

Spetisbury Boilers

**Gas Fired Cast Iron Sectional Boilers
110kW to 340kW**

**Installation, Commissioning
and Servicing Instructions**

NATURAL GAS I_{2H}

IMPORTANT NOTE

**THESE INSTRUCTIONS MUST BE READ
AND UNDERSTOOD BEFORE INSTALLING,
COMMISSIONING, OPERATING OR
SERVICING EQUIPMENT**

Customer Services

Technical Enquiries



01202 662527/662528

To supplement the detailed technical brochures, technical advice on the application and use of products in the Hamworthy Heating range is available from our technical team in Poole and our accredited agents.

Site Assembly



01202 662555

Hamworthy offer a service of site assembly for many of our products in instances where plant room area is restricted. Using our trained staff we offer a higher quality of build and assurance of a boiler built and tested by the manufacturer.

Commissioning



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Commissioning of equipment by our own engineers, accredited agents or specialist sub – contractors will ensure the equipment is operating safely and efficiently.

Maintenance Agreements



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Regular routine servicing of equipment by Hamworthy service engineers inspects the safety and integrity of the plant, reducing the risk of failure and improving performance and efficiency. Maintenance agreements enable our customers to plan and budget more efficiently.

Breakdown service, repair, replacement



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Hamworthy provide a rapid response breakdown, repair or replacement service through head office at Poole and accredited agents throughout the UK.

Spare Parts



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A comprehensive spare parts service is operated from our factory in Poole, providing replacement parts for both current and discontinued products. Delivery of parts and components is normally from stock within seven days. However, a next day delivery service is available for breakdowns and emergencies.

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NOTE: THESE INSTRUCTIONS SHOULD BE READ AND UNDERSTOOD BEFORE ATTEMPTING TO INSTALL, COMMISSION OR OPERATE THIS UNIT

THE SPETISBURY BOILER IS INTENDED FOR USE AS A COMMERCIAL APPLIANCE

THE GASED FIRED VARIANTS OF THIS BOILER ARE FOR USE ON GROUP H NATURAL GAS (2ND FAMILY) I_{2H}. PLEASE ENSURE RELEVANT INFORMATION REQUIRED WITHIN DOCUMENT IS FOUND RELATING TO SPECIFIC FUEL TO BE FIRED BEFORE FIRING BOILER.

THIS BOILER COMPLIES WITH ALL RELEVANT EUROPEAN DIRECTIVES.
EC TYPE CERTIFICATE No EC-87/04/038
PRODUCT IDENTIFICATION No. 87/BP/38

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1.0 INTRODUCTION

1.1 The Spetisbury boiler range consists of 5 gas fired cast iron sectional boilers with outputs ranging from 110kW to 340kW.

Spetisbury boilers can be used individually, or in a multi-boiler configuration, and are suitable for use on either open-vented or sealed low temperature hot water heating systems. For hot water production they can be used in conjunction with calorifiers or indirect hot water cylinders.

Stacking kits are available for pairs of Spetisbury boilers and are assembled on site to HHL instructions 500005091 in combination with this manual.

Portland and Weymouth pressurisation units are available from Hamworthy Heating Ltd for sealed systems.

1.2 Spetisbury sectional boilers are supplied unassembled ready for on-site assembly.

The heat exchanger consists of:

- a. A front section
- b. Plain intermediate sections which can be adapted to form the 3 types of intermediate sections.
- c. A rear section

These sections are connected to each other using guide rings and 'O' ring gaskets and are held together by short lacing bolts. The complete assembly is held together by four M14 threaded tie rods running the length of the heat exchanger.

The section to section flue gas seal is made by:

- d. A mastic strip around the outer perimeter of each section.
- e. A mastic strip around the perimeter of the combustion chamber of each section.

The sections are cast with extended surface fins to increase the heat exchange area and thus enhance thermal efficiency in use.

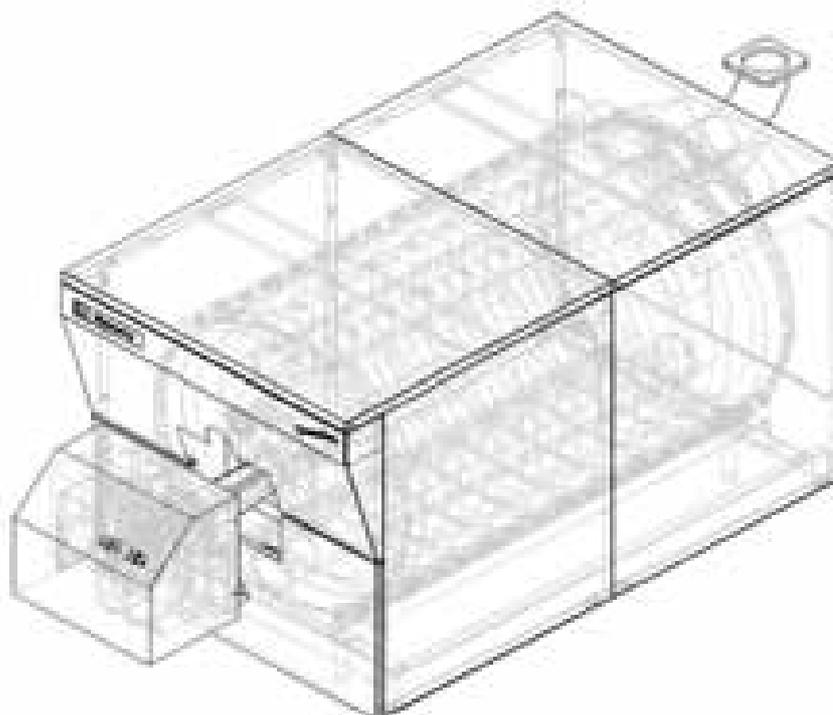
The heat exchanger assembly is completed by cast iron front and rear combustion chamber plates and access plates for the cleaning and inspection of the heat exchanger flue ways (on front and rear), all of which are internally lined with a ceramic fibre insulation board. The smoke box/flue connector is bolted to the upper part of the rear section and sealed with a ceramic fibre gasket.

The heat exchanger is mounted on a steel cradle which in turn stands on legs, leaving access for cleaning beneath the heat exchanger. The flow and return water connections are located at the rear of the boiler. Refer to Section 8 for details of water circulation system.

All site wiring is made direct to the burner, refer to section 10.6 for guidance.

The boiler is housed in a powder coated sheet steel casing which is supplied flat-packed for on-site assembly. Refer to Section 10.5 for casing assembly procedure.

1.3 All Spetisbury boiler sections are hydraulically tested to 10 bar (145 psi), ensuring the Spetisbury boiler is suitable for use on systems with maximum working pressures of up to 5 bar (73 psi).



2.0 UNPACKAGING

2.1 The boiler is normally supplied as a set of equipment comprising the following:

- a. Cast iron sections mounted on pallets
- b. Accessory kit and tie rods
- c. Casing panels and insulation blankets
- d. Matched burner.
- e. Flue collector box
- f. Burner mounting plate, drilled ready to accept burner (SP 110, 150 & 220 only. Burner mounting plate not required on SP 280 or 340).
- g. Steel cradle.

Remove all the packing material and inspect the equipment to ensure that all parts are present and undamaged. If in any doubt, DO NOT USE THE EQUIPMENT. Instead, contact the supplier.

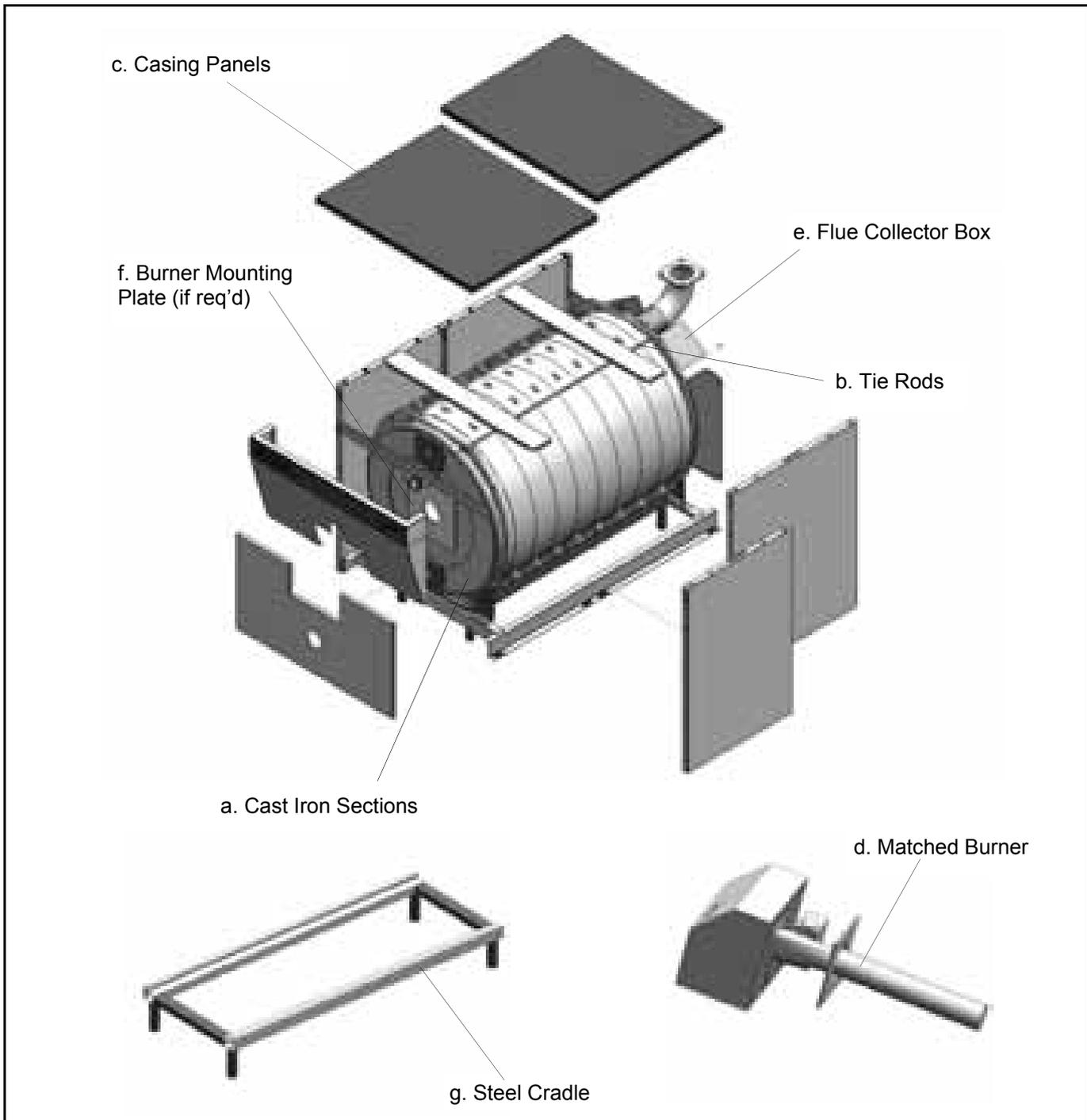


Figure 2.1 General Overview

3.0 GENERAL REQUIREMENTS

3.1 Related Documents.

Gas Safety (Installation and Use) Regulations 1994 – (As amended). It is the law that all gas appliances are installed by competent persons, in accordance with the above regulations. Failure to install appliances correctly could lead to prosecution.

It is in your own interest, and that of safety, to ensure that this law is complied with.

The installation of the boiler **MUST** be in accordance with the relevant requirements of the Gas Safety Regulations, Building Regulations, I.E.E. Regulations and the bylaws of the local water undertaking.

The installation should also be in accordance with any relevant requirements of the local gas region and local authority and the relevant recommendations of the following documents :-

British Standards

BS.5854 - Code of practice for flues and flue structures in buildings. See para 5 (3.6).

BS.6644 - Specification for installation of gas fired hot water boilers of rated inputs between 60kW and 2MW.

BS.6700 - Design, Installation, testing and maintenance of services supplying water for domestic use.

BS.6880 - Code of practice for low temperature hot water heating systems of output greater than 45kW.

Part 1: Fundamentals & design considerations.

Part 2: Selection of equipment.

Part 3: Installation, commissioning & maintenance.

BS 7074 - Application, selection and installation of expansion vessels and ancillary equipment for sealed water systems. **Part 2:** Code of practice for low and medium temperature hot water systems.

BS.CP342 - Code of practice for centralised hot water supply. **Part 2:** Buildings other than individual dwellings.

I. Gas E. Publications

IGE/UP/1 Soundness testing and purging of industrial and commercial gas installations.

IGE/UP/1A Soundness testing and direct purging of small low pressure industrial and commercial natural gas installations.

IGE/UP/2 Gas installation pipework, boosters and compressors in industrial and commercial premises.

IGE/UP/10 Installation of gas appliances in industrial and commercial premises.

Health and Safety Executive :-

Guidance note PM5 - Automatically controlled steam and hot water boilers.

CIBSE Publications:- "CIBSE Guide"

It is impractical in this document to specify all relevant information, but the following extracts from the above references are emphasised since failure to comply with these requirements will almost certainly result in an unsatisfactory installation.

3.2 Feed Water Quality

If the boiler feed water has a high degree of hardness, it is recommended that the water be treated to prevent precipitation of scale or sludge in the boiler water passageways. Details of additives can be obtained from any reliable manufacturer of water treatment products or the local water authority.

It should be noted however, that even if the boiler water is of average hardness, not requiring treatment, subsequent draining of the system for repair or constant make-up water due to an undetected leak will cause additional deposits and gradual build-up of scale. It is essential therefore, that leaks are attended to promptly and draining is kept to an absolute minimum.

It is recommended that the system be flushed out at least twice before any water treatment is added. If any doubt exists regarding the internal cleanliness of an old system, consideration should be given to the fitting of a coarse filter in the return pipework to the boiler(s).

3.3 Adequate Water Flow

Care should be taken in the initial design and layout having due regard for adequate water flow through the boilers and the influence of the system controls.

It is recommended that the system design should ensure a minimum return temperature of 50 °C.

If the temperature/flow rates of the application cannot meet those given in Figure 3.1 it may be necessary to incorporate mixing valves and shunt pumps to ensure that the boiler will operate satisfactorily. Figure 3.1 shows recommended and minimum water flows required with the associated pressure losses. The control system and valves, where fitted, should be regulated to avoid lower flows occurring.

3.4 Time Clock Control

In order to avoid local overheating and progressive calcium deposition at zero flow conditions where boilers are operated from time clocks, provision should be made for a 5 minute circulating pump over-run after the last boiler has ceased firing.

3.5 Minimum System Water Pressure

To comply with guidance note **PM5 (Health and Safety Executive)**, the minimum pressure requirements at the boiler are given below as examples :-

- 1) Single installed boiler running at 82°C flow temperature. Minimum head required is not less than 2 metres or 0.2 bar.
- 2) Single installed boiler running at 95°C flow temperature. Minimum head required = 5.1 metres or 0.5 bar. **See Section 8.9.1**
- 3) Modular boiler installation running at 82°C flow temperature and 11°C rise across system. Minimum head required = 4.3 metres or 0.42 bar.
- 4) Modular boiler installation running at 82°C flow temperature and 15°C rise across system. Minimum head required = 9.4 metres or 0.92 bar. **See Section 8.10** for Pressurised Water Systems.

4.0 LOCATION

4.1 The boiler location must permit the provision of a satisfactory flue system, and provide adequate space around the boiler for servicing and air circulation.

Sufficient space must be provided at the front of the boiler to allow the removal of the burner assembly for servicing/replacement, and at the rear for installation of pipes, valves and flue.

Sufficient clearance around the boiler must also be provided to allow access for servicing. Refer to **Figure 15.2** for recommended clearances.

The boiler room, or compartment, housing the boiler (s) - whether specifically constructed for the purpose, or a modification of an existing space - should be in accordance with the requirements of BS.6644.

Where a separate purpose built boiler room is not available, measures should be taken to protect the boiler or boilers from damage, and the boiler should be sited such that extraneous material cannot be stored next to, or against it.

The boiler stands on a steel cradle and therefore it requires installing on a suitable level non-combustible surface, capable of withstanding temperatures of 65°C and able to support the weight of the boiler (including pipework and ancillary equipment) when filled with water. A steel sheet can be placed beneath the boiler cradle to facilitate movement of the boiler during assembly. If a plinth is required, it should be level, non-combustible, 50mm nominal height, and must be equal in width to the boiler casing dimensions.

The compartment housing the boiler must have permanent air vents communicating directly with the outside air at both high and low level. Refer to **Section 7** for details.

5.0 GAS SUPPLY

5.1 Gas Service Pipes

The local gas region should be consulted at the installation planning stage to either determine the feasibility of providing a gas supply or, where there is an existing supply, to ensure that the meter capacity is adequate for the rated input of the proposed new boiler. An existing gas service pipe must not be used without prior consultation with the local gas region.

5.2 Gas Meters

A new gas meter will be connected to the service pipe by the local gas region, or a local gas region contractor. An existing meter should be checked, preferably by the gas region, to ensure that it is adequate to deal with the rate of gas supply required.

5.3 Gas Supply Pipes

Supply pipes must be fitted in accordance with **BS 6891 or IGE/UP/2**. Pipework from the meter to the boiler must be of adequate size. Do not use pipes of a smaller size than the boiler gas connection. The complete installation must be purged and tested for soundness as described in **BS 6891 or IGE/UP/1** and **IGE/UP/1A** as appropriate.

A manual shut off valve must be fitted on the incoming gas supply pipe, adjacent to each boiler, in an easily accessible position.

5.4 Boosted Gas Supplies

Where it is necessary to employ a gas pressure booster, the controls must include a low pressure cut-off switch at the booster inlet. The local gas region must be consulted before a gas pressure booster is fitted.

5.5 Boiler House Gas Control Valve

A manual valve for boiler house isolation shall be fitted in the gas supply line. It shall be clearly identified and readily accessible for operation, preferably by an exit.

