POTTERTON
COMMERCIAL

# POTTERTON RAPIDO F200

## Installation, Operation & Maintenance Manual

APRIL 1997

# INDEX

Fig.1.1 - General Data & Dimensions (all dimensions in mm)

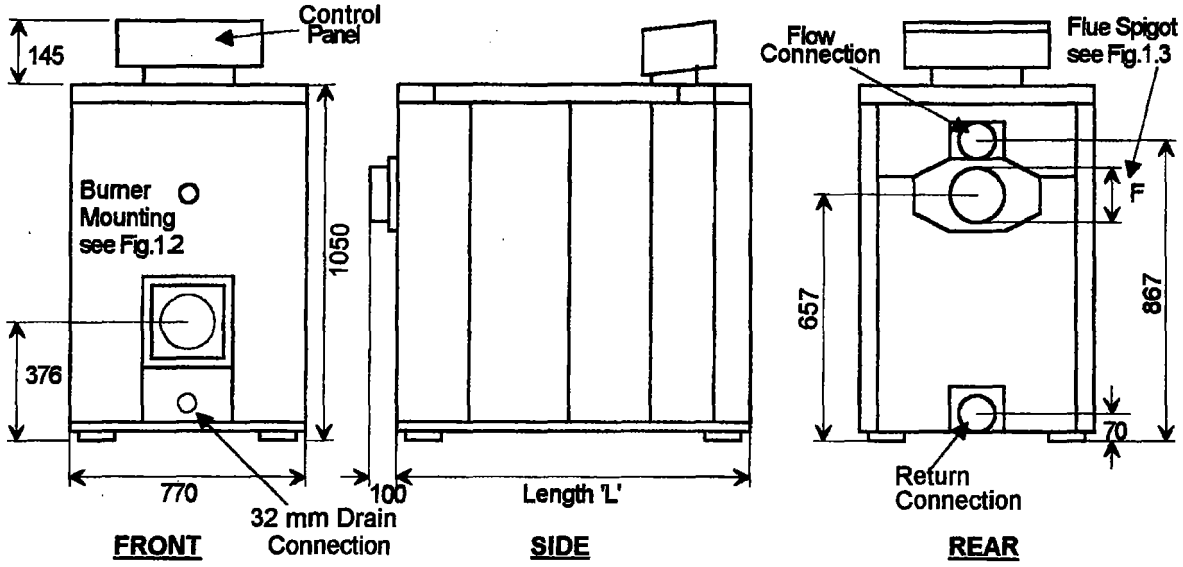



Table 1.1 - Boiler Dimensions

| No of Sections | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|
| L (Length) mm | 835 | 965 | 1095 | 1225 | 1355 | 1485 | 1615 | 1745 |
| F (Diameter) mm | 180 | 180 | 180 | 180 | 225 | 225 | 225 | 225 |

NOTE: Each boiler is supplied with 2 x 2.25" BSP screwed flanges complete with gaskets.

Fig.1.2 - Burner Mounting

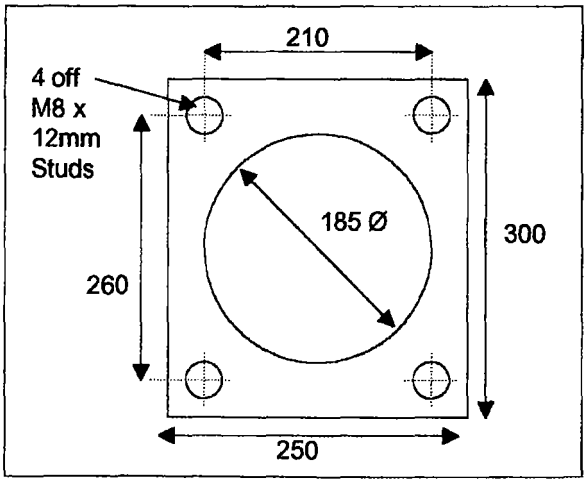



Fig.1.3 - Flue Spigot

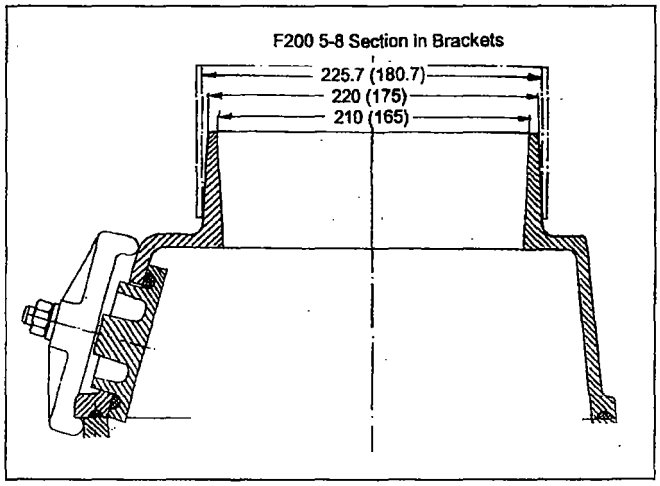



Table 1.2 - Combustion Chamber Data

| No of Sections | | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|
| Length | mm | 565 | 615 | 825 | 955 | 1085 | 1215 | 1345 | 1475 |
| Diameter* | mm | 420 | | | | | | | |
| Volume | $m^3$ | 0.08 | 0.09 | 0.11 | 0.13 | 0.15 | 0.17 | 0.19 | 0.2 |
| Surface Area | $m^2$ | 5.7 | 6.28 | 6.87 | 7.45 | 8.04 | 8.62 | 9.21 | 9.79 |
| Pressure | mbar | 0.05 | 0.1 | 0.15 | 0.24 | 0.33 | 0.44 | 0.55 | 0.68 |

* The burner location is central to the combustion chamber.

For burner details see appropriate burner data sheet.

Table 1.3 - Technical Data

| | Number of Sections | | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|
| | Output | kW | 95 | 115 | 135 | 160 | 185 | 215 | 245 | 280 |
| 1 | Fuel Consumption GAS | $m^3$/hr | 10.8 | 13.1 | 15.3 | 18.2 | 21 | 24.5 | 27.9 | 31.9 |
| | OIL | lit/hr | 10.7 | 12.9 | 15.2 | 18 | 20.8 | 24.2 | 27.6 | 31.6 |
| | Input GAS | kW | 115.8 | 140.2 | 164.6 | 195.1 | 225.6 | 262.2 | 298.7 | 341.5 |
| | OIL | kW | 113.1 | 136.9 | 160.7 | 190.4 | 220.2 | 255.9 | 291.7 | 333.3 |
| | Maximum Design Pressure | Bar | 4 BAR ALL MODELS | | | | | | | |
| 2 | Minimum Operating Pressure | Bar | 0.3 BAR ALL MODELS | | | | | | | |
| 3 | Nominal Flue Connection Size | | 180mm DIAMETER | | | | 225mm DIAMETER | | | |
| 4 | Flue Gas Volume | | 142 | 173 | 203 | 240 | 278 | 323 | 368 | 421 |
| | Flue Draught Requirements | | 0 - 4 mm ALL MODELS | | | | | | | |
| 5 | High Level Natural Ventilation to BS 6644 | $cm^2$ | 395 | 450 | 505 | 574 | 642 | 724 | 807 | 903 |
| 5 | Low Level Natural Ventilation to BS 6644 | $cm^2$ | 791 | 901 | 1010 | 1148 | 1285 | 1449 | 1614 | 1806 |
| 6 | Mechanical Inlet to BS 6644 | $m^3$/sec | 0.104 | 0.126 | 0.148 | 0.175 | 0.203 | 0.236 | 0.269 | 0.307 |
| 7 | Water Connection Size (See Fig.1.1) | BSP | 2.5" | 2.5" | 2.5" | 2.5" | 2.5" | 2.5" | 2.5" | 2.5" |
| 8 | Minimum Water Flow at 25°C Δ t | lit/sec | 0.9 | 1.1 | 1.28 | 1.52 | 1.76 | 2.04 | 2.33 | 2.66 |
| 8 | Water Flow at 11°C Δ t | lit/sec | 2.0 | 2.5 | 2.9 | 3.4 | 4.0 | 4.6 | 5.3 | 6.0 |
| 8 | Hydraulic Resistance at 11°C Δ t | kPa | 1.56 | 2.28 | 3.12 | 4.12 | 5.25 | 6.85 | 8.67 | 10.71 |
| 9 | Cold Feed Size to BS 6644 Minimum Bore | mm | 25 | 25 | 32 | 32 | 32 | 32 | 32 | 38 |
| 9 | Open Vent Size to BS 6644 Minimum Bore | mm | 32 | 32 | 38 | 38 | 38 | 38 | 38 | 50 |
| | Safety Valve Size to BS 6644 Nominal Size | mm | 19 | 19 | 19 | 19 | 19 | 19 | 25 | 25 |
| 2 | Maximum Flow Temperature | °C | 90°C ALL MODELS (110°C can be supplied to special order) | | | | | | | |
| 10 | Minimum Return Temperature | °C | 35°C ALL MODELS | | | | | | | |
| 11 | Dry Weight | kg | 470 | 540 | 610 | 665 | 735 | 805 | 875 | 945 |
| | Water Content | kg | 73 | 88 | 103 | 118 | 133 | 148 | 163 | 178 |
| | Power Requirements | | Standard 240V 1Ph - See Burner Card for Running Currents | | | | | | | |

For metric to imperial conversions see CONVERSION CHART inside back cover

1. FUEL CONSUMPTION

Gas fuel consumption is based on natural gas with a gross calorific value of 38.6 Mj/m$^3$, minimum gas pressure 17.5 mbar, maximum 35 mbar.

Oil fuel consumption is based on Class D (35 second) gas oil with a gross calorific value of 45.5 Mj/kg,supply oil pressure must be positive between 0.69 and 0 bar.

NOTE: The fuel and heat inputs are maximum values and may be reduced during commissioning to achieve the stated heat output depending on operating efficiency measured.

2. MINIMUM OPERATING PRESSURE

This is the minimum operating pressure of the boiler with pumps operating (NOT static pressure). The requirements of the Health & Safety Executive guidance note PM5 regarding maximum operating temperatures should be observed. See section 3 for further details.

3. BOILER FLUE CONNECTION

This is the nominal flue size of the flue connection spigot, for dimensional details of the flue connection spigot see Table 1.1, page 1.1. Actual flue size required to achieve correct draught and operation under all running conditions may need to be increased. See section 3.

4. FLUE GAS VOLUME

Flue gas volumes are given at STP (standard temperature and pressure [15°C and 1013.25 mbar]). Typical flue gas temperatures are 220°C (gross) at $CO_2$ levels of 9% and 12% respectively on gas and oil.

5. NATURAL VENTILATION

The sizes indicated are free grille areas and are based on a single boiler installation. See Table 1.3, page 1.2, and section 3 for further details on ventilation.

6. MECHANICAL VENTILATION

The volume given is for a single boiler installation. See Table 1.3, page 1.2, and section 3 for further details on mechanical ventilation.

7. WATER CONNECTION SIZES

The boiler water connections are flanged with 2.5" BSP screwed counter flanges provided. For further details on water connections see Fig.1.1, page 1.1.

8. WATER FLOW RATES

Water flow rates are given for boiler flow and return temperature differences of 11°C. See Table 1.3, page 1.2 for further details of maximum/minimum flow rates and hydraulic resistances at alternative flow rates.

9. COLD FEED/OPEN VENT/SAFETY VALVE SIZES

Sizes indicated are minimum sizes for single boiler installations. See Table 1.3, page 1.2 for further details.

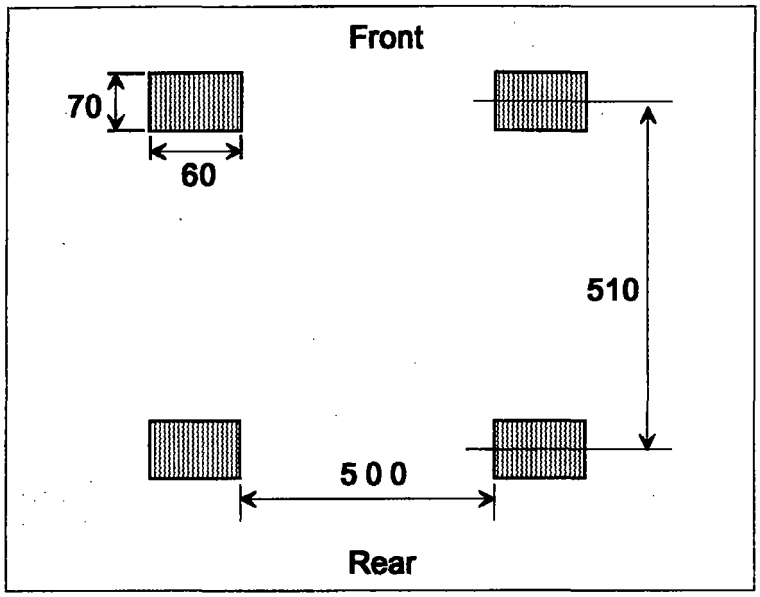
10. MINIMUM RETURN TEMPERATURE

This is the minimum operating return temperature to prevent condensation within the boiler system. See Section 3 for further details on back end protection.

11. WEIGHT

The dry weight is exclusive of the burner and gas train, see burner card for relevant burner weights.

Fig.1.4 - Boiler Feet Details




Feet details shown are for a 5 section boiler. For larger models additional intermediate section feet are added on 130mm spacing

## CLEARANCES

The minimum boiler room clearances for access, erection and maintenance are as follows:-

REAR - 750mm or sufficient to make flue and water connections.

SIDES - 300mm + burner projection on one side, 500mm on the other

FRONT- The length of the boiler to allow for cleaning, 1100mm minimum.

## BURNER INFORMATION

For general dimensions and specification see Potterton F200 burner data sheets. These publications are enclosed with the burners and also available from the Sales & Administration office (address on back page).

NB: There is a separate data sheet for each burner type, eg. NuWay, EOGB, etc.

The burner should be fitted in accordance with the instructions in section 4.

The burner unit should be commissioned in accordance with the manufacturers instructions supplied with the burner to obtain the combustion figures detailed in section 5. Burner commissioning requires specialist knowledge and equipment, we therefore strongly recommend that the services of the Potterton Service Department should be used.

## SPARGE PIPE DETAIL

Table 1.4 - Sparge Pipe Dimensions

| Sections | | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|
| Total Length | mm | 595 | 725 | 855 | 985 | 1115 | 1245 | 1375 | 1505 |
| Length A | mm | - | - | 510 | 510 | 510 | 510 | 510 | 510 |
| Length B | mm | - | - | 345 | 475 | 605 | 735 | 520 | 520 |
| Length C | mm | - | - | - | - | - | - | 345 | 475 |
| Diameter of Holes | mm | 14.5 | 14.5 | 14 | 12 | 11 | 10.5 | 10 | 10 |

Fig.1.5 - Sparge Pipe Configuration

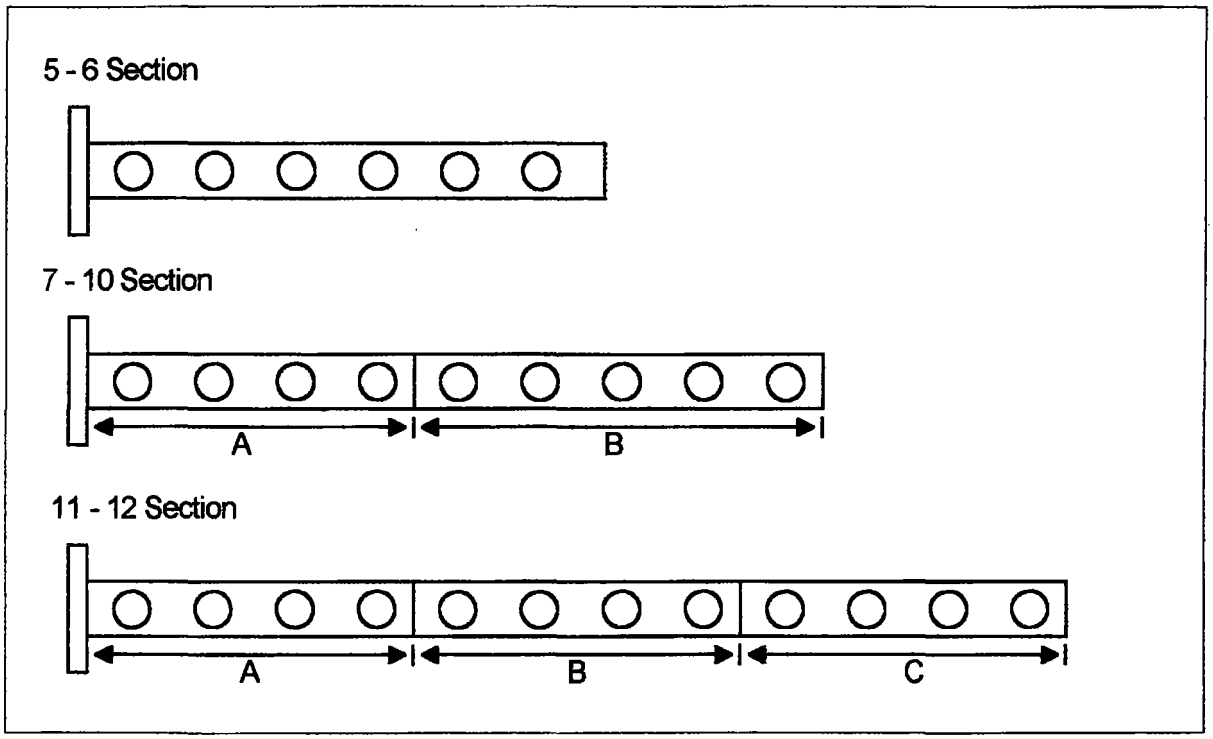
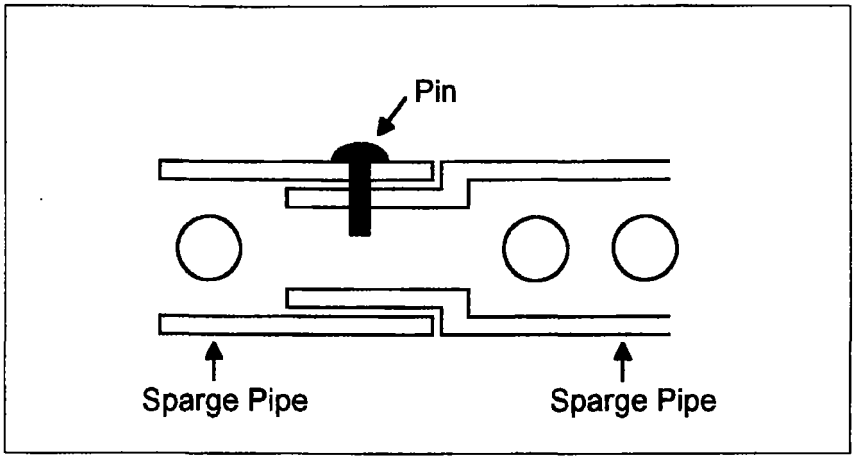



Fig.1.6 - Sparge Pipe Jointing



## GENERAL

The Potterton Rapido F200 cast iron sectional boiler is available in outputs from 95 kw (5 section model) to 280 kw (12 section model). Table 1.3 gives kw output and technical data for each model.

