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TECHNICAL SPECIFICATION
REF 17301/SP/MO1

for

PHASE 2 – HYDROTHERAPY POOL

at

ELMS BANK SPECIALIST ARTS COLLEGE, RIPON AVENUE, WHITEFIELD, BURY M45 8PJ

on behalf of

BURY METROPOLITAN BOROUGH COUNCIL

DEPARTMENT FOR CHILDREN, YOUNG PEOPLE AND CULTURE

Project No. – 17301
Date – FEBRUARY 2018

PHASE 2
HYDROTHERAPY POOL
ELMS BANK SPECIALIST ARTS COLLEGE, RIPON AVENUE, WHITEFIELD, BURY M45 8PJ

Ref 17301/M01

MECHANICAL SERVICES SPECIFICATION

CONTENTS

1.0 DRAWING SCHEDULE

The following drawings shall be read in conjunction with the specification and any other relevant tender documentation.

17301/M01 – Mechanical Services-Heating and Gas Installations
17301/M02 – Mechanical Services-Hot and Cold Water Installations
17301/M03 – Mechanical Services-Ventilation Installations
17301/M04 – Plant Room Installation
17301/M05 –Mechanical Services-Section, Details, Demolitions and MCW and Gas Services within the Existing School

2.0 GENERAL REQUIREMENTS AND DESCRIPTION OF WORKS

This specification 17301/SP/M01 shall be read in conjunction with drawings 17301/M01 to /M05 together with any other relevant tender documentation.
The contractor shall comply at all times with statutory requirements current at the time of tender, particularly the following:

The Gas Safety Regulations
The Gas Council Codes of Practice
IEE Regulations 17th Edition
The Factories Act.
British Standards/ISO
Building Regulations
Health and Safety at Work Act/ CDM Regulations
1999 Water Regulations

The contract works involve the demolition of existing buildings to facilitate the provision of a new hydrotherapy pool with associated wet changing rooms. New dry changing rooms will be provided for the existing sports hall. Some existing rooms will be altered. A new plant room will be included for the mechanical services. A separate pool plant room will be provided.

The installation of all equipment shall be carried out in accordance with manufacturer's instructions.

The contractor shall be wholly responsible for the provision, installation, testing, commissioning and setting to work of all of the mechanical and associated electrical services installations generally in accordance with this specification and as follows:-

1. The new installation comprises the provision of services pipe work, duct work, plant, valves, circulation pumps, pressurisation unit, thermal insulation, controls including associated electrical wiring.

2. The provision and installation of the associated electrical power and control wiring and equipment shall be carried out by a suitably accredited NICEIC or ECA electrical contractor and shall be the Mechanical Contractor's responsibility.

3. Flushing, cleansing and dosing of the new and existing installations.

4. Commissioning and setting to work of all systems including existing, balancing as required, providing performance / test figures and leaving in full working order to the satisfaction of the Supervising Officer.

5. Prior to practical completion, the contractor shall provide operating and maintenance and health and safety documentation

6. The building will be fully occupied and operational during the works.

7. Existing heating, gas and hot and cold water services shall be maintained throughout the works. Any break-ins to the existing services shall be carried out outside normal school hours and arranged in advance. Valves shall be installed to reinstate the existing services once altered.

8. The contractor must visit site to assess all requirements in order to carry out the works. Arrangements for access to visit site can be made through contacting the building manager on tel. 0161 253 6767.

3.0 SPECIFIED EQUIPMENT AND ALTERNATIVES

Where manufacturers have been specified, these shall be used, unless the Contractor makes a written request to the Contract Administrator for approval of an alternative manufacturer at least two weeks prior to the submission of his tender.

4.0 STRIP OUT WORKS

The existing heating, gas, hot and cold water and ventilation installations and plant shall be removed as indicated on the drawings.

5.0 ASSOCIATED BUILDERS WORK

All builders work associated with this contract shall be the responsibility of the Main Contractor unless stated otherwise. It is the responsibility of the Mechanical Services Contractor to inform the Main Contractor of the sizes and positions of all holes, chases, notching, etc. that will be required to complete the installation. The Mechanical Services Contractor shall provide to the Main Contractor builders work drawings indicating the positions of all holes, structural supports etc. as required. It shall be the Mechanical Services Contractors responsibility to provide all brackets and secondary supports where required for all pipe work.

6.0 PHASING AND COORDINATION OF THE WORKS

The works will be phased with the demolitions and new build works to facilitate the new pool and changing rooms as phase 1 and demolition of the existing hydrotherapy pool and garage as phase 2.

The contractor shall consult architectural drawing details of room layouts before fixing pipe work and equipment and shall arrange runs in consultation with the contractors of other engineering services. All mechanical engineering services shall be kept clear of electrical services. Any extra work caused due to lack of

consultation will be charged to the contractor.

7.0 LTHW HEATING AND GAS INSTALLATONS

The new LTHW heating installation shall be as indicated on the drawings, complying with the relevant British standards, building regulations and manufacturer's recommendations.

7.1 Boilers

The existing gas fired hot water heater/boiler and associated pipe work and equipment shall be removed. The Contractor shall supply and install 3No natural gas fired Ideal Boilers (tel-01482 492 251) Evomax 80 high efficiency, fully modulating, condensing boilers with Ultra Low Nox emission rated output 80kW each, and having a total rated output of 240kW. Boilers shall be suitable for conventional open flueing.

