

# **MULTI-TERTIARY EDUCATION BUILDING AT DIFE, THE TWENTIES, DROGHEDA, CO. LOUTH**

Volume A.2.3

Mechanical Specification

Part 4 of 4: Equipment Schedules

Date: July 2026

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# 1 HEATING CENTRE (51)

## 1.1 AIR SOURCE HEAT PUMPS

| <b>Reference: ASHP-01</b><br><b>Location: External Plant Compound</b>                                                                                                                                     |                                                          |          |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|----------|
| <div>  <div> <p><i>Typical Image</i></p> <p>Air Source Heat Pump as per technical specification below.</p> </div> </div> |                                                          |          |
| Element                                                                                                                                                                                                   | Specification                                            | Proposal |
| Description                                                                                                                                                                                               | High Efficiency Low Noise External Air Source Heat Pumps |          |
| Heating Capacity (kW)                                                                                                                                                                                     | 44.3                                                     |          |
| CoP (W/W)                                                                                                                                                                                                 | 3.26                                                     |          |
| SCoP (W/W)                                                                                                                                                                                                | 4.7                                                      |          |
| Efficiency (%)                                                                                                                                                                                            | 186                                                      |          |
| Compressor Type                                                                                                                                                                                           | Semi-Hermetic Piston Compressors                         |          |
| Minimum Number of Compressors                                                                                                                                                                             | 1                                                        |          |
| Global Warming Potential (GWP)                                                                                                                                                                            | 3                                                        |          |
| Refrigerant Type                                                                                                                                                                                          | R290 or better with a lower GWP                          |          |
| Total Refrigerant Charge (kg)                                                                                                                                                                             | 6.5                                                      |          |
| Outdoor Air Temp (°C)                                                                                                                                                                                     | -3.0                                                     |          |
| Integral Hydronic Kit c/w on board primary pumps                                                                                                                                                          | Required                                                 |          |
| Fluid Type                                                                                                                                                                                                | Water                                                    |          |
| In/Out Fluid Temp (°C)                                                                                                                                                                                    | 50.0 / 55.0                                              |          |
| Fluid Flowrate (m3/h)                                                                                                                                                                                     | 6.1                                                      |          |

|                                           |                                                                                                                                              |  |
|-------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|--|
| <b>Circuit Pressure Drop (kPa)</b>        | 20.5                                                                                                                                         |  |
| <b>Pump Available Pressure Drop (kPa)</b> | 152.6                                                                                                                                        |  |
| <b>Max Sound Power (dBA)</b>              | 78.6                                                                                                                                         |  |
| <b>Super Low Noise</b>                    | Required                                                                                                                                     |  |
| <b>Nominal Voltage Supply (Ph/V/Hz)</b>   | 3/400/50                                                                                                                                     |  |
| <b>Maximum Absorbed Power (kW)</b>        | 22.6                                                                                                                                         |  |
| <b>Maximum Absorbed Current (A)</b>       | 60.6                                                                                                                                         |  |
| <b>Discharge Direction</b>                | Vertical                                                                                                                                     |  |
| <b>Nominal Dimensions (L x W x H)</b>     | 1940 x 1260 x 2375mm                                                                                                                         |  |
| <b>Construction</b>                       | Galvanised Sheet Steel painted with polyurethane powder enamel c/w removable panels.                                                         |  |
| <b>Source Heat Exchanger</b>              | Cu/Al pipes and fins with hydrophilic coating 'Blue Fins'                                                                                    |  |
| <b>User Heat Exchanger</b>                | Braze Welded Plate Heat Exchanger (AISI 316 Stainless Steel) c/w closed cell insulation and discharge temp sensor for anti-freeze protection |  |
| <b>Control &amp; Protection Devices</b>   | Required – IP54 & ATEX protection                                                                                                            |  |
| <b>Control Panel</b>                      | Microprocessor based c/w display showing all operational icons and connections for MODBUS protocols                                          |  |
| <b>Serial Interface Card RS485</b>        | Required to allow the controller to communicate using Modbus Protocol                                                                        |  |
| <b>Head Pressure Control</b>              | This device, using a pressure probe                                                                                                          |  |

|                              |                                                                                                                                                                                                                                                                                                                                                                                                       |  |
|------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|                              | installed on the source heat exchanger, controls the fan speed with respect to the ambient conditions.                                                                                                                                                                                                                                                                                                |  |
| <b>Accessories</b>           | <ul style="list-style-type: none"> <li>• Rubber Anti-vibration feet/pad</li> <li>• Condensate Drip Tray</li> <li>• Anti Freeze Kit</li> <li>• Pressure Gauges</li> <li>• Master / Slave Cascade Control system</li> <li>• Outdoor Air Temperature Sensor for Weather Compensation</li> <li>• Hydraulic Kit comprising centrifugal circulating pump c/w safety valve &amp; fill/drain point</li> </ul> |  |
| <b>Defrost Method</b>        | Reverse Cycle                                                                                                                                                                                                                                                                                                                                                                                         |  |
| <b>Defrost Control</b>       | Sensor for outdoor temperature                                                                                                                                                                                                                                                                                                                                                                        |  |
| <b>Warranty</b>              | 5 year <u>parts</u> and <u>labour</u>                                                                                                                                                                                                                                                                                                                                                                 |  |
| <b>Standards/ Conformity</b> | <ul style="list-style-type: none"> <li>• Low Voltage Directive 2006/95/EC</li> <li>• EMC 2004/108/EC</li> <li>• PED 97/23/EC</li> <li>• WEEE 2012/19/EU</li> <li>• RoHS 2001/65/EU</li> <li>• EN378-1,2,3,4</li> <li>• EU Regulation 813/2013</li> <li>• EN14825</li> <li>• EN14511</li> </ul>                                                                                                        |  |

|                      |              |  |
|----------------------|--------------|--|
| <b>ErP Compliant</b> | Fans / Pumps |  |
|----------------------|--------------|--|

**Reference: ASHP-02**

**Location: External to new Heating Plantroom**



*Typical Image*

Air Source Heat Pump as per technical specification below.

| Element                                          | Specification                                                  | Proposal |
|--------------------------------------------------|----------------------------------------------------------------|----------|
| Description                                      | Low Noise Full Inverter External Monobloc Air Source Heat Pump |          |
| Heating Capacity (kW)                            | 38.9                                                           |          |
| CoP (W/W)                                        | 3.08                                                           |          |
| SCoP (W/W)                                       | 4.47                                                           |          |
| Compressor Type                                  | Scroll                                                         |          |
| Minimum Number of Compressors                    | 1                                                              |          |
| Global Warming Potential (GWP)                   | 3                                                              |          |
| Refrigerant Type                                 | R290                                                           |          |
| Outdoor Air Temp (oC)                            | 7.0                                                            |          |
| Outdoor Relative Humidity (%)                    | 87                                                             |          |
| Integral Hydronic Kit c/w on board primary pumps | Required                                                       |          |
| Fluid Type                                       | Water                                                          |          |
| In/Out Fluid Temp (oC)                           | 45.0 / 50.0                                                    |          |
| Max Sound Pressure @ 10m (dB(A))                 | 35                                                             |          |
| Fluid Flowrate (l/h)                             | 6769                                                           |          |
| Pump Available Pressure Drop (kPa)               | 62                                                             |          |
| Super Low Noise                                  | Required                                                       |          |
| Nominal Voltage Supply (Ph/V/Hz)                 | 3/400/50                                                       |          |
| Maximum Input Power (kW)                         | 12.6                                                           |          |

|                                         |                                                                                                                                                                                                                                                                                                                                                                              |  |
|-----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| <b>Discharge Direction</b>              | Horizontal                                                                                                                                                                                                                                                                                                                                                                   |  |
| <b>Nominal Dimensions – L x W x H</b>   | 2012 x 702 x 1465mm                                                                                                                                                                                                                                                                                                                                                          |  |
| <b>Heat Exchanger</b>                   | Cu/Al pipes and fins with hydrophilic coating 'Blue Fins'                                                                                                                                                                                                                                                                                                                    |  |
| <b>Control &amp; Protection Devices</b> | Required                                                                                                                                                                                                                                                                                                                                                                     |  |
| <b>Control Panel</b>                    | Microprocessor based c/w display showing all operational icons and connections for MODBUS protocols                                                                                                                                                                                                                                                                          |  |
| <b>Serial Interface Card RS485</b>      | Required to allow the controller to communicate using Modbus Protocol                                                                                                                                                                                                                                                                                                        |  |
| <b>Head Pressure Control</b>            | This device, using a pressure probe installed on the source heat exchanger, controls the fan speed with respect to the ambient conditions.                                                                                                                                                                                                                                   |  |
| <b>Accessories</b>                      | <ul style="list-style-type: none"> <li>• Rubber Anti-vibration mounts</li> <li>• Condensate Drip Tray</li> <li>• Anti Freeze Kit</li> <li>• Pressure Gauges</li> <li>• Control system</li> <li>• Outdoor Air Temperature Sensor for Weather Compensation</li> <li>• Hydraulic Kit comprising centrifugal circulating pump c/w safety valve &amp; fill/drain point</li> </ul> |  |
| <b>Defrost Method</b>                   | Reverse Cycle                                                                                                                                                                                                                                                                                                                                                                |  |
| <b>Defrost Control</b>                  | Sensor for outdoor temperature                                                                                                                                                                                                                                                                                                                                               |  |

|                              |                                                                                                                                                                                               |  |
|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| <b>Warranty</b>              | 5 year parts and labour                                                                                                                                                                       |  |
| <b>Standards/ Conformity</b> | <ul style="list-style-type: none"> <li>• Low Voltage Directive 2006/95/EC</li> <li>• EMC 2004/108/EC</li> <li>• PED 97/23/EC</li> <li>• WEEE 2012/19/EU</li> <li>• RoHS 2001/65/EU</li> </ul> |  |
| <b>ErP Compliant</b>         | Fans / Pumps                                                                                                                                                                                  |  |

**Reference: ASHP-03 & 04**

**Location: External Plant Compound**



*Typical Image*

Air Source Heat Pump as per technical specification below.

| Element                                          | Specification                                            | Proposal |
|--------------------------------------------------|----------------------------------------------------------|----------|
| Description                                      | High Efficiency Low Noise External Air Source Heat Pumps |          |
| Heating Capacity (kW)                            | 138.7                                                    |          |
| CoP (W/W)                                        | 3.86                                                     |          |
| SCoP (W/W)                                       | 4.1                                                      |          |
| Efficiency (%)                                   | 160.9                                                    |          |
| Compressor Type                                  | Semi-Hermetic Piston Compressors                         |          |
| Minimum Number of Compressors                    | 2                                                        |          |
| Global Warming Potential (GWP)                   | 3                                                        |          |
| Refrigerant Type                                 | R290 or better with a lower GWP                          |          |
| Total Refrigerant Charge (kg)                    | 20                                                       |          |
| Outdoor Air Temp (°C)                            | -3.0                                                     |          |
| Integral Hydronic Kit c/w on board primary pumps | Required                                                 |          |
| Fluid Type                                       | Water                                                    |          |
| In/Out Fluid Temp (°C)                           | 70.0 / 65.0                                              |          |
| Fluid Flowrate (m3/h)                            | 23.9                                                     |          |
| Circuit Pressure Drop (kPa)                      | 18.6                                                     |          |
| Pump Available Pressure Drop (kPa)               | 121.4                                                    |          |

|                                         |                                                                                                                                              |  |
|-----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|--|
| <b>Max Sound Power (dBA)</b>            | 94.1                                                                                                                                         |  |
| <b>Super Low Noise</b>                  | Required                                                                                                                                     |  |
| <b>Nominal Voltage Supply (Ph/V/Hz)</b> | 3/400/50                                                                                                                                     |  |
| <b>Maximum Absorbed Power (kW)</b>      | 77.9                                                                                                                                         |  |
| <b>Maximum Absorbed Current (A)</b>     | 168                                                                                                                                          |  |
| <b>Discharge Direction</b>              | Vertical                                                                                                                                     |  |
| <b>Nominal Dimensions (L x W x H)</b>   | 5350 x 1300 x 2550mm                                                                                                                         |  |
| <b>Construction</b>                     | Galvanised Sheet Steel painted with polyurethane powder enamel c/w removable panels.                                                         |  |
| <b>Source Heat Exchanger</b>            | Cu/Al pipes and fins with hydrophilic coating 'Blue Fins'                                                                                    |  |
| <b>User Heat Exchanger</b>              | Braze Welded Plate Heat Exchanger (AISI 316 Stainless Steel) c/w closed cell insulation and discharge temp sensor for anti-freeze protection |  |
| <b>Control &amp; Protection Devices</b> | Required – IP54 & ATEX protection                                                                                                            |  |
| <b>Control Panel</b>                    | Microprocessor based c/w display showing all operational icons and connections for MODBUS protocols                                          |  |
| <b>Serial Interface Card RS485</b>      | Required to allow the controller to communicate using Modbus Protocol                                                                        |  |
| <b>Head Pressure Control</b>            | This device, using a pressure probe installed on the source heat exchanger, controls the fan speed                                           |  |

|                              |                                                                                                                                                                                                                                                                                                                                                                                                   |  |
|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|                              | with respect to the ambient conditions.                                                                                                                                                                                                                                                                                                                                                           |  |
| <b>Accessories</b>           | <ul style="list-style-type: none"> <li>• Rubber Anti-vibration feet/pad</li> <li>• Condensate Drip Tray</li> <li>• Anti Freeze Kit</li> <li>• Pressure Gauges</li> <li>• Master / Slave Cascade Control system</li> <li>• Outdoor Air Temperature Sensor for Weather Compensation</li> </ul> <p>Hydraulic Kit comprising centrifugal circulating pump c/w safety valve &amp; fill/drain point</p> |  |
| <b>Defrost Method</b>        | <ul style="list-style-type: none"> <li>• Reverse Cycle</li> </ul>                                                                                                                                                                                                                                                                                                                                 |  |
| <b>Defrost Control</b>       | Sensor for outdoor temperature                                                                                                                                                                                                                                                                                                                                                                    |  |
| <b>Warranty</b>              | 5 year <u>parts</u> and <u>labour</u>                                                                                                                                                                                                                                                                                                                                                             |  |
| <b>Standards/ Conformity</b> | <ul style="list-style-type: none"> <li>• Low Voltage Directive 2006/95/EC</li> <li>• EMC 2004/108/EC</li> <li>• PED 97/23/EC</li> <li>• WEEE 2012/19/EU</li> <li>• RoHS 2001/65/EU</li> <li>• EN378-1,2,3,4</li> <li>• EU Regulation 813/2013</li> <li>• EN14825</li> </ul> <p>EN14511</p>                                                                                                        |  |
| <b>ErP Compliant</b>         | <ul style="list-style-type: none"> <li>• Fans / Pumps</li> </ul>                                                                                                                                                                                                                                                                                                                                  |  |
| <b>ErP Compliant</b>         | Fans / Pumps                                                                                                                                                                                                                                                                                                                                                                                      |  |

| <b>Reference: ASHP-05</b>                                                                                                                                                                    |                                                                |          |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|----------|
| <b>Location: External to Existing Plantroom</b>                                                                                                                                              |                                                                |          |
| <div>  <p><i>Typical Image</i></p> <p>Air Source Heat Pump as per technical specification below.</p> </div> |                                                                |          |
| Element                                                                                                                                                                                      | Specification                                                  | Proposal |
| <b>Description</b>                                                                                                                                                                           | Low Noise Full Inverter External Monobloc Air Source Heat Pump |          |
| <b>Heating Capacity (kW)</b>                                                                                                                                                                 | 38.9                                                           |          |
| <b>CoP (W/W)</b>                                                                                                                                                                             | 3.08                                                           |          |
| <b>SCoP (W/W)</b>                                                                                                                                                                            | 4.47                                                           |          |
| <b>Compressor Type</b>                                                                                                                                                                       | Scroll                                                         |          |
| <b>Minimum Number of Compressors</b>                                                                                                                                                         | 1                                                              |          |
| <b>Global Warming Potential (GWP)</b>                                                                                                                                                        | 3                                                              |          |
| <b>Refrigerant Type</b>                                                                                                                                                                      | R290                                                           |          |
| <b>Outdoor Air Temp (oC)</b>                                                                                                                                                                 | 7.0                                                            |          |
| <b>Outdoor Relative Humidity (%)</b>                                                                                                                                                         | 87                                                             |          |
| <b>Integral Hydronic Kit c/w on board primary pumps</b>                                                                                                                                      | Required                                                       |          |
| <b>Fluid Type</b>                                                                                                                                                                            | Water                                                          |          |
| <b>In/Out Fluid Temp (oC)</b>                                                                                                                                                                | 45.0 / 50.0                                                    |          |
| <b>Max Sound Pressure @ 10m (dB(A))</b>                                                                                                                                                      | 35                                                             |          |
| <b>Fluid Flowrate (l/h)</b>                                                                                                                                                                  | 6769                                                           |          |
| <b>Pump Available Pressure Drop (kPa)</b>                                                                                                                                                    | 62                                                             |          |
| <b>Super Low Noise</b>                                                                                                                                                                       | Required                                                       |          |
| <b>Nominal Voltage Supply (Ph/V/Hz)</b>                                                                                                                                                      | 3/400/50                                                       |          |

|                                         |                                                                                                                                                                                                                                                                                                                                                                              |  |
|-----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| <b>Maximum Input Power (kW)</b>         | 12.6                                                                                                                                                                                                                                                                                                                                                                         |  |
| <b>Discharge Direction</b>              | Horizontal                                                                                                                                                                                                                                                                                                                                                                   |  |
| <b>Nominal Dimensions – L x W x H</b>   | 2012 x 702 x 1465mm                                                                                                                                                                                                                                                                                                                                                          |  |
| <b>Heat Exchanger</b>                   | Cu/Al pipes and fins with hydrophilic coating 'Blue Fins'                                                                                                                                                                                                                                                                                                                    |  |
| <b>Control &amp; Protection Devices</b> | Required                                                                                                                                                                                                                                                                                                                                                                     |  |
| <b>Control Panel</b>                    | Microprocessor based c/w display showing all operational icons and connections for MODBUS protocols                                                                                                                                                                                                                                                                          |  |
| <b>Serial Interface Card RS485</b>      | Required to allow the controller to communicate using Modbus Protocol                                                                                                                                                                                                                                                                                                        |  |
| <b>Head Pressure Control</b>            | This device, using a pressure probe installed on the source heat exchanger, controls the fan speed with respect to the ambient conditions.                                                                                                                                                                                                                                   |  |
| <b>Accessories</b>                      | <ul style="list-style-type: none"> <li>• Rubber Anti-vibration mounts</li> <li>• Condensate Drip Tray</li> <li>• Anti Freeze Kit</li> <li>• Pressure Gauges</li> <li>• Control system</li> <li>• Outdoor Air Temperature Sensor for Weather Compensation</li> <li>• Hydraulic Kit comprising centrifugal circulating pump c/w safety valve &amp; fill/drain point</li> </ul> |  |
| <b>Defrost Method</b>                   | Reverse Cycle                                                                                                                                                                                                                                                                                                                                                                |  |

|                              |                                                                                                                                                                                               |  |
|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| <b>Defrost Control</b>       | Sensor for outdoor temperature                                                                                                                                                                |  |
| <b>Warranty</b>              | 5 year parts and labour                                                                                                                                                                       |  |
| <b>Standards/ Conformity</b> | <ul style="list-style-type: none"> <li>• Low Voltage Directive 2006/95/EC</li> <li>• EMC 2004/108/EC</li> <li>• PED 97/23/EC</li> <li>• WEEE 2012/19/EU</li> <li>• RoHS 2001/65/EU</li> </ul> |  |
| <b>ErP Compliant</b>         | Fans / Pumps                                                                                                                                                                                  |  |

