ANSTY CONDENSING BOILERS

Welded Stainless Steel Boilers

Installation, Commissioning and Operating Instructions

Models: 75kW to 640kW

NATURAL GAS I_{2H}

IMPORTANT NOTE

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

Hamworthy

Heating *at work.*

Customer After Sales Services

Telephone: **01202 662555** E-mail: **service@hamworthy-heating.com** Fax: **01202 662522**

Technical Enquiries

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

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

Commissioning

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

Service Contracts

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

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

Spare Parts

We offer a comprehensive range of spare parts, providing replacement parts for both current and discontinued products. Delivery options are available to suit you. Please refer to our website for more details.

Ansty Condensing Boilers

Welded Stainless Steel Boilers
75kW to 640kW

Installation, Commissioning and Servicing Instructions

NATURAL GAS I_{2H}

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

THE ANSTY CONDENSING BOILER IS INTENDED FOR USE AS A COMMERCIAL APPLIANCE

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

THIS BOILER COMPLIES WITH ALL RELEVANT EUROPEAN DIRECTIVES.
EC TYPE CERTIFICATE No. E0831/5374
PRODUCT IDENTIFICATION No. 0461BO0703

PUBLICATION NO. 500001119
ISSUE 'D'
JANUARY 2012

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1.0 INTRODUCTION

1.1 The Ansty stainless steel condensing boiler range consists of 7 gas fired models with outputs ranging from 75kW to 320kW. The boilers can also be stacked as 'Dual' versions, with 7 models giving outputs ranging from 150kW to 640kW. Refer to section 3.0 for dimensional details.

Ansty condensing 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 with a maximum working pressure up to 5 bar (73psi). For hot water production they can be used in conjunction with calorifiers or indirect hot water cylinders. Refer to section 8.0 for system details.

Ansty condensing boilers are suitable for connection to a normal temperature, low temperature or a condensing system.

For optimum efficiency performance, the Ansty condensing boiler should be used in systems with a return temperature below 55°C. Above this temperature, condensate from the flue gases will not form and the boiler will operate as a 'High Efficiency' boiler.

Ansty condensing boilers are assembled with a slight incline of the heat exchanger, assisting with the disposal of condensate from the flue collector box at the rear of the boiler. The front and rear support plates are removable to accommodate access through small openings.

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

The Ansty condensing boiler can be fitted with either a high/low or modulating burner for operation on Natural Gas I_{2H} (Second Family). Refer to section 10.6 for performance and burner details.

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

a. A fuse
b. An illuminated mains on/off switch
c. Boiler thermostats - Hi/Lo
d. Boiler run lamp
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. Hours run meters for Hi & Lo operation.
g. A water temperature thermometer (temperature gauge)
h. A flying lead and plug to connect to the burner
j. Volt free relays for normal run, overheat and lockout .

