

Wimborne GM Boilers

**Gas/Oil Fired Cast Iron Sectional Boilers
420kW to 1070kW**

Installation, Commissioning and Servicing Instructions

*NATURAL GAS I_{2H}
CLASS D (35 sec fuel oil)*

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



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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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THE WIMBORNE BOILER IS INTENDED FOR USE AS A COMMERCIAL APPLIANCE.

THE GAS FIRED VARIANTS ARE FOR USE ON GROUP H NATURAL GAS (2ND FAMILY) I_{2H}. THE OIL FIRED VARIANTS ARE FOR USE ON CLASS D (35 sec FUEL OIL). PLEASE ENSURE RELEVANT INFORMATION REQUIRED WITHIN DOCUMENT IS FOUND RELATING TO SPECIFIC FUEL TO BE FIRED BEFORE OPERATING THE BOILER.

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1.0 INTRODUCTION

1.1 Boiler Range

The Wimborne GM boiler range consists of 10 gas or oil fired cast iron sectional boilers with outputs ranging from 420kW to 1130kW. Refer to Section 2.0 for details on Natural Gas and Oil firing.

Wimborne GM 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.

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

1.2 Packing Lists

Description	Burner Model - Packing List Quantities										
	GM										
	6	7	8	9	10	11	12	13	14	15	
Intermediate section	4	5	6	7	8	9	10	11	12	13	
Front section	1	1	1	1	1	1	1	1	1	1	
Rear section	1	1	1	1	1	1	1	1	1	1	
Rear flue cover 250mm dia.	1	1	1	1	-	-	-	-	-	-	
Rear flue cover 350mm dia.	-	-	-	-	1	1	1	1	1	1	
Hinged front door	1	1	1	1	1	1	1	1	1	1	
Casing pack	1	1	1	1	1	1	1	1	1	1	
Insulation Pieces	1	1	1	1	1	1	1	1	1	1	
Flue tube insert pack (22 off)	1	1	1	1	1	1	1	1	1	1	
Control Panel Assembly.	1	1	1	1	1	1	1	1	1	1	
Installers Guide 500001113	1	1	1	1	1	1	1	1	1	1	
Accessory pack	1	1	1	1	1	1	1	1	1	1	

Packing List

Accessory Pack

Description	Burner Model - Accessory Pack Quantities									
	GM									
	6	7	8	9	10	11	12	13	14	15
Guide Ring	10	12	14	16	18	20	22	24	26	28
'O' Ring 7.3mm	10	12	14	16	18	20	22	24	26	28
Boiler Cement Pack	5	5	6	7	8	9	10	10	11	11
Silicon Sealant Tube	9	11	12	13	15	16	18	19	20	21
Primer - Silicon	2	2	2	3	3	3	3	3	4	4
Tie Bolt M12 x 230	20	24	28	32	36	40	44	48	52	56
Self-Tapping Screw	70	110	110	110	130	130	130	150	150	150

1.3 Sectional Boilers

Wimborne GM sectional boilers are supplied ready for on-site assembly.

The heat exchanger consists of:

- A front section
- Plain intermediate sections.
- A rear section

These sections are connected to each other using nipples and 'O' rings and are held together by short lacing bolts.

The section to section flue gas seal is made by a mastic strip located in a groove around the inner and outer perimeter of each section.

The boilers are of the reverse flame design with the first two passes in the combustion chamber. The final pass uses turbulator tubes to increase the heat exchange area and thus enhance thermal efficiency in use.

Wimborne GM boilers have an operating efficiency of over 82% based on gross CV.

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 (rear only), all of which are internally lined with a fibre insulation board. The burner mounts onto the front plate which is hinged, suitable for left or right hand operation.

The flow and return water connections are located on top and to the rear of the boiler. Refer to Figure D for details.

The Wimborne GM boiler is available with high/low burners for operation on Class D (35 second) fuel oil, Natural Gas I_{2H} (Second Family).

The boiler is supplied with a pre-wired control panel which contains:

- a. A fuse
- b. An illuminated mains on/off switch
- c. Boiler control thermostats (On/Off) & (High/Low)
- d. Boiler run, (High/Low) and lockout lamps.
- e. A temperature limiter (overheat thermostat) to shut down the boiler should the water temperature in the heat exchanger exceed 110°C - with manual reset.
- f. An overheat lamp
- g. A water temperature thermometer (temp. gauge)
- h. Flying leads and plugs to connect to the burner
- i. Volt free relay contacts for normal run, overheat and lockout.

The boiler is housed in a powder coated sheet steel casing which is supplied flat-packed for on-site assembly. Refer to Section 10.3 for casing assembly procedure.

1.4 Hydraulic Testing

All Wimborne GM boiler sections are hydraulically tested, ensuring the Wimborne GM boiler is suitable for use on systems with maximum working pressures of up to 6 bar.

1.5 Boiler Set

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
- d. Insulation blankets
- e. Flue tubes - 22 off
- f. Control panel
- g. Matched burner: fuel oil or gas
- h. Burner mounting plate, drilled ready to accept burner
- i. Oil burner nozzle/s where applicable.

1.6 COSHH Information

Irritant



The boiler insulation blankets are non-carcinogenic, mineral wool fibre, and may cause inflammation and irritation on immediate or repeated or prolonged contact with the skin or if inhaled. The use of suitable protective clothing is highly recommended. Avoid contact with skin and direct inhalation

1.6.1 In case of contact with the eyes, rinse immediately with plenty of water and seek medical advice.

1.6.2 In case of contact with skin, wash immediately with plenty of water.

1.6.3 In case of inhalation, retire to clean air supply and seek medical advice.

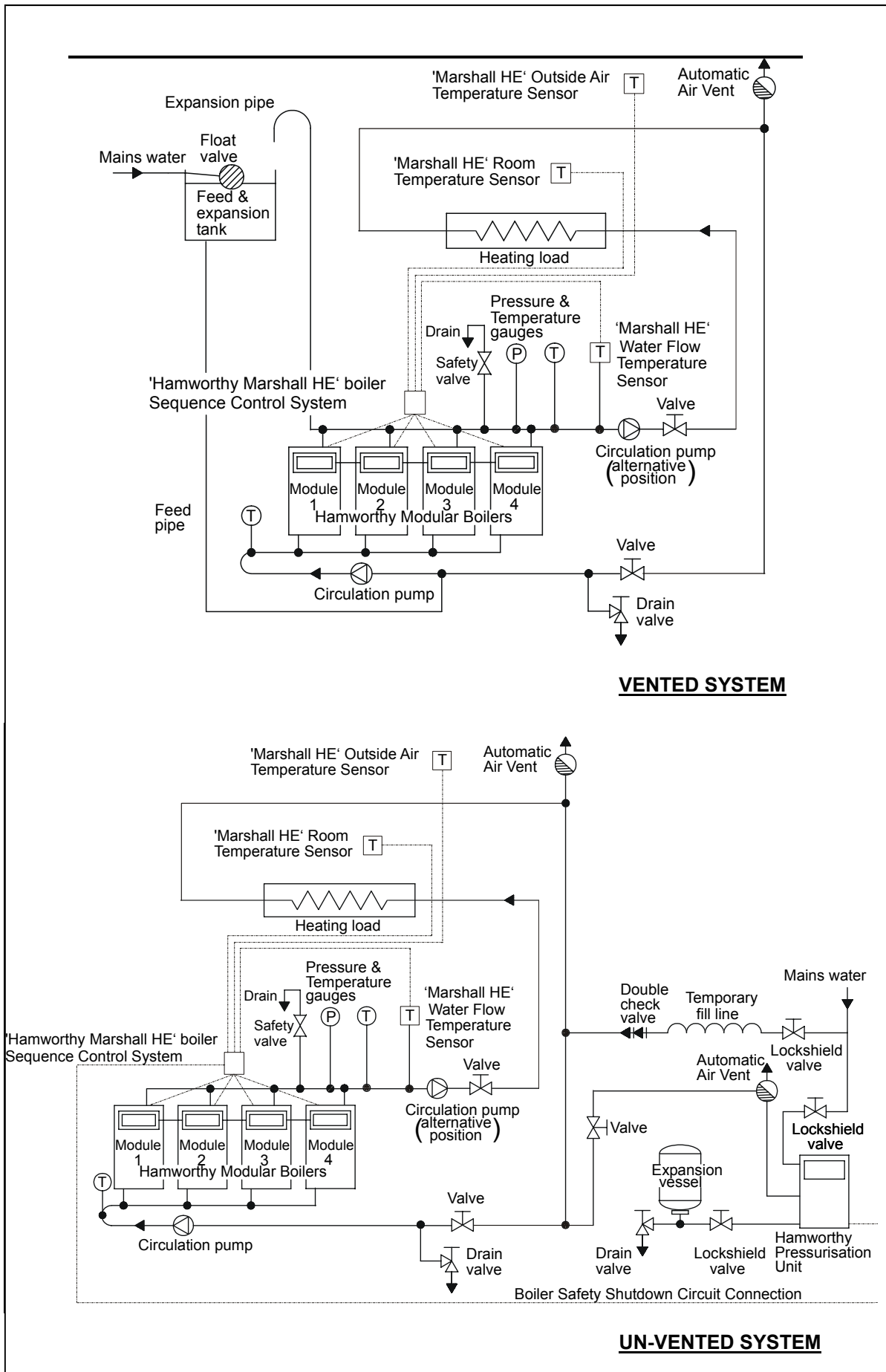


Figure A - Typical schematic boiler installation layout

2.0 TECHNICAL DATA

WIMBORNE GM		GM6	GM7	GM8	GM9	GM10	GM11	GM12	GM13	GM14	GM15	
No. OF SECTIONS		6	7	8	9	10	11	12	13	14	15	
BOILER OUTPUT Gas - maximum	kW	420	480	550	630	720	800	880	950	1020	1070	
INPUT RATE - Natural Gas (G20)	m ³ /h	49.3	56.3	64.6	73.9	84.5	93.9	103.3	111.5	119.7	125.6	
BOILER OUTPUT Oil - maximum	kW	440	510	580	670	760	840	925	1000	1070	1130	
INPUT RATE - Oil (35SR1)	l/h	49.7	57.6	65.5	75.7	85.9	94.9	104.5	113.0	120.9	127.7	
FLUE DATA												
NOMINAL FLUE DIA.	mm	258					358					
FLUE DRAUGHT REQUIRED AT BOILER OUTLET	mbar	0.1 - 0.3 suction										
	in.wg	0.04 - 0.12 suction										
COMBUSTION CHAMBER RESISTANCE	mbar	3.75	3.75	5.5	7.3	5.7	7	6	7.2	5.6	6.2	
	in.wg	1.5	1.5	2.2	2.9	2.2	2.8	2.4	2.8	2.2	2.4	
APPROX. FLUE GAS TEMP (net)	°C	200 (Gas) ~ 220 (Oil)										
APPROX. FLUE GAS VOLUME @ NTP (wet) - (m ³ /h)	Gas	650	776	882	1008	1146	1246	1392	1505	1610	1700	
	Oil	753	899	1022	1168	1328	1444	1613	1744	1866	1970	
GAS DATA	consult burner manufacturers manual											
WATER DATA												
CONNECTIONS - FLOW and RETURN		Flanged PN6 80			Flanged PN6 100				Flanged PN6 125			
HYDRAULIC RESISTANCE @ 11°C	mbar	28	40	50	65	82	110	130	145	150	180	
HYDRAULIC RESISTANCE @ 20°C	mbar	4.8	6.1	6.8	7.5	8.6	9.8	11	11.5	11.8	12.4	
DESIGN FLOW RATE @ 11°C	l/m	547	625	717	821	938	1042	1147	1238	1329	1394	
MINIMUM FLOW RATE @ 20°C	l/m	301	344	394	452	516	573	631	681	731	767	
MAXIMUM WATER PRESSURE	bar g.	6										
MAXIMUM FLOW TEMPERATURE	°C	90										
MINIMUM RETURN TEMPERATURE	°C	50										
WATER CONTENT	l	285	330	375	420	465	510	555	600	645	690	
WEIGHT (FULL) WITHOUT BURNER	kg.	1745	1985	2225	2455	2695	2935	3175	3470	3710	3955	
DIMENSION - L (boiler overall length)	mm	1255	1435	1615	1795	1975	2155	2335	2515	2695	2875	
DIMENSION - B (base overall length)	mm	970	1150	1330	1510	1690	1870	2050	2230	2410	2590	
ELECTRICAL SUPPLY												
400V 3 ph 50 Hz (Burner) – 230V 1 ph 50 Hz (Boiler Panel)												
Matched Burner - Nuway (Hi/Lo)	Gas	XGN650	XGN650	XGN 1000	XGN 1000	BG 700	BG 700	BG 700	BG 700	XGN 2100	XGN 2100	
	Oil	NOL 25T	NOL 25T	NOL30 25T	NOL30 25T	NOL50 28T	NOL50 34T	NOL50 34T	NOL50 34T	NOL50 34T	NOL50 34T	
Gas Booster Required - **									**	**	**	
Matched Burner - Riello (Hi/Lo)	Gas	RS50	RS70	RS70	RS100	RS100	RS100	RS100	RS100	RS130	RS130	
	Oil	RL50	RL50	RL70	RL70	RL100	RL100	RL100	RL130	RL130	RL130	
Gas Booster Required - **								**	**	**	**	
CLEARANCES - refer to Figure D.												
Dimension A - side of boiler (see note#)	Riello	670	930	930	930	930	930	930	930	930	930	
	Nuway	823	975	975	1275	1275	1275	1275	1275	1275	1275	
Dimension B - in front of boiler	Riello	1080	1340	1340	1340	1340	1340	1340	1340	1340	1340	
	Nuway	1233	1385	1385	1683	1683	1683	1683	1683	1683	1683	
Dimension C - rear of boiler		1000 - all models										

Figure B - Performance and general information

Note:- For matched burner/boiler combinations refer to Figure M.
For combustion target figures, refer to Figure O.
if boilers are to be installed adjacent to each other, the minimum spacing can be reduced to 200mm, provided that the doors hinge in opposite directions.

