	Up to 22mm	Thermostatic radiator valve (2270)	Polished chrome finish
		Drain off	15mm – 25mm	Bronze gland cock (2440A)	Provide with hose union and screw cap
		Strainer	15mm – 50mm	Bronze Y type : Stainless steel screens (2681) Or suction guide / strainer at pump suction (2682)	
			65mm & above	Cast Iron Y type : Stainless steel screens (2681) Or suction guide / strainer at pump suction (2682)	
		Non return/ check	15mm – 50mm	Bronze swing type (2320z)	
			65mm & above	Cast Iron swing type (2330z)	
		Air venting (at high points in distribution pipework)	15mm – 50mm	Bronze gland cock (2470) or Automatic air vents where specifically indicated (2511)	
		Deaerator and dirt separator LPHW (Plant room)	Up to 300mm	Microbubble type (2524) or pressure step vacuum degasser (2521) for static head greater than 15m	Refer to schedule Y11sch4 for detail requirements / duties
		Deaerator and dirt separator CHW (Plant room)	Up to 300mm	Microbubble type (2524) or pressure step vacuum degasser (2521) for static head greater than 5m	Refer to schedule Y11sch4 for detail requirements / duties
LTHW Heating and Hot Water Supply		Safety Valves	15mm – 50mm	Bronze pop safety valve (2430A)	
			65mm & above	C.I. pop safety valve (2430C)	
		Permanent Vents	15mm – 50mm	3 way DZR ball valve (2490)	
			65mm & above	3 way cast iron plug cock (2500A)	
Hot Water Supply and Cold Water Supply		Thermal Isolation	15mm & 22mm	Stop valve. Ball type valves Allen key operated (2081)	WRAS approved
Hot Water Supply and Cold Water Supply		Pressure Reduction	15mm and above	Bronze valve with stainless steel integral strainer and pressure adjustment / gauge	WRAS approved Constant outlet pressure required irrespective of flow Refer to scope of works for S10 / S11, schedule S10sch1 or drawings for maximum and minimum operating range

Service	Operating temp (°C)	Duty	Size	Type (The number in brackets after description refers to Y11 specification clause number)	Accessories & Notes
Hot Water Supply, Cold Water Down Service and Cold Feeds internally		Isolation of individual sanitary appliances for maintenance	15mm-22mm	Servicing valves to BS 6675 (2085z)	WRAS approved
		Isolation	15mm – 50mm	Stop valve, Ball type, wrench operated (2081)	WRAS approved
			65mm & above	Semi lugged butterfly valve (2090z)	Nitrile seat, WRAS approved
		Regulation	15mm – 50mm	Bronze DRV (globe type) (2151)	WRAS approved
			65mm & above	Semi lugged butterfly valve (2090z)	Nitrile seat, WRAS approved
		Anti-vacuum		To BS EN 14451	WRAS approved
		Showers	15mm – 35mm	Thermostatically controlled mixing valve	WRAS approved. (refer to clause S11.300.050 and S11 scope of works for details)
Mains Cold Water Internally		Isolation	15mm – 50mm	Stop valve, Ball type, wrench operated (2081)	WRAS approved
			65mm & above	Semi lugged butterfly valve (2090z)	WRAS approved
		Isolation (potable water supplies)	15mm – 50mm	Copper alloy stop taps to BSEN 1213 (2015)	WRAS approved
		Backflow prevention		RPZ valve - Refer to scope of works (2395A,B,C,D)	WRAS approved
		Anti-vacuum		To BS EN 14451	WRAS approved
Mains cold water externally		Isolation	15mm to 50mm	C.I. Stop tap to BS 5433	WRAS approved
			65mm & above	Cast iron sluice valve (2007)	WRAS approved
Mains Cold Water Supply Softened water and pumped supplies		Float operated valves	15mm to 150mm	Bronze equilibrium (2290A) or Bronze, delayed action valve (2290z) (Delete as appropriate to suit particular project)	WRAS approved
Domestic Water Services Inside and Outside Plantrooms		Drain off	15mm	Bronze gland cock (2440A)	WRAS approved To be provided with hose union screw cap
Natural Gas (Comply with the requirements of IGEM/UP/2 edition 3)		Isolation (incoming external mains – buried)	50mm – 300mm	Wedge gate or parallel slide gate (2016)	Steel or iron (access chamber required)
		Plant isolation	32mm & above	Up to 50mm - cast iron lubricated plug valves with wrench and suitable sealing compound (2091) or ball valve (2016). Above 50mm lugged butterfly (2016)	Over 125mm to be provided with a gearbox and handwheel  With suitable fire resistance
				Wedge gate or parallel slide gate (2016)	Fire resistance and position indication required
		Burner and zone isolation / customer check meters	15mm – 200mm	Up to 80mm – ball (2016) 80mm or greater – butterfly (2016)	Valves to be fire safe. Over 125mm to be provided with a gearbox and handwheel
Fuel Oil					

**Notes**

1. This schedule shall be read in conjunction with the relevant Y11 specification clauses. Where applicable, refer to clause Y11.2127 for standards for thermoplastic valves
2. Valves to be used in, or connected to, water supply pipe systems, above or below ground carrying water intended for human consumption to comply with the relevant parts of BS EN 1074 and BS 5163.
3. **Thermostatic radiator valves**
  - Type of thermostatic head assembly
    - Integral sensor / selector
    - Integral temperature selector and remote sensor
    - Remote sensor incorporating the selector
    - Remote sensor / selector assembly
    - Separate remote sensor and selector units
    - Stand-alone integral electronic smart thermostat with Bluetooth control
    - Integral electronic smart thermostat with facility to control from remote central controller
  - Valve type / pattern
    - Without integrated pre-setting facility
    - With integrated pre-setting facility to limit the maximum flow through the valve
    - Dynamic pressure independent radiator valve with built-in differential pressure regulator to maintain constant differential pressure / set flow rate
  - Pattern / connections
    - Straight
    - Angle

## **Y11sch6 - Schedule of Differential Pressure Control Valves**

---



For details of the design intent of associated to the replacement of the existing pumps upon which this specification is based refer to Section 1 Scope of Work of the MEP Specification.

The Contractor shall be responsible for completion of the schedule below detailing the proposed equipment for submission to the Client as part of their Technical Submission

[illegible]

**Notes**

- Quoted pump duties are based on the following pressure loss allowances.  
Before ordering the pumps, the contractor shall adjust the pump pressures to suit pressure drops of actual components used in the systems and any changes to the layout, and quantities of bends etc from that indicated on the tender drawings.  
Ensure scheduled volume is provided when operating against resistance of system corrected for changes between specified and selected component resistances.