6.0 FLUE SYSTEM

6.1 General Requirements

Detailed recommendations for flue systems are given in **BS 6644, IGE/UP/10**, "Flues for Commercial and Industrial Gas-Fired Boilers and Air Heaters."

The following notes are intended to give general guidance only.

The flue passages within the Spetisbury operate under pressurised conditions and in order to eliminate any additional resistance, it is recommended that the flue system shall be adapted to its design diameter as soon as possible, after leaving the boiler.

The boiler should be connected to a single flue system in the case of a single boiler, or a common flue header in the case of a multiple boiler installation. Flue systems must be self supporting, contain access for cleaning and contain a maintenance joint near the boiler outlet to allow for removal of the flue box during servicing.

Spetisbury boilers are suitable for installation in a balanced compartment in accordance with the requirements of **BS 6644**. Consult Hamworthy Heating Technical Department for help or assistance if in doubt.

6.2 Design Waste Gas Volume and Temperature

It is recommended that the volume and temperature of the waste gases used for design of the flue system are as shown in Figure 15.7.

6.3 Materials

Materials used for the flue system must be mechanically robust, resistant to internal and external corrosion, non-combustible and durable under the conditions to which they are likely to be subjected.

Consideration should be given to possible freezing of condense water traps and pipework. This must be avoided at all times. Insulate condense pipes if freezing temperatures are likely to be encountered.

Chimneys should be lined with a non-porous acid-resistant material in accordance with BS.5854, e.g. a flexible flue liner or similar British Gas Approved material. The internal diameter of the liner must not be less than the recommended flue size and the number of joints should be kept to a minimum.

Any joint between the flexible liner and the flue pipe from the boiler should be made using a purpose made connector. Existing chimneys should be thoroughly swept before use and any register plates, dampers, or restrictions removed.

If the boiler(s) is not connected to a chimney system, but is connected directly to outside by a standard stainless steel flue (either single or twin wall) it is particularly important to ensure that the

point at which it exits the building is fully weatherproofed.

6.4 Suction

The flue system should be designed to maintain atmospheric pressure or a slight suction at the boiler flue connection at all times (0.1 - 0.3mbar). It is recommended that a draught stabiliser is fitted to the flue system where the suction is likely to exceed 0.3mbar.

6.5 Disconnection

Provisions should be made for disconnection of the flue pipe for servicing. It is advisable that bends are fitted with removable covers for inspection and cleaning as appropriate. **NOTE!** The flue system must be self supporting and not present a risk to people in or around the building.

See **Section 13: SERVICING** for further information.

6.6 Flue Discharge

The flue system must ensure safe and efficient operation of the boiler to which it is attached, protect the combustion process from wind effects and disperse the products of combustion to the external air.

The flue must terminate in a freely exposed position and be situated so as to prevent the products of combustion entering any opening in a building. Consideration should be given to the fitting of a flue discharge terminal or grille to stop the ingress of birds etc.

The flue system should be designed such that the flue terminates at least 1 metre above the roof surface, or above the level of any nearby structure which is within 2.5 metres of the flue.

6.7 Surface Temperatures

Combustible materials in the vicinity of the boiler and flue shall not exceed 65 °C during boiler operation. The flue shall not be closer than 50mm to any combustible material, except where it passes through such material with a non-combustible sleeve when the air gap may not be less than 25mm.

6.8 Flue System Location

The flue system must not be placed or fitted where there is undue risk of accidental damage to the flue pipe or undue danger to persons in the vicinity. **NOTE!** The flue **MUST** be self supporting. Check that the flue and chimney are clear from any obstruction.

6.9 Condensate Discharge

When designing the flue system, care must be taken to ensure that any condensate which may form within the system, can be safely drained to a suitable waste point and, that the flue material used is resistant to the corrosive effects of that condensate.

7.0 AIR SUPPLY

Detailed recommendations for air supply are given in **BS 6644**. The following notes are intended to give general guidance. In all cases there must be provision for an adequate supply of air for both combustion and general ventilation, in addition to that required for any other appliance.

7.1 Air Supply By Natural Ventilation

The boiler room must have, or be provided with, permanent air vents directly to the outside air, at high level and at low level. For an exposed boiler house, air vents should be fitted preferably on all four sides, but at least on two sides. Air vents should have negligible resistance and must not be sited in any position where they are likely to be easily blocked or flooded or in any position adjacent to an extraction system which is carrying flammable vapour. Grilles or louvres must be so designed that high velocity air streams do not occur within the space housing the boiler.

The air supplied for boiler house ventilation shall be such that the maximum temperatures within the boiler house shall be as follows:

- 1) At floor level (or 100 mm above floor level) = 25 °C.
- 2) At mid-level (1.5 m above floor level) = 32 °C.
- 3) At ceiling level (or 100 mm below ceiling level) = 40 °C.

Where both low and high level openings are used, the grilles shall have a total minimum free area of :-

Low Level (inlet) 540cm² plus 4.5cm² per kW in excess of 60 kW total rated input (gross).

High Level (outlet) 270cm² plus 2.25cm² per kW in excess of 60kW total rated input (gross).

7.2 Air Supply By Mechanical Ventilation

Air supplied to the boiler room by mechanical means should be as follows :-

1) Mechanical inlet and mechanical extract can be utilized providing design extraction rates comply with Figure 7.1.

2) Mechanical extract ventilation with natural inlet ventilation **MUST NOT** be used.

NOTE: For mechanical ventilation systems an automatic control should be provided to cut off the gas supply to the boiler, in the event of failure of air flow in either inlet or extract fans.

Forced Draught Boilers	Flow Rate per 1000 kW	
	Inlet air (Combustion Ventilation)	Extract air (Ventilation)
	m ³ /s	m ³ /s
Volume	0.9	0.6

Figure 7.1 Mechanical Ventilation Flow Rates

8.0 WATER CIRCULATION SYSTEM

8.1 General

Recommendations for the water circulation system are given in **BS 6644** and **CP 342**. The following notes are of particular importance:-

- 1) In a combined central heating and hot water system, the hot water storage vessel must be of the indirect cylinder or calorifier type. The hot water storage vessel should be insulated preferably with not less than 75mm (3 in) thick mineral fibre, or its thermal equivalent.
- 2) Circulating pipework not forming part of the useful heating surface should be insulated to help prevent heat loss and possible freezing, particularly where pipes are run through roof spaces and ventilated cavities. Cisterns situated in areas, which may be exposed to freezing conditions, should also be insulated. Insulation exposed to the weather should be rendered waterproof.
- 3) Drain valves must be located in accessible positions which permit the draining of the whole system, including the boiler and hot water storage vessel.
- 4) Each boiler has 4" N.B. Flanged flow and return connections located on the rear section of the boiler. Mating flanges are supplied suitable for welding to 4" NB pipe.
- 5) Multiple boilers should be connected by flow and return headers. Headers should be connected to the system in a "reverse return" arrangement (the water flow in each header is in the same direction) to ensure equal flow in each module.

8.2 Pressure Relief Valve (Safety Valve)

The most important single safety device fitted to a boiler is its safety valve and each boiler, or in the case of a modular installation, each bank of boilers, must be fitted with a pressure relief valve to **BS 759** or **BS 6759** Part 1 (**ISO 4126**) and sized as shown in **BS 6644**.

BS 6644 provides comprehensive information for the selection and location of safety valves and attention is drawn to the higher capacity requirements of safety valves for pressurised hot water systems.

8.3 Open Vent and Cold Feed Pipe

(See **BS 6644** for further information.)

Every boiler or group of boilers should have an open vent pipe and cold feed pipe installed between the boiler and the first water isolating valve. The minimum bore (mm) of these pipes per installation are detailed in Figure 8.3.

The vent pipe must rise continually, must not be valved except by a design which when closed for maintenance the boiler is open to atmosphere. The pipe shall be protected against freezing where this might occur.

8.4 Altitude Gauge (Water Pressure Gauge)

Every boiler or group of boilers should be provided with a gauge complete with isolating valve. See Figure 15.1 for typical position.

Boiler Output	Feed	Vent
60kW - 150kW	25	32
150kW – 300kW	32	38
300kW – 600kW	38	50

Figure 8.3. Cold Feed and Vent Pipe Sizes (mm)

8.5 Thermometer

See Figure 15.1 for typical position. A thermometer complete with pocket should be fitted in the pipework to indicate water flow temperature.

8.6 Drain Valves

Each boiler should have ¾" NB drain valve fitted (not HHL supply), to drain the boiler only. A plugged Rc ¾" connection is provided for a drain valve at the bottom of the front boiler section. The heating system in total should have drain valves as recommended by **BS 6644**. See Figure 15.1 for recommended positions.

8.7 Circulating Pump

One or more circulating pumps will be required to circulate water around the boilers and heating system. The pump should be sited to facilitate servicing. It is also important that the existing system be flushed through twice to remove any loose matter, which may have accumulated. If in any doubt regarding the cleanliness of the system, a coarse filter should be fitted in the return pipework to the boilers.

NOTE: If boilers are run off time clock control, a pump overrun (not HHL supply) should be fitted which must run for a minimum of 5 minutes on shut-down of the last boiler.

8.8 Minimum Water Flow Rates

Minimum water flow rates are shown in Figure 3.1. These flow rates should be maintained through the boiler at all times whilst the boiler is firing. If the water flow rate is allowed to fall below the minimum, the boiler heat exchanger could fail due to the resultant scale formation. Particular attention should be paid to the restriction of external flow circuits during periods of low heat demand.

8.9 Control Schemes

8.9.1 Temperature Controls

An adjustable control thermostat is supplied with each boiler and should be set to operate within the range 65-90°C for standard applications. A temperature limiter, (hand reset limit thermostat) is also fitted to the boiler and must be set at 100°C.

NOTE! The minimum difference between control thermostat and temperature limiter **must never** be less than 10°C.

Where the system is operating on a DT of 20°C, care should be taken to ensure that the return temperature does not fall below 50°C.

8.9.2 Water Flow Controls

Any external mixing valve/shunt pump or similar controls should **ALWAYS ENSURE** that the minimum water flow rate as shown in Figure 3.1 is maintained.

8.9.3 Frost Protection

Consideration should be given to fitting a frost thermostat set at approximately 4°C.

8.10 Unvented Systems

See Figure 15.1 for typical layout of a Unvented (Pressurised) Hot Water System. For system design refer to **BS 7074 Part 2**.

In order to correctly size a pressurisation unit for any heating system certain parameters are required. These are:-

- 1) Static height of highest component in system (metres).
- 2) System volume - if it is not known a general rule of thumb of 10 litres/kW of installed boiler power can be used.
- 3) Maximum flow temperature (°C).
- 4) Maximum system hot working pressure, generally given in bar g.

From the above information Hamworthy Heating can size the pressurization unit and also the expansion vessel required. Care must be taken in sizing expansion vessels to ensure maximum acceptance factors are not exceeded. Normally manufacturers of vessels impose a limit of 0.5. This value must not be exceeded at any time during the operation of the boiler: this includes the over pressure condition should a safety valve lift.

Consideration should also be given to sizing of the safety valve(s) in the system. See **BS 6759: Part 1**, for information. See also **BS 6880: Part 1** for design considerations.

8.11 Modular Boiler Control Schemes

For modular boiler installations, Hamworthy Heating can supply a unique boiler management control system called the 'Marshall HE'. This system comprises: a wall mounted master control unit, which houses the main interface processor and will control up to 8 stages. For further information, contact Hamworthy Heating for details.

9.1 ELECTRICAL INSTALLATION

The electrical installation should be carried out by suitably qualified and competent personnel. Before commencing the installation, ensure that all electrical supplies to the burner are disconnected and that the gas supply is turned off.

Figure 9.1 shows the electrical wiring diagram for the burner. Connections must be made to supply 230V / 50Hz Live, Neutral, Earth and the (green/black) NTC temperature sensor plug must be correctly fitted.

You must always comply with the basic safety and electrical regulations that are in force when carrying out the electrical installation of the burner. This includes statutory Regulations and National and International Standards where they apply.

A means of disconnection from the supply having a separation of at least 3mm in all poles must be provided.

Always ensure that equipment is connected to the earthing system and never reverse the Live and Neutral connections.

9.2 GAS TRAIN INSTALLATION

The gas train installation should be carried out by suitably qualified and competent personnel. Before commencing the installation, ensure that the gas supply is turned off and that all electrical supplies to the burner are also disconnected.

When connecting a pipe to the Gas Valve Inlet always use a sound taper fitting with thread according to ISO 7-1 or a piece of new, properly reamed pipe, free from swarf, dirt or debris.

Flanges are provided to allow for a pipe size of 3/4" for SP110, SP150, 1" for SP220 and 1 1/4" for SP280 and SP340 models with a threaded length of 13mm. Do not thread or tighten the pipe or pipe fitting more than the 13mm as this could damage or distort the Gas Valve.

Always include a manually operated shut-off valve and means of burner disconnection in the gas train when carrying out the installation. This is required to isolate the burner for maintenance and servicing requirements, or for when the burner is taken out of use for prolonged periods.

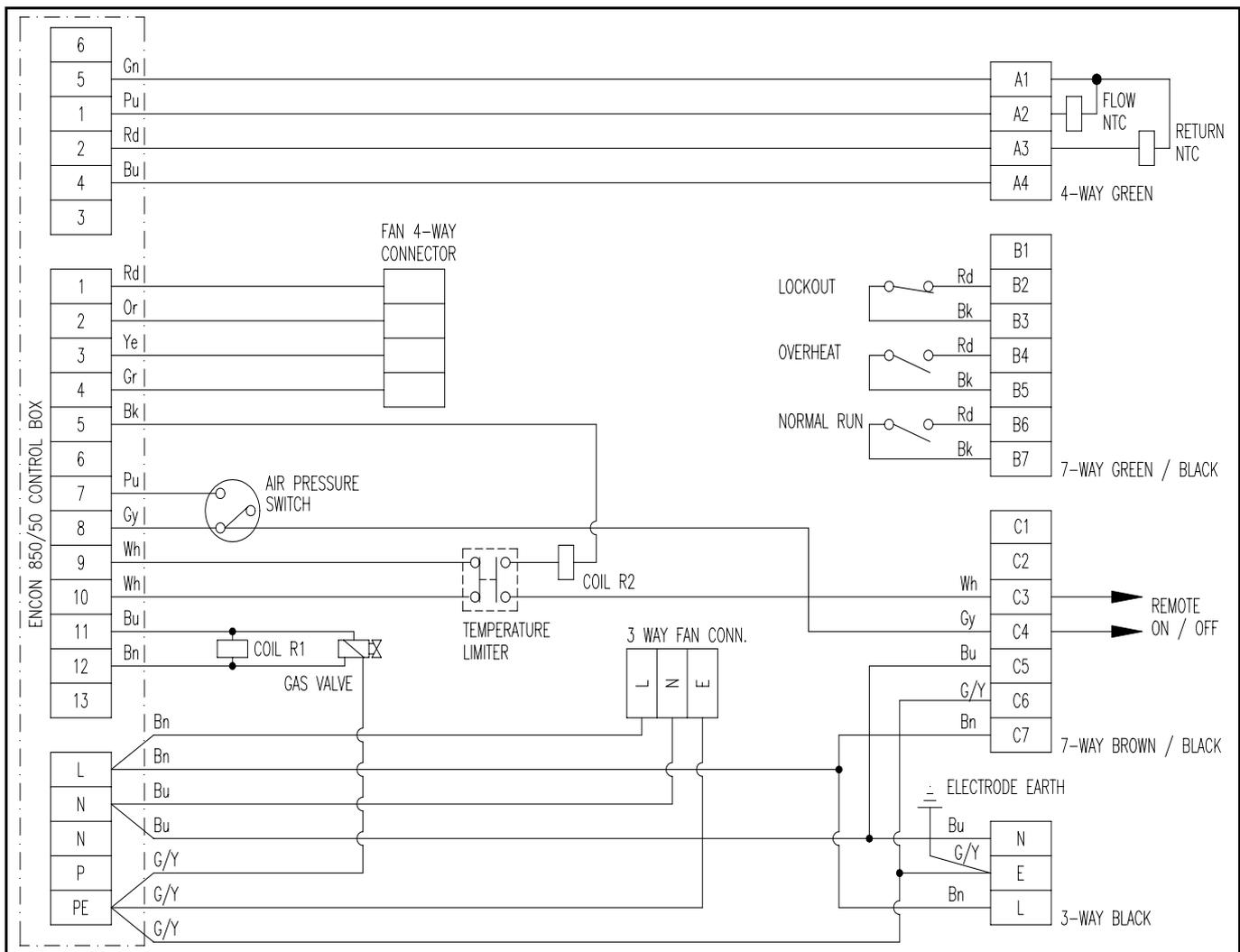
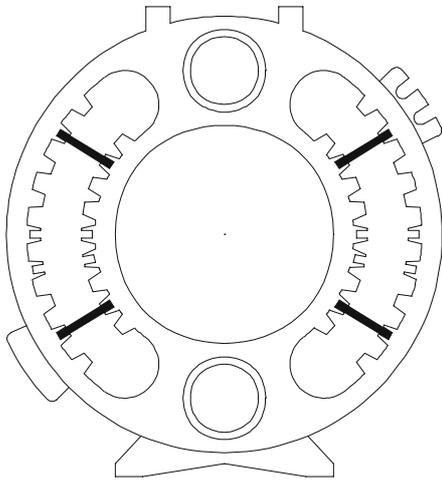
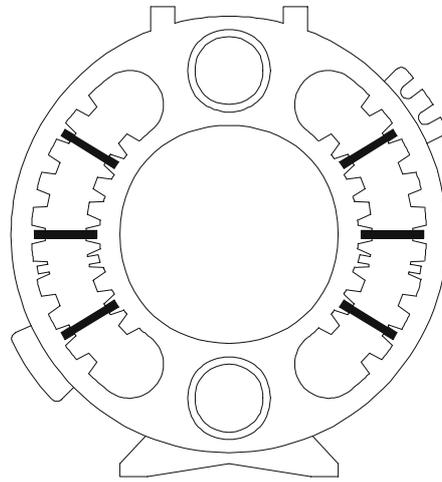


