

## HOT AND COLD WATER INSTALLATION NOTES

All control/power wiring shall be in accordance with the requirements of BS 7671 (the I.E.E. Wiring Regulations).

Generally, the entire hot and cold water installation shall comply fully with the Water Byelaws 2014 (Scotland) and BS 6700.

All pipework shall be seamless, round copper tubes in accordance with BS EN 1057 - Half-hard (R250). All copper pipework shall be manufactured by Pegler, 'Tectite'. The Contractor shall take all necessary precautions to avoid damage by future nailing to pipework in concealed locations by exercising care in the positioning of the pipework.

Capillary fittings shall to be to BS EN 1254-1 with solder joints to BS EN 29453. Compression fittings shall to be to BS EN 1254-2. The use of PTFE tape shall be to BS 7786. All metal fittings shall be manufactured by Pegler 'Tectite' (or equivalent). Ends of piping must be cut true and all tube ends reamed to a clean edge before fixing. All fittings shall be resistant to dezincification. All jointing compound and soldering fluxes must not support microbiological activity and additionally any residues left after soldering should be non corrosive and have negligible toxicity. Joints shall be kept to a reasonable minimum and neat. Formed pipe bends and sets are to be used in preference to bends. Sets or bends must be properly formed employing the correct sized springs for formers.

Copper pipework supports shall be manufactured by Pegler 'Tectite'. (or equivalent).

All internal pipework shall be insulated thermally with 13mm (internal domestics) thick, CFC and HCFC free closed cell polyethylene tubular insulation. Pipework insulation shall be manufactured by Armacell, their product range 'Tubolit' (thermal conductivity of 0.039 W/m.K at 40°C) (or equivalent). All insulation to only be applied to dry pipework and to itself be completely dry. The extent of work shall include all hot and cold water pipework installed during the works. The insulation shall be securely attached to pipework with an approved adhesive. Only short sections of surface mounted pipework which will be visible on the entire completion of the hot and cold water installation shall be left un-insulated.

All pipework shall be graded to fall to allow the system to be completely emptied of fluid when required. Brass draincocks shall be Type A to BS 2879 and manufactured by Pegler Yorkshire, their model 'Prestex 833' (or equivalent).

Ancillary info -  
Stop cocks (SC) shall be manufactured by Pegler Yorkshire, their model 'Prestex GM59' (or equivalent).  
Pressure reducing valves (PRV) shall be manufactured by Pegler Yorkshire, their model 'Prestex PRV-2' (or equivalent).  
Check valves (CV) shall be manufactured by Pegler Yorkshire, their model 'Prestex 1039' (or equivalent).  
Isolation valves (IV) shall be manufactured by Pegler Yorkshire, their model 'Prestex PB300' c/w blue lever handle on the cold and red lever handle on the hot (or equivalent).  
Non-return valves (NRV) shall be manufactured by Pegler Yorkshire, their model 'Prestex 801' (or equivalent).  
Servicing valves (SgV) shall be shall be 15mmØ and manufactured by Pegler Yorkshire, their model 'Prestex 808' (or equivalent).

Before filling the system with water, an air pressure test shall be carried out on the hot and cold water distribution system. The test procedure shall be as follows:

- Pressurise the system to 4.5 Bar or twice the working pressure, whichever is greatest.
- Allow the pressure to settle for 1 minute and then record all pressure measurements with a Bourdon gauge.
- Record the pressure 15 minutes later.
- In order to pass the test there shall be no pressure drop whatsoever over this period.
- If a drop in pressure occurs, the system shall me checked for leaks and any leaks found shall be made good prior to re-running the test.
- On completion of a satisfactory test, the system shall be flushed out and commissioned in accordance with this specification.

All new pipework, fittings and valves shall be thoroughly flushed out with drinking water prior to being brought into service. Where the existing mains cold water supply is utilised to flush out the system, backflow prevention (DCV) shall be incorporated into the temporary connection to prevent contaminated water within the pipework being injected into the mains water supply.

All outlets shall be opened to ensure that the hot and cold water supply flows freely and at a pressure which indicates that there are no blockages in the pipework and / or that any valves have been left closed.

## L.T.H.W HEATING INSTALLATION NOTES

All pipework shall be seamless, round copper tubes in accordance with BS EN 1057 - Half-hard (R250). All copper pipework shall be manufactured by Pegler, 'Tectite' (or equivalent). The Contractor shall take all necessary precautions to avoid damage by future nailing to pipework in concealed locations by exercising care in the positioning of the pipework.