Item	kPa
3 or 4 Port control valve up to 25mm	10
3 Port control valve heating 32mm & above	15
3 Port control valve cooling 32mm & above	40
2 Port control valve	25
2 Port pressure Independent control valve (PICV)	25
Differential pressure control valve	30
TRV's	5
IV's	1
Commissioning stations up to 50mm	4.5
Commissioning stations 65mm & above	10
NRV's	10
Venturi's	1
Heating coils up to 15kW	10
Heating coils above 15kW	15
Cooling coils up to 15kW	10
Cooling coils above 15kW	40
Strainers	10
Pump flexible connections	1
Basket Filters	35
Combined Deaerator and Dirt separator up to 50l/s	2.5
Combined Deaerator and Dirt separator greater than 50l/s	10
Radiant Panels	0.5
Radiator	2
Fan coil units	10
In duct coils	25
Chilled beams – cooling & heating coil	10
Boilers	25
Chillers	50
Plate Heat exchangers	50
Heat / Energy meters	10

2. Quoted pump duties include the following commissioning allowances:  
Flow rate 10%  
Head 15%
3. Select pumps for optimum efficiency in accordance with clause Y20.1020
4. Twin headed pumps are not to be used.
5. **Variable volume systems.**  
Pumps shall be selected with a steep curve in the anticipated range of the system.
6. Variable speed drives specified as integrated with the pump - the drive life expectancy shall be no shorter than the motor life expectancy.  
Refer to clause Y72.2191 for standard requirements for VSD's
7. 2 & 4 Pole TEFV, 3-phase, cage induction motors rated for 400 volts, 50 Hz, (outputs 0.75kW and above) shall have a rated efficiency at full load equal to or greater than the IE3 limit as defined in BS EN 60034-30-1 unless noted otherwise
8. Glandless circulators for heating and HWS circulation (single and twin headed) with motors up to 2.5kW maximum "Energy Efficiency Index" (EEI) to be **0.2** or better in accordance with EC directive 641/2009 and the amendment 622/2012. Pumps to utilise electronically controlled permanent magnet type or EC motor
9. Centrifugal pumps limiting "Minimum Efficiency Index" (MEI) to be **0.7** or better - in accordance with EC regulation 547/
10. **Testing Requirements:**  
Refer to clause Y20.1040
11. For systems pressure ratings refer to schedule A13 – Common Design Criteria

For details of the design intent in replacing the existing pressurisation and expansion units upon which this specification is based refer to Section 1 Scope of Work of the MEP Specification.  
The Contractor shall be responsible for completion of the schedule below detailing the proposed equipment for submission to the Client as part of their Technical Submission

Reference	PU			
System				
Location				
Ambient temperature (°C)				
Limiting overall dimensions LxWxD (m)				
Type	Packaged unit with break tank &,automatic make-up unit with pumps, control panel, diaphragm expansion tank,			
Pump Arrangement	Single			
System temperature limits (°C)	Maximum			
	Minimum			
System normal operating flow and return temperatures (°C)				
Maximum pressure at point of connection (bar g)				
Cold fill pressure (barg)				
Maximum height of system above P&E unit (m) [static head of system]				
System height below P&E unit (m)				
Test pressure (bar g)				
Energy Input into system (kW)				
System volume (l)				
Number of expansion vessels / volume (l)	Xx/xx(l)			
Fluid	Water or state % Gylcol			
Electrical Details				
Control panel rating @ 1ph 230V (A)				
Control panel IP rating	IP xx			

Reference	PU			
Alarms to be monitored by BMS				
Accessories	Water meter with pulsed output			

Notes

1. Include break tank with type AF air gap in packaged unit
2. Schedule to be read in conjunction with relevant T10, T60 or T61 Part 3 specification clause for standards, technical details and accessories
3. Install pressurisation unit (PU) and ancillary equipment including safety valve in distribution pipework (if not part of PU) in accordance with BS 7074 parts 1,2 or 3 depending on system
4. For systems pressure ratings refer to schedule A13 – Common Design Criteria

Ref	Service	Description	Capacity	Dimensions / Plate size	Insulation S – On site P – Pre-Insulated	Features (eg air gap requirements, connections, division plate)	Fluid Category to Water Supply (water Fittings) Regulations 1999.	Notes / class to BS EN 13280
CAT5-01	Category Five Water Service Break Tank In Basement Tank Room. For external car wash facility.	Local floor mounted break tank with integral fixed speed pump booster set	Integral 24litre break tank	700 x 570 x 505	MDPE integral tank	Integral type AB air gap Inflow 1 x 22mm Outflow 1 x 22mm Overflow 1 x 40mm Integral duty only pump set (Duty 0.3l/sec @ 0.3 bar) Fitted with factory fitted PRV on outlet to limit to 2 bar outlet pressure	Category 5	WRAS approved Local Cat 5 break tank & booster set based upon Arrow Valves Model BTAB700 or similar and approved. 1Phase electrical supply. 1.9A/0.65Kw.

## Notes

Storage tanks / cisterns shall comply with relevant British Standards and Water Supply (water fittings) Regulations 1999  
Unless otherwise indicated all tanks are to be provided with the ancillaries listed in clause Y21 3021 and the following:

- Boss connection to be provided for temperature probes. Probes to be positioned 300mm below top layer level and 300mm above bottom of tank.
- Boss connection to be provided on base tank for draining down proposed minimum size 50mm dia

Piped Service	Design Parameters				Electrical Supply	Tape type	Electrical Insulation	Application /Notes
	Minimum Fluid temperature to maintain (°C)	Ambient minimum temperature (°C)	Ambient maximum temperature (°C)	Start-up temperature (°C)				
Exposed CAT 5, BCWS and MWS pipework services, unheated areas	Dependent upon service	-5°C	40°C	5°C	10w/m at 5°C 1ph, 240v	Self-regulating	modified polyolefin	Frost protection. Refer to manufactures details for electrical supply requirements. Provide warning labels. As Pentair FS-A-2X system or equal approved. System to be provided with local control and alarm panel.

#### Notes

1. The heating cables shall be capable of demonstrating a lifetime in excess of 25 years.
2. The trace heating cable shall be terminated with insulation displacement connectors, tees, etc. and gel type end seals with no heat shrinkable components in use.
3. The trace heating system shall be straight traced or double traced or spiral traced where required to offset heat losses and generally installed, tested and commissioned strictly in accordance with the manufacturer's instructions and preferably by a specialist installer named by them.
4. All pipework with electrical trace heating shall be provided with suitable warning signs, spaced not more than 2 metres apart.
5. Thermal insulation shall be installed to pipework in accordance with trace heating manufacturer's recommendations.
6. The correct combination of thermal insulation (thermal conductivity / thickness) and heating cable (ie output / straight or double or spiral) shall be selected by the Trade Contractor to meet the design parameters.