Figure 9.1 Electrical Wiring Diagram

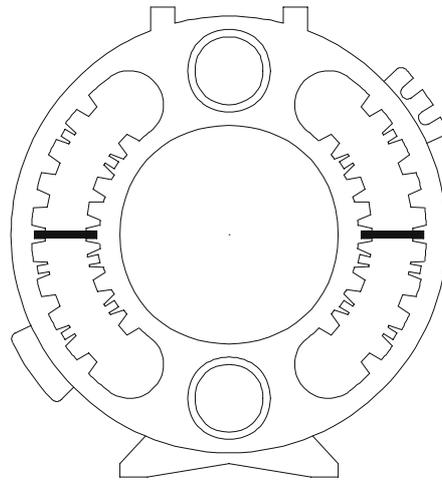
Figure 10.2 – Boiler Section Identification



A Rear Intermediate section (RI)
Fitted with 4 flue plates



B Intermediate section (I)
Fitted with 6 flue plates



C Front Intermediate section (FI)
Fitted with 2 flue plates

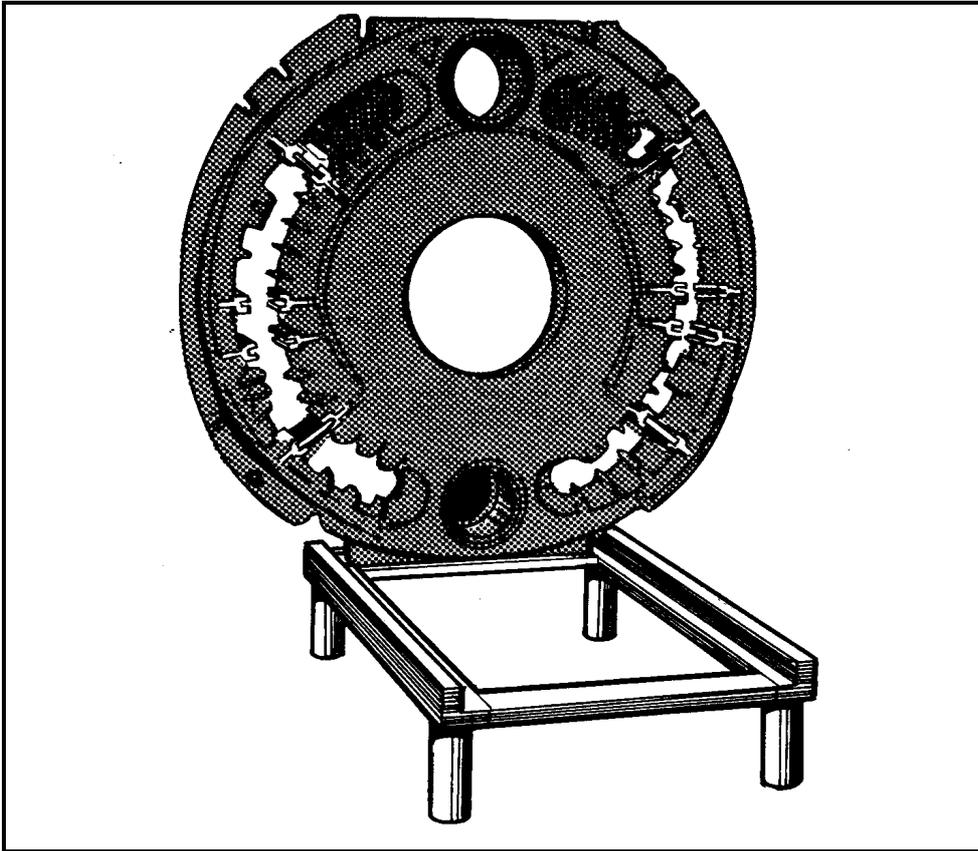


Figure 10.3 – Rear Section and Cradle

a. Position rear section (Item 4) onto end of cradle (Item 1) (Fig. 10.3) ensuring that it is safely supported. Sections can be lifted by utilising suitably tested and protected straps through the ports or flueways.

IT IS MOST IMPORTANT THAT THE BACK EDGES OF THE FEET ON THE CASTING ARE FLUSH WITH THE REAR OF THE CRADLE TO ALLOW FOR CORRECT FITTING OF THE CASING.

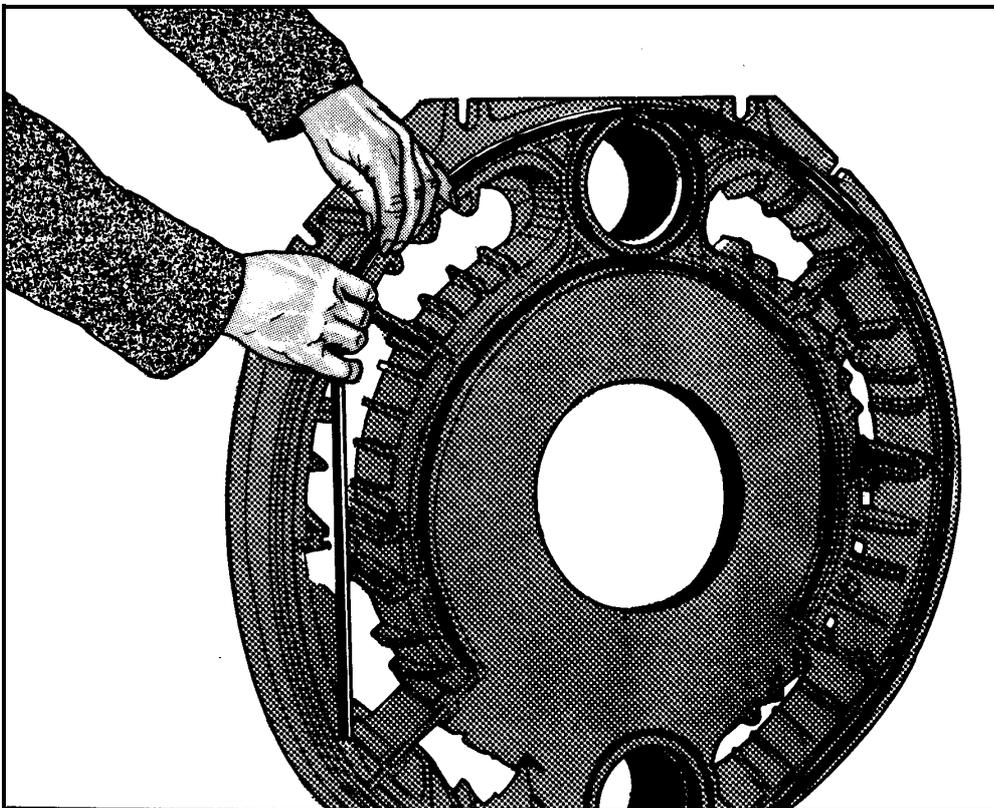
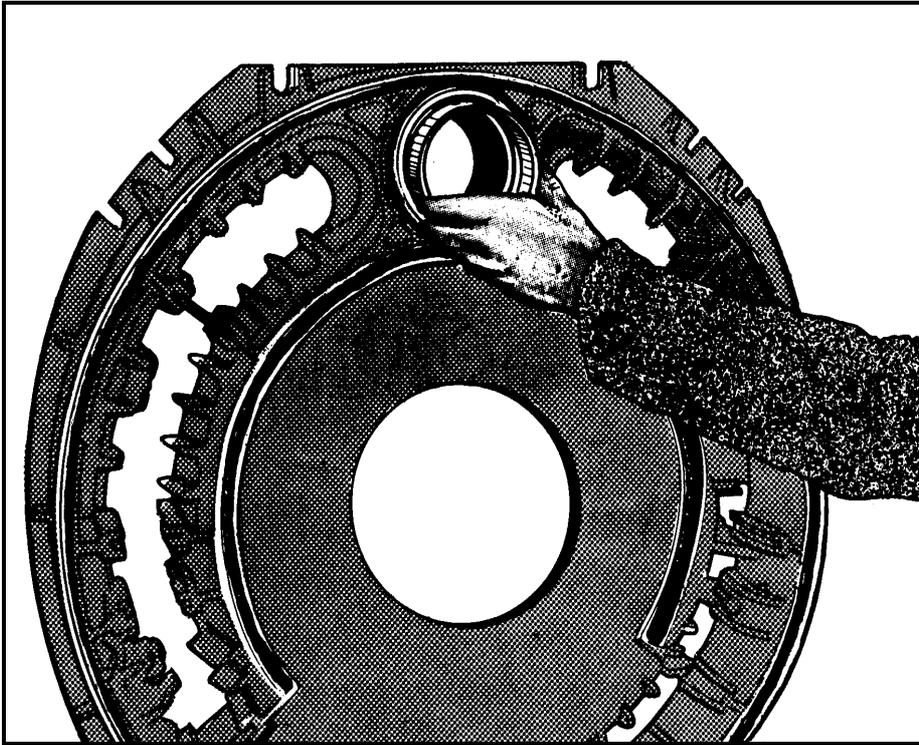


Figure 10.4 – Fitting Mastic Seal

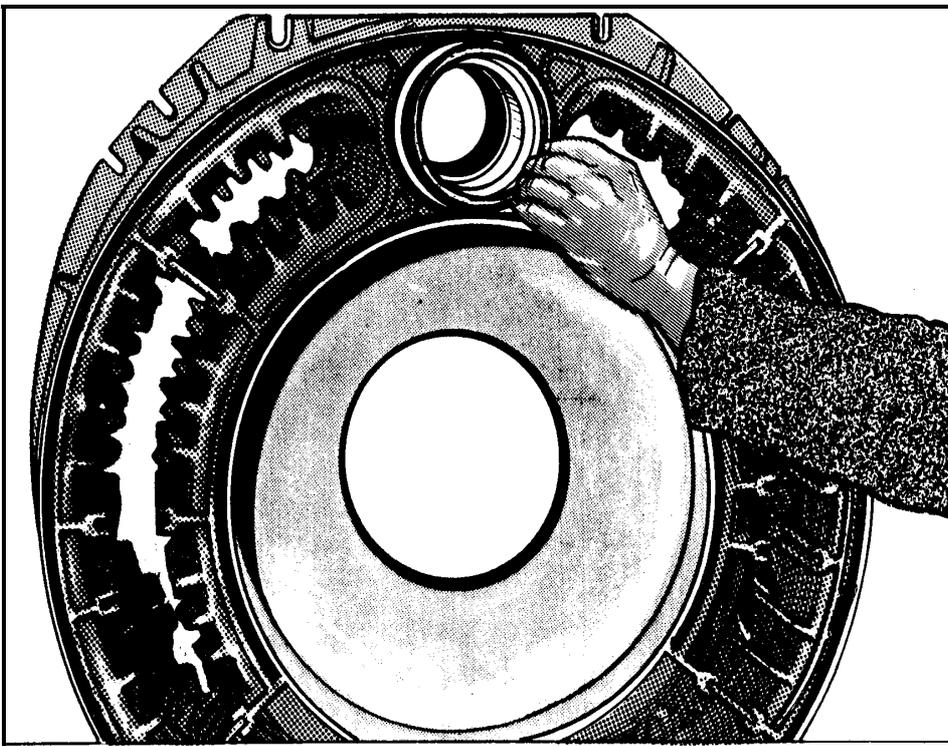
b. Fit sealing mastic to grooves around both perimeter of section and combustion chamber (Fig. 10.4). Should mastic rope break during this operation, the two ends **MUST** be overlapped to avoid any leakage.

N.B. Particular care should be taken in placing a mastic seal around both ports to protect the 'O'-ring gaskets.



c. Insert guide rings (6) into both upper and lower ports and fix in place using a small piece of the mastic sealing material (Fig. 10.5).

Figure 10.5 – Fitting Guide Ring



d. Carefully fit 'O'-ring gaskets (5) over guide rings to locate into machined recess around perimeter of port (Fig. 10.6).

Figure 10.6 – Fitting 'O'-Ring Seal

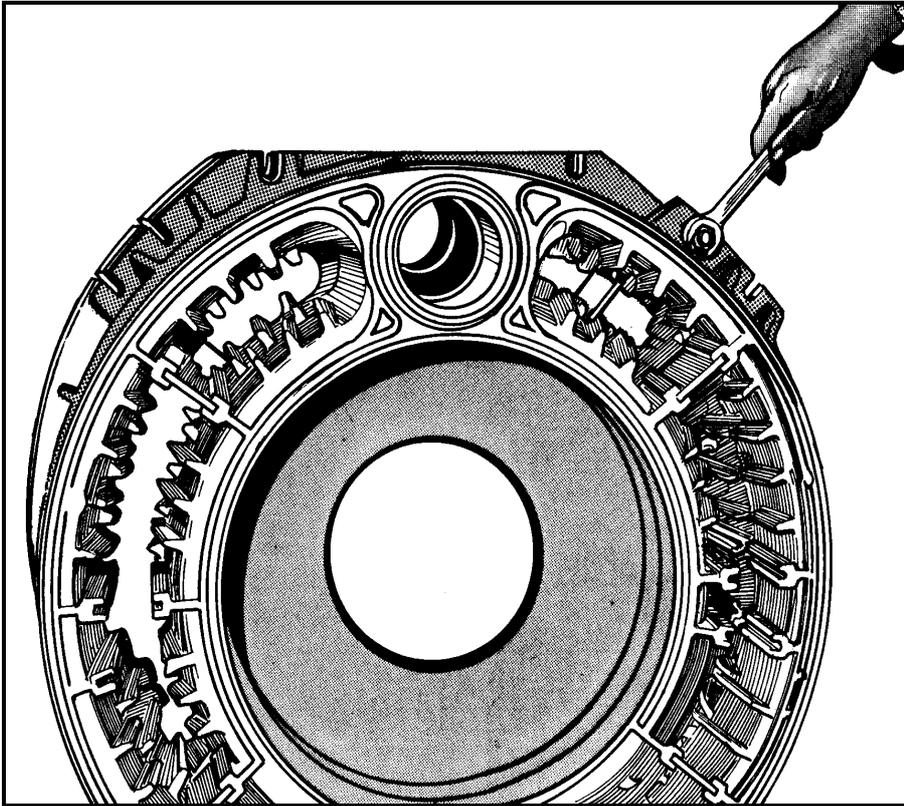


Figure 10.7 – Fitting Lacing Bolts

e. Place the next correct section (Item 3) onto the cradle and fit to rear section, carefully locating guide rings into ports and ensuring that 'O'-ring seals are correctly located between the machined faces and are not pinched or damaged.

f. Fit one of the lacing bolts (29) provided through each of the UPPER RIGHT and LOWER LEFT pairs of bolt flanges on the sections (Fig 10.7). Tighten the bolts EVENLY to a torque of 25Nm (18 lbf. ft.)

N.B. These bolts are intended only to keep the sections together during assembly. To avoid undue stress during expansion of boiler they should NOT be overtightened.

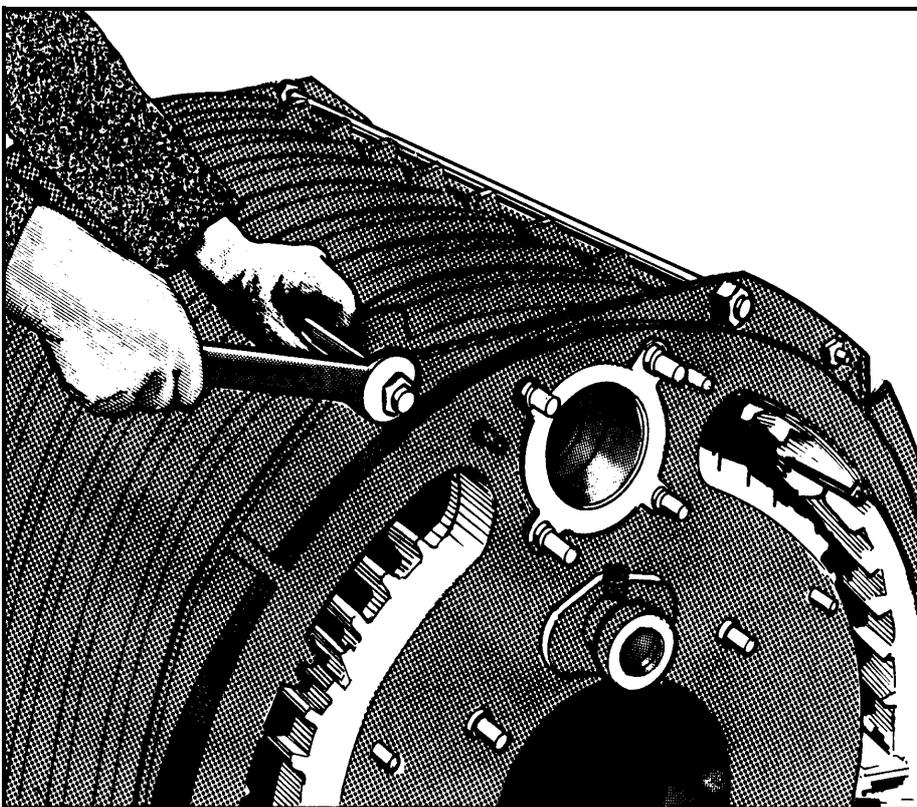


Figure 10.8 – Fitting Upper Tie Rods

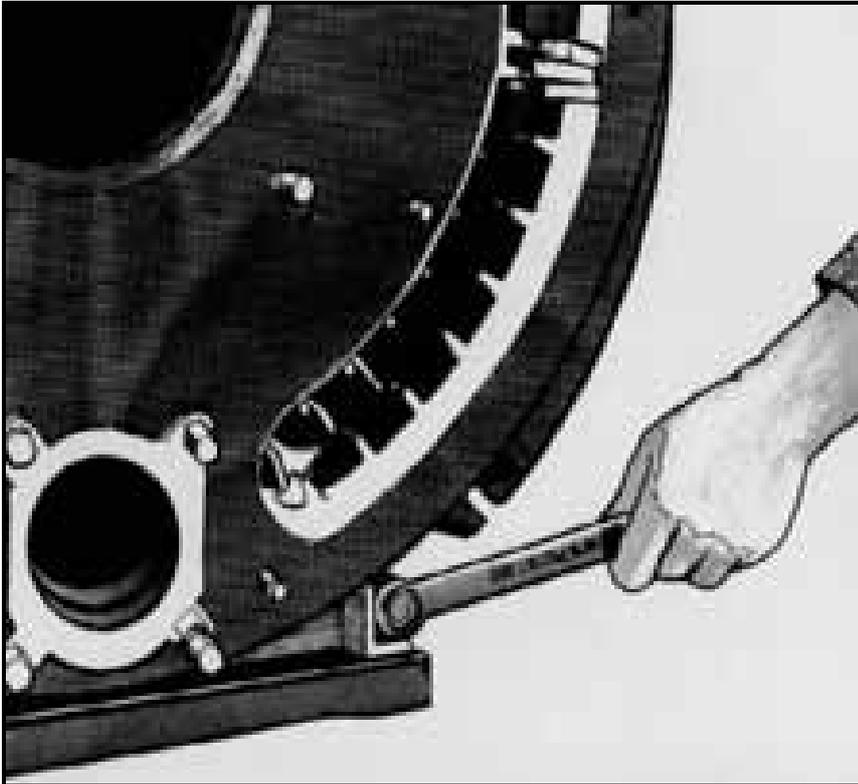
g. Repeat the above procedure for the remaining sections in the correct order ensuring that:

- * Mastic sealer is fitted into groove around perimeters of every section and port.