The boilers are available for use with natural gas or Class D (35 second) fuel oil as standard. Boilers are also available for alternative fuels, ie. LPG, Class C2 (28 second).

They are suitable for use on fully pumped open vented or sealed systems with a maximum design pressure of 4 bar (60 p.s.i.) and up to a maximum operating temperature of 90°C (110°C to special order). Refer to section 3 for installation requirements and maximum operating temperatures for Rapido F200 boilers on open vented and sealed systems.

The boilers are of the overpressure type with three pass, reverse flame design. The first two passes in the combustion chamber, the third in the convection passes achieving high heat transfer and efficiencies of up to 84% gross CV (93% nett CV).

The cast iron boiler sections are constructed and tested in accordance with BS 779 and are supplied with package burners constructed to BS 5885. The boiler package meets the requirements of M&E3.

The waterway sections are joined with steel taper nipples and secured with tie bars with the final sealing of the combustion chamber being made during assembly with ceramic fibre rope, see Fig.4.1.

The boilers are supplied unassembled and the largest individual section is approximately 905mm x 613mm x 130mmm and weighs approximately 94 kg. For assembled boiler weights see Table 4.1.

A 80mm thick insulating blanket encloses the assembled waterway sections and the complete unit is enclosed with pre-coated steel panels finished in orange (paint code RAL 7022) and grey (paint code RAL 2000).

The boilers are provided with a cleaning brush. See Section 5.

An instrument panel is located on the top of the boiler and accommodates a boiler on/off control thermostat (30 - 90°C), limit thermostat (95 - 110 °C) and on/off switch.

The panel is pre-wired to the burner with a flying lead plug and socket connection.

All external electrical connections are made to the instrument panel. An electrical isolator should be provided for each boiler mounted close to the boiler for isolating the incoming supply. See Section 6 for wiring details.

The boiler is fired by a package burner which fits into the firing door which is supported by the front waterway section to which it is attached by hinges on one side and locking nuts on the other. Hinge points are interchangeable allowing for left or right hand door opening

## INSTALLATION

The installation should comply with relevant British Standard Specifications, Codes of Practice and current Building Regulations, together with any special regional requirements of the Local Authorities, Gas Undertaking and Insurance Company. All electrical wiring must comply with I.E.E. Regulations for the Electrical Equipment of Buildings.

The installation of the boiler must be in accordance with the relevant requirements of:-

Health & Safety at Work Act 1974.

CP331:3 Low Pressure Installation Pipes.

BS 6644: 1991 Installation of Gas Fired Boilers.

BS 779: 1989 Cast Iron Boilers for Central Heating & Indirect Hot Water Supply (Rated Output 44 kw and above).

BS 7074: 1989 Part 2 Application, Selection & Installation of Expansion Vessels & Ancillary Equipment for Sealed Water Systems.

PM5 Health & Safety Executive Guidance Note for Automatically Controlled Steam & Hot Water Boilers.

CP341:300-307 Central Heating by Low Pressure Hot Water.

CP342:2 Centralised Hot Water Supply.

Also for gas fired appliances the following British Gas publications:-

Gas Safety (Installation & Use) Regulations 1984.

IM/11 Flues for Commercial and Industrial Gas Fired Boilers and Air Heaters.

IM/2 Purging Procedure for Non-Domestic Installations.

IM/5 Soundness Testing for Non-Domestic Installations.

In the event of a gas booster being necessary refer to IM/16 'Guidance Notes on the Installation of Gas Pipework, Boosters and Compressors in Customers Premises' and the Gas Act 1972, Schedule 4, Paragraph 18.

Manufacturers notes must not be taken in any way as overriding statutory obligations.

In addition for oil fired appliances refer to the following:-

BS 799 Oil Burning Equipment.

## BOILER SITING AND BASE

The boiler should be sited in accordance with BS 6644: 1991 with respect to protecting the boiler from damage, air for combustion and ventilation, discharge of products of combustion, clearances for service and access, temperatures, noise levels, the disposal of boiler water and the effects of flooding of the boiler house or seepage from a roof top boiler house. See section 1 for required boiler clearances for service and access.

A level non-combustible floor capable of supporting the weight of the boiler filled with water, see Table 1.4, together with any additional weight bearing down on the base from connections,burner, etc, must be provided. This will typically be a 50mm concrete plinth with an area equal to that of the plan of the boiler.

Consideration should be given to fitting steel strips beneath the boiler feet for boiler base protection, see Fig.1.2 for base details.

The boiler has a water cooled base and no special insulation is required. When preparing a site, reference should be made to Local Authorities and Building Regulations 1992.

It is not recommended to install commercial boilers in kitchens or living areas.

## ELECTRICAL SUPPLY

A 240V 50Hz AC 3-wire single phase electrical supply is required (three phase is available to special order). The incoming mains supply should be terminated via a double pole isolator to the instrument panel, see Section 6 for wiring details.

### Power Requirements

The electrical supply must be suitably fused by the installer as these are not supplied and this should be suitable for the burner start and run currents. Typical values are given on relevant burner card.

The burner is connected to the boiler instrument panel via a pre-wired lead and 7-pin plug (plus a 4-pin plug for high/low burners).

All on site wiring shall conform to I.E.E. Regulations.

## FUEL SUPPLY

### NATURAL GAS

Where there is an existing primary gas meter, the appropriate gas supplier/undertaking must be consulted to ensure that the service/meter supply capacity is adequate for the proposed installation.

The burner gas connection sizes and minimum and maximum inlet pressures are given on the relevant burner data card provided.

The gas supply pipe should be sized to allow the minimum operating pressure to be available at the burner inlet under full running conditions. The pipe should be sized to prevent excessive pressure drops under full running conditions.

Where gas boosters are required attention is drawn to the Gas Act 1986, Schedule 5, Part II, paragraph 8 (4). Guidance is given in IM/16 "Guidance Notes on the Installation of Gas Pipework, Boosters and Compressors in Customers Premises" published by British Gas Plc. Any gas booster should be electrically interlocked to the burner.

### GAS OIL (CLASS "D")

Each burner is provided with an integral fuel pump. Maximum and minimum recommended oil inlet pressures are 0.69 bar and 0 bar respectively. Where possible it is recommended that the oil fuel supply is maintained under positive pressure to prevent air separation from the oil.

Each burner is provided with a fuel filter for installation local to the burner. Refer to burner manufacturers information pack supplied with each burner for connection details for 1 and 2 pipe operation.

Oil distribution pipes should be sized to maintain positive pressure at the burner inlet where possible.

On oil distribution systems with long pipe runs or when the oil tanks are mounted at a lower level than the burner, consideration should be given to the use of a pressurised ring main. The individual boiler connections to the ring main should incorporate pressure regulating valves to maintain a constant pressure to the burner below the maximum inlet pressure.

## VENTILATION

Safe, efficient and trouble free operation of conventionally flued boilers is vitally dependent on the provision of an adequate supply of fresh air to the room in which the appliance is installed. Account must also be taken of any other fuel burning appliance existing or to be fitted when designing the ventilation and combustion air systems.

The air supplied for boiler house ventilation shall be such that the maximum temperatures within the boiler house shall not exceed 25°C at floor level, 32°C at mid level (1.5m above floor level) and 40°C at ceiling level (or 100mm below ceiling level). Refer to BS 6644: 1991 for further details.

### Air Supply by Natural Ventilation

Ventilation by grilles communicating directly with the outside air is required at both high and low levels.

A minimum free area of the grilles for a single boiler are given in Table 1.3. Where plant is likely to used at or near maximum capacity during the summer months, additional ventilation may be required to prevent excess temperatures.

For boiler houses with multiple boiler installations the minimum ventilation should be sized in accordance with BS 6644 as follows:-

Low Level (inlet) - 540 $cm^2$ plus 4.5 $cm^2$ per kW in excess of 60 kW total rated input.

High Level (outlet) - 270 $cm^2$ plus 2.25 $cm^2$ per kW in excess of 60 kW total rated input.

The above calculated areas are "free" grille areas. Grilles should be designed to minimise high velocity air streams within the boiler house. Typical free area of a standard louvre is approximately 50%.

For boilers installed in a basement boiler house or similar, it is recommended that the inlet air be ducted to low level in ducting not less than equal to the free grille area. Should the inlet duct length be excessive then mechanical ventilation should be used.

Position ventilation grilles to avoid accidental obstruction by blockage or flooding.

Further guidance on ventilation for gas appliances is provided by BS 6644: 1991.

Air Supply by Mechanical Ventilation

The supply of air to a space housing the boiler by mechanical means should be by mechanical inlet with natural or mechanical extraction. Mechanical ventilation with natural inlet must not be used, see Table 1.3 for mechanical inlet ventilation rates for single boiler applications

For multiple boiler installations the ventilation rate is based on a 0.9 $m^3$/sec flow rate per 1000 kW total rated input. The design extract rate should be based on 0.6 $m^3$/sec flow rate per 1000 kW total rated input.

For mechanical ventilation systems, an automatic control should be provided to cut off the supply of fuel to the boiler(s) in the event of failure of air flow in either inlet or extraction fans.

IMPORTANT: **The use of an extractor fan in the same room as the boiler (or in an adjacent room in communication) can, in certain conditions, adversely affect the safe operation of the boiler and therefore must be avoided.**

Tests for spillage of products from the flue system when the extractor fan is running and all doors and windows are shut should be carried out during commissioning. If spillage is detected, the area of permanent ventilation must be increased.

Contaminated Combustion Air

It is essential that fresh and uncontaminated air is introduced to the boiler for combustion.

Air contaminated with chlorine vapours and CFC gases must not be allowed to enter boiler combustion chambers or formation of chlorine gas and hydrochloric acid will create severe and rapid boiler corrosion There is also a danger that toxic chlorine gas will be emitted from the boiler flue.

In areas where such products are used, and these include degreasants, dry cleaning fluids, refrigerants and aerosol propellants, steps must be taken to isolate the boiler from the area by situating it in a separate area where fresh air can be introduced. Care should be taken in positioning extract ducts from contaminated areas in relation to boiler house grilles to ensure that cross contamination will not occur.

FLUE

To ensure safe and satisfactory operation the chimney system, which may be individual or common in the case of modular boiler installations, shall be capable of the complete evacuation of combustion products at all times. The effective height of the chimney terminal(s) above the boiler(s) flue outlet(s) shall ensure sufficient buoyancy to overcome the resistance of the bends, tees and runs of the flue pipe involved and shall terminate in a down draught free zone. The number of bends used should be kept to a minimum and runs of flue pipe less than 45° to the horizontal should be avoided in order to comply with the recommendations made in BS 6644: 1991 and British Gas publication IM/11 "Flues for Commercial and Industrial Gas Fired Boilers and Air Heaters". The third edition of the 1956 Clean Air Act Memorandum and the Building Regulations should be strictly observed and approval obtained where applicable, combustion chamber details are given in Section 1.

The chimney design should avoid the formation of condensate which may be achieved by insulating the flue.

In the case of flue systems which are exposed and have an overall height of 12m or more then consideration should be given to lining the flue.

In the case of brick or similar structures a stainless steel rigid or flexible flue liner (Grade 304/316) may be used backed up with a 50mm minimum thick layer of vermiculite or perlite granules between the inner skin and the chimney body. Cavities around the liner should be sealed at both top and bottom.

A flue system should be no nearer than 50mm to combustible material except where it passes through it enclosed in a sleeve of non-combustible material with an annular (air) space of 25mm.

Flues below 200 mm diameter should have effective protection to prevent ingress of rain, snow, leaves, birds, etc while having minimum resistance to the egress of flue products. For flues 200 mm and above no special flue terminal is required.

The flue termination should be at least 1m above the roof surface and away from any wind pressure areas where the flue products could re-enter the building, eg. near an openable window, mechanical air inlet, etc. Flues should not be terminated in areas where downdraught may occur.

IMPORTANT: **90° square bends must not be used on the flue system, including the boiler flue spigot, a straight length followed by an "easy sweep" or lobster back bend should be used.**

On multiple boiler installations where a common flue header is utilised, boiler connections to the flue header and connection of the flue header to the chimney stack should utilise 135° swept "T" connections.

Drainage points positioned at the bottom of all vertical chimney sections should be provided. Drain pipes should be no less than 25mm I.D. and should be manufactured from acid condensate resistant material such as high temperature polypropelene or stainless steel and positioned so that pipe runs and discharge points are not subject to the effects of frost. Copper pipe is not suitable due to the mildly acidic properties of the condensate. These runs should fall with a gradient of at least 3% and at no point must the drain pipe rise above the level of the drainage point connection.

A draught of 1-4mm.w.g. (0.04-0.16 in.w.g.) should be provided at the flue socket under full load running conditions. The flue system should be designed to evacuate the products of combustion when all boilers are firing. The Local Authority should be consulted with regard to Clean Air Act approval.

## FLUE SIZE CONSIDERATIONS

Nominal flue connection sizes are given in Table 1.1, these sizes refer to the boiler flue connection spigot, detailed dimensions of the connection spigot are given in Section 1.

The actual size of the flue system will depend on individual site applications. Detailed below are general considerations on sizing flue systems. These notes are for guidance only and Potterton Commercial Division cannot accept responsibility for any flue system designs.

### Natural Draught Flue Systems

#### Buoyancy Force

Natural draught flue systems are designed so that the buoyancy force due to the hot flue gases create a draught (suction) that, after overcoming resistance losses, is adequate for the flue draught requirements at the boiler connection spigot given in Table 1.4. Where the flue draught is inadequate to meet the minimum boiler flue draught requirements or excessive horizontal runs of flue have been utilised that may prevent satisfactory start-up of the boiler and flue system, then mechanical assistance should be considered. The buoyancy force is directly proportional to the flue gas temperature of the exhaust gas. The flue system should be designed, and insulated where necessary, to maintain a temperature drop of less than 17°C between the flue gas entry and flue gas exit.

For flue calculation purposes the mean flue gas temperature is equated from flue gas temperature (nett) + ambient temperature - 17°C/2 (this assumes a maximum temperature drop of 17°C across the flue system and represents the mean temperature). The Rapido F200 has a typical nett flue gas temperature of 200°C on high fire. Assuming an ambient temperature of 20°C, a typical mean flue gas temperature for the Rapido F200 boiler would be:-

$$200 + 20 - \frac{17}{2} = 211.5°C$$

NOTE: Nett flue gas temperature = gross flue gas temperature - ambient

The buoyancy force available due to the vertical height of the flue can be calculated as follows:-

$$\Delta P = 353 \times H \left[ \frac{1}{t^1 + 273} - \frac{1}{t^2 + 273} \right]$$

where: $\Delta P$ = Bouyancy force in mm
H = Stack height in m
$t_1$ = Ambient temperature °C
$t_2$ = Mean flue gas temperature °C

For a Rapido F200 boiler $\Delta P$ is typically 0.47 mm per metre stack height measured vertically from the flue connection on the boiler to the chimney exit point.

Flue System Losses

Losses in flue systems are attributed to friction losses owing to flue gas velocities, plus pressure losses owing to fittings and the chimney exit point. Table 3.1 (page 3.5) gives the pressure loss for each metre of flue pipe and the pressure drop for each flue fitting. The flue system pressure drops should be totalled including all horizontal flue runs and the chimney exit loss.

Subtraction of the total loss from the buoyancy available will give the flue draught available at the boiler flue outlet spigot. The flue system should be sized so that the draught available is within the operating range of the boiler as given in Table 1.4.

Horizontal Flue Runs

Horizontal flue runs are not recommended particularly over 2m in length, where these are unavoidable advice should be sought from a flue system specialist.

Cold Start Considerations

When the boiler starts up from cold no flue draught is available due to buoyancy and therefore the burner has to overcome the total resistance loss resulting in a positive pressure at the base of the flue equal to the total resistance loss as calculated from Table 3.1. Following start up of the boiler a flue draught, as calculated above, is available at the boiler flue connection spigot. This start up sequence results in the burner operating with a flue draught that can vary between P1 (positive flue pressure) and P2 (flue draught), eg. for a system with a total resistance of 5mm and a hot flue draught of 3 mm (-3 mm pressure), the burner whould be subject to a variance in flue draught on start up of 8 mm.