System	System Volume (Litres)	Pipework Material	System operating temp and pressure °C / Bar	Chemical Cleaning Required Yes/No	Disinfection Required	Dosing Requirements	Deaerator / Dirt separator	Notes
LPHW				yes		yes	yes	Dosing pot to be provided
CHW				yes			yes	Refer to schedule Y11 Schedule 4 for details of Deaerator / dirt separator
Mains Water				N/A	yes			
Cold Water Service				N/A	yes			
Domestic HWS				N/A	yes			Facility for deaeration required in unvented system

### Notes

- All work on closed circulating systems shall be undertaken by a specialist contractor in accordance with the latest revision of BSRIA Guide BG29 (Pre-commissioning cleaning of pipework systems) and specification clauses Y25. This shall include the provision of all temporary or permanent flushing connections and pipework required plus treating the initial fill, pressure test water and any water used to top up the system during the construction period with biocide and dispersant to avoid biofilm formation prior to cleaning. The Contractor shall also take weekly microbiological samples of the water quality with results monitored and tracked and issued to the contract administrator from the initial fill onwards.
- Specialist water treatment contractor shall select cleaning, dosing and corrosion inhibitor chemicals.
- Allow for separate flushing pumps; achieve flushing velocities in accordance with BSRIA Guide BG29 (Pre-commissioning cleaning of pipework systems)
- Obtain consent from water authority for discharging chemicals/flushing water to drain, or allow for removal from site. If discharging to drain, check capacity of drainage system.
- All necessary, temporary or permanent flushing connections shall be provided.
- Provide temporary water supply for filling system in accordance with current water regulations and WRAS advisory topics Ref B09 (>45kW systems) and B22 (<45kW and domestic systems). The facilities shall be approved by the local water authority. If RPZ valves are installed they shall be tested by an accredited tester in accordance with WRAS document ref IGN-9-03-02
- Treat the initial fill and pressure test water and any water used to top up the system during the construction period with biocide and dispersant to avoid biofilm formation prior to cleaning.
- A specialist shall undertake all flushing & cleaning of the piped systems. The specialist shall specify the final water quality required, & specify the subsequent maintenance necessary for protection against corrosion. A method statement/ full proposals are to be submitted for comment before carrying out the works.
- Provide consumables including chemicals for a period of 12 months from handover, as outlined in clause Y25.2080z
- Include for service visits during the commissioning period and identify as an option in the tender cost for service visits during the defects period as outlined in clause Y25 3080z.



- During initial commissioning or following major remedial works, undertake water treatment, cleaning and flushing of circulating water systems and system protection by dosing with corrosion and scale inhibitors / biocidal products in accordance with the guidance and recommendations in BS 7593. For larger closed heating systems such as found in commercial or municipal premises, or the primary systems on residential developments, use BSRIA BG29.

System location /	DW 144 Pressure Classification (+ve or -ve)	Material	Operation: Variable volume or CV	Leakage Testing Required to DW143 Yes/No	% of system to be leakage tested	Cleanliness quality class BS EN 15780	Protection, Delivery & Installation Level (Ref BESA TR/19)	Post Installation clean Yes/No	Notes, finish/ fire rating requirements / other test requirements

#### Notes

- Connections between galvanised ducts and plastic ducts to be flanged
- Access doors to plastic ductwork to be flanged and bolted
- Clear PVC inspection panels, flanged and bolted are to be installed at all fire damper locations in plastic ductwork systems
- Grilles and diffusers and associated plenum boxes shall be supported independently of the ceiling grid unless indicated otherwise.
- Leakage testing to be in accordance with BESA DW 143 and the requirements of BS EN 12237 and BS EN 1507
- Refer to clauses Y30 3051 & 4091 for locations of cleaning access doors. The facilities incorporated in the ductwork fabrication / installation drawings shall be confirmed as acceptable by a specialist ductwork cleaning contractor prior to installation.
- Refer to clause Y30 3101 for flexible ductwork.
- Ductwork for smoke and heat control systems to comply with BS EN 12101-7 (tested to BS EN 1366-8 or BS EN 1366-9) and be classified in accordance with BS EN 13501-4 for integrity, insulation, leakage, mechanical stability and maintenance of cross section to suit application and fire rating requirements.
- Refer to Y50 for acceptable fire protection cladding systems and Y50 schedule for ductwork insulation and finish.
- External ductwork to be hot dip galvanised to BESA DW144. Refer to clause Y30 4041

For details of the design intent in providing new dampers upon which this specification is based refer to Section 1 Scope of Work of the MEP Specification.  
The Contractor shall be responsible for completion of the schedule below detailing the proposed equipment for submission to the Client as part of their Technical Submission

System	Function	Position	Damper type	Actuation	Notes
	AHU intake damper		Opposed blade		
	Balancing	Final connection to terminals	Iris		
		Others			
			Opposed blade		

The design intent in providing new fire dampers and smoke dampers a upon which this specification is based is to aaaccord with the requirement of the fire Strategy as detaild in Section 1 Scope of Work of the MEP Specification.

The Contractor shall be responsible for completion of the schedule below detailing the proposed equipment for submission to the Client as part of their Technical Submission

System	Damper Type Shutter / curtain type (blades out of airstream) or blades partially in air stream Intumescent, Hit & Miss, Motorised, smoke or combination fire/smoke	Rating Required (hrs)	Accessories Required	Notes / Control mode of operation

### Notes

1.	The "standard installation solution" proposed by the Contractor must be supported by a valid test report or assessment provided by an approved 3rd party.
2.	Installation to be in accordance with the methods detailed in HVAC DW/145
3.	Smoke control dampers to be in accordance with BS EN 12101-8 tested to BS EN 1366-10 and classified in accordance with BS EN 13501-4.
4.	For each motorised fire/smoke damper the manufacturer shall provide a local damper control damper unit (DCU). Panels shall be to a minimum IP54 and include a test switch to facilitate local damper testing. Each DCU will also have on-board Led status indication for power, communication active, damper open & damper closed.
5.	The damper manufacturer shall supply and commission a purpose designed damper control system as detailed in schedule Y30sch4
6.	Final wiring between DCU and damper to be by BMS specialist

## Y30sch4 – Schedule of Smoke / Combination Smoke-Fire Damper Control System

Control panel Ref	Type	Location	Number of dampers served	Notes / Interface requirements with fireman's control panel
	Hard wired			