The boilers shall be complete with frame and header kits.

The new boilers shall be installed in accordance with the manufacturer's recommendation.

The LTHW heating system circuit has been based upon 80/60C Flow and return temperatures.

Notes:
1) Boilers and associated controls shall be site commissioned by the manufacturer.
2) Boilers to be wired to the new Trend system.
3) Volt free contacts to be provided to monitor boiler run and fault conditions.

7.2 Pressurisation Unit

Provide and install as indicated on the drawing a pressurisation unit & expansion vessel as manufactured by Aquatec Pressmain (tel-0161 226 4727). The pressurisation unit shall be the Aquapak AP Series model AP3. The associated expansion vessel shall be of the Aquatank Range, vessel size 300 litres, model no. 300VR, rated at 10Bar/120degC. The contractor shall seek manufacturer's confirmation on the above selection based upon the system requirements listed below.

The unit shall be connected to the system with the following criteria:

a) 5 metres (potentially) from the highest to the lowest point of the system
b) 240 kW total boiler output.
c) 80°C flow, 60°C return.
d) Total water content of system (approx. 2400 litres).
e) System pumps on secondary flow, boiler shunt on primary return

f) Cold fill pressure of 1.2 bar
g) 300 Litre Expansion Vessel
h) Single phase 2 amp electrical supply.

The pressurisation unit shall be commissioned by the manufacturer and is to come complete with volt free contacts to provide common high/low pressure signal alarm at the control panel.

The pressurisation unit shall lock out the boiler plant in the event of a high or low pressure alarm.

The pressurisation and expansion vessel shall be floor mounted on concrete bases. The pressurisation unit shall be connected to the MCWS and heating system pipe work in accordance with the manufacturer of the boiler & pressurisation unit recommendations.

The pressurisation unit is to incorporate a pressure transducer and electronic module to control and monitor the pressure within the system, twin pump with the facility of digital readout and audible alarm with mute.

The system shall be connected to an expansion vessel that shall be constructed in accordance with BS6144. The diaphragm shall be made from a special high quality rubber material.

7.3 Pumps

7.3.1 General Heating Pumps
Provide and install a single phase 230v, 1.77A max. Grundfos (tel-01525 850000) Magna 3D 40-80FN general circulating pump set to deliver 1.2kg/s against 53kPa head.

7.3.2 Pool Heating Pumps
Provide and install a single phase 230v, 1.77A max. Grundfos (tel-01525 850000) Magna 3D 32-60N pool circulating pump set to deliver 1.32kg/s against 28kPa head.

7.3.3 Hot water Secondary Pumps
Provide and install a single phase 230v, 1.62A max. Wilo (tel-01283 523000) TOP-Z 40/7 circulating pump.

7.3.4 Pool Plant Pit Sump Pump
Provide and install a Wilo (tel 01283523000) single phase submersible pump model TM32/7. Pump to be located in the pool plant pit.

7.4 Gas Fired Water Heater

Provide and install an Andrews (tel 08450701056) ECO Flo EC230-600 gas fired high efficiency condensing storage water heater rated at 35.1kW output 600litres/hour recovery rate through 50C as indicated on the drawing. The heater shall be complete plinth ref E923, unvented system kit ref. B290 and wall bracket assembly ref. B173, excluding the expansion vessel. The expansion vessel shall be a Flamco (tel. 017 447 447 44) Airfix D25 through flow vessel with Airfix control. The water heater shall be suitable for

conventional open flueing.

7.5 Gas Solenoid Valve and Controller

Provide and install and wire to the new gas solenoid valve 1no S & S Northern (tel. 01257 470 983) 50mm model BZEV50 gas solenoid valve, Merlin GDP2 gas detection panel, 1nr Merlin FAB fire alarm bypass panel, 1nr Merlin NG sensor, 1nr Merlin CO sensor and 4nr thermal links mounted above the boilers and water heater. The gas controls shall be wired into the new control panel and control wiring.

7.6 Controls

The design and installation of the automatic controls and the electrical power and control wiring for the project shall be undertaken by one of the following preferred companies.

1. Smart Control Systems Ltd
   Unit 5
   Bredbury Business Park
   Bredbury Park Way
   Stockport
   SK6 2SN
   Tel 0161 406 8844

2. JBC Control Systems Ltd
   The Quad
   Atherleigh Business Park
   Gibfield Park Avenue
   Atherton
   M46 0SY
   Tel 01942 895625

3. Demma Controls
   37/38 The Green
   Castle Bromwich
   Birmingham
   B36 9AL
   Tel 0121 749 1212

7.6.1 Control Requirements

The contractor shall include for the control and power supplies to the equipment identified in the plant room via the control panel. A power supply will be provided to the control panel position. The controls / power wiring shall be in accordance with the IEE Wiring Regulations with electrical certification provided on completion. Control / power wiring shall include for provision of conduit and trunking. Earth bonding of the services shall be provided.