For reliable operation of boiler plant and in particular on oil fired appliances, to prevent premature sooting of the boiler the variance in resistance on boiler start up should be kept to a minimum and is not recommended to exceed 4 mm. For example on a long, thin, tall flue system the cold start resistance is high but, due to the height, the flue draught available under full running conditions is also high resulting in an unacceptable variance in flue gas conditions. To reduce the cold start resistance consideration should be given to increasing the flue sizes or soft starting of the boiler plant and flue system by operating boilers on low fire only for a pre-determined period.

To reduce the high flue draught to an acceptable operating level, consideration should be given to the use of a draught stabiliser.

Common Flue Systems

Where multiple boilers are installed on a common flue system then the flue system should be designed to ensure the correct operation of the flue on varying load conditions. In particular that the appliance flue draught is within the operating parameter under full load and partial load conditions. For safe and reliable operation of the boiler plant it is recommended that the variance in flue draught available at each appliance under full and part load operation is designed to a minimum. **(It is recommended that the services of a specialist flue system manufacturer are sought for the design of common flue systems).**

Mechanical Assisted Flue Systems

Where mechanical assisted flue systems are being considered it is recommended that the advice of a flue system specialist is sought to ensure the duty and suitability of the fan. On mechanically assisted flues the boilers must be interlocked to prevent operation unless the fan is operating and air flow is proved.

**THE ABOVE RECOMMENDATIONS ARE FOR GENERAL GUIDANCE ONLY. POTTERTON COMMERCIAL DIVISION CANNOT ACCEPT RESPONSIBILITY FOR FLUE SYSTEM DESIGNS BASED ON THE ABOVE RECOMMENDATIONS.**

## FAN DILUTION SYSTEMS

Potterton Commercial gas fired boilers are suitable for fan dilution systems for low level discharge of products of combustion in accordance with BS 6644.

The fan dilution system should be designed to reduce the $CO_2$ concentration of the vented combustion products to 1% (volumetric) or less.

The discharge velocity from the fan dilution system should be a minimum of 7.5 m/sec and should be at least 2m above ground level for systems up to 1MW input.

The outlet grille should diffuse the products of combustion upwards and be located so that recirculation of combustion products is avoided, in particular the positioning of fan dilution systems in totally enclosed wells or courtyards should be avoided. The inlet and outlet grilles must be located on the same face of the building.

TABLE 3.1 - Flue Losses

| Boiler Size | 180mm I.D. Flue | | | |
|---|---|---|---|---|
| | Flue Exit Losses mm.w.g | 45° Bend Loss mm.w.g | Loss/m Straight Flue mm.w.g | Flue Gas Velocity m/sec |
| 5/95 kw | 0.2794 | 0.0559 | 0.0456 | 2.719 |
| 6/115 kw | 0.4094 | 0.0819 | 0.0668 | 3.312 |
| 7/135 kw | 0.5642 | 0.1128 | 0.0921 | 3.887 |
| 8/160 kw | 0.7925 | 0.1585 | 0.1293 | 4.595 |

| Boiler Size | 200 mm I.D. Flue | | | |
|---|---|---|---|---|
| | Flue Exit Losses mm.w.g | 45° Bend Loss mm.w.g | Loss/m Straight Flue mm.w.g | Flue Gas Velocity m/sec |
| 5/95 kw | 0.1651 | 0.033 | 0.0242 | 2.0826 |
| 6/115 kw | 0.2419 | 0.0484 | 0.0355 | 2.5211 |
| 7/135 kw | 0.3334 | 0.0667 | 0.0489 | 2.9595 |
| 8/160 kw | 0.4683 | 0.0937 | 0.0686 | 3.5076 |
| 9/185 kw | 0.6261 | 0.1257 | 0.0918 | 4.0557 |

| Boiler Size | 225 mm I.D. Flue | | | |
|---|---|---|---|---|
| | Flue Exit Losses mm.w.g | 45° Bend Loss mm.w.g | Loss/m Straight Flue mm.w.g | Flue Gas Velocity m/sec |
| 5/95 kw | 0.1038 | 0.0208 | 0.0118 | 1.6542 |
| 6/115 kw | 0.1521 | 0.0304 | 0.0173 | 2.0025 |
| 7/135 kw | 0.2096 | 0.0419 | 0.0238 | 2.3508 |
| 8/160 kw | 0.2945 | 0.0589 | 0.0334 | 2.7861 |
| 9/185 kw | 0.3937 | 0.0787 | 0.0447 | 3.2214 |
| 10/215kw | 0.5317 | 0.1063 | 0.0604 | 3.7438 |
| 11/245kw | 0.6905 | 0.1381 | 0.0784 | 4.2662 |
| 12/280kw | 0.9019 | 0.1804 | 0.1024 | 4.8757 |

| Boiler Size | 250 mm I.D. Flue | | | |
|---|---|---|---|---|
| | Flue Exit Losses mm.w.g | 45° Bend Loss mm.w.g | Loss/m Straight Flue mm.w.g | Flue Gas Velocity m/sec |
| 5/95 kw | 0.0683 | 0.0137 | 0.0072 | 1.34 |
| 6/115 kw | 0.1001 | 0.02 | 0.0105 | 1.6221 |
| 7/135 kw | 0.138 | 0.0276 | 0.0145 | 1.9042 |
| 8/160 kw | 0.1938 | 0.0388 | 0.0203 | 2.2569 |
| 9/185 kw | 0.2591 | 0.0518 | 0.0272 | 2.6095 |
| 10/215kw | 0.3499 | 0.07 | 0.0369 | 3.0326 |
| 11/245kw | 0.4544 | 0.0909 | 0.0477 | 3.4558 |
| 12/280kw | 0.5935 | 0.1187 | 0.0622 | 3.9495 |

EXAMPLE

A Rapido F200 7 section boiler connected to a 200 mm diameter flue 6m high, from the Tables above the flue loss is:-

| | | |
|---|---|---|
| Flue Exit Loss | | 0.3334 |
| 45° Bend Loss x 2 | + | 0.0667 x 2 |
| Straight Flue Loss | + | 0.0489 x 6 |
| TOTAL LOSS P1 | = | 0.7608 mm |

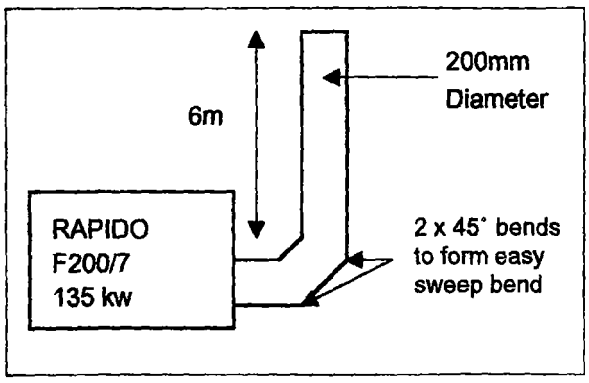
The buoyancy available is 6 x 0.47 mm = 2.82mm

Subtracting the loss from the buoyancy force;

P2 = ΔP - P1
= 2.82 - 0.7608
= 2.0592 mm draught

Thus P2 is an acceptable draught.

NOTE: P2 = 2.0592 mm draught
= -2.0592 mm pressure at boiler flue exit



Difference between cold and hot running;

0.7608 + 2.0592 mm = 2.82 mm

This is less than 4 mm and should give reliable cold start operation.

Fan dilution systems must be interlocked to prevent operation of the boilers unless adequate air flow is proved.

In accordance with BS 6644: 1991 the position of the outlet grille should comply with the following:-

1. The outlet grille shall not be less than 2 x 'U'm from any fan assisted intake, where 'U' is the uncorrected chimney height in metres, as defined in the Clean Air Act and is calculated from:-

   $$'U' = 1.3\ Q^{0.6}$$

   (where 'Q' is the heat input in MW)

2. The outlet shall not be within 2 x 'U' of an openable window or 6 x 'U' from an adjacent building.

3. The fan dilution system should be designed to provide a flue draught at each boiler of 1-2 mm.w.g.

Typical duct sizes, fan volumes and values of 'U' are given in Table 3.2.

It is important that adequate ventilation is provided into the boiler house especially as a proportion of the dilution air is drawn through the draught diverters on atmospheric appliances. Ventilation requirements must take this into account and may require larger louvres.

Table 3.2 - Typical Duct Sizes & Fan Volumes

| Boiler Size<br>Sections/kw | * Flue Volume @ 1% $CO_2$<br>$m^3$/sec | Duct Size (Diameter)<br>mm | Velocity<br>$m^3$/sec | ** "U"<br>m |
|---|---|---|---|---|
| 5 / 95 | 0.3047 | 250 | 6.207 | 0.352 |
| 6 / 115 | 0.3688 | 250 | 7.514 | 0.394 |
| 7 / 135 | 0.433 | 300 | 6.125 | 0.434 |
| 8 / 160 | 0.5131 | 350 | 7.259 | 0.481 |
| 9 / 185 | 0.5933 | 350 | 6.167 | 0.524 |
| 10 / 215 | 0.6895 | 350 | 7.167 | 0.574 |
| 11 / 245 | 0.7858 | 400 | 6.253 | 0.621 |
| 12 / 280 | 0.8980 | 400 | 7.146 | 0.672 |

* Flue gas volume @ 1013.25 mbar and 15°C. Typical diluted flue gas temperature is 14°C above ambient.

** Uncorrected chimney height from "Clean Air Act".

## WATER CIRCULATION SYSTEMS

The water circulation systems should be indirect and installed in accordance with the relevant parts of British Standards Codes of Practice CP342 and BS 6644: 1991.

The maximum and minimum design temperature differential across the boiler should be 20°C and 10°C and the boiler should be prevented from operating with flow rates giving a temperature difference across the boiler greater than 25°C based on the full boiler output. Boilers operating under constant flow conditions can be more accurately controlled and are not subject to excessive temperature stresses.

On systems with variable flow rates due to flow reducing devices, ie. TRVs, zone valves, etc, or where the minimum heat demand, ie. summer domestic hot water load, does not achieve the minimum boiler flow rate then consideration shall be given to incorporating a primary loop system. For further information see Potterton Publication Technical Bulletin No.1 Issue 2.

The flow rate and hydraulic resistance for an 11°C boiler temperature rise are given in Table 1.3, alternatively, flow rates through boilers can be calculated from:-

$$\text{FLOW (lit/sec)} = \frac{\text{kW (Boiler Output)}}{4.2 \times \text{Boiler Temperature Rise °C}}$$

The minimum design flow rate relates to a 20°C boiler temperature rise and should not be misinterpreted as the system design temperature drop particularly where systems have been designed with stand-by capacity.

The hydraulic resistance of the boiler is proportional for flow rates equating to a boiler temperature of between 10°C and 20°C. The hydraulic resistance at 11°C is given in Table 1.3, hydraulic resistance at alternative flow rates can be calculated from:-

$$R_2 = R_1 \times \left(\frac{T_1}{T_2}\right)^2$$

where:- $R_1$ = Boiler Resistance at 11°C
$R_2$ = Boiler Resistance at $T_2$°C
$T_1$ = 11°C
$T_2$ = Alternative Boiler Temperature Rise

The maximum and minimum design pressures are 4 bar (136 ft.w.g.) and 0.3 bar (10 ft.w.g.). Care is needed in siting the pump relative to the cold feed and open vent connections. (NOTE: The above are not static pressures).

For further advice on water circulation systems see Potterton publication Technical Bulletin No.1, Issue 2.

### Boiler Condensation

If the system water content is large, and the start up period before which the water return temperature attains the minimum operating temperature exceeds 20 minutes then consideration should be given to the fitting of a shunt pump or by-pass valve controlled by a pipe thermostat to raise the return water temperature to prevent formation of condensation within the boiler and flue system. It should be noted that shunt pumps should not be used to boost low water flow rates. See Potterton Publicaton Technical Bulletin No.1 Issue 2 for further information.

## BOILER PROTECTION

The provision of pump overrun by a time delay relay or a thermostat situated in the flow pipe close to the boiler is essential to remove residual heat from the boiler, see Fig.6.2, Section 6.

The boiler and system should be protected by suitable frost thermostats.

Unions and isolating valves should be fitted to the flow and return manifolds so that the boiler can be isolated from the system if the need arises.

### Strainers

Migrating sludge and debris will have a detrimental effect on the life and operation of the boiler and this must not occur. If all debris cannot be removed, strainers and/or other devices should be fitted. Consideration should be given to water treatment and inhibitors to maintain water quality. Migration of system debris or scaling of the waterways will impair the life expectancy of the boiler sections.

### System Filling

When filling the boiler system with water care should be taken that the water does not backwash system debris into the boiler via the flow connection by-passing any strainers that may have been fitted.

It is essential that all systems are thoroughly flushed through with a flushing agent to remove all debris and scale prior to fitting the boilers. Cleaning systems with acidic descaling agents is not generally recommended as, if incorrectly used, the scale and deposits may continue to break up after the system has been flushed and the boiler installed.

Where the boiler is being installed as a replacement for an existing boiler it is recommended that where possible sections of the removed boiler are cut open and internally examined to determine the presence of scale or system debris to foresee and rectify any potential problems for the new boilers.

The fitting of strainers is strongly recommended.

The system should be checked to ensure that there is no raw water make-up. It is strongly recommended that a suitable water meter is fitted to the cold feed supply of the boiler system to monitor for unregulated water make-up.

The quality of the water in both the heating system and the water supply should be checked to ensure that the hardness (100 ppm) and salinity (TDS) are not excessive. In the case of systems containing aluminium components the pH should be monitored to prevent corrosion.

On systems where unregulated raw water make-up or system debris is known to exist but remedial action cannot be implemented then consideration should be given to installing a heat exchanger to isolate the boiler from the water system to protect the boiler otherwise premature failure may occur.

A specialist water treatment company should be consulted if in doubt.

## OPEN VENTED SYSTEMS

### Maximum Operating Temperature

The maximum operating temperature of a system is dependent on the operating pressure. The minimum design operating pressure (not static) at any point of a system should be sufficient to prevent boiling within any part of the heating system and the boiler control thermostat should be set to provide a 17°C safety margin below the saturated steam absolute pressure given in Table 3.3 corresponding to the minimum design operating pressure.

## COLD FEED SUPPLY

A cold feed pipe should be provided and taken directly from a feed and expansion cistern which shall not supply water for any other purpose. It shall not be smaller than as specified in Table 1.3 and shall be connected to the boiler or boiler side of any valve on the return pipe.

The cold feed pipe shall be situated within the building and shall be insulated along those parts of it's length where freezing conditions or condensation may be expected to occur.

For multiple and modular boiler installations the cold feed connection shall be either to the common return pipe upstream of the individual boiler isolating valves or to each individual boiler return pipe downstream of the isolating valve.

The cold feed to a multiple or modular boiler installation shall be provided with a lockable isolating valve and sized in accordance withTable 3.5.

**TABLE 3.3 - Saturated Steam Pressures**

| Temperature °C | 110 | 120 | 130 | 140 | 160 |
|---|---|---|---|---|---|
| Saturated Steam Absolute Pressure * | 1.43 Bar | 1.98 Bar | 2.7 Bar | 3.61 Bar | 6.18 Bar |

* **NOTE: These are absolute pressures not gauge. For gauge pressure 1 bar must be subtracted.**

EXAMPLE: A boiler system with a maximum operating temperature of 93°C and allowing for a safety margin of 17°C the temperature would be 93°C + 17°C = 110°C. From above the minimum gauge pressure within the system should be 1.43 bar - 1 bar = 0.43 bar.

## CISTERN SIZING

The cistern should be sized to accommodate the water expansion in the system from 0°C to the maximum operating temperature. Where the volume of the system is not known then it can be estimated at 12 litres per kw of design load.

For systems with a maximum operating temperatures of upto 100°C the water can expand by 4% (for systems up to 140°C the expansion is 8%). Therefore assuming a system loading of 1000 kw, the approximate system volume is 1000 x 12 litres = 12000 litres and the expansion of water in a system with a maximum design temperature of 100°C is 4% x 12000 = 480 litres. In this instance the cistern should have an expansion capacity between the cold fill level and the overflow pipe of 480 litres (minimum), (overflow should be 80mm above the highest expansion level).

**IMPORTANT: The water level in the cistern or expansion tank should be minimal on cold charge to allow expansion without discharge from the overflow between cold and hot operating conditions.**

TABLE 3.4

| Open Vent Pipe Sizes from BS 6644: 1991 | | |
|---|---|---|
| Rated Output | Minimum Bore | Nominal Size (DN[1]) |
| kw | mm | mm |
| 45 - 60 | 25 | 25 |
| 61 - 150 | 32 | 32 |
| 151 - 300 | 38 | 40 |
| 301 - 600 | 50 | 50 |
| [1] Steel pipe sizes complying with medium or heavy quality of BS 1387 | | |
| For rated outputs above 600 kW the minimum cross sectional area of the venting pipe A (in $mm^2$) shall be determined as:- 3.5 x QR where QR is the rated output in kW | | |

Multiple or modular boiler installations shall have an open vent pipe or pipes of the size stated in Table 3.4 as appropriate. Individual open vent pipes shall be either routed independently to the venting point or be connected to a common open vent pipe of appropriate size for the total rated heat input of the installation (see Table 1.3 for individual boiler open vent sizes). The open vent pipe shall rise continuously by the shortest practical route to the venting point. The open vent pipe shall discharge into the feed and expansion cistern above the overflow level and for a single boiler installation the pipe shall not be fitted with valves (apart from a 3-way type such that when closed the boiler is open to atmosphere through the third port and shall incorporate means of indicating the position of the open port. The nominal bore of the valve shall be not less than that of the open vent pipe in which it is fitted). Nor shall there be any obstruction which could prevent safe venting of the boiler. The vent pipe shall be insulated along those parts of it's length where freezing may be expected and shall be situated as far as is practicable inside the building to reduce freezing problems.