- * Guide rings and 'O'-ring seals are correctly fitted.

- * Lacing bolts are fitted and not overtightened.

- * Flue plates (19) are correctly positioned.



h. After fitting front section (2), fit the four tie rods (30) through the lugs on top and bottom of front and rear sections (Figs 10.8 & 10.9). Tighten tie rod nuts to a torque of 45 Nm (34 lbf.ft)

Figure 10.9 – Fitting Lower Tie Rods

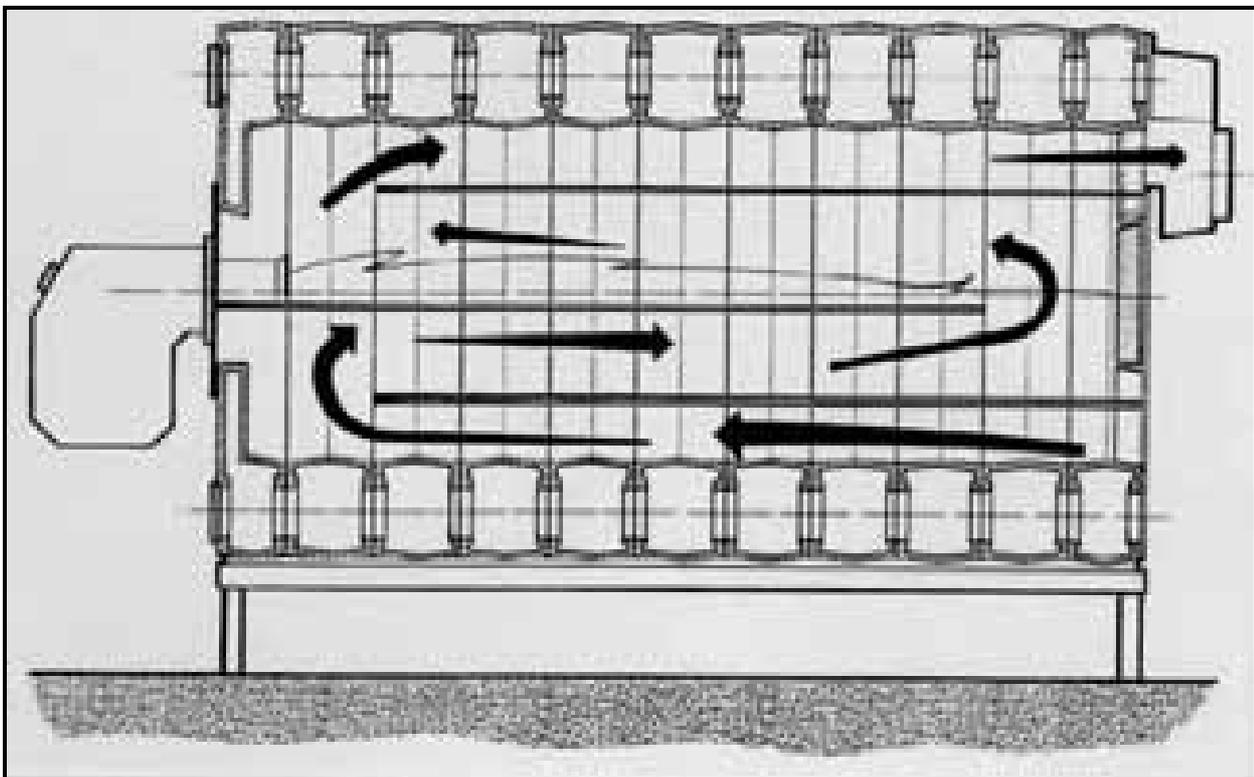


Figure 10.10 – Flue Gas Flow Path

- i. Fit thermostat pocket (18) in top and bottom of front section, and 3/4" BSP drain plug or cock (not supplied) to bottom of front section (See Fig. 14.3 for fitting instruction).
- j. Fit heating flow pipe elbow (28) to top of rear section, note correct orientation.

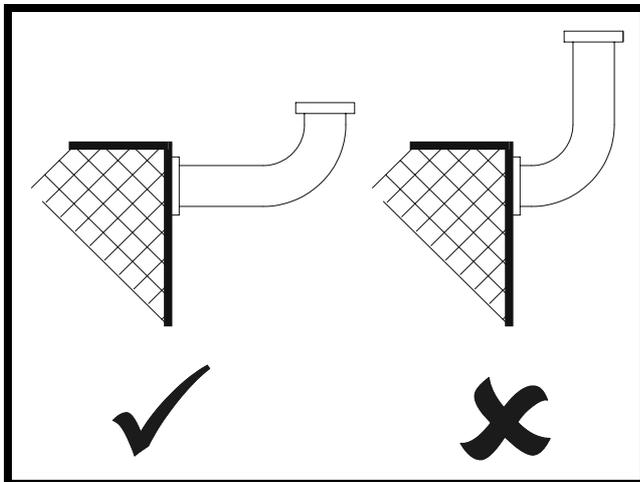


Figure 10.11 – Outflow Pipework Orientation

- k. Fit water distribution tube (11), holes uppermost, into the return connection at bottom of rear section. (Note: Not required on SP 110, 150 and 220.
- l. On completion of assembly, the heat exchanger should be hydraulically pressure tested to 1.5 times the maximum system pressure for 30 minutes (BS779 - 1989, Amendment 1 - 1993).

10.4 Assembly of Boiler.

Further to assembly of the sections, proceed as follows (refer to Fig. 14.1):

- a. Locate and fit the flue collector box (23) to the upper part of the rear casting using the studs, nuts and gaskets (22) provided. The rear access doors (25,26) will need to be loosened to allow correct fitting of gaskets.
- b. On SP 110, SP 150 and SP 220 models, locate and fit the burner mounting plate (13) ensuring that the pads of insulation are packed into the burner aperture and that the fibre board gasket (12) is in position. Carefully cut a hole through both the fibre pads and board, large enough to accept the burner blast tube. **Note!** Burner mounting plate **NOT** required on SP 280 and SP 340 models.
- c. Locate the foil covered insulation wrap which comprises a front blanket, a rear blanket and lengths of straight wrap. Position the front and rear blankets on the boiler so that the cut outs align with the appropriate items, i.e. burner mounting plate, thermostat pocket, flue collector and return connection. Mould the excess wrap backwards around the edges of the boiler sections and tape to secure. Position the straight wraps over the boiler body. Where more than one wrap is used, they

should be overlapped so that the front and rear edges fall flush with the front and rear of the boiler. Secure wraps in position by using tape or strapping and buckles. For further details, see instruction sheet packed with insulation.

Note! The front and rear insulation pieces will need to be removed for maintenance of the boiler.

- d. Using a combination of M10 x 35 hex head bolts, nuts and washers and existing tie rods fit 4 off casing support brackets as shown below.

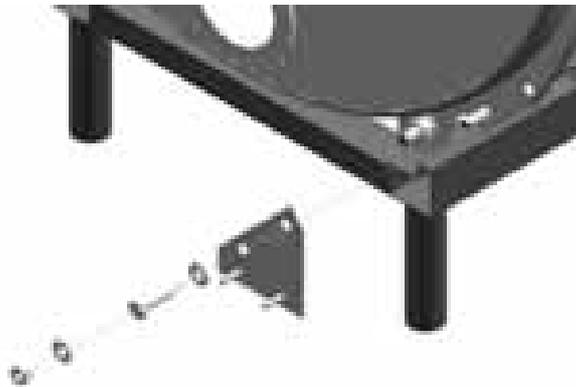


Figure 10.12 - Fitting Casing Support Brackets

- e. On SP 110, SP 150 & SP 220 models locate burner onto mounting plate. On SP 280 and SP 340 models locate burner directly on to boiler front casting.
- f. Complete all pipework connections and fuel lines.
- g. Complete installation by fitting casing and sensors - refer to Section 10.5, 10.6, Fig. 10.13 to 10.21 and Fig. 14.3.

10.5 Casing Assembly

Figure 10.13

1. Using M6 nuts and washers fit front and rear cross members to M6 studs protruding from body of boiler.

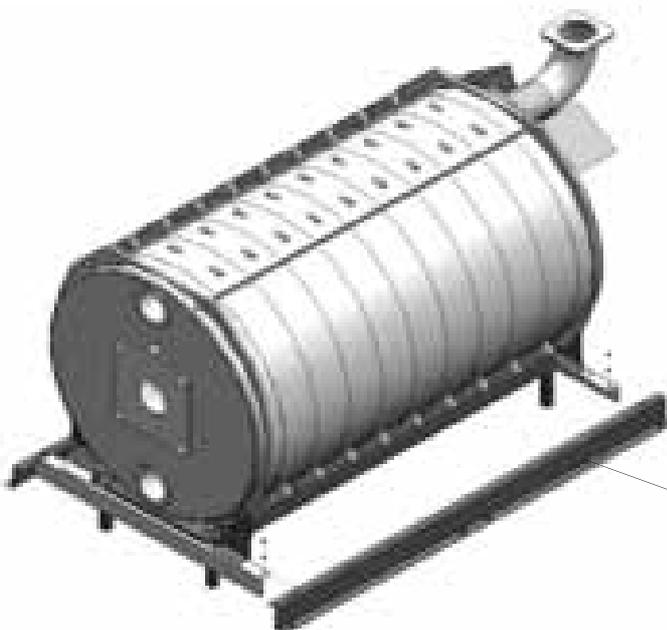
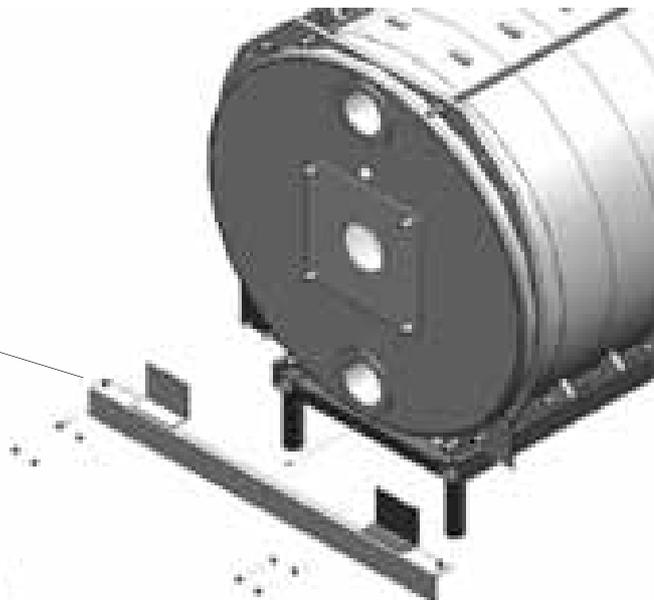


Figure 10.14

2. Using M6 nuts and washers fit casing support rails to M6 studs on front and rear cross members.

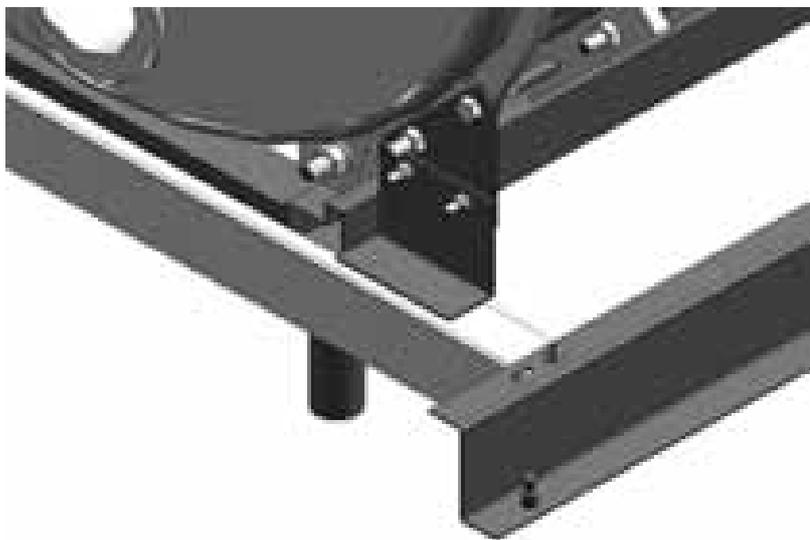


Figure 10.15

Note position of slot as viewed from front of boiler.

Figure 10.16

3. Snap side panels into position on side rails locating ball stud fasteners on base of side panels into mating latches on side rails.

4. Snap cross struts into position to anchor side panels in position.

5. Attach casing support strut to front edges of side panels and secure with M5 x 10 pozi screws and washers.

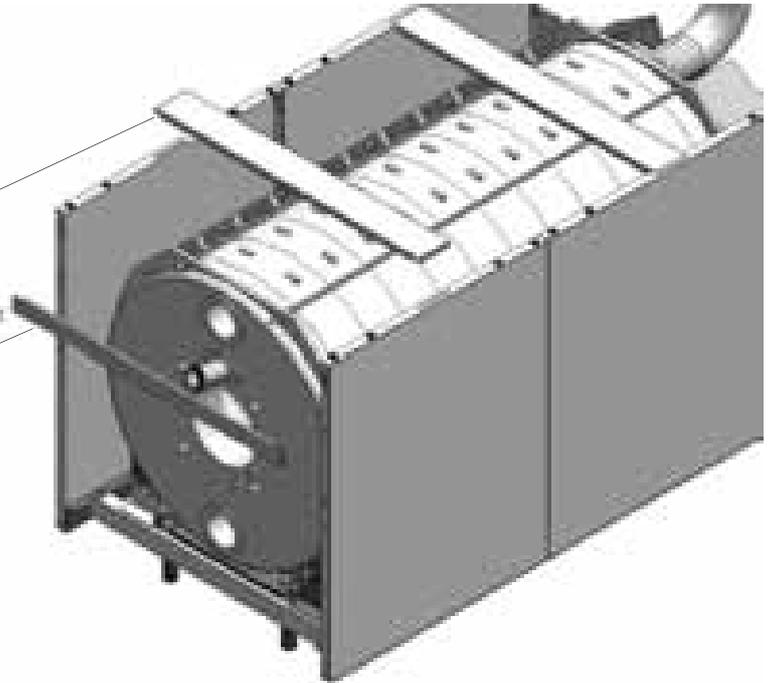


Figure 10.17

Note: On assemblies with two side panels, secure panels together with M8 x 16 hex head screw, nut and washer utilising the 9mm diameter hole towards the top of the side panel.

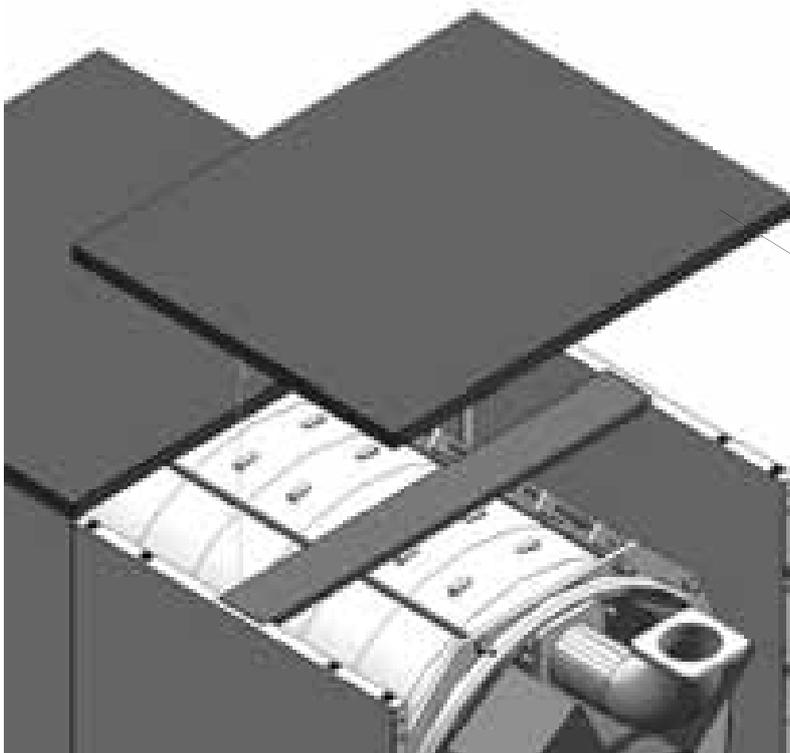


Figure 10.18

6. Snap top panel(s) into position, locating on pre-fitted latch and strikers. Note that top panel should overlap to the front.