The boiler plant controls shall allow the boiler plant and other equipment included to be monitored and controlled by Bury Council's BEMS system using an IQ4E controller. IQView 8 Display Panel shall be provided locally

and all control components used shall be compatible with the authority's BEMS system. The IQView8 controller shall be linked to the existing IQView controller serving the recent classroom extension and a Trend IQ4E controller integral to the pool air handling unit 3 as indicated on drawing 17301/M03. The contractor shall include for installing the necessary cabling from the remote IQView controllers to the IQView8. The existing IQView controller in the classroom extension plant room shall be modified for the new arrangement. Communication for the new BEMS controls shall be via the ethernet and to this effect the building manager will be asked by others to provide via their IT network provider a network point to be located adjacent the proposed control panel and linked to the buildings switch cabinet. In addition to the above the controls shall be arranged so that the boiler plant and other items identified can be controlled and operated locally and independent of the BEMS.

The following main control features shall be provided:-

Optimum start/stop
Auto/Manual/Holiday switch
Summer/Winter switch
Pump selection / indication / status i.e. run/ trip/fail
Pressurisation interlock
Lead boiler selection rotation /run -trip indication
Frost protection
Ventilation controls
Direct boiler weather compensation with night setback facility.
Thermal links over boilers and water heater, natural gas and CO detectors and gas knock off linked to the gas solenoid valve and gas control system, with provision in the control system to link to fire alarm installation.
Gas shut off linked to the S & S Northern gas control system panel for boiler and plant room through which it is intended that the solenoid valve and heat detectors shall be linked with BEMS interface. The Merlin panel shall be arranged to provide provision to isolate both gas and electricity to the plant items in an emergency and allow for auto reset and function of plant after initial checking procedures and gas proving, subject to there being no fault condition prior to shut down. The Merlin panel shall be commissioned by S & S Northern.

All electrical, plant and control items including isolators shall be identified using Traffolyte type engraved labels.

In addition graphics shall be provided on the BEMS central supervisor showing plant items details of principal circuits, indicating their operational status, alarms and temperatures etc at the relevant points. Temperature sensors etc. shall be provided by the controls contractor as free issue to the mechanical contractor for installation. Trend field devices shall be used where possible.

Drawings of the control wiring and panel layout installations shall be submitted to the Engineer for comment prior to manufacture.

7.6.2 Controls List

The controls shall be Trend and based on the IQ4 range of controllers which will be connected to the client's I.T. network. Site specific graphics shall be provided for installation on to the existing BEMS Central Supervisor.

A local IQVIEW8 Touchscreen shall provide local authorised access to the pool extension plant time and temperature settings together with the recent existing classroom extension plant and the pool air handling unit 3.

Manual overrides shall be provided for plant items together with a plant Auto /Manual/ Holiday rotary switch.

7.6.3 BEMS Equipment

IQ4E controller

IQ4/IO/DO modules

IQVIEW8/24 local display panel

Schematic layouts for existing central supervisor

Frost Protection

Three stage frost protection shall be provided for the heating installation.
Stage 1:- Should the outside air temperature fall below 1C, then all pumps shall be enabled and all valves shall open at the end of occupancy of the last time zone. First stage protection shall switch off when the outside air temperature rises above 3C.
Stage 2:- Should the boiler return temperature fall below 5C, then all pumps shall be enabled and all valves shall open as for the first stage, the lead boiler shall be enabled and shall operate until the return temperature rises above 8C.
Stage 3:- Should the internal room sensor temperature fall below 12C all plant shall be energised.

1	TB/TI	Trend immersion temperature sensor c/w pocket.
1	TB/TO	Trend outside temperature sensor. Mounted as indicated on drawing 17301/M01 (exact position to be agreed on site prior to installation)
2	TB/TI	Trend inside temperature sensors. Mounted as indicated on drawing 17301/M01 (exact position to be agreed on site prior to installation)

Gas Safety

The Merlin gas shut off panels complete with thermal links and gas solenoid valve. The system shall be commissioned by S & S Northern and connected to the control panel to electrically isolate the plant in the event of fire.

1	Emergency stop push button
4	Electro-thermal links (3 x boilers and 1 x gas fired water heater)
2	Merlin gas shut off panels-one existing and one new
1	50mm Gas Solenoid Valve
1	Natural gas sensor
1	Carbon monoxide detector

7.6.4 Boiler Control

The output of the boiler plant shall be weather compensated. As the outside temperature increases/decreases the boiler controlled output shall decrease/increase in line with the compensation slope.

The boilers shall be demand enabled from the heating circuit and operated in sequence to maintain a flow temperature of 80C. The lead boiler shall be rotated on a weekly basis to ensure equal usage of the heating plant.

Each boiler minimum flow pump shall be enabled along with its respective boiler and will operate at all times along with the boiler.

7.6.5 Pressurisation Unit

The pressurisation unit will be monitored by the BEMS for a fault condition. Should a high or low pressure be detected the heating plant shall be shut down.

7.6.6 General Heating Pump Set

The control system will provide optimum start/stop for the general heating plant by monitoring the room temperature and outside temperature and calculating the latest time to start the plant in order to have the building up to temperature by the start of the occupancy period. In the same way at the end of the occupancy period the control will calculate the earliest time to switch off the general heating plant but still maintain the building temperature until the end of the occupancy period. Night setback facility shall also be provided.
In order to provide equal usage for the pumps, the duty and stand-by pumps will automatically changeover on a weekly basis. The pump changeover will also operate on failure of the duty pump as sensed by a current switch for motor status.