## 1.2 LPHW BUFFER VESSEL

| Reference: BUF-01                                                                                                                                                                                        |                                                                                                                                                                                                                             |          |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| Location: New Heating Plantroom                                                                                                                                                                          |                                                                                                                                                                                                                             |          |
| <div>  <div> <p><i>Typical Image</i></p> <p>Direct Buffer Vessel as per technical specification below</p> </div> </div> |                                                                                                                                                                                                                             |          |
| Element                                                                                                                                                                                                  | Specification                                                                                                                                                                                                               | Proposal |
| Description                                                                                                                                                                                              | Direct Heating Vertical Buffer Vessel                                                                                                                                                                                       |          |
| Storage Capacity (L)                                                                                                                                                                                     | 1000<br>(ASHP Specialist to confirm based on HP Selection)                                                                                                                                                                  |          |
| Material                                                                                                                                                                                                 | Carbon Steel Construction with exterior paint                                                                                                                                                                               |          |
| Insulation                                                                                                                                                                                               | Hard Polyurethane Foam High Thermal Insulation to ErP class B or C.                                                                                                                                                         |          |
| Max Storage Temperature (°C)                                                                                                                                                                             | 99                                                                                                                                                                                                                          |          |
| Max Working Pressure (bar)                                                                                                                                                                               | 6.0                                                                                                                                                                                                                         |          |
| Heating Coils                                                                                                                                                                                            | Not Required                                                                                                                                                                                                                |          |
| Electric Immersion                                                                                                                                                                                       | 6kW                                                                                                                                                                                                                         |          |
| Dimensions - Ø x H (mm)                                                                                                                                                                                  | 1010 x 2075                                                                                                                                                                                                                 |          |
| Warranty                                                                                                                                                                                                 | 5 Years                                                                                                                                                                                                                     |          |
| Accessories                                                                                                                                                                                              | <ul style="list-style-type: none"> <li>• Temperature Gauge</li> <li>• Pressure Gauge</li> <li>• Temp/Pressure Safety Valve &amp; tundish</li> <li>• Immersion Pockets 200mm deep (min)</li> <li>• Connecting Kit</li> </ul> |          |
| Standards/ Conformity                                                                                                                                                                                    | CE / EN 13501 / ErP                                                                                                                                                                                                         |          |

**Reference: BUF-02**

**Location: Existing Heating Plantroom**



*Typical Image*

Direct Buffer Vessel as per technical specification below

| Element                      | Specification                                                                                                                                                                                                         | Proposal |
|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| Description                  | Direct Heating Vertical Buffer Vessel                                                                                                                                                                                 |          |
| Storage Capacity (L)         | 2000<br>(ASHP Specialist to confirm based on HP Selection)                                                                                                                                                            |          |
| Material                     | Carbon Steel Construction with exterior paint                                                                                                                                                                         |          |
| Insulation                   | Closed Cell Polyurethane & Polyester Fibre High Thermal Insulation to ErP class B or C.                                                                                                                               |          |
| Max Storage Temperature (°C) | 99                                                                                                                                                                                                                    |          |
| Max Working Pressure (bar)   | 6.0                                                                                                                                                                                                                   |          |
| Heating Coils                | Not Required                                                                                                                                                                                                          |          |
| Electric Immersion           | 6kW                                                                                                                                                                                                                   |          |
| Dimensions - Ø x H (mm)      | 1320 x 2565                                                                                                                                                                                                           |          |
| Warranty                     | 5 Years                                                                                                                                                                                                               |          |
| Accessories                  | <ul style="list-style-type: none"><li>• Temperature Gauge</li><li>• Pressure Gauge</li><li>• Temp/Pressure Safety Valve &amp; tundish</li><li>• Immersion Pockets 200mm deep (min)</li><li>• Connecting Kit</li></ul> |          |
| Standards/ Conformity        | CE / EN 13501 / ErP                                                                                                                                                                                                   |          |

### 1.3 GAS FIRED BOILERS

| Reference: Cascade Gas Fired Boilers (BLR-01)                                                                                                                                                                        |                                         |          |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|----------|
| Location: Heating Plantroom                                                                                                                                                                                          |                                         |          |
| <div>  <p><i>Typical Image</i></p> <p>Natural Gas Fired wall hung modulating boiler as per technical specification below</p> </div> |                                         |          |
| Element                                                                                                                                                                                                              | Specification                           | Proposal |
| Type                                                                                                                                                                                                                 | Wall-mounted boiler cascade arrangement |          |
| Fuel                                                                                                                                                                                                                 | Natural Gas                             |          |
| No. of Boilers                                                                                                                                                                                                       | 1no.                                    |          |
| LPHW Flow & Return Operating Temps                                                                                                                                                                                   | 75/65°C                                 |          |
| Nominal heat output at 80/60°C                                                                                                                                                                                       | 56.9 kW                                 |          |
| Nominal heat input (Hi)                                                                                                                                                                                              | 57.9 kW                                 |          |
| Modulation Ratio                                                                                                                                                                                                     | 1:10                                    |          |
| Gas Consumption                                                                                                                                                                                                      | 6.13 m <sup>3</sup> /h (G20)            |          |
| Gas Supply Pressure                                                                                                                                                                                                  | 20 mbar                                 |          |
| Dimensions (W x H x D)                                                                                                                                                                                               | 530 x 1050 x 595 mm                     |          |
| Flue Exhaust connection                                                                                                                                                                                              | 100Ø                                    |          |
| Air Inlet connection                                                                                                                                                                                                 | 100Ø                                    |          |
| Condensate drain                                                                                                                                                                                                     | 35 mm                                   |          |
| Heat Exchangers                                                                                                                                                                                                      | Dual Heat Exchangers                    |          |
| Heat Exchanger Material                                                                                                                                                                                              | <u>Stainless Steel</u>                  |          |
| Full Load Efficiency (100%)                                                                                                                                                                                          | 98.2 %                                  |          |
| Maximum working pressure                                                                                                                                                                                             | 6.0 bar                                 |          |
| Flowrate (ΔT 20K) (m <sup>3</sup> /h)                                                                                                                                                                                | 6.7                                     |          |
| Available Head (ΔT 20K) (kPa)                                                                                                                                                                                        | 8                                       |          |
| Water content                                                                                                                                                                                                        | 9.3 litres                              |          |
| Sound Power level at 1m, full load                                                                                                                                                                                   | 61.5 dB(A)                              |          |

|                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |  |
|--------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| <b>NOx Level (EN 15502) GCV</b>                        | 21.7 mg/kWh                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |
| <b>Electrical supply (per boiler)</b>                  | 1 Ph / 230 V / 50 Hz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |
| <b>Electrical consumption<br/>(full load / boiler)</b> | 126 W                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |
| <b>Shunt Pump Control</b>                              | 0 – 10V                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |
| <b>Accessories</b>                                     | <ul style="list-style-type: none"> <li>• Weather compensated cascade controller and north facing sensor</li> <li>• Main Flow &amp; Return Header &amp; Gas Header pipework</li> <li>• Pump group connections and modulating pump (per boiler)</li> <li>• Low Loss Header</li> <li>• Boiler Piping Set</li> <li>• Manifold configuration supports</li> <li>• Pre-formed Rigid Insulation for Header Pipework</li> <li>• Immersion Sensor Pocket</li> <li>• EA1 connection module and VFC required for connection to the BMS for Enable/Fault</li> </ul> |  |
| <b>Warranty</b>                                        | 2 years <u>parts</u> and <u>labour</u>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |
| <b>Standards/ Conformity</b>                           | CE, ErP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |

**Reference: Cascade Gas Fired Boilers (BLR-02 – BLR-04)**

**Location: Heating Plantroom**



*Typical Image*

Natural Gas Fired wall hung modulating cascading boilers as per technical specification below

| Element                               | Specification                           | Proposal |
|---------------------------------------|-----------------------------------------|----------|
| Type                                  | Wall-mounted boiler cascade arrangement |          |
| Fuel                                  | Natural Gas                             |          |
| No. of Boilers                        | 3no.                                    |          |
| LPHW Flow & Return Operating Temps    | 70/65°C                                 |          |
| Nominal heat output at 80/60°C        | 155.5 kW                                |          |
| Nominal heat input (Hi)               | 158.8 kW                                |          |
| Modulation Ratio                      | 1:10                                    |          |
| Gas Consumption                       | 16.8 m <sup>3</sup> /h (G20)            |          |
| Gas Supply Pressure                   | 20 mbar                                 |          |
| Dimensions (W x H x D)                | 690 x 1050 x 675 mm                     |          |
| Flue Exhaust connection               | 130Ø                                    |          |
| Air Inlet connection                  | 130Ø                                    |          |
| Condensate drain                      | 35 mm                                   |          |
| Heat Exchangers                       | Dual Heat Exchangers                    |          |
| Heat Exchanger Material               | <u>Stainless Steel</u>                  |          |
| Full Load Efficiency (100%)           | 97.9 %                                  |          |
| Maximum working pressure              | 6.0 bar                                 |          |
| Flowrate (ΔT 20K) (m <sup>3</sup> /h) | 2.4                                     |          |
| Available Head (ΔT 20K) (kPa)         | 29.6                                    |          |
| Water content                         | 21.3 litres                             |          |
| Sound Power level at 1m, full load    | 67 dB(A)                                |          |
| NO <sub>x</sub> Level (EN 15502) GCV  | 22.6 mg/kWh                             |          |

|                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |  |
|--------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| <b>Electrical supply (per boiler)</b>                  | 1 Ph / 230 V / 50 Hz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |
| <b>Electrical consumption<br/>(full load / boiler)</b> | 464 W                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |
| <b>Shunt Pump Control</b>                              | 0 – 10V                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |
| <b>Accessories</b>                                     | <ul style="list-style-type: none"> <li>• Weather compensated cascade controller and north facing sensor</li> <li>• Main Flow &amp; Return Header &amp; Gas Header pipework</li> <li>• Pump group connections and modulating pump (per boiler)</li> <li>• Low Loss Header</li> <li>• Boiler Piping Set</li> <li>• Manifold configuration supports</li> <li>• Pre-formed Rigid Insulation for Header Pipework</li> <li>• Immersion Sensor Pocket</li> <li>• EA1 connection module and VFC required for connection to the BMS for Enable/Fault</li> </ul> |  |
| <b>Warranty</b>                                        | 2 years <u>parts</u> and <u>labour</u>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |
| <b>Standards/ Conformity</b>                           | CE, ErP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |

## 1.4 BOILER FLUES

| <b>Reference: Gas Fired Boiler Flues</b><br><b>Location: Heating Plantrooms / External</b>                                                                                                                              |                                                                         |          |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|----------|
|  <p style="text-align: center;"><i>Typical Image</i></p> <p style="text-align: center;">Flue as per technical specification below.</p> |                                                                         |          |
| Element                                                                                                                                                                                                                 | Specification                                                           | Proposal |
| <b>Description</b>                                                                                                                                                                                                      | Horizontal Balanced Flue Kit                                            |          |
| <b>Inner/Outer Diameter</b>                                                                                                                                                                                             | 100/150mm (Contractor to confirm with Boiler specialist prior to order) |          |
| <b>Construction Inner</b>                                                                                                                                                                                               | 304 grade s/steel (EN 1.4301)                                           |          |
| <b>Construction Outer</b>                                                                                                                                                                                               | Powder Coated Steel                                                     |          |
| <b>Insulation Thickness</b>                                                                                                                                                                                             | 50mm                                                                    |          |
| <b>Fire Rating</b>                                                                                                                                                                                                      | 2 hours (BS 476: Part 20)                                               |          |
| <b>Minimum Clearance to Combustible Material</b>                                                                                                                                                                        | 50mm                                                                    |          |
| <b>Terminal Type</b>                                                                                                                                                                                                    | Suitable for Horizontal discharge                                       |          |
| <b>Support Brackets – Int. Use</b>                                                                                                                                                                                      | Powder-coated, 304 grade stainless steel                                |          |
| <b>External wall terminal kit</b>                                                                                                                                                                                       | Required                                                                |          |

\*\* Nominal lengths and flue diameters identified for pricing purposes only. Contractor to satisfy themselves regarding actual lengths, component quantities, etc with reference to drawings & specifications.

## 1.5 LPHW HEATING CIRCULATION PUMPS

| <b>Reference: PMP-01 PMP-02, PMP-04 &amp; PMP-11</b><br><b>Location: Heating Plantrooms</b>                                                                                                     |                                                                    |          |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|----------|
| <div>  <p><i>Typical Image</i></p> <p>Single head inline pump as per technical specification below.</p> </div> |                                                                    |          |
| Element                                                                                                                                                                                         | Specification                                                      | Proposal |
| <b>Description</b>                                                                                                                                                                              | Single head c/w integral variable speed drives & BEMS connectivity |          |
| <b>Design Duty</b>                                                                                                                                                                              | See Pump Schedule Below                                            |          |
| <b>Pump Housing Material</b>                                                                                                                                                                    | Cast Iron                                                          |          |
| <b>Impeller Material</b>                                                                                                                                                                        | Composite                                                          |          |
| <b>Maximum Operating Pressure</b>                                                                                                                                                               | 10 bar                                                             |          |
| <b>Pressure Rating</b>                                                                                                                                                                          | PN 10                                                              |          |
| <b>Electrical Power Supply</b>                                                                                                                                                                  | 1ph / 230V / 50Hz                                                  |          |
| <b>Max Power Input</b>                                                                                                                                                                          | See Pump Schedule Below                                            |          |
| <b>Enclosure Class</b>                                                                                                                                                                          | X4D                                                                |          |
| <b>Insulation Class</b>                                                                                                                                                                         | F                                                                  |          |
| <b>Energy (EEI)</b>                                                                                                                                                                             | 0.18                                                               |          |
| <b>On-board VSD</b>                                                                                                                                                                             | Required                                                           |          |
| <b>Volt Free Contacts</b>                                                                                                                                                                       | Required for BEMS enable/fault                                     |          |
| <b>Differential Pressure Transducer Kit for sealed circuits</b>                                                                                                                                 | Required                                                           |          |
| <b>Standards/ Conformity</b>                                                                                                                                                                    | CE, VDE, EAC, EN 12756, EN 1092-2 & ISO 7005-2, WEEE               |          |

**Reference: PMP-03, PMP-06 & PMP-07**

**Location: Heating Plantrooms**



*Typical Image*

Single head inline pump as per technical specification below.

| Element                                                  | Specification                                                      | Proposal |
|----------------------------------------------------------|--------------------------------------------------------------------|----------|
| Description                                              | Single head c/w integral variable speed drives & BEMS connectivity |          |
| Design Duty                                              | See Pump Schedule Below                                            |          |
| Pump Housing Material                                    | Cast Iron                                                          |          |
| Impeller Material                                        | Composite                                                          |          |
| Maximum Operating Pressure                               | 10 bar                                                             |          |
| Pressure Rating                                          | PN 6/10                                                            |          |
| Electrical Power Supply                                  | 1ph / 230V / 50Hz                                                  |          |
| Max Power Input                                          | See Pump Schedule Below                                            |          |
| Enclosure Class                                          | X4D                                                                |          |
| Insulation Class                                         | F                                                                  |          |
| Energy (EEI)                                             | 0.17                                                               |          |
| On-board VSD                                             | Required                                                           |          |
| Volt Free Contacts                                       | Required for BEMS enable/fault                                     |          |
| Differential Pressure Transducer Kit for sealed circuits | Required                                                           |          |
| Standards/ Conformity                                    | CE, VDE, EAC, EN 12756, EN 1092-2 & ISO 7005-2, WEEE               |          |

**Reference: PMP-08 - PMP-10 & PMP-12**

**Location: Heating Plantrooms**



*Typical Image*

Twin head inline pump as per technical specification below.

| Element                                                  | Specification                                                    | Proposal |
|----------------------------------------------------------|------------------------------------------------------------------|----------|
| Description                                              | Twin head c/w integral variable speed drives & BEMS connectivity |          |
| Design Duty                                              | See Pump Schedule Below                                          |          |
| Pump Housing Material                                    | Cast Iron                                                        |          |
| Impeller Material                                        | Composite                                                        |          |
| Maximum Operating Pressure                               | 10 bar                                                           |          |
| Pressure Rating                                          | PN 6/10                                                          |          |
| Electrical Power Supply                                  | 1ph / 230V / 50Hz                                                |          |
| Max Power Input                                          | See Pump Schedule Below                                          |          |
| Enclosure Class                                          | X4D                                                              |          |
| Insulation Class                                         | F                                                                |          |
| Energy (EEI)                                             | 0.18                                                             |          |
| On-board VSD                                             | Required                                                         |          |
| Volt Free Contacts                                       | Required for BEMS enable/fault                                   |          |
| Differential Pressure Transducer Kit for sealed circuits | Required                                                         |          |
| Standards/ Conformity                                    | CE, VDE, EAC, EN 12756, EN 1092-2 & ISO 7005-2, WEEE             |          |

## Heating Circulating Pumps Schedule

| Ref    | System                                            | Flow (kg/s)                | Head (kPa)                 | Electrical Supply | Motor (kW) |
|--------|---------------------------------------------------|----------------------------|----------------------------|-------------------|------------|
| PMP-01 | LPHW Injection Circuit (Extension)                | 1.65                       | 55                         | 220/1/50          | 0.5        |
| PMP-02 | LPHW from LPHW Buffer Vessel (Extension)          | 1.3                        | 40                         | 220/1/50          | 0.5        |
| PMP-03 | LPHW to UFH Space Heating Circuit 1               | 0.4                        | 85                         | 220/1/50          | 0.5        |
| PMP-04 | LPHW to UFH Space Heating Circuit 2               | 1.4                        | 110                        | 220/1/50          | 0.8        |
| PMP-06 | LPHW Injection Circuit (Existing Plantroom)       | 6.7                        | 55                         | 220/1/50          | 0.5        |
| PMP-07 | LPHW from LPHW Buffer Vessel (Existing Plantroom) | 8.2                        | 50                         | 220/1/50          | 1.3        |
| PMP-08 | LPHW to North East & 2010 Extension Circuit       | To match existing + 1 kg/s | To match existing + 90 kPa | 220/1/50          | TBC        |
| PMP-09 | LPHW to South West Circuit                        | To match existing          | To match existing          | 220/1/50          | TBC        |
| PMP-10 | LPHW to Gym Unit Heater Circuit                   | To match existing          | To match existing          | 220/1/50          | TBC        |
| PMP-11 | LPHW to Gym Rad Circuit                           | To match existing          | To match existing          | 220/1/50          | TBC        |
| PMP-12 | LPHW to 2012 Extension Circuit                    | To match existing          | To match existing          | 220/1/50          | TBC        |

### **Notes:**

1. All heating circulating pumps to be the single head inline type with pressure transducer kits for sealed circuits and on board speed controllers (VSD's).
2. All pumps shall be selected to match pipework line sizes. No reduction in pipe diameter for pump connections.