### Notes

- Standards: BS EN54-2/4, relevant parts of BS 5839, BS 9999
- Refer to schedule Y30sch3 for details of dampers and local damper control units.
- A purpose made damper control system shall be supplied and commissioned by the damper manufacturer.
- The system shall intelligently control and monitor the dampers and operate via data loops from the main panel(s) to the local damper control units.
- Panels shall have an addressable network capability allowing control and monitoring of all dampers on the system from any panel.
- The damper system control panel(s) shall be constructed from mild steel with a polyester power coated finish, construction to be minimum IP54.
- The control panel(s) shall have integral LCD displays on the panel facia. The panel(s) shall display the system operating status and report faults on a continuous monitoring basis. The condition of the network shall also be monitored and the location of any break in the control loops displayed and the loss of communication with any remote module identified.
- Damper limit switches shall be monitored and should a damper not be made, a fault shall be raised at the panel with associated damper identification showing status ( i.e. open or closed fault)
- Remote BMS monitoring to be achieved by volt free contacts showing general fault and general alarm.
- Addressable panels / system shall be programmed to operate in accordance with the cause and effect strategy of the building.
- Addressable system shall provide data logging for at least 500 events that have occurred with the facility to download the data onto a PC.
- Input / output cards will be provided as necessary to provide remote control or status at the Fireman's Control Panel.
- Refer to scope of works for demarcation of installation requirements, including all data cabling, 230v power including non switched spur unit to local DCU's and panels, BMS links and Fire Alarm interface cabling.
- Data loop cabling shall be carried out using a suitable fire resistant cable to suit the system requirements. The installer shall liaise with the damper control manufacturer and the design engineer to confirm requirements.

For details of the design intent in providing new fire resisting and smoke /heat control ductwork upon which this specification is based refer to Section 1 Scope of Work of the MEP Specification.

The Contractor shall be responsible for completion of the schedule below detailing the proposed equipment for submission to the Client as part of their Technical Submission

SERVICE / SYSTEM (or section)	PURPOSE OF DUCTWORK	DUCT FIRE RESISTANCE TEST standard	DUCT TYPE / METHOD OF FIRE RATING and MATERIALS	PRESSURE CLASS DW 144	THERMAL INSULATION REQUIREMENTS	FIRE RATING			NOTES
						Stability (mins)	Integrity (mins)	Insulation (mins)	

#### Notes

1. Refer to Y30 specification clauses 2110C, and 2110D or 2110F as appropriate.
2. Refer to Y50 clause 2195 for fire protection cladding details.
3. Refer to Y30 clause 2065 for kitchen extract systems.
4. Thermal insulation thicknesses to be in accordance with tables in Y50.
5. Provide classification documents to BS EN 13501-3 & 4 and relevant test documentation for ductwork tested to BS EN 1366 Parts 1, 8 or 9. Classification Documents required to confirm that systems are suitable for horizontal and vertical applications and in both rectangular and circular profiles / sizes specified.
6. Ductwork for smoke and heat control systems to comply with BS EN 12101-7 (tested to BS EN 1366-8 or BS EN 1366-9) and be classified in accordance with BS EN 13501-4 for integrity, insulation, leakage, mechanical stability and maintenance of cross section to suit application and fire rating requirements.

For details of the design intent in the replacement of existing fans upon which this specification is based refer to Section 1 Scope of Work of the MEP Specification.

The Contractor shall be responsible for completion of the schedule below detailing the proposed equipment for submission to the Client as part of their Technical Submission

[illegible]

Notes:

1. The contractor is to validate the existing fan duties by survey and commissioning to establish the volume flow rate and pressure losses external to the fan unit. The selection of the new fans to be based on achieving a duty equal to the existing fans .
2. Before ordering the fans, the contractor shall adjust the fan static pressures to suit pressure drops of actual components used in the systems and any changes to the ductwork layout, types / quantities of bends etc from that indicated on the tender drawings.

2. The selected fan duties shall include the following commissioning allowances:-

	Low Pressure Systems	Medium & High Pressure Systems
On Flow Rates	10 %	5%
On Head	20%	15%

3. If the quoted fan sound power levels are exceeded by actual figures of fans selected, then the relevant attenuator insertion loss shall also be increased to maintain the permissible discharge and radiated noise levels.
4. 2 & 4 Pole TEFV, 3-phase, cage induction motors rated for 400 volts, 50 Hz, (outputs 0.75kW and above) shall be High Efficiency having a rated efficiency at full load equal to or greater than the IE3 limit (or IE2 limit if fitted with a VSD) as defined in BS EN 60034-30-1 unless noted otherwise.
5. Specific Fan Power (SFP) at 25% of design flow rate to be no greater than that achieved at 100% design flow rate
6. Overall fan/motor/drive efficiency as defined in BS EN ISO 12759.
7. All fans with motors larger than 1.1kW shall have variable speed drives
8. Demarcation of responsibilities and location of VSD –
9. Variable Speed Drive details / BMS interface –
10. Refer to clause Y72.2191 for standard requirements for VSD's
11. Kitchen extract fans to comply with BESA DW / 172.
11. Fan data required at commissioning:
  - i. Air volume
  - ii. Motor input power (which for an EC motor must be read from a meter which calculates the real power from the harmonics present)
  - iii.  $SFP_v$  for EPC calculations in accordance with BS EN 16798-3

#### ALL FANS RATED AT MORE THAN 1.1kW SHOULD BE FITTED WITH VARIABLE SPEED DRIVE

The specific fan power (SFP) of ventilation systems (**supply & extract**) should not exceed the values in the table below:

Calculate the SFP for each system or obtain as part of the manufacturers selection taking into account the fan efficiency, motor efficiency and inverter loss (filter pressure loss should be at clean filter condition in accordance with the BS EN 13779 - 2007).