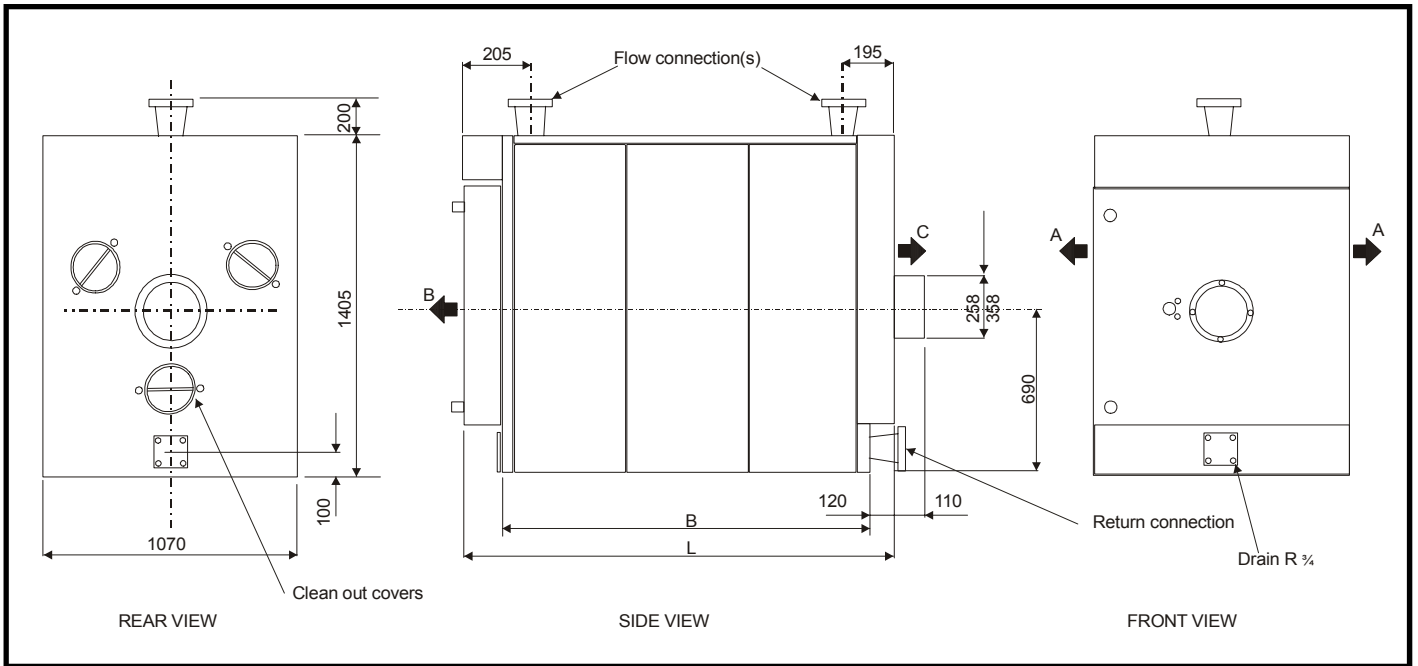


Figure C - Boiler dimensions

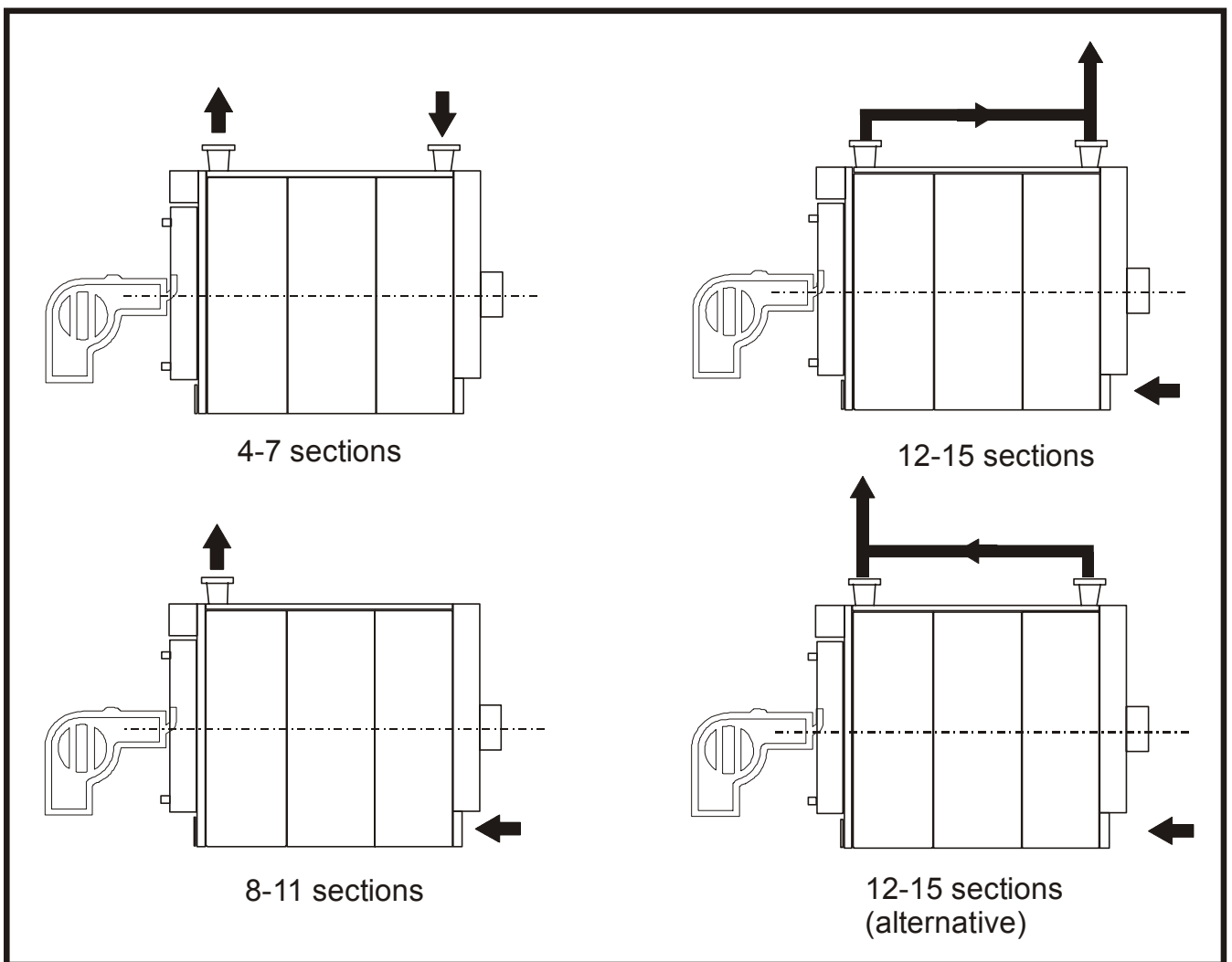


Figure D - water connections

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, Fire 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 5410 Part 2** Code of practice for oil firing. Installations of 44 kW and above capacity for space heating, hot water and steam supply purposes.
- BS 5854** Code of practise for flues and flue structures in buildings. See paragraph 5 (3.6).
- BS 6644** Specification for installation of gas fired hot water boilers of rated inputs between 60kW & 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 and 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 I 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 Pt 1 flued appliances.

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 B, it may be necessary to incorporate mixing valves and shunt pumps to ensure that the boiler will operate satisfactorily. Figure B 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.

NOTE:- Time clocks should not interrupt live, neutral or earth connections, see Section 9.0: Electrical Supply for details.

See Figure G for wiring details.

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 8.10.1 for details.
- 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 8.11 for Pressurised Water Systems.

4.0 LOCATION

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 Figures C & D 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 either **BS 6644**, or **BS 5410 Part 2**, as appropriate.

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 7.0 for details.

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 must be installed 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. The plinth must be level, non-combustible, 80mm nominal height, and must be equal in width to the boiler casing dimensions.

IMPORTANT:- the plinth must not protrude from the rear of the boiler to enable fitting of the extension turrets on the rear return connections.

See Figures C & D for plinth dimensions.

5.0 GAS / OIL 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 **IM/16**. 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 **IM/2** and **IM/5** 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.

5.6 Oil Supply

The oil storage & supply system should be designed and installed in accordance with **BS5410:Pt.2**, as appropriate.

The following notes are given as guidance :-

5.6.1 Oil Storage Tank

The oil storage tank should be of sufficient capacity to permit economic deliveries of oil to be taken. Reference should be made to oil distributor for advice.

The tank should be installed such that:

a. The oil outlet should be higher than the top of the oil burner pump. If site conditions prevent this, then a suction lift (or 'two-pipe') fuel supply system must be used.

b. The maximum head on the suction side of the oil pump should not exceed 4 metres (14 feet).

c. The base should be sloped away from the outlet and towards a drain cock to allow draining of any water or sediment from the tank.

d. It is sited outside, if possible, and complies fully with the requirements of the relevant British Standards and Local Authority Regulations.

5.6.2 Oil Supply Lines

The oil supply line/s between storage tank and burner should be run in copper, steel or aluminium pipe. Galvanised pipes and fittings should not be used. All pipework and fittings must be oil-tight, with any screwed joints made good with an oil resistant compound. The supply line should terminate adjacent to the burner with an isolating valve and metal bowl filter (with replaceable filter element). All burners are supplied with flexible oil pipes to make the final connection between the oil supply pipe and the burner

5.6.3 Gravity Feed Supply

Where the delivery connection of the storage tank is above the level of the pump inlet on the burner a 'single pipe' gravity feed system can be used. At no point in this system should the supply pipework be higher than the lowest level of fuel in the tank.

5.6.4 Suction Lift Supply

Where the delivery connection of the tank is below the level of the pump inlet on the burner a 'two-pipe' fuel supply system **MUST** be used. This system uses the burner pump to provide a circulation of oil to and from the tank.

NOTE:- Burner pumps can be supplied ready for use on a 'single-pipe' system. For use on a 'two-pipe' system it may be necessary to fit the pump with a by-pass plug. Refer to technical information supplied with burner.

The return line should terminate within the oil tank at the same level as the suction line, in which case a non-return valve is not required. If the return line terminates above the fuel level, a non-return valve **MUST** be fitted.

6.0 FLUE SYSTEM

6.1 General Requirements

Detailed recommendations for flue systems are given in **BS 6644**, & **IGE UP/10**. The following notes are intended to give general guidance only.

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.

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 B.

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 - 0.3 mbar).

It is recommended that a draught stabiliser is fitted to the flue system where the suction is likely to exceed 0.3 mbar.

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 13.0: 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 Temperature

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 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 utilised providing design extraction rate does not exceed one third of the design inlet rate.

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 total rated heat input (gross)	
	Inlet air (Combustion Ventilation)	Extract air (Ventilation)
	m ³ /s	m ³ /s
Volume	0.9	0.6

Figure E - 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 PN6 Flanged flow and return connections located on the top/ rear section of the boiler.

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.

Figure F - Cold Feed and Vent Pipe Sizes (mm)

Boiler Output	Feed	Vent
60kW to 150kW	25	32
150kW to 300kW	32	38
300kW to 600kW	38	50
600kW & above	50	65

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 Pt.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 is as follows:-

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 A for typical position.

8.5 Thermometer

See Figure A 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 3/4" NB drain valve fitted (not H.H.L. supply), to drain the boiler only. A plugged Rc 3/4" 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 A 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 H.H.L. 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 B. 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 Waterside Pressure Drop

The waterside hydraulic resistance (Pressure drop) is shown in Figure B.

8.10 Control Schemes

8.10.1 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 ΔT of 20°C, care should be taken to ensure that the return temperature does not fall below 50°C.

8.10.2 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 B is maintained.

8.10.3 Frost Protection

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

8.11 Unvented Systems

See Figure A for typical layout of a Unvented (Pressurised) Hot Water System.

For system design refer to **BS 7074 Pt.2**.

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

- 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 pressurisation 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:Pt.1**, for information.

See also **BS 6880:Pt.1**, for design considerations.

8.12 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.

9.0 ELECTRICAL SUPPLY

WARNING: THIS APPLIANCE MUST BE EARTHED

9.1 Site Wiring

Wiring external to the boiler must be installed in accordance with the I.E.E Regulations and any local regulations which apply. Wiring must be completed in heat resistant cable. (For size, refer to the Technical Instructions supplied by the burner manufacturer). The boiler control panel requires a 230V, single phase 50 Hz supply.