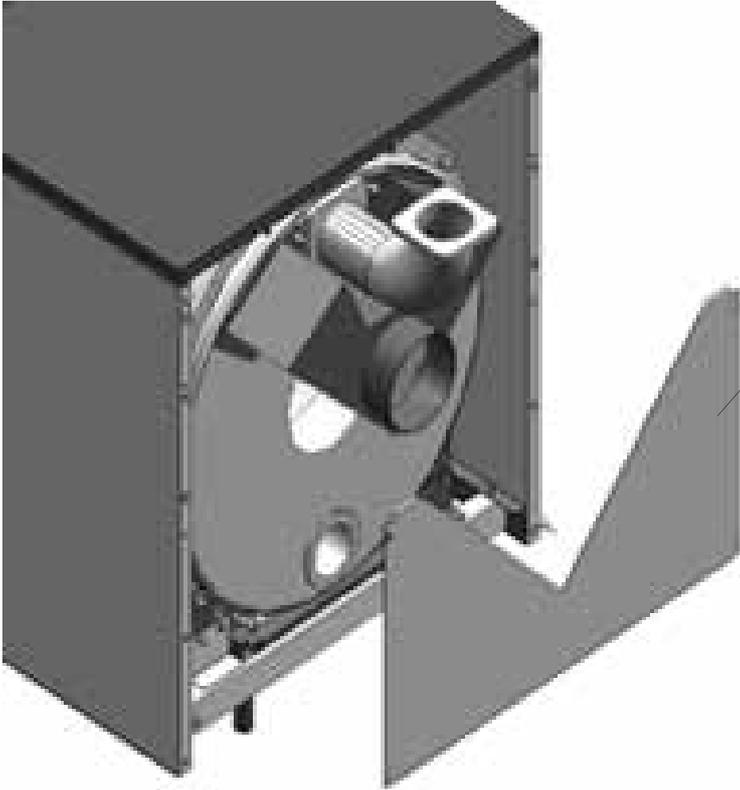
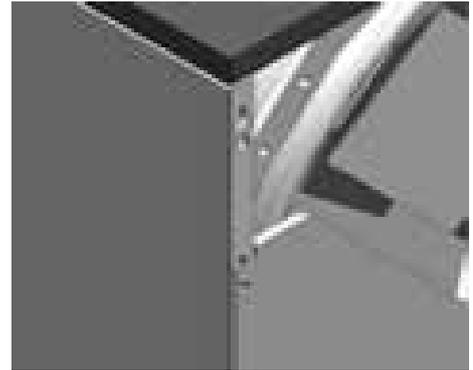


Figure 10.19

7. Position and fit rear cover to rear of casing using M5 x 10 posi screws and washers.

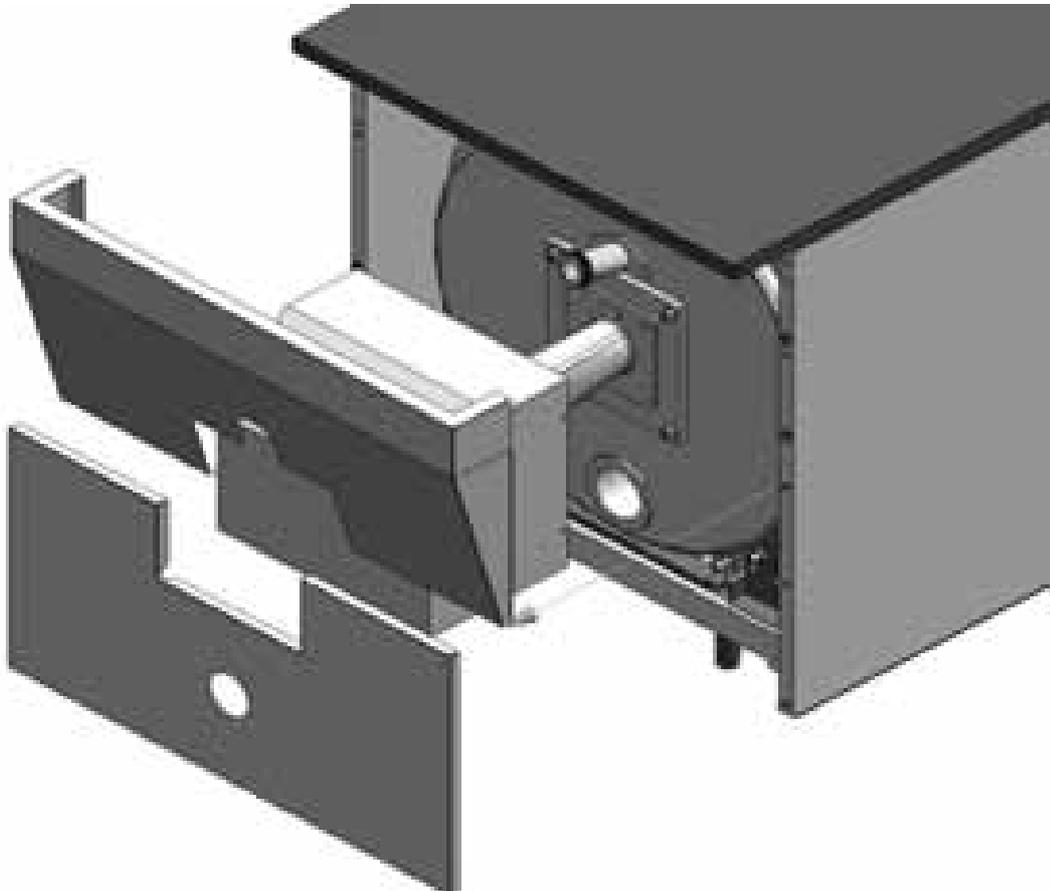
Figure 10.20

Note: Ensure that rear cover is located in correct position as indicated below.



8. After mounting burner on burner mounting plate, fit plastic strikers and latches to upper and lower covers and side covers then snap covers into place.
Note: Attach edging to bare edges of upper top panel.

Figure 10.21



10.6 BURNER CONTROL AND ADJUSTMENT

10.6.1 Fan Speeds

The fan speeds for the Spetisbury range of burner are pre-set and should not require adjustment. Although max/min speeds can be adjusted if required, adjustment of the ignition speed is not recommended as this may affect the reliability of operation.

10.6.2 Starting Up

AS WITH ALL FORCED DRAUGHT BURNER SYSTEMS THE SPETISBURY SP PREMIX BURNER MUST BE SET UP CORRECTLY TO ENSURE SATISFACTORY AND RELIABLE OPERATION

Note: The air pressure switch on this burner is factory set and should not require adjustment.

Before attempting to light the burner for the first time, suitably competent personnel should inspect the installation to ensure the following;

- a) That all electrical safety circuits are made and the electrical installation has been carried out according to the instructions in this manual.
- b) There must be an adequate ground to the burner and the Live and Neutral should be correctly connected.
- c) The gas pipe work is of a suitable size for the burner requirements and the installation has been checked for leaks and fully purged.

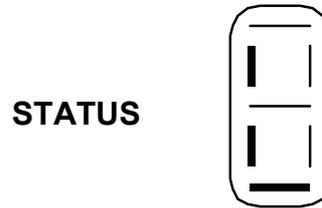
On turning on the burner the display should be as show in Fig 10.22 below.

Press the start button and after a few seconds the burner should start to pre-purge. Ignition will commence and the fan will stay at ignition speed for 10 seconds. The burner is pre-programmed with a step-control, so it will not reach maximum fan speed for approximately 90 seconds.

Once the burner has reached maximum fan speed check the CO₂ levels. These should be the same as shown in the table below:

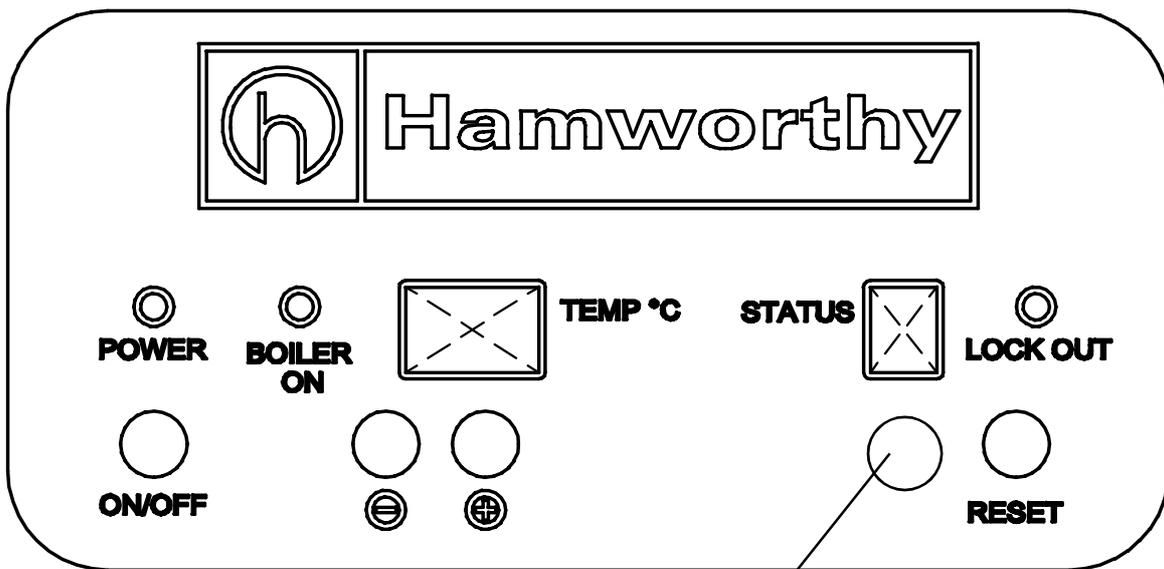
CO	CO ₂
<10ppm	9.4%±0.2

Drive the fan speed manually to the minimum setting. This is done by pressing and holding down for 3 seconds the hidden button below the 'STATUS' figure at the same time as the '-' (minus) button. See Fig. 10.22 below. The 'STATUS' figure will now show;



Check for adequate flue gas temperature and CO₂ levels. The CO₂ should now be as shown in the table below.

CO	CO ₂
<10ppm	9.3%±0.2



Hidden button for fan speed adjustment.

Fig 10.22 Burner Display Panel

10.6.3 Burner Adjustment

If adjustments are required to obtain the correct flue gas temperature and CO₂ levels, do this by carrying out the following steps;

- a. Manually drive the fan speed to maximum by pressing the hidden button as before, but this time at the same time as the '+' (plus) button. Hold them both down for 3 seconds.
- b. To increase the CO₂ levels at the maximum fan speed, first remove the black plastic throttle security cover. Below this is the 3mm Allen key screw for throttle adjustment. To increase the CO₂, turn the throttle screw anti-clockwise a quarter turn at a time, checking the levels constantly until the desired level is reached.
- c. To decrease CO₂ levels at the maximum fan speed, turn the throttle screw clockwise a quarter turn at a time.
- d. Manually drive the fan speed back to minimum by pressing the hidden button at the same time as the '-' (minus) button. Again, hold them both down for 3 seconds.
- e. Recheck the flue gas temperature and CO₂ levels
- f. To increase CO₂ levels at the minimum fan speed, first remove the dust cover from the regulator on the gas valve. Below this is the white plastic torx offset adjustment screw. Turn the screw clockwise a quarter turn at a time, checking the levels constantly until the desired level is reached.
- g. To decrease the CO₂ levels at the minimum fan speed, turn the screw anti-clockwise a quarter turn at a time, checking the levels constantly until the desired level is reached.
- h. Replace the gas valve security cover.

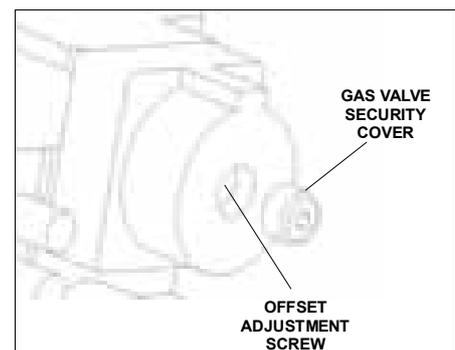
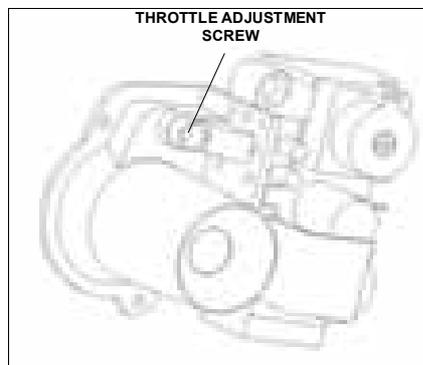
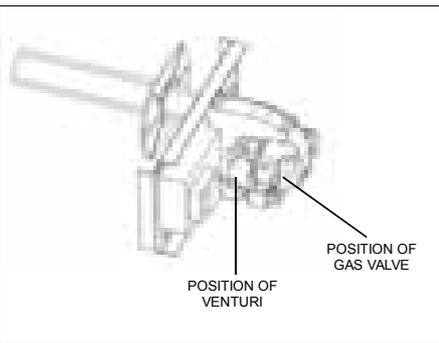


Figure 10.23 - Throttle and Gas Valve Adjustment

- i. Manually drive the fan speed back to maximum by pressing the hidden button at the same time as the '+' (plus) button. Once again, hold them both down for 3 seconds. Check CO₂ / rating.
- j. Recheck the flue gas temperature and CO₂ at minimum rate to make sure that they are still correct. If required the flue gas temperature should be adjusted by altering the minimum fan speed.
- k. When finished, replace both security dust covers over the adjustment screws.

10.6.4 Starting Up and Running

Press the On/Off button on the Burner Display Panel (see Fig. 10.22). After a few seconds the burner should start to pre-purge. Ignition will commence and the fan will stay at ignition speed for a short period. The burner is pre-programmed with a step-control, so it will not reach maximum fan speed for at least 90 seconds after this. The burner should then run normally.

If a lock out condition occurs, refer to the Status Display Lock Out Code Table in the Fault Finding Section of this manual (Section 12.0) to identify the cause. If other faults occur, refer to the Fault Finding Flowchart in Section 12.0. If repairs are deemed necessary ring Hamworthy Heating Technical Department for assistance.

10.6.5 Shutting Down

To switch off the burner, press the On/Off switch on the Burner Display Panel. The burner should shut down immediately.

If required, an external timing device can be attached to the burner to switch it off remotely.

11.0 COMMISSIONING AND TESTING

11.1 Electrical Installation

Wiring **MUST** be checked by a suitably competent person. An isolator correctly fused should be sited close to the boiler. Refer to section 9 and 10 of this manual.

11.2 Gas Installation

For design see **Section 5: GAS SUPPLY**.
The whole of the gas installation including the meter must be inspected and tested for soundness and purged in accordance with the recommendations of **IGE/UP/1** or **IGE/UP/1A** as appropriate.

11.3 Water Circulation System

For design see **Section 8: WATER SYSTEM**.

The system should be thoroughly flushed out with cold water without the pump in position. Ensure all the valves are open.

With the pump fitted the system should be filled and air locks cleared. Vent the radiators and check for leaks.

If the system is unvented the pressurization unit should not be utilized for the initial filling. This should be carried out using a WRC approved double check valve and temporary filling loop. In order to comply with local Water Authority Regulations, this loop must be disconnected when filling is complete. Water treatments should not be fed through the pressurization unit unless permitted by the manufacturer. Check the expansion vessel cushion pressure as detailed by the manufacturer's Installer's Guide.

11.4 Commissioning The Boiler

Only competent persons registered for working on non domestic gas appliances should attempt the following: Before attempting to commission any boiler, ensure that personnel involved are aware of what action is about to be taken and begin by making the following checks:-

- 1) Flueway passages to chimney are clear.
- 2) Adequate ventilation as per **Section 7: AIR SUPPLY** exists in the boilerhouse.
- 3) The system is fully charged with water, ready to receive heat. All necessary valves are open and the pump is circulating water.
- 4) The pipework and valve arrangement is installed to Hamworthy Heating recommendations in such a way that water flow rates will be in accordance with Figure 3.1.
- 5) The gas supply pipework is clear of any loose matter, tested for soundness and purged to **IGE/UP/1** or **IGE/UP/1A** as appropriate.

11.4.1 Boiler Checks Prior To Lighting

BEFORE starting the boiler, check the following:

- a. Check that fuel supply is turned off.
- b. Check that electrical supply is isolated.
- c. Check that electrical installation conforms to the requirements of these Instructions, the IEE Wiring Regulations for electrical installations, and any other local Regulations which apply.
- d. Check boiler castings are undamaged. Remove access plates to check flue plates are correctly located in sections, then replace and reseal.
- e. Check all thermostat bulbs are correctly inserted in the appropriate pockets on the upper and lower faces of the front casing.
- f. Check for water leaks and ensure that both boiler and heating system is full of water and properly vented. On SP 280 and 340 models check distribution tube is fitted.
- g. Check that all drain cocks are closed, and that all isolating valves in flow and return pipework are open.
- h. Check soundness of gas installation and that pipework is purged of air, as detailed in I. Gas. E. Publications IGE/UP/1 or IGE/UP/1A respectively. Check that gas meter is operational and has been checked by the local region of British Gas.
- j. Check that gas meter and supply pipework is of sufficient size to meet the input rating of the burner/boiler. Refer to Figure 15.2.
- k. Check that burner output is correct for size of boiler in question, referring to Figure 15.7

Note: -

Refer to the firing procedure of the burner in Section 10.6 of this manual before firing the boiler.

Always adjust the fuel supply upwards from a low position to ensure that a fuel rich mixture is not achieved.

