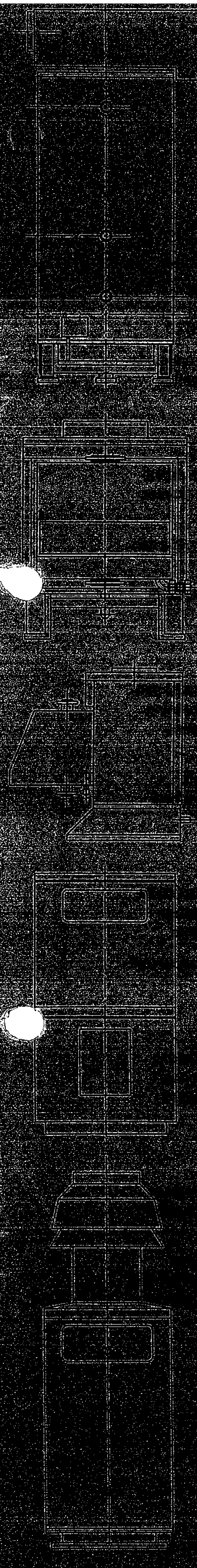


Installation, Commissioning and Servicing Instructions

Wimborne HE Series Boilers

450kW to 900kW

Wimborne HE

Gas/Oil Fired Cast Iron Sectional Boiler
450kW to 900kW

NATURAL GAS I_{2H}
LPG PROPANE I_{3P}
CLASS D fuel oil

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

BS EN ISO 9001:1994
Certificate No. FM 10038

HAMWORTHY
heating products

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

Specialist teams are available for on site assembly of the full range of Hamworthy boilers (excluding Lulworth). Boiler sections for site assembly must be positioned within the boiler house prior to the arrival of the assembly team and provide sufficient space for safe working. Handling sections into boiler houses other than at ground level may be subject to additional charges.

The normal assembly price does not include for the fitting of boiler casings or the burner, however this can be carried out at the time of build at additional cost.

Providing the facilities are available on site, a hydraulic test will be carried out within the terms of BS779. Upon completion a certificate of assembly and test will be issued.

COMMISSIONING ☎ 01202 662555

Commissioning of equipment by Hamworthy Heating's own engineers, accredited agents or specialist sub-contractors will ensure that the equipment is operating safely and efficiently. Hamworthy commissioning reports provide a detailed record of the original status of the plant, which is essential for future routine maintenance and trouble free operation.

Standard warranty terms provide for the free of charge replacement of defective parts, but does not include labour. When the equipment is commissioned and routinely maintained by Hamworthy Heating under a Service Maintenance Agreement then the warranty terms will cover both parts and labour.

MAINTENANCE AGREEMENTS ☎ 01202 662555

Regular routine servicing by Hamworthy Heating's engineers ensures trouble free operation and optimum efficiency. The frequency of visits required is variable, dependent upon the equipment type and usage. Annual service agreements are available on all Hamworthy products to meet individual requirements.

Planned maintenance of equipment by routine servicing reduces operational costs considerably below that associated with repair or breakdown approach.

BREAKDOWN SERVICE, REPAIR, REPLACEMENT ☎ 01202 662555

Even when the commissioning and routine servicing has been carried out to the highest standard there are always occasions when the unexpected breakdowns occur. Hamworthy provide a rapid response breakdown, repair or replacement service through head office at Poole and accredited agents located throughout the UK.

SPARE PARTS ☎ 01202 662525

A comprehensive spare parts service is operated from our factory in Poole, providing replacement parts for both current and discontinued products. In some instances spares may be available from accredited agents.

Delivery of parts and components is normally from stock within 7 days. However, a 24 hour delivery service is available for breakdowns and emergencies for the additional cost of the courier. Please contact our spares team, providing details of product type, serial number, model or any other identifying marks or codes to determine part requirements wherever possible.

WIMBORNE HE

GAS/OIL FIRED
CAST IRON SECTIONAL BOILERS

INSTALLATION, COMMISSIONING AND SERVICING INSTRUCTIONS

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} OR LPG - PROPANE (3RD FAMILY) I_{3P}. THE OIL FIRED VARIANTS ARE FOR USE ON CLASS D (35sec FUEL OIL). PLEASE ENSURE RELEVANT INFORMATION REQUIRED WITHIN DOCUMENT IS FOUND RELATING TO SPECIFIC FUEL TO BE FIRED BEFORE OPERATING THE BOILER.

THIS BOILER COMPLIES WITH ALL RELEVANT EUROPEAN DIRECTIVES
EC TYPE CERTIFICATE No. BG/EC-87/96/3
EC IDENTIFICATION No. 87AR3

PUBLICATION NO. 500001050
ISSUE 'E'
May 1999

CONTENTS

1.0 INTRODUCTION

1.1 The Wimborne HE boiler range consists of 10 gas or oil fired cast iron sectional boilers with outputs ranging from 450kW (1,535,400 Btu/h) to 900kW (3,070,800 Btu/h). Refer to **Section 2.0** for details on Natural Gas, Appendix A for Propane and Appendix B for Oil firing.

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

The heat exchanger consists of:
a. A front section
b. Plain 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 taper nipples and are held together by short lacing bolts. The complete assembly is held together by four M16 threaded tie rods running the length of the heat exchanger.

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

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

Wimborne HE boilers have an operating efficiency of over 80% 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 (on front and rear), all of which are internally lined with a fibre insulation board. The smoke box/flue connector is bolted to the upper part of the rear section and sealed with a fibre rope gasket.

The heat exchanger assembly is mounted on the steel cradle provided. The flow and return water connections are located at the rear of the boiler. Refer to **Section 8** for details.

The Wimborne HE boiler is available with high/low burners for operation on Class D (35 second) fuel oil, Natural Gas I_{2H} (Second Family) or Propane I_{3P} (Third 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 lamps (High/Low)
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. Hours run meters (High/Low)
h. A water temperature thermometer (temperature gauge)
i. Flying leads and plugs to connect to the burner
j. A volt free relay kit for normal run, overheat and lockout. (optional).

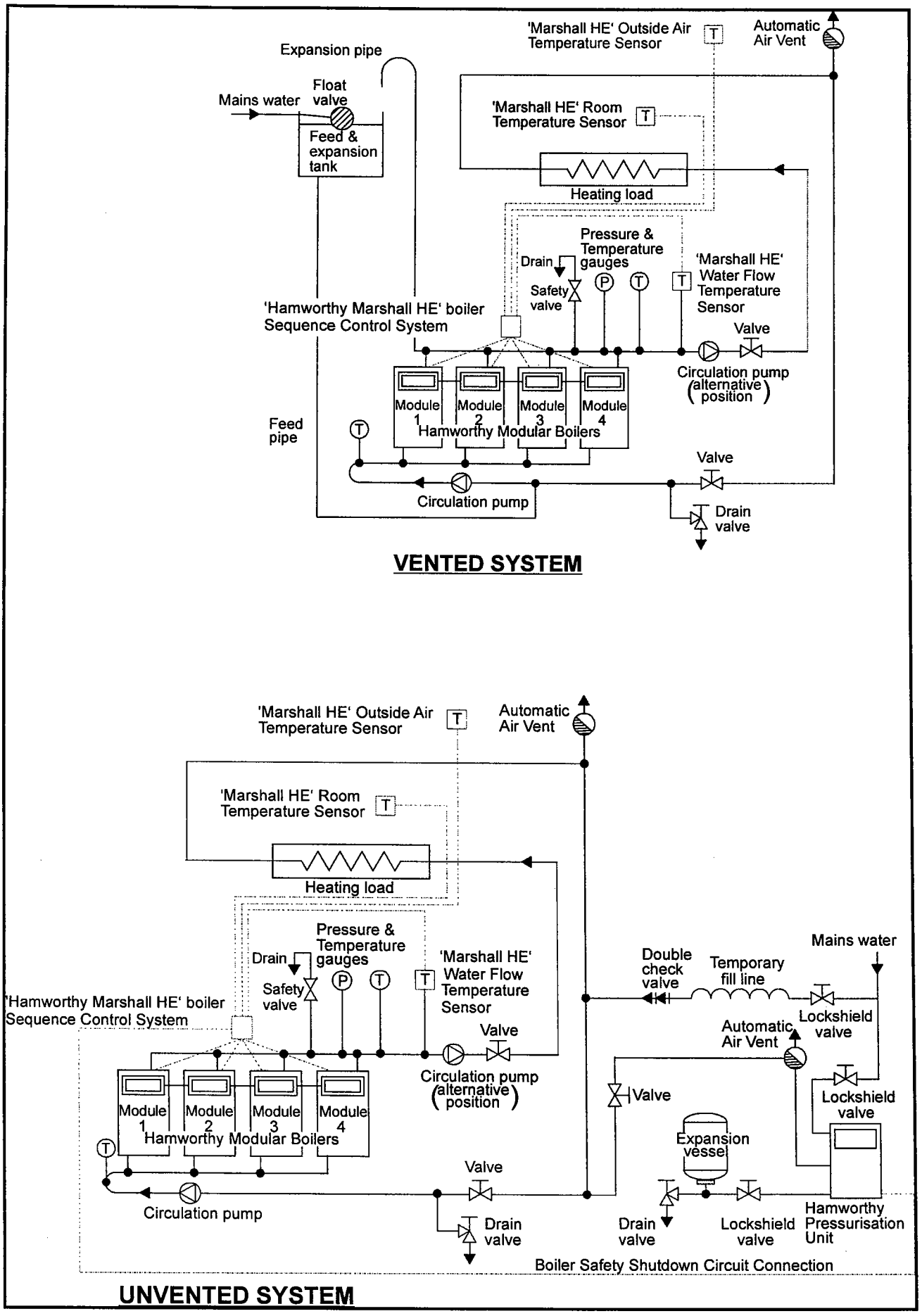
The boiler is housed in a plastic coated sheet steel casing which is supplied flat-packed for on-site assembly. To prevent damage in transit or during assembly these panels may be protected by a plastic film on all coated surfaces. This film MUST be removed before first-firing the boiler. Refer to **Section10** for casing assembly procedure.

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

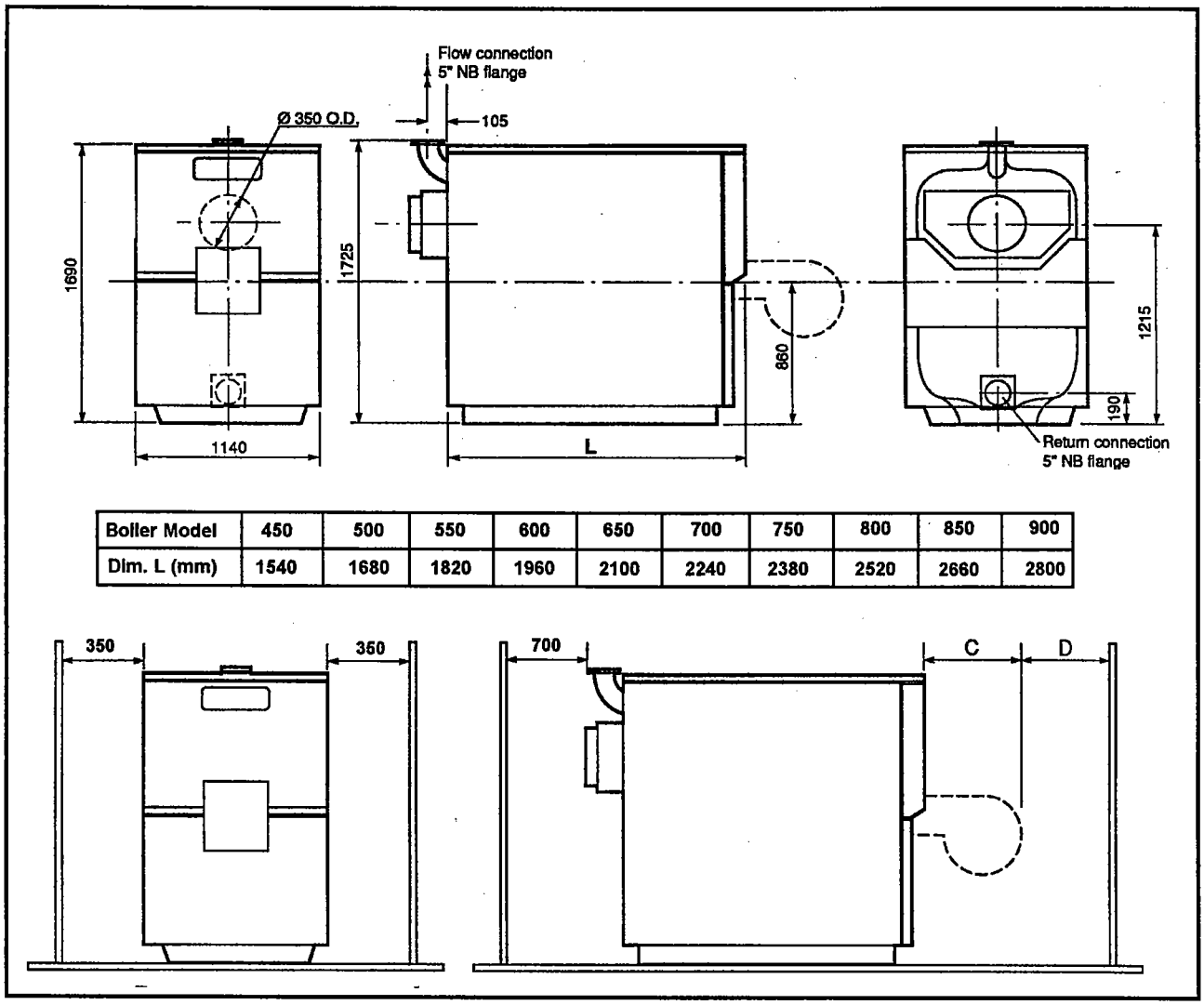
1.4 The boiler is normally supplied as a set of equipment comprising the following:

a. Cast iron sections mounted on pallets
b. Accessory kit and tie rods
c. Casing panels and insulation blankets
d. Control panel
e. Matched burner: fuel oil or gas
f. Flue collector box
g. Burner mounting plate, drilled ready to accept burner
h. Steel cradle
i. Oil burner nozzle(s) where applicable.