## 1.6 LPHW HEATING PRESSURISATION UNIT & EXPANSION VESSEL

| Reference: PRU-01 & PRU-02                                                                                                                                                                                                                                                                              |                                                             |          |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|----------|
| Location: Heating Plantrooms                                                                                                                                                                                                                                                                            |                                                             |          |
| <div>   </div> <p><i>Typical Image</i></p> <p>Pressurisation Unit &amp; Expansion Vessel(s) as per technical specification below.</p> |                                                             |          |
| Element                                                                                                                                                                                                                                                                                                 | Specification                                               | Proposal |
| Description                                                                                                                                                                                                                                                                                             | Floor Standing LPHW Pressurisation Unit & Expansion Vessels |          |
| Pumps                                                                                                                                                                                                                                                                                                   | 2no.                                                        |          |
| Heating Load (kW)                                                                                                                                                                                                                                                                                       | Extension – 60kW<br>Existing – 500kW                        |          |
| Static Head (m)                                                                                                                                                                                                                                                                                         | Extension – 10<br>Existing – 6                              |          |
| Approx System Water capacity                                                                                                                                                                                                                                                                            | Extension - 837 litres<br>Existing - 7200 litres            |          |
| F&R Operating Temps                                                                                                                                                                                                                                                                                     | Extension - 55 / 45 (°C)<br>Existing - 70 / 65 (°C)         |          |
| Dimensions (mm)                                                                                                                                                                                                                                                                                         | 470 (W) x 290 (D) x 832 (H)                                 |          |
| Breaktank Capacity                                                                                                                                                                                                                                                                                      | 17.5 litres                                                 |          |
| Breaktank Connection                                                                                                                                                                                                                                                                                    | 'AB' gap to water supply                                    |          |
| Max Cold Fill Pressure                                                                                                                                                                                                                                                                                  | 4.0 Bar                                                     |          |
| Connectivity                                                                                                                                                                                                                                                                                            | High/Low level fault output to BMS via Volt Free Contacts   |          |
| Digital Display                                                                                                                                                                                                                                                                                         | Required                                                    |          |
| Independent High / Low Pressure Alarm                                                                                                                                                                                                                                                                   | Hard-wired                                                  |          |
| Auto Fill Capacity                                                                                                                                                                                                                                                                                      | Required                                                    |          |
| Power Supply                                                                                                                                                                                                                                                                                            | 1ph / 240V / 50 Hz                                          |          |
| Power Consumption / F.L.C                                                                                                                                                                                                                                                                               | 0.44 kW / 1.9 A                                             |          |
| Standards/ Conformity                                                                                                                                                                                                                                                                                   | ISO 9001, BSEN 60204 Part 1                                 |          |

|                                                   |                                                                                                                                                                                                                                                                                                                                           |  |
|---------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|                                                   | WRAS approved, IMQ & VDE Standards, PED, EMC Directives, CE, UKCA                                                                                                                                                                                                                                                                         |  |
| <b>Expansion Vessel Capacity</b>                  | <p>Extension – 80 L 480Ø x 565H</p> <p>Existing – 600 L 740Ø x 1521H</p> <p>Carbon Steel Tank</p> <p>To be confirmed by Mechanical</p> <p>Contractor based on parameters noted above and contractors proposed manufacturer – Contractor to forward manufacturers expansion calculation for review when forwarding technical submittal</p> |  |
| <b>Max. Working Pressure of Expansion Vessels</b> | 6 bar                                                                                                                                                                                                                                                                                                                                     |  |

## 1.7 DOSING POT

| <b>Reference: Dosing Pot</b><br><b>Location: Heating Plantrooms</b>                                                                                                                                                                                             |                                                                                                                                                                                                                                                |          |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| <div style="display: flex; align-items: center;">  <div style="margin-left: 20px;"> <p>Typical Image</p> <p>Dosing Pot as per technical specification below.</p> </div> </div> |                                                                                                                                                                                                                                                |          |
| Element                                                                                                                                                                                                                                                         | Specification                                                                                                                                                                                                                                  | Proposal |
| <b>Description</b>                                                                                                                                                                                                                                              | Chemical Dosing Pot                                                                                                                                                                                                                            |          |
| <b>Application</b>                                                                                                                                                                                                                                              | LPHW Heating Systems                                                                                                                                                                                                                           |          |
| <b>Capacity</b>                                                                                                                                                                                                                                                 | 11 litres                                                                                                                                                                                                                                      |          |
| <b>Construction</b>                                                                                                                                                                                                                                             | Stainless Steel                                                                                                                                                                                                                                |          |
| <b>Mounting</b>                                                                                                                                                                                                                                                 | Wall mounted c/w wall mounting brackets                                                                                                                                                                                                        |          |
| <b>Connection Details</b>                                                                                                                                                                                                                                       | <ul style="list-style-type: none"> <li>• Tundish</li> <li>• 25mm fill valved connection</li> <li>• 25mm drain valved connection</li> <li>• 25mm flow valved connection</li> <li>• 25mm return valved connection</li> <li>• Air vent</li> </ul> |          |
| <b>Connection Sizes</b>                                                                                                                                                                                                                                         | 25 mm                                                                                                                                                                                                                                          |          |
| <b>Typical Height</b>                                                                                                                                                                                                                                           | 865 mm                                                                                                                                                                                                                                         |          |
| <b>Typical Diameter</b>                                                                                                                                                                                                                                         | 320 mm                                                                                                                                                                                                                                         |          |
| <b>Weight</b>                                                                                                                                                                                                                                                   | 16.3 kg                                                                                                                                                                                                                                        |          |
| <b>Compliance</b>                                                                                                                                                                                                                                               | Declaration of Performance / CE Certification / Confirmation of CPR Exemption<br><br>PED 2014/68/EU                                                                                                                                            |          |

## 1.8 AIR SEPARATOR

| <b>Reference: Air Separator</b><br><b>Location: Heating Plantrooms</b>                                                                                                         |                                                                                                     |          |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|----------|
| <div>  <p>Typical Image</p> <p>Air Separator as per technical specification below.</p> </div> |                                                                                                     |          |
| Element                                                                                                                                                                        | Specification                                                                                       | Proposal |
| Description                                                                                                                                                                    | Deaerator                                                                                           |          |
| Application                                                                                                                                                                    | LPHW Heating Systems                                                                                |          |
| Connection Size                                                                                                                                                                | <i>Extension</i> - DN 50<br><i>Existing</i> - DN 125                                                |          |
| Construction                                                                                                                                                                   | Mild steel, welded, Flanged Connections                                                             |          |
| Mounting                                                                                                                                                                       | Inline                                                                                              |          |
| Finish                                                                                                                                                                         | Powder coated                                                                                       |          |
| Max. flow velocity                                                                                                                                                             | 1.5 m/s                                                                                             |          |
| Pressure drop at Max. Flow                                                                                                                                                     | 4.2 kPa                                                                                             |          |
| Auto Air Vent                                                                                                                                                                  | Integral                                                                                            |          |
| Typical Height                                                                                                                                                                 | 700 mm                                                                                              |          |
| Typical Length                                                                                                                                                                 | 650 mm                                                                                              |          |
| Compliance                                                                                                                                                                     | Declaration of Performance / CE Certification / Confirmation of CPR Exemption<br><br>PED 2014/68/EU |          |

## 1.9 DIRT SEPARATOR

| <b>Reference: Dirt Separator</b><br><b>Location: Heating Plantrooms</b>                                                                                                         |                                                                                                 |          |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|----------|
| <div>  <p>Typical Image</p> <p>Dirt Separator as per technical specification below.</p> </div> |                                                                                                 |          |
| Element                                                                                                                                                                         | Specification                                                                                   | Proposal |
| Description                                                                                                                                                                     | Magnet Dirt Separator                                                                           |          |
| Application                                                                                                                                                                     | LPHW Heating System                                                                             |          |
| Connection Size                                                                                                                                                                 | <i>Extension</i> - DN 50<br><i>Existing</i> - DN 125                                            |          |
| Construction                                                                                                                                                                    | Mild steel, welded, Flanged Connections                                                         |          |
| Mounting                                                                                                                                                                        | Inline                                                                                          |          |
| Finish                                                                                                                                                                          | Powder coated                                                                                   |          |
| Max. flow velocity                                                                                                                                                              | 1.5 m/s                                                                                         |          |
| Pressure drop at Max. Flow                                                                                                                                                      | 4.2 kPa                                                                                         |          |
| Internal Magnet                                                                                                                                                                 | Required                                                                                        |          |
| Typical Height                                                                                                                                                                  | 690 mm                                                                                          |          |
| Typical Length                                                                                                                                                                  | 635 mm                                                                                          |          |
| Compliance                                                                                                                                                                      | Declaration of Performance / CE Certification / Confirmation of CPR Exemption<br>PED 2014/68/EU |          |

## 1.10 AUXILIARY HEATER

| <b>Reference: Auxiliary Frost Protection Heater</b><br><b>Location: Heating Plantrooms &amp; Tank Room</b>                                                                       |                                                                                                     |          |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|----------|
| <div>  <p><i>Typical Image</i></p> <p>Radiator as per technical specification below.</p> </div> |                                                                                                     |          |
| Element                                                                                                                                                                          | Specification                                                                                       | Proposal |
| Benchmark                                                                                                                                                                        | Dimplex                                                                                             |          |
| Type                                                                                                                                                                             | Oil filled electric radiator                                                                        |          |
| Mounting                                                                                                                                                                         | Wall mounted c/w wall mounting brackets                                                             |          |
| Finish                                                                                                                                                                           | White stove enamel                                                                                  |          |
| Fixings                                                                                                                                                                          | Supplied with concealed wall mounting brackets                                                      |          |
| Minimum Output                                                                                                                                                                   | 1.5 kW                                                                                              |          |
| Controls                                                                                                                                                                         | Remote Frost Thermostat/Room Thermostat                                                             |          |
| Typical Height                                                                                                                                                                   | 659mm                                                                                               |          |
| Maximum Length                                                                                                                                                                   | 1084mm                                                                                              |          |
| Weight                                                                                                                                                                           | 20 kg                                                                                               |          |
| Compliance                                                                                                                                                                       | Declaration of Performance /<br>CE Certification<br><br>EN 60335<br><br>ERP Directive (2009/125/EC) |          |

## 2 PLUMBING EQUIPMENT (53)

### 2.1 POTABLE COLD WATER STORAGE TANK

| Reference: WT-01                                                                                                                                                                                            |                                                |          |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|----------|
| Location: Extension Roof Space Water Tank Room                                                                                                                                                              |                                                |          |
| <div>  <div> <p><i>Typical Image</i></p> <p>Sectional storage tank as per technical specification below.</p> </div> </div> |                                                |          |
| Element                                                                                                                                                                                                     | Specification                                  | Proposal |
| Description                                                                                                                                                                                                 | GRP pre-insulated sectional water storage tank |          |
| Location                                                                                                                                                                                                    | Internal                                       |          |
| Contents                                                                                                                                                                                                    | Potable Cold Water                             |          |
| Specification                                                                                                                                                                                               | Format 30                                      |          |
| Actual Capacity Req'd                                                                                                                                                                                       | 5625 Litres                                    |          |
| Dimensions (LxWxH)                                                                                                                                                                                          | 2.65m x 1.65m x 1.50m                          |          |
| Internal Divider                                                                                                                                                                                            | Required                                       |          |
| Drip Tray                                                                                                                                                                                                   | Required                                       |          |
| Inlet Connection                                                                                                                                                                                            | 2 no. DN 15                                    |          |
| Outlet Connection                                                                                                                                                                                           | 2 no. DN 50                                    |          |
| Overflow Connection                                                                                                                                                                                         | 2 no. DN 50                                    |          |
| Vents                                                                                                                                                                                                       | 2 no.                                          |          |
| Access Hatch                                                                                                                                                                                                | 2 no. 600 x 600mm                              |          |
| Internal Ladders                                                                                                                                                                                            | Not Required                                   |          |
| External Ladder                                                                                                                                                                                             | Not Required                                   |          |
| Tank Base Description                                                                                                                                                                                       | Pre-insulated c/w internal flanges             |          |
| Tank Wall Description                                                                                                                                                                                       | Pre-insulated c/w external flanges             |          |

|                                                     |                                                                                                                                                                  |  |
|-----------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| <b>Tank Cover Description</b>                       | Heavy duty and pre-insulated<br>c/w internal flanges to Format<br>30                                                                                             |  |
| <b>Underwater Bolts, Tie<br/>Bars, Joiners, etc</b> | Stainless steel, grade 316 S16                                                                                                                                   |  |
| <b>External bolts</b>                               | Mild steel to BS 3692 and<br>galvanised to BS 729                                                                                                                |  |
| <b>Mesh Screen Details</b>                          | All vents, warning pipes,<br>overflows, shall have mesh<br>screens of maximum 0.65mm<br>x 0.65mm holes                                                           |  |
| <b>Standards/ Conformity</b>                        | Commissioned and<br>Maintained to BS 6700<br><br>BS 3692, BS 729, BS4211 1994<br><br>Declaration of Performance /<br>CE certification<br><br>I.S. EN 13280: 2001 |  |

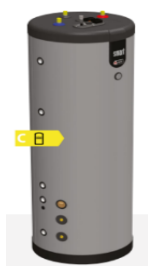
## 2.2 DHW PRE-HEAT CYLINDER

| Reference: CYL-01                                                                                                                                                                                  |                                                                                             |          |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|----------|
| Location: Heating Plantrooms                                                                                                                                                                       |                                                                                             |          |
| <div>  <p>Typical Image</p> <p>Tank-in-Tank Pre-Heat DHW Cylinder as per technical specification below</p> </div> |                                                                                             |          |
| Element                                                                                                                                                                                            | Specification                                                                               | Proposal |
| Description                                                                                                                                                                                        | Quick Recovery Vertical Tank In Tank Indirect Pre Heat DHW Cylinder                         |          |
| DHW Storage Capacity Req'd (L)                                                                                                                                                                     | 517                                                                                         |          |
| Capacity Total (L)                                                                                                                                                                                 | 800                                                                                         |          |
| Peak Flow 60°C                                                                                                                                                                                     | 504 litres / 10'                                                                            |          |
| Peak Flow 60°C 1 <sup>st</sup> Hour                                                                                                                                                                | 1368 litres / 60'                                                                           |          |
| Continuous Flow 60°C                                                                                                                                                                               | 1037 litres / hr                                                                            |          |
| Cylinder Material                                                                                                                                                                                  | Stainless Steel                                                                             |          |
| Insulation                                                                                                                                                                                         | Thick Polypropylene Jacket with high Thermal insulation to Class B or C.                    |          |
| Max DHW Storage Temperature (°C)                                                                                                                                                                   | 80                                                                                          |          |
| Max DHW Operating Pressure (bar)                                                                                                                                                                   | 8.6                                                                                         |          |
| Primary Heating Coil                                                                                                                                                                               | ASHP @ 55/45° F&R<br>30kW to heat 517L CWS from 10° - 50°C in 30mins                        |          |
| Pasteurisation                                                                                                                                                                                     | Anti legionella pump from gas fired water heater to cylinder for 4 hours 1 day per week     |          |
| Standing Losses (W) / (kWh/day)                                                                                                                                                                    | 120 / 2.88                                                                                  |          |
| Typical Dimensions - Ø x H                                                                                                                                                                         | 780 x 2000mm                                                                                |          |
| Accessories                                                                                                                                                                                        | <ul style="list-style-type: none"> <li>Temperature Gauge</li> <li>Pressure Gauge</li> </ul> |          |

|                              |                                                                                                                                                                                               |  |
|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|                              | <ul style="list-style-type: none"> <li>• Temp/Pressure Safety Valve &amp; tundish</li> <li>• Unvented Kit</li> <li>• Immersion pockets as required</li> <li>• 80L Expansion Vessel</li> </ul> |  |
| <b>Warranty</b>              | 5 Years on S/S Cylinder                                                                                                                                                                       |  |
| <b>Standards/ Conformity</b> | WRAS, KIWA, CE Marked                                                                                                                                                                         |  |

**Reference: CYL-02**

**Location: Heating Plantrooms**



*Typical Image*

Tank-in-Tank Pre-Heat DHW Cylinder as per technical specification below

| Element                             | Specification                                                                                                                                   | Proposal |
|-------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| Description                         | Quick Recovery Vertical Tank In Tank Indirect Pre Heat DHW Cylinder                                                                             |          |
| DHW Storage Capacity Req'd (L)      | 800                                                                                                                                             |          |
| Capacity Total (L)                  | 675                                                                                                                                             |          |
| Peak Flow 60°C                      | 961 litres / 10'                                                                                                                                |          |
| Peak Flow 60°C 1 <sup>st</sup> Hour | 2124 litres / 60'                                                                                                                               |          |
| Continuous Flow 60°C                | 1395 litres / hr                                                                                                                                |          |
| Cylinder Material                   | Stainless Steel                                                                                                                                 |          |
| Insulation                          | Thick Polypropylene Jacket with high Thermal insulation to Class B or C.                                                                        |          |
| Max DHW Storage Temperature (°C)    | 80                                                                                                                                              |          |
| Max DHW Operating Pressure (bar)    | 8.6                                                                                                                                             |          |
| Primary Heating Coil                | ASHP @ 55/45° F&R<br>39kW to heat 675L CWS from 10° - 50°C in 30mins                                                                            |          |
| Pasteurisation                      | Anti legionella pump from gas fired water heater to cylinder for 4 hours 1 day per week                                                         |          |
| Standing Losses (W) / (kWh/day)     | 120 / 2.88                                                                                                                                      |          |
| Typical Dimensions - Ø x H          | 780 x 1955mm                                                                                                                                    |          |
| Accessories                         | <ul style="list-style-type: none"><li>• Temperature Gauge</li><li>• Pressure Gauge</li><li>• Temp/Pressure Safety Valve &amp; tundish</li></ul> |          |

|                              |                                                                                                                                           |  |
|------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|--|
|                              | <ul style="list-style-type: none"> <li>• Unvented Kit</li> <li>• Immersion pockets as required</li> <li>• 80L Expansion Vessel</li> </ul> |  |
| <b>Warranty</b>              | 5 Years on S/S Cylinder                                                                                                                   |  |
| <b>Standards/ Conformity</b> | WRAS, KIWA, CE Marked                                                                                                                     |  |

## 2.3 GAS FIRED WATER HEATER

| <b>Ref:</b> WH-01 & WH-02<br><b>Location:</b> Heating Plantrooms                                                                                                                     |                                                                           |          |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|----------|
| <div>  <p><i>Typical Image</i></p> <p>Water Heater as per technical specification below.</p> </div> |                                                                           |          |
| Element                                                                                                                                                                              | Specification                                                             | Proposal |
| <b>Description</b>                                                                                                                                                                   | Direct gas-fired un-vented condensing storage water heater (tank-in-tank) |          |
| <b>Fuel</b>                                                                                                                                                                          | Natural Gas                                                               |          |
| <b>DHW Storage Capacity</b>                                                                                                                                                          | 190 litres                                                                |          |
| <b>Peak Flow at 60°C</b>                                                                                                                                                             | 371 litres/10'                                                            |          |
| <b>Peak Flow at 60°C 1<sup>st</sup> Hr</b>                                                                                                                                           | 1638 liters/60'                                                           |          |
| <b>Constant Flow at 60°C</b>                                                                                                                                                         | 1520 litres/hour                                                          |          |
| <b>Heat Input</b>                                                                                                                                                                    | 94.4 kW                                                                   |          |
| <b>Efficiency at 100% (EN89)</b>                                                                                                                                                     | 97.5 %                                                                    |          |
| <b>Water Heating Efficiency Class</b>                                                                                                                                                | A                                                                         |          |
| <b>Water Heating Energy Efficiency (EU 814/2013)</b>                                                                                                                                 | 87.2%                                                                     |          |
| <b>Max Working Pressure (DHW)</b>                                                                                                                                                    | 8.6 bar                                                                   |          |
| <b>NOx weighted (GCV) (EN15502)</b>                                                                                                                                                  | 29.3 mg/kWh                                                               |          |
| <b>Sound Power Level</b>                                                                                                                                                             | 61 dB                                                                     |          |
| <b>Dimensions (WxDxH)</b>                                                                                                                                                            | 690 x 787 x 2170mm                                                        |          |

|                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |
|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| <b>Electrical Requirements</b> | 230V / 50Hz / 1ph                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |
| <b>Heat Exchanger</b>          | Stainless Steel                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |
| <b>Burner</b>                  | Modulating air/gas premix natural gas burner                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |
| <b>BMS Interface</b>           | Remote Enable Terminals & Fault Output                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  |
| <b>Accessories</b>             | <ul style="list-style-type: none"> <li>• Weather compensated controller c/s north facing temp stat</li> <li>• Air Inlet &amp; Exhaust Outlet concentric flue kit.</li> <li>• Unvented Kit comprising; non-return valve, 6 bar expansion valve, expansion vessels suitable for hot water and a 7 bar T&amp;P relief valve for hot water outlet.</li> <li>• Connection module and VFC required for connection to the BEMS for Enable/Fault</li> <li>• Water Heater integral PCB board ability to enable and control re-circulation pump</li> </ul> |  |
| <b>Warranty</b>                | 5 Years parts and labour                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  |
| <b>Standards / Conformity</b>  | CE Marked, WRAS, KIWA approved                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |

## 2.4 WATER HEATER FLUE

| <b>Reference: Water Heater Flues</b><br><b>Location: All Heating Plantrooms / External</b>                                                                                                                              |                                                                              |          |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|----------|
|  <p style="text-align: center;"><i>Typical Image</i></p> <p style="text-align: center;">Flue as per technical specification below.</p> |                                                                              |          |
| Element                                                                                                                                                                                                                 | Specification                                                                | Proposal |
| <b>Description</b>                                                                                                                                                                                                      | Horizontal Balanced Flue Kit                                                 |          |
| <b>Inner/Outer Diameter</b>                                                                                                                                                                                             | 80/125mm (Contractor to confirm with Water Heater specialist prior to order) |          |
| <b>Construction Inner</b>                                                                                                                                                                                               | 304 grade s/steel (EN 1.4301)                                                |          |
| <b>Construction Outer</b>                                                                                                                                                                                               | Powder Coated Steel                                                          |          |
| <b>Insulation Thickness</b>                                                                                                                                                                                             | 45mm                                                                         |          |
| <b>Fire Rating</b>                                                                                                                                                                                                      | 2 hours (BS 476: Part 20)                                                    |          |
| <b>Minimum Clearance to Combustible Material</b>                                                                                                                                                                        | 50mm                                                                         |          |
| <b>Terminal Type</b>                                                                                                                                                                                                    | Suitable for Horizontal discharge                                            |          |
| <b>Support Brackets – Int. Use</b>                                                                                                                                                                                      | Powder-coated, 304 grade stainless steel                                     |          |
| <b>External wall terminal kit</b>                                                                                                                                                                                       | Required                                                                     |          |

\*\* Nominal lengths and flue diameters identified for pricing purposes only. Contractor to satisfy themselves regarding actual lengths, component quantities, etc with reference to drawings & specifications.

## 2.5 COLD WATER BOOSTER PUMP

| <b>Reference: Cold Water Booster Pump (BS-01 &amp; BS-02)</b><br><b>Location: Extension Roof Space Water Tank Room and Existing Plantroom</b>                                                  |                                                                             |          |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|----------|
| <p>Typical Image</p> <div>  <p>Twin Pump Packaged Booster Set as per technical specification below</p> </div> |                                                                             |          |
| Element                                                                                                                                                                                        | Specification                                                               | Proposal |
| <b>Description</b>                                                                                                                                                                             | Packaged Cold Water booster pumps c/w integrated VSD's                      |          |
| <b>Type</b>                                                                                                                                                                                    | Twin Pump Duty/Assist                                                       |          |
| <b>Design Duty</b>                                                                                                                                                                             | <i>Extension - 4.0 l/s @ 2.5 Bar</i><br><i>Existing – 1.5 l/s @ 1.5 Bar</i> |          |
| <b>Integral Frequency Converter and PID Controller with adjustable PI parameters</b>                                                                                                           | Required                                                                    |          |
| <b>Integral Expansion Vessel, Pressure Transducer &amp; Pressure Gauge</b>                                                                                                                     | Required                                                                    |          |
| <b>Integral Non-return Valve</b>                                                                                                                                                               | Required                                                                    |          |
| <b>Variable Speed Drive</b>                                                                                                                                                                    | Required                                                                    |          |
| <b>Pump Housing Material</b>                                                                                                                                                                   | 304 Stainless Steel                                                         |          |
| <b>Impeller Material</b>                                                                                                                                                                       | 304 Stainless Steel                                                         |          |
| <b>Manifolds</b>                                                                                                                                                                               | 304 Stainless Steel                                                         |          |
| <b>Rubber Material</b>                                                                                                                                                                         | EPDM                                                                        |          |
| <b>Shaft Seal Material</b>                                                                                                                                                                     | Service Friendly HQQE                                                       |          |
| <b>Max. Operating Pressure</b>                                                                                                                                                                 | 10 bar                                                                      |          |
| <b>Electrical Requirements</b>                                                                                                                                                                 | 400 V / 3ph / 50 Hz                                                         |          |

|                                   |                                                   |  |
|-----------------------------------|---------------------------------------------------|--|
| <b>IE Efficiency Class</b>        | IE5                                               |  |
| <b>Enclosure class (IEC 34-5)</b> | IP54                                              |  |
| <b>Insulation class (IEC 85)</b>  | F                                                 |  |
| <b>Volt Free Contacts</b>         | Required for BEMS enable/fault                    |  |
| <b>Manufacturer's Warranty</b>    | 2 years (minimum)                                 |  |
| <b>Dry Run Protection</b>         | Required – Float Switch                           |  |
| <b>Standards / Conformity</b>     | DIN Standard 1988/T5,<br>CE Marked<br>WRAS / KIWA |  |

## 2.6 DOMESTIC HOT WATER RECIRCULATION PUMP

| <b>Reference: Domestic Hot Water Return Pump (PMP-05 &amp; PMP-13)</b><br><b>Location: Heating Plantrooms</b>                                                                                        |                                                                  |          |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|----------|
| <div>  <p><i>Typical Image</i></p> <p>Single head circulating pump as per technical specification below.</p> </div> |                                                                  |          |
| Element                                                                                                                                                                                              | Specification                                                    | Proposal |
| Type / Model                                                                                                                                                                                         | Single-head, canned rotor type c/w integral variable speed drive |          |
| Minimum Energy Class                                                                                                                                                                                 | A                                                                |          |
| Design Duty                                                                                                                                                                                          | See DHWR Pumps Schedule below                                    |          |
| Pump Housing Material                                                                                                                                                                                | Stainless Steel EN 1.4308                                        |          |
| Impeller Material                                                                                                                                                                                    | Composite                                                        |          |
| Maximum Operating Pressure                                                                                                                                                                           | 10 bar                                                           |          |
| Maximum Operating Temperature:                                                                                                                                                                       | 110°C                                                            |          |
| Power Input                                                                                                                                                                                          | See DHWR Pumps Schedule below                                    |          |
| Electrical Requirements                                                                                                                                                                              | 1phase / 230V / 50 Hz                                            |          |
| Enclosure Class                                                                                                                                                                                      | X4D                                                              |          |
| Insulation Class                                                                                                                                                                                     | F                                                                |          |
| Energy Efficiency Index (EEI)                                                                                                                                                                        | 0.18                                                             |          |
| On-board VSD                                                                                                                                                                                         | Required                                                         |          |
| Volt Free Contacts                                                                                                                                                                                   | Required for BMS enable/fault                                    |          |
| Standards/ Conformity                                                                                                                                                                                | CE, VDE, EAC, CN, ROHS, WEEE, WRAS                               |          |

### DHWR Pump Schedule

| Ref    | Flow Rate<br>(kg/s) | Head<br>(kPa) | Electrical | Motor Rating<br>(kW) |
|--------|---------------------|---------------|------------|----------------------|
| PMP-05 | 0.25kg/s            | 95            | 220/1/50   | 0.15                 |
| PMP-13 | 0.5kg/s             | 75            | 220/1/50   | 0.15                 |

**Notes:**

1. DHWR circulating pump to be the single head inline type with on board speed controllers and suitable for installation on hot water return systems

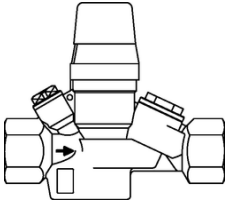
## 2.7 ANTI LEGIONELLA PUMPS

| <b>Reference: Domestic Hot Water Return Pump</b><br><b>Location: Heating Plantrooms</b>                                                                                                              |                                                                  |          |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|----------|
| <div>  <p><i>Typical Image</i></p> <p>Single head circulating pump as per technical specification below.</p> </div> |                                                                  |          |
| Element                                                                                                                                                                                              | Specification                                                    | Proposal |
| Type / Model                                                                                                                                                                                         | Single-head, canned rotor type c/w integral variable speed drive |          |
| Minimum Energy Class                                                                                                                                                                                 | A                                                                |          |
| Design Duty                                                                                                                                                                                          | 1 kg/s @ 30kPa                                                   |          |
| Pump Housing Material                                                                                                                                                                                | Stainless Steel EN 1.4308                                        |          |
| Impeller Material                                                                                                                                                                                    | Composite                                                        |          |
| Maximum Operating Pressure                                                                                                                                                                           | 10 bar                                                           |          |
| Maximum Operating Temperature:                                                                                                                                                                       | 110°C                                                            |          |
| Electrical Requirements                                                                                                                                                                              | 1phase / 230V / 50 Hz                                            |          |
| Enclosure Class                                                                                                                                                                                      | X4D                                                              |          |
| Insulation Class                                                                                                                                                                                     | F                                                                |          |
| Energy Efficiency Index (EEI)                                                                                                                                                                        | 0.18                                                             |          |
| On-board VSD                                                                                                                                                                                         | Required                                                         |          |
| Volt Free Contacts                                                                                                                                                                                   | Required for BMS enable/fault                                    |          |
| Standards/ Conformity                                                                                                                                                                                | CE, VDE, EAC, CN, ROHS, WEEE, WRAS                               |          |

### Notes:

1. All Anti Legionella circulating pumps to be the single head inline type with on board speed controllers and suitable for installation on hot water return systems.

## 2.8 THERMOSTATIC REGULATING VALVE

| <b>Reference: Thermostatic Regulating Valve</b><br><b>Location: On each DHW Return branch as indicated on drawings (M-5300 Series)</b>                                                                                                                                             |                                                     |          |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|----------|
| <div style="display: flex; align-items: center;">  <div style="margin-left: 20px;"> <p><i>Typical Image</i></p> <p>Thermostatic regulating valve as per technical details below</p> </div> </div> |                                                     |          |
| Element                                                                                                                                                                                                                                                                            | Specification                                       | Proposal |
| <b>Description</b>                                                                                                                                                                                                                                                                 | Self Regulating Thermal Balancing Valve             |          |
| <b>Application</b>                                                                                                                                                                                                                                                                 | DHW Return Pipework                                 |          |
| <b>Coupling</b>                                                                                                                                                                                                                                                                    | Female Threaded – both ends                         |          |
| <b>Size</b>                                                                                                                                                                                                                                                                        | Line Size                                           |          |
| <b>Temperature Range (Maximum)</b>                                                                                                                                                                                                                                                 | 40°C - 65°C                                         |          |
| <b>Factory Preset Temperature</b>                                                                                                                                                                                                                                                  | 58°C                                                |          |
| <b>Temp Range for Thermal Distinfection</b>                                                                                                                                                                                                                                        | >70°C                                               |          |
| <b>Maximum Pressure</b>                                                                                                                                                                                                                                                            | 16 Bar                                              |          |
| <b>Dry Fit Thermometer</b>                                                                                                                                                                                                                                                         | Built In                                            |          |
| <b>Valve Body</b>                                                                                                                                                                                                                                                                  | DRZ Brass                                           |          |
| <b>Seals</b>                                                                                                                                                                                                                                                                       | Vitron                                              |          |
| <b>Tamperproof Cap</b>                                                                                                                                                                                                                                                             | Required                                            |          |
| <b>Standards</b>                                                                                                                                                                                                                                                                   | WRAS Approved                                       |          |
| <b>Accessories</b>                                                                                                                                                                                                                                                                 | Pre-molded insulation cover<br>Integral thermometer |          |

## 2.9 THERMOSTATIC MIXING VALVES

| Reference: TMV's                                                                                                                                                            |                         |          |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|----------|
| Locations: Wash Hand Basins & Sinks                                                                                                                                         |                         |          |
| <div>  <p><i>Typical Image</i></p> <p>TMV as per technical specification below.</p> </div> |                         |          |
| Element                                                                                                                                                                     | Specification           | Proposal |
| Description                                                                                                                                                                 | TMV-3 type mixing valve |          |
| Body                                                                                                                                                                        | Gunmetal                |          |
| Seals                                                                                                                                                                       | Nitrile                 |          |
| Spring                                                                                                                                                                      | Stainless Steel         |          |
| Fittings                                                                                                                                                                    | DZR Brass               |          |
| Strainers                                                                                                                                                                   | Stainless Steel         |          |
| Factory temperature setting                                                                                                                                                 | 38°C                    |          |
| Temp Setting Range                                                                                                                                                          | 38 - 46°C               |          |
| Minimum hot to mix differential temperature                                                                                                                                 | 10°C                    |          |
| Temperature stability                                                                                                                                                       | ± 2°C                   |          |
| Max Static Pressure                                                                                                                                                         | 16 bar                  |          |
| Working Pressure Range                                                                                                                                                      | 0.1 – 5.0 bar           |          |
| Minimum flowrate                                                                                                                                                            | 4 L/min                 |          |
| Standards                                                                                                                                                                   | BS 7942, NHS MES D08    |          |
| Approvals                                                                                                                                                                   | WRAS & TMV3 Approved    |          |

## 2.10 WALL HUNG WATER BOILERS

| <b>Reference: WB1</b><br><b>Locations: Servery</b>                                                                                                                                            |                                                           |          |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|----------|
| <div>  <p><i>Typical Image</i></p> <p>Electric Water Boiler as per technical specification below.</p> </div> |                                                           |          |
| Element                                                                                                                                                                                       | Specification                                             | Proposal |
| <b>Description</b>                                                                                                                                                                            | Over-sink, wall-mounted, steam-free electric water boiler |          |
| <b>Storage Capacity</b>                                                                                                                                                                       | 7.5 litres                                                |          |
| <b>Heat Up Time From 10°C</b>                                                                                                                                                                 | 17 minutes                                                |          |
| <b>Delivery Rate</b>                                                                                                                                                                          | 45 Cups                                                   |          |
| <b>Power Rating</b>                                                                                                                                                                           | 1ph/230V/50Hz (13A) – 2.4kW                               |          |
| <b>Water Supply</b>                                                                                                                                                                           | Potable Water                                             |          |
| <b>Water Supply Pressure</b>                                                                                                                                                                  | 0.7 bar – 7.0 bar                                         |          |
| <b>Nominal Dimensions</b>                                                                                                                                                                     | 578 (H) x 318 (W) x 198 (D)mm                             |          |
| <b>Construction</b>                                                                                                                                                                           | Twin Chamber, Stainless Steel c/w cool touch tap          |          |
| <b>Case</b>                                                                                                                                                                                   | Stainless Steel                                           |          |
| <b>Tap</b>                                                                                                                                                                                    | Pull down classic                                         |          |
| <b>Drip Tray</b>                                                                                                                                                                              | Required                                                  |          |
| <b>Mains Water Expansion Kit</b>                                                                                                                                                              | Required                                                  |          |
| <b>Approvals</b>                                                                                                                                                                              | WRAS, KIWA, CE Certified                                  |          |
| <b>Warranty</b>                                                                                                                                                                               | 2 years                                                   |          |

## 2.11 EXTERNAL BIB TAP

| <b>Reference:</b> Frost Free Bib Tap<br><b>Locations:</b> As indicated on Plumbing Drawings (M-5300 Series)                                                                                        |                                            |          |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|----------|
| <div>  <p><i>Typical Image</i></p> <p>Frostfree Lockable bib tap as per technical specification below.</p> </div> |                                            |          |
| Element                                                                                                                                                                                            | Specification                              | Proposal |
| <b>Description</b>                                                                                                                                                                                 | Frost Free Lockable Bib Tap                |          |
| <b>Body</b>                                                                                                                                                                                        | Gun Metal with Chrome Finish               |          |
| <b>Seat Seals</b>                                                                                                                                                                                  | EPDM                                       |          |
| <b>Extension Kit</b>                                                                                                                                                                               | Copper                                     |          |
| <b>Extension Kit</b>                                                                                                                                                                               | Required                                   |          |
| <b>Automatic Draining</b>                                                                                                                                                                          | Required                                   |          |
| <b>Back Flow Prevention</b>                                                                                                                                                                        | Required                                   |          |
| <b>Fixing Set</b>                                                                                                                                                                                  | Required                                   |          |
| <b>Lockable Cap</b>                                                                                                                                                                                | Required                                   |          |
| <b>Standards</b>                                                                                                                                                                                   | DIN EN IS 3822<br>DIN1988 100, DIN EN 1717 |          |
| <b>Approvals</b>                                                                                                                                                                                   | WRAS Approved                              |          |

### 3 GAS EQUIPMENT (53)

#### 3.1 GAS LEAK DETECTION SYSTEMS

| Reference: CP-01                                                                                                                                                                                            |                                                                                |          |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|----------|
| Location: Heating Plantrooms as indicated on Plantroom Drawings (M-5100 Series)                                                                                                                             |                                                                                |          |
| <div>  <p><i>Typical Image</i></p> <p>Gas detection &amp; isolation system as per technical specification below</p> </div> |                                                                                |          |
| Element                                                                                                                                                                                                     | Specification                                                                  | Proposal |
| Description                                                                                                                                                                                                 | Gas Leak Detection & Isolation System                                          |          |
| Panel Dimensions                                                                                                                                                                                            | 183mm(H) x 212mm(W) x 97mm(D)                                                  |          |
| IP Rating                                                                                                                                                                                                   | IP65                                                                           |          |
| Electrical Supply                                                                                                                                                                                           | 1ph, 230V, 50Hz                                                                |          |
| Gas Solenoid Valve Size                                                                                                                                                                                     | Line Size as indicated on Gas Drawings<br>M-5400 Series                        |          |
| Auxiliary Position Status Facility                                                                                                                                                                          | Required on solenoid valve for BMS                                             |          |
| Gas Detector Type                                                                                                                                                                                           | Natural Gas                                                                    |          |
| Gas Detector Calibration                                                                                                                                                                                    | Pre alarm: 5% of low explosion level<br>High alarm: 10% of low explosion level |          |
| Quantity of Gas Detectors                                                                                                                                                                                   | Extension - 2no.<br>Existing - 3no.                                            |          |
| Integral Emergency Stop Button & Reset                                                                                                                                                                      | Required                                                                       |          |
| Auxiliary Emergency Stop Button                                                                                                                                                                             | 1 no.                                                                          |          |
| Audible Alarm                                                                                                                                                                                               | Required                                                                       |          |
| LED Indication                                                                                                                                                                                              | Power – GREEN<br>Gas On - RED                                                  |          |
| Manual Reset After Power Supply Failure                                                                                                                                                                     | Required                                                                       |          |
| BMS Connectivity                                                                                                                                                                                            | Volt free contacts                                                             |          |
| Fire Test Isolation Mode                                                                                                                                                                                    | Required                                                                       |          |
| Fire Alarm Interface                                                                                                                                                                                        | Required                                                                       |          |
| Compliance                                                                                                                                                                                                  | Declaration of Performance/CE Certification                                    |          |