TABLE 3.5

| Cold Feed Pipe Sizes from BS 6644: 1991 | | |
|---|---|---|
| Rated Output | Minimum Bore | Nominal Size (DN[1]) |
| kw | mm | mm |
| Below 60 | 19 | 20 |
| 60 - 150 | 25 | 25 |
| 150 - 300 | 32 | 32 |
| 300 - 600 | 38 | 40 |
| Over 600 | 50 | 50 |
| [1] Steel pipe sizes complying with medium or heavy quality of BS 1387 | | |

For further details see BS 6644: 1991.

Boiler Safety Valves

Each boiler, whether in single or multiple installations, shall be fitted with an individual safety valve complying with BS 6759 Part 1.

In the case of modular boiler installations each bank of boilers shall be provided with a common safety valve sized in accordance Table 3.6 to suit the total rated output of the boiler bank. Any boiler in a modular installation that can be isolated from the water supply shall be fitted with an individual safety valve.

The safety valve shall be sized to suit the total rated output of the boiler and shall be located between the boiler and the water isolating valve. See Table 3.6 for safety valve sizes on open vented systems. Refer to notes on sealed systems for safety valve sizes on sealed systems.

TABLE 3.6

| Safety Valve sizes to BS 6644 1991 (Open Vented Systems Only) | | |
|---|---|---|
| Rated Output | Nominal Size | Minimum Area (A) |
| kw | mm | $mm^2$ |
| 45 - 264 | 19 | 284 |
| 265 - 352 | 25 | 491 |
| 353 - 440 | 32 | 802 |
| 441 - 528 | 40 | 1135 |
| 529 - 732 | 50 | 2050 |
| 733 - 1142 | 65 | 3210 |
| 1142 - 1640 | 80 | 4540 |

Alternatively:-
'A' can be calculated from:- $A = \frac{R}{0.659 \times P1 \times Kdr}$

where R = Boiler Output in kW
P1 = 7.6
Kdr = The derated coefficient of discharge available from the safety valve manufacturer.
A = Flow Area in $mm^2$

The safety valves shall be fitted in the flow pipework between the boiler and the next valve in line and the safety valves shall not be more than 1m from the boiler measured along the flow pipe.

Boiler safety valves shall be of the direct spring loaded type or dead weight type and the maximum setting shall not exceed the following equation:-

MAXIMUM VALVE = 0.1 + MAX BOILER DESIGN
SETTING (IN BAR) PRESSURE (IN BAR)

NB: 1 Bar = 33.5 ft head or 14.5 lb/in$^2$

On systems containing components with lower maximum operating pressures than the boiler, the rating of the safety valve should be reduced accordingly or additional safety valves provided to protect these items.

Spring loaded valves are recommended where the static head exceeds 2.5 bar and/or where the boiler may be affected by external vibrations.

The size of the connecting pipe from the safety valve shall terminate in a visible position where discharge will not result in hazard to the user or plant. The size of the discharge pipe shall be not less than the nominal size of the valve outlet.

For further guidance on safety valve sizes see BS 6644: 1991.

## SEALED SYSTEMS

### General

Potterton Commercial boilers are suitable for use on sealed systems designed in accordance with BS 6644: 1991 and BS 6880 Part 2. In addition, reference should be made to the Health & Safety Executive guidance note PM5 "Automatically Controlled Steam & Hot Water Boilers".

### Expansion Vessels

The sealed system should incorporate an expansion vessel complying with BS 4814 sized to accommodate the volumetric hydraulic expansion of the heating system between 0°C and the temperature setting of the overheat thermostat without exceeding the maximum design pressure of the boiler. The position of the expansion vessel(s) should be such that the manufacturers maximum operating temperature is not exceeded and the provision of an anti gravity tank may be required for systems operating above 100°C. In addition, the position of the expansion vessel(s) should prevent inadvertant isolation of the boiler system from the the expansion vessel, where isolating devices, ie, valves, etc, are incorporated between the boiler(s) and the expansion vessel these should be capable of being locked in the open position during normal operation. See BS 6880 Part 2 for further details.

### System Filling & Water Make-Up

The sealed system should incorporate suitable means for initial filling, ie. pressure boost pump, which shall comply with the local water authority bye laws and the cold feed supply to the system should incorporate a non-return valve and an isolating valve with the capability of being locked in the open position during normal operation. An automatic air vent should be provided between the isolating valve and the non-return valve and provision should be made within the sealed system to allow automatic replacement of water lost from the system. This may include a pressure boostpump and associated controls or an independent primary feed cistern. However, it is recommended that a suitable device such as a water meter is installed to detect unregulated raw water make-up. See BS 6644: 1991 for further details on provision for filling and make-up on sealed systems.

### Maximum Operating Temperature

The maximum operating temperature of a sealed system is dependent on the operating pressure. The minimum design operating pressure (not static) at any point of a sealed system should be sufficient to prevent boiling within the any part of the heating system and the boiler control thermostat should be set to provide a 17°C safety margin below the absolute saturated steam pressure given in Table 3.3 corresponding to the minimum design operating pressure.

The boiler overheat thermostat should provide a safety margin of at least 6°C below the absolute saturated steam pressure.

### Minimum Operating Pressure

The minimum operating pressure (not static) or cold fill pressure should be sufficient to maintain a positive pressure within the heating system to prevent boiling as detailed above. Care should be taken in positioning of the circulating pump(s) relative to the expansion vessel (zero or null point) particularly on systems where a high hydraulic resistance is present to ensure that operation of the pump does not cause a reduction in operating pressure at any point in the system below the minimum operating pressure.

A low water pressure cut off device shall be incorporated to prevent operation of the boiler plant on low water pressure. The pressure cut off device should be set at a pressure to prevent boiling in any part of the heating system while operating at the design working temperature.

Consideration should be given to the positioning of safety valves, low level cut off devices and automatic air vents relative to the minimum operating pressure to ensure that the influence of pump operation does not cause or prevent operation of these devices.

Maximum Operating Pressure

The boiler plant should be prevented from operating when the system pressure rises to within 0.35 bar of the safety valve setting.

Safety Valves

The safety valve on a sealed system should be sized in accordance with the following equation.

$$A = \frac{R}{2.5 \times Kdr}$$

where R = Boiler output in kW
Kdr = the derated coefficient of discharge available from the safety valve manufacturer.
A = flow area in mm

## NOISE LEVEL

Detailed figures are available on request for all types of burner specified, but as a guide only, the noise level is N65 for all burners under typical operating conditions. Caution should be exercised in siting the boiler in kitchen or living areas.

## BOILER ERECTION

Before commencing erection ensure that all parts shown on the packing list are on site.

## ERECTION PROCEDURE

**WARNING: THE SECTIONS ARE NOT SELF SUPPORTING UNTIL SEVERAL SECTIONS HAVE BEEN ASSEMBLED TOGETHER. THEREFORE WHEN STARTING TO BUILD THE BOILER THE REAR SECTION AND ADJACENT INTERMEDIATE SECTIONS SHOULD BE ADEQUATELY SUPPORTED TO PREVENT INJURY OR DAMAGE.**

### Waterways

1. Stand the rear section upright and prop it up with a block of wood with the two water connection flanges facing to the rear.

2. Thoroughly clean the nipples and the nipple sockets. Remove any rough burrs with a file if necessary taking care not to damage the nipple bearing faces. Wipe both nipples and nipple sockets clean and apply the nipple compound (Bosswhite) to the outside face of each nipple and insert into the top and bottom nipple sockets on the rear section.

3. Apply a bead of sealing adhesive (Reda) in the outer groove around the section and apply the ceramic rope into the grooves, see Fig.4.1.

4. Clean the nipple sockets on both faces of the first intermediate section as described in 2 above.

5. Position the intermediate section adjacent ot the rear section and engage the upper nipple socket on to the nipple already fitted to the rear section then gently engage the lower socket over the lower nipple (a flat bar under the section may have to be used to engage the lower nipple in the socket). Ensure sections are installed the correct way round, see Fig 4.1.

   The nipples should fit sufficiently into the nipple sockets to support the intermediate section.

6. Insert the assembly rods through each of the top and bottom nipple sockets and fit nuts and clamps where they protrude at the rear of the boiler. The rear projection should be no more than 150mm (6").

7. Fit the clamp and nuts to the other end of the assembly rod and screw down until they tighten against the clamp which in turn tightens against the intermediate section, see Fig 4.2.

   The final tightening to pull the two sections together must be done evenly so that uniform pressure is applied to the nipples and teh section faces remain parallel. Tighten sufficiently so that there is a metal to metal contact between the sections. This can be achieved without straining on the assembly tools.

**WARNING: WHEN TIGHTENING THE ASSEMBLY RODS DO NOT STAND DIRECTLY IN FRONT OF THE NUT OR AT THE REAR OF THE BOILER. THIS IS ESPECIALLY IMPORTANT WHEN TIGHTENING THE FINAL SECTIONS.**

8. Smooth over any of the adhesive sealing compound that has squeezed out from between the sections. This will have to be repeated after tightening of each section in turn. It is essential that there are no leaks from the flue gas side.

9. Check that the two sections are upright and that the rear section is aligned with the flow/return pipework and flue system where applicable.

10. Unscrew the assembly nuts and withdraw the rods from the top and bottom nipple sockets.

11. Prepare the next intermediate section as before and then position against the already assembled sections and locate as previously described.

**NOTE: ENSURE THAT THE NIPPLES AND SOCKETS ARE CLEAR OF BURRS AND ARE ADEQUATELY COATED WITH NIPPLE COMPOUND (BOSSWHITE). SIMILARLY IT IS ESSENTIAL TO CORRECTLY FIT THE ROPE FLUE GAS SEAL, INCORRECT FITTING WILL MEAN A STRIP DOWN AND REBUILD.**

12. Always erect and tighten one section at a time taking care to tighten evenly. Pulling up more than one section is NOT recommended.

13. The front section is fitted in the same way as the intermediate sections.

14. When all sections have been erected and the assembly rods have been withdrawn, the tie bars are fitted. These are located one at the top and one at the bottom of the boiler section block next to the nipple ports.

Fig 4.1 - Section Sealing

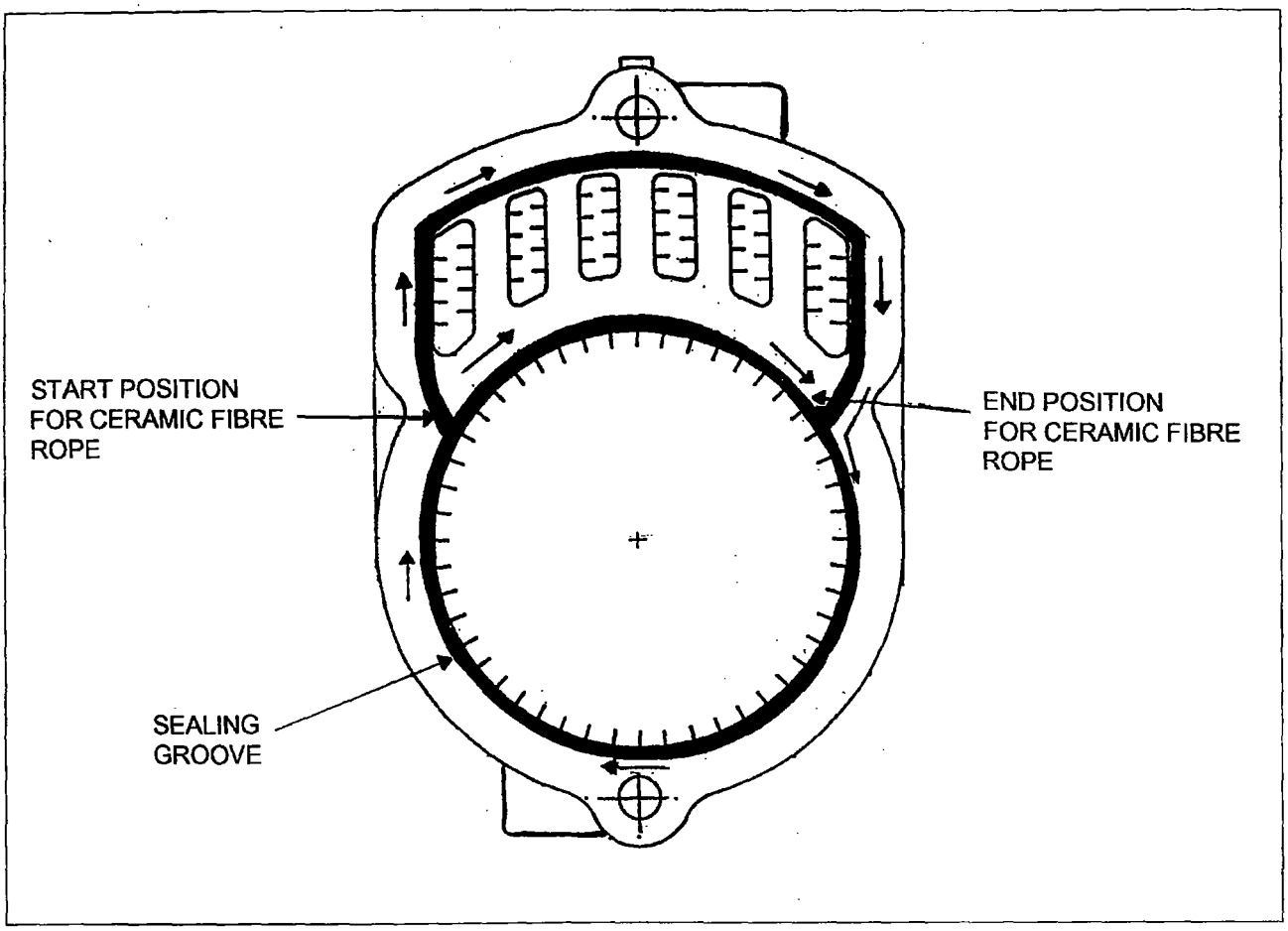
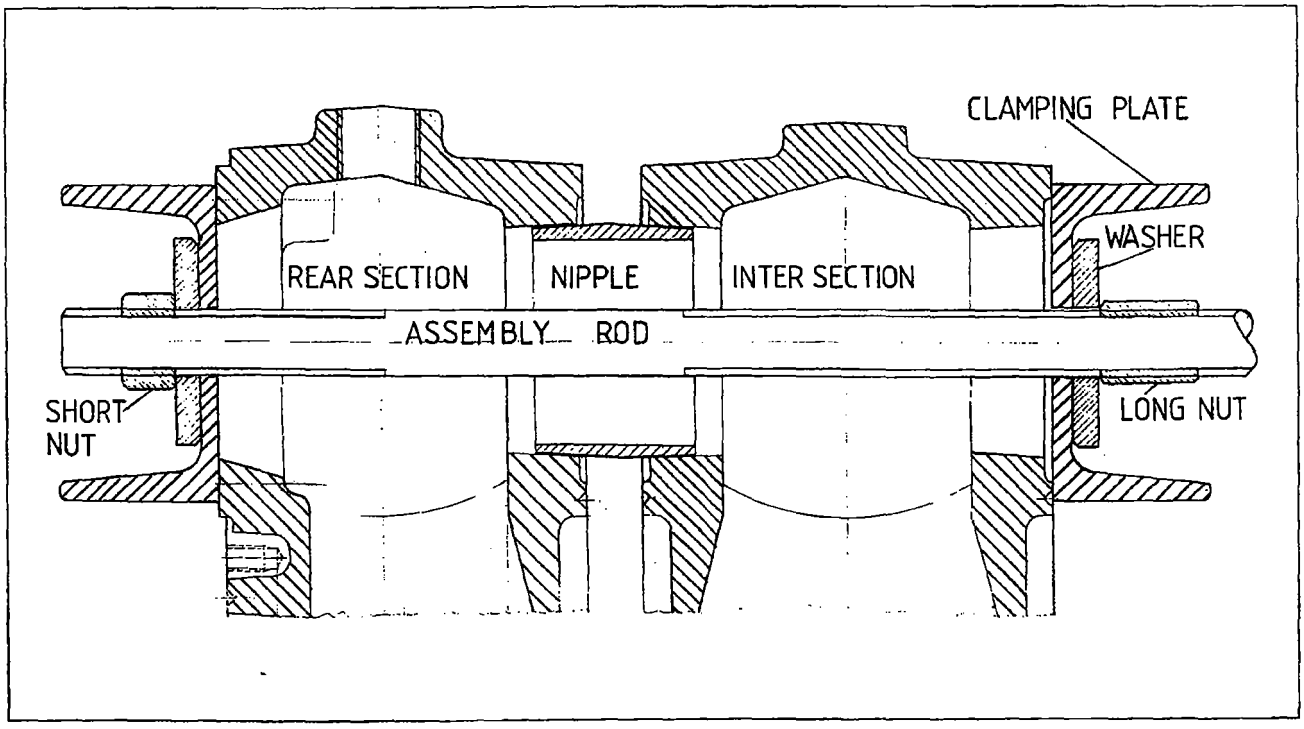



Fig 4.2 - Assembly Rods



Pass the rods through the lugs on the front and rear sections and secure with the nuts and washers provided. Tightening of the rods is usually carried out from the front of the boiler once the two nuts at the rear have been tightened.

CAUTION: IT IS ESSENTIAL TO TIGHTEN THE RODS PROGRESSIVELY IN SEQUENCE TO ENSURE EVEN TIGHTENING. A TORQUE WRENCH, ALTHOUGH NOT ESSENTIAL, WILL ENSURE EVEN TIGHTENING OT THE RODS AND A MAXIMUM TORQUE OF 80 Nm (60 lb/ft) SHOULD BE APPLIED. DO NOT STRAIN OR OVERTIGHTEN.

15. When the boiler has been erected and the tie rods fitted check to ensure that all sections are sealed and the boiler is level. Position a spirit level on the rods to check this.