Figure1.1 - Boiler Installation Typical



2.0 TECHNICAL DATA



Boiler Model	450	500	550	600	650	700	750	800	850	900
Dim. L (mm)	1540	1680	1820	1960	2100	2240	2380	2520	2660	2800

Figure 2.1 - Dimensions and Clearances

MODEL	Cmm						Dmm					
	Gas Firing		Oil Firing		Dual Fuel		Gas Firing		Oil Firing		Dual Fuel	
	RIELLO	NUWAY	RIELLO	NUWAY	RIELLO	NUWAY	RIELLO	NUWAY	RIELLO	NUWAY	RIELLO	NUWAY
450	790	680	630	580	N/A	750	455	455	405	455	N/A	455
500	790	680	630	580	N/A	750	455	455	405	455	N/A	455
550	790	830	630	580	N/A	750	455	455	405	455	N/A	455
600	790	830	630	540	N/A	960	455	455	405	455	N/A	455
650	790	830	630	540	N/A	960	455	455	405	455	N/A	455
700	790	1130	630	500	790	960	455	455	405	455	320	455
750	790	1130	630	500	790	960	455	455	405	455	320	455
800	790	1130	630	690	790	1080	455	455	405	455	320	455
850	790	1130	630	690	790	1080	455	455	405	455	320	455
900	790	1130	630	690	790	1080	455	455	405	455	320	455

Figure 2.2 – Burner Clearances

Figure 2.3 – Performance and General Data Information (Natural Gas)

BOILER MODEL - WIMBORNE HE		450	500	550	600	650	700	750	800	850	900
GENERAL DATA											
No. OF SECTIONS		9	10	11	12	13	14	15	16	17	18
BOILER INPUT - maximum	kW	504	560	617	673	728	788	844	901	957	1013
(nett) 34.06MJ/m³	Btu/hx1000	1719	1911	2104	2295	2483	2688	2880	3074	3265	3456
BOILER INPUT - maximum	kW	559	622	684	747	808	874	937	1000	1062	1124
(gross) 37.8MJ/m³	Btu/hx1000	1908	2121	2335	2547	2756	2982	3187	3412	3624	3835
BOILER OUTPUT - maximum	kW	450	500	550	600	650	700	750	800	850	900
	Btu/hx1000	1535	1706	1877	2047	2218	2388	2559	2730	2900	3071
FLUE DATA											
NOMINAL FLUE DIA.	mm	350									
	in	14									
FLUE DRAUGHT REQUIRED	mbar	0.1 -0.3									
AT BOILER OUTLET	in.wg	0.04 - 0.12									
COMBUSTION CHAMBER	mbar	0.78	1.03	1.02	1.08	1.19	1.5	1.8	2.1	2.5	2.8
RESISTANCE	in.wg	0.31	0.41	0.40	0.43	0.47	0.59	0.71	0.83	1.0	1.1
APPROX. FLUE GAS TEMP(gross)	°C	225									
APPROX. FLUE GAS VOLUME	m³/h	590	655	721	788	852	922	988	1055	1120	1186
@ NTP (wet)	ft³/h	20830	23128	25488	27824	30084	32571	34890	37241	39556	41870
GAS DATA											
NOMINAL GAS INLET PRESSURE	mbar	20									
MAXIMUM GAS INLET PRESSURE	mbar	25									
GAS FLOW RATE	m³/h	53.3	59.2	65.2	71.1	76.9	83.3	89.2	95.2	101.2	107.1
	ft³/h	1881	2091	2301	2511	2716	2942	3150	3362	3574	3782
GAS INLET CONNECTION		Rc 2.0"					Rc 2.5"				
WATER DATA											
WATER CONNECTIONS - FLOW and RETURN		Flanged 5" N.B.									
MAXIMUM WATER	bar g.	5									
PRESSURE	Psi g.	73									
WATER CONTENT	l	364	399	434	469	504	539	574	609	644	679
	UK gal.	80.2	87.9	95.6	103.3	111.0	118.7	126.4	134.1	141.9	149.6
WEIGHT (FULL)	kg.	2350	2539	2774	2979	3204	3419	3644	3869	4095	4320
WITHOUT BURNER	lb.	5170	5586	6103	6554	7049	7465	7880	8296	8712	9128
ELECTRICAL SUPPLY		400V 3ph 50 Hz (Burner) – 230V 1ph 50Hz (Boiler Panel)									

Note: For matched burner/boiler combinations, refer to Figures 11.1, 11.2 & 11.3
For combustion target figures, refer to figure 11.5

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 - Code of practice for oil firing. **Part 2**: 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 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 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.

British Gas Publications

IM/2 Purging procedures for non-domestic gas installations.
IM/5 Soundness testing procedures for industrial and commercial gas installations.
IM/11 Flues for commercial and industrial gas fired boilers and air heaters.
IM/16 Guidance notes on the installation of gas pipework, boosters and compressors in customers premises (excluding domestic installations of 25mm and below).

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).

BOILER MODEL Wimborne	DESIGN FLOW RATE (11 ° C. ΔT)				MINIMUM FLOW RATE (20 ° C. ΔT)			
	FLOW RATE		PRESS. DROP		FLOW RATE		PRESS. DROP	
	l/min	UKgal/min	mbar	in. wg	l/min	UKgal/min	mbar	in. wg
HE450	584	128.6	15.0	5.9	321.3	70.8	5.0	2.0
HE500	650	143.2	17.0	6.7	357.0	78.6	8.0	3.1
HE550	715	157.5	18.0	7.1	392.7	86.5	10.0	3.9
HE600	780	171.2	20.0	7.9	428.4	94.4	12.0	4.7
HE650	845	186.1	22.0	8.7	464.1	102.2	12.0	4.7
HE700	910	200.4	23.0	9.0	499.8	110.0	13.0	5.1
HE750	975	214.7	25.0	9.8	535.5	118.0	14.0	5.5
HE800	1040	229.0	26.0	10.2	571.2	125.8	15.0	5.9
HE850	1105	243.4	28.0	11.0	606.9	133.7	16.0	6.3
HE900	1170	257.7	29.0	11.4	642.6	141.5	17.0	6.7

Figure 3.1 - Water Flow Rates and Pressure Drops

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/flowrates 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.
NOTE! Time clocks should not interrupt live, neutral or earth connections, see **Section 9.0: ELECTRICAL SUPPLY** for details. See Figure 9.1 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**
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

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 2.1** 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.

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 / 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 and supply system should be designed and installed in accordance with BS.5410 Part 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.

N.B. 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**, British Gas Publication **IM/11**,"Flues for Commercial and Industrial Gas-Fired Boilers and Air Heaters."
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.

Wimborne HE 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 2.2.

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) 540cm^2 plus 4.5cm^2 per kW in excess of 60 kW total rated input (gross).
High Level (outlet) 270cm^2 plus 2.25cm^2 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

Figure 7.1 Mechanical Ventilation Flow Rates

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

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 5" N.B. Flanged flow and return connections located on the rear section of the boiler. Mating flanges are supplied suitable for welding to 5" N.B. 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 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.

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

Boiler Output	Feed	Vent
60kW - 150kW	25	32
150kW – 300kW	32	38
300kW – 600kW	38	50
600kW – 900kW	50	65

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 1.1. for typical position.

8.5 Thermometer

See Figure 1.1. 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 H.H.L. 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 1.1. 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 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 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 Waterside Pressure Drop

The waterside hydraulic resistance (Pressure drop) is shown in Figure 3.1.

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 3.1. 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 1.1. 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 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**: Part 1, for information. See also **BS 6880**: Part 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 upto 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 C of these instructions for a wiring diagram to be included.

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, Part 1 or BS 3456, Part 201**.

9.2 Indication Signals and Volt Free Contacts

Optional control panels are available with v.f.c. 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.

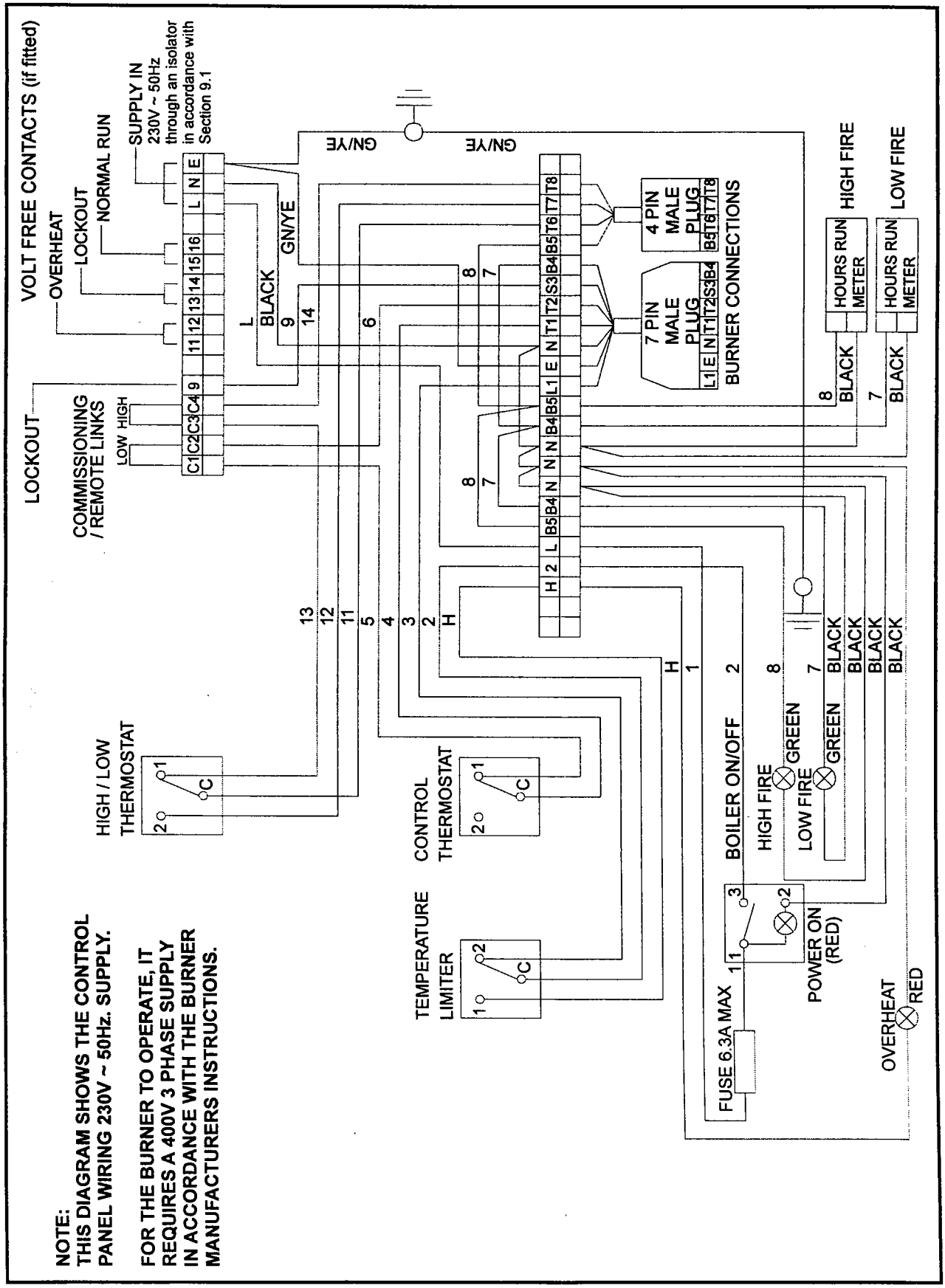


Figure 9.1 – Boiler Control Panel Wiring Diagram (High/Low Burner Control)

WIMBORNE HE	SECTION TYPE																	
450	R	RI	RI	I	I	I	FI	FI	F									
500	R	RI	RI	I	I	I	I	FI	FI	F								
550	R	RI	RI	RI	I	I	I	I	FI	FI	F							
600	R	RI	RI	RI	I	I	I	I	I	FI	FI	F						
650	R	RI	RI	RI	I	I	I	I	I	FI	FI	FI	F					
700	R	RI	RI	RI	I	I	I	I	I	I	FI	FI	FI	F				
750	R	RI	RI	RI	I	I	I	I	I	I	1	FI	FI	FI	F			
800	R	RI	RI	RI	RI	I	I	I	I	I	I	I	FI	FI	FI	F		
850	R	RI	RI	RI	RI	I	I	I	I	I	I	I	FI	FI	FI	FI	F	
900	R	RI	RI	RI	RI	I	I	I	I	I	I	I	I	FI	FI	FI	FI	F
Section No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

R - REAR SECTION
F - FRONT SECTION
I - INTERMEDIATE SECTION
FI - FRONT INTERMEDIATE SECTION
RI - REAR INTERMEDIATE SECTION

Figure10.1 - Composition of Sections within Heat Exchanger

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 Boiler Sections

The heat exchanger is made up from five different types of section, each plain section weighing around 190 kg (300kg for assembled front and rear), as follows:-

a. One complete front section (assembled with access doors etc.)
b. One complete rear section (assembled with access doors etc.)
c. A number of plain intermediate sections which are converted to the correct number of front, rear and central intermediate sections by the addition of flue plates.

Prior to building the boiler the flue plates and their retaining nuts and bolts should be located and identified in the accessory kit. **Reference MUST be made to Figures 10.1 & 10.2,** Having determined the size of boiler to be built the numbers of each of the three sections required (RI, I and FI) can be read from Figure 10.1. The correct number of each section **MUST** then be made up by inserting the flue plates and locking into position with nuts and bolts. The plates **MUST** be inserted into the sections in the slots provided and the number and position of the plates **MUST** be in accordance with the detail shown in Figure 10.2.

For the purposes of identification, the Intermediate sections (I) have FOUR flue plates fitted into the flueways (2 small, 2 large). The Front Intermediate section (FI) has TWO large plates fitted below the centreline of the flueways and the Rear Intermediate section has TWO small plates fitted above the centre of the flueways. **NOTE:** The assembled front and rear castings of the boiler are already fitted with flue plates.

IMPORTANT ! THE BOILER MUST BE BUILT WITH THE CORRECT NUMBER AND TYPE OF SECTIONS IN THE CORRECT ORDER.

10.2 Preparation

Place boiler sections in boiler room, adjacent to proposed site for boiler, in order of build to allow quick and easy handling and assembly.

Clean both upper and lower ports on each section. Thoroughly clean the machined joint faces on both sides of each section to leave a smooth, clean, paint-free finish.

From the fittings crate, remove the lacing bolts, sealing mastic, nipples and nipple sealant.

N.B. Ensure these nipples are kept free from dirt and grit.
Position the steel cradle on the level surface prepared for the boiler. Refer to **Section 4.0 - LOCATION**.

Note: Older boilers (pre-June 1999) are fitted with guide rings and 'O' rings between the sections. Boilers can only be assembled using the same method throughout. Guide rings and 'O' rings cannot be mixed with nipples on the same boiler as the machining of the section is different.