Capillary fittings shall to be to BS EN 1254-1 with solder joints to BS EN 29453. Compression fittings shall to be to BS EN 1254-2. The use of PTFE tape shall be to BS 7786. All metal fittings shall be manufactured by Pegler 'Tectite'.

Ends of piping must be cut true and all tube ends reamed to a clean edge before fixing. All fittings shall be resistant to dezincification. All jointing compound and soldering fluxes must not support microbiological activity and additionally any residues left after soldering should be non corrosive and have negligible toxicity. Joints shall be kept to a reasonable minimum and neat. Formed pipe bends and sets are to be used in preference to bends. Sets or bends must be properly formed employing the correct sized springs for formers.

Pipework supports shall be manufactured by Pegler 'Tectite' range.

All internal pipework shall be insulated thermally with 9mm thick (internal heating), CFC and HCFC free closed cell polyethylene tubular insulation. Pipework insulation shall be manufactured by Armacell, their product range 'Tubolit' (thermal conductivity of 0.039 W/m.K at 40°C) (or equivalent). All insulation to only be applied to dry pipework and to itself be completely dry. The extent of work shall include all L.T.H.W heating pipework installed during the works. The insulation shall be securely attached to pipework with an approved adhesive. Only short sections of surface mounted pipework which will be visible on the entire completion of the L.T.H.W heating installation shall be left un-insulated.

All pipework shall be graded to fall to allow the system to be completely emptied of fluid when required. Brass draincocks shall be Type A to BS 2879 and manufactured by Pegler Yorkshire, their model 'Prestex 833' (or equivalent).

Isolation valves (IV) shall be manufactured by Pegler Yorkshire, their model 'Prestex PB350' (or equivalent).

All pipework, where practical and necessary, shall be graded to vent. Automatic air vents (AAV) shall be installed at the highest point of the distribution pipework systems. AAV shall be manufactured by Spirax Sarco, their model 'AE30B' (or equivalent). The AAV shall be installed complete with 10m of 10mmØ copper discharge pipework which shall be routed to the nearest suitable drain.

Air Source Heat Pumps shall be manufactured by Mitsubishi. The ASHP shall be MCS accredited, and fully eligible for payment through the Renewable Heat Incentive (RHI) scheme. The ASHP and associated equipment shall be installed in accordance with the manufacturers written instructions. The installation contractor shall be fully MCS accredited and it shall be the Contractors responsibility to ensure the full installation is MCS compliant, and they shall provide all required information as part of the MCS certification.

Before filling the system with water, an air pressure test shall be carried out on the hot and cold water distribution system. The test procedure shall be as follows:

- Pressurise the system to 4.5 Bar or twice the working pressure, whichever is greatest.
- Allow the pressure to settle for 1 minute and then record all pressure measurements with a Bourdon gauge.
- Record the pressure 15 minutes later.
- In order to pass the test there shall be no pressure drop whatsoever over this period.
- If a drop in pressure occurs, the system shall me checked for leaks and any leaks found shall be made good prior to re-running the test.
- On completion of a satisfactory test, the system shall be flushed out and commissioned in accordance with this specification.

The L.T.H.W heating installation shall then be completely flushed out with all valves open (both manually and electrically operated) at least twice, once hot and once cold. The flushing agent shall be manufactured by Thermax, their 'Air source fluid' (or equivalent). The circulating pump shall be removed and a bridge piece inserted in its place prior to the initial filling and flushing. The pump shall be replaced after flushing is complete. Any leaks shall be made good. The system shall be filled with water and all air released and the inhibitor solution added. A final check shall be made at all joints and valves.

The anti-freeze/protector solution shall be added to the L.T.H.W heating system after it has been flushed out in accordance with the specification prior to commissioning. The anti-freeze/protector solution shall be manufactured by Fernox, their 'HP-5C Antifreeze' (as recommended by Mitsubishi). The anti-freeze/protector solution must be added in accordance with the manufacturers' written instructions.

The ASHP's shall be commissioned in accordance with the manufacturers written instructions and the completed commissioning checklist entered into the appropriate section of the 'Operation and Maintenance Manual'.