Fuse ratings for individual boilers are marked on the appliance data plate. The control panel is supplied with flying lead and plugs for direct connection to corresponding sockets supplied with the burner. Should non-standard connecting wiring be necessary due to particular burners or contract conditions, space is provided in Appendix A of these instructions for a wiring diagram to be included.

Note a 3 phase 4 wire (including neutral) supply is required from which the 3 phase should be wired direct to the burner with a single phase and neutral spurred off to the boiler control panel.

The method of connection to the mains electricity supply must facilitate complete electrical isolation of the single boiler/battery with a contact separation of at least 3 mm in all poles.

The appliance must be isolated from the mains electricity supply in the event of electric arc welding being carried out on any connecting pipework.

A mains isolator must be provided adjacent to the boiler in a readily accessible position. The supply should only serve the boiler.

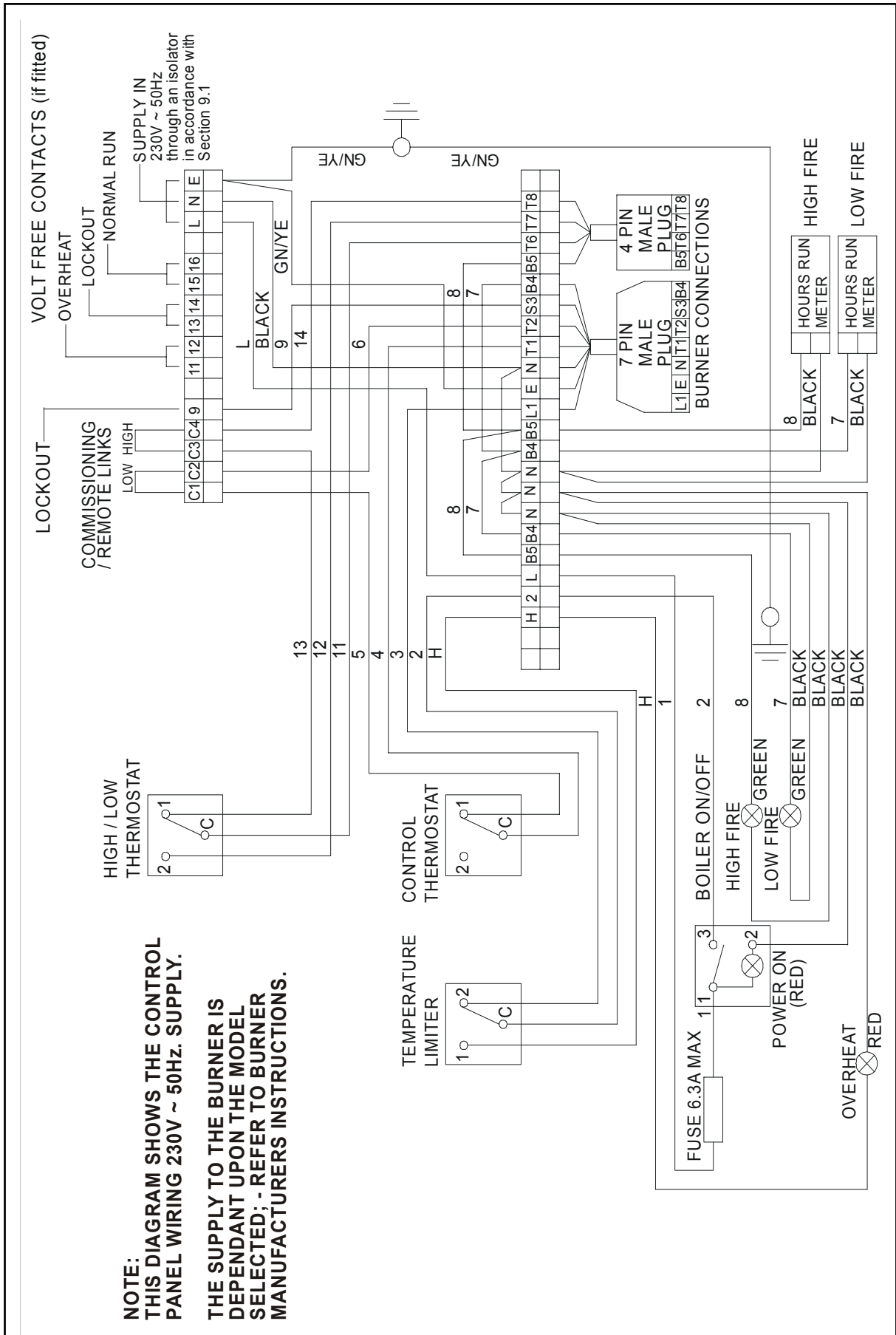
NOTE:- Volt free contact electrical supplies must also be isolatable where fitted (see note in control panel). Further details regarding connection to the electricity supply are given in **BS EN 60335 Pt.1** or **BS 3456 Pt. 201**.

9.2 Indication Signals and Volt Free Contacts

Control panels are fitted with v.f.c.'s (volt free contacts) to enable external indicator lights or alarms to derive signals for normal run, overheat and lockout.

NOTE:- These external circuits **MUST** be isolated before any service or maintenance procedures are carried out.

Figure G - High / Low Burner Control Panel Wiring Diagram



Note: For modulating burner operation the 4 pin burner plug must be disconnected from terminals B5, T6, T7 and T8 and discarded.

Item	Description	No. of sections									
		6	7	8	9	10	11	12	13	14	15
2	Intermediate section	4	5	6	7	8	9	10	11	12	13
6	Guide ring	10	12	14	16	18	20	22	24	26	28
7	'O' ring (7.3mm)	10	12	14	16	18	20	22	24	26	28
45	Boiler cement (packs)	5	5	6	7	8	9	10	10	11	11
46	Silicone sealant (tube)	9	11	12	13	15	16	18	19	20	21
47	Primer—silicone	2	2	2	3	3	3	3	3	4	4
56	Section tie bolts M12 x 230	20	24	28	32	36	40	44	48	52	56
73	Self tapping screw - casing	70	110	110	110	130	130	130	150	150	150

Figure H - Composition of heat exchanger

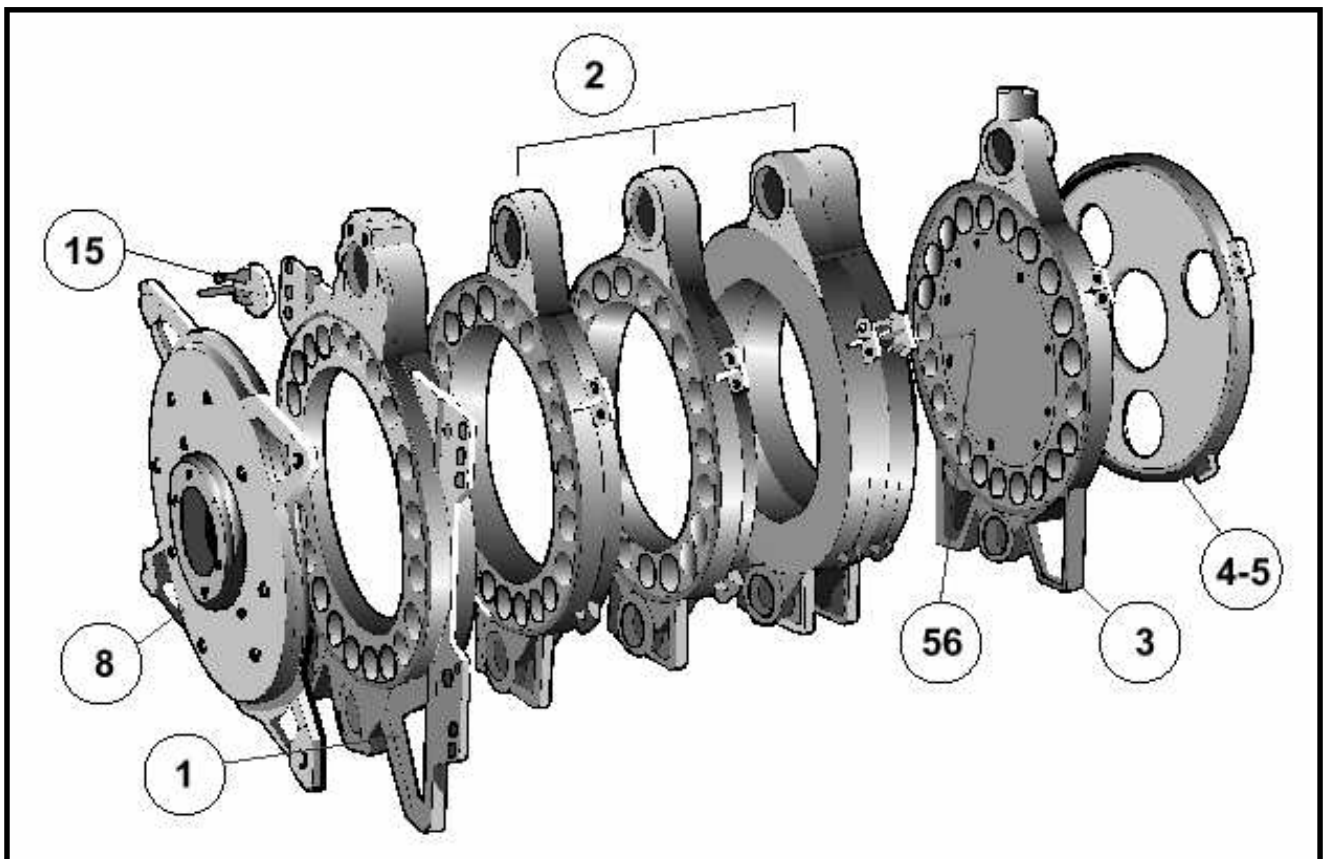


Figure I - Composition of heat exchanger assembly

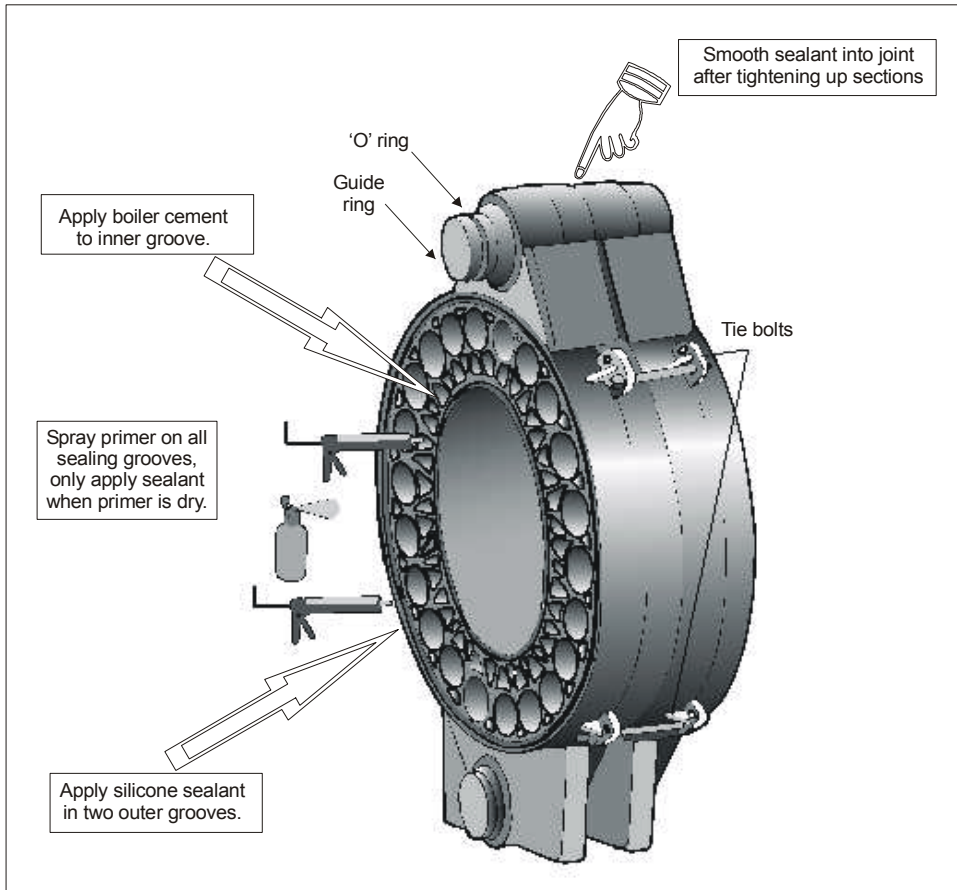


Figure J - Applying the sealant

10.0 BOILER ASSEMBLY

The following procedure should be adopted for the initial site build of the boiler or following any dismantling due to maintenance.

10.1 Preparation

The heat exchanger is made up from three different types of section, each section weighing around 190 kg. Due to the weight, this operation should be carried out by two operatives.

1) Check off all materials and parts (see Packing List Section 1.2) and that a sealant gun and adequate supply of sealants and primer have been provided.

Using a clean rag and kerosene, or similar, wipe the 'O' ring grooves and sockets on each section prior to assembly. Clean all sealing grooves on the casting face with a wire brush and apply the primer liquid using the applicator bottle provided.