## BOILER DISMANTLING

IMPORTANT: THE BOILER SECTIONS ARE NOT SELF SUPPORTING PARTICULARLY WHEN THERE ARE ONLY TWO OR THREE SECTIONS LEFT IN SITU. THEREFORE DURING DISMANTLING THE SECTIONS SHOULD BE SUPPORTED TO PREVENT INJURY TO OPERATIVES.

Dismantling of the boiler is a reversal of the erection procedure as detailed on page 4.1. Care should be taken during dismantling due to the weight of the sections and should be carried out by two operators one section at a time.

## BOILER DOOR

The door can be fitted on the left or right hand side as necessary.

1. On the front section there are four lugs provided for the door to be fixed to.

2. Take two hinge pins and thread an M12 nut and washer onto the door hinge thread and then pass it through the lugs. From the front of the boiler fit the door onto the hinges with the fixing pins provided.

3. Take the M12 pins and place these through the lugs with the thread protruding through the front section. Secure using M12 nuts and washers.

4. Close the door and tighten the nuts and washers until the door is sealed.

## SPARGE PIPE

1. Fit four M12 x 35mm (1.5") studs into the four tapped holes adjacent to the flow and return tappings at the top and bottom of he rear section.

2. Insert the sparge pipe into the return tapping taking care that the holes in the sparge pipe run along the side of the pipe (not along the top or bottom). The gasket supplied should be fitted between the rear section and the sparge pipe flange.

3. Fit the screwed counrteflange and gasket using the M12 nuts and washers provided.

4. Fit the counterflange and gasket on the flow connection in the same way.

5. On larger size boilers the sparge pipe is supplied in either two or three pieces which should be connected using the pins provided, see page 1.5.

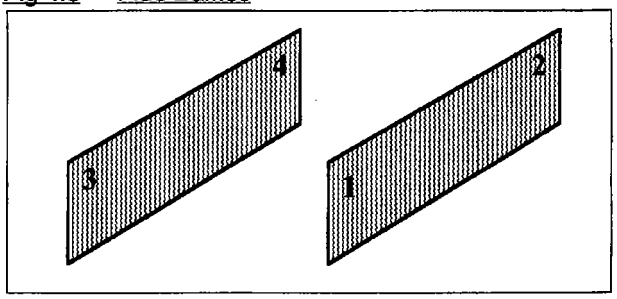
## BAFFLE PLATES

Baffles are only fitted on the 5, 6 and 7 section boilers.

1. Insert the flue baffles according to Fig 4.3 below with the numbers on the baffles corresponding to those on the sections, ie. 1 to 1, 3 to 3, etc.

2. The number on the baffle should be placed towards the front of the boiler.

Fig 4.3 - Flue Baffles




## FITTING THE CASING

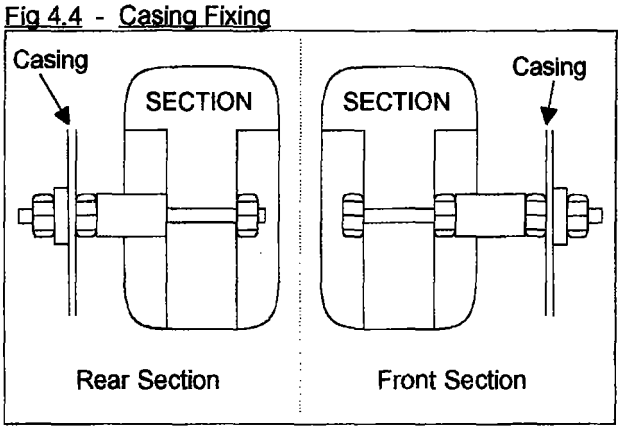
1. Fit insulation jacket around sections.

2. Fit the four M8 x 60mm bolts into the holes provided in the casing support bracket on the front section, top and bottom.

Insert bolt through hole from the back and then fit the spacer provided and tighten nut up to spacer. Repeat for the other support brackets.

3. On the rear section fit the four M8 x 60mm bolts into the holes provided in the casing support brackets. Insert bolt through hole from back then using nut tighten up the section. Wind the second nut onto the thread leaving about one nut width thread protruding to allow fixing of casing, see Fig 4.4.

Fig 4.4 - Casing Fixing




4. Take top casing side support fixing panel and fit with self tapping screws provided into the third hole from the front. Repeat for rear side casing panel. Repeat on other side of boiler.

5. Fit rear casing locating pins into the return edge of the side panels.

6. Place the lower casing side support channel on the floor in the approximate fixing position. Take the front side panel and locate into channel matching the fixing holes and secure with self tapping screws provided. Repeat for rear side casing panel. Repeat on other side of boiler.

7. Take side casing and locate front fixing lip with slots provided onto the M8 bolt as previously positioned in 2 above. Repeat on the rear edge. Repeat on other side of boiler.

8. Take front casing top panel (this can be identified by a 70mm hole in the top). Take boiler control panel and fit to top casing panel using the M5 studs provided into the control panel fixing holes. Pass the caplillaries through the centre hole. Place the control panel console on the bottom of the control panel passing through the stud locating holes provided and then thread remainder of stud through top panel and secure with the wing nuts provided. See Fig 4.5.

9. Take top front casing panel and fix with self tapping screws provided into the fixing holes in the side panel.

10. Take the rear section insulation and fit it around the rear section with the aluminium foil towards the boiler sections.

11. Take top rear casing and fit it as in paragraph 9 above.

12. Take rear section casing (aluminium plate) and slide it upwards behind the top casing and locate bottom of panel onto locating pins (see paragraph 5) then fix using self tapping screws into top rear casing panel.

13. Fit side panels (from packs 2 and 3 - one of each). take the larger panel (width) and position over side casing support rail and lower into bottom channel. Repeat this process for the smaller panel. See Fig 4.6. Repeat on other side of boiler.

14. Fit top casing support bracket between side casing support brackets with the return edge towards the back of the boiler and secure with self tapping screws.

15. Place the two top casing panels in position.

16. Take front base tray and align with fixing holes and secure with self tapping screws provided. There are two levelling screws at the front of the base tray.

17. Place top front insulation around the top of boiler sections and take front panel and position by placing on top of panel onto fixing lip provided.

18. Fit lower blanking plate which is secured by a magnetic fixing on the base tray.

## BURNER

1. Fit the burner mounting plate to the hinged boiler front door using the M8 nuts provided. The burner mounting plate fitting will be dependent on the burner used.

2. Plug the burner electrical connection into the socket at the rear of the boiler control panel.

Fig 4.5 - Control Panel Fixing

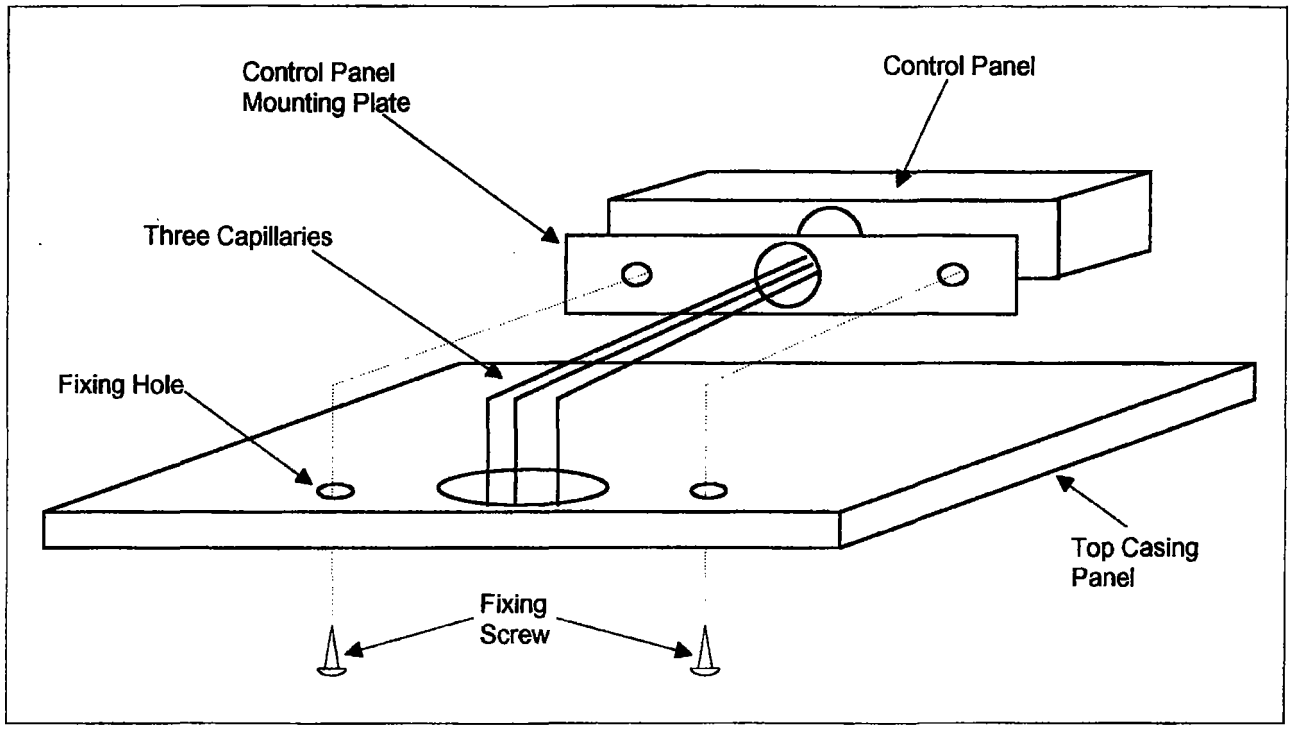
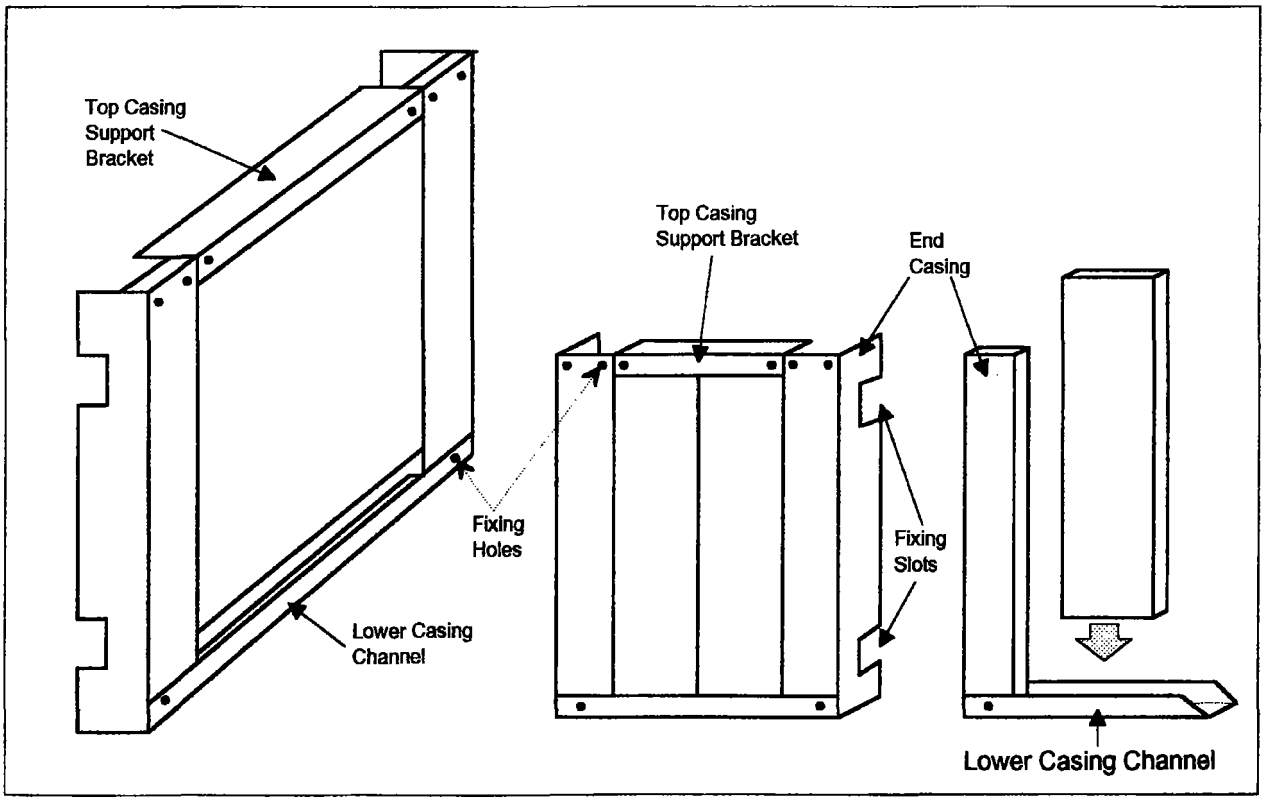



Fig 4.6 - Side Casing Fixing



## BOILER MAINTENANCE

It is essential for efficient and trouble free operation that the boiler plant is regularly maintained. This must be carried out by qualified and experienced engineers and in the case of gas fired appliances attention is drawn to the mandatory requirement of CORGI (Confederation of Registered Gas Installers) registration of personnel undertaking work on these appliances. This facility is available from Potterton Commercial Division, details are available from regional offices listed on the back page back of this manual.

Boilers should be serviced and re-commissioned as a minimum on an annual basis.

It is strongly advised that a maintenance contract be entered into with Potterton Commercial Division to ensure that the boiler/burner unit is correctly and properly maintained.

**WARNING: Isolate the electrical and fuel supplies before attempting any maintenance work.**

### Cleaning of Flue Surfaces

The boilers are supplied with a flueway brush for routine cleaning procedures. Boilers may require periodic cleaning with specialist mechanical equipment dependent on boiler conditions, fuel type, etc.

Cleaning of the boiler requires opening of the door, removal of the boiler baffles, these should be removed and re-installed as detailed in Section 4.

Frequency of boiler cleaning varies and is dependent on site conditions, fuel type, heat load, design of controls and running conditions.

For the maximum efficiency and economy in running it is essential that the combustion chamber and flueway surfaces should be kept clean and free from deposits.

A layer of deposits 1/16" thick will reduce the heat transfer through the tube wall by up to 10%.

Not only does this waste fuel but the higher flue gas temperatures that result will increase the thermal stress within the boiler and may lead to joint leakage or in extreme cases section failure.

### Natural Gas, Manufactured Gas & LPG Fired Boilers

We recommend brushing out of the combustion chamber and flueways and the removal of the rear clean out cover to check for deposits in the flue box twice a year.

### Class 'D' Fuel Oil

The boilers should be brushed out thoroughly at least bi-monthly for 35 second and Class 2, 28 second during the heating season but more frequent attention may be necessary dependent on the operating conditions to prevent the formation of hard adherent scale on the flueway surfaces.

It is essential to ensure that cleaning is carried out throughout the full length of the boiler passes and that the rear clean out cover is taken off to allow for the removal of deposits brushed through into the flue box.

Should a heavy or tough adherent deposit become formed, which is too hard for the standard brush to remove, it may be necessary to wash out the tubes with water followed by a thorough brushing - this may have to be repeated several times.

### Sludge Gas

Maintenance for boilers running on these fuels will be required at more frequent intervals, possibly on a weekly basis or even a daily basis dependent on fuel type and quality.

### Boiler Ancillaries

Check the sealing of the boiler door against the front section. There should be a uniform depression about 3/32" (2mm) deep from the sealing grooves of the front section in the braiding. If this is not uniform, the sealing may be adjusted by the locknuts on the hinge pins - see Fig.4.4. Make sure the locknuts are fully tightened after adjustment is complete.

Keep a regular check on the condition of the door refractory. If there is any deterioration this must be made good immediately to prevent damage to the boiler and burner.

### Boiler Controls

The operation of boiler controls including control thermostat, high/low thermostat and overheat thermostat should be checked on an annual basis and the burner recommissioned as detailed below.

Safety Interlocks

The operation of safety interlocks such as flow proving on mechanical flue/ventilation systems should be checked to ensure that operation of the boiler is prevented on a fault.

## COMMISSIONING

**IMPORTANT: The boiler must be commissioned following completion of installation. Operation of an uncommissioned appliance may cause injury to personnel and damage to the boiler/burner unit and could invalidate the manufacturers warranties.**

Commissioning should only be carried out by personnel approved and competent to do so. This facility is available from Potterton Commercial Service Offices at the addresses as listed on the back page of this manual.

Commissioning of the burner unit should be carried out in accordance with the burner manufacturers handbook provided with combustion adjustments in accordance with the Potterton burner data sheet also provided.

Before commencing to commission the burner check the following.

1. Electrical supply is of correct voltage and polarity and earthing is available.

2. Fuel supply is tested for leakage and purged of air. Ensure the burner is suitable for the connected fuel supply and pressure.

3. Boiler and system are fully flooded with water and the operating pressure is within the appliance range.

4. Pumps are operational and any flow proving interlocks are functional. The operation of the pump should be checked, particularly on sealed systems, to ensure that operation does not cause a reduction in pressure within the system below the minimum operating pressure. See Section 3 for further details on water circulation systems.

5. Ventilation is adequate and, in the case of mechanical ventilation systems, operation of the boiler is inhibited unless the ventilation fan is proved.

6. On mechanically assisted flue systems the operation of the boiler plant should be inhibited unless the mechanical flue system is operational and flow proved.

7. The safety valve should be checked to ensure that it is of the correct size and pressure. See Section 3 for further details.

8. The cold feed and open vent sizes should be checked. See Section 3 for further details.

9. Ensure the burner fitted to the boiler is of the correct specification and size for the boiler and suitable for the fuel supply available.