The L.T.H.W heating system thermostatic controls, programmer and control valves shall be checked to ensure that they operating correctly, as per the control strategy detailed within the Mechanical Design drawings and to the satisfaction of the Mechanical Design Engineer.

All tools, equipment included with parts and operating instructions shall be handed over to the Client on completion of each installation.

## DISCHARGE FROM UNVENTED HOT WATER CYLINDER -

It is a requirement of Building Regulation G3 that any discharge from an unvented system is conveyed to where it is visible, but will not cause danger to persons in or about the building. The tundish and discharge pipes should be fitted in accordance with the requirements and guidance notes of Building Regulation G3. The G3 Requirements and Guidance section 3.50 - 3.63 are reproduced in the following sections of this manual. For discharge pipe arrangements not covered by G3 Guidance advice should be sought from your local Building Control Officer. Any discharge pipe connected to the pressure relief devices (Expansion Valve and Temperature/Pressure Relief Valve) must be installed in a continuously downward direction and in a frost free environment.

Water may drip from the discharge pipe of the pressure relief device. This pipe must be left open to the atmosphere. The pressure relief device is to be operated regularly to remove lime deposits and to verify that it is not blocked.

Inhibitor, and scale reduction measures/chemicals to be utilised as per Mitsubishi recommendations

Outdoor unit fuse rating at consumer unit:  
40A RCBO for 14kW Heat Pumps

Outdoor unit Dip Switch SW8-3 should be ON when powering FTC board independently.

## TYPICAL ASHP INSTALLATION SCHEMATIC

## SYSTEM CONTROL

The Mitsubishi Air Source Heat Pumps along with the Mitsubishi control package shall be capable of controlling all pumps and plant while receiving a run/off signal from the room thermostat.

The back-up immersions in the ASHP buffer will be powered and controlled by an immersion programmer which will be manually operated should the ASHP's fail and the property requires heating or hot water; in addition to the legionella cycle desired below.

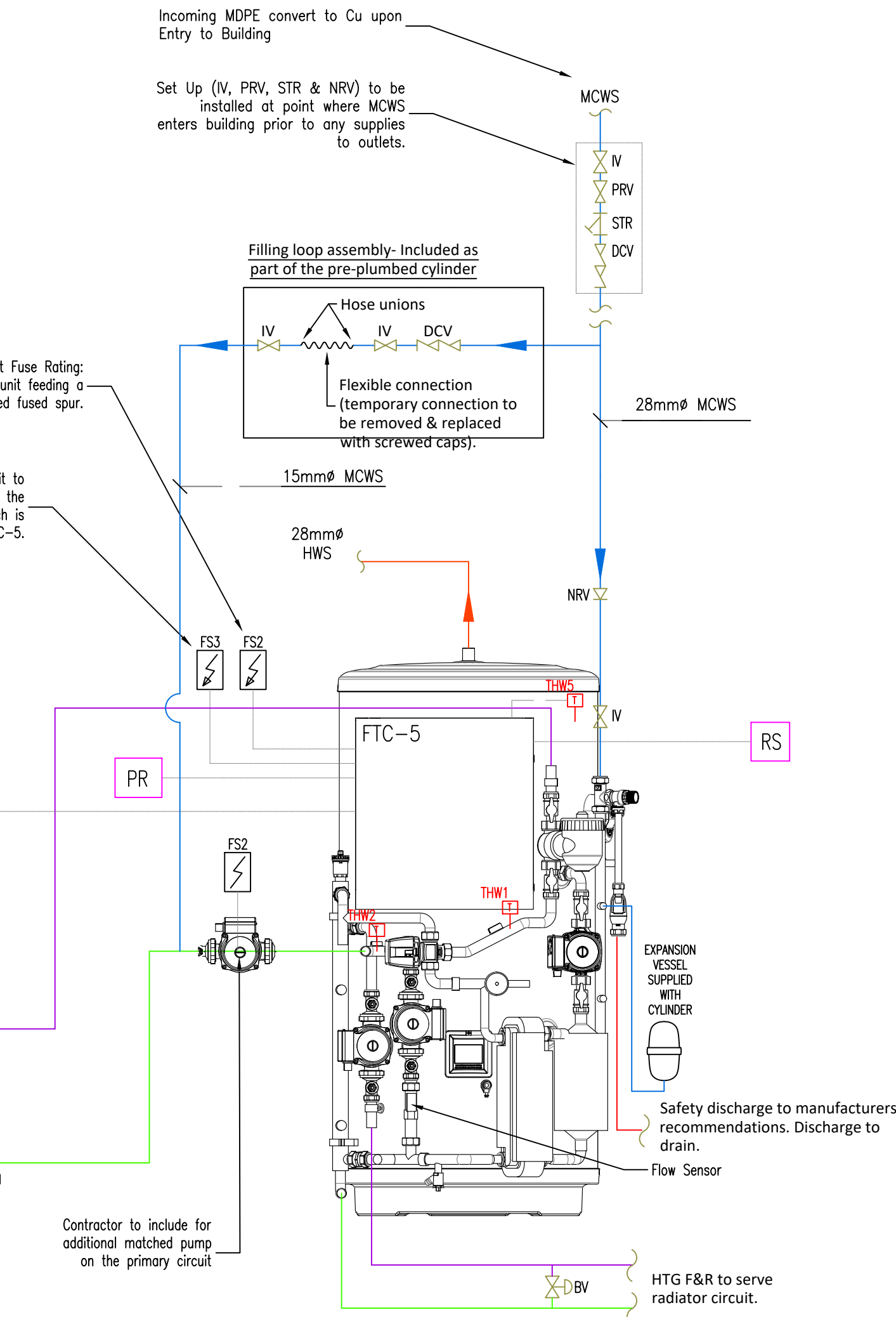
The ASHP is the primary source of energy for the property; providing heating and hot water to the property. There is 1 no. 3kW immersion heaters installed within the hot water cylinder.