### 3.2 GAS PRESSURE PROVING SYSTEMS

| <b>Reference:</b> CP-02<br><b>Location:</b> School Reception                                                                                                                                       |                                                              |          |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|----------|
| <div>  <p><i>Typical Image</i></p> <p>Gas pressure proving system as per technical specification below</p> </div> |                                                              |          |
| Element                                                                                                                                                                                            | Specification                                                | Proposal |
| <b>Description</b>                                                                                                                                                                                 | Gas pressure proving system                                  |          |
| <b>Nominal Dimensions</b>                                                                                                                                                                          | 183(H) x 212(W) x 97(D)mm                                    |          |
| <b>IP Rating</b>                                                                                                                                                                                   | IP65                                                         |          |
| <b>Electrical Supply</b>                                                                                                                                                                           | 1ph, 230V, 50Hz                                              |          |
| <b>LCD Display</b>                                                                                                                                                                                 | Required                                                     |          |
| <b>Gas Solenoid Valve Size</b>                                                                                                                                                                     | Line Size as indicated on Gas Drawings M-5400 Series         |          |
| <b>Gas Solenoid Valve Actuator Rating</b>                                                                                                                                                          | 230V                                                         |          |
| <b>Auxiliary Position Status Facility</b>                                                                                                                                                          | Required on solenoid valve for BMS                           |          |
| <b>Auxiliary Pressure Sender Unit</b>                                                                                                                                                              | Required. Note - mechanical pressure switches NOT acceptable |          |
| <b>Integral Electrical Isolation</b>                                                                                                                                                               | Optional                                                     |          |
| <b>Integral Emergency Stop Button &amp; Reset</b>                                                                                                                                                  | Required                                                     |          |
| <b>Auxiliary Emergency Stop Button</b>                                                                                                                                                             | As indicated on Gas Drawings M-5400 Series                   |          |
| <b>Keyswitch Operation</b>                                                                                                                                                                         | Required                                                     |          |
| <b>Audible Alarm</b>                                                                                                                                                                               | Required                                                     |          |
| <b>LED Indication</b>                                                                                                                                                                              | Power – GREEN, Gas On - RED<br>Fan Running - YELLOW          |          |

|                              |                                                                                                                   |  |
|------------------------------|-------------------------------------------------------------------------------------------------------------------|--|
| <b>Ventilation Interlock</b> | <ul style="list-style-type: none"> <li>• HE Canopy exhaust fan(s)</li> <li>• Engineering Canopy Fan(s)</li> </ul> |  |
| <b>Fire Alarm Interface</b>  | Required                                                                                                          |  |
| <b>Compliance</b>            | Declaration of Performance/CE Certification                                                                       |  |

## 4 SPACE HEATING EQUIPMENT (56)

### 4.1 ROOM SPACE TEMPERATURE CONTROLLERS

**Reference:** Digital Space Thermostat – (Ts)

**Location:** As indicated on LPHW heating drawings (M-5600 Series)



*Typical Image*

Modbus Digital Thermostat as per technical specification below

| Element                      | Specification                                                                                                                                                                                                                          | Proposal |
|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| LCD Display                  | 3.5" Touchscreen                                                                                                                                                                                                                       |          |
| Temperature Display Format   | Celsius                                                                                                                                                                                                                                |          |
| Temperature Sensor           | Built In                                                                                                                                                                                                                               |          |
| Temperature Adjustment Range | Lockable for adjustment only between 18°C - 22°C                                                                                                                                                                                       |          |
| Power Supply                 | 24 Vac/dc                                                                                                                                                                                                                              |          |
| Dimensions                   | 87mm(W) x 112mm(H) x 14mm(D)                                                                                                                                                                                                           |          |
| Mounting                     | Wall Mounted                                                                                                                                                                                                                           |          |
| Housing                      | Polycarbonate Plastic                                                                                                                                                                                                                  |          |
| Modbus Compatible            | Required – RTU Protocol                                                                                                                                                                                                                |          |
| Programable                  | <p>7 Programming days</p> <p>Control &amp; Time settings available over modbus.</p> <p>Space thermostat to be programable to allow each space to have individual time / temperature settings which will be controlled via the BEMS</p> |          |

## 4.2 2-PORT CONTROL VALVES

| <b>Reference: 2 Port Valve &amp; Actuator</b><br><b>Location: As indicated on LPHW Heating Drawings (M-5600 Series)</b>                                                                      |                                       |          |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|----------|
| <div>  <p>Typical Image</p> <p>2 Port Valve &amp; Actuator as per technical specification below.</p> </div> |                                       |          |
| Element                                                                                                                                                                                      | Specification                         | Proposal |
| Description                                                                                                                                                                                  | Assisted Lift Servo Operated Valve    |          |
| Control Function                                                                                                                                                                             | On/Off: Normally Closed               |          |
| Application                                                                                                                                                                                  | LPHW Heating                          |          |
| Coupling                                                                                                                                                                                     | As per Part 3: Standard Specification |          |
| Size                                                                                                                                                                                         | As per drawings                       |          |
| Max. Differential Pressure                                                                                                                                                                   | 10 Bar                                |          |
| Valve Body                                                                                                                                                                                   | Brass                                 |          |
| Spindle                                                                                                                                                                                      | Stainless steel                       |          |
| Media                                                                                                                                                                                        | Low Pressure Hot Water                |          |
| Media Seal                                                                                                                                                                                   | Ethylene Propylene                    |          |
| Media Temperature                                                                                                                                                                            | -10 °C to +140 °C                     |          |
| Max Pressure                                                                                                                                                                                 | 16 Bar                                |          |
| Motor Supply Voltage                                                                                                                                                                         | 24 Vac/dc                             |          |
| Power Consumption                                                                                                                                                                            | 8 W                                   |          |
| Max. Ambient Temperature                                                                                                                                                                     | +50°C                                 |          |
| IP rating                                                                                                                                                                                    | IP65                                  |          |

### 4.3 HEATING MANIFOLDS & CONTROL STATION

**Reference:** Heating Manifold & Control Station

**Location:** As indicated on LPHW Heating Drawings (M-5600 Series)



*Typical Images*

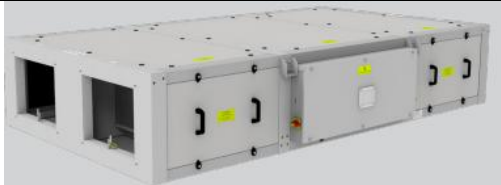
Pre-assembled Heating Manifold & Control Station as per technical specification below.

| Element                               | Specification                                                                                                                                                                         | Proposal |
|---------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| <b>Application</b>                    | Pre-assembled Underfloor Heating Manifold, Pump & Wiring Centre                                                                                                                       |          |
| <b>Material</b>                       | Nickel plated, brass                                                                                                                                                                  |          |
| <b>Size</b>                           | As required to meet zone requirements as shown on manifold schedule on drawings                                                                                                       |          |
| <b>No. of Ways</b>                    | As required for UFH distribution                                                                                                                                                      |          |
| <b>Flow Header Fittings</b>           | Electrothermic heads and actuators                                                                                                                                                    |          |
| <b>Return Header Fittings</b>         | Integral double regulating lockshields                                                                                                                                                |          |
| <b>Additional Fittings Per Header</b> | <ul style="list-style-type: none"> <li>• isolation valve</li> <li>• draincock</li> <li>• air vent</li> <li>• temperature gauge</li> <li>• temperature sensor for each zone</li> </ul> |          |
| <b>Wiring Centre Capacity</b>         | As required                                                                                                                                                                           |          |
| <b>Wiring Centre Supply Voltage</b>   | 230VAC, 50 Hz, 8A                                                                                                                                                                     |          |
| <b>BMS Connectivity</b>               | Volt free contacts (enable/fault)                                                                                                                                                     |          |
| <b>Max. Ambient Temperature</b>       | 0°C - 40°C                                                                                                                                                                            |          |

|                   |                                               |  |
|-------------------|-----------------------------------------------|--|
| <b>IP rating</b>  | IP44                                          |  |
| <b>Compliance</b> | Declaration of Performance / CE Certification |  |

## 5 VENTILATION & AIR CONDITIONING EQUIPMENT (57)

### 5.1 MECHANICAL HEAT RECOVERY VENTILATOR UNITS (CONCEALED TYPE)

| <b>Unit Reference:</b> HRU1<br><b>Location:</b> Teaching Spaces as indicated on Vent Drawings (M-5700 Series)                                                                                                                                                                                                                                                                                  |                                                                                                                                                 |          |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| <div style="display: flex; align-items: center;">  <div style="margin-left: 20px;"> <p><i>Typical Image</i></p> <p>MHRV Unit as per technical specification below.</p> </div> </div> <div style="margin-top: 20px;">  </div> |                                                                                                                                                 |          |
| Element                                                                                                                                                                                                                                                                                                                                                                                        | Specification                                                                                                                                   | Proposal |
| <b>Description</b>                                                                                                                                                                                                                                                                                                                                                                             | Demand Controlled Horizontal Mechanical Ventilation with Heat Recovery Unit c/w demand controller                                               |          |
| <b>Type</b>                                                                                                                                                                                                                                                                                                                                                                                    | Aluminium Counter Flow Heat Exchanger Type                                                                                                      |          |
| <b>Plane of Operation</b>                                                                                                                                                                                                                                                                                                                                                                      | Horizontal                                                                                                                                      |          |
| <b>Dimensions (LxWxH)</b>                                                                                                                                                                                                                                                                                                                                                                      | 2141 x 1323 x 350mm                                                                                                                             |          |
| <b>Airflow / ESP</b>                                                                                                                                                                                                                                                                                                                                                                           | 30 l/s @150 Pa (@ 75%)                                                                                                                          |          |
| <b>Max Specific Fan Powers</b>                                                                                                                                                                                                                                                                                                                                                                 | 1.07 W/(l/s) (@ 75%)                                                                                                                            |          |
| <b>Filters</b>                                                                                                                                                                                                                                                                                                                                                                                 | F7/G4 filters (supply & Extract)                                                                                                                |          |
| <b>Casing</b>                                                                                                                                                                                                                                                                                                                                                                                  | Double Skinned Aluzinc Panels, internally lined with 90kg/m <sup>3</sup> thermal & acoustic insulation c/w bottom access panels for maintenance |          |
| <b>Heat Exchanger Efficiency</b>                                                                                                                                                                                                                                                                                                                                                               | 93% (EN 308)                                                                                                                                    |          |
| <b>By Pass Damper</b>                                                                                                                                                                                                                                                                                                                                                                          | Yes – modulating summer by-pass                                                                                                                 |          |
| <b>Fans</b>                                                                                                                                                                                                                                                                                                                                                                                    | Class 1 EC/DC Fan/motor Variable Speed Control, low energy, high efficiency, ErP rated motorised fans                                           |          |

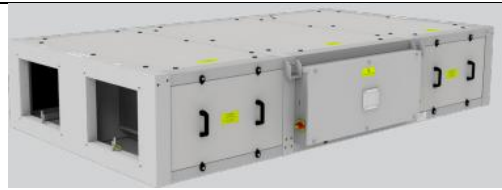
|                              |                                                                                                                                                                                                                                                                                                                                                                  |  |
|------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|                              | providing low specific fan powers and stepless speed control                                                                                                                                                                                                                                                                                                     |  |
| <b>Impellers</b>             | Backward curved                                                                                                                                                                                                                                                                                                                                                  |  |
| <b>Integral Frost Heater</b> | 2.4kW                                                                                                                                                                                                                                                                                                                                                            |  |
| <b>Weight</b>                | 275 kg's                                                                                                                                                                                                                                                                                                                                                         |  |
| <b>Voltage</b>               | 220-240V/1/50Hz                                                                                                                                                                                                                                                                                                                                                  |  |
| <b>Fuse Rating</b>           | 12A                                                                                                                                                                                                                                                                                                                                                              |  |
| <b>Max Noise Levels</b>      | 32 dB(A) @ 3m (Breakout)                                                                                                                                                                                                                                                                                                                                         |  |
| <b>Warranty</b>              | 5 years                                                                                                                                                                                                                                                                                                                                                          |  |
| <b>Matched Attenuators</b>   | <p>Required on supply &amp; extract</p> <p>Matched attenuators to suite supply &amp; extract spigots</p> <p>Attenuators to be sized by acoustic specialist to achieve max sound pressure level within classrooms of 35 dB(A) @ 1.5m</p>                                                                                                                          |  |
| <b>Accessories</b>           | <ul style="list-style-type: none"> <li>• Wall controller</li> <li>• PIR motion detector</li> <li>• Duct mounted CO2 Sensor for Demand Control of fan speeds</li> <li>• Suspension brackets</li> <li>• VFC for BEMS connectivity</li> <li>• Remote ON/OFF Adapter (PAC-SE55RA-E or similar) to allow MHRV unit to disable under fire alarm conditions.</li> </ul> |  |

#### **Note**

1. MHRV Units proposed must not have a height greater than specified due to the limited ceiling void available for the co-ordinating of services.
2. MHRV units must be the Demand Control Ventilation type with its own duct mounted CO2 sensor c/w fly lead mounted in the return air duct to proportionally balance the air volume to the space based on occupancy / CO2 levels.
3. Internal MHRV units must have access from the bottom only.

**Unit Reference: HRU2**

**Location: Teaching Spaces as indicated on Vent Drawings (M-5700 Series)**



*Typical Image*

MHRV Unit as per technical specification below.



| Element                   | Specification                                                                                                                                                      | Proposal |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| Description               | Demand Controlled Horizontal Mechanical Ventilation with Heat Recovery Unit c/w demand controller                                                                  |          |
| Type                      | Aluminium Counter Flow Heat Exchanger Type                                                                                                                         |          |
| Plane of Operation        | Horizontal                                                                                                                                                         |          |
| Dimensions (LxWxH)        | 2400 x 1312 x 460mm                                                                                                                                                |          |
| Airflow / ESP             | 150 l/s @150 Pa (@ 75%)                                                                                                                                            |          |
| Max Specific Fan Powers   | 1.03 W/(l/s) (@ 75%)                                                                                                                                               |          |
| Filters                   | F7/G4 filters (supply & Extract)                                                                                                                                   |          |
| Casing                    | Double Skinned Aluzinc Panels, internally lined with 90kg/m <sup>3</sup> thermal & acoustic insulation c/w bottom access panels for maintenance                    |          |
| Heat Exchanger Efficiency | 93% (EN 308)                                                                                                                                                       |          |
| By Pass Damper            | Yes – modulating summer by-pass                                                                                                                                    |          |
| Fans                      | Class 1 EC/DC Fan/motor Variable Speed Control, low energy, high efficiency, ErP rated motorised fans providing low specific fan powers and stepless speed control |          |
| Impellers                 | Backward curved                                                                                                                                                    |          |

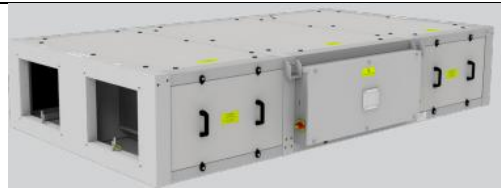
|                              |                                                                                                                                                                                                                                                                                                                                                                  |  |
|------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| <b>Integral Frost Heater</b> | @ 2.8kW                                                                                                                                                                                                                                                                                                                                                          |  |
| <b>Weight</b>                | 275 kg's                                                                                                                                                                                                                                                                                                                                                         |  |
| <b>Voltage</b>               | 220-240V/1/50Hz                                                                                                                                                                                                                                                                                                                                                  |  |
| <b>Fuse Rating</b>           | 14A                                                                                                                                                                                                                                                                                                                                                              |  |
| <b>Max Noise Levels</b>      | 30 dB(A) @ 3m                                                                                                                                                                                                                                                                                                                                                    |  |
| <b>Warranty</b>              | 5 years                                                                                                                                                                                                                                                                                                                                                          |  |
| <b>Matched Attenuators</b>   | <p>Required on supply &amp; extract (see separate schedule)</p> <p>Matched attenuators to suite supply &amp; extract spigots</p> <p>Attenuators to be sized by acoustic specialist to achieve max sound pressure level within classrooms of 35 dB(A) @ 1.5m</p>                                                                                                  |  |
| <b>Accessories</b>           | <ul style="list-style-type: none"> <li>• Wall controller</li> <li>• PIR motion detector</li> <li>• Duct mounted CO2 Sensor for Demand Control of fan speeds</li> <li>• Suspension brackets</li> <li>• VFC for BEMS connectivity</li> <li>• Remote ON/OFF Adapter (PAC-SE55RA-E or similar) to allow MHRV unit to disable under fire alarm conditions.</li> </ul> |  |

#### **Note**

4. MHRV Units proposed must not have a height greater than specified due to the limited ceiling void available for the co-ordinating of services.
5. MHRV units must be the Demand Control Ventilation type with its own duct mounted CO2 sensor c/w fly lead mounted in the return air duct to proportionally balance the air volume to the space based on occupancy / CO2 levels.
6. Internal MHRV units must have access from the bottom only.

**Unit Reference: HRU3**

**Location: Teaching Spaces and Changing Areas as indicated on Vent Drawings (M-5700 Series)**



*Typical Image*

MHRV Unit as per technical specification below.



| Element                   | Specification                                                                                                                                                      | Proposal |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| Description               | Demand Controlled Horizontal Mechanical Ventilation with Heat Recovery Unit c/w demand controller                                                                  |          |
| Type                      | Aluminium Counter Flow Heat Exchanger Type                                                                                                                         |          |
| Plane of Operation        | Horizontal                                                                                                                                                         |          |
| Dimensions (LxWxH)        | 2400 x 1312 x 460mm                                                                                                                                                |          |
| Airflow / ESP             | 330 l/s @150 Pa (@ 75%)                                                                                                                                            |          |
| Max Specific Fan Powers   | 1.13 W/(l/s) (@ 75%)                                                                                                                                               |          |
| Filters                   | F7/G4 filters (supply & Extract)                                                                                                                                   |          |
| Casing                    | Double Skinned Aluzinc Panels, internally lined with 90kg/m <sup>3</sup> thermal & acoustic insulation c/w bottom access panels for maintenance                    |          |
| Heat Exchanger Efficiency | 93% (EN 308)                                                                                                                                                       |          |
| By Pass Damper            | Yes – modulating summer by-pass                                                                                                                                    |          |
| Fans                      | Class 1 EC/DC Fan/motor Variable Speed Control, low energy, high efficiency, ErP rated motorised fans providing low specific fan powers and stepless speed control |          |
| Impellers                 | Backward curved                                                                                                                                                    |          |

|                              |                                                                                                                                                                                                                                                                                                                                                                                                                       |  |
|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| <b>Integral Frost Heater</b> | @ 5.6kW                                                                                                                                                                                                                                                                                                                                                                                                               |  |
| <b>Weight</b>                | 296 kg's                                                                                                                                                                                                                                                                                                                                                                                                              |  |
| <b>Voltage</b>               | 220-240V/1/50Hz                                                                                                                                                                                                                                                                                                                                                                                                       |  |
| <b>Fuse Rating</b>           | 29A                                                                                                                                                                                                                                                                                                                                                                                                                   |  |
| <b>Max Noise Levels</b>      | 38 dB(A) @ 3m                                                                                                                                                                                                                                                                                                                                                                                                         |  |
| <b>Warranty</b>              | 5 years                                                                                                                                                                                                                                                                                                                                                                                                               |  |
| <b>Matched Attenuators</b>   | <p>Required on supply &amp; extract (see separate schedule)</p> <p>Matched attenuators to suite supply &amp; extract spigots</p> <p>Attenuators to be sized by acoustic specialist to achieve max sound pressure level within classrooms of 35 dB(A) @ 1.5m</p>                                                                                                                                                       |  |
| <b>Accessories</b>           | <ul style="list-style-type: none"> <li>• Humidity Sensor located in Changing Rooms</li> <li>• Wall controller</li> <li>• PIR motion detector</li> <li>• Duct mounted CO2 Sensor for Demand Control of fan speeds</li> <li>• Suspension brackets</li> <li>• VFC for BEMS connectivity</li> <li>• Remote ON/OFF Adapter (PAC-SE55RA-E or similar) to allow MHRV unit to disable under fire alarm conditions.</li> </ul> |  |

#### **Note**

7. MHRV Units proposed must not have a height greater than specified due to the limited ceiling void available for the co-ordinating of services.
8. MHRV units must be the Demand Control Ventilation type with its own duct mounted CO2 sensor c/w fly lead mounted in the return air duct to proportionally balance the air volume to the space based on occupancy / CO2 levels.
9. Internal MHRV units must have access from the bottom only.