10. The boiler baffles have been correctly fitted, see Section 4.

Following completion of the above checks the burner should be commissioned in accordance with the burner manufacturers hand book provided with the burner. Typical combustion figures for relevant burners are detailed below. The combustion figures, etc. should be completed on the commissioning form provided with this manual and returned to Potterton Commercial at the address on the back page.

| | | |
|---|---|---|
| OIL | $CO_2$ | - 11 - 12% |
| | Smoke | - 0 - 1 Bacharach |
| | Flue Gas Temp | - 220°C (428°F) |
| | Draught | - 1 mm negative |
| GAS | $CO_2$ | - 8 - 9% |
| | $O_2$ | - 4 - 5% |
| | CO | - Nil |
| | Flue Gas Temp | - 220°C (428°F) |
| | Draught | - 1 mm negative |

**IMPORTANT: The boiler/burner units are supplied in accordance with Potterton Commercial Quality Assurance plan registered to meet the requirements of BS 5750 Part 2. A condition of the supply of the appliance for compliance with this Quality Assurance plan is the return of the appliance commissioning report.**

Following/during commissioning of the burner unit the following additional checks should be carried out.

14. Operation of the control, high/low and high limit thermostats should be checked for correct operation.

15. The flue draught available at the appliance flue outlet should be checked under all operating conditions (hot and cold) and should be within the boiler operating parameters, see Table 1.3.

16. The fuel supply to the appliance should be isolated and the burner operated to ensure safety shut down and lockout of the burner on flame failure.

17. Shut down of the boiler plant by external controls does not cause a hazardous condition and pump overrun is provided to remove residual heat from the boiler.

18. Following commissioning the boiler overheat and control thermostats should be set to the required operating setting. See Section 3 for maximum operating temperature

19. Following completion of commissioning the soundness of all automatic fuel valves should be checked for leakage.

Additional Checks

Where possible the system should be checked to ensure that following purging of air there is no raw water make-up. In particular, when the system is operated in the hot condition, there should be no discharge of water from the safety valve, open vent or cold feed tank overflow that would otherwise lead to unregulated raw water make-up when the system cools down.

## FAULT FINDING

General fault finding for burner failure should be in accordance with the burner manufacturers hand book. Set out below are general guidance notes on system fault finding.

Overheat Operation

Operation of the boiler overheat thermostat is associated with a reduction in boiler water flow. Where overheat operation is reported the following should be checked.

a) The boiler/system pump is adequate for the duty.

b) Operation of flow reducing devices, ie, TRVs, compensated mixing valves, etc., do not reduce the water flow rate through the boiler below the minimum flow rate. See Water Circulation Systems in Section 3 for boiler flow rates.

c) Pump overrun is incorporated to dissipate residual heat from the boiler on system shut down.

d) The operation of boiler back end valves incorporate a time delay to allow for removal of residual heat from the boiler.

e) The boiler is operating at the correct rate and is not overfired.

f) Check sparge pipe for blockage.

To reset the overheat thermostat allow the boiler to cool down, remove the overheat thermostat knob and press the reset button.

The use of a primary loop system is highly recommended to provide a constant boiler flow rate under all operating conditions. For further information refer to Potterton Publication Technical Bulletin No.1 Issue 2.

Burner Lockout

The package burners supplied with the boiler unit have an integral safety system to allow the safe and reliable operation of the burner. Failure of the burner to operate correctly will cause the burner control box to "lockout" and the lockout button on the burner will illiuminate to indicate this.

The lockout condition can be manually reset by pushing the reset button and the control box should restart it's control sequence in an attempt to light the burner. If the control box lockout will not reset or goes to lockout after being reset then the services of a boiler repair/maintenance company should be sought. This service is available from Potterton Commercial Division service offices at the addresses on the back page of this manual.

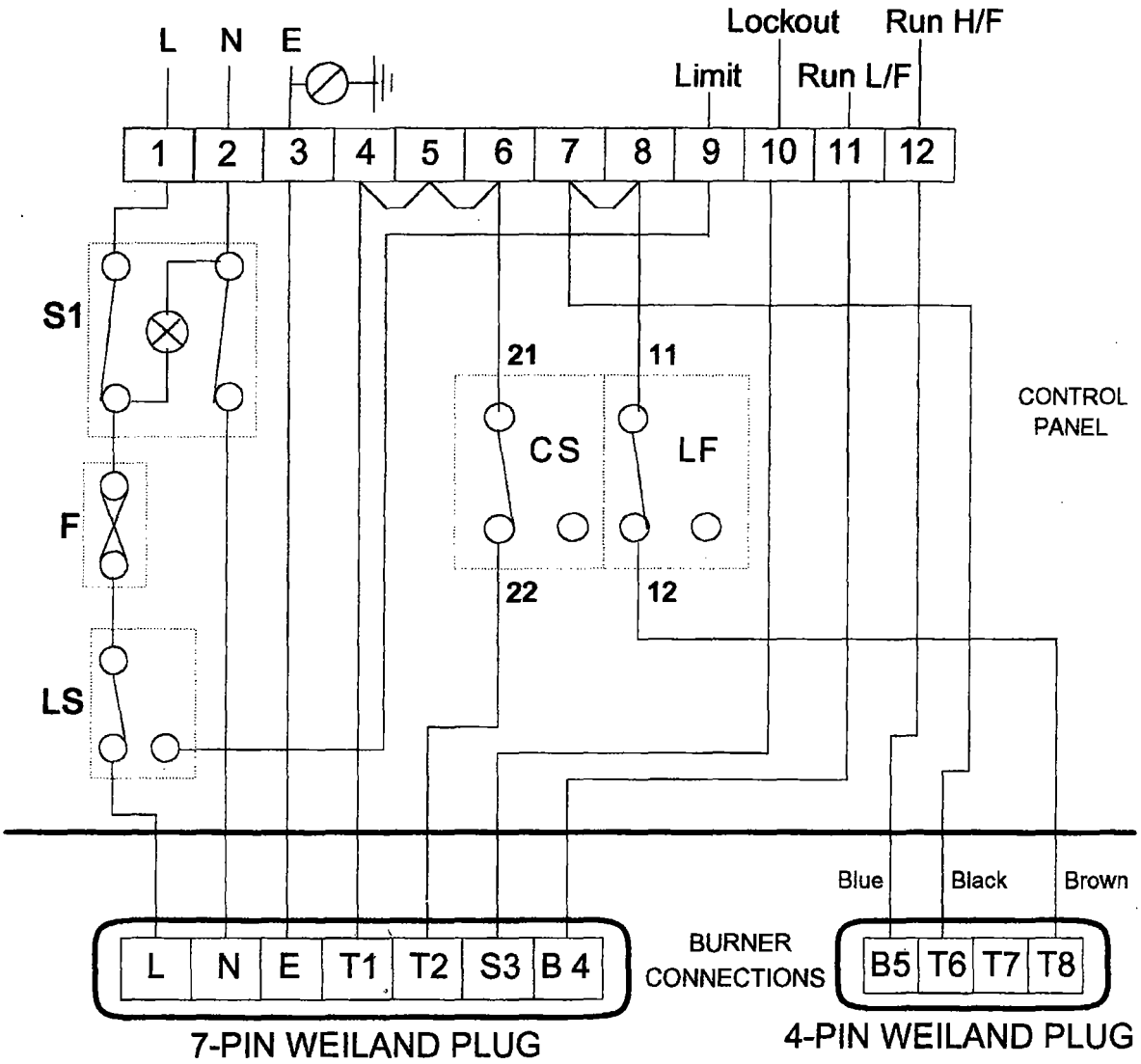
**WARNING: The lockout reset button should not be repeatedly operated otherwise a hazardous situation may occur.**

Should the boiler go to lockout, check the following before attempting to relight the burner.

1. Fuel is available at the burner.
2. The electrical supply to the appliance is of the correct voltage and polarity.

The boiler control boxes in some instances have indicator dials as an aid to fault finding on boiler lockout. In these instances refer to the control box manufacturers data sheet for fault finding details.

Fig.6.1 - F200 Control Panel Wiring




| LEGEND | | |
|---|---|---|
| S1 - POWER ON/OFF | L - LIVE | B4 - HOURS RUN METER (1st STAGE) |
| F - FUSE (6.3A) | N - NEUTRAL | B5 - HOURS RUN METER (2nd STAGE) |
| LS - OVERHEAT STAT | E - EARTH | T6 - LOW FIRE STAT (FEED) |
| CS - CONTROL STAT | T1 - CONTROL STAT (FEED) | T7 - [SPARE] |
| LF - LOW FIRE STAT | T2 - CONTROL STAT (RETURN) | T8 - LOW FIRE STAT (RETURN) |
| | S3 - LOCKOUT SIGNAL | |

* Burner connections shown are general. For specific burner wiring details refer to individual burner details.

HIGH/LOW BURNER CONTROL PANEL CONVERSION

1. General — The standard boiler control panel is supplied with a two stage EMERSON 722 RU thermostat configured for ON/OFF burner operation and is supplied complete with a 7-pin Wieland plug for connection to the burner. For high/low operation an additional 4-pin Wieland plug must be fitted to the burner together with a two stage thermostat.

2. High/Low Burner Kit — The following parts are supplied with the conversion kit;

   Cable Gland and Nut - 4-Pin Plug with 2m Cable (pre-wired)

   Installation Instructions

   i) Undo retaining screws to access control panel.
   ii) Remove grommet and fit cable gland into spare access hole.
   iii) Fit 4-pin plug cable to control panel and connect as follows (see also wiring diagram Fig.6.1 and two stage stat below);
   - Spade Connector - Connect to Terminal 12 (two stage stat)
   - Wire No.7 - Connect to Terminal 7
   - Wire No.12 - Connect to Terminal 12

   iv) Close control panel and secure with screws.
   v) Connect 4-pin plug to 4-pin burner socket (300mm loose lead on NuWay and EOGB burners, integral socket on Riello burners)

Fig.6.2 - Two Stage Thermostat Wiring

NB: Ensure that two stage stat is connected as follows;

BURNER OFF - 48°C to 95°C stat - CONNECTIONS 21 and 22

BURNER LOW FIRE - 38°C to 85°C thermostat - CONNECTIONS 11 and 12

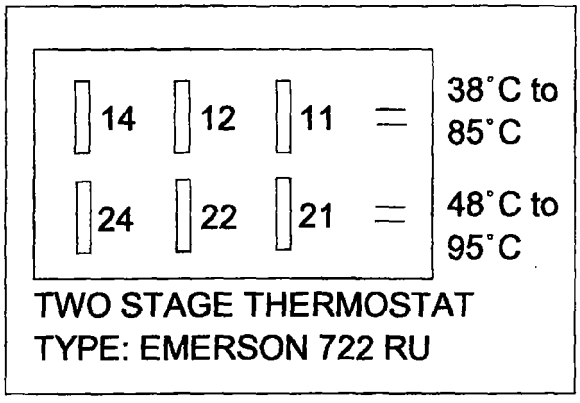
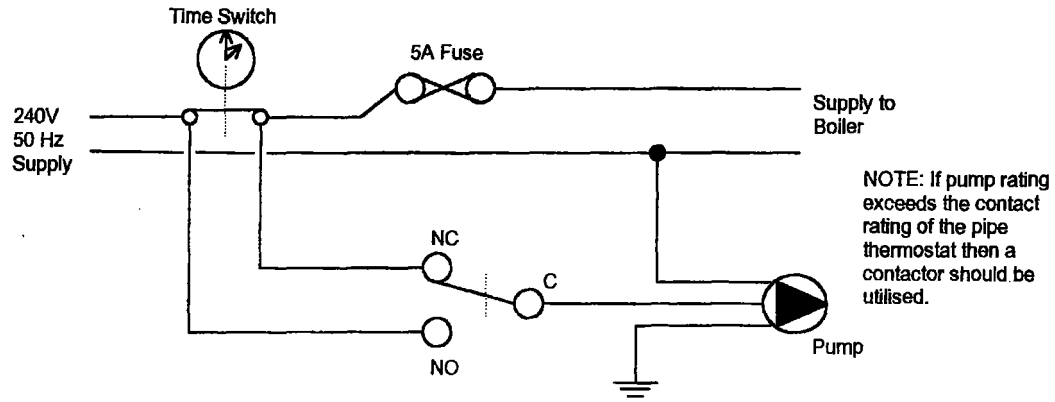


Fig 6.3 - Pump Overrun Using Changeover Pipe Thermostat



Parts List for RAPIDO F200

| ITEM | DESCRIPTION | POTTERTON PART No. | QUANTITY PER BOILER | |
|---|---|---|---|---|
| **BOILER** | | | | |
| 1 | Front Section | 358614 | 1 | |
| 2 | Rear Section | 358615 | 1 | |
| 3 | Intermediate Section (F200 / 5) | 358616 | 3 | |
| | Intermediate Section (F200 / 6) | 358616 | 4 | |
| | Intermediate Section (F200 / 7) | 358616 | 5 | |
| | Intermediate Section (F200 / 8) | 358616 | 6 | |
| | Intermediate Section (F200 / 9) | 358616 | 7 | |
| | Intermediate Section (F200 / 10) | 358616 | 8 | |
| | Intermediate Section (F200 / 11) | 358616 | 9 | |
| | Intermediate Section (F200 / 12) | 358616 | 10 | |
| 4 | Boiler Nipple (D 74 - 25 x 50) 5 section | 358617 | 8 | |
| | Boiler Nipple (D 74 - 25 x 50) 6 section | 358617 | 10 | |
| | Boiler Nipple (D 74 - 25 x 50) 7 section | 358617 | 12 | |
| | Boiler Nipple (D 74 - 25 x 50) 8 section | 358617 | 14 | |
| | Boiler Nipple (D 74 - 25 x 50) 9 section | 358617 | 16 | |
| | Boiler Nipple (D 74 - 25 x 50) 10 section | 358617 | 18 | |
| | Boiler Nipple (D 74 - 25 x 50) 11 section | 358617 | 20 | |
| | Boiler Nipple (D 74 - 25 x 50) 12 section | 358617 | 22 | |
| 5 | Tie Rod - 5 section | 358618 | 2 | |
| | Tie Rod - 6 section | 358619 | 2 | |
| | Tie Rod - 7 section | 358620 | 2 | |
| | Tie Rod - 8 section | 358621 | 2 | |
| | Tie Rod - 9 section | 358622 | 2 | |
| | Tie Rod - 10 section | 358623 | 2 | |
| | Tie Rod - 11 section | 358624 | 2 | |
| | Tie Rod - 12 section | 358625 | 2 | |
| 6 | Burner Mounting Plate gasket | 358626 | 1 | * SEE BELOW |
| 7 | Burner Mounting Plate | 358627 | 1 | |
| 8 | Isoceramic Section Sealing Strip | 358628 | | |
| 9 | Front Section End Plug (1 1/4") | 358629 | 1 | |
| 10 | Front Section Reducer Bush (1 1/4 x 1") | 358630 | 1 | |
| 11 | Front Section End Plug Washer | 358631 | 2 | |
| 12 | Sight Glass Manifold | 358632 | 1 | |
| 13 | | | | |
| 14 | Baffle - 5 section | 358633 | 2 | |
| | Baffle - 6 section | 358634 | 2 | |
| | Baffle - 7 section | 358635 | 2 | |
| 15 | Baffle - 5 section | 358637 | 2 | |
| | Baffle - 6 section | 358638 | 2 | |
| | Baffle - 7 section | 358639 | 2 | |
| 16 | Burner Door | 358642 | 1 | |
| 17 | Inner Door Refractory (Triton Kaowool - Mate - 7315 x 610 x 12.7) | 358643 | 1 | |
| 18 | Burner Door Insulation | 358644 | 1 | |
| 19 | Sight Glass Tempax (D.55 x 5) | 358645 | 1 | |
| 20 | Sparge Pipe Gasket | 358646 | 1 | |
| 21 | Door Hinge (M12 x 80) | 358647 | 2 | |
| 22 | Door Hinge Pin (12 x 60) | 358648 | 2 | |