The Control Strategy for the ASHP system is -

The Mitsubishi Control Panel will monitor the flow and return temperature from the ASHP's and the signal from the room thermostat which monitors the Room thermostats. When room thermostat calls for heat the control panel will ensure adequate LTHW provision and continue to monitor secondary flow and return temps along with the flow and return from the ASHP(s).

The control will monitor the temperature within the hot water cylinder - upon the temperature falling within the cylinder the system will divert LTHW from the heating to the hot water cylinder circuit to bring the temperature in the cylinder back up.

The Mitsubishi control panel will also operate the immersion within the hot water cylinder to heat the cylinder to 60degC for 1 hour every day - this is a legionella prevention cycle.



## ASHP Technical Requirements

The Ecodan outdoor unit must be installed on anti-vibration mounts. Rubber mounting blocks are recommended.

Adequate provision should be made to prevent condensate from collecting around the outdoor units. A soak away or drip tray can be used.

Flexible hoses shall be used to connect the Ecodan unit to the primary pipework.

There must be provision to measure the flow rate through each Ecodan outdoor unit. This can be achieved using mechanical commissioning sets or flow meters installed in the return pipework to each unit. Adequate filtration must be used on the return pipework to the Ecodan outdoor unit. This can be either, magnetic filter (TF1 supplied by MEUK) or strainer with air dirt separator.

All water systems should be designed, installed and commissioned in accordance with industry good practise guidelines; such as, but not limited to: BSRIA Guide BG2/2010 - Water System Commissioning, BSRIA Guide BG29/2011 - Pre-Commissioning of Pipework Systems, BSRIA Guide BG50/2013 - Water Treatment for Closed Heating & Cooling Systems, CIBSE Commissioning Code W - Water distribution systems.

Isolation valves and a flushing bypass circuit are recommended for the outdoor unit. This is best practice and not required for warranty purposes.

The installing contractor should make the necessary arrangements to ensure the design of the system meet the requirement of the application and where possible follow industry guidelines and best practice.

This schematic must be used in conjunction with the corresponding technical submission document issued by Mitsubishi Electric.

A Issued for Building Warrant 12/03/24

Rev Description Date



Unit 48 Gateway Business Park,  
Beancross Road,  
Grangemouth,  
FK3 8WX

Building Services | Mechanical | Electrical Low Carbon  
Sustainable Engineering by Design



Client

Dunblane Square Limited

Project

The Bank, Dunblane

Project No. 23009

Drawing No. 23009-IPME-XXXX-GF-DR-M-56002

Revision A

Mechanical Engineering Services  
Heating Services  
Schematic

Status

S2 - FOR INFORMATION

Date Created March 24

Drawn by JA

Scale 1:50

Sheet @ A1