7.6.7 Pool Heating Pumps

The BEMS will provide a fixed time schedule for pool heating pumps. The Pumps will be monitored for a flow fail condition via a current switch for motor status.

7.6.8 DHW

The BEMS will provide a fixed time schedule for the gas fired water heater and DHW secondary pump. The Pump will be monitored for a flow fail condition via a current switch for motor status.

7.6.9 Air Handling Units 1, 2 & 3 and Extract Units 1 & 2

The BEMS will provide a fixed time schedule for each of the 3 air handling units. The units will be monitored for faults. Air handling units 1 and 2 include remote interface units for fitting into the control panel fascia and wired to the units. Air handling unit 3 includes a Trend IQ4 to be wired to the IQ8 controller. Extract units 1 & 2 will be operated through local control with fault monitoring via the BMS.

7.6.10 Plant Override Switches

Auto/Manual/Holiday: - When selected, the plant will operate accordingly. Frost protection shall be maintained during the holiday selection.
Summer/Winter: - When selected, the plant shall switch the Wet and Dry changing room fan convector to summer operation via the convector BMS link.

7.6.11 Pool Make-Up Booster Set

The unit will operate through local control with fault monitoring via the BMS.

7.6.12 BEMS I/O Schedule

Description	AI	AO	DI	D0	PI	Device
Boiler Room and Pool Hall						
Temperature/Humidity Sensors						
Outside Temperature Sensor	1					TB/TO
Inside Temperature Sensor	2					TB/TS
Pool Hall Temperature Sensor	1					TB/TI
Pool Hall Humidity Sensor	1					HT/S
Pool Water Flow Temperature Sensor	1					TB/TI
Pool Water Flow Temperature Sensor	1					TB/TI
Boiler Return Temperature Sensor	1					TB/TI
Boiler Flow Temperature Sensor	1					TB/TI
HWS Flow Sensor	1					TB/TI
HWS Return Sensor	1					TB/TI
AHU 1 Supply Air Temp. Sensor	1					TB/TI
AHU 1 Return Air Temp. Sensor	1					TB/TI
AHU 2 Supply Air Temp. Sensor	1					TB/TI
AHU 2 Return Air Temp. Sensor	1					TB/TI
AHU 2 Return Air Temp. Sensor	1					TB/TI
AHU 2 Return Air Temp. Sensor	1					TB/TI
Plant Sub-Total	**17**					
Gas Safety						
Gas Solenoid Valve			1			VFC
Gas Detection Panel			1			VFC
Fire alarm by-pass			1			VFC
Plant Sub-Total			**3**			

Description	AI	AO	DI	D0	PI	Device
Boiler Control						
Boiler No.1 / Pump 1 Enable				1		DO
Boiler No.1 Control		1				AO
Boiler No.1 Fault			1			VFC
Boiler Pump No.1 Fault			1			VFC
Boiler No.2 / Pump 2 Enable				1		DO
Boiler No.2 Control		1				AO
Boiler No.2 Fault			1			VFC
Boiler Pump No.2 Fault			1			VFC
Boiler No.3 / Pump 3 Enable				1		DO
Boiler No.3 Control		1				AO
Boiler No.3 Fault			1			VFC
Boiler pump no 3 fault			1			VFC
Plant Sub-Total		**3**	**6**	**3**		
Heating Pressurisation Unit and Pool Booster Set						
Heating High Pressurisation Alarm			1			VFC
Heating Low Pressurisation Alarm			1			VFC
Pool Booster Set Alarm			1			VFC
Plant Sub-Total			**3**			
Heating Pump Sets						
General heating Pump Set Enable		1				2RM
General heating Pump Set Fault			2			VFC(2)
General heating Pump Set Flow Fail			1			EP113
Pool heating Pump Set Enable		1				2RM
Pool heating Pump Set Fault			2			VFC(2)
Pool heating Pump Set Flow Fail			1			EP113
Plant Sub-Total		**2**	**6**			
DHW						
Gas Fired Heater Enable				1		DO
Gas Fired Heater Fault			1			VFC
DHW Secondary Pump Enable				1		DO
DHW Secondary Pump Fault			1			VFC
DHW Secondary Pump Flow Fail			1			EP113
Plant Sub-Total			**3**	**2**		
Ventilation unit control						
Wet Change AHU 1 Enable				1		DO
Wet Change AHU 1 Fault			1			VFC

Description	AI	AO	DI	D0	PI	Device
Dry Change AHU 2 Enable				1		DO
Dry Change AHU 2 Fault			1			VFC
Pool AHU 3 Enable				1		DO
Pool AHU 3 Fault			1			VFC
Wet Change Extract Unit 1 Fault			1			VFC
Dry Change Extract Unit 2 Fault			1			VFC
Plant Sub-Total			**5**	**3**		
Plant Override Switches						
Auto/Manual/Holiday Select			1			VFC
Summer/Winter Select			1			VFC
Plant Sub-Total			**2**			
Location Sub-Total	**17**	**5**	**28**	**8**		

7.6.13 Control Panel

The control panel shall be a wall mounted, manufactured to the control panel manufacturer's specification, except where specifically indicated.

The panel dimensions shall be suitable for the space available.