11.4.2 Gas fired Boilers

- a. Check that ignition electrode and rectification probe are correctly positioned. See Fig. 11.2 below;

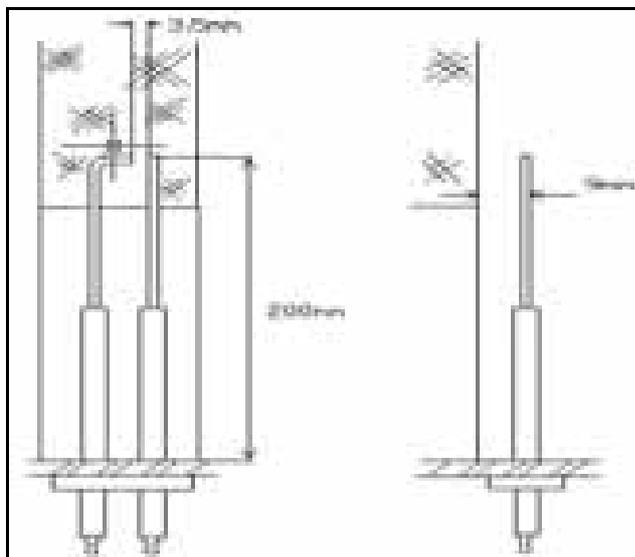


Figure 11.2 - Spark Gap and Electrode Positions

b. Check burner seats correctly onto burner mounting plate and is securely fastened in place.

c. Open main isolating valve in gas supply to boiler. Check for leaks throughout gas train and pipework to boiler.

d. Adjust gas supply governor to achieve at least 17.5 mbar (7.0 in wg) at inlet to boiler gas train. Ensure that maximum pressure of gas train governor is not exceeded. If a gas booster is to be fitted, commission in accordance with the manufacturer's instructions.

e. Close main isolating valve in gas supply and start the burner. The burner control will first operate the fan to pre-purge the boiler, then produce an ignition spark and attempt to ignite the burner. The flame should fail to ignite and the burner should go to lockout after three failed ignition attempts.

f. Open main isolating valve in gas supply. Reset the burner control and restart the burner, the main flame should light at the ignition rate and stabilise for 90 seconds before running up to full rate. Note: the fan speed for start, max/min run is factory set and does not need adjustment (refer to fig 15.7).

g. After allowing burner to reach stable firing conditions for approximately 15 minutes, carry out combustion gas check.

Measure gas pressure at the burner inlet CO₂, CO, flue gas temperature, and circulating water temperature rise across the boiler. The readings obtained for the appropriate gas should be as indicated in figure 11.1, target appliance readings. Readings should be taken at max and min firing rates. Check and adjust parameters to comply with target figures nominated in section 10.6 of this manual.

IF BURNER REPEATEDLY FAILS TO LIGHT, A FULL INVESTIGATION TO FIND CAUSE SHOULD BE MADE.

h. Check gas flow rate at meter. Ensure that all other appliances served by the meter are isolated whilst flow rate is checked.

j. Cycle boiler on and off several times to ensure reliable burner ignition and boiler operation. Check for gas, water and flue gas leakage. Tighten all access, flue box and burner mounting bolts and nuts.

k. Set boiler control thermostat to required setting, and check operation of heating control system.

l. Fully familiarise the user with the boiler operating controls, the main component functions and the safety features.

THESE INSTALLATION AND SERVICING INSTRUCTIONS SHOULD BE LEFT WITH THE USER OF THE BOILER FOR FUTURE REFERENCE.

11.5 External Controls

The external controls used in typical boiler installations, for both vented and unvented systems, are shown in Figure 15.1. If different systems or

controls are to be used and there are any doubts as to the suitability, contact Hamworthy Heating Technical Department for advice.

11.6 Installation Noise

In order to avoid the possibility of noise from the installation, care should be taken to follow the manufacturer's instructions. Particular attention should be paid to minimum water flow rates. If acoustic insulation is added to the boiler, care must be taken not to impede combustion or ventilation air flow. If in doubt contact the manufacturer.

11.7 User Instructions

When the above is complete, the boiler owner or their representative should be made aware of the lighting and operating instructions. A practical demonstration should be given describing each functional step. This Installer's Guide should then be handed over and kept in a safe place for easy reference.

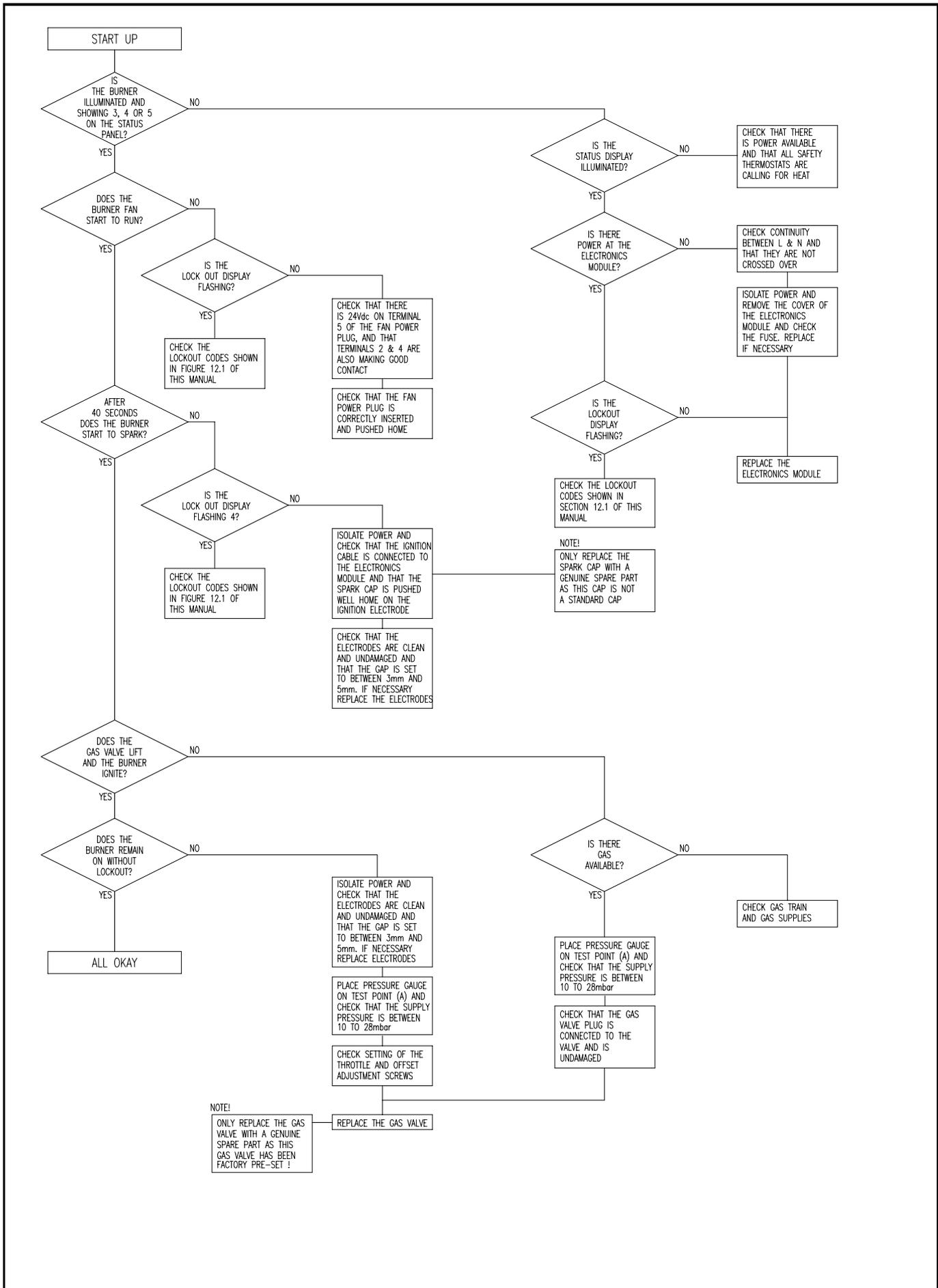
12.0 FAULT FINDING

If the equipment still cannot be operated satisfactorily after following these instructions, consult Hamworthy Heating Technical Department for assistance.

Figure 12.1 - Status Display Lock Out Codes

	Parameter Code	Lock Out Condition
0		Interrupted or short-circuited boiler FLOW temperature sensor (NTC1) Interrupted or short-circuited boiler RETURN temperature sensor (NTC2)
1	1CA 1CB 1CC	Boiler FLOW temperature sensor (NTC1) higher than lock out temperature. Boiler RETURN temperature sensor (NTC2) higher than lock out temperature. Hot water tank temperature sensor (NTC3 - if fitted) higher than lock out temperature.
2	1CG 1CD, 1CF 1CE, 1CH	Boiler FLOW (NTC1) and RETURN (NTC2) temperature sensors have been exchanged. Boiler FLOW (NTC1) and RETURN (NTC2) temperature sensors are not equal in rest position. Boiler FLOW (NTC1) and RETURN (NTC2) temperature sensors are too high while running.
3	2BH, 2BI, 2BJ, 2BK	Too many gradient interventions at boiler FLOW (NTC1) temperature sensor per heat demand.
4		No flame signal after all ignition attempts.
5		Flame error in operation.
6		Flame on in rest position.
7		Parameters programmed incorrectly.
8	1AH, 1AK	Fan not switched off when in stand-by.
9	1AI	Speed control is activated when in operation.
A	1AI	Fan does not start to run.
B		Parameters programmed incorrectly.
C		Gas valve not connected or defective.
D		Gas valve circuit test incorrect.
E		Mains voltage control problem.
F		Software fault/EMC interference.
H		Electronics module out of order.

Figure 12.2 - Fault Finding Flowchart



13.0 SERVICING & MAINTENANCE

A qualified engineer registered for working on non domestic gas or oil appliances should check and ensure that the flue, its support and terminal, the ventilation to the boiler house, safety valve, drain, water filter if fitted, pressure gauge, etc.; are in a serviceable and working condition and still comply with the relevant standards and codes of practice - see **Section 3.1**

The boiler should be serviced at regular intervals, not exceeding TWELVE months. In the case of continuous operation, the maintenance operations should be carried out every SIX months.

When carrying out boiler servicing always consider both your own safety and that of others. The use of protective equipment (e.g. eye protection, face mask, protective gloves, etc.) is recommended where necessary.

13.1 Initial Inspection

a. Operate boiler and check for any signs of unsatisfactory operation, water leaks, gas leaks or unusual noise from burner.

b. After allowing burner to reach stable firing conditions for approximately 15 minutes, carry out combustion gas check.

Measure CO₂, CO, flue gas temperature and water temperature rise across the boiler. The readings obtained should be noted for reference upon completion of the servicing procedure.

c. Measure gas pressure at inlet to burner gas train.

d. Check operation of both boiler and heating system controls, then set burner to OFF. Allow the boiler/burner to cool.

13.2 Burner Service Procedure.

SWITCH OFF ELECTRICAL SUPPLY AND FUEL SUPPLY TO BOILER.

a. Disconnect electrical and fuel connections to burner.

b. Disconnect burner from mounting flange and remove from front of boiler (taking care to remove thermostat bulbs).

c. Check the burner head for any signs of damage or degrading of the material. Cleaning should only be done using a soft bristle brush and vacuum cleaner.

d. Examine the condition of the electrodes and check that they are clean, undamaged, and not loose. If necessary, remove, clean using a very fine emery paper and then refit. For the correct spark gap and position of the electrodes, refer to Fig. 11.2 In this manual.

e. Examine all gasket material and check for any signs of damage or degrading. If necessary, replace them, but always use the correct type.

f. Check all electrical connections and cables to ensure that they are all sound, undamaged and

have not worked loose.

g. Remove and clean the flexible tube to the air pressure switch and check that this is functioning correctly.

h. If required, clean the combustion air fan.

i. Refit all parts and reconnect the electricity and gas supplies.

j. Check for gas soundness and electrical safety before switching on.

k. Switch on the burner and check for correct operation.

l. Check combustion CO and CO₂ levels at both the minimum and maximum fan speeds as described in Section 10.6 and adjust if necessary.

IF IT IS NECESSARY TO REPLACE ANY PARTS, REFER TO SECTION 14.2 OF THIS MANUAL FOR CORRECT PART NUMBERS.

13.3 Boiler Service Procedure

a. After removing burner, remove boiler casing and front insulation to gain access to front section of boiler.

b. Remove heat exchanger access plates (11, 12 and 15 referring to Fig. 14.1), and corresponding insulation panels, from boiler front section.

Boiler combustion chamber and heat exchanger flueways are now accessible for cleaning with suitable brushes and a vacuum cleaner.

c. Access to rear of heat exchanger flueways and combustion chamber can be obtained by removing rear insulation wrap, flue box (Fig. 14.1 item 31), cover plate (Fig 14.1 item 32), insulation and fire brick (Fig. 14.1 item 28) from rear of boiler.

The refractory fire brick (Fig. 14.1 item 28), located at the rear of the boiler, should be checked at least once every two years and replaced if necessary.

N.B. Removal of flue box requires disconnection of flue.

d. Replace all access/cover plates, ensuring that all gaskets and insulation panels are correctly fitted.

Refit securing studs/nuts and tighten evenly.

e. Refit boiler insulation and casing. For guidance, refer to **Section 10.**

f. Refit burner. Reconnect fuel and electrical supplies. Refit and ensure thermostat bulbs are correctly located in pocket.

g. Turn on fuel supply and check soundness of fuel supply pipework.

h. Check all flue joints for integrity.

i. Check ventilation ducts/grilles to boiler room and ensure they are clear.

j. Re-commission boiler as detailed in relevant parts of **Section 11.0: COMMISSIONING & TESTING**

14.0 REPLACEMENT OF PARTS

There are a number of components listed in Fig 14.1 which can be replaced simply and quickly by following the given procedure. In each case the operation of each replaced component must be checked by carrying out the appropriate part of the commissioning procedure. See **Section 11.0: COMMISSIONING & TESTING**.

NOTE: Isolate all electrical supplies to the burner and turn off the gas supply before removing covers and commencing any servicing or component exchange procedure.

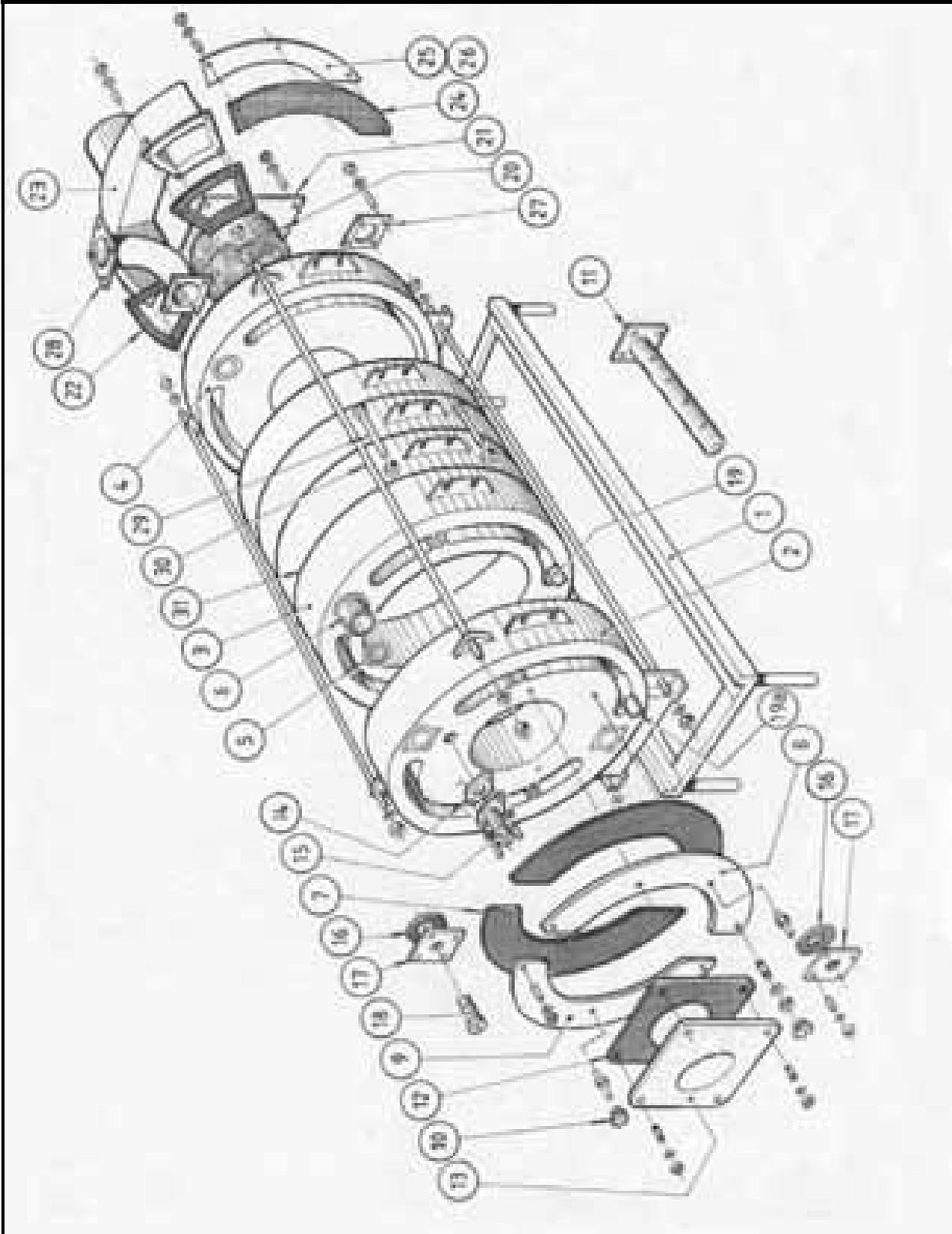


Figure 14.1 – Exploded View of Boiler

SPARE PARTS LIST

14.1 Boiler Spares (refer to Fig. 14.1)

ITEM	DESCRIPTION	PART NO.	
1	Boiler Cradle		
	Spetisbury 110		573405511
	Spetisbury 150		573405512
	Spetisbury 220		573405514
	Spetisbury 280		573405165
	Spetisbury 340		573405167
2	Front Section		573405170
3	Intermediate Section		573405172
4	Rear Section		573405174
5	'O-Ring' Seal		573405175
6	Guide Ring		573405176
7	Front Access Plate Insulation Panel.....		573405177
8	Front Access Plate - Right Hand.....		573405179
9	Front Access Plate - Left hand.....		573405178
10	Cast Iron Hand Nut.....		573405180
11	Water Distribution Tube.....		573405181
	(Not Required on SP 110, SP 150 or SP 220 Models)		
12	Burner Plate Insulation Panel.....		573405182
	(Not Required on SP 280 or SP 340 Models)		
13	Burner Mounting Plate.....		530805065
	(Not Required on SP 280 or SP 340 Models)		
14	Sight Glass Insulation Gasket		573405184
15	Sight Glass Assembly		573405185
16	Gasket 135 Dia X 100 X 4.....		573405186
17	Cast Iron Plate ¾" BSP		573405187
18	Thermostat Pocket ¾" BSP.....		573405049
19	Intermediate Section Flueway Plate		573405188
19A	Front Section Flueway Plate		573405189
20	Fire Brick		573405190
21	Combustion Chamber Rear Cover Plate.....		573405191
22	Flue Box Gasket.....		573405192
23	Flue Box		573405193
24	Rear Access Plate Insulation Panel		573405194
25	Rear Access Plate - Left Hand		573405195
26	Rear Access Plate - Right Hand.....		573405196
27	Return Pipe Flange		573405197
28	Flow Pipe Elbow.....		573405198
29	Lacing Bolt M10 X 150		573405199
30	Tie Rod Set (M14)		
	Spetisbury 110		573405521
	Spetisbury 150		573405522
	Spetisbury 220		573405524
	Spetisbury 280		573405200
	Spetisbury 340		573405202