Important:- Allow the primer to dry prior to applying the sealant (10 mins).

WARNING:- the sections are not self supporting until several sections have been assembled together. Precautions should be taken to adequately support sections to prevent injury or damage. Ensure that the position of the sections is aligned with the intended water and flue connections during assembly.

2) Select the rear and intermediate section and apply a bead of silicone rubber compound, 5mm proud, around each of the two outer sealing grooves, of the mating faces.

Apply boiler cement to the inner sealing groove mating faces.

3) Position the sections on the plinth, fit the guide and 'O' rings to the top and bottom sockets of the rear section. These may require careful tapping into position using a mallet.

Position the intermediate section directly in front of the rear section, and using a crow bar under the bottom of the intermediate section, gently lift the intermediate section to engage the upper guide ring and then manoeuvre onto the lower guide ring.

4) Insert the four tie bolts through the securing lugs and tighten diagonally to ensure an even pull up on the guide rings until a face to face contact has been achieved. A maximum torque of 20N/m should be applied. Alternate the tie bolts between upper and lower fixings on adjacent sections.

Only work with one section at a time when pulling together.

Smooth over the sealing compound to leave a clean bead but slightly proud of the casting.

5) Complete the boiler build by repeating steps 1-4. Once all waterway sections have been assembled, prepare the rear section and flue cover casting by applying primer and silicone to the outer grooves.

Secure the flue cover to the rear section using tie bolts.

6) Fitting the Inserts

WARNING: THE INSERTS MUST BE INSTALLED BEFORE THE BURNER IS FIRED OTHERWISE DAMAGE MAY OCCUR TO THE FLUE SYSTEM DUE TO HIGH EXHAUST GAS TEMPERATURES.

NOTE: Insert dimensions vary depending on boiler size. Ensure correct length tube is used prior to assembly.

a) Install the inserts with the pointed end, incorporating the removal ring, pointing towards the front of the boiler whilst ensuring that inserts are pushed fully back.

b) The inserts must be positioned to ensure that they sit on the support feet. If the inserts are not correctly installed burn out may occur.

7) Fit the boiler flow and return connections and cap off with blanking plates and gaskets, leaving a suitable fitting on top of the rear section to enable venting during filling and testing. Fit a drain connection to the lower flange on the front section.

8) 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).

9) Check carefully for any leaks, and if satisfactory, drain the boiler sections and remove the blanking plates.

10.2 Dismantling

IMPORTANT:- the boiler sections are not self supporting, particularly when there are only a few sections remaining.

During dismantling, the sections must be supported to prevent injury or damage.

Dismantling the boiler is the reversal of the assembly procedure. Inserts should be removed using removal tool provided.

10.3 Assembly of Boiler Casing

Installers must ensure compatibility between boiler body and burner by referring to Figure M. If in any doubt, contact Hamworthy Heating for assistance.



Picture 1: Completed Build

Items Required for Build:

M10 x 40 Stud	6 Off
M10 x 20 Screw	3 Off
M10 Nut	4 Off
Pin 50 mm Long	12 Off
Control Panel Bracket	2 Off
Pack of Self-Tapping Screws	Accessory Pack

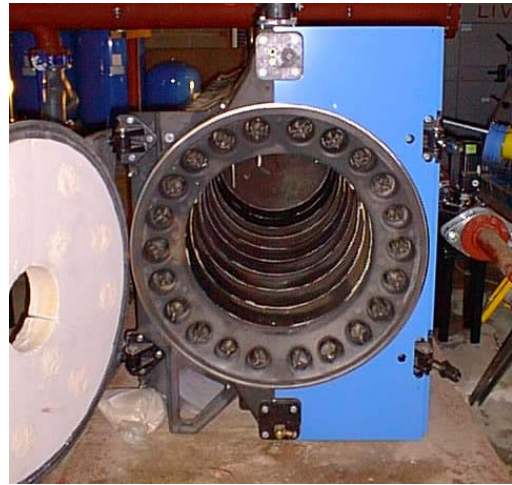
Tools Required for Build:

Stanley Torx T25 Screwdriver or equivalent
Ø10 mm Round File
Ø4 mm Drill Bit & Drill
Spanners 17 mm A/F & 36 mm A/F
Gloves etc for handling Fibreglass

Note: In general the casing panels will be drilled ready for the self-tapping screws, thus the build instructions will assume all aligning holes will be locked together with these screws unless otherwise stated.

10.3.1 Fitting of Door & Front Casings

Attach and tighten the four hinges (Items 15 to 18 & 62 to 64) to the front section. Fit the locknuts to the studs on the hinge side.

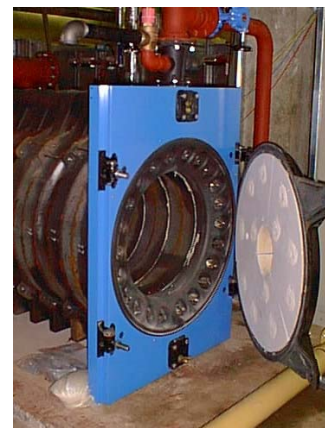


Picture 2: RH Front Casing Fitted incl. Door

Fit the six hexagonal spacers to the front section and fit the LH & RH boiler front casing (2-piece construction) using the screws provided.

Position the hinged door casting for left or right opening. The two smaller of the four door fixing holes should be positioned on the hinge side. Using a jack, raise the door to align with the hinge brackets and engage the door holes with the appropriate hinge studs. Fit and tighten the fixing screws.

Close the door and fasten with the door securing nuts, open it, then check the impression of the sealing grooves in the braiding. There should be a uniform impression approximately 2mm in depth. Adjust the fixing nuts to obtain the correct impression. Tighten all fixings diagonally to ensure an even seal between the door and front section.



Picture 3: Both Casings Fitted incl. Door

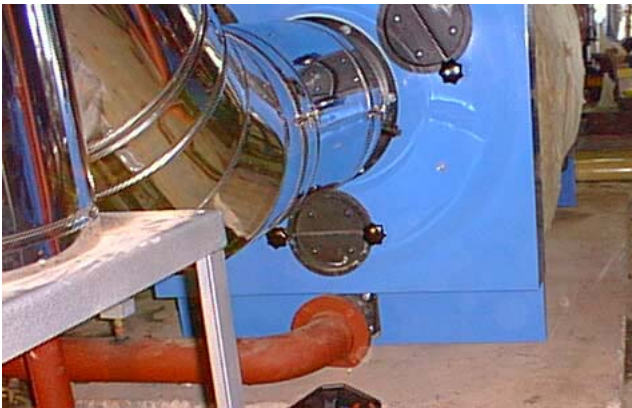
10.3.2 Fitting of Rear Casing

Fit the Insulation over the rear section , then fit the LH & RH boiler rear casing (2-piece construction). These are located with the Inspection Doors and Flue Connection Spigot. Ensure that the Flue Gasket is used. Lock to position using 3 off M10 X 20 Long screws and 2 off self- tapping screws.



Picture 3: RH Rear Casing Fitted

Fit the lower rear casings (2-piece construction) as shown using 1 off self-tapping screw each side.



Picture 4: Lower Rear Casings

10.3.3 Boiler Body Insulation & Side Rails

Place the boiler body insulation over the sections and draw down equally on both sides to the base of the boiler. Make good any joints with the tape provided. The insulation should be cut-out around the front and rear top connection flanges.



Picture 5: Boiler Body Insulation

Note: It may will be necessary to trim the length of the insulation to suit therefore suitable protective apparel should be worn. (see Section 1.5)

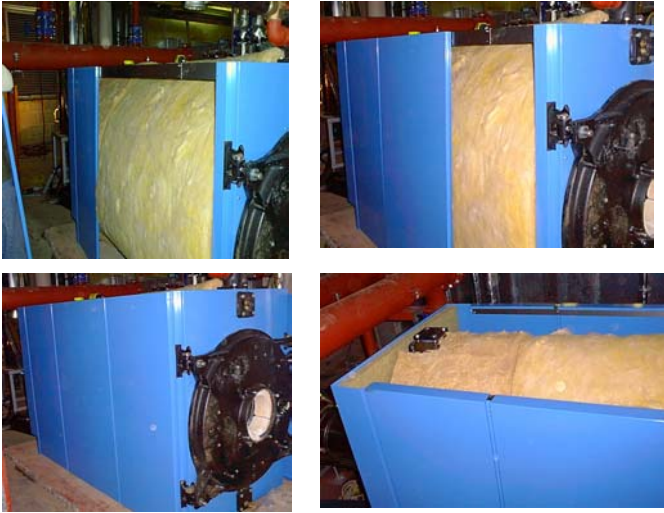


Picture 6: Side Rail attachment.

Due to the sectional nature of the Boiler the Side Rails are supplied as 2 `L` shaped brackets, on larger boiler sections, which slide over one another to achieve the required length. When the Front and Rear Covers are in place these brackets should be attached on both sides using 2 off Self-Tapping Screws into the slotted holes. It will then be necessary to drill 4 off Ø4mm holes to attach these brackets together with an additional 4 off Self-Tapping Screws; these should be drilled through the existing Ø4mm holes on the brackets.

Note: It is easier to fit the top Side Rail, then to move it to the bottom position to achieve correct length matching.

10.3.4 Side Cover Mounting



Picture 7: Side Plate attachment

Starting from the Rear the first side plate should be hung over the Top Side Rail and attached to the Rear Cover using 4 off Self-Tapping Screws. These will require drilling Ø4mm.

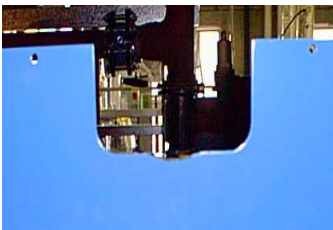
This should be repeated towards the front until all side panels are in position as shown.

10.3.5 Top Panel Mounting

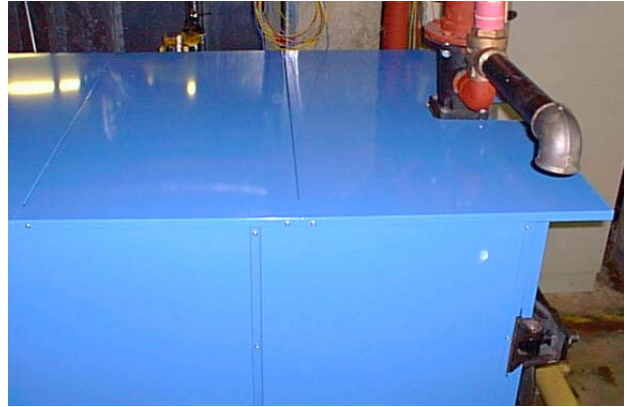


Picture 8: Top Rear Plates

Attach the Rear Top Plate using 4 off Self-Tapping Screws. Position the 2 Rear Flange Top Plates as shown but do not secure, the Top Covers should be fitted from the front.



Note: It may be necessary to file the Rear Flange Top Plates as shown to fit, due to interference with the riser connection.



Picture 9: Top Cover Complete

Fit the Front Top Cover as shown using the Control Box as a guide to how far forward this plate should extend. This Control Box may be fitted at this time if required (see section 10.3.8).

Then fit top cover sections in turn from front locking them into position with Self-Tapping Screws drilled to position, as required.

10.3.6 Door Insulation

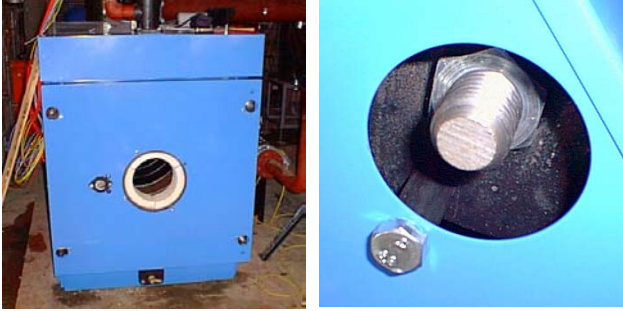


Picture 10: Door Casing Insulation

Fit the Door Casing Insulation by pushing onto the 4 off M10 x 40 Studs. Place the upper and lower Back Insulation pieces to position and pin using the 50mm Pins provided.

The two side Insulation Pieces should also be similarly located.

10.3.7 Door Casing



Picture 11: Door Casing

Locate the door casing with the Burner Flange Mounting Screws then lock to position using the M10 bolts, spacer and the M10 nuts. Fit the Sight Glass assembly.

10.3.8 Control Box Fitting Procedure

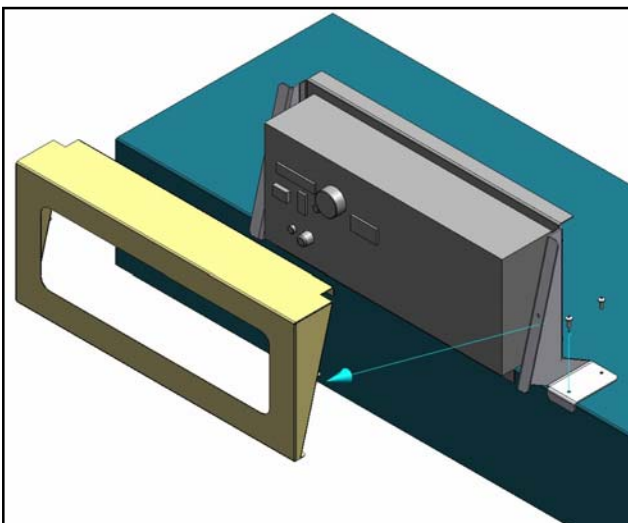


Picture 12: Control Box

Fit the Control Box to position using 6 off Self-Tapping Screws, 4 along the top and 2 at bottom as shown.