The control panel shall house the following equipment:-

1 Control Circuit Fuse
1 Panel Live Lamp
1 Door Interlocked Main Isolator
4 Single Phase MCB power supplies, complete with enabled and fault lamps, Hand/Off/Auto rotary switches serving the following:-

Boiler no.1
Boiler no.2
Boiler no 3
Gas Fired Water Heater

1 Single Phase MCB power supply, complete with on and fault indication for the following:-

S & S Northern gas controllers

1 Single Phase 1.5A MCB power supply, complete with on and high, low pressure indicator lamps for the following:-

Heating Pressurisation Unit

1 Single Phase fused supply for Trend 25mm 3 port diverting valve, actuator and sensors serving pool AHU 3 heater battery

1 Single Phase fused supply for Trend 32mm 3 port diverting valve, actuator and sensors serving pool heat exchanger

2 3 Position Selector Key switches for the Following:-

Auto /Manual/Holiday
Summer/Winter

1 Fire relay and Indicator Lamp.

8 Indicator lamps for the following:-

General Heating Pump Set Flow Fail
Pool Heating Pump Set Flow Fail
DHW Secondary Flow Fail
Wet Change AHU 1 Fail
Dry Change AHU 2 Fail
Wet Change Extract Unit 1 Fail
Dry Change Extract Unit 2 Fail
Pool Make-Up Booster Set Fail

2 Pair of DOL starters, rated up to 1.5 kW three phase, complete with thermal overloads, two Run and two Trip lamps, Hand/Off/Auto & No1\Off\No.2 rotary switches serving the following:-

General Heating Pump Set
Pool Heating Pump Set

4 DOL starter rated up to 1.5 kW single phase complete with thermal overload, one Run and one Trip lamps, Hand\Off\Auto rotary switches, serving the following:-

Boiler Pump P1
Boiler Pump P2
Boiler Pump P3
DHW Secondary Pump

1 Internally Mounted 13 Amp twin socket outlet c/w RCD.

1 Control Circuit 24v Transformer.

Mount IQ4 I/O Modules

1 Mounting of an IQ3 96 point Outstation.

1 Fascia mounted IQVIEW8 Touchscreen.

1 Fascia mounted remote user interface for wet change AHU 1

1 Fascia mounted remote user interface for dry change AHU 2

Interlocking relays as necessary.

1 240/24 Volt 150VA transformer complete with mcb.

7.6.14 Commissioning

On completion the system shall be fully commissioned and a report issued showing all set points and tests carried out.
The contractor shall include for recommissioning the system six months after completion to make any necessary adjustments following operation of the installations.

7.6.15 Operating & Maintenance Manuals

A description of the controls and their operation shall be provided together with as fitted drawings / wiring diagrams, manufacturer's literature of principal components, test certificates including electrical test certificate and commissioning reports. A set of documentation shall be submitted to the contract administrator for comment prior to formal issue.

7.6.16 Demonstration of Controls

The controls installation shall be demonstrated formally to the client at handover or at a meeting specifically set aside by the Contract Administrator for this purpose. The contractor shall obtain written confirmation / signature from the client that this has been undertaken.
The contractor shall include for a second demonstration of the controls following the six monthly recommissioning of the system.

7.7 Heating and Gas Pipe Work

LPHW heating pipe work up to 50mm shall be either mild steel medium Grade quality to BS1387 with screwed fittings to BS21 or Pegler/Yorkshire (tel 0844 243 4400) Xpress carbon steel tube and fittings. Pipe work above 50mm shall be welded.
Above ground gas pipe work shall be mild steel medium Grade quality to BS1387 with screwed fittings to BS21 up to 40mm and welded above 40mm.
External underground gas pipe work shall be to British Gas standard BGC/PS/PL2, Part 1 and 2. Pipe work shall be yellow finish medium density. Fittings and joints shall be butt fusion welded. Pipe work shall be installed in accordance with the manufacturer's recommendations.

Drain off cocks shall be fitted at all low points on flow and return pipe work to allow the system to be fully drained down. AAVs shall be installed at high points in an accessible position on the LTHW heating pipe work. Brackets shall be at centres as indicated in appendix B.

The contractor is to allow for all necessary steelwork to support the pipe work/plant from the structure. The contractor shall submit support proposals for approval prior to manufacture and installation.

Holes for services through walls and floors are to be diamond core drilled, incorporate mild steel sleeves and be fire sealed. Existing pipe work holes shall also be sleeved and fire sealed. Cover plates shall be used where pipe work is exposed to view.

7.8 Pressure and Temperature Gauges

Pressure and temperature gauges shall be installed as indicated on the drawings. Each gauge shall be 100mm diameter with bottom entry manufactured to have a bourdon movement mounted within a black steel case with chrome bezel. The gauges shall be complete with brass internals, and a set pointer. The gauges are to be graduated in metres head and bar for pressure gauges and centigrade and fahrenheit for temperature gauges, selected to operate in the middle of the scale of the gauge. Each gauge is to be supplied and installed complete with a brass U siphon and gauge cock. The arrangement shall be installed to the manufacturer's recommendations to ensure accurate readings.
Items supplied by either VIP Ltd. Tel. 0161 683 5693 or Brannan

7.9 Dosing Pot

Dosing pot shall be Smith Brothers Stores Ltd (tel-0161 621 6288) 40 litre capacity complete with all necessary connections and isolating valves.