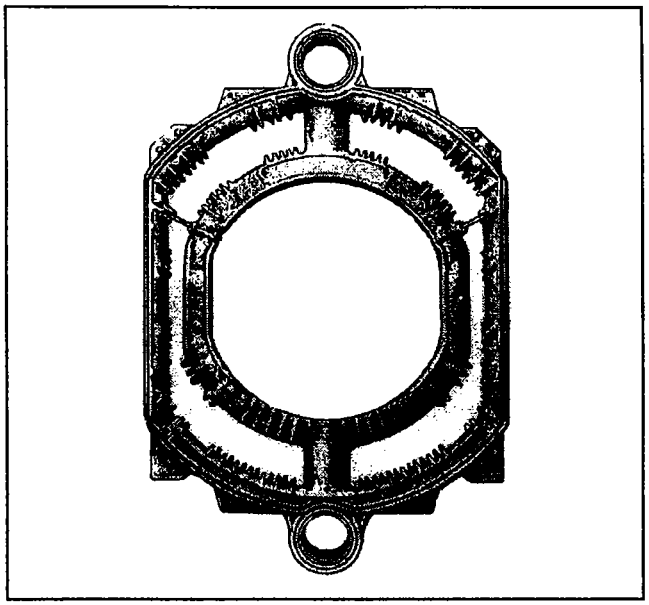
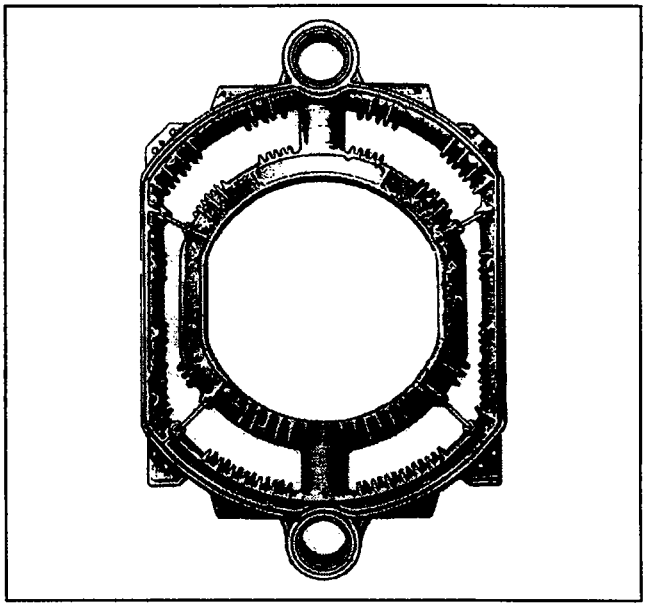
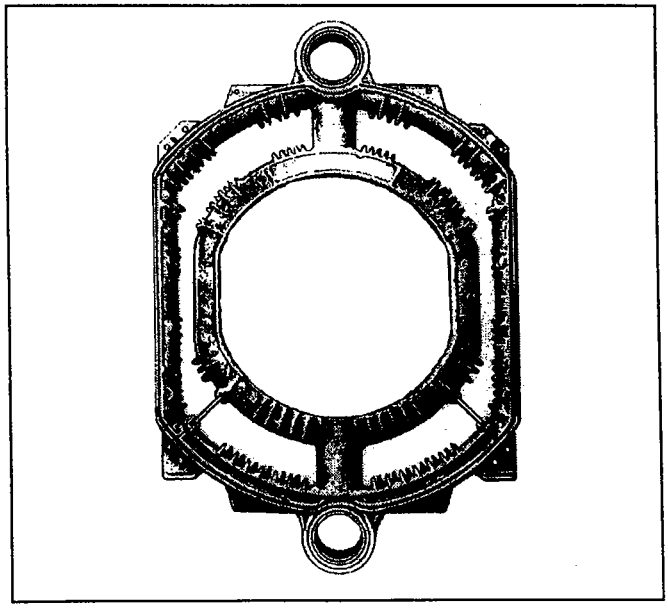


Figure 10.2 – Boiler Section Identification

a. Rear Intermediate Section (RI) fitted with two flue plates



b. Intermediate Section (I) fitted with four flue plates



c. Front Intermediate Section (FI) fitted with two flue plates

10.3 Assembly of Sections

In order to assemble the boiler sections, it is necessary to have TWO special tools (contact Hamworthy) or a suitable set of pulling up tools, a soft faced mallet and appropriate spanners. Assemble the sections as follows, referring to Figures 10.3 – 10.8. & Figure 15.1.

a. Position rear section (3) onto end of cradle (25) (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.

b. Fit sealing mastic to grooves around both perimeter of section and combustion chamber and the two small grooves either side of the fitted flue plates (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 between both ports and the flue passages to protect the nipples.

c. Select two nipples and clean the outer surfaces. Smear sealant onto the contact surfaces of the nipple and the nipple port. Fit the nipples into the ports on the rear of the section (Fig. 10.5) and tap into place using a soft faced mallet

d. Place the next correct section (2) onto the cradle and fit to rear section, carefully locating the nipples into ports. Ensure that the section remains in position by hammering on the nipples using a soft faced mallet. Secure the section in place if necessary.

e. Fit the special tools by passing the swivel ends into the rear casting through the nipple ports. Swivel the joint to right angles to the rod and pull to latch the claw against the inside of the rear section. Fit the flanges and nuts to the rods and tighten.

f. Using a suitable spanner, wind both nuts up **evenly**, ensuring boiler sections pull together with an even space around the perimeter joint.
Tighten the winding nuts until the sections are pulled together but do not over-tighten. Slacken off the winding nuts and remove with the flanges. Swivel the claw inside the casting and withdraw. If other types of pulling tools are used, follow the instructions supplied ensuring that the sections are pulled together **evenly**.

g. Fit the four lacing bolts (6a) provided through one of the two holes in each of the corresponding pairs of bolt flanges on the sections (Fig 10.6). 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 over-tightened.

h. 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 flue plate.
- Nipples and nipple ports are thoroughly cleaned and smeared with sealant.
- Lacing bolts are fitted and not over-tightened.
- Flue plates (23 & 24) are correctly positioned.

i. After fitting front section (1), fit the four tie rods (6) through the lugs on top and bottom of front and rear sections (Figs 10.7 & 10.8). Tighten tie rod nuts to a torque of 45 Nm (34 lbf.ft)

j. Fit thermostat pocket (36) in top of front section, and ¾" BSP drain plug or cock (not supplied) to bottom of front section.

k. Fit heating flow pipe elbow (9) to top of rear section.

l. Fit water distribution tube (39), holes uppermost, into the return connection at bottom of rear section **(HE600 TO 900 only).**

m. 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).