## 5.2 MHRV ROOM CONTROLLERS

| <b>Reference: C</b><br><b>Location: Teaching Spaces as indicated on Vent &amp; BEMS wiring drawings (M-5700 &amp; M-5800 Series)</b>                                                                                                                                        |                             |          |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|----------|
| <div style="display: flex; align-items: center;">  <div style="margin-left: 20px;"> <p><i>Typical Image</i></p> <p>MHRV Controller as per technical specification below.</p> </div> </div> |                             |          |
| Element                                                                                                                                                                                                                                                                     | Specification               | Proposal |
| Description                                                                                                                                                                                                                                                                 | MHRV Wall Controller        |          |
| Power Supply                                                                                                                                                                                                                                                                | Fed from MHRV unit          |          |
| Relay contact rating                                                                                                                                                                                                                                                        | 230 Vac 10A                 |          |
| Fan Speed Selection                                                                                                                                                                                                                                                         | Speeds 1 – 4                |          |
| Ventilation Mode                                                                                                                                                                                                                                                            | Energy Recovery/Bypass/Auto |          |
| Weekly Timer                                                                                                                                                                                                                                                                | Required                    |          |
| Filter Cleaning Sign                                                                                                                                                                                                                                                        | Required                    |          |
| HRV Core Cleaning Sign                                                                                                                                                                                                                                                      | Required                    |          |
| Error Indication                                                                                                                                                                                                                                                            | Required                    |          |
| Error History                                                                                                                                                                                                                                                               | Required                    |          |
| OA/RA/SA Temp Display                                                                                                                                                                                                                                                       | Required                    |          |
| Backlit LCD Display                                                                                                                                                                                                                                                         | Required                    |          |
| Housing                                                                                                                                                                                                                                                                     | White ABS                   |          |
| Dimensions (L)x(W)x(D)                                                                                                                                                                                                                                                      | 120 x 120 x 19mm            |          |
| Mounting                                                                                                                                                                                                                                                                    | Wall / Flush mounted        |          |
| Volt Free Contacts                                                                                                                                                                                                                                                          | For BEMS Fault Connectivity |          |
| Warranty                                                                                                                                                                                                                                                                    | 5 years                     |          |

### 5.3 IN-LINE EXTRACT FANS

| <b>Reference: F1-F5</b><br><b>Location: As indicated on Ventilation drawings (M-5700 Series)</b>                                                                                                                                                                       |                                                                                                                                                                                                                             |          |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| <div style="display: flex; align-items: center;">  <div style="margin-left: 20px;"> <p><i>Typical Image</i></p> <p>Inline Fan as per technical specification below.</p> </div> </div> |                                                                                                                                                                                                                             |          |
| Element                                                                                                                                                                                                                                                                | Specification                                                                                                                                                                                                               | Proposal |
| Description                                                                                                                                                                                                                                                            | Low Noise In-line Acoustic Box Fan                                                                                                                                                                                          |          |
| Size                                                                                                                                                                                                                                                                   | As indicated on Fan Schedule                                                                                                                                                                                                |          |
| Design Duty                                                                                                                                                                                                                                                            | As indicated on Fan Schedule                                                                                                                                                                                                |          |
| Impeller Type                                                                                                                                                                                                                                                          | Backward curved impellar (low noise)                                                                                                                                                                                        |          |
| Casing                                                                                                                                                                                                                                                                 | Aluzinc with bottom access                                                                                                                                                                                                  |          |
| Sound Output                                                                                                                                                                                                                                                           | < 20 dB(A) @ 3m ( <b>Quiet Fans</b> )                                                                                                                                                                                       |          |
| Specific Fan Power (max)                                                                                                                                                                                                                                               | 0.5 W/(l/s)                                                                                                                                                                                                                 |          |
| Speed Control                                                                                                                                                                                                                                                          | Variable                                                                                                                                                                                                                    |          |
| Motor                                                                                                                                                                                                                                                                  | EC Technology                                                                                                                                                                                                               |          |
| Voltage                                                                                                                                                                                                                                                                | 230V/1/50Hz                                                                                                                                                                                                                 |          |
| Insulation Class                                                                                                                                                                                                                                                       | B                                                                                                                                                                                                                           |          |
| Enclosure Motor IP Rating                                                                                                                                                                                                                                              | IP 44                                                                                                                                                                                                                       |          |
| ErP Compliant                                                                                                                                                                                                                                                          | Required                                                                                                                                                                                                                    |          |
| Warranty                                                                                                                                                                                                                                                               | 5 years                                                                                                                                                                                                                     |          |
| Accessories                                                                                                                                                                                                                                                            | <ul style="list-style-type: none"> <li>• Integral adjustable over-run timer variable between 2-30 minutes</li> <li>• Speed controller (commissioning only)</li> <li>• Ceiling mounted PIR (as noted on drawings)</li> </ul> |          |
| Conformance                                                                                                                                                                                                                                                            | ISO 9001, ISO 5801, ErP, CE                                                                                                                                                                                                 |          |

### Inline Fan Schedule

| Ref | Area Served                   | Air Volume (l/s) | ESP (Pa) |
|-----|-------------------------------|------------------|----------|
|     |                               |                  |          |
| F1  | Referee Room & UA Shower Room | 50               | 65       |
| F2  | Comms Room                    | 95               | 65       |
| F3  | Changing Place                | 70               | 65       |
| F4  | Unisex WC's & UA Shower / WC  | 335              | 75       |
| F5  | Dental Studies 1 & 2          | 210              | 70       |

### **Note**

1. All local extract fans shall be supplied with a local speed controller mounted above the ceiling for commissioning only.
2. All fans to be connected to ducting via flexible connections no greater than 500mm to prevent vibration transmission.
3. All ventilation components including electrical accessories are to be provided by the mechanical contractor. The electrical contractor shall be responsible for mounting and connecting all electrical accessories.
4. All changing areas & toilet exhaust fans shall be supplied c/w run-on-timer set for 5 mins in WC areas, 15 mins in laundry/shower and 30 mins in cleaners stores.
5. For internal rooms with no openable windows the extract should be set to have a minimum of 15 mins run-on-timer

## 5.4 PIR PRESENCE DETECTORS

| <b>Reference:</b> PIR<br><b>Location:</b> As indicated on Ventilation drawings (M-5700 Series)                                                                                                |                                                                                    |          |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|----------|
| <div>  <p><i>Typical Image</i></p> <p>PIR presence detector as per technical specification below.</p> </div> |                                                                                    |          |
| Element                                                                                                                                                                                       | Specification                                                                      | Proposal |
| <b>Description</b>                                                                                                                                                                            | Ceiling mounted presence detector                                                  |          |
| <b>Modes of operation</b>                                                                                                                                                                     | Presence and absence detection                                                     |          |
| <b>Supply Voltage</b>                                                                                                                                                                         | 230VAC +/- 10%, 50Hz                                                               |          |
| <b>Power Consumption</b>                                                                                                                                                                      | On 625mW, Off 807mW                                                                |          |
| <b>Max. Load Rating</b>                                                                                                                                                                       | 2.5A / 600W Inductive                                                              |          |
| <b>Mounting</b>                                                                                                                                                                               | Ceiling                                                                            |          |
| <b>Mounting Component</b>                                                                                                                                                                     | Standard UK single gang mounting box                                               |          |
| <b>Time-out period range</b>                                                                                                                                                                  | Adjustable 5 to 25 minutes                                                         |          |
| <b>Light level</b>                                                                                                                                                                            | Light to dark                                                                      |          |
| <b>Ingress Protection</b>                                                                                                                                                                     | IP43                                                                               |          |
| <b>Temperature Operation</b>                                                                                                                                                                  | -10°C to 35°C                                                                      |          |
| <b>Connectivity</b>                                                                                                                                                                           | Volt-free contacts                                                                 |          |
| <b>Conformity/standards</b>                                                                                                                                                                   | Declaration of Performance / CE Certification<br>EMC-2004/108/EC<br>LVD-2006/95/EC |          |

## 5.5 FAN SPEED CONTROLLERS

| <b>Reference: Speed Controller</b><br><b>Location: Above ceilings adjacent each inline fan for Commissioning Only</b>                                                                   |                                              |          |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|----------|
| <div>  <p><i>Typical Image</i></p> <p>Speed Controller as per technical specification below</p> </div> |                                              |          |
| Element                                                                                                                                                                                 | Specification                                | Proposal |
| <b>Description</b>                                                                                                                                                                      | Fan Speed Controller                         |          |
| <b>Modes of operation</b>                                                                                                                                                               | On/off fan control<br>Variable speed control |          |
| <b>Operation Indication</b>                                                                                                                                                             | Fan active - led                             |          |
| <b>Supply Voltage</b>                                                                                                                                                                   | 220-240V/1/50Hz                              |          |
| <b>Max. Load Rating</b>                                                                                                                                                                 | 400W                                         |          |
| <b>Mounting</b>                                                                                                                                                                         | Above Ceiling                                |          |
| <b>Max. dimensions</b>                                                                                                                                                                  | 86(H) x 156(W) x 53(D) mm                    |          |
| <b>Ingress Protection</b>                                                                                                                                                               | IP20                                         |          |
| <b>Temperature Operation</b>                                                                                                                                                            | 0°C to 40°C                                  |          |
| <b>Conformity/standards</b>                                                                                                                                                             | EMC-2004/108/EC LVD-2006/95/EC               |          |

## 5.6 THERMOSWITCHES

| <b>Reference:</b> [T]<br><b>Location:</b> Comms Room                                                                                                                                              |                                                            |          |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|----------|
| <div>  <div> <p><i>Typical Image</i></p> <p>Thermoswitch as per technical specification below.</p> </div> </div> |                                                            |          |
| Element                                                                                                                                                                                           | Specification                                              | Proposal |
| <b>Modes of operation</b>                                                                                                                                                                         | Automatic switching of fan on rise/fall of air temperature |          |
| <b>Setting Range</b>                                                                                                                                                                              | 6°C to 30°C                                                |          |
| <b>Temperature Range Locking Facility</b>                                                                                                                                                         | Required                                                   |          |
| <b>Max. Load Current</b>                                                                                                                                                                          | 16 A (resistive)                                           |          |
| <b>Contact Rating</b>                                                                                                                                                                             | 1.5 A (inductive)                                          |          |
| <b>Mounting</b>                                                                                                                                                                                   | Surface mounted                                            |          |
| <b>Max. dimensions</b>                                                                                                                                                                            | 80mm(H) x 104mm(W) x 36mm(D)                               |          |
| <b>Ingress Protection</b>                                                                                                                                                                         | IP20                                                       |          |
| <b>Compliance</b>                                                                                                                                                                                 | Declaration of Performance / CE Certification              |          |

## 5.7 SWIRL DIFFUSER

| Reference: S1, S2, S3, S4                                                                                                                                                              |                                                                            |          |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------|----------|
| Location: Teaching Spaces as indicated on Ventilation Drawings (M-5700 Series)                                                                                                         |                                                                            |          |
| <div>  <p><i>Typical Image</i></p> <p>Swirl Diffuser as per technical specification below.</p> </div> |                                                                            |          |
| Element                                                                                                                                                                                | Specification                                                              | Proposal |
| Description                                                                                                                                                                            | Ceiling Mounted Swirl Diffuser                                             |          |
| Nominal Size                                                                                                                                                                           | 595 x 595mm                                                                |          |
| Volume Flow-rate                                                                                                                                                                       | As indicated on Diffuser Schedule                                          |          |
| Max. Pressure Drop                                                                                                                                                                     | 20 Pa                                                                      |          |
| Max Noise Levels                                                                                                                                                                       | NR 35                                                                      |          |
| Material & Finish                                                                                                                                                                      | Polyester Powder Coated Extruded Aluminium<br>Colour: White RAL 9010       |          |
| Integral Opposed Blade Damper                                                                                                                                                          | Required                                                                   |          |
| Plenum Box                                                                                                                                                                             | Side Entry with neck spigot to suit ductwork size                          |          |
| Noise Attenuation                                                                                                                                                                      | Not Required                                                               |          |
| Compliance                                                                                                                                                                             | Declaration of Performance / CE Certification / Statement of CPR Exemption |          |

## 5.8 4 WAY LOUVRE FACED DIFFUSER

| Reference: E4, E5, E6, E7, E8                                                                                                                                                         |                                                                            |          |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------|----------|
| Location: As indicated on Ventilation Drawings (M-5700 Series)                                                                                                                        |                                                                            |          |
| <div>  <p>Typical Image</p> <p>Four-way louvre face as per technical specification below.</p> </div> |                                                                            |          |
| Element                                                                                                                                                                               | Specification                                                              | Proposal |
| Description                                                                                                                                                                           | Four-way louvre-faced diffuser                                             |          |
| Nominal Size                                                                                                                                                                          | As indicated on Grille Schedule                                            |          |
| Volume Flow-rate                                                                                                                                                                      | As indicated on Grille Schedule                                            |          |
| Max. Pressure Drop                                                                                                                                                                    | 20 Pa                                                                      |          |
| Max Noise Levels                                                                                                                                                                      | Refer to grille schedule                                                   |          |
| Material & Finish                                                                                                                                                                     | Powder Coated Extruded Aluminium<br>Colour: White RAL 9010                 |          |
| Integral Opposed Blade Damper                                                                                                                                                         | Required                                                                   |          |
| Plenum Box                                                                                                                                                                            | Side Entry with neck spigot to suit ductwork size                          |          |
| Noise Attenuation                                                                                                                                                                     | Not Required                                                               |          |
| Compliance                                                                                                                                                                            | Declaration of Performance / CE Certification / Statement of CPR Exemption |          |

## 5.9 EXTRACT AIR VALVE

| <b>Reference:</b> E1, E2, E3<br><b>Location:</b> As indicated on Ventilation Drawings (M-5700 Series)                                                                                              |                                                                                     |          |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|----------|
| <div>  <p><i>Typical Image</i></p> <p>Circular Extract Air Valve as per technical specification below.</p> </div> |                                                                                     |          |
| Element                                                                                                                                                                                            | Specification                                                                       | Proposal |
| <b>Description</b>                                                                                                                                                                                 | Circular Extract Air Valve                                                          |          |
| <b>Nominal Size</b>                                                                                                                                                                                | 100Ø & 150Ø                                                                         |          |
| <b>Volume Flow-rate</b>                                                                                                                                                                            | As indicated on Grille Schedule                                                     |          |
| <b>Max. Pressure Drop</b>                                                                                                                                                                          | 20 Pa                                                                               |          |
| <b>Material</b>                                                                                                                                                                                    | Steel construction finished in durable white stove enamel<br>Colour: White RAL 9010 |          |
| <b>Adjustable Core</b>                                                                                                                                                                             | Required                                                                            |          |
| <b>Noise Attenuation</b>                                                                                                                                                                           | Not Required                                                                        |          |
| <b>Installation Accessories</b>                                                                                                                                                                    | Sealing Gasket<br>Mounting Rings                                                    |          |

### Supply Diffuser Schedule

| Ref | Air Volume (l/s) | Type                         | Nominal Size (mm) | Max Face Velocity (m/s) | NR (Max Output) |
|-----|------------------|------------------------------|-------------------|-------------------------|-----------------|
| S1  | 60               | Square 4 Way Supply Diffuser | 600 x 600         | 3                       | 35              |
| S2  | 90 - 100         | Square 4 Way Supply Diffuser | 600 x 600         | 3                       | 35              |
| S3  | 100 - 120        | Square 4 Way Supply Diffuser | 600 x 600         | 3                       | 35              |
| S4  | 140 - 165        | Square 4 Way Supply Diffuser | 600 x 600         | 3                       | 35              |

### Extract Grille Schedule

| Ref | Air Volume (l/s) | Type                          | Nominal Size (mm) | Max Face Velocity | NR (Max Output) |
|-----|------------------|-------------------------------|-------------------|-------------------|-----------------|
| E1  | 23               | Extraction Valve              | 150Ø              | 3                 | 35              |
| E2  | 50-60            | Extraction Valve              | 200Ø              | 3                 | 35              |
| E3  | 70               | Extraction Valve              | 250Ø              | 3                 | 35              |
| E4  | 95               | Square 4 Way Extract Diffuser | 225 x 225         | 3                 | 35              |
| E5  | 60               | Square 4 Way Extract Diffuser | 600 x 600         | 3                 | 35              |
| E6  | 90 - 100         | Square 4 Way Extract Diffuser | 600 x 600         | 3                 | 35              |
| E7  | 100 - 120        | Square 4 Way Extract Diffuser | 600 x 600         | 3                 | 35              |
| E8  | 140 - 165        | Square 4 Way Extract Diffuser | 600 x 600         | 3                 | 35              |

#### Notes:

1. All supply diffusers / grilles shall be sized by the specialist to provide a maximum terminal velocity of 0.25 m/s in the occupied space for room air movement.
2. Plenum boxes shall be provided on all supply & extract grilles with the exception of extract valves and shall be independently supported from the structure and not the ceiling grid.
3. Spigots on the back of plenum boxes shall be as duct sizes as indicated on the design drawings.