7.10 Magnetic Filter

Magnetic filter shall be a 50mm Magnaclean magnetic filter installed in the heating return pipe work as manufactured by Adey (tel 01242 54671)

7.11 Flue Pipe Work

The new flue pipe work installation shall be designed and installed by one of the following companies:-

a) Sigram Flue Systems
Unit E2 Meadowbank Business Park
Tweedale Way, Chadderton
Oldham OL9 8EH
Tel 0161 682 1999

b) Flue-Stax
The Old Chapel, Chapel Street
Tingley
WF3 1RE
Tel 0113 252 2246

c) Jeremias UK Ltd
Unit2-4 Loop Stoop Way
Crown Farm Industrial Estate
Mansfield NG19 0FG
Tel 01623 889219

The flue shall be MF twin wall stainless steel inner seam welded, 25mm thick insulation, 304 stainless steel outer c/w ME Single skin 316 stainless steel seam welded liner.
The boiler flue shall be 1No 200 i.d. / 250 o.d. common flue serving the 3no. boilers and water heater run within the plant room to a 200 i.d. single skin tee at the base of the chimney before rising to the termination terminal. The

installation shall include lengths, bends, module header tees, end caps, drain points (drain pipework by mechanical contractor), roof sleeve, roof flashing plate , storm collar, base tee, rigid liner, top plate, terminal, brackets, site survey, delivery and installation.

7.12 Low Surface Temperature Radiators

Low surface temperature radiators shall be Myson (tel 0191 491 7530) of the type and size as indicated on drawing 17301/M01. Radiators shall be complete with close coupled thermostatic radiator valves on flow and matching lock shield valves with drain cocks on the return. Thermostatic heads shall be located to suit location and be accessible

7.13 Ceiling Fan Convectors

Fan convectors shall be S & P Coils Ltd (tel 0116 249 0044) Belgravia Tilevector of the type as indicated on drawing 17301/M01. Heaters shall be complete with coil connectors ISV, FSB box, BMS1, RT1 remote on/off thermostat and ALTC adjustable low temperature cut out. Remote thermostats shall be handed to the electrical contractor for fixing. Heaters to be set on low speed.

7.14 Secondary Gas Meter

Gas meter shall be a Solenvis (tel 01189 342607) TBX100L 50mm low pressure loss turbine meter located as indicated on drawing 17301/M04.

8.0 HOT AND COLD WATER SERVICES INSTALLATIONS

8.1 Pipe Work

Above ground hot and cold water pipe work shall be Pegler/Yorkshire (tel 0844 243 4400) Xpress copper tube and fittings.
Below ground pipe work shall be MDPE barrier type polyethylene pipe work to BS EN 12201.

The domestic water services installation shall be installed as indicated on the drawings. The installation shall comply with BS 6700, WRAS and the building regulations.

8.2 Thermostatic Mixing Valves and Shower Sets

Thermostatic mixing valves and shower sets shall be Reliance Controls Ltd (tel 0800389 5931) of the type as indicated on drawing 17301/M02.

8.3 Safety Shower

Safety shower shall be Safety Shower People (tel 01273 400092) basic line freestanding body shower with hand held eye shower ref1212014.

8.4 Secondary Water Meter

Shall be Meters UK Ltd (tel 01524 555 929) 40mm ref. 301007.

8.5 Pool Booster Set

Shall be Kemper UK Ltd (tel 01684 854 930) model 3690002500 with floor mounting support kit reference 3690300100 and tank cleaning kit reference 3690200100.

9.0 VENTILATION INSTALLATIONS

9.1 Duct Work

Ductwork shall generally be spiral wound, low pressure and low velocity and manufactured from hot dipped galvanised mild steel sheet. Duct work serving the pool hall and wet changing rooms shall be suitable for a chlorine environment. It shall be manufactured and installed generally in accordance with appendix H of HVCA DW/144. Flexible duct work may be used for final termination at grilles/diffusers. The duct work serving the chemical store extract fans shall be UPVC. The contractor shall submit detailed layout drawings, to suit the actual dimensions on site, for approval prior to manufacture and installation. Inspection points shall be installed where necessary to allow adequate inspection for ductwork, fittings and dampers. Supports for ductwork shall be suspended from the roof work supports. The contractor shall include for any trimmers to allow for adequate suspension supports. The proposed support arrangement shall be submitted for approval prior to manufacture and installation. All supply and extract ductwork shall be insulated.

The whole of the ventilation installation shall be balanced and commissioned on completion to provide the air flow volumes as provided by the engineer.

9.2 Extract Fans

Extract fan units 1 and 2, chemical store extract fans and the pool plant room extract fan shall be as manufactured by Vent Axia Ltd (tel 03448560590) and of the type as indicated on drawing 17301/M03.

9.3 Air Handling Units

9.3.1 Air handling units shall be supported from the floor for unit 3 or the structural steel work for units 1 and 2. The contractor shall include for all necessary support steel work and shall submit support detailed proposals for consideration prior to manufacture and installation.