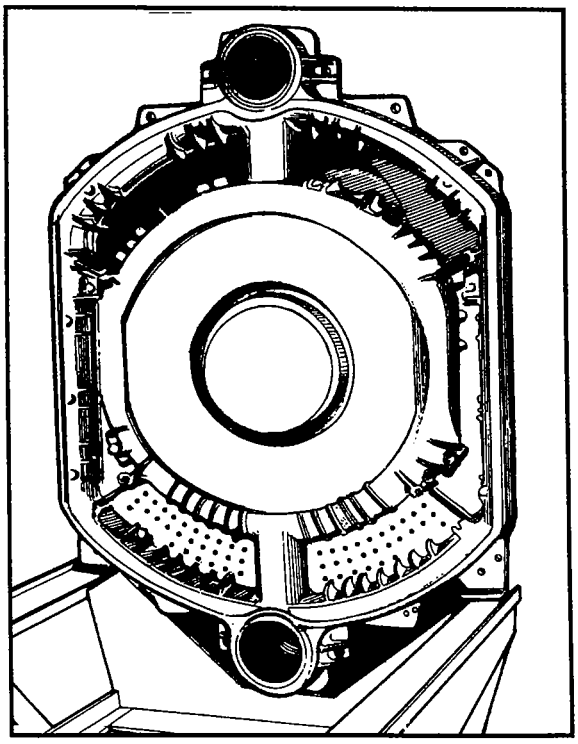


Figure 10.3 – Rear Section and Cradle

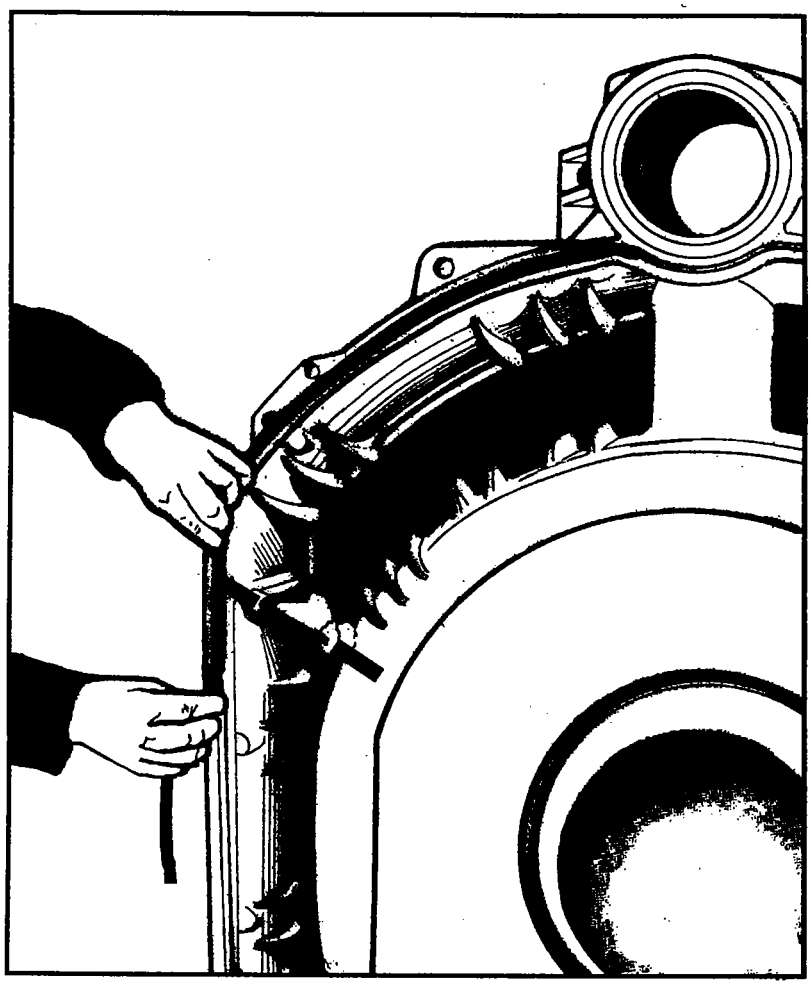


Figure 10.4 – Fitting Mastic Seal

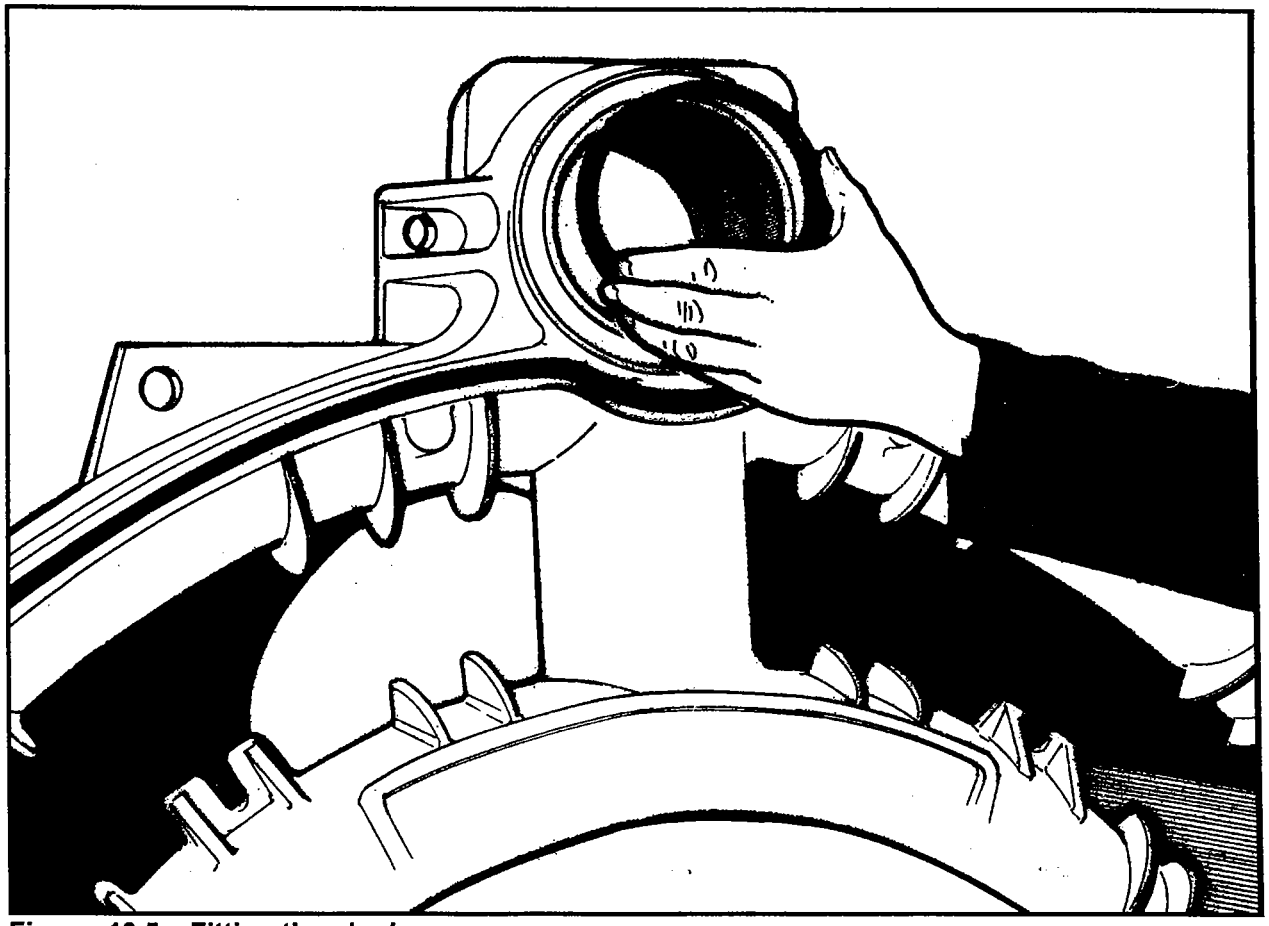


Figure. 10.5 – Fitting the nipple

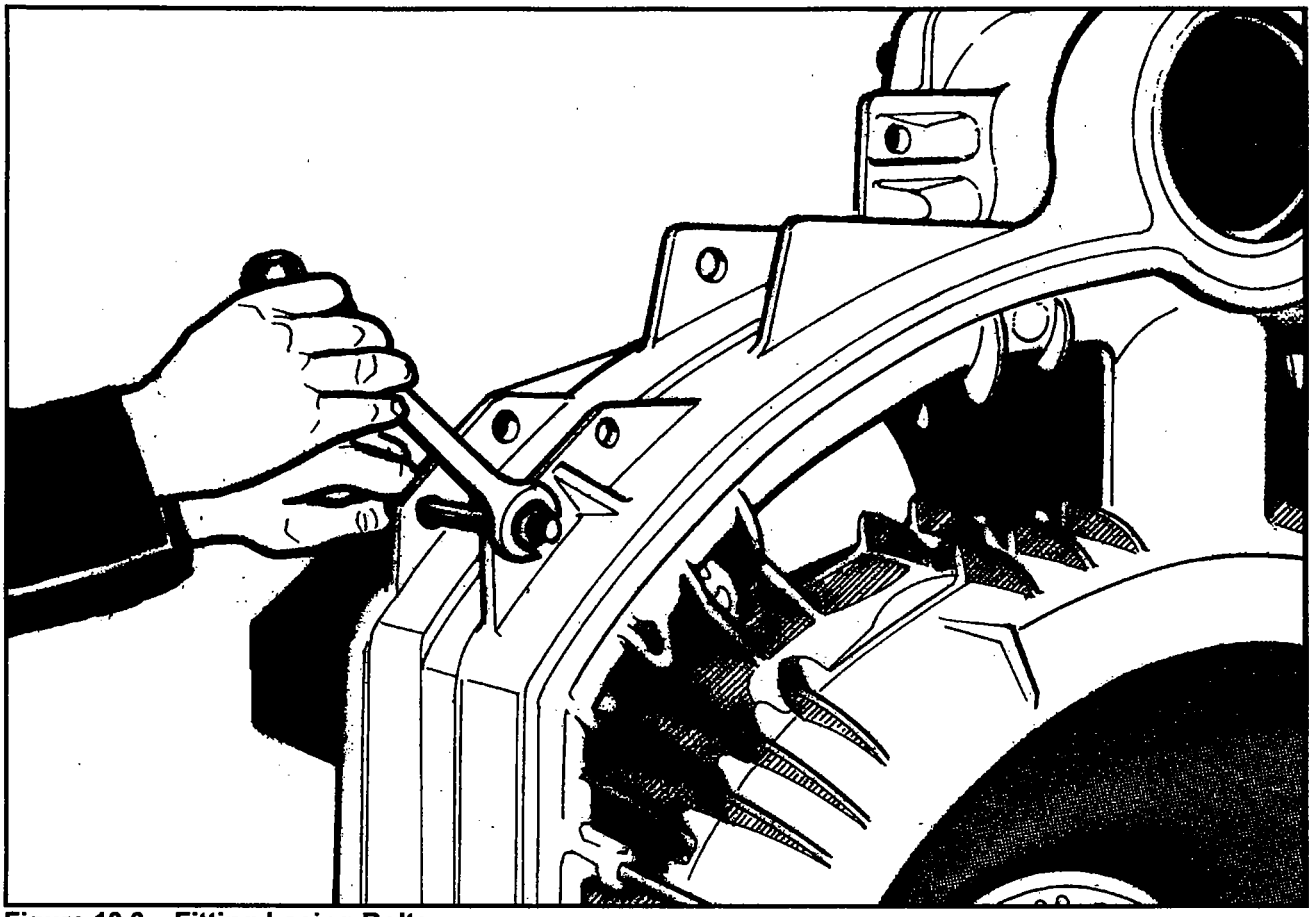


Figure 10.6 – Fitting Lacing Bolts

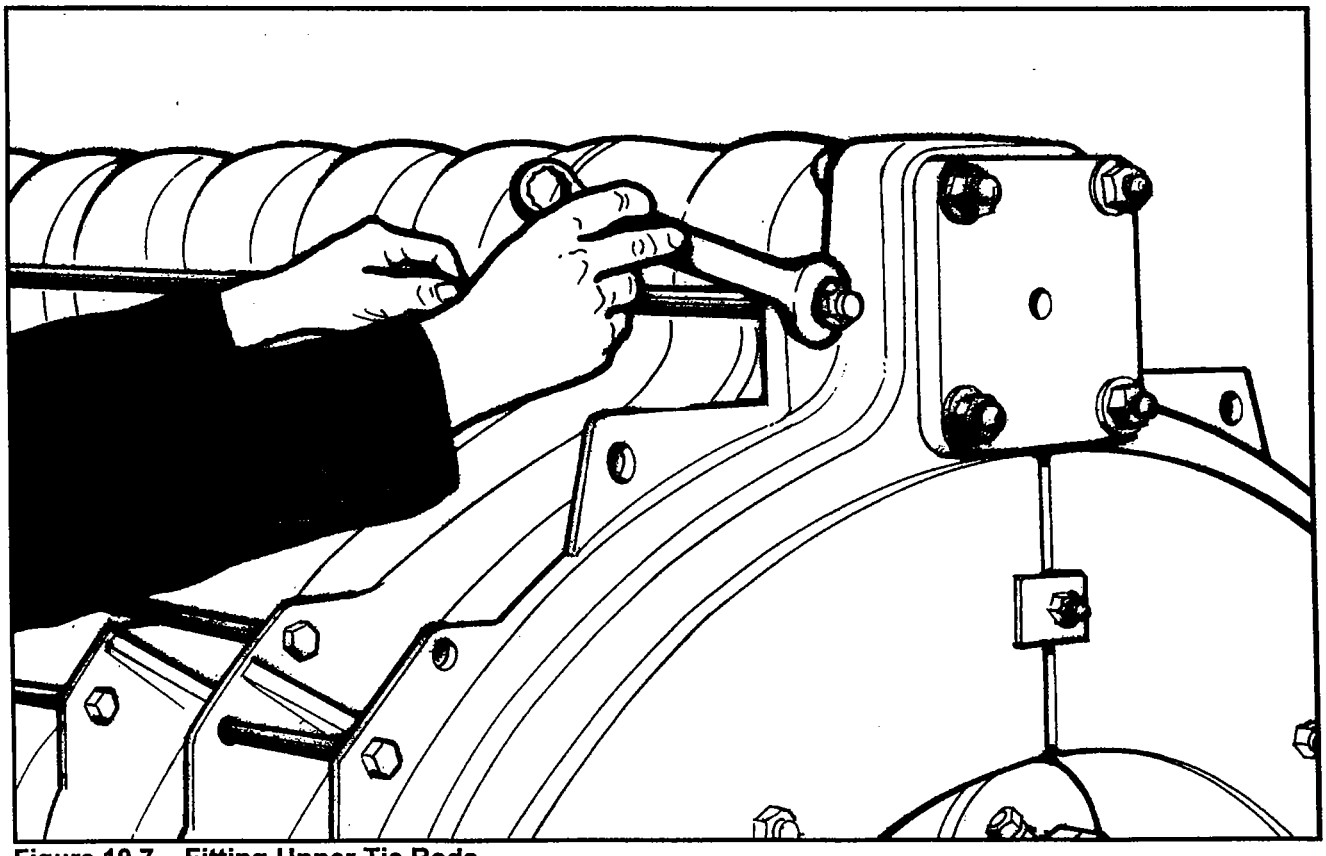


Figure 10.7 – Fitting Upper Tie Rods

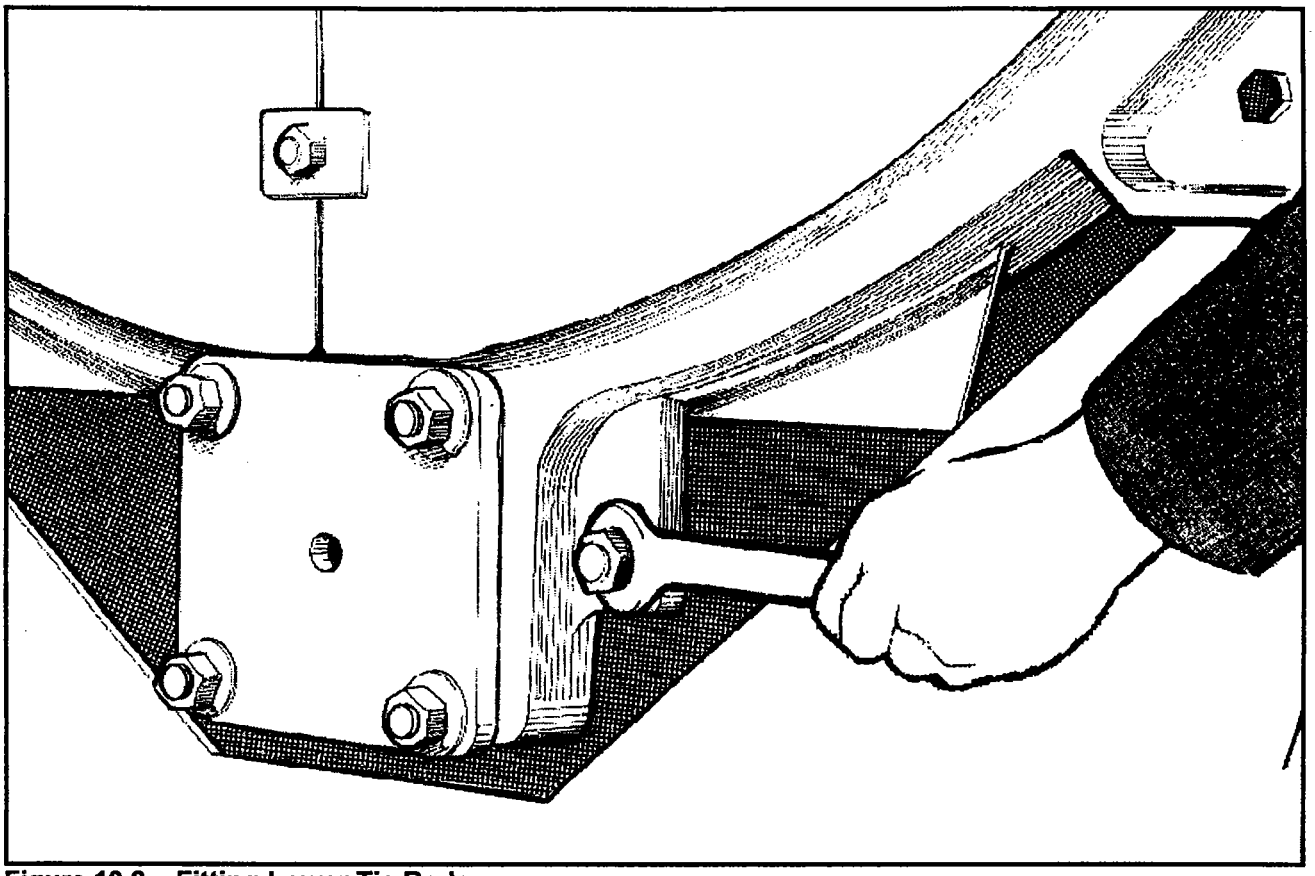


Figure 10.8 – Fitting Lower Tie Rods

10.4 Assembly of Boiler

Installers must ensure compatability between boiler body and burner by referring to Figures 11.1, 11.2 & 11.3. If in any doubt, contact Hamworthy Heating for assistance.

Further to assembly of the sections, proceed as follows (refer to Fig. 15.1):

a. Locate and fit the flue collector box (31) to the upper part of the rear casting using the studs, nuts, brackets (33) and gaskets provided. The rear access doors (32) will need to be loosened to allow correct fitting of brackets.

b. Locate and fit the burner mounting plate (17) ensuring that the pads of insulation are packed into the burner aperture and that the fibre board gasket (16) is in position. Carefully cut out a hole through both the fibre pads and board, large enough to accept the burner blast tube

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. Secure the rear blanket to the rear section using the four M12 nuts and large washers. 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. Locate burner onto mounting plate with the lower front casing panel stood in position.

e. Complete all pipework connections and fuel lines.

f. Complete installation by fitting casing and control panel - refer to **Section 10.5.**

10.5 Casing Assembly (refer to Figs 10.9 & 10.10)

a. Fit the 4 bottom brackets (items 1 & 2, marked A & B respectively) utilising the existing lacing bolts and nuts, and M12x30 hex. screws, nuts and spring washers (items 3,4 & 5) as required.

b. Fit the 2 front, top brackets (items 6 & 7, marked C & D respectively) utilising the existing lacing bolts and nuts, and M12x30 hex. screws, nuts and spring washers (items 3,4 & 5) as required.

c. Fit the 2 rear, top brackets (items 8 & 9, marked E & F respectively) utilising the existing lacing bolts and nuts, and M12x30 hex. screws, nuts and spring washers (items 3,4 & 5) as required.

d. 8 to 10 Section Boilers only:

Select the 2 bottom side rails (item 10) and fit 4 off 'studs' (item 12), in the positions shown in Figure 10.11, to each side rail. Secure the studs with 2BA nuts and shakeproof washers (items 13 & 14).