Fit the Control Box Cover.

10.3.9 Control Panel Fitting Procedure



Picture 13: Control Panel Attachment

Fit brackets to control panel using 4 off M5 x 12 pozi screws. Position the assembly on the casing top panel, mark positions of the 4 fixing holes. Remove Control panel assembly and drill 4 holes 3mm dia. in casing. Place Control Panel assembly in position and secure with 4 off Self-Tapping Screws.

The control panel fascia can now be hinged down by unlatching the catch on the top right hand using a screwdriver. NOTE: before attempting to hinge the fascia down, the thermostat knobs must be pulled off and the temperature limiter (high limit) cover knob unscrewed and removed.

With the fascia hinged down, the terminals are exposed and the power supply can be connected to the appropriate terminals via the glands in a removable plate at the bottom right hand side. The upper front casing panel has a cut out appropriately positioned beneath the gland plate to allow the power supply cables to enter the casing and to allow the flying leads to the burner to exit.

A powered lock-out terminal and a remote control link C1-C2 are also provided together with an optional volt-free contact kit (see Fig G on page 14 of this manual) the terminals being adjacent to the power supply, and cables for these functions should be run in a similar manner. For remote control remove the wire link between C1-C2 and replace with control cables. If the panel is for High/Low burners an additional link C3-C4 is also supplied, removal of which holds the burner on low fire. This link can also be replaced by control cables if remote high/low operation is required. For ease of disconnection, the terminals used are of the plug and socket type and hence all external wiring can be easily removed by pulling the top half of the terminal rail upwards and threading cables through the gland plate once removed.

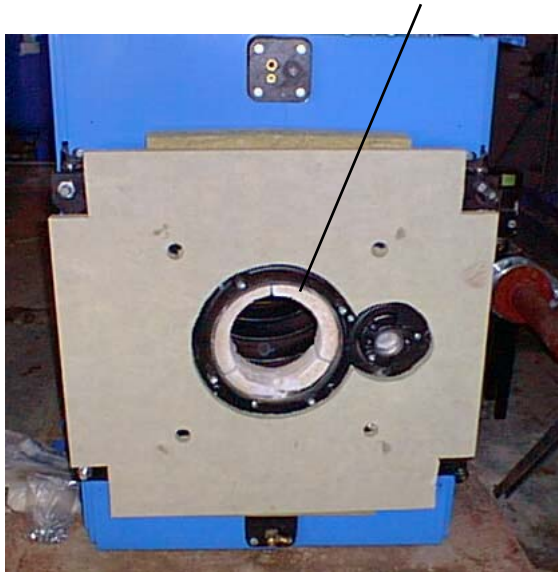
Depending on the type of burner fitted, the panel will provide a single flying lead terminating in a seven pin plug for connection to an on/off burner, or an additional flying lead terminating in a four pin plug for connection to a high/low burner. The panel for a high/low burner will also have an additional thermostat, hours run meter and run lamp.

When wiring is complete, raise hinged fascia and click into position by pushing on latch screw and replace thermostat knobs. Finally, locate control panel cover on brackets and secure with M5 nuts and shakeproof washers.

10.4 Fitting the Burner

A burner mounting plate is supplied with each boiler specific to the burner requested. Fit the plate to the front door casting using four M12 countersunk screws. Secure the burner and gasket to the burner mounting plate using the four bolts supplied with the burner.

IMPORTANT: BEFORE SECURING THE BURNER MOUNTING PLATE TO THE FRONT DOOR CASTING, APPLY MASTIC TO THE RIM OF THE BURNER APERTURE ON THE CASTING. FAILURE TO SEAL THIS JOINT WILL RESULT IN LEAKAGE OF FLUE PRODUCTS AND HEAT STAINING OF THE SURROUNDING CASING PANELS.



Having secured the burner to the mounting plate, apply the Cafco Blaze burner sealant between the burner blast tube and door refractory lining. The compound should be gradually mixed with water until pliable (the 2kg pack requires 4 litres of water). It is essential that the gap is filled and that the mix has been compressed and finished flush with the inner face of the door refractory lining.

Check that the weight of the burner has not affected the sealing of the door, especially after several opening and closings operations. Larger burners should be supported independently with a suitable device whilst still allowing the door to open.

NOTE:- All cables must exit the control via the cut-outs in the bottom and must be routed adjacent to the burner mounting plate.

The cables MUST NOT be routed across the burner or it's mounting plate.

Following completion of the boiler assembly, the cleaning and assembly tools should be left on site in a safe place, preferably within the boiler room.

11.0 COMMISSIONING AND TESTING

11.1 Electrical Installation

Wiring **MUST** be checked by a suitably competent person. Power supply required is 400V 50 Hz three phase, 4 wire. An isolator correctly fused should be sited close to the boiler. Refer to the burner instructions.

It should be noted the 3 phase supply should be wired direct to the burner and a separate 240V single phase supply derived from the burner should be wired to the panel.

The boiler is supplied with a remote stop/start circuit for time clock operation. **Any other interlocks, i.e. Pressurisation unit, BEM System should be wired in series with the remote stop/start loop.**

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.

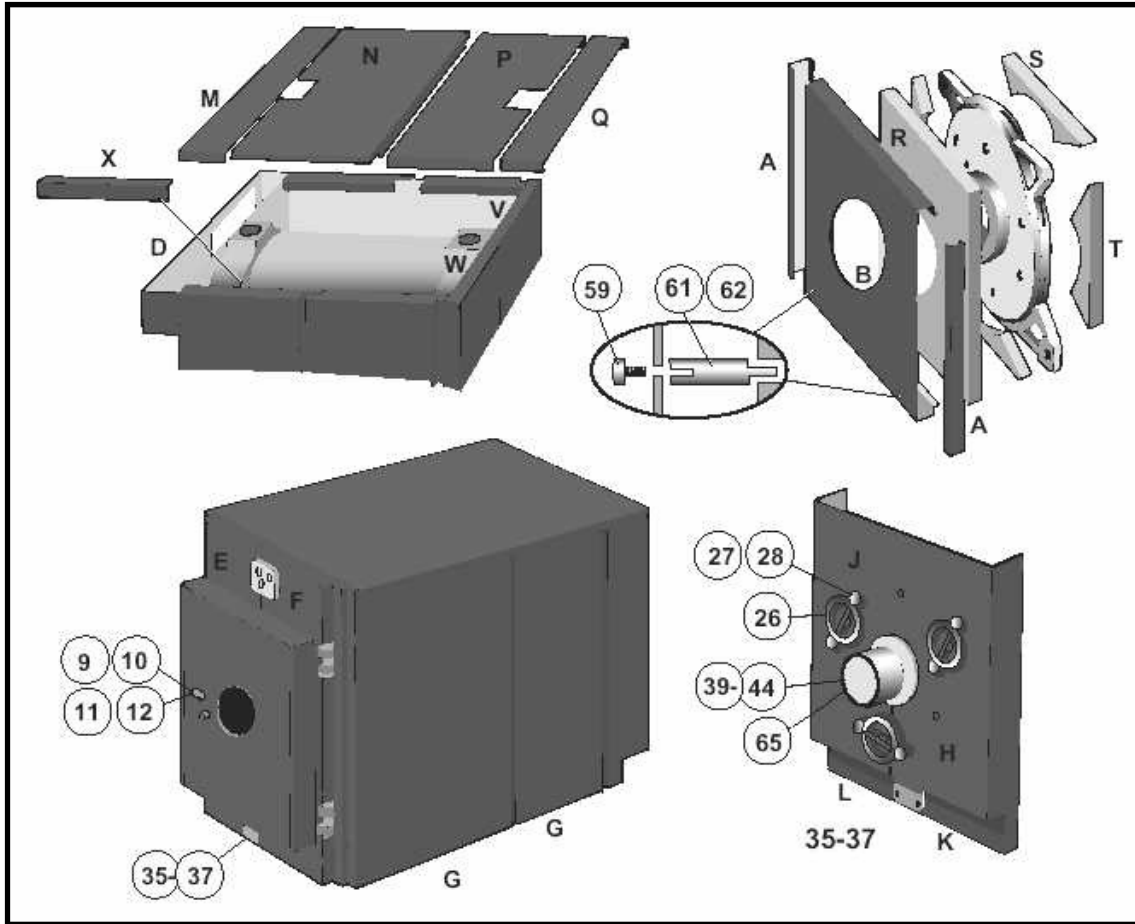
With the pump fitted the system should be filled and air locks cleared. Vent the radiators and check for leaks.

If the system is unvented the pressurisation unit should not be utilised 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 pressurisation 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) Flue way passages to chimney are clear.
- 2) Adequate ventilation as per Section 7: Air Supply exists in the boiler house.



No. of Boiler sections	SIDE PANEL	TOP REAR PANEL	SUPPORT RAIL	BOILER INSULATION
	No. off * length (mm)	No. off * length (mm)	No. off * length (mm)	No. off * width (m)
6	2 * 916	1 * 799	N/A	1 * 1.2
7	4 * 556	1 * 439	4 * 1057	1 * 1.2
8	2 * 556	1 * 619	4 * 1057	1 * 1.2
	2 * 736			1 * 0.6
9	2 * 556	1 * 799	8 * 1057	2 * 1.2
	2 * 916			
10	6 * 556	1 * 439	8 * 1520	2 * 1.2
				1 * 0.6
11	4 * 556	1 * 619	8 * 1520	2 * 1.2
	2 * 736			1 * 0.6
12	4 * 556	1 * 799	8 * 1520	2 * 1.2
	2 * 916			1 * 0.6
13	8 * 556	1 * 439	8 * 1520	2 * 1.2
				1 * 0.6
14	6 * 556	1 * 619	8 * 1520	3 * 1.2
	2 * 736			
15	4 * 556	1 * 799	8 * 1520	3 * 1.2
	4 * 736			

Figure K - Composition of Boiler Casing Assembly

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 B.

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 inserts are fitted.
 - e. Check all thermostat bulbs are correctly inserted in the appropriate pocket.
 - f. Check for water leaks and ensure that both boiler and heating system is full of water and properly vented.
 - g. Check that all drain cocks are closed, and that all isolating valves in flow and return pipework are open.
 - h. **For OIL**; check that tank/s have been filled and oil supply pipework between tank and burner has been primed.
 - j. **For GAS**; check soundness of gas installation and that pipework is purged of air, as detailed in British Gas Publications IM/5 and IM/2 respectively.
- Check that gas meter is operational and has been checked by the local region of British Gas.
Check that gas meter and supply pipework is of sufficient size to meet the input rating of the burner/boiler. Refer to Section 2.1.
- k. Check that burner output is correct for size of boiler in question, referring to Figure M, and the manufacturer's technical information supplied with the burner.

NOTE: - ALL FUELS. Refer to the commissioning procedure in the burner manufacturers literature, 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 Oil fired Boilers

- a. Check flexible oil lines are tightly jointed and are not twisted or kinked to form an obstruction.
- b. Check correct nozzle/s is fitted to burner (Fig 11.4) and that it is tight.

NOTE:- Some burners are despatched with a test nozzle/s fitted. In these cases, the correct nozzle/s is despatched in a separate package with the boiler and **MUST** be fitted to the burner before attempting to fire the boiler.

- c. Check electrodes and ensure porcelain insulation is not cracked.
- d. Check electrodes are correctly positioned, and gap is correctly set, as specified in the manufacturer's technical information supplied with the burner.
- e. Check blast tube is correctly located, and securely fastened in place and firebrick at rear of combustion chamber is sound and correctly located.
- f. Check burner seats correctly onto burner mounting plate and is securely fastened in place.
- g. Set burner for the required fuel and air throughputs, as specified in the manufacturer's technical information supplied with the burner.
- h. Fit a pressure gauge on burner oil pump to check pump pressure is correctly set.
- i. Check that overheat thermostat manual reset is set, and that boiler control thermostat and control system are set to call for heat.
Switch the boiler on and start the burner.

j. The burner control will first operate the fan to pre-purge the boiler, then produce an ignition spark and finally open the oil solenoid valve and the flame should ignite.

- k. Purge air from oil pump through pressure gauge port.

IF BURNER LOCKS OUT WAIT 45 SECONDS BEFORE PRESSING RESET BUTTON ON BURNER CONTROL BOX.

l. With burner firing, check the atomising pressure on gauge and adjust as necessary using the pressure regulator on burner oil pump. Refer to technical information supplied with burner.

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

Measure CO₂, CO, smoke number, flue gas temperature and circulating water temperature rise across the boiler. The readings obtained should be as indicated in Figure O, target appliance readings.