* BOILERS UP TO 1994 PART NUMBER 502777 200 x 200 x 100 ϕ
" AFTER 1995 " " 505949 300 x 250 x 190 ϕ

| ITEM | DESCRIPTION | POTTERTON PART No. | QUANTITY PER BOILER |
|---|---|---|---|
| 23 | Sight Glass Gasket | 358649 | 2 |
| 24 | Sparge Pipe - 5 section | 358650 | 1 |
| | Sparge Pipe - 6 section | 358651 | 1 |
| | Sparge Pipe - 7 section | 358652 | 1 |
| | Sparge Pipe - 8 section | 358653 | 1 |
| | Sparge Pipe - 9 section | 358654 | 1 |
| | Sparge Pipe - 10 section | 358655 | 1 |
| | Sparge Pipe - 11 section | 358656 | 1 |
| | Sparge Pipe - 12 section | 358657 | 1 |
| 25 | Rear Section Flange | 358658 | 2 |
| 26 | | | |
| 27 | Rear Flue Hood - 5 to 8 section | 358659 | 1 |
| | Rear Flue Hood - 9 to 12 section | 358662 | 1 |
| 28 | Rear Flue Hood Clean Out Clamp | 358660 | 1 |
| 29 | Rear Flue Hood Clean Out Door | 358661 | 1 |
| 60 | Tie Rod Washer (A 14 D.126) | 358663 | 4 |
| 61 | Tie Rod Nut (M12 D.934-8) | 358664 | 4 |
| 62 | Front Door Refractory Pin (M8 x 30) | 358665 | 2 |
| 63 | Flue Fastener (M8 Din.315) | 358666 | 1 |
| 64 | | | |
| 65 | Sight Glass Stud (M8 x 25) | 358668 | 2 |
| 66 | Sight Glass Washer | 358669 | 2 |
| 67 | Burner Mounting Bolt (M8 x 30) | 358670 | 4 |
| 68 | Door Fastener Bolt (M12 x 30) | 358671 | 2 |
| 69 | Door Fastener Washer | 358672 | 4 |
| 70 | Flue Fastener Stud (M8 x 40) | 358673 | 1 |
| 71 | Flue Hood Washer | 358795 | 4 |
| 72 | Flue Hood Nut (M8) | 358796 | 4 |
| 73 | | | |
| 74 | Sparge Pipe Fixing Stud (M12) | 358797 | 4 |
| 75 | Flue Hood Stud (M8 x 60) | 358798 | 4 |
| **CASING** | | | |
| 13 | Self Tapping Screws | 358779 | 24 |
| 30 | Front Plate Cover | 358735 | 1 |
| 31 | Edge Protection - Black | 358736 | 1 |
| 32 | Handle - Black | 358737 | 1 |
| 33 | Front Casing Panel | 358738 | 1 |
| 34 | Front Panel Insulation Jacket | 358739 | 1 |
| 35 | Front Top Insulation Jacket | 358740 | 1 |
| 36 | Front Top Boiler Insulation Jacket | 358741 | 1 |
| 37 | Side Casing Lower Support Channel - 5 sec | 358749 | 2 |
| | Side Casing Lower Support Channel - 6 sec | 358748 | 2 |
| | Side Casing Lower Support Channel - 7 sec | 358747 | 2 |
| | Side Casing Lower Support Channel - 8 sec | 358746 | 2 |
| | Side Casing Lower Support Channel - 9 sec | 358745 | 2 |
| | Side Casing Lower Support Channel - 10 sec | 358744 | 2 |
| | Side Casing Lower Support Channel - 11 sec | 358743 | 2 |
| | Side Casing Lower Support Channel - 12 sec | 358742 | 2 |
| 38 | Corner Panel Insulation | 358750 | 4 |
| 39 | Corner Casing Panel (Left Front & Right Rear) | 358751 | 2 |
| 40 | Side Casing Upper Support Channel - 5 sec | 358759 | 2 |
| | Side Casing Upper Support Channel - 6 sec | 358758 | 2 |
| | Side Casing Upper Support Channel - 7 sec | 358757 | 2 |

| ITEM | DESCRIPTION | POTTERTON PART No. | QUANTITY PER BOILER | |
|---|---|---|---|---|
| | Side Casing Upper Support Channel - 8 sec | 358756 | 2 | |
| | Side Casing Upper Support Channel - 9 sec | 358755 | 2 | |
| | Side Casing Upper Support Channel - 10 sec | 358754 | 2 | |
| | Side Casing Upper Support Channel - 11 sec | 358753 | 2 | |
| | Side Casing Upper Support Channel - 12 sec | 358752 | 2 | |
| 41 | Top Front Casing Clamping Strip | 358760 | 1 | |
| 42 | Side Casing Panel (Size 2) | 358761 | 2 | |
| 43 | Side Casing Panel (Size 3) | 358762 | | |
| 44 | Locating Screw (M6 x 10 Din.927) | 358763 | 4 | |
| 45 | Front Top Plate | 358764 | 1 | |
| 46 | Front Top Panel (Control Panel Mounting) | 358765 | 1 | |
| 47 | Top Casing Panel (Size 2) | 358766 | | |
| | Top Casing Panel (Size 3) | 358767 | | |
| 48 | Rear Top/Top Rear Casing Panel | 358768 | 1 | |
| 49 | Top Casing Panel Insulation | 358769 | 1 | |
| 50 | Boiler Insulation Jacket | 358770 | 1 | |
| 51 | Rear Casing Insulation Panel | 358771 | 1 | |
| 53 | Cable Grommet (D 17) [fits into item 48] | 358772 | 1 | |
| 54 | Rear Casing Panel | 358773 | 1 | |
| 55 | Hexagonal Nut Casing Fixing (M8 Din.934-B) | 358774 | 18 | |
| 56 | Corner Casing Panel (Front Right & Rear Left) | 358775 | 2 | |
| 57 | Front Base Tray | 358776 | 1 | |
| 59 | Spacer (Casing Fixing) | 358777 | 2 | |
| 75 | Hexagonal Screw (M8 x 60 Din.933) | 358778 | 4 | |
| 76 | Flange/Sparge Pipe Gasket **NOT SHOWN** | 924015 | 3 | |
| 77 | Boiler Flue Brush 5-6 Section **NOT SHOWN** | 358800 | 1 | c/w HANDLE |
| 78 | Boiler Flue Brush 7-12 Section **NOT SHOWN** | 358781 | 1 | " " |
| CONTROL PANEL | *(Item 3 replaces items 5 and 6 on high/low option) | | | |
| 1 | Control Panel Complete | 358496 | 1 | |
| 2 | Switch (1801/1102) | 358497 | | |
| 3 | High/Low Thermostat (Optional)* | 358522 | | |
| 4 | Limit Thermostat (RAK 67-4471) | 358498 | | |
| 5 | Control Thermostat (718RU 8790d) | 358499 | | |
| 6 | Control Thermostat Knob (1438260) | 358220 | | |
| 7 | Thermometer (TFW58 PSR) | 358500 | | |
| 8 | Cable Grommet (DE29) | 358501 | | |
| 10 | 12-Pin Connector Block | 358502 | | |
| 11 | 5-Pin Connector Block | 358503 | | |
| 13 | G Fuse Holder - Form 2 | 358504 | | |
| 14 | Micro Fuse - 63 Amp | 358505 | | |
| 15 | Cable Set (SP110) | 358506 | | |
| 16 | Thermostat Pocket (1/2" x 180 c/w spring) | 358507 | | |
| 17 | Copper Phial Separator (55790) | 358508 | | |
| 19 | Control Panel Console (110/1100 CP) | 358509 | | |
| 25 | Cable Clip | 358510 | | |
| 26 | Screw (B 2.9 x 9.5 Din.7981) | 358511 | | |
| 27 | Screw (B 2.9 x 6.5 Din.7981) | 358512 | | |
| 28 | Screw (B 2.9 x 16 Din.7981) | 358513 | | |
| 30 | Control Thermostat Screws (M3 x 6 Din.7985) | 358514 | | |
| 31 | Stud (M5 x 30 Din.938) | 358515 | | |
| 32 | Hexagon Screw (M4 x 12 Din.933175) | 358516 | | |
| 33 | Hexagon Nut (M4 Din.933175) | 358517 | | |

| ITEM | DESCRIPTION | POTTERTON PART No. | QUANTITY PER BOILER |
|---|---|---|---|
| 34 | Wing Nut (Din.315) | 358518 | |
| 35 | Lock Washer (A43 Din.6797) | 358519 | |
| 36 | Plug & Harness (on/off) ** NOT SHOWN ** | 358495 | |
| 37 | Plug & Harness (high/low) ** NOT SHOWN ** | 358695 | |

PULLING UP TOOLS

| Boiler Size | Length | Diameter | Potterton Part Number |
|---|---|---|---|
| 5 | 920 mm | 20 mm | 358801 |
| 6 | 920 mm | 20 mm | 358801 |
| 7 | 920 mm | 20 mm | 358801 |
| 8 | 1260 mm | 20 mm | 358802 |
| 9 | 1260 mm | 20 mm | 358802 |
| 10 | 1260 mm | 20 mm | 358802 |
| 11 | 1620 mm | 20 mm | 358803 |
| 12 | 1620 mm | 20 mm | 358803 |

| Description | Dimension (mm) | Potterton Part Number | Qty / Boiler |
|---|---|---|---|
| F200 Clamping Plate | 90 x 90 (20mm Centre Hole) | 358804 | 2 |
| F200 Special Nut | 20 | 358806 | 4 |
| F200 Large Spacer Washer | 60 (O.D.) / 20 (I.D.) | 358807 | 4 |
| F200 Washer | 20 | 358808 | 4 |

Boiler Sealant - Reda

| Boiler Size | Quantity | Potterton Part Number |
|---|---|---|
| 5 | 1 Tin | 924042 |
| 6 | 1 Tin | 924042 |
| 7 | 1 Tin | 924042 |
| 8 | 1 Tin | 924042 |
| 9 | 2 Tins | 924042 |
| 10 | 2 Tins | 924042 |
| 11 | 2 Tins | 924042 |
| 12 | 2 Tins | 924042 |

Nipple Compound (Bosswhite)

| Boiler Size | Quantity | Potterton Part No. |
|---|---|---|
| 5 to 12 | 1 x 400g Tub | 705013 |

| ITEM | DESCRIPTION | POTTERTON PART No. | QUANTITY PER BOILER |
|---|---|---|---|
| 34 | Wing Nut (Din.315) | 358518 | |
| 35 | Lock Washer (A43 Din.6797) | 358519 | |
| 36 | Plug & Harness (on/off) ** NOT SHOWN ** | 358495 | |
| 37 | Plug & Harness (high/low) ** NOT SHOWN ** | 358695 | |

PULLING UP TOOLS

| Boiler Size | Length | Diameter | Potterton Part Number |
|---|---|---|---|
| 5 | 920 mm | 20 mm | 358801 |
| 6 | 920 mm | 20 mm | 358801 |
| 7 | 920 mm | 20 mm | 358801 |
| 8 | 1260 mm | 20 mm | 358802 |
| 9 | 1260 mm | 20 mm | 358802 |
| 10 | 1260 mm | 20 mm | 358802 |
| 11 | 1620 mm | 20 mm | 358803 |
| 12 | 1620 mm | 20 mm | 358803 |

| Description | Dimension (mm) | Potterton Part Number | Qty / Boiler |
|---|---|---|---|
| F200 Clamping Plate | 90 x 90 (20mm Centre Hole) | 358804 | 2 |
| F200 Special Nut | 20 | 358806 | 4 |
| F200 Large Spacer Washer | 60 (O.D.) / 20 (I.D.) | 358807 | 4 |
| F200 Washer | 20 | 358808 | 4 |

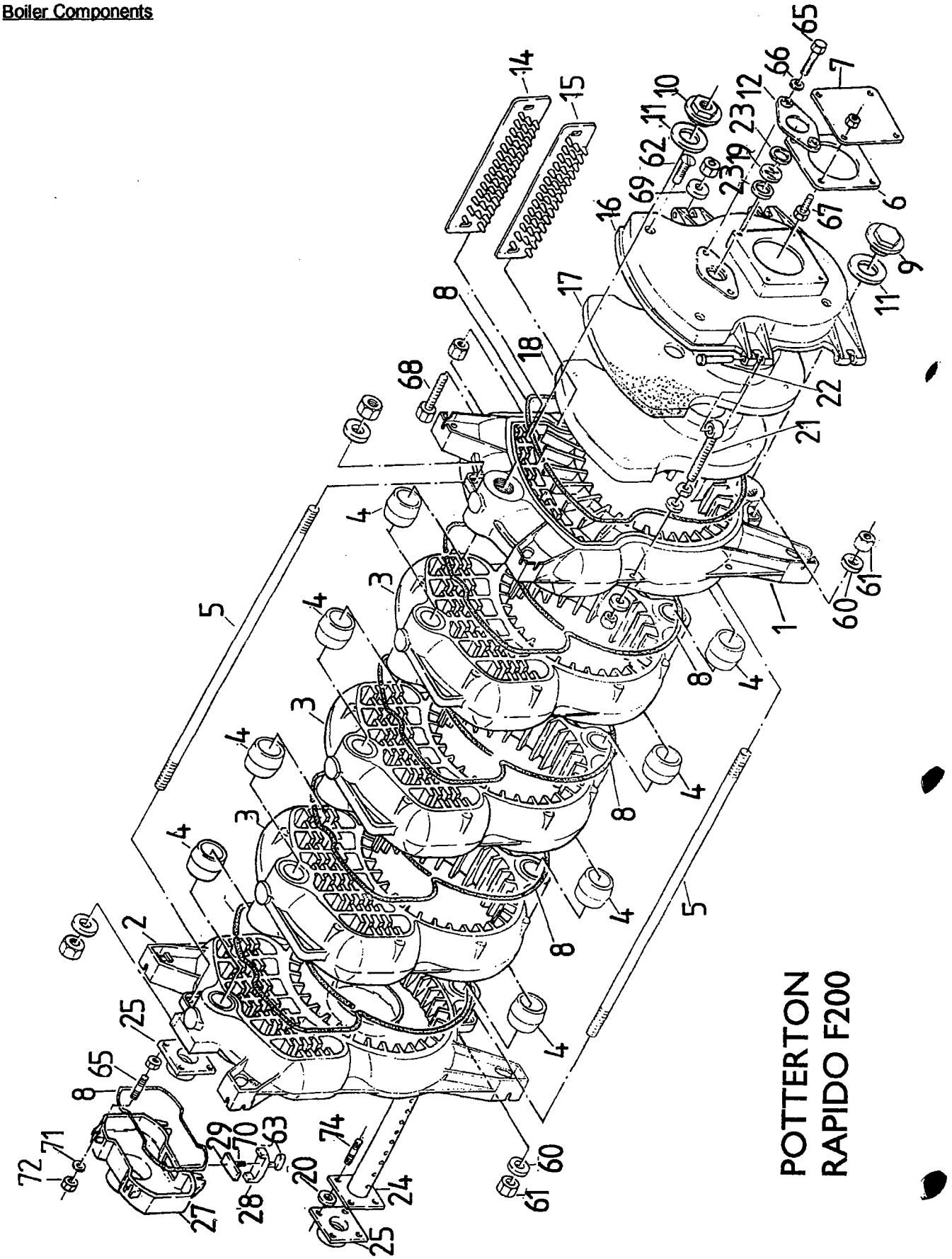
Boiler Sealant - Reda

| Boiler Size | Quantity | Potterton Part Number |
|---|---|---|
| 5 | 1 Tin | 924042 |
| 6 | 1 Tin | 924042 |
| 7 | 1 Tin | 924042 |
| 8 | 1 Tin | 924042 |
| 9 | 2 Tins | 924042 |
| 10 | 2 Tins | 924042 |
| 11 | 2 Tins | 924042 |
| 12 | 2 Tins | 924042 |

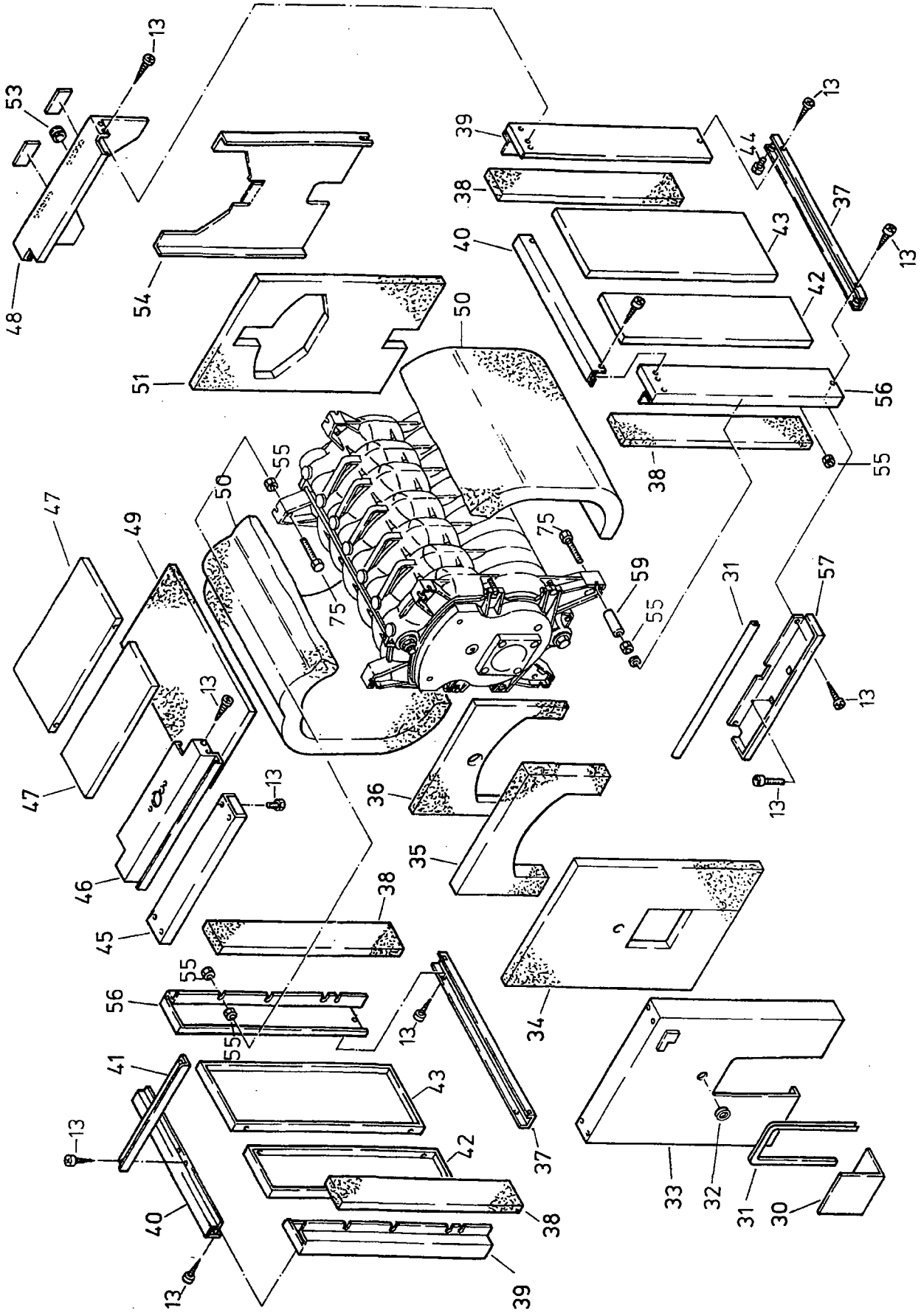
Nipple Compound (Bosswhite)

| Boiler Size | Quantity | Potterton Part No. |
|---|---|---|
| 5 to 12 | 1 x 400g Tub | 705013 |