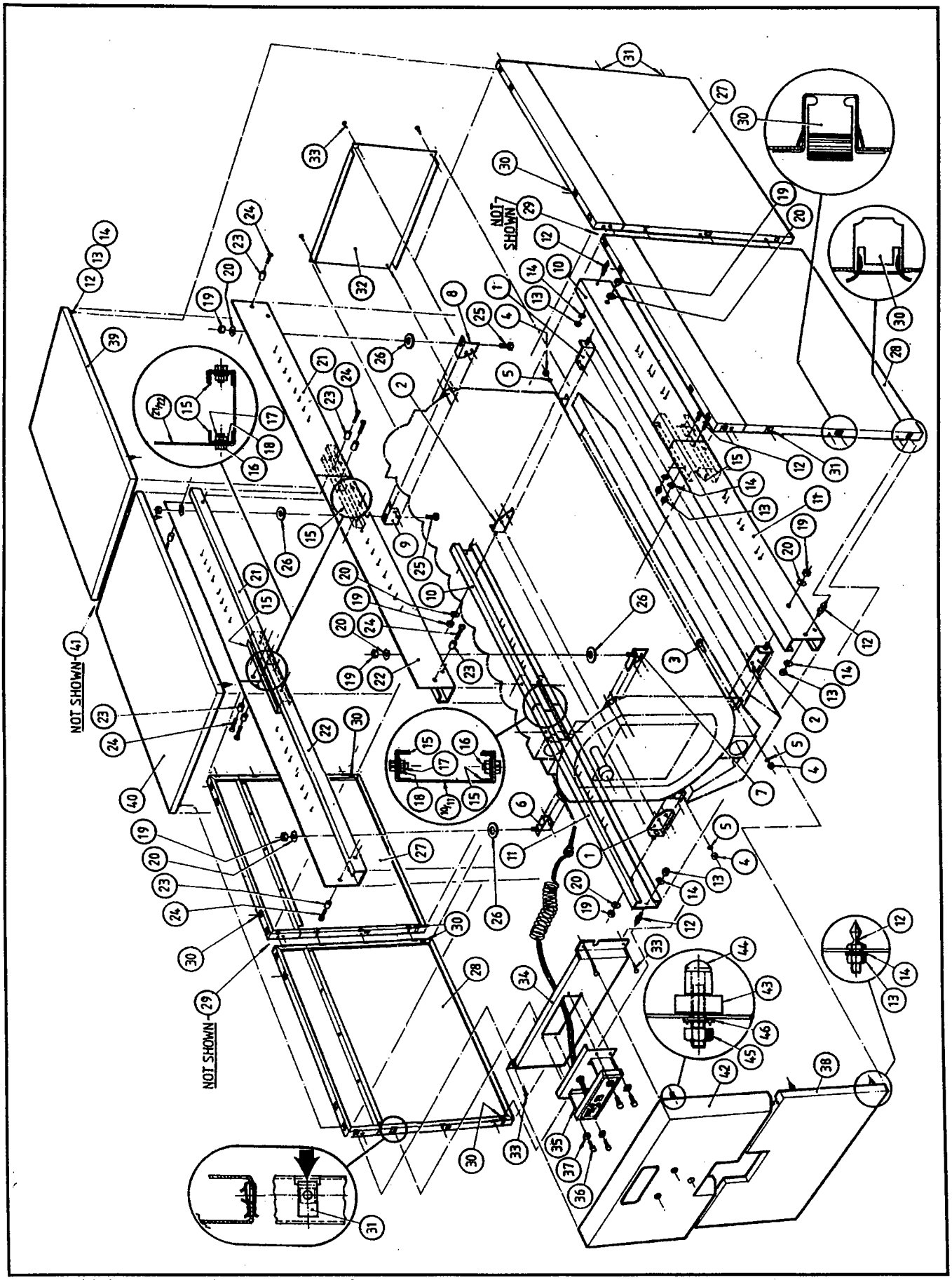


Figure 10.9 – Boiler Casing Assembly

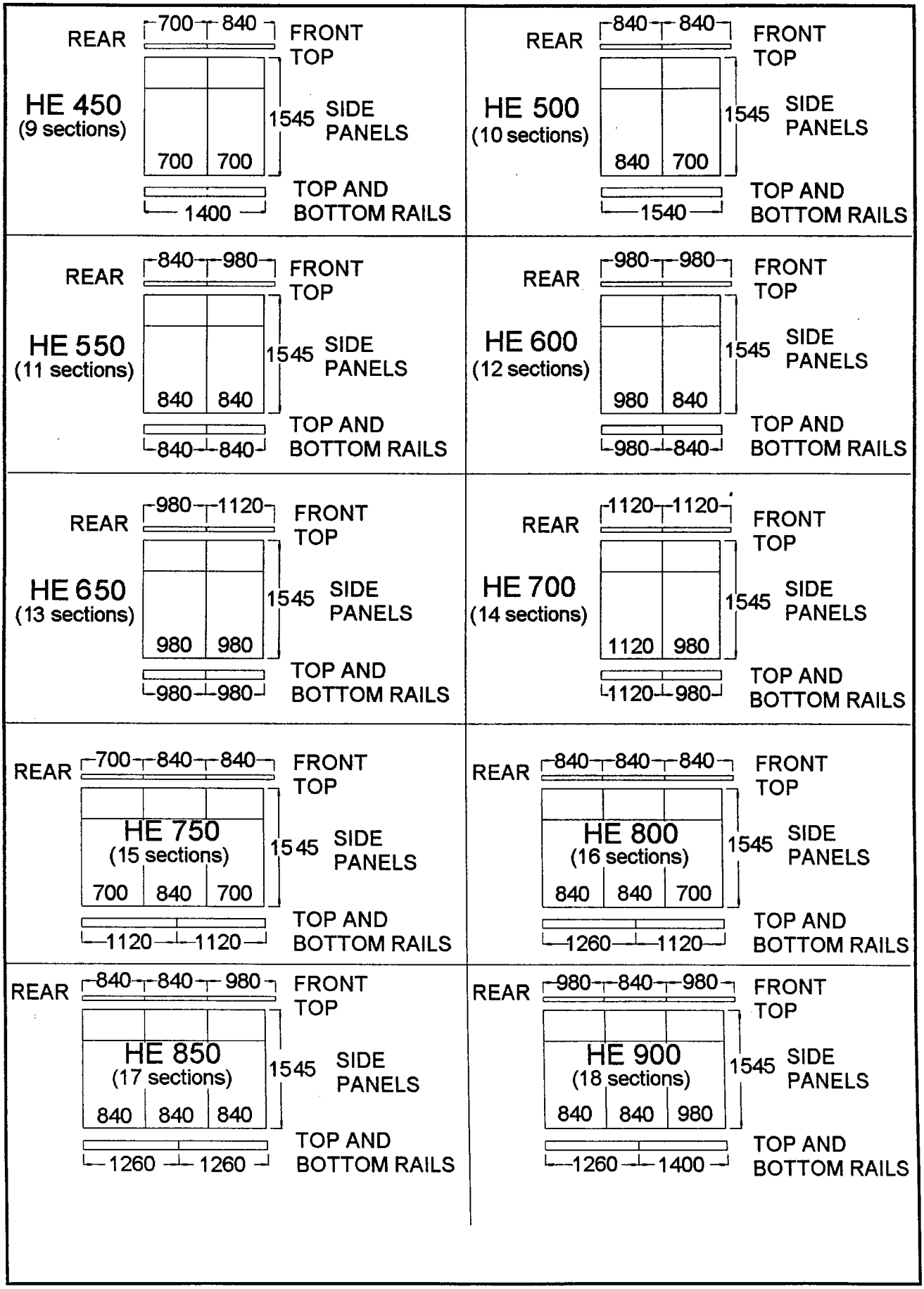


Figure 10.10 – Rail and Casing Assembly Combinations

WIMBORNE MODEL (SECTIONS)	TOP SIDE RAILS 'SPACER POSITION																			LOWER SIDE RAILS 'STUD' POSITIONS															
	REAR										FRONT										REAR								FRONT							
	A	B	C	D	E	F	G	H	J	K	L	M	N	P	R	S	T	U	V	W	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
HE450 (9)	*					*	*			*										*			*	*			*								
HE500 (10)	*					*	*			*										*					*	*	*								
HE550 (11)	*									*	*									*	*							*	*							*
HE600 (12)	*									*	*									*	*							*	*							*
HE650 (13)	*									*	*									*	*							*	*							*
HE700 (14)	*									*	*									*	*							*	*							*
HE750 (15)	*							*	*			*	*							*	*					*	*					*	*			*
HE800 (16)	*							*	*			*	*							*	*					*	*					*	*			*
HE850 (17)	*							*	*			*	*							*	*					*	*					*	*			*
HE900 (18)	*							*	*			*	*							*	*					*	*					*	*			*

- Holes not available
- Single rail only

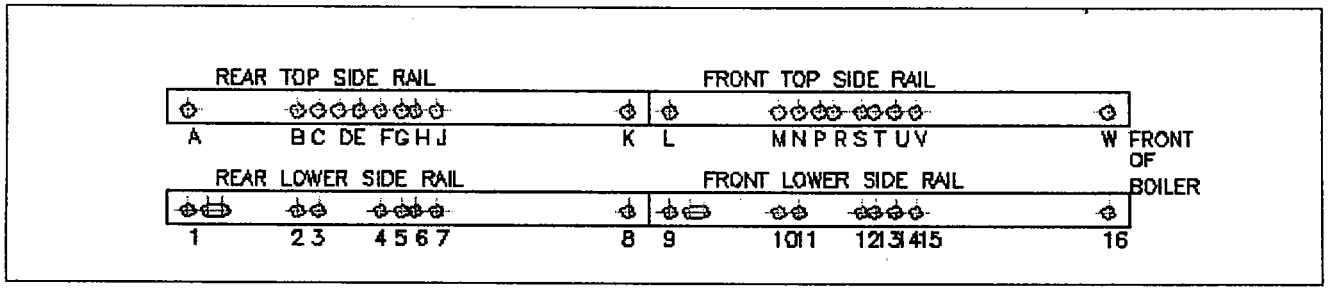


Figure 10.11 – Rail Spacer and Stud Positions for Mounting of Side Panels

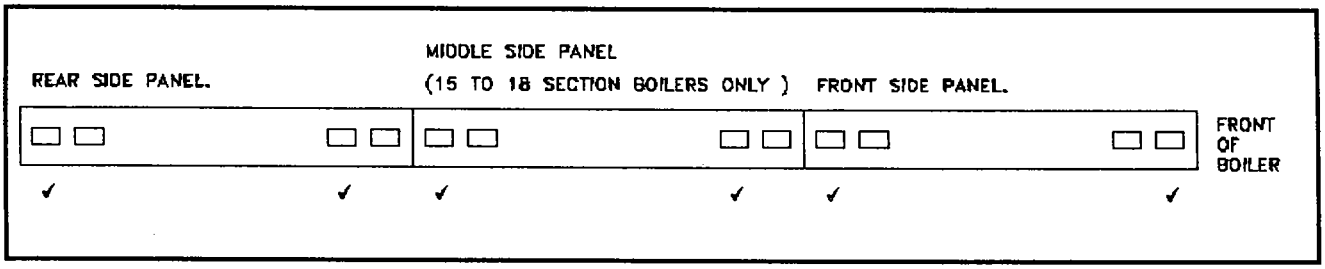


Figure 10.12 – Side Panel Latch Positions for Mounting Top Panels

Casing Assembly cont.
e. 11 to 18 Section Boilers only:

(i) Select 1 off rear, bottom side rail (item 10) and 1 off front, bottom side rail (item 11).
NOTE: The rear rail must be the longer of the two if they are not identical.
(ii) Join the 2 rails utilising 2 off rail connectors (item 15) and 4 off M6x12 hex. screws, nuts and shakeproof washers (items 16,17 & 18).
NOTE: Orientation - the 9mm slotted hole at the rear, 9mm dia. hole at the front.
(iii) Repeat for the remaining 2 bottom side rails.

(iv) 11 to 14 Section Boilers only:

Fit 4 off 'studs' (item 12), at the positions shown in Figure 10.11, to each side rail assembly. Secure with 2BA nuts and shakeproof washers (items 13 & 14).

(v) 15 to 18 Section Boilers only:

Fit 6 off 'studs' (item 12), at the positions shown in Figure 10.11, to each side rail assembly. Secure with 2BA nuts and shakeproof washers (items 13 & 14).

f. Fit the bottom side rails (or rail assemblies) to the studs on the bottom brackets, with M8 nuts and shakeproof washers (items 19 & 20). Ensure that the rails are level and that both are at the same height from the floor.

g. 8 to 10 Section Boilers only:
Select the 2 top side rails (item 21) and fit: The rear rail must be the longer of the two if they are not identical.

h) 11 to 18 Section Boilers only:

i) Select 1 off rear, top side rail (item 21) and 1 off front, top side rail (item 22).
NOTE: The rear rail must be the longer of the two if they are not identical.
(ii) Join the 2 rails utilising 2 off rail connectors (item 15) and 4 off M6x12 hex. screws, nuts and shakeproof washers (items 16,17 & 18).
(iii) Repeat for the remaining 2 top side rails.

(iv) 11 to 14 Section Boilers only:
Fit 4 off 'spacers' (item 23), at the positions shown in Figure 10.11, to each side rail assembly. Secure the spacers with M4x16 Taptite screws (item 24).

(v) 15 to 18 Section Boilers only:
Fit 6 off 'spacers' (item 23), at the positions shown in Figure 10.11, to each side rail assembly. Secure the spacers with M4x16 Taptite screws (item 24).

j. Fit the top side rails (or rail assemblies) to the top brackets as follows:
(i) At the front of the boiler utilise the 2 studs fitted to the brackets, through the front slot in the top side rails. Secure with 2 off M8 nuts and shakeproof washers (items 19 & 20).
(ii) At the rear of the boiler utilise 2 off M8x16 hex. screws (item 25), through the foremost slot at the rear of the rails. Secure with 2 off M8 nuts and shakeproof washers (items 19 & 20).
(iii) Ensure that the rails are level and that both are at the same height above the bottom side rails. Use the 'shims' (item 26) under the rails to adjust their height if necessary. Also ensure that the ends and outside faces of the top rails are directly above the corresponding points on the bottom rails.

k. Select the side panels (items 27,28 [and 29 for 15 to 18 Section boilers]). Fit the 2 rectangular holes in the rear returns of each side panel with metal latches (item 30).

l. Fit the side panels, in the positions shown in Figure 13, as follows:
(i) Hook the return in the upper rear of the side panel over the top side rail, ensuring that the spacers attached to the top side rail locate inside the rear returns of the side panel.
(ii) Locate the metal latches in the rear of the side panel over the corresponding struts attached to the bottom side rail, ensure they engage fully.

m. Fit the bottom 2 circular holes in the rear edges of the 2 rear side panels with No. 8 'U' nuts (item 31). Fit the back panel (item 32), securing with 4 off No. 8x½" screws (item 33).
n. Fit the top 2 circular holes in the front edges of the 2 front side panels with No. 8 'U' nuts (item 31). Fit the control panel mounting plate (item 34), securing with 4 off No. 8x½" screws (item 33).

o. Select the control panel (item 35). Feed the thermostat sensors through the hole in the control panel mounting plate and insert them into the boiler pocket. Secure the control panel to its mounting plate with 4 off M5x10 screws and shakeproof washers (item 36 & 37).

p. Fit the 4 rectangular holes in the front edges of the 2 front side panels with metal latches (item 30).

q. Fit the 4 studs (item 12) into the rear returns of the lower front panel (item 38), securing with 2BA nuts and shakeproof washers (items 13 & 14). Fit the lower front panel, locating the studs into the metal latches in the front edges of the 2 front side panels.

r. Fit the top edges of the side panels with metal latches (item 30) in the positions shown in Figure 10.12.

s. Select the top panels (items 39, 40 [and 41 for 15 to 18 Section boilers]). Fit the 4 holes in the bottom returns of each top panel with studs (item 12), securing with 2BA nuts and shakeproof washers (items 13 & 14).

t. Fit the top panels in the positions shown in Figure 10.10, ensuring that the studs engage in the metal latches.

u. Select the door (item 42) and fit it with 6 off location pins (item 43), 4 off in the bottom edge of the door and 2 off in the rear edges. Secure with M4x20 screws, nuts and shakeproof washers (items 44,45 & 46).
v. Fit the door by locating the 4 bottom pins into the holes in the top edge of the lower front panel, then locate the 2 rear pins into the holes in the front edges of the 2 front side panels. Turn the 2 door latches through 90° to secure.