NB the fan power is the total fan power including power losses through switchgear and controls, eg an inverter drive will have losses of approx. 3-5%

Motor efficiencies are given in the table overleaf

**THE TABLE BELOW GIVES LIMITING SFP FIGS FOR SYSTEMS IN NEW AND EXISTING BUILDINGS. These figs can be extended by the following for additional components as below:**

**Additional return filter for heat recovery - +0.1, HEPA filter - +1.0, Heat recovery +0.3, Humidification / dehumidification +0.1**

Example - system in new building with heating and cooling +heat recovery: Air volume =  $1m^3/s$  supply fan pressure = 850Pa and extract fan pressure = 300Pa

**Target SFP =  $1.6 + 0.1 + 0.3 = 2.0W/l/s$**

Supply fan power =  $1 \times 850 / \text{fan efficiency} / \text{motor efficiency} / \text{inverter efficiency}$

Supply fan power =  $1 \times 850 / 0.75 / 0.85 / 0.96 = W$  therefore Fan SFP =  $1.38W/l/s$

Extract fan power =  $1 \times 300 / 0.75 / 0.85 / 0.96 = W$  therefore Fan SFP =  $0.49 W/l/s$

System SFP =  $1380 + 490 / 1000 = 1.87 W/l/s$



Limiting system specific fan powers W/l/s (supply and extract)		
System Type	New Buildings	Existing Buildings
Central mechanical ventilation with heating & cooling	1.6**	2.2**
Central mechanical ventilation with heating only	1.5**	1.8**
All other central systems	1.1**	1.6**
Zonal supply system where the fan is remote from the zone (eg ceiling void or roof mounted units)	1.1	1.4
Zonal extract system where the fan is remote from the zone (eg ceiling void or roof mounted units)	0.5	0.5
Zonal supply & extract vent units such as ceiling void or roof units serving a single room or zone with heating & heat recovery	1.9	1.9
Local supply or extract system eg wall / roof units serving single area with heat recovery	1.6	1.6
Local supply or extract units eg wall or window or roof mounted serving a single area (eg toilet extract)	0.3	0.4
Other local ventilation supply or extract units	0.5	0.5
Fan assisted VAV terminal	1.1	1.1
Fan coil unit (rating weighted average)	0.5	0.5
Kitchen extract, fan remote from zone with grease filter	1.0	1.0

**Electric motors** – Ref EC Regulation 640/2009 from 1 January 2017 all motors with a rated output of 0,75-375 kW shall not be less efficient than the IE3 efficiency level or meet the IE2 efficiency level, as defined in Annex I, point 1, and be equipped with a variable speed drive.

#### Motor types

Introduction (asynchronous).

Asynchronous induction with VSD.

Permanent-Magnet Synchronous with VSD.

Magnet free synchronous reluctance with VSD.

EC Permanent-Magnet Synchronous with integral AC to DC converter (rectifier) and electronic controls with 0-10V control input.

EC Permanent-Magnet Synchronous with integral AC to DC converter (rectifier) and electronic controls with 0-10V control input and integral PID controller to enable sensors to be connected directly to the motor.

Motor efficiencies comparison table				
REFER TO CLAUSE Y92 2026 FOR FULL LIST OF MOTOR EFFICIENCY LIMITS (FROM 0.12 – 200Kw) FOR 2, 4, 6 AND 8 Pole motors				
BS EN 60034-30-1				
Power	IE2 %		IE3 %	
kW	2 Pole	4 Pole	2 Pole	4 Pole
0.12	53.6	59.1	60.8	64.8
0.18	60.4	64.7	65.9	69.9
0.20	61.9	65.9	67.2	71.1
0.25	64.8	68.5	69.7	73.5

## Y41sch - Schedule of Fans

---

0.37	69.5	72.7	73.8	77.3
0.40	70.4	73.5	74.6	78.0
0.55	74.1	77.1	77.8	80.8
0.75	77.4	79.6	80.7	82.5
1.1	79.6	81.4	82.7	84.1
1.5	81.3	82.8	84.2	85.3
2.2	83.2	84.3	85.9	86.7
3.0	84.6	85.5	87.1	87.6
4.0	85.8	86.6	88.1	88.6
5.5	87	87.7	89.2	89.6
7.5	88.1	88.7	90.1	90.4
11.0	89.4	89.8	91.2	91.4
15.0	90.3	90.6	91.9	92.1
18.5	90.9	91.2	92.4	92.6
22.0	91.3	91.6	92.7	93
30.0	92	92.3	93.3	93.6
37.0	92.5	92.7	93.7	93.9

[illegible]


**Acoustic Insulation**

Service	Location	Insulation Thickness (mm)	Mass layer kg/m²	Notes
		50	10	Mineral fibre matt type with polymeric mass layer Refer to Y45 2090z for detailed spec Tested and rated to relevant parts of BS EN ISO 10140 Fire resistance: Class O Building Regulations when tested to BS476: Part 6 and Part 7.

**Notes**

1. Contractor to confirm selected equipment inlet and outlet sound power levels and adjust attenuator insertion loss as necessary.
2. Attenuators to be delivered to site with capped ends to prevent ingress of dirt prior to installation.
3. Attenuators to be constructed from the same materials as ductwork system and have the same surface treatment as defined in Y 30.
4. Attenuators in the discharge side of any flue connection in a flue dilution system shall be fabricated from 304 Stainless steel. Where any appliance operates in condensing mode the complete system shall be fabricated from stainless steel.

Service	Location	Material	Applied Finish	Function (N, F or C)	Notes
LPHW HWS HWS storage vessels Calorifiers Heat exchangers and	In plant areas	Rock or Glass Mineral wool or CFC and HCFC free phenolic foam	Hammerclad Aluminium or sheet steel coated with aluminium / zinc alloy	N	Insulation shall be carried through the pipeline supports including all off-site prefabricated pipework / modules.
	Internally in voids and ducts		Class O Aluminium foil	N	For temperature maintenance of HWS pipework with trace heating the insulation thickness shall be agreed with the trace
	Internally where visible other than plant areas (exposed).		Class O Aluminium foil	N	

other pipeline mounted components	Externally			N	heating specialist to suit the tape selected. Phenolic foam sections shall have a suitable dust suppressant, acid neutralising and passivating internal coating. All exposed edges of phenolic foam insulation shall be sealed to the surface being insulated with a suitable vapour sealing mastic
Chilled Water including heat exchangers pumps and other pipeline mounted components CWS Condensate Drains Internal Rainwater	In plant areas	Rock or Glass Mineral wool or CFC and HCFC free phenolic foam	Hammerclad Aluminium or sheet steel coated with aluminium / zinc alloy	N / C	Vapour seal required in all locations, including supports Phenolic foam sections shall have a suitable dust suppressant, acid neutralising and passivating internal coating. All exposed edges of phenolic foam insulation shall be sealed to the surface being insulated with a suitable vapour sealing mastic
	Internally in voids and ducts		Class O Aluminium foil		
	Internally where visible other than plant areas (exposed)		Class O Aluminium foil		
	Externally				
Sub zero brine or Glycol mixture (Ice build)	In plant areas	CFC and HCFC free phenolic foam, or Closed cell Nitrile rubber	Hammerclad Aluminium or sheet steel coated with aluminium / zinc alloy	N / C	Vapour seal required in all locations Apply vapour sealant/adhesive to all outermost layer joints operating below 0C. Install 2-layer construction with all joints staggered when operating below -10C. Thermal insulation to provide evidence of experience refrigerated installations. Phenolic foam sections shall have a suitable dust suppressant, acid neutralising and passivating internal coating. All exposed edges of phenolic foam insulation shall be sealed to the surface being insulated with a suitable vapour sealing mastic
	Internally in voids and ducts		Class O Aluminium foil on each layer of insulation		
	Internally where visible other than plant areas (exposed)		Class O Aluminium foil on each layer of insulation		