Readings should be taken at both High and Low settings. A link 20-22 is provided in the control panel terminals, the removal of which, will hold the burner on low fire.

n. Switch off boiler. Remove oil pressure gauge and replace sealing plug complete with gasket.

o. Restart boiler and cycle it on and off several times to ensure reliable burner ignition and boiler operation. Check for oil, water and flue gas leakage. Tighten all access flue box and burner mounting bolts and nuts.

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

q. 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 USERS OF THE BOILER FOR THEIR FUTURE REFERENCE.

11.4.3 Gas fired Boilers

a. Check that ignition electrode and rectification probe are correctly positioned. Refer to manufacturer's technical information supplied with the burner.

b. Check that ignition electrode and rectification probe leads are connected.

c. Check blast tube is correctly located, and securely fastened in place.

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

e. With firing head separate from burner adjust air and gas settings, as specified in the manufacturer's technical information supplied with the burner.

f. Determine minimum burner gas pressure which corresponds to required burner output (boiler input), as follows:

From the manufacturer's technical information (supplied with the burner) take burner pressure corresponding to required burner output.

Add combustion resistance (in mbar), given in Figure D for the boiler in question, to obtain gas pressure value to be measured at burner test point.

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

h. 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.

i. Adjust start and main output gas rates as detailed in the manufacturer's technical information supplied with the gas burner.

j. Check that overheat thermostat manual reset is set, and that boiler control thermostat and control system are set to call for heat.

k. Close main isolating valve in gas supply, switch the boiler on 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.

l. Open main isolating valve in gas supply. If gas train has separate pilot gas line, open pilot gas isolating valve and close main gas isolating valve. Restart boiler/burner. The burner control will pre-purge, produce an ignition spark and ignite pilot flame. The main flame should fail to light, and burner will continue running on ignition flame only. The pilot gas rate can be checked and adjusted as detailed in the manufacturer's technical information supplied with the gas burner.

IF BURNER FAILS TO LIGHT, BOILER MUST BE PRE-PURGED BEFORE ATTEMPTING TO RESTART BURNER. IF BURNER REPEATEDLY FAILS TO LIGHT, A FULL INVESTIGATION TO FIND CAUSE SHOULD BE MADE.

m. Stop boiler/burner. Open main gas isolating valve and restart burner. The burner will pre-purge, ignite pilot flame and, after a short delay of several seconds, the main flame will light. Adjust the main gas rate as detailed in the manufacturer's technical information supplied with the gas burner.

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

Measure 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 O, target appliance readings.

Readings should be taken at both High and Low settings. A link 20-22 is provided in the control panel terminals, the removal of which, will hold the burner on low fire.

o. After all other adjustments have been made, set burner air pressure switch as instructed in manufacturer's technical information supplied with burner.

p. Check gas pressure at burner head corresponds with value determined from burner manufacturer's technical information - as detailed in (f) above.

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

r. 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.

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

t. 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 A. 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 and burner Operating Instructions should then be handed over and kept in a safe place for easy reference.

12.0 FAULT FINDING

Fault finding on the burner control system is detailed in the burner manufacturers instructions. If the boiler still cannot be operated satisfactorily after following these instructions, consult Hamworthy Heating for assistance.

13.0 SERVICING

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 SIX months for oil fired boilers, or TWELVE months for gas fired boilers.

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, oil leaks or unusual noise from burner oil pump or motor.

b. After allowing burner to reach stable firing conditions for approximately 15 minutes, carry out combustion gas check. Measure CO₂, CO, flue gas temperature, smoke number (for oil) and water temperature rise across the boiler. The readings obtained should be noted for reference upon completion of the servicing procedure.

c. Measure either gas pressure at burner head, or oil pressure at burner pump, as applicable, and check value is correct for size of boiler in question.

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

13.2 Burner Service Procedure.

SWITCH OFF ELECTRICAL SUPPLY TO BOILER AT ISOLATOR AND SHUT OFF FUEL SUPPLY TO BOILER.

Clean and service the burner in accordance with the burner manufacturers instructions.

- a. Disconnect electrical and fuel connections to burner, as necessary.
- b. Disconnect burner from the fuel supply and open the hinged door, with the burner attached.

13.3 Boiler Service Procedure

- a. After hinging the burner, remove boiler casing, control panel (taking care to remove thermostat bulbs) and front insulation to gain access to front section of boiler. The power supply to the control panel and additional control cables, if used, must be disconnected.
- b. Boiler combustion chamber and heat exchanger flueways are now accessible for cleaning with the brush and a vacuum cleaner once the flue inserts have been removed.
- c. Access to rear of heat exchanger flueways and combustion chamber can be obtained by removing the access covers from rear of boiler.
- 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, casing and control panel (ensure thermostat bulbs are correctly located in pocket). For guidance, refer to Section 10.
- f. Refit burner. Reconnect fuel and electrical supplies.
- 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 below 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 boiler and turn off the gas supply before removing controls cover and commencing any servicing or component exchange procedure.

NOTE:- For replacement of burner components refer to the burner manufacturers instructions.

14.1 Control and High/Low Thermostat/s

Record the existing temperature setting of the thermostat for reference before removal.

NOTE:- Before removing the control panel top, the thermostat knobs must be pulled off and the temperature limiter (high limit) cover knob unscrewed and removed.

Withdraw the appropriate thermostat bulb from the thermostat pocket and disconnect the electrical connections noting the terminal identifications.

Remove the two screws securing the thermostat to its mounting bracket and withdraw the thermostat body whilst feeding the capillary through the hole in the control panel mounting plate.

Fit the new thermostat and ensure the capillary is correctly located within the thermostat pocket. Close the fascia and run the boiler to check for correct operation. Set the thermostat to the previously noted setting.

14.2 Temperature Limiter (Limit Thermostat)

The temperature limiter replacement procedure follows that of the control thermostat with some minor differences as detailed below:

With the plastic cover removed, unscrew the holding nut and carefully withdraw the thermostat body

Prior to fitting the replacement thermostat, set to 100°C and check the operation of the device by carefully applying a heat source to the bulb.

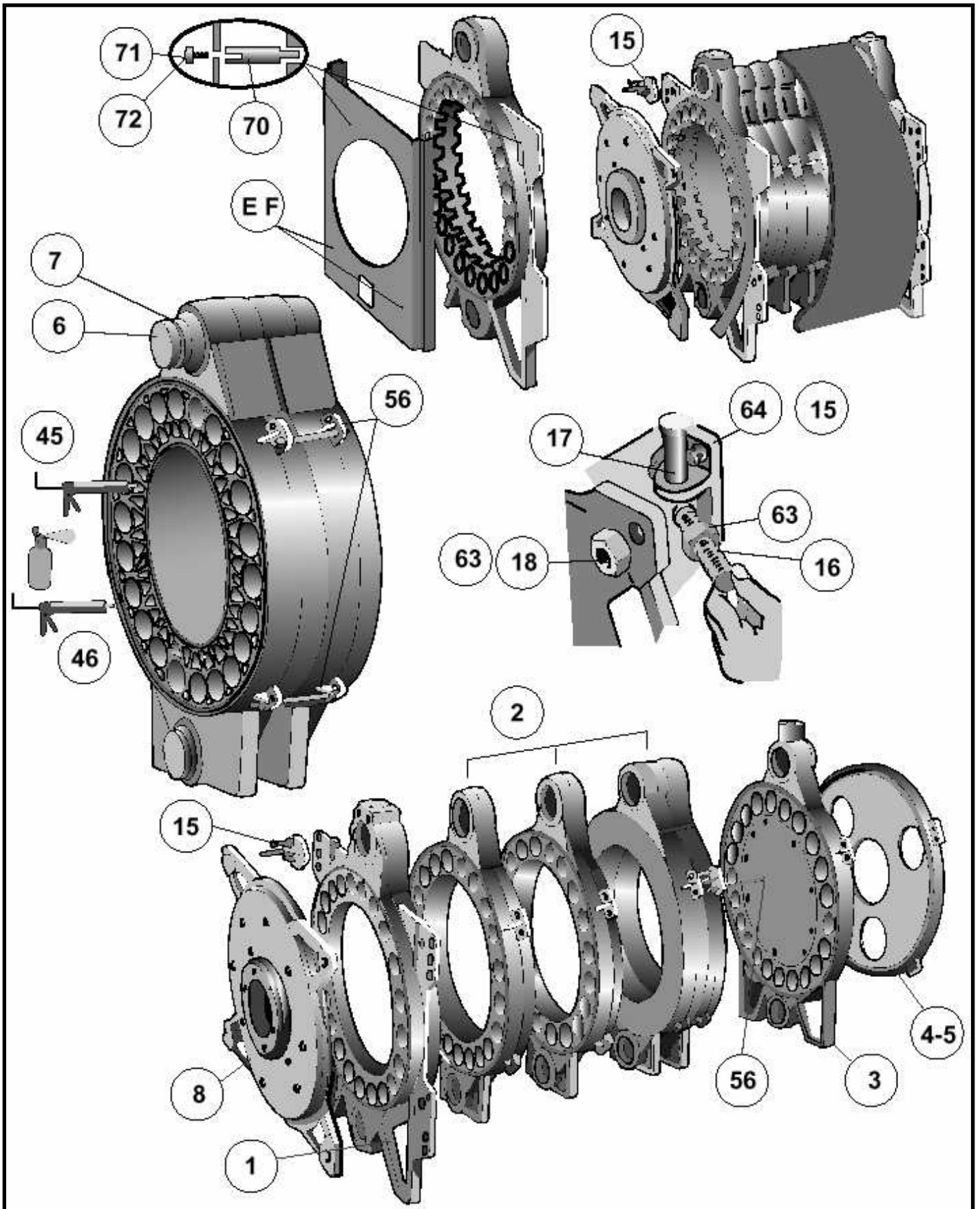


Figure L - Exploded view of boiler

15.0 SPARE PARTS LIST

Ref	Description	HHL Pt No	No. Off Req'd Per Assembly					
			GM6	GM7	GM8 GM9	GM10 GM11	GM12 GM13	GM14 GM15
	Distance Bolt M6 x 45	5111480817	1	1	1	1	1	1
47	Silicone Primer	5017150100	2	2	2	3	3	3
45	Boiler Cement	5017400100	5	5	6	8	9	10
60	Inspection Window Bolt M10 x 35	5200649712	2	2	2	2	2	2
	Screw M12 x 30	5202453642	4	4	4	4	4	4
28	Pin M10 x 45	5204036011	6	6	6	6	6	6
	Screw M6 x 8	5206236211	10	12	10	10	12	10
	Washer 14 x 28 x 2	5280161911	28	28	28	28	28	28
	Washer M6 x 14 x 1.5	5281621101	12	12	12	12	12	12
	Gasket 90 x 120 dia. x 6 thk	5034110205	4	4	4	4	4	4
	Tubing	5036470100	1	1	1	1	1	1
65	Flue Hood Screw M8 x 30	5039210123	4	4	4	4	4	4
	Screw M10 x 16	5039210136	3	3	3	3	3	3
43	Screw M10 x 30 for Flue Spigot	5039210138	4	4	4	6	6	6
59	Door Panel Bolt M10 x 65	5039210139	4	4	4	4	4	4
64	Screw M12 x 30 for Door Hinge	5039210149	12	12	12	12	12	12
38	M12 x 40 bolts (for 3" Flanges)	5039210150	24	24	24	24	24	24
	Screw M6 x 16	5039270116	2	2	2	2	2	2
	Torx Screw 4.8 x 16	5039360121	70	110	110	130	150	150
	Bits torx 867-4Z TX-25	5039360999	1	1	1	1	1	1
63	Door Lock-nut M24	5039370120	4	4	4	4	4	4
62	M10 Nut for Door Panel Bolt	5039370160	4	4	4	4	4	4
	Nut M12	5039370166	52	60	68/76	84/92	100/112	116
	Washer M8 16 x 1.5	5039820107	4	4	4	4	4	4
44	Washer M10 for Flue Spigot	5039820127	4	4	4	4	4	4
	Circuit Breaker	5045620003	1	1	1	1	1	1
	Fitting	5033490100	1	1	1	1	1	1
	Fitting	5033490103	1	1	1	1	1	1
	Limit Switch	5033510138	1	1	1	1	1	1
	Screw M4 x 20	5039270108	2	2	2	2	2	2
	M4 Nut	5039370150	2	2	2	2	2	2
	M4 Serrated Lock Washer	5039800101	2	2	2	2	2	2
	Circuit Breaker Bracket	5045620002	1	1	1	1	1	1
	Tubing 0.4m	5721017904	1	1	1	1	1	1
	Tubing 18.6	5033350102	0.4m	0.4m	0.4m	0.4m	0.4m	0.4m
	Nut for Tubing	5763011503	2	2	2	2	2	2
30	4" Flange, painted (Table D)	5701016201	2	2	2	2	2	2
34	Drain Flange 3/4"	5701016202	1	1	1	1	1	1
37	Gasket 90 x 120	5701068103	2	2	2	2	2	2
29	Extension	5701414701	1	1	-	-	-	-
29	Extension	5701414801	-	-	1	-	-	-
29	Extension	5701414805	-	-	-	2	3	-
	Extension c/w threaded hole	5701414721	1	1	-	-	-	-
	Extension c/w threaded hole	5701414821	-	-	1	-	-	1
	Insulation 1.2m wide x 7250 x 80mm thk	5701576401	1	1	1	1	1	2