9.3.2 Air Handling Units 1 and 2

Shall be by VES (tel 08448 156 060). Each unit shall be model EVC446-1/FP-W/EE/LB/G4/CPSC fan unit complete with EVCA200/1200/STD room and atmosphere side silencers, EVCCWKT200 heater battery valve and actuator kit, CPBO-1/W/P/C blue sense control package, EPEL9041 additional user interface and manufacturer's site commissioning.

9.3.3 Air Handling Unit 3

Shall be by Recotherm Ltd (tel 01527 894 533) Aries 100H unit complete with Trend expansion module, recuperator summer bypass and manufacturer's site commissioning. The manufacturer has provided an initial quotation reference E24161. The contractor shall obtain a revised quotation to include any additional requirements indicated above.

9.4 Grilles, Diffusers and Dampers

9.4.1 Grilles, louvres and dampers shall be of the sizes and types as indicated on drawing 17301/M03 or indicated below and shall be manufactured by GDL Air Systems Ltd (tel 01457 861538).

The contractor shall include for screw fixing grilles and diffusers in suspended grid ceilings and doors. Additional supports shall be provided in the ceiling grid to provide a suitable fixing for ceiling grilles and diffusers. Grille, louvre and diffuser finishes shall be to a RAL colour to be agreed before ordering. Ductwork transformation pieces shall be used for changes from circular to rectangular grilles, louvers and dampers.

9.4.2 Fire dampers shall be located as indicated on drawing 17301/M03, reference DC8SF+0V for pool supply/extract and DC8MF+0V for other areas.

9.4.3 Volume control dampers shall be located as indicated on drawing 17301/M03, reference DE000+1S for pool supply/extract and DE000+0M for other areas.

9.5 Roof Terminal Cowls and Attenuators

Shall be by Vent Axia Ltd of the types and sizes indicated on drawing 17301/M03 and /M05 and below. Attenuators and cross talk attenuators shall be Sonex of the length and sizes indicated on the drawing.

10.0 PIPE WORK ENCASEMENT

The contractor shall include for the supply and installation of the boxing in of pipe work as indicated on the drawing including low level heating and hot water pipe work. It shall be by encasement ltd (tel 01733 266889) and shall suit the particular requirements to encase the pipe work. Boxing shall be either versa 5 or versa 8 of a size to suit the requirements on site. The installation shall include all necessary accessories i.e. internal/external corners, stop ends, joint covers, screw cover caps etc. suitably sized rectangular plastic access panels shall be installed to provide access to thermostatic mixing valves, isolating valves etc.

11.0 ELECTRICAL WORKS

The electrical installations work associated with the controls installations shall be carried out by a contractor on the current roll of the National Inspection Council for Electrical Installation Contracting (NICEIC), the Electrical Contractors Association (ECA), National Association of Professional Inspectors and Testers (NAPIT), or the Electrical Installation Self-Assessment Scheme (ELECSA), at the time of tender and during the entire contract period, the roll number of which shall be stated on request.

12.0 WATER TREATMENT AND DISINFECTION

12.1 LTHW Installation

The contractor shall include for the whole of the building's LTHW system to be thoroughly flushed through until clear water is passing through the system. The contractor shall then refill and treat the system using Sentinel (tel 01928 704330) X400 liquid dosed at 1% of the system volume of (2400 litres approx.). The Sentinel X400 should be circulated around the system with all valves open for a period of three days. Warming the water will aid the process. After the three day period the system shall be drained and flushed again before refilled with water including a multi-metal corrosion inhibitor of a type acceptable to the boiler manufacturer.

The corrosion inhibitor shall be Sentinel X100 liquid dosed at 1% of the LPHW system volume (2400litres approx.)

After the system water has mixed with the corrosion inhibitor the contractor shall include for taking a sample of the systems water and testing to confirm the correct dosage has been applied.

The cleansing and dosing of the LTHW installation shall be carried out in accordance with the boiler and dosing manufacturers' recommendations

12.2 Hot and Cold Water Installation

After the completion of the works for the installation of the new cold water pipe work the contractor shall include for sterilising the pipe work in accordance with the requirements of BS 6700.

13.0 VALVES AND DRAIN OFF COCKS

Isolating valves, regulating valves, safety valves, automatic air vents and drain off cocks are to be supplied and installed in accordance with this specification and as indicated on the drawings. The contractor shall include for a plant room layout drawing together with valve labels and valve chart. The valve chart shall be mounted on the wall in the plant room.

a) Isolating Valves

Isolating valves on pipe work up to and including 50mm shall be full bore quarter turn ball valve type. These shall be used on DHWS, and MCWS pipe work where indicated on the tender drawings.
The valves shall be the Pegler (tel-01302 560 560) Bulldog PB700T range of ball valves. Valves within the roof void are to be supplied with lever handles together with the optional spindle extension piece to accommodate thermal insulation. All other valves are to be supplied with tee handles. All handles and levers are to be colour co-ordinated to the service they isolate i.e. DHWS – red, MCWS and TCWS – blue and gas – yellow.

b) Drain Off Cocks

Drain off cocks are to be provided at all low points, and are to be bronze, with screwed end taper thread and the hose end being ribbed. All drain off cocks are to be of the lockshield type, and be as manufactured by Crane Ltd (tel-01473 277 300) their model reference D340

c) Stopcocks

Stopcocks shall be installed on all domestic cold water pipe work as indicated on the drawing for isolating purposes. These shall be manufactured from gunmetal body, with brass headwork to BS 1010 and come with compression joints. The valves shall be as manufactured by IMI Yorkshire Fittings Ltd. (tel-01302 560 560) and be their figure reference 551.

d) Automatic Air Vents

Automatic air vents shall be Flamco (tel-01744 744 744) flexvent supplied complete with a ball-o-fix valve fitted between the AAV and the pipe work branch.

e) Double Regulating Valves

Shall be Crane Ltd (tel 01473 277 300) fixed orifice double regulating valve, DM931.

f) Heating strainer shall be Crane Ltd 50mm reference FM276 PN16.