Service	Location	Material	Applied Finish	Function (N, F or C)	Notes
	Internally in voids and ducts		Class O Aluminium foil,	N	
	Internally where visible other than plant areas (exposed)		Class O Aluminium foil.	N	
	Externally			N	
Water Tanks	Internally	Rock or Glass Mineral wool or CFC and HCFC free phenolic foam in slab form	Hammerclad Aluminium or sheet steel coated with aluminium / zinc alloy	F/C	

	Externally				Ensure all joints are weatherproofed Tanks externally to be painted white or other highly reflective colour in order to minimise heat gain.
Refrigerant pipework	All	Closed cell Nitrile rubber	Class O	N	Apply protection to all insulation which could be subject to damage, including at low level or in locations where mechanical damage could occur or which could be damaged by UV radiation.
Supply ductwork (including inlet D/W to AHU or fan) Extract ductwork downstream of reclaim coils	In plant areas	On rectangular ducts use Rock or Glass Mineral wool or CFC and HCFC free phenolic foam slabs. On circular or flat oval use Mineral fibre lamella mat or crimped mat.	Hammerclad Aluminium or sheet steel coated with aluminium / zinc alloy	N (N/C on cooled ducts)	Insulation on supply ductwork carrying chilled air to incorporate continuous vapour seal

Service	Location	Material	Applied Finish	Function (N, F or C)	Notes
Supply ductwork (including inlet D/W to AHU or fan) and duct mounted components. Extract ductwork before a heat recovery device	Internally in voids and ducts and where visible when the duct surface temperature is below the dew point of the space served.	On rectangular ducts use Rock or Glass Mineral wool rigid insulation or CFC and HCFC free phenolic foam slabs. On circular or flat oval use Mineral fibre lamella mat or crimped mat	In voids & ducts - Class O Aluminium foil.  Visible ductwork to be clad with stainless steel sheet or RAL colour coated steel or aluminium sheet.	N (N/C on cooled ducts)	Insulation on supply ductwork carrying chilled air to incorporate continuous vapour seal.  Extent of insulation to include ductwork downstream of fan coil and VAV / CV terminal units including terminal plenum boxes
	Internally where visible other than plant areas (exposed) carrying air above 20°C	N/A	N/A		

	Externally	On rectangular ducts use Rock or Glass Mineral wool duct slab or CFC and HCFC free phenolic foam slabs or sections. On circular or flat oval use Mineral fibre lamella mat or crimped mat	laminated foil/film protection either factory pre-applied or applied in-situ) (see guidance notes Ref comparison with PIB)	N (N/C on cooled ducts)	Insulation on supply ductwork carrying chilled air to incorporate continuous vapour seal
Untreated Outside Air ductwork	Internally	As supply	As supply	C	
Extract ductwork	Externally before a Heat recovery device Hot air exhaust ductwork where the ductwork could radiate heat back to the room (eg extract from UPS)	As supply	laminated foil/film protection either factory pre-applied or applied in-situ) (	C	
	Elsewhere	N/A			

Functions:

- N Normal: The control of heat loss and gain  
F The prevention of freezing  
C The prevention of surface condensation

Notes.

1. Refer to Workmanship Specification Section Y50 for appropriate thickness of insulation to suit specified function.
2. Refer to Y50 clauses 1021, 1031 and 1036 for: Standards; Regulations; fire classification for surface spread of flame, fire propagation, combustibility of materials, smoke emission and production of flaming droplets.
3. Refer to clause Y50 2221 for valves, ancillaries and flange insulation requirements
4. In locations where insulation cannot be installed adequately after pipeline or duct line installation, pre-insulated sections shall be installed. Insulation to such sections shall be equivalent in thermal and physical properties to that specified for the remainder of the system including vapour barriers.
- 5.

Ref	Plant Description & Location	Flexible Connections reqd. (Yes or No) (see Y11 for Spec)	Housekeeping Plinth only	Inertia Base (Yes or No)	Other Mounting		Approx weight Kg	Plant	clause ref in specification ref Y52
					Type	Static Deflection (mm)			
	All pumps	Yes							
	Chillers	Yes							
	Boilers	No							
	AHU Coils	No							

Notes

1.
2.
3.
4.
- Approx. plant weight is for tender purposes only; the contractor shall confirm plant weight to supplier of mountings before ordering.
- All packaged plant shall be provided with integral means of vibration isolation to prevent noise and vibration transmission to the structure. Units to be mounted on pads between plant and structure.
- All pipework within plant areas shall be supported on spring hangers.
- All plant shall have a housekeeping plinth unless stated otherwise.

Rev:	Date:	Description:	Made:	Chk: App:



## Y60sch1 - Schedule of Conduit

Application	Conduit Type/Finish	Standard	Saddles	Fittings	Locknuts	Plugs	Notes
Internal areas except plantrooms	Rigid steel seam welded heavy gauge. Black enamel Class 2.	BS EN 61386 parts - 1 & 21	Plain	Malleable Iron	Steel	Hex Brass	
Plant rooms and external areas	Rigid steel seam welded heavy gauge. Hot dipped galvanised Class 4	BS EN 61386 parts - 1 & 21	Plain	Malleable Iron	Malleable Iron	Hex Brass	
Connections to motors and for expansion joints	Flexible steel	BS EN 61386 parts - 1 & 21	-	Malleable Iron	Steel	Hex Brass	
Corrosive atmosphere high humidity areas eg. Swimming pools	Rigid non-metallic PVC	BS 4607 Part 1 and BS EN 61386-1	PVC	PVC Solvent welded	PVC	Spout entry	
Expansion joints and where otherwise PVC appropriate	Flexible non-metallic PVC	BS 4607 Part 1 and BS EN 61386-1	-	PVC	PVC Screwed ring	Spout entry	
Cable Management Systems (Internal areas)	Rigid steel	BS EN 61386-21	Plain	Malleable Iron	Steel	Hex Brass	
	Rigid non-metallic	BS 4607 Part 1 or BS EN 61386-21	PVC	PVC Solvent welded	PVC	Spout entry	
	Pliable	BS EN 61386-22	-				
	Flexible	BS EN 61386-23	-				