15.0 SPARE PARTS LIST (Continued)

Ref	Description	HHL Pt No	No. Off Req'd Per Assembly					
			GM6	GM7	GM8 GM9	GM10 GM11	GM12 GM13	GM14 GM15
	Rear Isolation	5702003701	2	2	2	2	2	2
36	Flange - plain	5701016203	1	1	1	1	1	1
35	Flange 3"	5702005602	1	1	1	1	1	1
56	Section Bolts, M12 x 230	5702004301	20	24	28/32	36/40	44/48	52/56
57	Flue Gas Plate Bolts M12 x 140	5702004302	4	4	4	4	4	4
49	Applicator	5702005001	1	1	1	1	1	1
46	Silicone Sealant	5702005301	a/r	a/r	a/r	a/r	a/r	a/r
	Plug 3/8"	5711059605	1	1	1	1	1	1
	Plug 1/2"	5711059607	1	1	1	1	1	1
	Plug 3/4"	5711059610	1	1	1	1	1	1
52	Flue Pipe Brush Extension	5702005701	1	1	-	-	-	1
53	Flue Pipe Brush Extension	5702005702	-	-	1	1/0	-	1
54	Flue Pipe Brush Extension	5702005703	-	-	-	0/1	1	-
39	Smoke Outlet Pipe 250mm	5702008201	1	1	1	-	-	-
7	'O' Ring	5702010603	10	12	14/16	18/20	22/24	26/28
	Burner Sealing Compound (2kg)	5702012701	1	1	1	1	1	1
4	Flue Gas Plate 250mm	5702015501	1	1	1	-	-	-
5	Flue Gas Plate 350mm	5702015502	-	-	-	1	1	1
3	Rear Section	5702020411	1	1	1	1	1	1
8	Front Door	5702020507	1	1	1	1	1	1
	Front Door Gasket	5111427302	12	12	12	12	12	12
	Glass Fibre Braid 3/4"	5017310122	3.1m	3.1m	3.1m	3.1m	3.1m	3.1m
	Screw M6 x 12	5200636612	2	2	2	2	2	2
	Screw M8 x 70	5039210132	12	12	12	12	12	12
	M8 Nut	5039370155	12	12	12	12	12	12
	Washer M8	5039840101	12	12	12	12	12	12
	Insulation (Rockwool)	5702042801	3	3	3	3	3	3
	Plug KR 1/4"	5711059604	1	1	1	1	1	1
15	Hinge Bracket	5702020601	4	4	4	4	4	4
26	Cleaning Door	5721003101	1	1	1	1	1	1
48	Primer Applicator	5702023401	1	1	1	1	1	1
6	Guide Ring	5702024901	10	12	14/16	18/20	22/24	26/28
61	Spacer Bolt	5702026201	4	4	4	4	4	4
9	Inspection Window	5702028001	1	1	1	1	1	1
	Inspection Window Gasket	5702027601	2	2	2	2	2	2
	Inspection Window, fire resisting	5721005901	1	1	1	1	1	1
	Flue Gas Pipe	5702029401	-	-	-	1	1	1
	Sealing Cover	5702029701	-	-	-	1	1	1
50	Flue Pipe Brush	5702030701	1	1	1	1	1	1
1	Front Section	5702040011	1	1	1	1	1	1
2	Intermediate Section	5702040111	4	5	6/7	8/9	10/11	12/13
	Insulation	5702042501	2	2	2	2	2	2
	Insulation PS 51252	5702042601	2	2	2	2	2	2
27	Lock Handle	5711105611	6	6	6	6	6	6
	Locking Nut	5702045901	2	2	2	2	2	2

15.0 SPARE PARTS LIST (Continued)

Ref	Description	HHL Pt No	No. Off Req'd Per Assembly					
			GM6	GM7	GM8 GM9	GM10 GM11	GM12 GM13	GM14 GM15
88	Flue Tube x 945 lg, 6 Section	5702041106	22	-	-	-	-	-
88	Flue Tube x 1125 lg, 7 Section	5702041101	-	22	-	-	-	-
88	Flue Tube x 1315 lg, 8 / 9 Section	5702041102	-	-	22	-	-	-
88	Flue Tube x 1665 lg, 10 / 11 Section	5702041103	-	-	-	22	-	-
88	Flue Tube x 2025 lg, 12 / 13 Section	5702041104	-	-	-	-	22	-
88	Flue Tube x 2385 lg, 14 / 15 Section	5702041105	-	-	-	-	-	22
	Flue Tube Extraction Tool	5702042101	1	1	1	1	1	1
F	Front Right Hand Side Casing Panel	5702043001	1	1	1	1	1	1
E	Front Left Hand Side Casing Panel	5702043101	1	1	1	1	1	1
J	Right Hand Rear Panel (6-9 Section)	5702043201	1	1	1	-	-	-
J	Right Hand Rear Panel (10-15 Section)	5702043202	-	-	-	1	1	1
H	Left Hand Rear Panel (6-9 Section)	5702043301	1	1	1	-	-	-
H	Left Hand Rear Panel (10-15 Section)	5702043302	-	-	-	1	1	1
Q	Top Rear End Panel	5702043501	1	1	1	1	1	1
K	Bottom Rear Left Hand Panel	5702043601	1	1	1	1	1	1
L	Bottom Rear Right Hand Panel	5702043701	1	1	1	1	1	1
X	Support Rail 1057mm	5702043801	-	4	8	8/0	-	-
X	Support Rail 1520mm	5702043802	-	-	-	0/8	8	8
G	Side Panel 556mm	5702043901	-	4	2/2	6/4	4/8	6
G	Side Panel 736mm	5702043902	-	-	2/0	0/2	-	2
G	Side Panel 916mm	5702043903	2	-	0/2	-	2/0	0
P	Top Rear Intermediate Panel - 439mm	5702044001	-	1	-	1/0	0/1	0
P	Top Rear Intermediate Panel - 619mm	5702044002	-	-	1/0	0/1	-	1
P	Top Rear Intermediate Panel - 799mm	5702044003	1	-	0/1	-	1/0	0
P	Top Intermediate Panel	5702044101	-	1	1	1	1	1
N	Top Front Panel	5702044201	1	1	1	1	1	1
M	Top Front End Panel	5702044401	1	1	1	1	1	1
B	Front Door Casing	5702044701	1	1	1	1	1	1
A	Front Door Side Plates	5702044801	2	2	2	2	2	2
	Rivet 3.2 x 5	5111438206	4	4	4	4	4	4
	Isol. Plate	5702044501	1	1	1	1	1	1
	Plastic Plug	5711231702	8	8	8	8	8	8
	Sensor Tube	5702070401	1	1	1	1	1	1
10	Inspection Window Flange	5721003301	1	1	1	1	1	1
	Screw M6 x 30	5200637412	4	4	4	4	4	4
41	Gasket for 250mm Spigot	5721006002	1	1	1	1	1	1
51	Handle for Flue Pipe Brush	5721009305	1	1	1	1	1	1
17	Hinge Pin	5721010501	4	4	4	4	4	4
16	Hinge Bolt	5721010601	4	4	4	4	4	4
	Burner Gasket	5721015901	1	1	1	1	1	1
	Burner Gasket	5721015904	1	1	1	1	1	1
	Insulation	5721023202	1	1	1	1	1	1
	Key (Din894)	5000907732	1	1	1	1	1	1

15.0 CONTROL PANEL / SPARES

Ref	Description	HHL Pt No	No. Off Req'd Per Assembly					
			GM6	GM7	GM8 GM9	GM10 GM11	GM12 GM13	GM14 GM15
	Control Panel Complete (inc. instruments)	563902223	1	1	1	1	1	1
	Control Panel Support Bracket (LH)	530101024	1	1	1	1	1	1
	Control Panel Support Bracket (RH)	530101025	1	1	1	1	1	1
	Control Panel Cover	533902031	1	1	1	1	1	1
	Control Thermostat	533901178	2	2	2	2	2	2
	Temperature Limiter	533901179	1	1	1	1	1	1
	Temperature Gauge	557002005	1	1	1	1	1	1
	Hours Run Meter	533901067	2	2	2	2	2	2
	On/Off Switch (Illuminated)	533901212	1	1	1	1	1	1
	Fuse Holder	747224779	1	1	1	1	1	1
	Anti-Surge Fuses 5A & 6.3A (20mm)	500005033	1	1	1	1	1	1
	Green Neon	533901031	2	2	2	2	2	2
	Red Neon	533901029	1	1	1	1	1	1

Boiler model	Burner Details			Boiler Details				Combustion chamber diameter dim (B) mm	Combustion chamber length dim (A) mm	Comb head (mm)	
	Make	Model	Mode	Heat Output (kW)	Max Heat Input		Min Heat Input				
					(Nett) (kW)	Gas Rate m³/h	(Nett) (kW)				Gas Rate m³/h
GM6	Riello	RS50	Hi / Lo				242.0	25.61		216	
GM6	Riello	RS50 / M	Modul'n	420.0	465.9	49.3	85.0	8.99	920	216	
GM6	Nu Way	XGN 650	Hi / Lo				353	37.3		240	
GM7	Riello	RS70	Hi / Lo				266.0	28.15		250	
GM7	Riello	RS70 / M	Modul'n	480.0	532.0	56.3	135.0	14.29	1100	250	
GM7	Nu Way	XGN 650	Hi / Lo				389	41.1		240	
GM8	Riello	RS70	Hi / Lo				306.0	32.38		250	
GM8	Riello	RS70 / M	Modul'n	550.0	610.5	64.6	135.0	14.29	1280	250	
GM8	Nu Way	XGN 1000	Hi / Lo				389	41.1		240	
GM9	Riello	RS100	Hi / Lo				350.0	37.04		250	
GM9	Riello	RS100 / M	Modul'n	630.0	698.4	73.9	150.0	15.87	1460	250	
GM9	Nu Way	XGN 1000	Hi / Lo				247	26.1		240	
GM10	Riello	RS100	Hi / Lo				400.0	42.33		250	
GM10	Riello	RS100 / M	Modul'n	720.0	798.5	84.5	150.0	15.87	1640	250	
GM10	Nu Way	BG 700	Hi / Lo				247	26.1		328	
GM11	Riello	RS100	Hi / Lo				444.0	46.98		250	
GM11	Riello	RS100 / M	Modul'n	800.0	887.4	93.9	154.0	16.3	1820	250	
GM11	Nu Way	BG 700	Hi / Lo				247	26.1		328	
GM12	Riello	RS100	Hi / Lo				488.0	51.64		250	
GM12	Riello	RS100 / M	Modul'n	880.0	976.2	103.3	169.0	17.88	2000	250	
GM12	Nu Way	BG 700	Hi / Lo				423.5	44.8		328	
GM13	Riello	RS100	Hi / Lo				522.0	55.24		250	
GM13	Riello	RS100 / M	Modul'n	950.0	1043.7	111.5	183.2	19.39	2180	250	
GM13	Nu Way	BG 700	Hi / Lo				423.5	44.8		328	
GM14	Riello	RS130	Hi / Lo				565.0	59.79		280	
GM14	Riello	RS130 / M	Modul'n	1020.0	1131.2	119.7	196.0	20.74	2360	280	
GM14	Nu Way	XGN 2100	Hi / Lo				423.5	44.8		240	
GM15	Riello	RS130	Hi / Lo				594.0	62.86		280	
GM15	Riello	RS130 / M	Modul'n	1070.0	1186.9	125.6	214.7	22.72	2540	280	
GM15	Nu Way	XGN 2100	Hi / Lo				423.5	44.8		240	

Figure M - Matched Burner Boiler Combinations for Natural Gas

Boiler model	Burner Details			Boiler Heat Inputs / Outputs				1st nozzle	2nd nozzle	Combustion chamber diameter dim (B) mm	Combustion chamber length dim (A) mm	Comb head (mm) dim (C) mm		
	Make	Model	Mode	Max Output (kW)	Max Heat Input		Min Heat Input					250	150	
					(Nett) (kW)	Fuel rate l/h	(Nett) (kW)							Fuel rate l/h
GM6	Riello Nu Way	RL50 NOL 25T	Hi/Lo	440	489.7	49.7	244.9	24.86	5.00	4.50	635	920	250	150
GM7	Riello Nu Way	RL50 NOL 25T	Hi/Lo	510	567.5	57.6	283.8	28.8	7.00	4.50	635	1100	250	150
GM8	Riello Nu Way	RL70 NOL 30	Hi/Lo	580	645.4	65.5	322.7	32.75	7.50	5.50	635	1280	250	150
GM9	Riello Nu Way	RL70 NOL 30	Hi/Lo	670	745.9	75.7	373.0	37.86	8.50	6.00	635	1460	250	150
GM10	Riello Nu Way	RL100 NOL 50	Hi/Lo	760	846.4	85.9	423.2	42.95	10.00	7.00	635	1640	250	240
GM11	Riello Nu Way	RL100 NOL 50	Hi/Lo	840	935.0	94.9	467.5	47.45	11.00	7.00	635	1820	250	240
GM12	Riello Nu Way	RL100 NOL 50	Hi/Lo	925	1029.7	104.5	514.9	52.26	12.00	8.00	635	2000	250	240
GM13	Riello Nu Way	RL100 NOL 50	Hi/Lo	1000	1113.4	113.0	556.7	56.5	13.00	9.00	635	2180	250	240
GM14	Riello Nu Way	RL130 NOL 50	Hi/Lo	1070	1191.2	120.9	595.6	60.45	14.00	9.00	635	2360	250	240
GM15	Riello Nu Way	RL130 NOL 50	Hi/Lo	1130	1258.2	127.7	629.1	63.85	15.00	10.00	635	2540	250	240