## 5.10 ROOF COWL SCHEDULE

| <b>Reference: Roof Cowl</b><br><b>Location: Roof</b>                                                                                                                              |                                                                                                             |          |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|----------|
| <div>  <p><i>Typical Image</i></p> <p>Roof Cowl as per technical specification below.</p> </div> |                                                                                                             |          |
| Element                                                                                                                                                                           | Specification                                                                                               | Proposal |
| <b>Description</b>                                                                                                                                                                | Curb Mounted Roof Cowl                                                                                      |          |
| <b>Nominal Size</b>                                                                                                                                                               | As dictated by supply & extract air volumes.<br><br>For Tendering Purposes allow for 600x600mm nominal size |          |
| <b>Volume Flow-rate</b>                                                                                                                                                           | Refer to Fan schedule for each cowl exhaust volume                                                          |          |
| <b>Free Area</b>                                                                                                                                                                  | 50% minimum                                                                                                 |          |
| <b>Material &amp; Finish</b>                                                                                                                                                      | Powder Coated moulded plastic to Architect's RAL specification                                              |          |
| <b>Bird Guard</b>                                                                                                                                                                 | Required                                                                                                    |          |
| <b>Insect Screen</b>                                                                                                                                                              | Not Required                                                                                                |          |
| <b>Max. Pressure Drop</b>                                                                                                                                                         | 20 Pa                                                                                                       |          |
| <b>Max. Sound Output</b>                                                                                                                                                          | N/A                                                                                                         |          |
| <b>Noise Attenuation</b>                                                                                                                                                          | Not Required                                                                                                |          |

## 5.11 EXTERNAL LOUVRES

| <b>Reference: External Louvre</b><br><b>Location: As indicated on Ventilation Drawings (M-5700 Series)</b>                                                                              |                                                                            |          |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------|----------|
| <div>  <p><i>Typical Image</i></p> <p>External Louvre as per technical specification below.</p> </div> |                                                                            |          |
| Element                                                                                                                                                                                 | Specification                                                              | Proposal |
| Description                                                                                                                                                                             | Pitch Louvre                                                               |          |
| Nominal Size                                                                                                                                                                            | L1 – 300 x 750mm<br>L2 – 200 x 200mm                                       |          |
| Blade Pitch                                                                                                                                                                             | 38mm                                                                       |          |
| Flange Width                                                                                                                                                                            | 22.5mm                                                                     |          |
| Free Area                                                                                                                                                                               | 50%                                                                        |          |
| Material & Finish                                                                                                                                                                       | Powder Coated Aluminium to Architect's RAL specification                   |          |
| Insect Screen                                                                                                                                                                           | Required                                                                   |          |
| Max. Pressure Drop                                                                                                                                                                      | 20 Pa                                                                      |          |
| Max. Sound Output                                                                                                                                                                       | N/A                                                                        |          |
| Noise Attenuation                                                                                                                                                                       | Not Required                                                               |          |
| Colour                                                                                                                                                                                  | To architects specification                                                |          |
| Compliance                                                                                                                                                                              | Declaration of Performance / CE Certification / Statement of CPR Exemption |          |

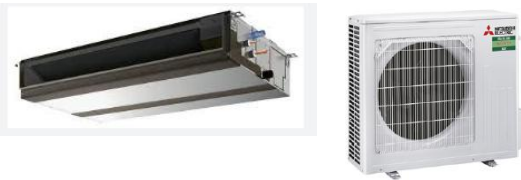
## 5.12 CO2 SENSORS

| <b>Reference:</b> C0<br><b>Location:</b> As indicated on Ventilation drawings (M-5700 Series)                                                                                      |                                                           |          |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|----------|
| <div>  <p><i>Typical Image</i></p> <p>CO2 Sensor as per technical specification below.</p> </div> |                                                           |          |
| Element                                                                                                                                                                            | Specification                                             | Proposal |
| Description                                                                                                                                                                        | CO2 Sensor                                                |          |
| Nominal Size                                                                                                                                                                       | 125mm x 86mm x 36mm                                       |          |
| Display Area (Min)                                                                                                                                                                 | 8.5cm <sup>2</sup>                                        |          |
| Traffic Light Indication                                                                                                                                                           | Green: <1000ppm<br>Amber: 1000 – 1500ppm<br>Red: >1500ppm |          |
| Power Supply                                                                                                                                                                       | 230 VAC / 50Hz                                            |          |
| Power Consumption                                                                                                                                                                  | 3 W                                                       |          |
| CO2 Range                                                                                                                                                                          | 0 – 5,000ppm                                              |          |
| Co2 Display Resolution                                                                                                                                                             | 1ppm                                                      |          |
| CO2 Sensing Mode                                                                                                                                                                   | Solid State NDIR                                          |          |
| CO2 Response Time                                                                                                                                                                  | 30 Seconds                                                |          |
| CO2 Sensor Life                                                                                                                                                                    | 10 Years                                                  |          |
| IP Rating                                                                                                                                                                          | IP40                                                      |          |
| Housing Material                                                                                                                                                                   | Flame Retardant ABS                                       |          |
| Approval                                                                                                                                                                           | CE                                                        |          |

Note: The CO2 monitoring sensor shall be located on the teaching wall facing the classroom.

## 5.13 AIR CONDITIONING EQUIPMENT

### 5.13.1 Ceiling Concealed Ducted A/C Heat pump

| <b>Reference: AC-01</b><br><b>Location: As indicated on the A/C and Ventilation drawings (5700 Series)</b>                                                                        |                                                       |          |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|----------|
| <div>  <p><i>Typical Image</i></p> <p>A/C System as per technical specification below</p> </div> |                                                       |          |
| Element                                                                                                                                                                           | Specification                                         | Proposal |
| Description                                                                                                                                                                       | Ceiling Concealed Ducted standard Inverter Heat Pumps |          |
| Refrigerant                                                                                                                                                                       | R32                                                   |          |
| Heating (UK)                                                                                                                                                                      | 2.5 kW                                                |          |
| Total Cooling (UK)                                                                                                                                                                | 2.0 kW                                                |          |
| Sensible Cooling (UK)                                                                                                                                                             | 1.8 kW                                                |          |
| Air Flow (Lo-Med-Hi)                                                                                                                                                              | 100-125-142 (l/s)                                     |          |
| Sound Pressure Levels dB(A)                                                                                                                                                       | 21-25-27 (Lo-Med-Hi)                                  |          |
| Max. Weight (Indoor Unit)                                                                                                                                                         | 26 kg                                                 |          |
| Max. Weight (Outdoor Unit)                                                                                                                                                        | 40 kg                                                 |          |
| Power Requirements                                                                                                                                                                | 1ph / 230 V / 50 Hz                                   |          |
| Running Current (A)                                                                                                                                                               | 0.25 / 0.25 (Htg/Clg)                                 |          |
| Fuse Rating (A)                                                                                                                                                                   | 6                                                     |          |
| Controller                                                                                                                                                                        | Wall Controller [AC]                                  |          |
| Energy Label                                                                                                                                                                      | Cooling: A++<br>Heating: A+                           |          |
| Control Type                                                                                                                                                                      | Inverter Driven                                       |          |

|                                |                                                              |  |
|--------------------------------|--------------------------------------------------------------|--|
| <b>Additional Requirements</b> | Volt Free Contacts for connection to BEMS<br>Wall Controller |  |
|--------------------------------|--------------------------------------------------------------|--|

**Notes:**

1. All interconnecting wiring and pipework shall be carried out by the specialist A/C installer.
2. A/C unit shall be suitable for R32 refrigerant.
3. Allowance shall be made for running condensate drains from the internal unit by gravity to the nearest Soil Stack / Vent Pipe with self-sealing HEPVO waste valve.
4. NR40 to be achieved within the space.

### 5.13.2 A/C Room Controller

| <b>Reference: AC</b><br><b>Location: As indicated on the A/C and Ventilation drawings (5700 Series)</b>                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                      |          |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| <div style="display: flex; align-items: center;">  <div style="margin-left: 20px;"> <p><i>Typical Image</i></p> <p>A/C Controller as per technical specification below.</p> </div> </div> |                                                                                                                                                                                                                                                                                                      |          |
| Element                                                                                                                                                                                                                                                                    | Specification                                                                                                                                                                                                                                                                                        | Proposal |
| Description                                                                                                                                                                                                                                                                | A/C Wall Controllers                                                                                                                                                                                                                                                                                 |          |
| Power Supply                                                                                                                                                                                                                                                               | Fed from indoor unit                                                                                                                                                                                                                                                                                 |          |
| Relay contact rating                                                                                                                                                                                                                                                       | 230 Vac 10A                                                                                                                                                                                                                                                                                          |          |
| Time Programme Configuration                                                                                                                                                                                                                                               | 24 hour / 7 day                                                                                                                                                                                                                                                                                      |          |
| Backlit LCD Display                                                                                                                                                                                                                                                        | Required                                                                                                                                                                                                                                                                                             |          |
| Lockable Temperature Range                                                                                                                                                                                                                                                 | Required                                                                                                                                                                                                                                                                                             |          |
| Winter Summer Time Change                                                                                                                                                                                                                                                  | Automatic                                                                                                                                                                                                                                                                                            |          |
| Housing                                                                                                                                                                                                                                                                    | White ABS                                                                                                                                                                                                                                                                                            |          |
| Mounting                                                                                                                                                                                                                                                                   | Wall / Flush mounted                                                                                                                                                                                                                                                                                 |          |
| Warranty                                                                                                                                                                                                                                                                   | 5 years                                                                                                                                                                                                                                                                                              |          |
| Operating Functions                                                                                                                                                                                                                                                        | <ul style="list-style-type: none"> <li>• On/Off</li> <li>• Mode (Heating/Cooling)</li> <li>• Temperature Setpoint Adjust</li> <li>• Fan Speed</li> <li>• Room Temperature</li> <li>• Night Setback</li> <li>• Button Lock</li> <li>• Clock</li> <li>• Filter Sign</li> </ul> <p>Room Temperature</p> |          |

## 5.14 DENTAL AIR COMPRESSOR

**Reference:** CA-01

**Locations:** As indicated on drawings (5400 Series)



*Typical Image*

Compressor as per technical specification below.

| Element                           | Specification                                                                                                                                                                                                                                                                                                                                                | Proposal |
|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| <b>Type</b>                       | <p>Super silent compressor with the following features:</p> <ul style="list-style-type: none"> <li>• 2 Surgeries</li> <li>• Oil-free, dry, hygienic, taste and odourless compressed air</li> <li>• closed crankcase</li> <li>• Extremely low-noise</li> <li>• Plug 'n' play installation</li> <li>• Membrane-drying unit</li> <li>• Two cylinders</li> </ul> |          |
| <b>Pressure Tank Volume</b>       | 20 l                                                                                                                                                                                                                                                                                                                                                         |          |
| <b>Suction Power Approx.</b>      | 260/315 l/min                                                                                                                                                                                                                                                                                                                                                |          |
| <b>Delivery at 5 bar</b>          | 124/140 l/min                                                                                                                                                                                                                                                                                                                                                |          |
| <b>Dimensions</b>                 | 65(H) x 48(W) x 41(D)                                                                                                                                                                                                                                                                                                                                        |          |
| <b>Weight</b>                     | 38 Kg                                                                                                                                                                                                                                                                                                                                                        |          |
| <b>Noise Level</b>                | 68 dB(A)                                                                                                                                                                                                                                                                                                                                                     |          |
| <b>Noise Level with Cabinet</b>   | 51/52 dB(A)                                                                                                                                                                                                                                                                                                                                                  |          |
| <b>Medical Device Class (MDR)</b> | Ila                                                                                                                                                                                                                                                                                                                                                          |          |

|                                 |           |  |
|---------------------------------|-----------|--|
| <b>Cut-In pressure</b>          | 6 bar     |  |
| <b>Cut-out Pressure</b>         | 7.8 bar   |  |
| <b>Rate Voltage</b>             | 230 V     |  |
| <b>Mains Frequency</b>          | 50/60 Hz  |  |
| <b>Nominal current at 8 bar</b> | 7.6/6.9 A |  |
| <b>Type of Protection</b>       | IP 24     |  |
| <b>Mains fuses</b>              | 16 A      |  |

## 5.15 DENTAL VACUUM PUMP

**Reference:** VA-01

**Locations:** As indicated on drawings (5400 Series)



*Typical Image*

Compressor as per technical specification below.

| Element                               | Specification                                                                                                                                                                                                                                                                                                                  | Proposal |
|---------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| <b>Type</b>                           | Semi-wet suction system with inverter control with the following features: <ul style="list-style-type: none"> <li>• 2-3 chairs</li> <li>• Intelligent aspiration</li> <li>• Self-regulating of suction flow</li> <li>• Automatic self-diagnosis system</li> <li>• Fitted with ISO 18 Hydrocyclone Amalgam Retention</li> </ul> |          |
| <b>Amalgam Retention</b>              | ISO 11143 Compliant<br>Max Flow – 18 l/min<br>Min Flow – 0.5 l/min                                                                                                                                                                                                                                                             |          |
| <b>Inverter control Max Flow</b>      | 1,430 l/min                                                                                                                                                                                                                                                                                                                    |          |
| <b>Max vacuum for continuous duty</b> | 210 mBar                                                                                                                                                                                                                                                                                                                       |          |
| <b>Sound</b>                          | 69 dB(A)                                                                                                                                                                                                                                                                                                                       |          |

|                      |                             |  |
|----------------------|-----------------------------|--|
| <b>Power</b>         | 7 A, 1.45 kW                |  |
| <b>Dimensiosn</b>    | 645 (H) x 400 (W) x 330 (D) |  |
| <b>Net Weight</b>    | 39.6 Kg                     |  |
| <b>TUV Certified</b> | 98.1% amalgam retention     |  |
| <b>Warrenty</b>      | 5 years                     |  |

## 6 BUILDING ENERGY MANAGEMENT SYSTEM (56)

### 6.1 BEMS CONTROL PANEL

| <b>Reference: BEMS Panel</b><br><b>Location: Heating Plantrooms</b>                                                                                                                |                 |          |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|----------|
| <div>  <p><i>Typical Image</i></p> <p>BEMS Panel as per technical specification below.</p> </div> |                 |          |
| Specification                                                                                                                                                                      | Quantity        | Proposal |
| Door interlocked isolator                                                                                                                                                          | 1               |          |
| Control circuit MCB                                                                                                                                                                | 1               |          |
| Control panel live lamp                                                                                                                                                            | 1               |          |
| Fire relay complete with status lamp                                                                                                                                               | 1               |          |
| I/O Modules                                                                                                                                                                        | As Required     |          |
| GSM Module                                                                                                                                                                         | 1               |          |
| Hand / Off / Auto Selector Switches                                                                                                                                                | As Required     |          |
| Selection Switch for Holiday Settings                                                                                                                                              | 1               |          |
| Selection Switch for Winter/Summer Settings                                                                                                                                        | 1               |          |
| 415/240V Transformer complete with MCB                                                                                                                                             | 1               |          |
| 240/24V Transformer complete with MCB                                                                                                                                              | 1               |          |
| Touch-screen interface panel mounted at 1500 AFFL                                                                                                                                  | 1               |          |
| <b>Compliance</b>                                                                                                                                                                  | Full CE Marking |          |

This schedule should be read in conjunction with the Mechanical Specification Part 1, Section 10 (58) Building Energy Management System and the relevant BEMS & Mechanical Wiring drawings (M-5800 Series) - which gives a full description of the BMS requirements

## 6.2 BEMS REMOTE PANEL

### Reference: Remote Panel

**Location:** General Office



*Typical Image*

Remote Panel as per technical specification below.

| Specification                  | Quantity                                                    | Proposal |
|--------------------------------|-------------------------------------------------------------|----------|
| Maximum Front Dimensions       | 500mm x 500mm                                               |          |
| Run-on Timers                  | As noted on BEMS Mechanical Wiring Drawings (M-5800 Series) |          |
| Heating Programme Active Lamps | Required                                                    |          |
| Fault Status Lamps             | Required                                                    |          |
| Energy Monitoring Status Lamps | Required                                                    |          |

## 6.3 UTILITY METERS

### 6.3.1 Water Meters

| <b>Reference: Water Meter</b><br><b>Location: Heating Plantrooms</b>                                                                                                                                                                                                         |                                                                                                                                                                      |          |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| <div style="display: flex; align-items: center;">  <div style="margin-left: 20px;"> <p><i>Typical Image</i></p> <p>Cold Water Meter as per technical specification below.</p> </div> </div> |                                                                                                                                                                      |          |
| Element                                                                                                                                                                                                                                                                      | Specification                                                                                                                                                        | Proposal |
| <b>Description</b>                                                                                                                                                                                                                                                           | Volumetric water meter                                                                                                                                               |          |
| <b>Media</b>                                                                                                                                                                                                                                                                 | Mains Water                                                                                                                                                          |          |
| <b>Visible Display</b>                                                                                                                                                                                                                                                       | 5 roller counter                                                                                                                                                     |          |
| <b>Pulse Output</b>                                                                                                                                                                                                                                                          | Switch type - reed<br>Contacts - VFC<br>Pulse value – 1 per litre<br>Load current - 500mA<br>Max switch voltage - 180Vdc<br>Contact rating – 10W<br>Flying lead - 2m |          |
| <b>Connection Type</b>                                                                                                                                                                                                                                                       | As per Part 3: Standard Clauses                                                                                                                                      |          |
| <b>Inline Strainer</b>                                                                                                                                                                                                                                                       | Required                                                                                                                                                             |          |
| <b>Installation Positions</b>                                                                                                                                                                                                                                                | Horizontal & Vertical                                                                                                                                                |          |
| <b>Valve Body</b>                                                                                                                                                                                                                                                            | Epoxy resin coated brass to DIN 50 930 part 6                                                                                                                        |          |
| <b>Max Pressure</b>                                                                                                                                                                                                                                                          | 16 Bar                                                                                                                                                               |          |
| <b>Media Temperature</b>                                                                                                                                                                                                                                                     | 0 °C - 30°C                                                                                                                                                          |          |
| <b>Operating Temperature</b>                                                                                                                                                                                                                                                 | -20 °C - 50 °C                                                                                                                                                       |          |
| <b>Conformance</b>                                                                                                                                                                                                                                                           | WRAS Approved<br>MID Approved<br>IS EN 14154<br>Declaration of Performance /<br>CE Certification                                                                     |          |

### 6.3.2 Gas Meters

| <b>Reference: Natural Gas Meter</b><br><b>Location: Heating Plantrooms</b>                                                                                                                             |                                                                                                                                                                                                  |          |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| <div>  <div> <p><i>Typical Image</i></p> <p>Natural Gas Meter as per technical specification below.</p> </div> </div> |                                                                                                                                                                                                  |          |
| Element                                                                                                                                                                                                | Specification                                                                                                                                                                                    | Proposal |
| <b>Description</b>                                                                                                                                                                                     | Low Pressure Drop Turbine Gas Meter with pulsed output to BMS                                                                                                                                    |          |
| <b>Media</b>                                                                                                                                                                                           | Natural Gas                                                                                                                                                                                      |          |
| <b>Visible Display</b>                                                                                                                                                                                 | Digital                                                                                                                                                                                          |          |
| <b>Pulse Output</b>                                                                                                                                                                                    | Pulse value – 1 per 0.1m <sup>3</sup><br>Load current - 20mA<br>Max switch voltage - 24Vdc<br>Contact rating – 0.2W<br>Pulse Width – 40msec<br>Flying lead - 2m<br>Required for BMS connectivity |          |
| <b>Connection Type</b>                                                                                                                                                                                 | Screwed unions/welded                                                                                                                                                                            |          |
| <b>Meter Model</b>                                                                                                                                                                                     | Contractor to confirm based on proposed equipment peak gas loads                                                                                                                                 |          |
| <b>Installation Positions</b>                                                                                                                                                                          | Horizontal                                                                                                                                                                                       |          |
| <b>Casing</b>                                                                                                                                                                                          | Aluminium Resin Coated Steel                                                                                                                                                                     |          |
| <b>Max Pressure</b>                                                                                                                                                                                    | 0.5 Bar                                                                                                                                                                                          |          |
| <b>Operating Temperature</b>                                                                                                                                                                           | -25 °C - 55 °C                                                                                                                                                                                   |          |
| <b>Back Flow Prevention</b>                                                                                                                                                                            | Required                                                                                                                                                                                         |          |
| <b>Conformance</b>                                                                                                                                                                                     | CE<br>MID Approved<br>EN 1359<br>EEC/71/318                                                                                                                                                      |          |

|  |                                             |  |
|--|---------------------------------------------|--|
|  | UNI-CIG 7987/7988 norms<br>OIML Regulations |  |
|--|---------------------------------------------|--|