14.0 THERMAL INSULATION

All heating, hot and cold water pipe work and air handling unit duct work in roof voids and where boxed in shall be insulated. Insulation shall comprise of KingspanTarec (tel 01457 890 400) Kooltherm rigid section phenolic foam sections with class 'O' rated reinforced aluminium foil faced finish. Insulation shall be installed in accordance with the manufacturer's instructions.
Insulation thicknesses shall comply with appendix A

Kooltherm insulated pipe support inserts shall be used at all bracket positions to allow continuity of insulation.

Insulation shall have colour bandings for identification, service type labels and flow direction.

Valves and fittings shall be insulated using ISO Covers Ltd (tel-01889 574333) 25mm thickness fire proof removable insulation covers.

15.0 OPERATION & MAINTENANCE DOCUMENTATION AND AS FITTED DRAWINGS

The contractor shall prepare two sets of operating and maintenance documents to give a step by step guide to the daily running and maintenance requirements of the new installations. Each set shall include a paper copy and an electronic CD copy. All

electronic documents are to be in word format with drawings in AutoCAD format. The contractor shall be provided with the Bury Council AutoCAD tender drawings for the contractor to develop and include any site deviations from the original design to provide accurate as fitted drawings, for inclusion in the O&M file.

The contractor shall submit to the Contract Administrator a draft copy of the documents for comments prior to practical completion. The contractor shall then update the documents to incorporate the C.A.'s comments and provide two copies of the documents to the main contractor two weeks after practical completion.

All information shall be presented within full clear plastic pockets for inclusion within a lever arch folder. Each section shall be divided up using durable polypropylene numbered index sheets, with matching contents page.

The information to be contained within the O&M documents shall generally be as detailed below;

The information contained within comprehensive O&M manuals can be grouped into the following areas:

- how to use the manual
- emergency information
- contractual and legal information
- systems description and design intent
- asset list/equipment schedule
- parts identification and recommended spares
- spares policy
- commissioning data
- operation
- maintenance
- schedule of service intervals for equipment
- fault finding
- modification information
- disposal instructions
- manufacturers
- manufacturers' literature

APPENDIX A

PIPEWORK/DUCT WORK INSULATION THICKNESS TABLE

Nominal Pipe Size mm	Service and Insulation Minimum Thickness mm					
	Condensate 100°C max.	LTHW 75°C max.	DHWS 65°C/75°C max.	CWS 10°C max.	Chilled Water 5°C min.	Cold Feed & Vents 10°C
15	N/A	15	15	15	20	15
20/22	N/A	20	15	15	20	15
25/28	N/A	20	20	15	20	15
32/35	N/A	20	20	15	20	15
40/42	N/A	20	20	15	25	15
50/54	N/A	25	25	20	25	20
65/67	N/A	25	25	20	25	20

N.B. Duct work shall be insulated to a thickness of 25mm

Note: The above thicknesses for cold and chilled water services are in accordance with BS 5422: Table 7 for condensation control on a low emissivity finish.

On valves, expansion bellows and flanges, the insulation shall be the same thickness as the adjacent pipe work.

APPENDIX B

DISTANCES BETWEEN PIPEWORKDUCT WORK SUPPORTS

TABLE 1 SUPPORTS FOR STEEL PIPEWORK

Interval for Horizontal Runs			
Size of Tube (mm)	Bare Pipe	Lagged Pipe	Intervals for vertical runs, bare or lagged
15	1.8	1.8	2.4
20	2.4	2.4	3.0
25	2.4	2.4	3.0
32	2.7	2.4	3.0
40	3.0	2.4	3.7
50	3.0	2.4	3.7
65	3.7	3.0	4.6
80	3.7	3.0	4.6
100	4.0	3.0	4.6
125	4.5	3.7	5.5
150	5.5	4.5	5.5
200	8.5	6.0	8.5
250	9.0	6.5	9.0
300	10.0	7.0	10.0

TABLE 2 SUPPORTS FOR COPPER PIPEWORK

Interval for Horizontal Runs			
Size of Tube (mm)	Bare Pipe	Lagged Pipe	Intervals for vertical runs, bare or lagged
15	1.2	1.2	1.8
22	1.2	1.2	1.8
28	1.8	1.5	2.4
35	2.4	1.8	3.0
42	2.4	1.8	3.0
54	2.7	1.8	3.0
65 (2½")	3.0	2.4	3.7
76.1	3.0	2.4	3.7
108	3.0	2.4	3.7
133	3.7	3.0	3.7
159	4.5	3.7	3.7

N.B. Duct work supports shall be generally in accordance with appendix H of HVCA DW/14.