Figure N - Matched Burner Boiler Combinations for Class D Oil

MAKE (type)	MODEL	MODE	QUANTITY	PART No.	DESCRIPTION
RIELLO (Danfoss/ Delavan)	GM6	HI/LO	1	532904015	5.0 x 60° - (Low)
			1	532904009	4.5 x 60° - (High)
	GM7	HI/LO	1	532904020	7.0 x 60° - (Low)
			1	532904009	4.5 x 60° - (High)
	GM8	HI/LO	1	532904022	7.5 x 60° - (Low)
			1	532904016	5.5 x 60° - (High)
	GM9	HI/LO	1	532904050	8.5 x 60° - (Low)
			1	532904017	6.0 x 60° - (High)
	GM10	HI/LO	1	532904024	10.0 x 60° - (Low)
			1	532904020	7.0 x 60° - (High)
GM11	HI/LO	1	532904026	11.0 x 60° - (Low)	
		1	532904020	7.0 x 60° - (High)	
GM12	HI/LO	1	532904027	12.0 x 60° - (Low)	
		1	532904049	8.0 x 60° - (High)	
GM13	HI/LO	1	532904066	13.0 x 60° - (Low)	
		1	532904023	9.0 x 60° - (High)	
GM14	HI/LO	1	532904051	14.0 x 60° - (Low)	
		1	532904023	9.0 x 60° - (High)	
GM15	HI/LO	1	532904067	15.0 x 60° - (Low)	
		1	532904024	10.0 x 60° - (High)	

Figure O.1 - Riello Oil Nozzle selection

MAKE (type)	MODEL	MODE	QUANTITY	PART No.	DESCRIPTION
Nu-Way (Monarch)	GM6	HI/LO	1	532904034	5.0 x 60° - (Low)
			1	532904034	5.0 x 60° - (High)
	GM7	HI/LO	1	532904040	5.5 x 60° - (Low)
			1	532904040	5.5 x 60° - (High)
	GM8	HI/LO	1	532904034	5.0 x 60° - (Low)
			1	532904034	5.0 x 60° - (High)
	GM9	HI/LO	1	532904042	6.0 x 60° - (Low)
			1	532904042	6.0 x 60° - (High)
	GM10	HI/LO	1	532904043	7.0 x 60° - (Low)
			1	532904042	6.0 x 60° - (High)
GM11	HI/LO	1	532904044	7.5 x 60° - (Low)	
		1	532904043	7.0 x 60° - (High)	
GM12	HI/LO	1	532904072	8.0 x 60° - (Low)	
		1	532904044	7.5 x 60° - (High)	
GM13	HI/LO	1	532904045	8.5 x 60° - (Low)	
		1	532904072	8.0 x 60° - (High)	
GM14	HI/LO	1	532904070	9.0 x 60° - (Low)	
		1	532904070	9.0 x 60° - (High)	
GM15	HI/LO	1	532904071	10.0 x 60° - (Low)	
		1	532904071	10.0 x 60° - (High)	

Figure O.2 - Nu-Way Oil Nozzle selection

BOILER MODEL		GM6	GM7	GM8	GM9	GM10	GM11	GM12	GM13	GM14	GM15
FUEL TYPE											
NATURAL GAS G20	CO ₂ (DRY)	10.0 - 10.5%									
	CO	Less than 100 ppm (air free)									
	FLUE GAS TEMP. °C gross	200—210									
	TEMP RISE ACROSS BOILER °C	Less than 20									
CLASS D FUEL OIL	CO ₂ (DRY)	10.5 – 11%									
	CO	Less than 85 ppm (air free)									
	FLUE GAS TEMP. °C gross	220 - 230									
	TEMP RISE ACROSS BOILER °C	Less than 20									
	SMOKE No.	0 - 1									

Figure P - Combustion target figures

Burner Model	GM6	GM7	GM8	GM9	GM10	GM11	GM12	GM13	GM14	GM15
Volume - m ³	0.291	0.349	0.407	0.465	0.522	0.581	0.639	0.697	0.754	0.811
Surface Area - m ²	2.15	2.51	2.86	3.22	3.58	3.94	4.3	4.65	5.01	5.38

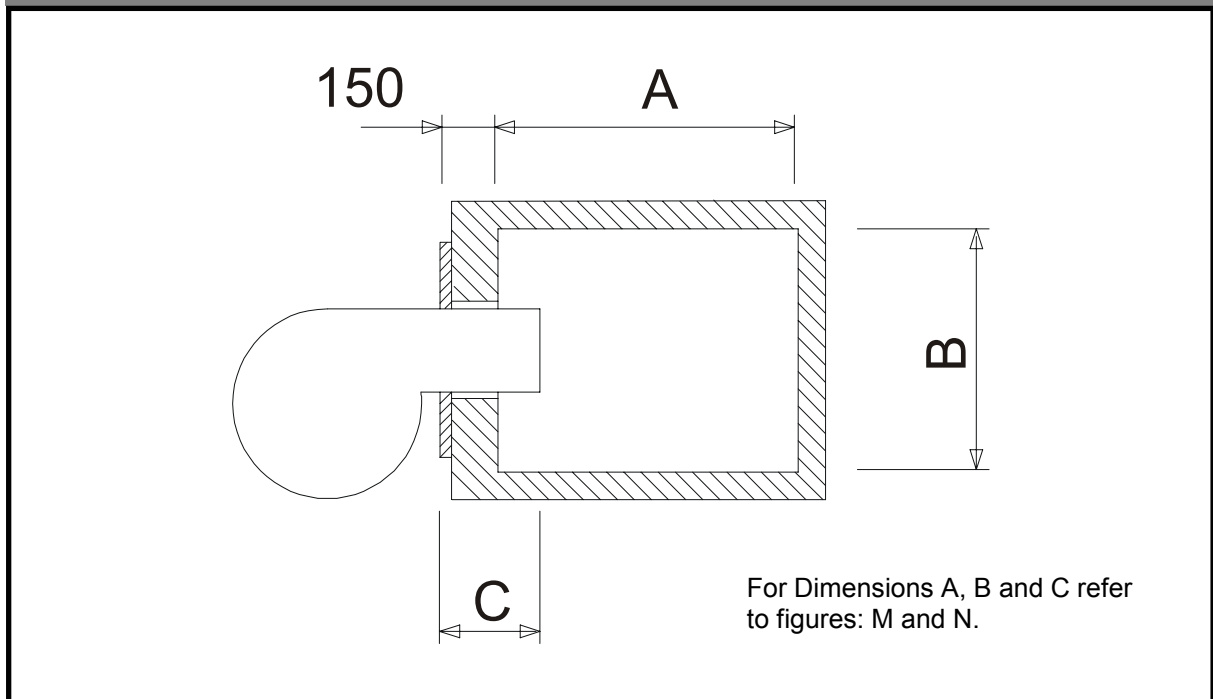
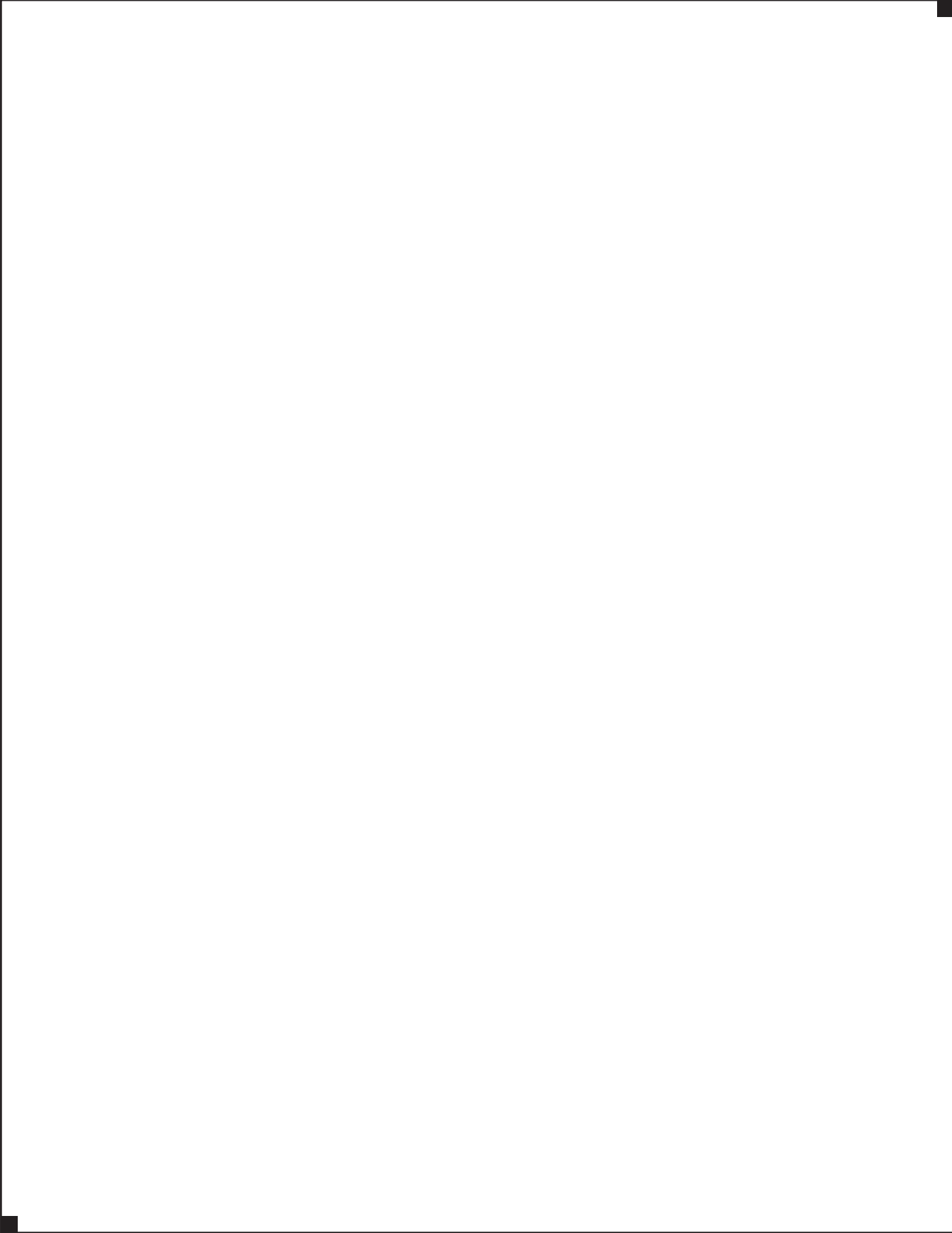


Figure Q - Combustion chamber data

APPENDIX A BOILER / BURNER WIRING DIAGRAMS

Notes



Connect direct






Direct Dial Telephone and Fax Numbers



- boilers
- controllers
- water heaters
- pressurisation sets

Poole Office

Hamworthy Heating Limited
Fleets Corner, Poole, Dorset BH17 0HH England
Main switchboard tel: **01202 662500**

Technical enquiries	 01202 662527/662528	 01202 665111
Spare parts	 01202 662525	 01202 665111
Service department	 01202 662555	 01202 662522



- flue components
- packaged fan dilution systems
- bespoke flue components
- bespoke flue systems
- design and installation

Birmingham Office

Hamworthy Heating Limited
Shady Lane, Great Barr, Birmingham B44 9ER
Main switchboard tel: **0121 360 7000** fax: **0121 325 2309**

General enquiries  **0121 360 7000**

Direct Email Addresses

Customer Services spares@hamworthy-heating.com
service@hamworthy-heating.com
technical@hamworthy-heating.com
sales.flues@hamworthy-heating.com

Hamworthy Heating Accredited Agents

North West England

Gillies Modular Services
210-218 New Chester Road, Birkenhead, Merseyside L41 9BG
tel: **0151 666 1030** fax: **0151 647 8101**

Southern Ireland

HEVAC Limited
Naas Road, Dublin 12, Ireland
tel: **00 3531 141 91919** fax: **00 3531 145 84806**

Northern Ireland

HVAC Supplies Limited
Unit 2, Antrim Line Business Park, Sentry Lane, Newtownabbey BT36 8XX
tel: **02890 849826** fax: **02890 847443**

Scotland

McDowall Modular Services
14-46 Lomond Street, Glasgow, Scotland G22 6JD
tel: **0141 336 8795** fax: **0141 336 8954**

North East England

Allison Heating Products
17 Beech Road, South Shields, Tyne & Wear NE33 2QH
tel: **0191 455 7898** fax: **0191 455 7899**

Website

www.hamworthy-heating.com

Associate Companies, Offices and Agents throughout the World.

Hamworthy reserves the right to make changes and improvements which may necessitate alteration to the specification without prior notice.