10.6 Control Panel (Refer to Fig 9.1)

When fully assembled, access to the control panel for wiring purposes is gained by firstly removing the upper front casing panel. Turn the single latch a quarter turn using a screwdriver or coin and lift off. The fascia can then be hinged downwards 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 Figures 9.1 & 15.3) 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. 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.

The panel will provide flying leads terminating in a seven pin plug and 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.

Two fuses are provided for the fuse holder on the panel rated at 5A and 6.3A. The correct fuse must be selected for the burner supplied -refer to burner instructions supplied separately.
When wiring is complete, raise hinged fascia and click into position by pushing on latch screw. Replace thermostat knobs and front casing panel allowing cabling to exit from the cut out.

NOTE: - All cables must exit the boiler casing via the cutout in the bottom right hand edge of the upper front door and must be routed adjacent to the burner mounting plate. THE CABLES MUST NOT BE ROUTED ACROSS THE BURNER OR IT'S MOUNTING PLATE.

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. 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 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 **IM/2** or **IM/5** 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) 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 **IM/2** or **IM/5** 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 pocket.
f. Check for water leaks and ensure that both boiler and heating system is full of water and properly vented. Check distribution tube is fitted. **(HE 600 to HE 900).**
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 Figures 11.1, 11.2 & 11.3, 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 CO_2, CO, smoke number, flue gas temperature and circulating water temperature rise across the boiler. The readings obtained should be as indicated in Figure 11.5, target appliance readings.

Readings should be taken at both High and Low settings. A link C3-C4 is provided in the control panel terminals, the removal of which, by pulling out the terminals, 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, and firebrick at rear of combustion chamber is sound and correctly located.
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 2.2 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 CO_2, 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 11.5, target appliance readings.
Readings should be taken at both High and Low settings. A link C3-C4 is provided in the control panel terminals, the removal of which, by pulling out the terminals, 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.

11.4 External Controls

The external controls used in typical boiler installations, for both vented and unvented systems, are shown in Figure 1.1. 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.

11.5 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.

11.6 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.

Figure 11.1 - Matched Burner/ Boiler Combinations (Natural Gas)

NOTE ! To comply with the requirements of the Gas Appliance Directive, only the combinations listed below may be utilised for natural gas applications.

BOILER MODEL	BURNER DETAILS			BOILER DETAILS					COMBUSTION CHAMBER DETAILS		
				NOMINAL HEAT INPUTS/OUTPUTS					DIMENSIONS		BLAST TUBE PENETRATION REFER DIM. B FIGURE 11.6
	MAKE	MODEL	MODE	HEAT OUTPUT	HIGH FIRE HEAT INPUT (NET)		MINIMUM HEAT INPUT BELOW WHICH BURNER MUST NOT OPERATE (NET)		DIAMETER	LENGTH - REFER DIM. A FIG 11.6	
				(kW)	(kW)	GAS RATE m^3/h	(kW)	GAS RATE m^3/h	REFER TO FIG.11.6	(mm)	(mm)
HE450	RIELLO RIELLO NU-WAY NU-WAY	RS70 RLS70 NGN25T NDF25T	HIGH/LOW HIGH/LOW HIGH/LOW HIGH/LOW	450	504	53.3	190 190 353 309	20.1 20.1 37.3 32.7		1145	250 250 150 150
HE500	RIELLO RIELLO NU-WAY NU-WAY	RS70 RLS70 NGN25T NDF25T	HIGH/LOW HIGH/LOW HIGH/LOW HIGH/LOW	500	560	59.2	190 190 353 309	20.1 20.1 37.3 32.7		1285	250 250 150 150
HE550	RIELLO RIELLO NU-WAY NU-WAY	RS70 RLS70 NGN35T NDF25T	HIGH/LOW HIGH/LOW HIGH/LOW HIGH/LOW	550	617	65.2	190 190 389 309	20.1 20.1 41.1 32.7		1425	250 250 240 150
HE600	RIELLO RIELLO NU-WAY NU-WAY	RS70 RLS70 NGN35T NDF35-25T	HIGH/LOW HIGH/LOW HIGH/LOW HIGH/LOW	600	673	71.1	190 190 389 530	20.1 20.1 41.1 56.0		1565	250 250 240 240
HE650	RIELLO RIELLO NU-WAY NU-WAY	RS70 RLS70 NGN35T NDF35-25T	HIGH/LOW HIGH/LOW HIGH/LOW HIGH/LOW	650	728	76.9	190 190 389 530	20.1 20.1 41.1 56.0		1705	250 250 240 240
HE700	RIELLO RIELLO NU-WAY NU-WAY	RS100 RLS100 NGN35T NDF35-25T	HIGH/LOW HIGH/LOW HIGH/LOW HIGH/LOW	700	788	83.3	240 240 389 530	25.4 25.4 41.1 56.0		1845	250 250 240 240
HE750	RIELLO RIELLO NU-WAY NU-WAY	RS100 RLS100 NGN35T NDF35-25T	HIGH/LOW HIGH/LOW HIGH/LOW HIGH/LOW	750	844	89.2	240 240 389 530	25.4 25.4 41.1 56.0		1985	250 250 240 240
HE800	RIELLO RIELLO NU-WAY NU-WAY	RS100 RLS100 NGN35T NDF50-28T	HIGH/LOW HIGH/LOW HIGH/LOW HIGH/LOW	800	901	95.2	240 240 389 885	25.4 25.4 41.1 93.6		2125	250 250 240 240
HE850	RIELLO RIELLO NU-WAY NU-WAY	RS100 RLS100 NGN45T NDF50-28T	HIGH/LOW HIGH/LOW HIGH/LOW HIGH/LOW	850	957	101.2	240 240 389 885	25.4 25.4 41.1 93.6		2265	250 250 240 240
HE900	RIELLO RIELLO NU-WAY NU-WAY	RS100 RLS100 NGN45T NDF50-28T	HIGH/LOW HIGH/LOW HIGH/LOW HIGH/LOW	900	1013	107.1	240 240 389 885	25.4 25.4 41.1 93.6		2405	250 250 240 240

NOTE ! Heat input values quoted above are based on Natural Gas (G20) with a net CV of 34.06 MJ/m^3 @ 1013mbar and 15°C

Figure 11.2 - Matched Burner/ Boiler Combinations (LPG Propane)

NOTE ! To comply with the requirements of the Gas Appliance Directive, only the combinations listed below may be utilised for LPG applications.

BOILER MODEL	BURNER DETAILS			BOILER DETAILS					COMBUSTION CHAMBER DETAILS		
				NOMINAL HEAT INPUTS/OUTPUTS					DIMENSIONS		BLAST TUBE PENETRATION REFER DIM. B FIGURE 11.6
	MAKE	MODEL	MODE	HEAT OUTPUT	HIGH FIRE HEAT INPUT (NET)		MINIMUM HEAT INPUT BELOW WHICH BURNER MUST NOT OPERATE (NET)		DIAMETER	LENGTH - REFER DIM. A FIG 11.6	
				(kW)	(kW)	GAS RATE m^3/h	(kW)	GAS RATE m^3/h	REFER TO FIG.11.6	(mm)	(mm)
HE450	RIELLO NU-WAY	RS70 NGL25T	HIGH/LOW HIGH/LOW	450	504	21.1	190 353	7.8 14.4		1145	250 150
HE500	RIELLO NU-WAY	RS70 NGL25T	HIGH/LOW HIGH/LOW	500	560	23.4	190 353	7.8 14.4		1285	250 150
HE550	RIELLO NU-WAY	RS70 NGL35T	HIGH/LOW HIGH/LOW	550	617	25.7	190 389	7.8 15.9		1425	250 240
HE600	RIELLO NU-WAY	RS70 NGL35T	HIGH/LOW HIGH/LOW	600	673	28.1	190 389	7.8 15.9		1565	250 240
HE650	RIELLO NU-WAY	RS70 NGL35T	HIGH/LOW HIGH/LOW	650	728	30.4	190 389	7.8 15.9		1705	250 240
HE700	RIELLO NU-WAY	RS100 NGL35T	HIGH/LOW HIGH/LOW	700	788	32.9	240 389	9.8 15.9		1845	250 240
HE750	RIELLO NU-WAY	RS100 NGL35T	HIGH/LOW HIGH/LOW	750	844	35.3	240 389	9.8 15.9		1985	250 240
HE800	RIELLO NU-WAY	RS100 NGL35T	HIGH/LOW HIGH/LOW	800	901	37.6	240 389	9.8 15.9		2125	250 240
HE850	RIELLO NU-WAY	RS100 NGL45T	HIGH/LOW HIGH/LOW	850	957	40.0	240 389	9.8 15.9		2265	250 240
HE900	RIELLO NU-WAY	RS100 NGL45T	HIGH/LOW HIGH/LOW	900	1013	42.3	240 389	9.8 15.9		2405	250 240

NOTE ! Heat input values quoted above are based on Propane (G31) with a net CV of 88 MJ/m^3 @ 1013mbar and 15°C

Figure 11.3 - Matched Burner/ Boiler Combinations (Class D fuel oil)

BOILER MODEL	BURNER DETAILS			BOILER DETAILS					COMBUSTION CHAMBER DETAILS		
				NOMINAL HEAT INPUTS/OUTPUTS					DIMENSIONS		BLAST TUBE PENETRATION REFER DIM. B FIGURE 11.6
	MAKE	MODEL	MODE	HEAT OUTPUT	HIGH FIRE HEAT INPUT (NET)		MINIMUM HEAT INPUT BELOW WHICH BURNER MUST NOT OPERATE (NET)		DIAMETER	LENGTH - REFER DIM. A FIG 11.6	
				(kW)	(kW)	OIL FLOW RATE l/h	(kW)	OIL FLOW RATE l/h	REFER TO FIG.11.6	(mm)	(mm)
HE450	RIELLO RIELLO NU-WAY NU-WAY	RL70 RLS70 NOL20-23T NDF25T	HIGH/LOW HIGH/LOW HIGH/LOW HIGH/LOW	450	504	53	190 190 353 309	19.2 19.2 35.6 31.2		1145	250 250 150 150
HE500	RIELLO RIELLO NU-WAY NU-WAY	RL70 RLS70 NOL25-23T NDF25T	HIGH/LOW HIGH/LOW HIGH/LOW HIGH/LOW	500	560	60	190 190 353 309	19.2 19.2 35.6 31.2		1285	250 250 150 150
HE550	RIELLO RIELLO NU-WAY NU-WAY	RL70 RLS70 NOL25-23T NDF25T	HIGH/LOW HIGH/LOW HIGH/LOW HIGH/LOW	550	617	65	190 190 389 309	19.2 19.2 39.3 31.2		1425	250 250 240 150
HE600	RIELLO RIELLO NU-WAY NU-WAY	RL70 RLS70 NOL30-25T NDF35-25T	HIGH/LOW HIGH/LOW HIGH/LOW HIGH/LOW	600	673	71	190 190 389 530	19.2 19.2 39.3 53.5		1565	250 250 240 240
HE650	RIELLO RIELLO NU-WAY NU-WAY	RL70 RLS70 NOL30-25T NDF35-25T	HIGH/LOW HIGH/LOW HIGH/LOW HIGH/LOW	650	728	77	190 190 389 530	19.2 19.2 39.3 53.5		1705	250 250 240 240
HE700	RIELLO RIELLO NU-WAY NU-WAY	RL100 RLS100 NOL30-25T NDF35-25T	HIGH/LOW HIGH/LOW HIGH/LOW HIGH/LOW	700	788	83	240 240 290 530	24.2 24.2 29.3 53.5		1845	250 250 240 240
HE750	RIELLO RIELLO NU-WAY NU-WAY	RL100 RLS100 NOL30-25T NDF35-25T	HIGH/LOW HIGH/LOW HIGH/LOW HIGH/LOW	750	844	87	240 240 290 530	24.2 24.2 29.3 53.5		1985	250 250 240 240
HE800	RIELLO RIELLO NU-WAY NU-WAY	RL100 RLS100 NOL50-28T NDF50-28T	HIGH/LOW HIGH/LOW HIGH/LOW HIGH/LOW	800	901	95	240 240 485 885	24.2 24.2 49.0 89.3		2125	250 250 240 240
HE850	RIELLO RIELLO NU-WAY NU-WAY	RL100 RLS100 NOL50-28T NDF50-28T	HIGH/LOW HIGH/LOW HIGH/LOW HIGH/LOW	850	957	101	240 240 485 885	24.2 24.2 49.0 89.3		2265	250 250 240 240
HE900	RIELLO RIELLO NU-WAY NU-WAY	RL100 RLS100 NOL50-28T NDF50-28T	HIGH/LOW HIGH/LOW HIGH/LOW HIGH/LOW	900	1013	107	240 240 485 885	24.2 24.2 49.0 89.3		2405	250 250 240 240

NOTE ! Heat input values quoted above are based on Class D Fuel Oil with a net CV of 35.47 MJ/litre @ 15°C