Y60sch2 - Schedule of Trunking

'Standard' Trunkings						
Application	Trunking Type/Finish	Colour	Standard	Compartment	Size	Notes
Internal areas	Steel – hot dipped galvanised finish class 3	Self Colour	Relevant parts of BS EN 50085			
External areas	Steel – hot dipped galvanised finish class 3	Self Colour	Relevant parts of BS EN 50085			Lids to be flanged and gasketted.
Areas with corrosive atmospheres and/or high humidities	Non Metallic PVC heavy gauge	Manufacturers standard	Relevant parts of BS EN 50085			
Wall/Dado Trunking	Marshall Tufflex Sterling 1,2 or 3 range					

Rev:	Date:	Description:	Made:	Chk: App:

## **Y60sch2 - Schedule of Trunking**


---


Floor Grommet Type	Shape (in plan)	Material	Flange / Trim type, Colour & Finish	Floor Covering Type	Approximate Floor Covering Thickness	Body External Dimensions	Body Internal Dimensions	Notes
A	Round	Polycarbonate	External carpet flange, finished Grey.	Carpet tiles	6mm	225mm Ø	190mm	Unit to be provided with a removable lid. The lid shall separate to allow a BS EN 60309-2 plug to pass through the unit.

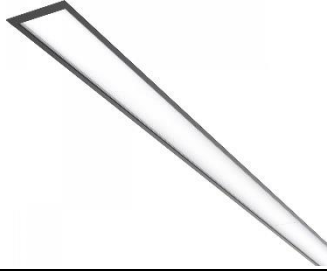


Application	Support System	Side wall	Finish	Notes
Power Cables 50mm <sup>2</sup> and above	Rack (Ladder)	Sidewall to suit load and span, 100mm minimum	Hot dipped galvanised	
Cables over 30mm OD	Cable Tray : Heavy duty return flange	50mm Flange	Hot dipped galvanised / Epoxy powder coated	
Cables up to 30mm OD	Cable Tray : Medium duty tray return flange	25mm Flange	Hot dipped galvanised / Epoxy powder coated	
Cables over 30mm OD	Cable Basket : Heavy duty	5mm Rod 50mm Mesh 75mm Wall (minimum)	Zinc Plated	
Cables up to 30mm OD	Cable Basket : Medium duty	4mm Rod 50mm Mesh 50mm Wall (minimum)	Zinc Plated	
Communications	Cable Basket : Medium duty	4mm Rod 50mm Mesh 50mm Wall (minimum)	Zinc Plated	
Communications Underfloor	Cable Basket : Heavy duty	5mm Rod 50mm Mesh 75mm Wall (minimum)	Zinc Plated	

Notes:



1. Rack/Tray/Basket support system to be designed and installed in accordance with manufacturers recommendations for the imposed loadings and deflection. System to be consistent throughout unless specified otherwise.

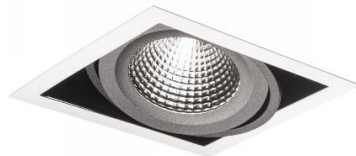
		Lamps		Description	Image	Application	Mounting
	Type	Power	Dimensions				
Watford Police Station Remodelling_(17-03-22 12-41)	A	35.4W 4665lm	680mmØ	<b>Whitecroft (Equal and Approved)</b>  Convor  Two part spun steel body finished silver and injection moulded gear tray. High output LED 4000K. Micro polymere polycarbonate diffuser for		Stairwells	Surface

	Lamps			Description	Image	Application	Mounting
	Type	Power	Dimensions				
Watford Police Station Remodelling (17-03-22 12-41) Page 103 of 111				increased impact resistance. Diffuser twist lock fixing, rated IP40 RAL Colour: Silver RAL9006			
	<b>B</b>	50W 7490lm	1578mm	<b>Whitecroft (Equal and Approved)</b>  ACL Industry  LED anti-corrosive luminaire with GRP body with high impact polycarbonate injection moulded opal diffuser. High quality seamless gasket for extreme durability All have width of 145mm and height of 101mm		Back of House	Surface/Suspended
		48W 6425lm	1282mm				
		33W 4628lm	1282mm				
		27W 3970lm	1282mm				
		19W 2794lm	1282mm				
		24.2W 3275lm	658mm				

	Lamps			Description	Image	Application	Mounting
	Type	Power	Dimensions				
Watford Police Station Remodelling_(17-03-22 12-41) Page 104 of 111	B1	1933lm Per meter		<b>Whitecroft (Equal and Approved)</b>  Avenue Metro Recessed		Visitor Waiting Area/Reception	Recessed
	C	47.5W 5158lm		<b>Whitecroft (Equal and Approved)</b>  Tegan 2  Recessed LED 4000K, 600mm x 600mm panel luminaire with slim line steel body and Quadraprism optic for LG7 compliant schemes. Suitable for lay in Exposed Tee ceilings		Admin Area	Recessed
	D	9W 659lm	85mmØ	<b>Whitecroft (Equal and Approved)</b>  LDR65  Recessed high output single bin LED downlight with bezel Ø <85mm and depth <15mm. Die cast aluminium body		WCs and BOH Circulation	Recessed



	Lamps			Description	Image	Application	Mounting
	Type	Power	Dimensions				
Watford Police Station Remodelling_(17-03-22 12-41) Page 105 of 111				complete with driver. IP65 from below ceiling.			
	H	16W 1383lm	120mmØ	<b>Whitecroft (Equal and Approved) Mirage C110</b>  Featuring a range of lumen outputs, a choice of reflector finishes and medium and wide distribution patterns the Mirage 3 C110 series is as much at home in feature areas as it is in functional spaces. IP44 as standard.		Circulation	Recessed
	F	17W 1526lm	224mm x 375mm x 329mm	<b>Whitecroft (Equal and Approved) Spectre WX</b>  Die cast aluminium body, finished in polyester powder coat graphite grey (RAL7024), rated IP67. LED lamp 4000K. Complete with 3hr duration self-contained non-maintained		Roof and Ground External	Surface

		Lamps		Description	Image	Application	Mounting
Type	Power	Dimensions					
Watford Police Station Remodelling_ (17-03-22 12-41) Page 106 of 111				emergency lighting battery pack			
	G	15W 1787lm		<b>Whitecroft (Equal and Approved)</b>  Minion  Available in single, double or triple configurations. Circular downlight within a square/rectangular bezel Steel body with aluminium gimbal. Inner housing and gimbal finished black and outer bezel finished white RAL 9016. Rotates 360° tilts 0-45°. Suitable for ceiling thickness of 3-35mm IP20.		Angled Roof	Recessed

**NOTES:**  
WHERE LUMINAIRES ARE NOTED ON LAYOUT IN THE FORMAT, “E”, EMERGENCY LIGHTING WILL BE REQUIRED PROVIDED VIA INTEGRAL 3 HOUR BATTERY BACKUP.