14.2 – Burner Spares (Refer to Figure 14.2)

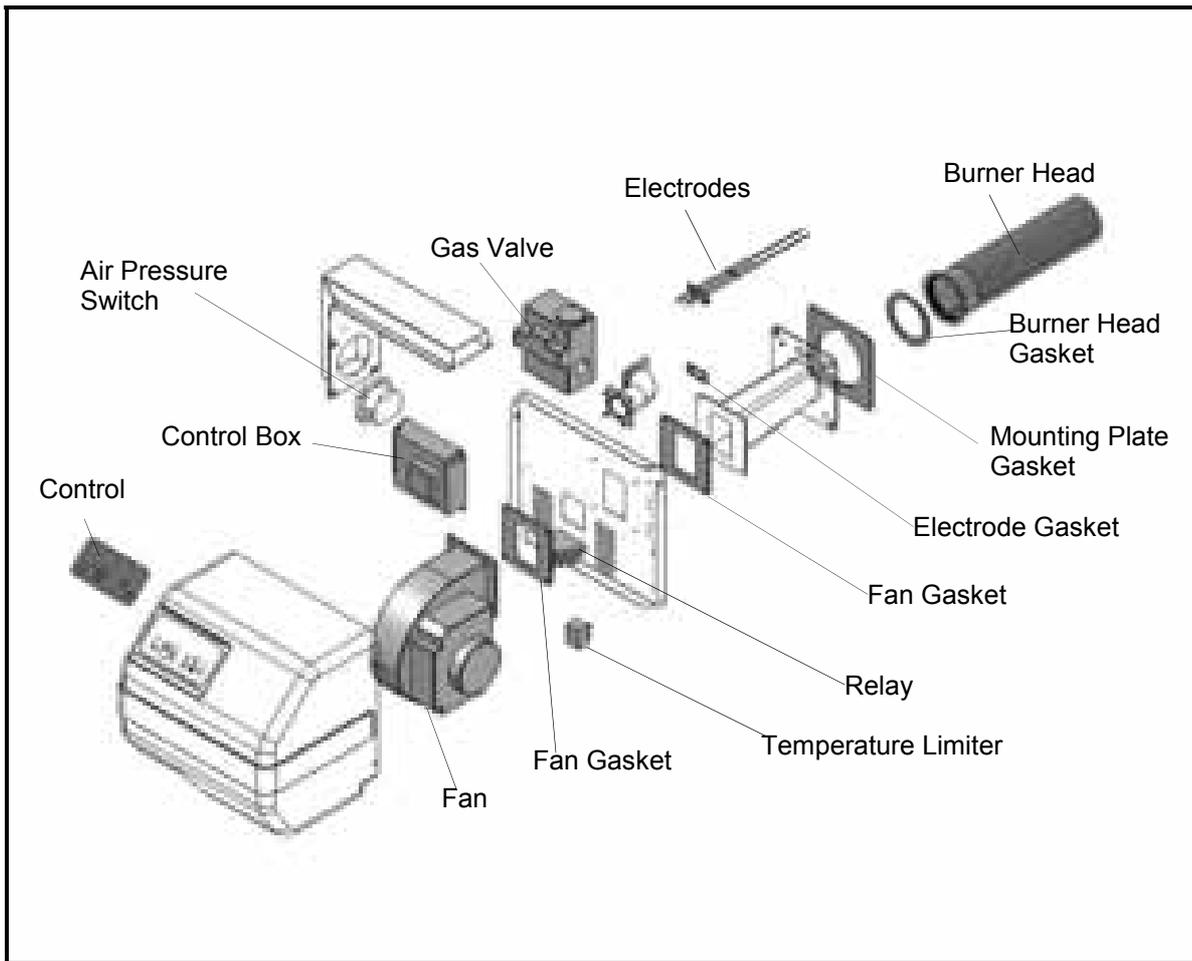


Figure 14.2 – Exploded View of Burner

Parts Common To All Models

Relay	533306054	Not shown in exploded view	
Control Display	533306055	Display PCB	533306059
Temperature Limiter	533306056	Lock-out PCB	533306060
Electrode Gasket	533306057	Volt Free Relay	533306061
Electrode Assembly	533306058	Relay housing	533306062
Air Pressure Switch	533306073	NTC Sensor 1.5m	533306063

Spetisbury SP 110

Control Box	533306065
Gas Valve	533306066
Fan Unit	533306067
Mounting Plate Gasket	533306068
Burner Head Gasket	533306069
Fan Gasket	533306070
Burner Head	533306071
Inlet Gas Flange kit	533306072
Gasket Kit	563605284
Service Kit	563605285

Spetisbury SP 150

Control Box	533306075
Gas Valve	533306066
Fan Unit	533306067
Mounting Plate Gasket	533306068
Burner Head Gasket	533306069
Fan Gasket	533306070
Burner Head	533306071
Inlet Gas Flange kit	533306076
Gasket Kit	563605284
Service Kit	563605285

Spetisbury SP 220

Control Box	533306077
Gas Valve	533306078
Fan Unit	533306067
Mounting Plate Gasket	533306068
Burner Head Gasket	533306069
Fan Gasket	533306070
Burner Head	533306071
Inlet Gas Flange kit	533306076
Gasket Kit	563605284
Service Kit	563605285

Spetisbury SP 280

Control Box	533306079
Gas Valve	533306080
Fan Unit	533306081
Mounting Plate Gasket	533306082
Burner Head Gasket	533306083
Fan Gasket	533306084
Burner Head	533306085
Inlet Gas Flange kit	533306086
Gasket Kit	563605286
Service Kit	563605287

Spetisbury SP 340

Control Box	533306089
Gas Valve	533306080
Fan Unit	533306081
Mounting Plate Gasket	533306082
Burner Head Gasket	533306083
Fan Gasket	533306084
Burner Head	533306085
Inlet Gas Flange kit	533306086
Gasket Kit	563605286
Service Kit	563605287

Note:

The Gasket Kit contains all the gaskets used in the burner assembly.

The Service Kit contains all the parts needed during a service.