MAKE (type)	MODEL	MODE	QUANTITY	PART No.	DESCRIPTION
RIELLO	HE450	HI/LO &	1	532904015	5.0 x 60°(Low)
(Danfoss/		dual/fuel	1	532904009	4.5 x 60°(High)
Delavan)	HE500	HI/LO &	1	532904016	5.5 x 60°(Low)
		dual/fuel	1	532904016	5.5 x 60°(High)
	HE550	HI/LO &	1	532904017	6.0 x 60°(Low)
		dual/fuel	1	532904017	6.0 x 60°(High)
	HE600	HI/LO &	1	532904019	6.75 x 60°(Low)
		dual/fuel	1	532904018	6.5 x 60° (High)
	HE650	HI/LO &	1	532904021	7.25 x 60° (Low)
		dual/fuel	1	532904021	7.25 x 60° (High)
	HE700	HI/LO &	1	532904023	9.0 x 60° (Low)
		dual/fuel	1	532904018	6.5 x 60° (High)
	HE750	HI/LO &	1	532904024	10.0 x 60° (Low)
		dual/fuel	1	532904018	6.5 x 60° (High)
	HE800	HI/LO &	1	532904025	10.5 x 60° (Low)
		dual/fuel	1	532904020	7.0 x 60° (High)
	HE850	HI/LO &	1	532904026	11.0 x 60° (Low)
		dual/fuel	1	532904022	7.5 x 60° (High)
	HE900	HI/LO &	1	532904027	12.0 x 60° (Low)
		dual/fuel	1	532904022	7.5 x 60° (High)
NU-WAY	HE450	HI/LO	1	532904034	5.0 US/60°PLP (Low)
(Monarch)			1	532904034	5.0 US/60°PLP (High)
		dual/fuel	1	532904045	8.5 US/60°PLP (High)
	HE500	HI/LO	1	532904040	5.5 US/60°PLP (Low)
			1	532904040	5.5 US/60°PLP (High)
		dual/fuel	1	532904046	9.5 US/60°PLP
	HE550	HI/LO	1	532904041	6.5 US/60°PLP (Low)
			1	532904041	6.5 US/60°PLP (High)
		dual/fuel	1	532904047	10.5 US/60°PLP
	HE600	HI/LO &	1	532904040	5.5 US/60°PLP (Low)
		dual/fuel	1	532904034	5.0 US/60°PLP (High)
	HE650	HI/LO &	1	532904042	6.0 US/60°PLP (Low)
		dual/fuel	1	532904040	5.5 US/60°PLP (High)
	HE700	HI/LO	1	532904041	6.5 US/60°PLP (Low)
			1	532904042	6.0 US/60°PLP (High)
		dual/fuel	1	532904043	7.0 US/60°PLP (Low)
			1	532904042	6.0 US/60°PLP (High)
	HE750	HI/LO &	1	532904043	7.0 US/60°PLP (Low)
		dual/fuel	1	532904041	6.5 US/60°PLP (High)
	HE800	HI/LO &	1	532904044	7.5 US/60°PLP (Low)
		dual/fuel	1	532904043	7.0 US/60°PLP (High)
	HE850	HI/LO	1	532904049	8.0 x 60° (Low)
			1	532904043	7.0 US/60°PLP (High)
		dual/fuel	1	532904045	8.5 US/60°PLP (Low)
			1	532904043	7.0 US/60°PLP (High)
	HE900	HI/LO &	1	532904045	8.5 US/60°PLP(Low)
		dual/fuel	1	532904044	7.5 US/60°PLP (High)

Figure 11.4 – Oil nozzle selection

BOILER MODEL		HE450 HE500 HE550 HE600 HE650 HE700 HE750 HE800 HE850 HE900
FUEL TYPE		
NATURAL G20	CO2 (DRY)	10.0 - 10.5%
	CO	Less than 100 ppm (air free)
	FLUE GAS TEMP. °C gross	200 - 225
	TEMP RISE ACROSS BOILER °C	11 - 20
LPG PROPANE G31	CO2 (DRY)	11.0 - 11.5%
	CO	Less than 100 ppm (air free)
	FLUE GAS TEMP. °C gross	200 - 225
	TEMP RISE ACROSS BOILER °C	11 - 20
CLASS D FUEL OIL	CO2 (DRY)	10.5 – 11%
	CO	Less than 85 ppm (air free)
	FLUE GAS TEMP. °C gross	200 - 225
	TEMP RISE ACROSS BOILER °C	11 - 20
	SMOKE No.	0 - 1

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.

Figure 11.5 – Combustion Target Figures

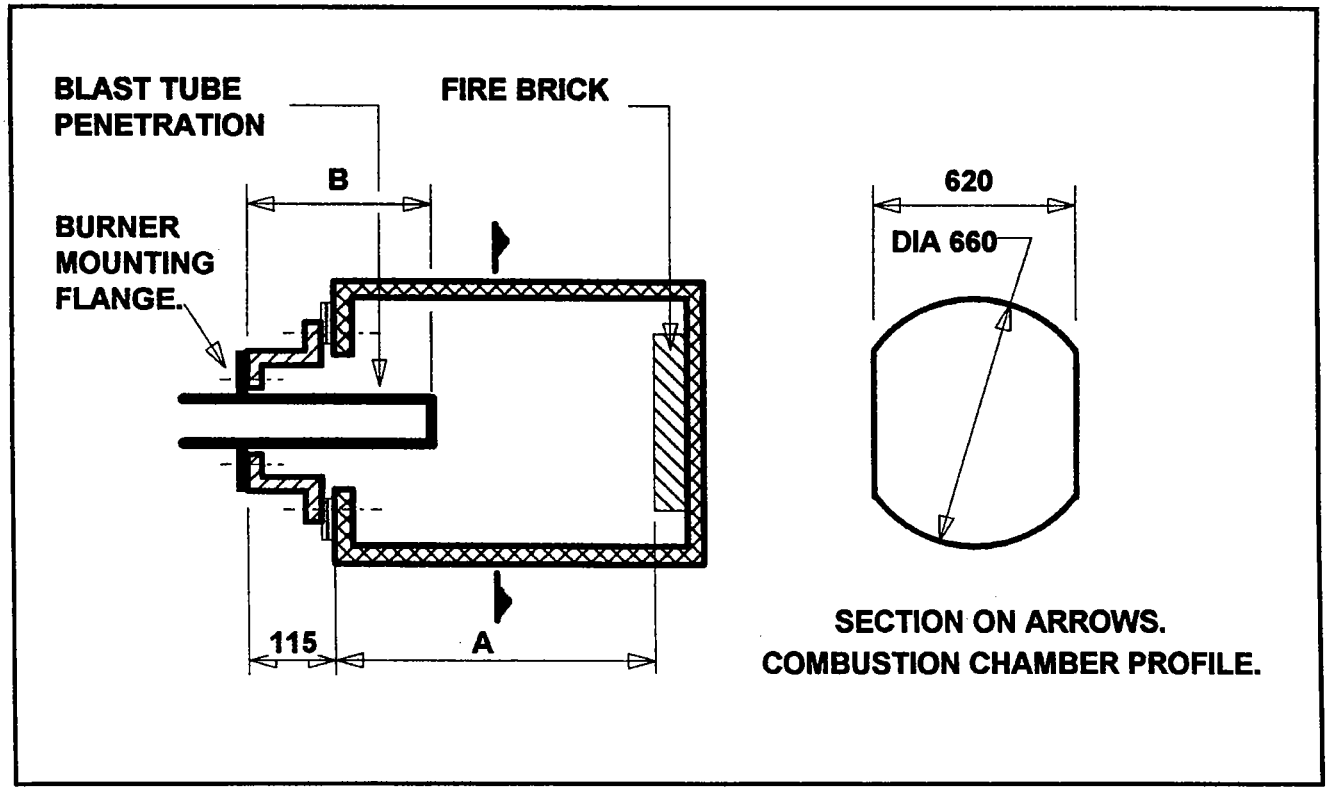


Figure 11.6 – Combustion Chamber and Burner Data

12.0 FAULT FINDING

12.1 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 CO_2, 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 mounting flange and remove from front of boiler.

13.3 Boiler Service Procedure

a. After removing 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, can be disconnected by removing upper front panel, lowering fascia after removing thermostat knobs, pulling out the top half of the terminal block and removing the gland plate.
b. Remove heat exchanger access plates (11,12 and 15 referring to Fig. 15.1), 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 (31), cover plate (32), insulation and fire brick (28) from rear of boiler.
The refractory fire brick (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, 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 attempting to hinge the fascia down, the thermostat knobs must be pulled off and the temperature limiter (high limit) cover knob unscrewed and removed.
Remove the upper front casing panel. Turn the two latches a quarter turn using a screwdriver or coin and lift off. The fascia can then be hinged downwards by unlatching the catch on the top right hand using a screwdriver.
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.

15.0 SPARE PARTS LIST

15.1 Boiler Spares (refer to Fig. 15.1)

ITEM	DESCRIPTION	PART NO.
1.	Front section	573405491
2.	Intermediate section	573405492
3.	Rear section	573405494
4.	Nipple	573405505
	Nipple sealant	573405506
6.	Tie Rod set - Wimborne HE450	573405008
	Tie Rod set - Wimborne HE500	573405009
	Tie Rod set - Wimborne HE550	573405010
	Tie Rod set - Wimborne HE600	573405011
	Tie Rod set - Wimborne HE650	573405012
	Tie Rod set - Wimborne HE700	573405486
	Tie Rod set - Wimborne HE750	573405487
	Tie Rod set - Wimborne HE800	573405488
	Tie Rod set - Wimborne HE850	573405489
	Tie Rod set - Wimborne HE900	573405438
6a.	Lacing bolt M12 x 205	573405013
7.	Cast iron plate ¾" BSP	573405014
8.	Gasket 165 dia x 120 x 4	573405016
9.	Flow elbow and flange 5"	573405017
10.	Flow/Return flange 5"	573405018
11.	Front access plate - left	573405019
12.	Front access plate - right	573405020
13.	Front/rear insulation panel - upper	573405021
14.	Front/rear insulation panel - lower	573405022
15.	Combustion chamber front plate	573405023
16.	Burner plate insulation panel	573405024
17.	Burner plate (blank)	573405025
	Burner plate insulation pad	533806051
18.	Fire guard plate - left	573405026
19.	Fire guard plate - right	573405027
20.	Sight glass insulation gasket	573405028
21.	Sight glass assembly	573405029
22.	Front flueway plate	573405030
23.	Lower flueway plate	573405031
24.	Upper flueway plate	573405032
25.	Boiler cradle - Wimborne HE450	573405033
	Boiler cradle - Wimborne HE500	573405034
	Boiler cradle - Wimborne HE550	573405035
	Boiler cradle - Wimborne HE600	573405036
	Boiler cradle - Wimborne HE650	573405037
	Boiler cradle - Wimborne HE700	573405482
	Boiler cradle - Wimborne HE750	573405483
	Boiler cradle - Wimborne HE800	573405484
	Boiler cradle - Wimborne HE850	573405485
	Boiler cradle - Wimborne HE900	573405437
26.	Rear flueway plate	573405038
27.	Rear access plate - left	573405039
27a.	Rear access plate - right	573405040
28.	Fire brick	573405041
31.	Flue box	573405044
32.	Combustion chamber rear plate	573405045
33.	Flue box fixing bracket	573405046
34.	Front plate fixing bracket	573405047
35.	Mastic sealing rope 10 dia	573405205
36.	Thermostat pocket ¾" BSP x 4T	573405049
39.	Water distribution tube (Wimborne HE600 to 900)	573405052

15.2 Control Panel Spares (refer to Fig. 15.2)

ITEM	DESCRIPTION	PART NO.
1	Control and High/Low Thermostat	533901178
2	Temperature Limiter (High Limit)	533901179
3.	Temperature Gauge	557002005
4.	Hours Run Meter	533901067
5.	On/off Switch (illuminated)	533901212
6.	Fuse Holder	747224779
7.	Fuse 5A (20 mm)	533901218
	Fuse 6.3A (20 mm)	533901221
8	Green Neon	533901031
9	Red Neon	533901029