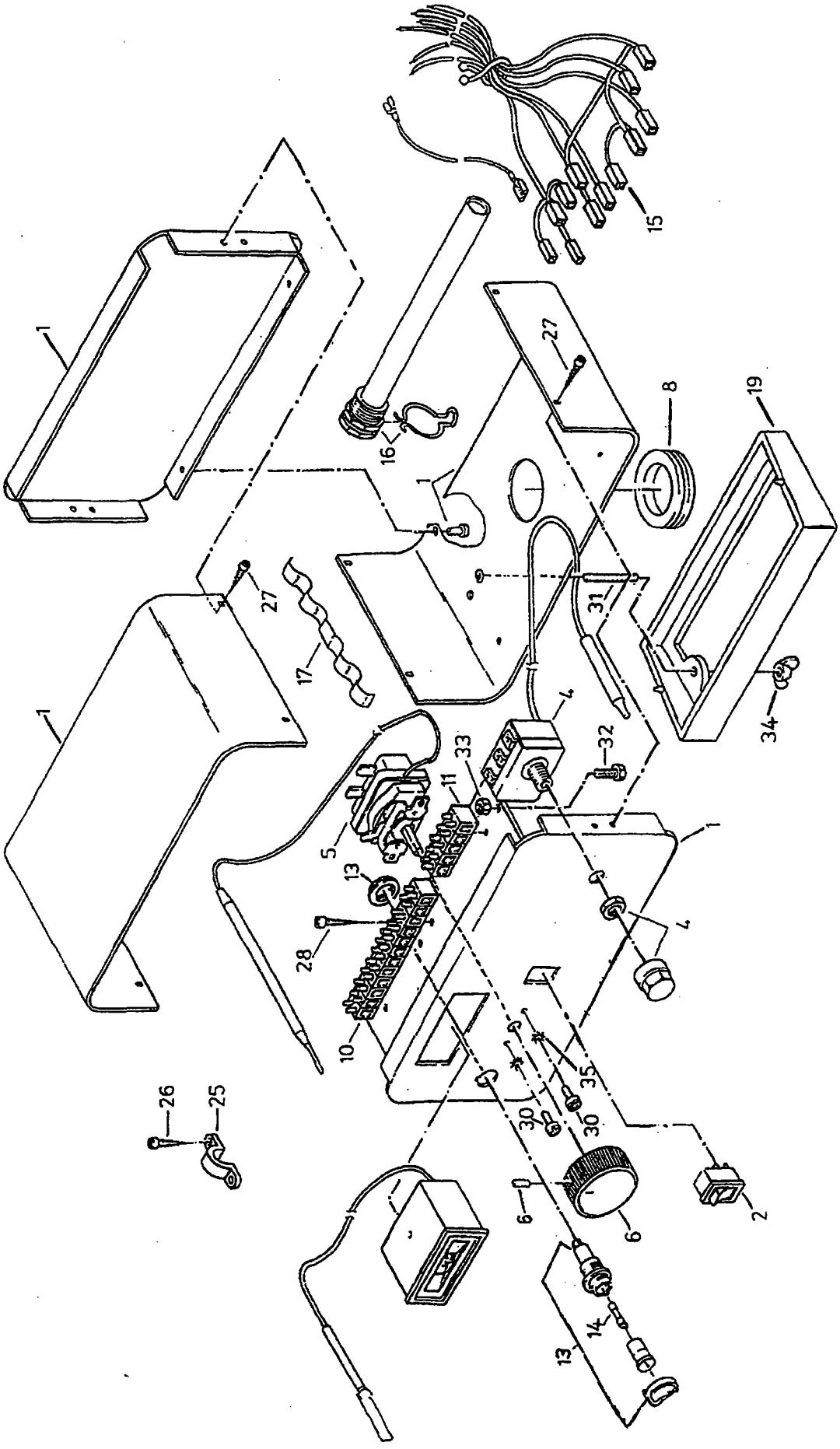
Boiler Components



Casing/Insulation



Control Panel



# NATURAL GAS/L.P.G./OIL (KEROSENE & CLASS D) BOILER/BURNER COMMISSIONING REPORT IN ACCORDANCE WITH BS5750

POTTERTON
COMMERCIAL
PORTOBELLO WORKS, EMSCOTE ROAD
WARWICK CV34 5QU
Tel: 01926 493420 Fax: 01926 410523

REPORT SENT TO INSTALLER:

Date: .....

Signature: .....

REPORT NO: .....

SITE ADDRESS: .....

.....

.....

.....

INSTALLER NAME & ADDRESS: .....

.....

.....

.....

.....

DATE OF COMMISSIONING: .....

| 1.0 | BOILER | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1.1 | Type | | | | | | | | |
| 1.2 | No of Sections | | | | | | | | |
| 1.3 | Boiler No/Position | | RH | | LH | | Centre | | |
| 1.4 | Serial No | | | | | | | | |
| 1.5 | Fuel: Kerosene | | Class D | | N / Gas | | LPG | | |

| 2.0 | BURNER |
|---|---|
| 2.1 | Type |
| 2.2 | Serial No |
| 2.3 | Spec No |
| 2.4 | Control Box Type |
| 2.5 | Electrical Supply |
| 2.6* | Gas Train Type & Size |
| 2.7* | Gas Train Serial No |
| 2.8* | Gas Booster Type & Size |
| 2.9* | Gas Booster Serial No |

| 3.0 | BURNER SETTINGS | | | |
|---|---|---|---|---|
| 3.1 | Draught Tube Diameter | | | mm |
| 3.2 | Draught Tube Projection | | | mm |
| 3.3 | Diffuser Diameter | | | mm |
| 3.4 | Diffuser Setting (Distance from end of draught tube) | | | mm |
| 3.5* | Gas Nozzle: | Side | No of Holes | |
| | | | Diameter | mm |
| | | End | No of Holes | |
| | | | Diameter | mm |
| 3.5¶ | Oil Nozzles: | High Fire | Size | |
| | | | Type | |
| | | Low Fire | Size | |
| | | | Type | |
| 3.6 | Electrode Settings? (to burner card/manufacturers instructions) | | | |
| 3.7 | Burner to Spec? (to burner card/manufacturers instructions) | | | |

| 4.0 | PRE-COMMISSIONING CHECKS (SEE NOTE BELOW) | |
|---|---|---|
| 4.1 | Is the boiler house ventilation as per manual? | |
| 4.2 | Electric supply, fused, isolated & earth wire connected? | |
| 4.3 | Check external controls allow operation | |
| 4.4 | Check boiler/system flooded & pumps operational and any isolation valves open | |
| 4.5* | Check gas available at burner | |
| 4.5¶ | Check oil available at burner | |
| 4.6* | Check gas meter sizing adequate | |
| 4.7 | Check flue system clear | |

| 5.0 | COMBUSTION | Pilot | Low | High | Unit |
|---|---|---|---|---|---|
| 5.1* | Gas rate | | | | $m^3/hr$ |
| 5.2* | Burner head pressure | | | | mmwg |
| 5.3* | Ionisation probe/UV cell current | | | | µA |
| 5.4 | Air shutter position | | | | - |
| 5.5¶ | Oil pump pressure | | | | bar |
| 5.6 | $CO_2$ or $O_2$ | | | | % |
| 5.7* | CO | | | | ppm |
| 5.8¶ | Smoke Number | | | | - |
| 5.9 | Gross flue gas temperature | | | | °C |
| 5.10 | Ambient temperature | | | | °C |
| 5.11 | Flue draught | | | | mmwg |
| 5.12* | Inlet gas pressure (high fire). If multi boiler installation, inlet gas pressure all boilers high fire. | | | | mmwg |
| 5.13 | Combustion chamber resistance | | | | mmwg |
| 5.14 | Burner fan static pressure | | | | mmwg |

**NOTE**: Normally 5.13 and 5.14 only recorded when tappings provided. Position of measurement to be in accordance with boiler / burner manufacturers instructions.

* GAS FIRED INSTALLATIONS ONLY
¶ OIL FIRED INSTALLATIONS ONLY

NOTE: It is the installers responsibility to ensure that the boiler is correctly commissioned by a competant engineer and that this report is completed and kept as a record. A commissioning service is available from Potterton at the address listed on the back page of the boiler manual. When a Potterton engineer commissions, this completed report will be sent to the installer. It is the installers responsibility to action any points arising. Commissioning by Potterton engineers is restricted to equipment of our supply. No responsibility is accepted for the on site assembly or installation of the equipment unless specifically carried out by Potterton. The installer must ensure that the boiler is installed in accordance with the manufacturers instructions and all relevant BS Codes of Practice and Regulations (see manufacturers instructions for full details). Items 4.1 to 4.6 are related to the boiler installation and as such these pre-commissioning checks should be carried out in the presence of the installer.

| 6.0 | OPERATIONAL SAFETY CHECKS | |
|---|---|---|
| 6.1 | Check control stat operation | |
| 6.2 | Check limit stat operation | |
| 6.3 | Check high/low stat operation | |
| 6.4* | Check for gas leaks | |
| 6.5* | Check for gas leakage past valve assembly | |
| 6.5¶ | Check for oil leaks | |
| 6.6 | Check boiler locks out on loss of flame signal | |
| 6.7 | Check boiler locks out on air pressure switch operation | |
| 6.8 | Check boiler locks out on all other safety functions | |
| 6.9* | Check gas booster interlocks operational | |
| 6.10 | Record INLET and OUTLET pressure switch settings:-<br>INLET ..... OUTLET ..... | |

| 7.0 | BOILER/SYSTEM CHECK LIST | |
|---|---|---|
| 7.1 | Control stat left at | |
| 7.2 | Limit stat left at | |
| 7.3 | High/low stat left at | |
| 7.4 | Maximum flow temperature recorded | |
| 7.5 | Maximum return temperature recorded | |
| 7.6 | Boiler water pressure | |
| 7.7 | Are pipework connections as per manual? | |
| 7.8 | Is safety valve fitted? | |
| 7.9 | Are water isolating valves fitted? | |
| 7.10 | Are water fow switches fitted? | |
| 7.11 | Are return water shut off or diverter valves fitted? | |
| 7.12 | Is shunt pump fitted? | |
| 7.13 | Is pump overrun fitted? | |
| 7.14 | Flue type and diameter of connection to boiler:-<br>TYPE<br>DIAMETER (mm)<br>Where appropriate and for multi boiler installations sketch details of flue system showing length of runs and diameters.<br>Conventional ..... Fan assisted ..... Flue Dilution* .....<br>Approximate overall height ..... m<br>* Is the fan interlocked with the boiler YES / NO | |
| 7.15 | Are flue dampers fitted? YES / NO<br>If so, interlocked? YES / NO | |
| 7.16 | Fan assisted ventilation? YES / NO<br>If so, interlocked? YES / NO | |
| 7.17 | Any evidence of condensate formation? YES / NO | |
| 7.18 | Any evidence of water leakage? YES / NO | |
| 7.19 | Any evidence of flue gas leakage? YES / NO | |
| 7.20 | Has boiler been built and cased correctly? YES / NO | |
| 7.21* | Is gas service cock installed? YES / NO<br>If so, accessible? YES / NO | |
| 7.22¶ | Is oil filter fitted? YES / NO | |
| 7.23¶ | Is fire valve fitted? YES / NO | |
| 7.24¶ | Oil Supply: Single pipe | |
| | Two Pipe | |
| | Ring Main | |

| 8.0 | COMMENTS ON ACCESSIBILITY FOR MAINTENANCE |
|---|---|
| | |

| 9.0 | NOTES & COMMENTS BY COMMISSIONING ENGINEER |
|---|---|
| | |

**FINDINGS**

| | YES | NO |
|---|---|---|
| Is the installation safe for use? | | |
| If the answer is NO, has a warning notice been raised? | | |
| Is any remedial work required? | | |
| Have warning labels been fitted? | | |

Customer Signature:

Print Name:

Date:

**ENGINEER DETAILS**

| | |
|---|---|
| NAME | |
| COMPANY | |
| SIGNATURE | |
| DATE | |

# CONVERSION TABLE

| IMPERIAL TO METRIC | | | METRIC TO IMPERIAL | | |
|---|---|---|---|---|---|
| **HEAT** | **1 Therm = 100,000 Btu/hr** | | | | |
| 1 Btu/hr | = | 0.2931 W | 1 kW | = | 3412 Btu/hr |
| 1 Btu/hr | = | 1055 J | 1 J | = | 0.0009478 Btu/hr |
| 1 Btu/hr | = | 0.252 kcal | 1 kcal | = | 3.968 Btu/hr |
| **FUEL CONSUMPTION** | | | **1 $dm^3$ = 1 LITRE** | | **1,000 $dm^3$ = 1$m^3$** |
| 1 $ft^3$ | = | 28.317 $dm^3$ | | | |
| 1 Imp. Gall | = | 4.546 litre | 1 $m^3$ | = | 35.3147 $ft^3$ |
| 1 Imp. Gall | = | 1.2 U.S. Gallon | 1 litre | = | 0.2199 Imp. Gallon |
| **PRESSURE** | **1 PSI = 2.307 FT** | | **1 kPa = 1000 Pa** | | **1 bar = 1000 mbar = 100 kPa** |
| 1 lb/$in^2$ | = | 6895 Pa | 1 bar | = | 33.45 ft.w.g. |
| 1 lb/$in^2$ | = | 68.95 mbar | 1 kPa | = | 0.3345 ft.w.g. |
| 1 in.w.g. | = | 249.1 Pa | 1 bar | = | 14.5 ib/$in^2$ |
| 1 in.w.g. | = | 2.491 mbar | 1 Pa | = | 0.3858 in.w.g. |
| 1 in.w.g | = | 25.4 mm.w.g. | 1 mm.w.g. | = | 0.0394 in.w.g. |
| | | | 1 mm.w.g. | = | 9.8 Pa.w.g. |
| **LENGTH** | | | **1m = 1000mm** | | |
| 1 inch | = | 25.4mm | 1 mm | = | 0.03937 in |
| 1 ft | = | 0.3048 m | 1 m | = | 3.281 ft |
| 1 yard | = | 0.9144 m | 1 m | = | 1.094 yard |
| 1 mile | = | 1.609 km | 1 km | = | 0.6214 mile |
| **VOLUME** | | | | | |
| 1 $ft^3$ | = | 0.02832 $m^3$ | 1 $m^3$ | = | 35.3147 $ft^3$ |
| 1 $ft^3$ | = | 28.32 litre | 1 litre | = | 0.03531 $ft^3$ |
| **AREA** | | | | | |
| 1 $in^2$ | = | 645.2 $mm^2$ | 1 $mm^2$ | = | 0.00155 $in^2$ |
| 1 $in^2$ | = | 6.452 $cm^2$ | 1 $cm^2$ | = | 0.155 $in^2$ |
| 1 $ft^2$ | = | 929 $cm^2$ | 1 $m^2$ | = | 1550 $in^2$ |
| 1 $ft^2$ | = | 0.0929 $m^2$ | 1 $m^2$ | = | 10.76 $ft^2$ |
| **FLOW RATE** | **1 kg/sec = 1 lit/sec @** | | **0°C reference temperature** | | |
| 1 gall/min | = | 0.07577 lit/sec | 1 lit/sec | = | 13.2 gall/min |
| 1 $ft^3$/min | = | 0.4719 lit/sec | 1 lit/sec | = | 2.119 $ft^3$/min |
| 1 $ft^3$/min | = | 0.02832 $m^3$/sec | 1 $m^3$/sec | = | 2119 $ft^3$/min |
| **TEMPERATURE** | | | | | |
| °F to °C | = | ("X"°F - 32) x 0.5556 | °C to °F | = | ("X" °C x 1.8) + 32 |
| **TEMPERATURE DIFFERENCE** | | | **1°C = 1°K** | | |
| "X"°F x 0.5556 | = | °C | "X" °C x 1.8 | = | °F |
| **WEIGHT** | | | | | |
| 1 lb | = | 0.4536 kg | 1 kg | = | 2.205 lb |
| 1 cwt | = | 50.8 kg | 1 tonne | = | 0.9842 ton |
| 1 ton | = | 1016 kg | 1 tonne | = | 2204.6 lb |

For further details on Potterton Commercial boiler products contact the following:-

## COMMERCIAL SALES & TECHNICAL ENQUIRIES

Potterton Commercial Products Division
Portobello Works
Emscote Road
WARWICK
CV34 5QU

Tel: (01926) 493420
Fax: (01926) 410523

## COMMERCIAL SERVICE OFFICES

Our service organisation covers the whole of the U.K. to look after your needs for all Potterton Commercial Products. We are also able to offer our services for other products.

Southern Region
Potterton Commercial Service Dept
Unit 5, Newtons Court,
Crossways Business Park,
DARTFORD
Kent DA2 6QL
Tel: (01322) 280388
Fax: (01322) 287575

Northern Region
Potterton Commercial Service Dept
Unit 102, Batley Enterprise Centre,
513 Bradford Road,
BATLEY
West Yorkshire WF17 8JY
Tel: (01924) 420035
Fax: (01924) 420276

Our service offices offer a wide range of specialised services including:-

- Boiler Site Assembly
- Burner Commissioning for all Fuels
- Boiler Maintenance & Maintenance Contracts
- Breakdown & Repair Services
- Boiler Dismantling & Rejointing
- Burner & Boiler Replacement
- Oil/Gas Conversions
- System Conditioning
- Water Treatment & Descaling
- Packaged Units

## SPARES

Potterton Commercial spares are available nationwide through the Potterton Myson Interpart Division at:-

Potterton Myson Parts & Distribution Centre
Queensway
Leamington Spa
Warwickshire
CV31 3RG

Tel: (01926) 880600
Fax: (01926) 880680



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