15.0 TECHNICAL DATA

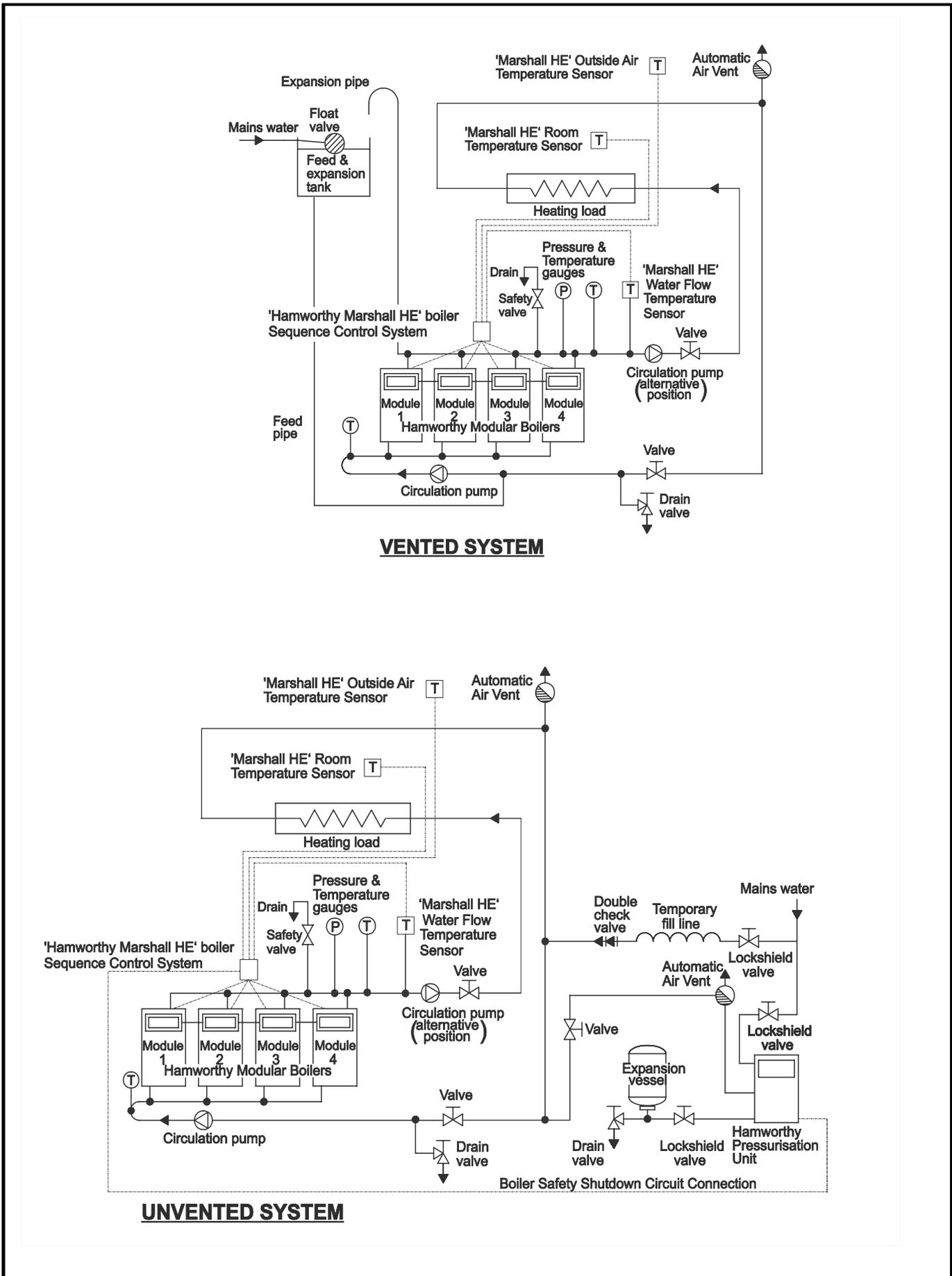


Figure 15.1 Boiler Installation Typical

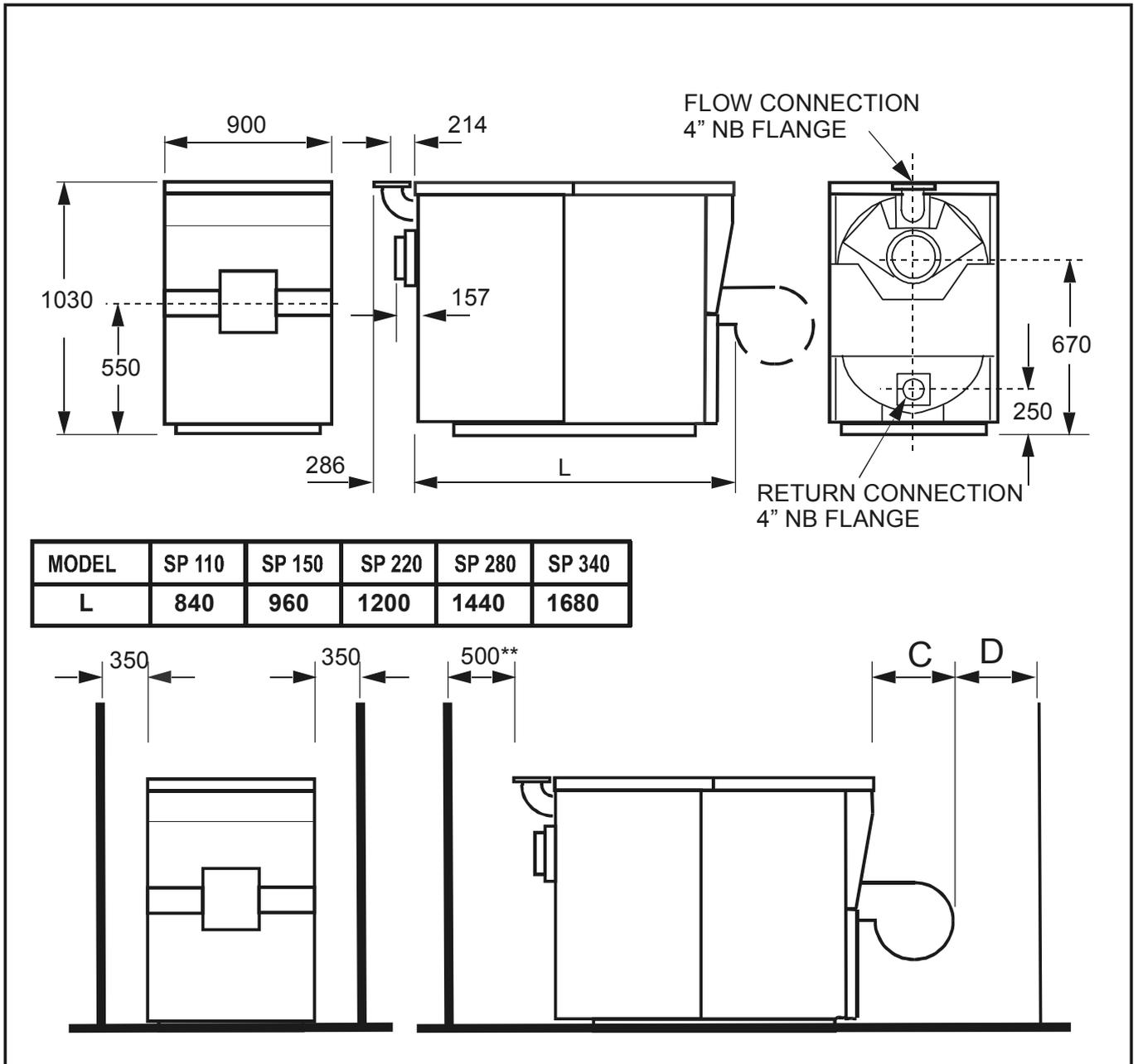


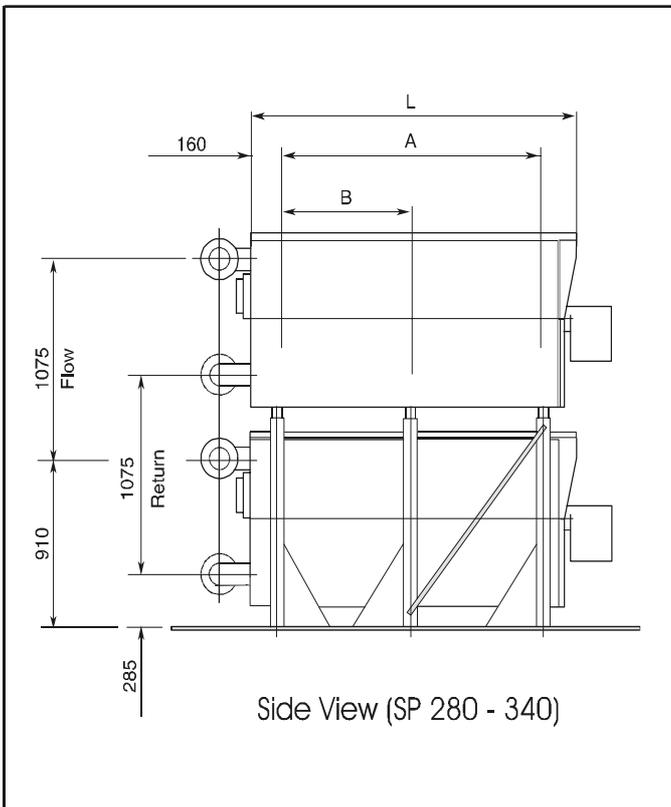
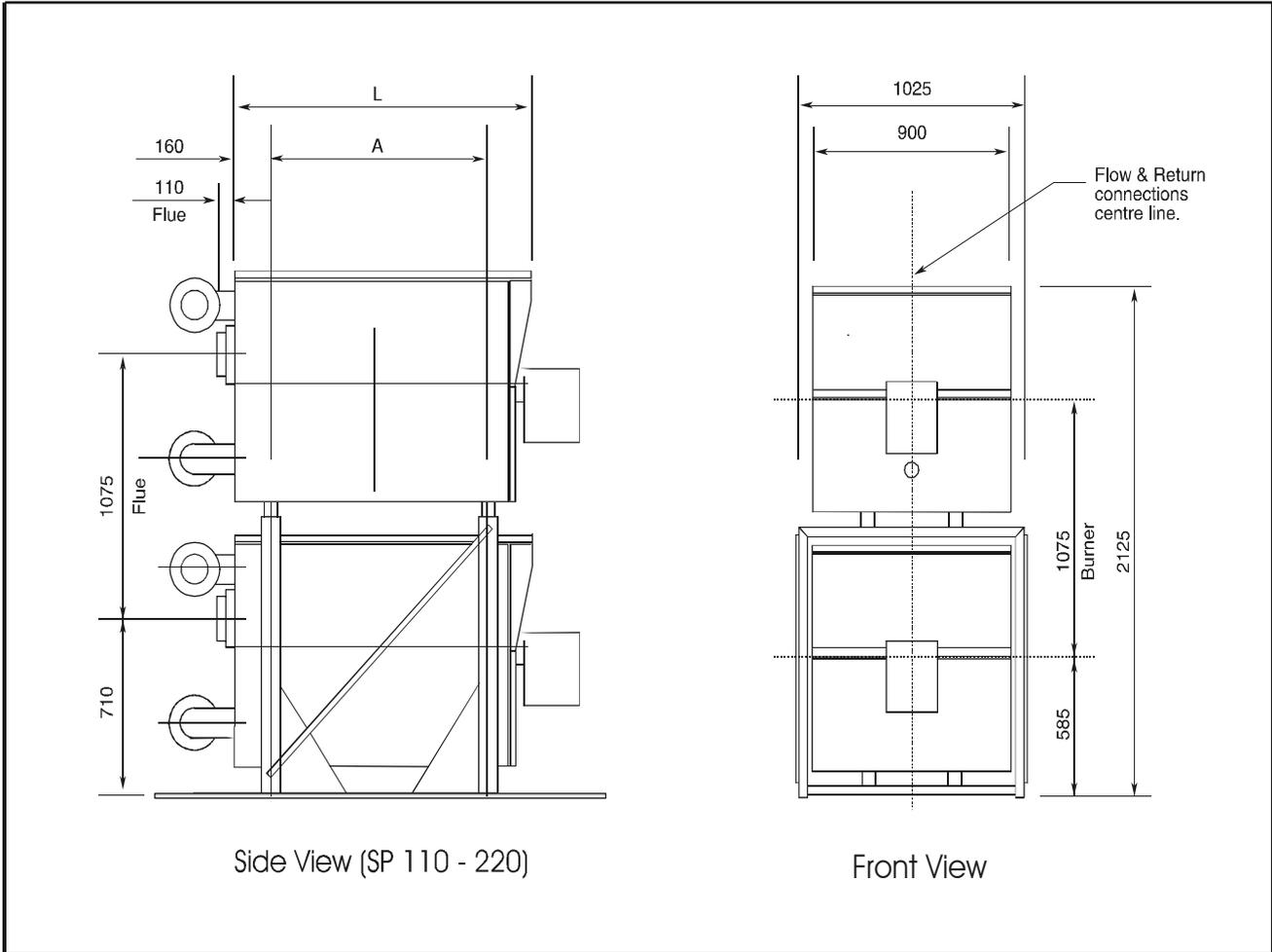
Figure 15.2 Dimensions and Clearances

Note ** - this dimension is a minimum recommendation permitting access to the rear of the boiler for maintenance (800mm for stacked boilers). It may not however be adequate for the installation of flue bends within the boiler house. Where necessary, the dimension must be increased accordingly.

Figure 15.3 Burner Clearances

Boiler / Burner Model	C mm	D mm
SP 110	310	480
SP 150	310	480
SP 220	310	600
SP 280	505	560
SP 340	505	560

STACKED BOILER DIMENSIONS



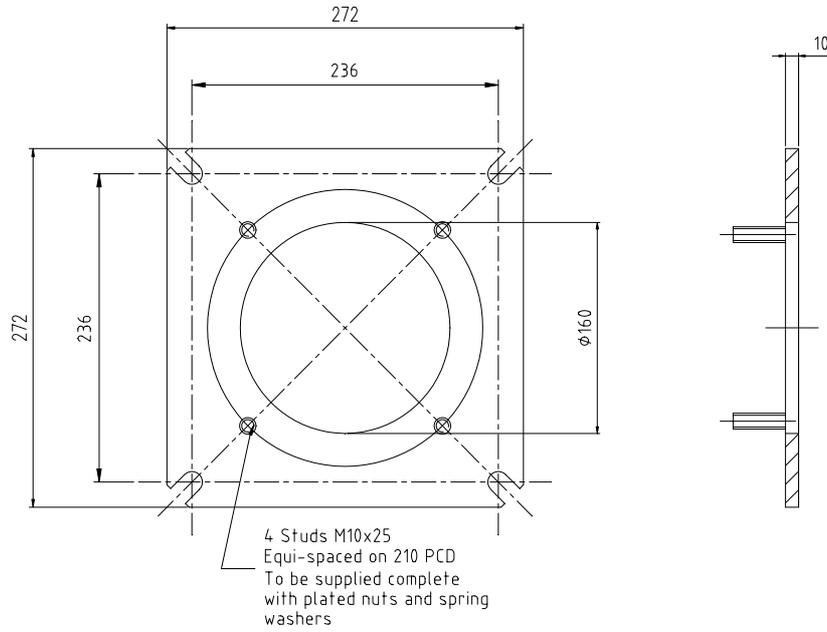
Model	Dim A	Dim B	Dim L
110	490	N/A	840
150	610	N/A	960
220	850	N/A	1200
280	1090	545	1440
340	1330	665	1680

Figure 15.4 - Stacked Boiler Dimensions.

BURNER MOUNTING PLATE DIMENSIONS

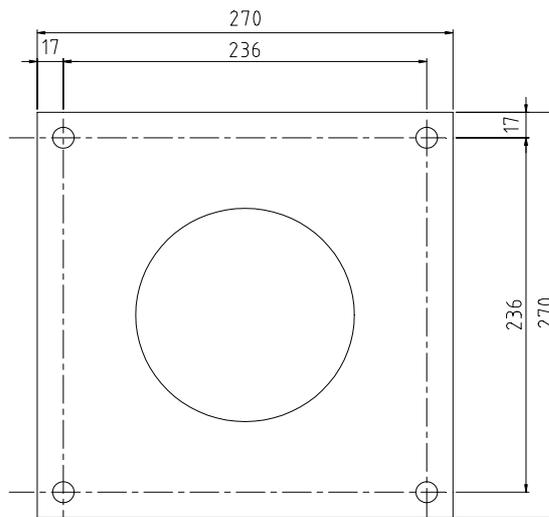
When installing a Spetisbury SP 110, SP 150 or SP 220 a burner mounting plate is supplied, the dimensions of which are shown below.

Figure 15.5 - SP 110, 150, 220 Burner Mounting Plate Dimensions



When installing a Spetisbury SP 280 or SP 340 a burner mounting plate is not required as the burner fits directly to the boiler casting. The dimensions of the SP 280 / 340 burner fixings are shown below.

Figure 15.6 - SP 280 / 340 Burner Fixings



GENERAL INFORMATION

BOILER MODEL - Spetisbury		110	150	220	280	340
GENERAL DATA						
No. OF SECTIONS		5	6	8	10	12
BOILER INPUT - maximum (nett) 34.06 MJ/m ³	kW	125.5	171.2	250.5	309.9	377.9
	Btu/hr x 1000	428.2	584.1	854.7	1057	1289
BOILER INPUT - maximum (gross) 37.8 MJ/m ³	kW	139.37	190.1	278.2	344.0	419.4
	Btu/hr x 1000	475.5	648.6	949.2	1174	1431
BOILER OUTPUT - maximum	kW	110	150	220	280	340
	Btu/hr x 1000	375	511	751	955	1160
FLUE DATA						
NOMINAL FLUE DIA.	mm	180				
	in	7				
FLUE DRAUGHT REQUIRED AT BOILER OUTLET	mbar	0.1 - 0.3				
	in.wg.	0.04 - 0.12				
COMBUSTION CHAMBER RESISTANCE (maximum)	mbar	2.8	5.0	5.9	3.9	5.5
	in.wg.	1.1	1.96	2.32	1.54	2.17
APPROX. FLUE GAS TEMP (gross)	°C	225				
APPROX. FLUE GAS VOLUME @ NTP (wet)	m ³ /h	174	236	294	383	467
	ft ³ /h	6144	8333	10381	13532	16501
GAS DATA						
NOMINAL GAS INLET PRESSURE	mbar	20				
MAXIMUM GAS INLET PRESSURE	mbar	25				
GAS FLOW RATE	m ³ /h	13.3	18.2	26.5	32.8	39.9
	ft ³ /h	469.5	642.5	935.5	1157	1410
GAS INLET CONNECTION		Rc ¾"		Rc 1"	Rc 1¼"	
WATER DATA						
WATER CONNECTIONS - FLOW & RETURN		4 in N.B.				
MAXIMUM WATER PRESSURE	bar g.	5.0				
	psi g	73.0				
WATER CONTENT	litres	78	92	120	148	176
	UK gal.	17.2	20.3	26.4	32.6	38.8
BOILER WEIGHT (FULL) WITHOUT BURNER	kg	508	592	755	923	1106
	lb	1118	1302	1661	2031	2433
BURNER WEIGHT (including packaging)	kg	27.6	27.6	27.6	47.6	47.6
	lb	61	61	61	105	105
PRESSURE SWITCH SETTING	mbar	0.3	0.2	0.4	1.3	1.4
MAX WATER TEMP. (TEMP LIMITER SET AT °C)		100 °C				
ELECTRICAL SUPPLY		230V 1ph ~ 50Hz				

Figure 15.7 – Performance and General Data Information (Natural Gas)

Note: For matched burner/boiler combinations, refer to Figure 15.7
For combustion target figures, refer to Figure 11.1

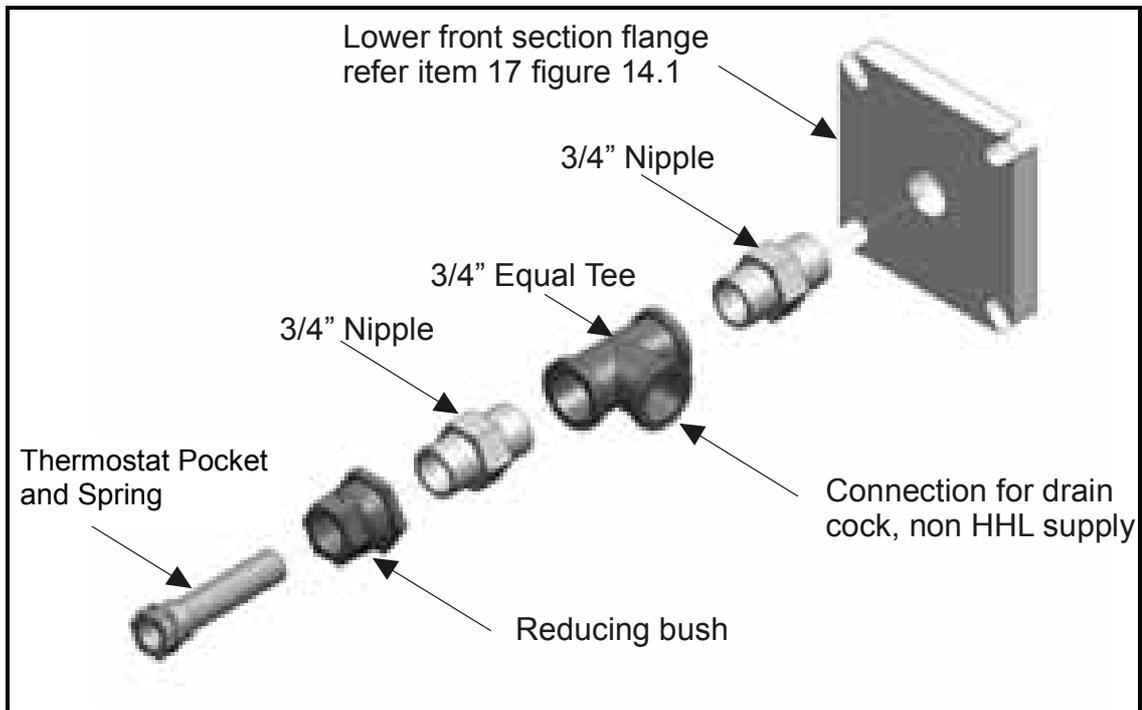


Figure 14.3 – Exploded View return sensor pocket assembly

BOILER MODEL Spetisbury	DESIGN FLOW RATE (11 ° C. ΔT)				MINIMUM FLOW RATE (20 ° C. ΔT)			
	FLOW RATE		PRESS. DROP		FLOW RATE		PRESS. DROP	
	l/min	UK gal/min	mbar	in. wg	l/min	UK gal/min	mbar	in. wg
SP 110	158.5	34.8	3.5	1.4	80	17.6	1.0	0.4
SP 150	206.7	45.4	6.5	2.6	108	23.8	1.8	0.7
SP 220	286.7	63.1	11.5	4.5	157.7	34.7	3.7	1.5
SP 280	357.5	78.6	16.5	6.6	196.3	43.2	5.0	2.0
SP 340	435.0	95.7	21.0	8.4	240.0	52.8	6.4	2.6

Figure 3.1 - Water Flow Rates and Pressure Drops

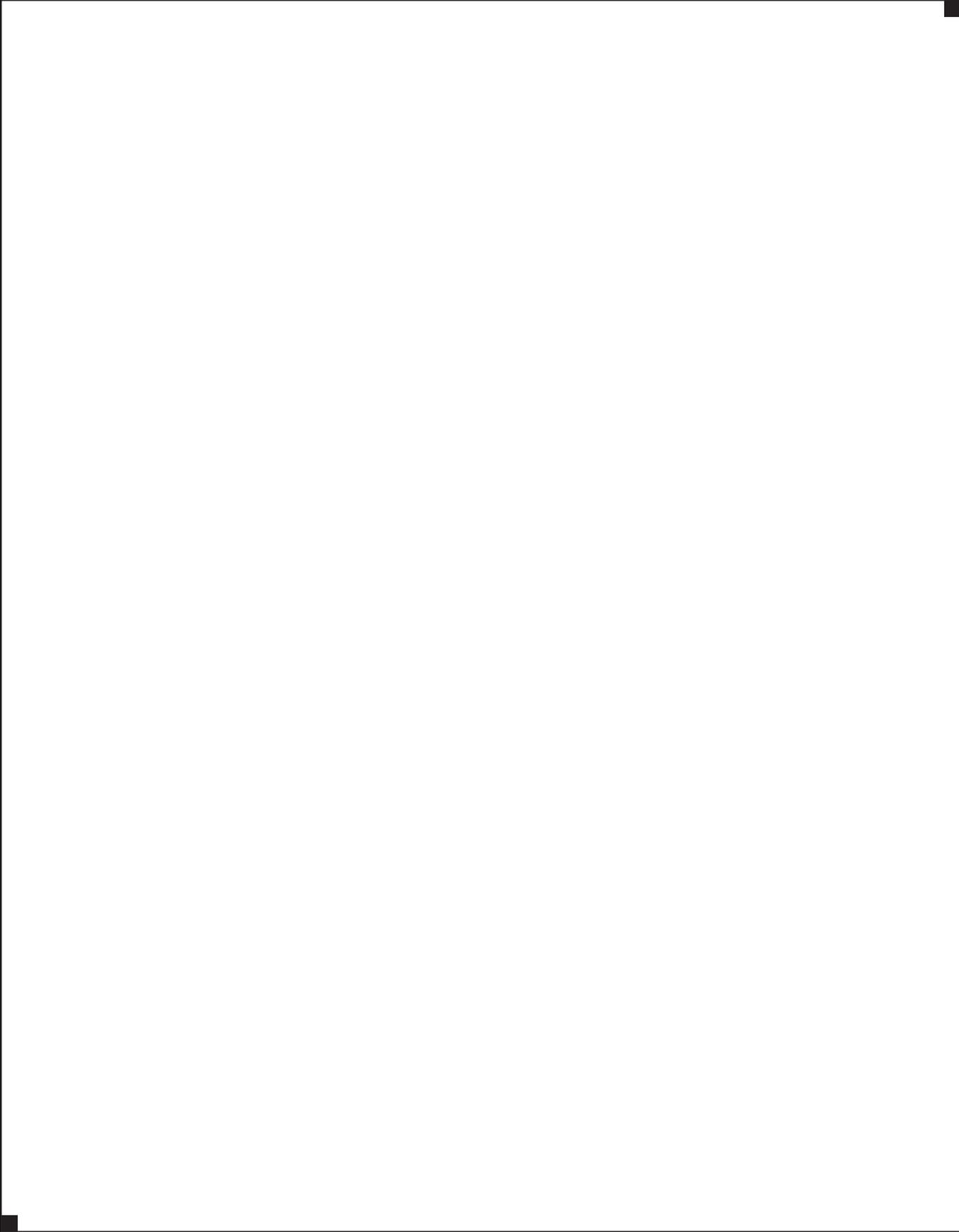
Fuel Type	BOILER MODEL	SP 110	SP 150	SP 220	SP 280	SP 340
Natural Gas G20	CO ₂ (DRY)	9.6% ±0.2			9.4% ±0.2	
	CO	Less than 100 ppm (air free)				
	Flue Gas Temp Rise °C	225 °C				
	Temp Rise Across Boiler	Less than 20°C				

Figure 11.1 – Target Appliance Readings.

Note ! The above target values provide an approximate guide with which to attain nominal operation of the appliance so as to satisfy the requirements of the Boiler Efficiency Directive

NOTES:

Notes



Connect direct

Direct Dial Telephone and Fax Numbers



- boilers
- controllers
- water heaters
- pressurisation sets

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- flue components
- packaged fan dilution systems
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