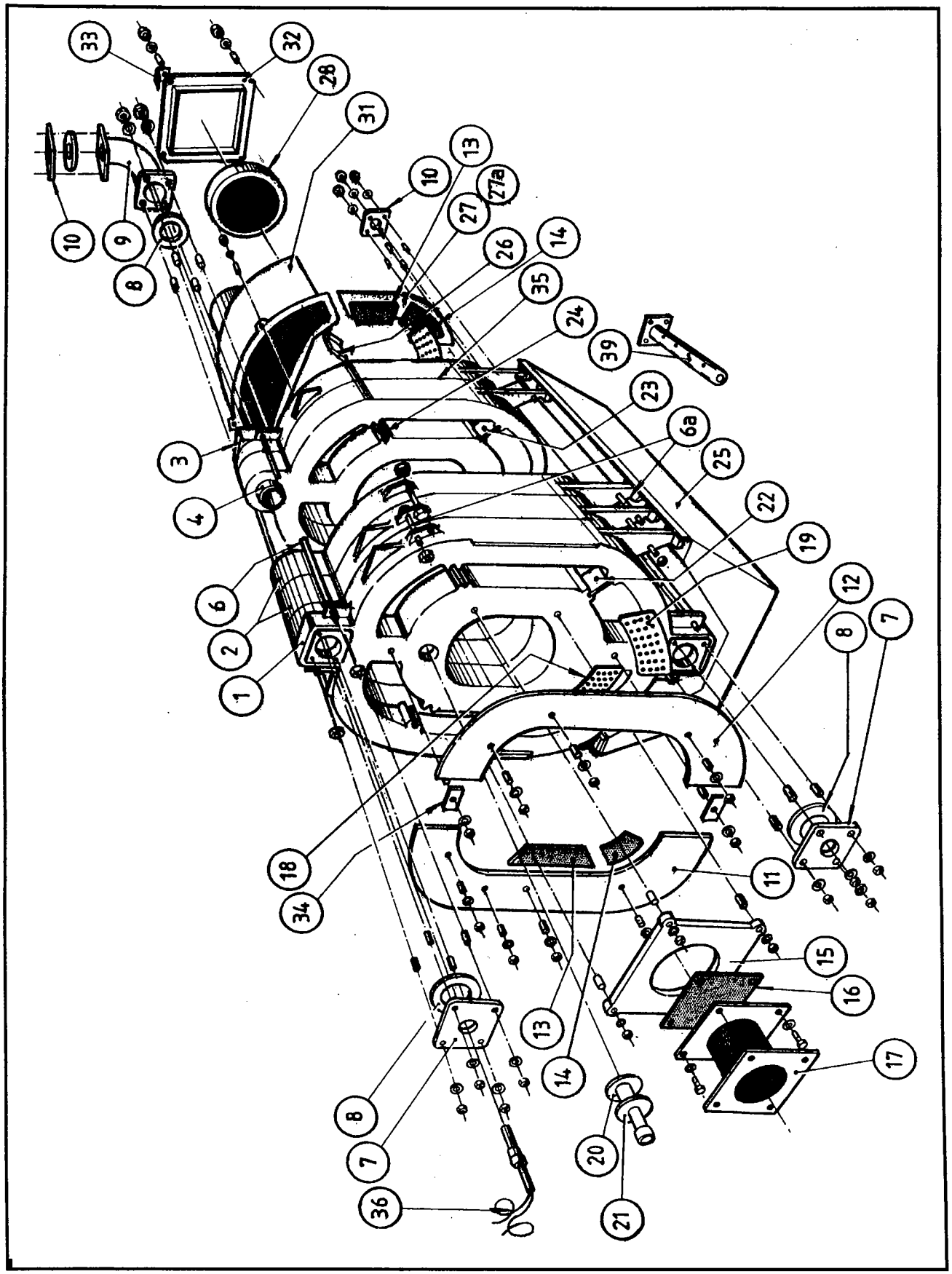


Figure 15.1 – Exploded View of Boiler

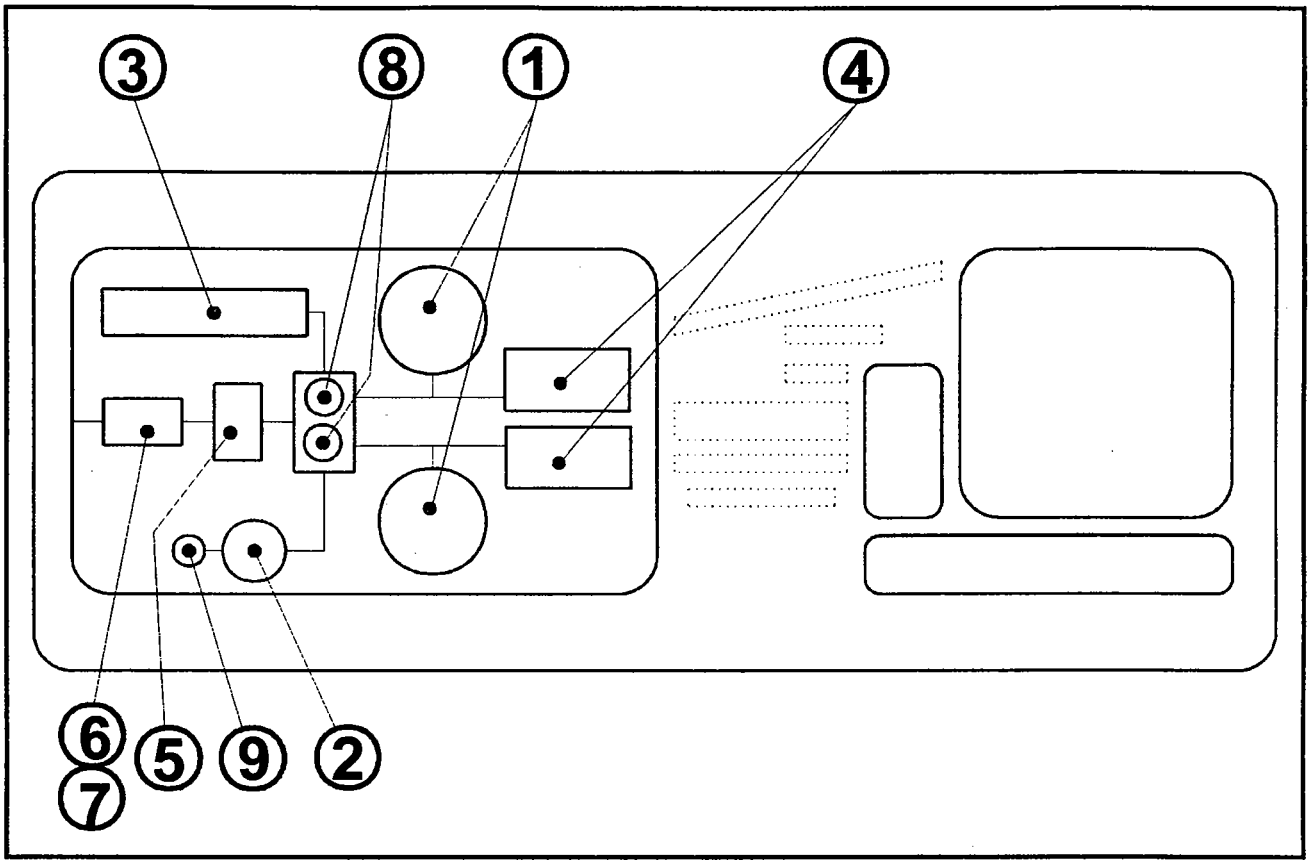


Figure 15.2 – Control Panel Fascia – (refer to Section 15.2)

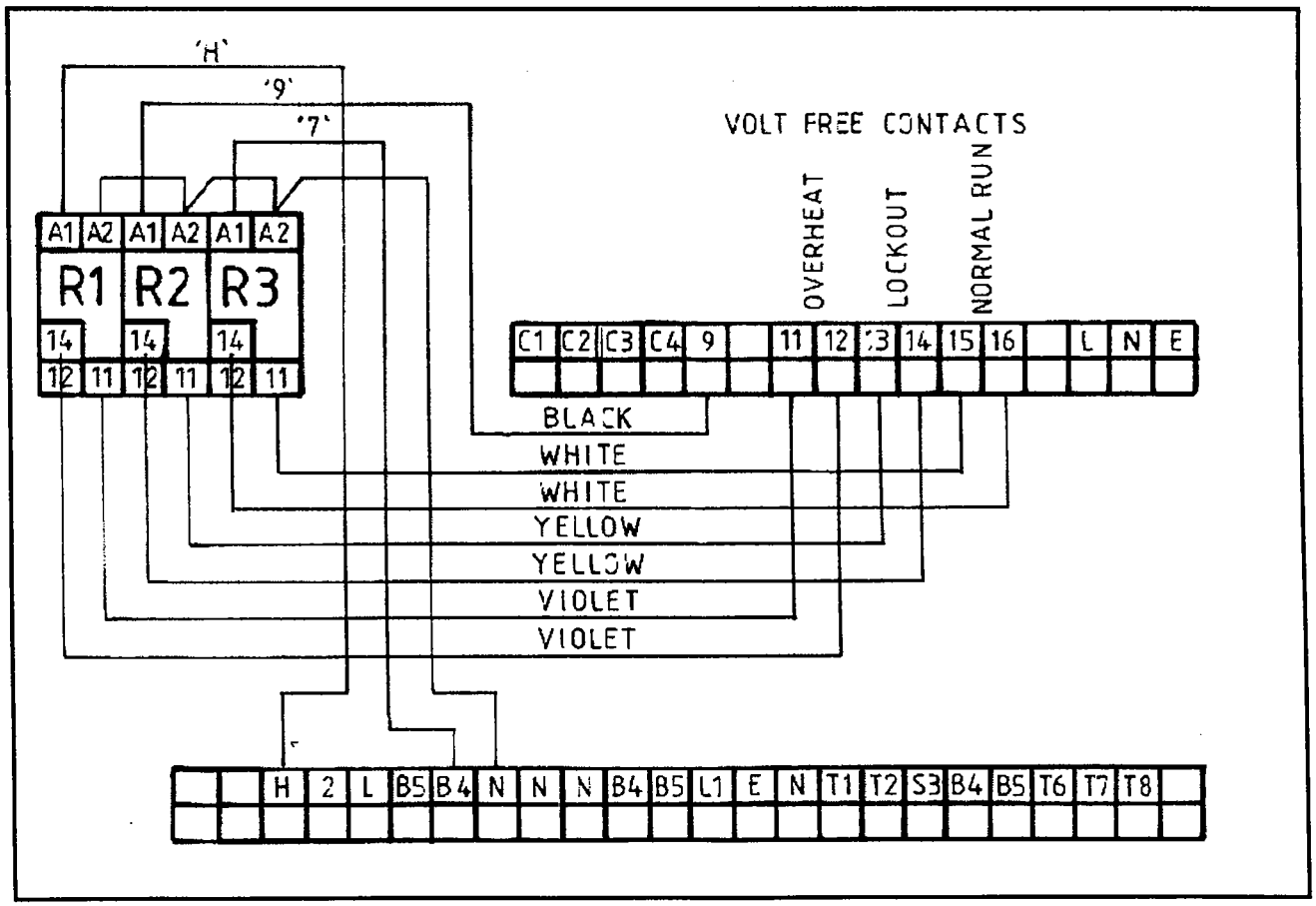


Figure 15.3 – Volt Free Contact Kit and Wiring (Optional)

APPENDIX A – INFORMATION RELATING TO PROPANE FIRING

Figure 2.3 – Performance and General Data Information (LPG Propane)

BOILER MODEL - WIMBORNE HE		450	500	550	600	650	700	750	800	850	900
GENERAL DATA											
No. OF SECTIONS		9	10	11	12	13	14	15	16	17	18
BOILER INPUT - maximum	kW	504	560	617	673	728	788	844	901	957	1013
(net)	Btu/hx1000	1719	1911	2104	2295	2483	2688	2880	3074	3265	3456
BOILER INPUT - maximum	kW	547	608	670	731	790	855	916	978	1039	1100
(gross)	Btu/hx1000	1867	2075	2285	2493	2697	2919	3127	3338	3545	3753
BOILER OUTPUT - maximum	kW	450	500	550	600	650	700	750	800	850	900
	Btu/hx1000	1535	1706	1877	2047	2218	2388	2559	2730	2900	3071
FLUE DATA - PROPANE (G31)											
APPROX. FLUE GAS TEMP(gross)	°C	225									
APPROX. FLUE GAS VOLUME	m^3/h	600	660	728	797	861	933	1000	1066	1134	1199
@ NTP (wet)	ft^3/h	21186	23304	25705	28142	30400	32944	35310	37640	40040	42336
GAS DATA											
NOMINAL GAS INLET PRESSURE	mbar	37									
MAXIMUM GAS INLET PRESSURE	mbar	45									
GAS FLOW RATE	m^3/h	21.1	23.4	25.7	28.1	30.4	32.9	35.3	37.6	40.0	42.3
	ft^3/h	745	826	907	992	1073	1161	1239	1327	1412	1494

NOTE: For matched burner/boiler combinations, refer to Figure 11.2
For combustion performance figures, refer to Figure 11.4

APPENDIX B – INFORMATION RELATING TO OIL FIRING

Figure 2.3 – Performance and General Data Information (Class D fuel oil)

BOILER MODEL - WIMBORNE HE		450	500	550	600	650	700	750	800	850	900
GENERAL DATA											
No. OF SECTIONS		9	10	11	12	13	14	15	16	17	18
BOILER INPUT - maximum	kW	504	560	617	673	728	788	844	901	957	1013
(net)	Btu/hx1000	1719	1911	2104	2295	2483	2688	2880	3074	3265	3456
BOILER INPUT - maximum	kW	537	596	657	717	775	839	899	959	1019	1078
(gross)	Btu/hx1000	1831	2035	2242	2445	2645	2863	3066	3274	3477	3680
BOILER OUTPUT - maximum	kW	450	500	550	600	650	700	750	800	850	900
	Btu/hx1000	1535	1706	1877	2047	2218	2388	2559	2730	2900	3071
FLUE DATA - CLASS D FUEL OIL											
APPROX. FLUE GAS TEMP(gross)	°C	225									
APPROX. FLUE GAS VOLUME	m^3/h	686	763	840	916	991	1067	1144	1220	1296	1372
@ NTP (wet)	ft^3/h	24237	26945	29658	32356	35006	37690	40389	43082	45776	48465
OIL DATA											
OIL FLOW RATE	l/h	53	60	65	71	77	83	87	95	101	107
	UK gal/h	11.7	13.2	14.3	15.6	16.9	18.3	19.1	20.9	22.2	23.6

NOTE: For matched burner/boiler combinations, refer to Figure 11.3
For combustion performance figures, refer to Figure 11.4

APPENDIX C - BOILER/ BURNER WIRING DIAGRAM INFORMATION.

☐ **Central & South West England**

Driver Engineering Limited
7/8 Wimborne Road, Moordown
Bournemouth BH9 2DX
Tel: 01202 524140
Fax: 01202 536242

☐ **Scotland**

McDowell Modular Services
972 [illegible] Street
Glasgow G3 8LL
Tel: 0141 336 8795
Fax: 0141 336 8964

☐ **North West England**

Sykes Modular Services
210-214 New Chester Road
Birkenhead
Merseyside L41 9BG
Tel: 0151 666 1030
Fax: 0151 647 8101

☐ **Northern Ireland**

[illegible] Limited
32-34 Dargan Crescent
Duncrue Industrial Estate
Belfast BT3 9JP
Tel: 01232 777788
Fax: 01232 778385

☐ **North East England**

Allison Heating Products
17 Beach Road
South Shields
Tyne & Wear NE33 2QA
Tel: 0191 455 7898
Fax: 0191 455 7899

☐ **Southern Ireland**

HEVAC Limited
70-72 Lower Dorset Street
Dublin 1, Ireland
Tel: 00 353 1 830 1211
Fax: 00 353 1 830 1099

For all other areas, or for further advice, please contact the [illegible] Heating head office service department [illegible] telephone [illegible]

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For general enquiries on products and services available from Hamworthy Heating, our Customer Liaison staff are on hand to answer your questions.

QUOTATIONS 01202 662552
Hamworthy Heating provide an efficient pricing and quotation service. Our Customer Liaison staff will also be pleased to arrange for one of our Sales Engineers or Authorised Sales Agents to visit you to discuss your needs in person, and offer expert technical and commercial advice on heating, flue and water systems.

TECHNICAL ENQUIRIES .... 01202 [illegible]
For problems of a technical nature and further product support, our Technical Applications Engineers offer specifiers and contractors advice on all aspects of equipment application, configuration and capability.

ORDER ENQUIRIES 01202 662516
For an efficient response to order acknowledgement and administrative queries, contact our order processing team.

DELIVERY ENQUIRIES .... [illegible]
Deliveries from Hamworthy Heating arrive direct from the factory on a vehicle equipped with a tail-lift for ease of off-loading to ground level. Our contracts team will progress despatch and liaise individual delivery arrangements.

SPARE PARTS 01202 662527
A comprehensive spare parts service is operated from our factory in Poole, providing replacement parts for both current and discontinued products. Please contact our spares team, providing details of product type, serial number, model and part requirements wherever possible.

SERVICE DEPARTMENT .... 01202 [illegible]
At Hamworthy Heating we employ our own skilled service engineers who are trained to work on all of our products. Our National coverage of all UK mainland sites is supported by a network of Authorised Service Agents who can provide the same high level of service and product expertise.

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[illegible]

[illegible]
[illegible], Birmingham [illegible]
Main Switchboard tel: [illegible]
Customer Services fax: [illegible]

[illegible]

[illegible] design [illegible] installation

[illegible] ENQUIRIES .... [illegible]
Our office in Birmingham offers a comprehensive range of flue products [illegible] design and installation service [illegible] drawings [illegible]