## 6.4 HEAT METERS

| <b>Reference: Heat Meters</b><br><b>Location: Various</b>                                                                                                                                                                                                                                                                                                |                                                                                                                        |          |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|----------|
| <div style="display: flex; align-items: center;">   <div style="margin-left: 20px;"> <p><i>Typical Image</i></p> <p>Heat Meter as per technical specification below.</p> </div> </div> |                                                                                                                        |          |
| Element                                                                                                                                                                                                                                                                                                                                                  | Specification                                                                                                          | Proposal |
| <b>Output Type</b>                                                                                                                                                                                                                                                                                                                                       | Static Ultrasonic Flow Meter with Stand-alone Calculator                                                               |          |
| <b>Recording Parameters</b>                                                                                                                                                                                                                                                                                                                              | Energy<br>Volume<br>Flow<br>Temperatures (Supply & Return)<br>Time in Error<br>Operation time<br>Date & Time<br>Volume |          |
| <b>Line Size</b>                                                                                                                                                                                                                                                                                                                                         | DN65 and greater                                                                                                       |          |
| <b>Temperature range</b>                                                                                                                                                                                                                                                                                                                                 | 0°C to 130°C                                                                                                           |          |
| <b>Temperature Sensors</b>                                                                                                                                                                                                                                                                                                                               | 2 no. Pt100                                                                                                            |          |
| <b>Back-up Memory</b>                                                                                                                                                                                                                                                                                                                                    | EEPROM                                                                                                                 |          |
| <b>Display</b>                                                                                                                                                                                                                                                                                                                                           | LCD – min. 7 digits                                                                                                    |          |
| <b>Connectivity</b>                                                                                                                                                                                                                                                                                                                                      | 2 no pulse outputs<br>2 no. Modbus outputs                                                                             |          |
| <b>Power Supply</b>                                                                                                                                                                                                                                                                                                                                      | 230V, 50 Hz                                                                                                            |          |
| <b>Compliance</b>                                                                                                                                                                                                                                                                                                                                        | Declaration of Performance /<br>CE Certification<br>MID 2014/32/EU Module B+D                                          |          |

|  |                                                                                                                                  |  |
|--|----------------------------------------------------------------------------------------------------------------------------------|--|
|  | <p>Class 2.0 acc. EN 1434</p> <p>Environmental class EN1434<br/>class C, MID class E2 + M2</p> <p>IP 68</p> <p>PED compliant</p> |  |
|--|----------------------------------------------------------------------------------------------------------------------------------|--|

**Reference: Heat Meters**

**Location: Various**



*Typical Image*

Heat Meter as per technical specification below.

| Element                     | Specification                                                                                                                                   | Proposal |
|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| <b>Output Type</b>          | Compact Ultrasonic Flow Meter                                                                                                                   |          |
| <b>Recording Parameters</b> | Energy<br>Volume<br>Flow<br>Temperatures (Supply & Return)<br>Time in Error<br>Operation time<br>Date & Time<br>Volume                          |          |
| <b>Line Size</b>            | DN50 and below                                                                                                                                  |          |
| <b>Temperature range</b>    | 0°C to 180°C                                                                                                                                    |          |
| <b>Temperature Sensors</b>  | 2 no. Pt100                                                                                                                                     |          |
| <b>Back-up Memory</b>       | EEPROM                                                                                                                                          |          |
| <b>Display</b>              | LCD – min. 7 digits                                                                                                                             |          |
| <b>Connectivity</b>         | 2 no. pulse outputs<br>2 no. MODbus outputs                                                                                                     |          |
| <b>Power Supply</b>         | 230V, 50 Hz                                                                                                                                     |          |
| <b>Compliance</b>           | Declaration of Performance /<br>CE Certification<br>MID 2014/32/EU Module B+D<br>Class 2.0 acc. EN 1434<br>Env. Class E1, M1 acc.<br>2014/32/EU |          |

|  |                                                 |  |
|--|-------------------------------------------------|--|
|  | OIML R75<br>SP Test $\leq$ -2%<br>PED compliant |  |
|--|-------------------------------------------------|--|

## 6.5 BOILERHOUSE DEVICES

### 6.5.1 Immersion Sensor

| <b>Reference: Ts</b><br><b>Location: See Drawings M5150-M5151</b>                                                                                                                                    |                                                                             |          |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|----------|
| <div>  <p><i>Typical Image</i></p> <p>Immersion Temperature Sensor as per technical specification below.</p> </div> |                                                                             |          |
| Element                                                                                                                                                                                              | Specification                                                               | Proposal |
| Output Type                                                                                                                                                                                          | Thermistor Resistive                                                        |          |
| Measurement range                                                                                                                                                                                    | -30 °C to +110 °C                                                           |          |
| Accuracy                                                                                                                                                                                             | ±1.28 °C                                                                    |          |
| Probe                                                                                                                                                                                                | Brass                                                                       |          |
| Probe length                                                                                                                                                                                         | 150mm                                                                       |          |
| Housing                                                                                                                                                                                              | Material ABS<br>Ambient temp -10 °C to +40°C                                |          |
| Cable entry                                                                                                                                                                                          | M20                                                                         |          |
| IP Protection                                                                                                                                                                                        | IP67                                                                        |          |
| Pocket                                                                                                                                                                                               | 316 Stainless steel                                                         |          |
| Compliance                                                                                                                                                                                           | Declaration of Performance /<br>CE Certification<br>EU Directive 2004/108/E |          |

### 6.5.2 Immersion Thermostat

**Reference:** Immersion Frost Thermostat

**Location:** See Drawings M5150-M5151



*Typical Image*

Immersion Frost Thermostat as per technical specification below.

| Element                  | Specification                                 | Proposal |
|--------------------------|-----------------------------------------------|----------|
| Switch rating            | 230Vac                                        |          |
| Sensing element          | Copper                                        |          |
| Measurement range        | 0°C -35°C                                     |          |
| Reset function           | Automatic                                     |          |
| Temperature differential | 0.5 °C                                        |          |
| Probe                    | Brass                                         |          |
| Probe length             | 120mm                                         |          |
| Housing                  | Material ABS<br>Max Ambient temp 80 °C        |          |
| Cable entry              | M20                                           |          |
| IP Protection            | IP43                                          |          |
| Pocket                   | Brass                                         |          |
| Compliance               | Declaration of Performance / CE Certification |          |

### 6.5.3 Outside Air Temperature Sensor

| <b>Reference: Outside Air Temperature Sensor</b><br><b>Location: See Drawings M5150-M5151</b>                                                                                                   |                                                                           |          |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|----------|
| <div>  <p><i>Typical Image</i></p> <p>Outside Air Temperature as per technical specification below.</p> </div> |                                                                           |          |
| Element                                                                                                                                                                                         | Specification                                                             | Proposal |
| Temperature Output                                                                                                                                                                              | Voltage 0-10Vdc                                                           |          |
| Humidity Output                                                                                                                                                                                 | Voltage 0-10Vdc                                                           |          |
| Measurement range                                                                                                                                                                               | -20°C to +50°C                                                            |          |
| Accuracy                                                                                                                                                                                        | Temp 0.3% of span                                                         |          |
| Power supply                                                                                                                                                                                    | 12/24Vac                                                                  |          |
| Probe Material                                                                                                                                                                                  | Brass                                                                     |          |
| Housing                                                                                                                                                                                         | Material ABS<br>Ambient temp -20 °C to +80 °C                             |          |
| Cable entry                                                                                                                                                                                     | M20                                                                       |          |
| IP Protection                                                                                                                                                                                   | IP65                                                                      |          |
| External shield                                                                                                                                                                                 | Radiation shield                                                          |          |
| Compliance                                                                                                                                                                                      | Declaration of Performance / CE Certification<br>EU Directive 2004/108/EC |          |

#### 6.5.4 Outside Frost Thermostat

**Reference:** Outside Frost Thermostat

**Location:** See Drawings M5150-M5151



*Typical Image*

Outside Frost Thermostat as per technical specification below.

| Element                            | Specification                                 | Proposal |
|------------------------------------|-----------------------------------------------|----------|
| <b>Output Type</b>                 | Thermistor Resistive                          |          |
| <b>Measurement range</b>           | -20 °C to +30°C                               |          |
| <b>Accuracy</b>                    | ±1.0 °C                                       |          |
| <b>Electrical Rating</b>           | 230VAC, 50Hz                                  |          |
| <b>Max. Switching Current</b>      | 3A (inductive load)<br>10A (resistive load)   |          |
| <b>Housing</b>                     | Material ABS                                  |          |
| <b>Operating Temperature Range</b> | -25 °C to +60 °C                              |          |
| <b>Cable entry</b>                 | M20                                           |          |
| <b>IP Protection</b>               | IP65                                          |          |
| <b>Mounting</b>                    | Wall-mounted on standard UK single gang box   |          |
| <b>Accessories</b>                 | Opaque tamperproof cover                      |          |
| <b>Compliance</b>                  | Declaration of Performance / CE Certification |          |

## 6.6 FIELD DEVICES

### 6.6.1 Run-on Timer

**Reference :** Electronic Run-on Timer (Over-ride Timer)

**Location:** See BEMS Drawings (M5800 Series)



*Typical Image*

Electronic Run On Timer as per technical specification below.

| Element                      | Specification                                                                                                  | Proposal |
|------------------------------|----------------------------------------------------------------------------------------------------------------|----------|
| <b>Power Supply</b>          | 24VAC – 230VAC                                                                                                 |          |
| <b>Relay contact rating</b>  | 230VAC 10A                                                                                                     |          |
| <b>Time selection</b>        | 1-5hrs                                                                                                         |          |
| <b>Max restriction times</b> | 1-2-3hrs                                                                                                       |          |
| <b>Accuracy</b>              | <+/-1s/h                                                                                                       |          |
| <b>Indication</b>            | LED                                                                                                            |          |
| <b>Dimensions</b>            | 85mm(W) x 86mm(H) x 14mm(D)                                                                                    |          |
| <b>Housing</b>               | White ABS                                                                                                      |          |
| <b>Mounting</b>              | Flush mounting to electrical trunking/ control panel or surface mounting to single gang electrical socket box. |          |
| <b>Compliance</b>            | Declaration of Performance / CE Certification                                                                  |          |

### 6.6.2 Zone Valves

**Reference: 3-port Solenoid Valve & Actuator**

**Location: See Drawings M5150-5151**



*Typical Image*

Solenoid Valve & Actuator as per technical specification below

| Element                    | Specification                         | Proposal |
|----------------------------|---------------------------------------|----------|
| Description                | Assisted Lift Servo Operated Valve    |          |
| Control Function           | On/off: Normally Closed               |          |
| Application                | LPHW Heating                          |          |
| Coupling                   | As per Part 3: Standard Specification |          |
| Size                       | As per drawings                       |          |
| Max. Differential Pressure | 10 Bar                                |          |
| KVS                        | 37 m <sup>3</sup> /h                  |          |
| Valve State                | Normally closed                       |          |
| Valve Body                 | Brass                                 |          |
| Spindle                    | Stainless steel                       |          |
| Media Seal                 | Ethylene Propylene                    |          |
| Media Temperature          | -10 °C to +140 °C                     |          |
| Max Pressure               | 16 Bar                                |          |
| Motor Supply Voltage       | 24 Vac                                |          |
| Power Consumption          | 8 W                                   |          |
| Max. Ambient Temperature   | +50°C                                 |          |
| IP rating                  | IP65                                  |          |

|                   |                                                  |  |
|-------------------|--------------------------------------------------|--|
| <b>Compliance</b> | Declaration of Performance /<br>CE Certification |  |
|-------------------|--------------------------------------------------|--|

## 7 FIRE PROTECTION EQUIPMENT (67)

### 7.1 AQUEOUS FILM FORMING FOAM EXTINGUISHER

Reference: (W)

Location: As indicated on Soils / Wastes & Fire Drawings (M-5200 Series)



*Typical Image*

Foam Fire Extinguisher & 3D Sinage as per technical specification below.

| Element                                       | Specification          | Proposal |
|-----------------------------------------------|------------------------|----------|
| Description                                   | AFFF Foam Extinguisher |          |
| Capacity                                      | 6 litres               |          |
| Fire Rating                                   | 21A / 183B             |          |
| Cylinder Dimensions                           | Ø160mm x 545mm         |          |
| Filled Weight                                 | 10.5kg                 |          |
| Range of Throw                                | >4m                    |          |
| Duration of Discharge                         | 28 seconds             |          |
| Working pressure (at 20°C)                    | 13.5 bar               |          |
| Temperature range                             | 5°C to +60°C           |          |
| IS EN3-7 approved                             | Required               |          |
| Non-conductive, frost-free, anti-static horns | Required               |          |
| Squeeze grip operation                        | Required               |          |
| Wall-mounting bracket                         | Required               |          |
| Guarantee                                     | 5 years                |          |
| Cylinder BS 5045-8:2000                       | Required               |          |
| Compliance                                    | I.S. 291:2015 & EN 3   |          |

## 7.2 CO<sub>2</sub> FIRE EXTINGUISHER

**Reference:** (C)

**Location:** As indicated on Soils / Wastes & Fire Drawings (M-5200 Series)



*Typical Image*

CO<sub>2</sub> Fire Extinguisher & 3D signage as per technical specification below.

| Element                            | Specification                                                                | Proposal |
|------------------------------------|------------------------------------------------------------------------------|----------|
| <b>Description</b>                 | CO <sub>2</sub> Aluminium Extinguisher                                       |          |
| <b>Capacity</b>                    | 2 kg (9kg Energy Centre)                                                     |          |
| <b>Fire Rating</b>                 | 55B                                                                          |          |
| <b>Cylinder Dimensions</b>         | Ø110mm x 540mm                                                               |          |
| <b>Filled Weight</b>               | 5.3kg                                                                        |          |
| <b>Range of Throw</b>              | >4m                                                                          |          |
| <b>Duration of Discharge</b>       | 12 seconds                                                                   |          |
| <b>Working pressure (at 20° C)</b> | 62 bar                                                                       |          |
| <b>Temperature range</b>           | -20°C to +60°C                                                               |          |
| <b>EN3 approved</b>                | Required                                                                     |          |
| <b>Swivel horn</b>                 | Twin wall frost free black polyethene                                        |          |
| <b>Squeeze grip operation</b>      | Required                                                                     |          |
| <b>Wall-mounting bracket</b>       | Required                                                                     |          |
| <b>Guarantee</b>                   | 5 years                                                                      |          |
| <b>Cylinder EN1964-1: 1999</b>     | Required                                                                     |          |
| <b>Compliance</b>                  | Declaration of Performance /<br>CE Certification<br><br>I.S. 291:2015 & EN 3 |          |

### 7.3 PENDANT FIRE EXTINGUISHERS

| Reference: (DP)                                                                                                                                                                                 |                                                                       |          |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|----------|
| Location: Heating Plantrooms                                                                                                                                                                    |                                                                       |          |
| <div>  <p><i>Typical Image</i></p> <p>Dry Powder Extinguisher as per technical specification below.</p> </div> |                                                                       |          |
| Element                                                                                                                                                                                         | Specification                                                         | Proposal |
| Description                                                                                                                                                                                     | 6kg Powder Automatic Extinguisher                                     |          |
| Capacity                                                                                                                                                                                        | 6kg                                                                   |          |
| Automatic Bulb Temperature Rating                                                                                                                                                               | 68°C                                                                  |          |
| Cylinder Dimensions                                                                                                                                                                             | Ø240mm x 320mm                                                        |          |
| Filled Weight                                                                                                                                                                                   | 9.4 kg                                                                |          |
| Coverage                                                                                                                                                                                        | 9 m <sup>2</sup>                                                      |          |
| Duration of Discharge                                                                                                                                                                           | 14 seconds                                                            |          |
| Working pressure (at 20° C)                                                                                                                                                                     | 15 bar                                                                |          |
| Temperature range                                                                                                                                                                               | -30°C to +60°C                                                        |          |
| IS EN3-7 approved                                                                                                                                                                               | Required                                                              |          |
| Rigid Mounting Bracket                                                                                                                                                                          | Required                                                              |          |
| Guarantee                                                                                                                                                                                       | 5 years                                                               |          |
| Manufactured to BS 5423                                                                                                                                                                         | Required                                                              |          |
| Compliance                                                                                                                                                                                      | Declaration of Performance / CE Certification<br>I.S. 291:2015 & EN 3 |          |

## 7.4 FIRE BLANKET

| <b>Reference: (FB)</b><br><b>Location: As indicated on Soils / Wastes &amp; Fire Drawings (M-5200 Series)</b>                                                                                     |                                           |          |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|----------|
| <div>  <div> <p><i>Typical Image</i></p> <p>Fire Blanket as per technical specification below.</p> </div> </div> |                                           |          |
| Element                                                                                                                                                                                           | Specification                             | Proposal |
| Description                                                                                                                                                                                       | Silicone Coated Glass Fabric Fire Blanket |          |
| Size                                                                                                                                                                                              | 1.2m x 1.2m                               |          |
| Weight                                                                                                                                                                                            | 340 +/- 20g/m <sup>2</sup>                |          |
| Thickness                                                                                                                                                                                         | 0.25 +/- 0.03mm                           |          |
| Container                                                                                                                                                                                         | Rigid PVC Colour Red                      |          |
| Wall-mounting bracket                                                                                                                                                                             | Required                                  |          |
| Guarantee                                                                                                                                                                                         | 5 years                                   |          |
| Manufactured to IS 1869:2019                                                                                                                                                                      | Required                                  |          |
| Adhesive Wall Signage                                                                                                                                                                             | Required                                  |          |

## 7.5 FIRE DAMPERS

| <b>Reference: FD</b><br><b>Locations: As indicated on Ventilation drawings (M-5700 Series)</b>                                                                                      |                                                                                          |          |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|----------|
| <div>  <p><i>Typical Image</i></p> <p>Fire Damper as per technical specification below.</p> </div> |                                                                                          |          |
| Element                                                                                                                                                                             | Specification                                                                            | Proposal |
| <b>Construction</b>                                                                                                                                                                 | Galvanised carbon steel body with 25mm thick closing blade made with refractory material |          |
| <b>Fire Integrity</b>                                                                                                                                                               | 4 Hours                                                                                  |          |
| <b>Thermal Activation</b>                                                                                                                                                           | 72°C                                                                                     |          |
| <b>Reset Mechanism</b>                                                                                                                                                              | Required                                                                                 |          |
| <b>Connections</b>                                                                                                                                                                  | Circular                                                                                 |          |
| <b>Classification</b>                                                                                                                                                               | EN 13501-3                                                                               |          |
| <b>Fire Resistance Test</b>                                                                                                                                                         | EN 1366-2                                                                                |          |
| <b>CE Certification</b>                                                                                                                                                             | EN 15650                                                                                 |          |
| <b>Fire Resistance Performance</b>                                                                                                                                                  | EN 13501-3:2005 + A1:2009                                                                |          |
| <b>Thermal Release Mechanism Test</b>                                                                                                                                               | ISO 10294-4                                                                              |          |
| <b>Integrity Classification</b>                                                                                                                                                     | E                                                                                        |          |
| <b>Compliance</b>                                                                                                                                                                   | DW 144 Part Seven, Section 24                                                            |          |
| <b>CE Marked</b>                                                                                                                                                                    | Required                                                                                 |          |