ALL LUMINAIRES WITH EXCEPTION TO THOSE UTILISED WITHIN PLANTROOMS AND STOREROOMS SHALL BE PROVIDED WITH FULLY ADDRESSABLE CONTROL GEAR (DALI)

ALL EMERGENCY FITTINGS WILL BE CONNECTED TO A CENTRAL MONITORING/TESTING SYSTEM (PART OF THE LIGHTING CONTROL SYSTEM).

ALL FINISHES AND COLOURS OF ALL FITTINGS TO BE AGREED AND CONFIRMED WITH THE ARCHITECT

## Y74sch2 – Schedule of Electrical Equipment / Accessory Mounting Heights

### Clause References

Y74.3030 - Fixing  
Y74.3041 – Measuring mounting heights  
Y74.3051 - Standards

### MOUNTING HEIGHTS:

Mount electrical accessories in accordance with the following table, unless otherwise indicated. Measurement to be to top (T) or bottom (B) of equipment / accessory from either finished floor or worktop. If specified height coincides with top of tiling mount above tiling with a clear gap of 50mm. Where located below a worktop mount 100mm below underside of worktop.

Electrical Equipment / Accessory	Location	Standard Mounting Height (mm)	Project Mounting (mm)	Specific Height
Lighting switch		1,200 (T)		
Socket outlet	General	450 (B)		
	Kitchen not above work surface	1,000 (T)		
	Above work surface	150 above surface to bottom of accessory		
	Plantroom	1,000 (B)		
	External	1,000 (B)		
Shaver socket outlet		1,000(B)		
Fused connection unit	General	450(B)		
	Above work surface	150 above surface to bottom of accessory		
Fused connection unit controlling	Radiant heater:– wall	1,800(T)		
	Radiant heater:– focal point	450(B)		
	Tubular heater	450(B)		
	Clock	1,900(T)		
Cooker control unit	Above worktop	150 above surface to centre of accessory		
Cooker connection unit		600(B)		
Room temperature thermostat or sensor with no set point control.		1,400(T)		
Room temperature thermostat or sensor with set point control.		1,000(T)		
Telephone outlet		between 450(B) to 1200 (T)		
Radio/TV outlet		450 (B)		
Pushbutton		1,200 (T)		
Control panels	Domestic premises	1,200 to top		
	Non-Domestic Premises	1,800 to top		
Fire alarm manual call point		1,200(T)		
Fire Detector local indicator	Ceiling mounted detector	2,200 or 200mm below ceiling if less than 2,400mm		
Evacuation Alert System Control & Indicating Equipment (EACIE) cabinet		1,400(B) 2,200(Top most manual control)		
Evacuation Alert Device	Ceiling or wall	150 maximum below ceiling level		
Gaseous Extinguishing System Status Indicators		1,200		

## Y74sch2 – Schedule of Electrical Equipment / Accessory Mounting Heights

Electrical Equipment / Accessory	Location	Standard Mounting Height (mm)	Project Mounting (mm)	Specific Height
Bell or buzzer		1,900		
Fire Alarm Visual Indicator		2,000 or 200mm below ceiling if less than 2,400mm		
Wall mounted loudspeaker		2,200 or 200mm below ceiling if less than 2,400mm		
Emergency Voice Communication Handset		950		
Distribution Boards	Non-domestic premises	1,800mm to the top		
	Domestic premises	1,200mm to the top		
Local Isolators / Inverters / Starters		Between 750 and 1,200		

### Notes :

- 'Standard' mounting heights are based upon compliance with BS 8300 Parts 1 or 2 and Approved Document M (vols 1 or 2) of the Building Regulations for Dwellings to suit building type, all mounting heights shall be confirmed with the Architects.  
The heights are for rooms and circulation areas in dwellings, and office, reception and general circulation areas of other premises, use the following preferred standard mounting heights for wall-mounted accessories:
- Outlets and switches shall be located a minimum of 350mm from room corners
- In car parks and garages comply with appropriate Petroleum Regulations for mounting heights of electrical outlets, normally a minimum of 1,200mm.
- For wheelchair access the following pull cord lengths are recommended:–  
Ceiling mounted switches  
 Cord pulls to extend to 1000mm above finished floor level.  
 Alarm pulls to be coloured red and have two red 50mm diameter bangles, one set at 100mm and the other set between 800 and 1,000mm above the floor.  
Shower circuit switch  
 Pull cord to isolating switch to extend to 1000mm above finished floor level.

Test Description	Required Yes/No	Notes
Continuity of protective conductors Continuity of ring final circuit conductors Insulation resistance Site applied insulation Separation of circuits Direct contact protection Insulation of building elements Polarity Earth electrode resistance Earth fault loop impedance (Protection by automatic disconnection of supply) Functional protection Measurement of voltage drops	Yes Yes Yes     Yes  Yes	
Generator Transformer Switchgear Protection System Cables	Specify detail required	

**Contractor/testing authority to provide verification of calibration of any test equipment/instruments used.**

The following is a list of Certificates required, as appropriate, from the Contractor prior to the issue of a Certificate of Practical Completion, (Taking-Over Certificate.) The Supervising Officer should be advised against certifying completion without the appropriate services certificates being issued and verified.

- Completion Certificate for electrical installation to BS 7671
- Completion Certificate for Emergency lighting to BS 5266
- Completion Certificate for Fire Alarm System to BS 5389
- Completion Certificate for Evacuation Alert System to BS 8629
- Test Certificates for
  - Earthing System
  - Lightning Protection
  - Public Address
  - Security
  - Lighting Control
  - Structured Wiring
  - Controls System

Any other special systems

**Prospective fault current  $I_{Pf}$**

Where design responsibility is with the Contractor ensure Work Sections clearly define those responsibilities. Where we have design responsibility supply characteristics should be obtained from the appropriate Authority.

**Supply Characteristics**

Where design responsibility is with the Contractor ensure Work Sections clearly define those responsibilities. Where we have design responsibility supply characteristics should be obtained from the appropriate Authority.

**Earth Fault Loop Independence/ $Z_s$**

Where design responsibility is with the Contractor ensure Work Sections clearly define those responsibilities. Where we have design responsibility supply characteristics should be obtained from the appropriate Authority. BS 7671 Completion Tests will apply. (see clause Y71 2071)

**Standby Generators**

Ensure Work Sections specify any special tests.

## End of Specification

---

This is the final page of the specification.