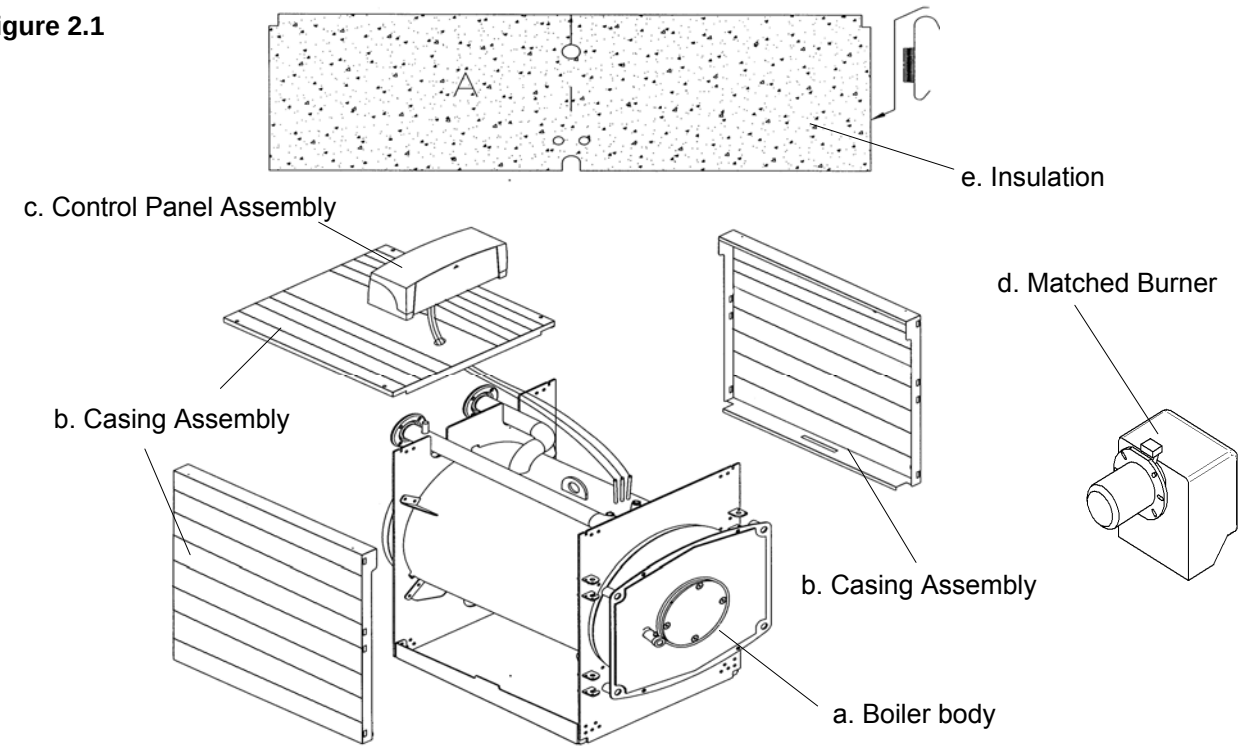
2.0 DELIVERY

2.1 The Ansty condensing boiler is delivered in four/ five packages:

a. Boiler body - incl. Burner mounting plate and documentation.
b. Casing assembly and Insulation
c. Control panel assembly
d. Burner
e. Dual assembly kit (where applicable)

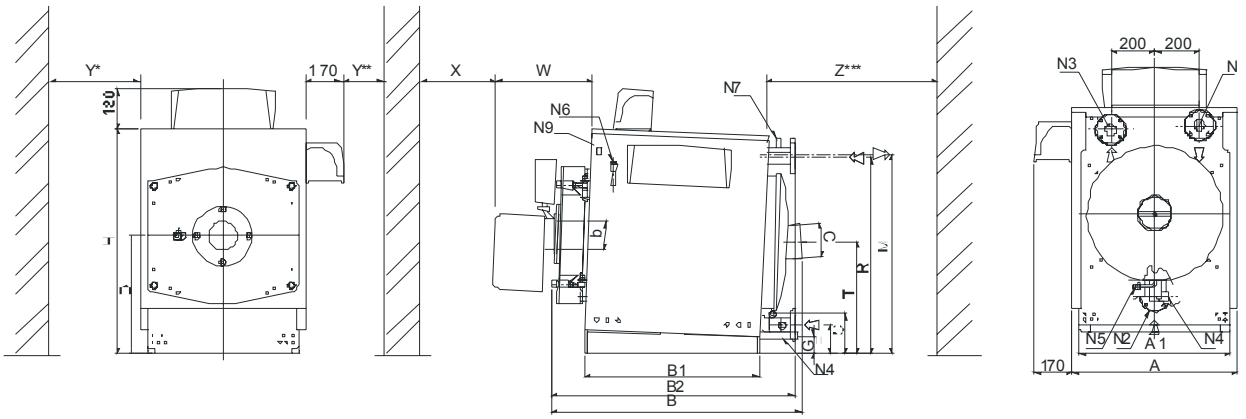
See Figure 2.1 Below

Figure 2.1



3.0 BOILER DIMENSIONS AND CLEARANCES

Figure 3.1 Ansty Single Boiler Models



ANSTY									
Model			**A75**	**A90**	**A120**	**A160**	**A220**	**A270**	**A320**
Casing Width	A	mm	746	746	746	846	846	976	976
Frame Width	A1	mm	680	680	680	780	780	920	920
Overall Length	B	mm	1155	1155	1155	1155	1435	1455	1455
Body Length	B1	mm	785	785	785	785	1040	1040	1040
Boiler Length	B2	mm	1093	1093	1093	1119	1398	1436	1436
Condense Drain	C	mm	174	174	174	174	174	77	77
Burner	D	mm	529	530	530	580	580	550	550
Return	F	mm	125	126	126	126	126	133	133
Boiler Drain	G	mm	125	126	126	126	126	59	59
Boiler Height	H	mm	1015	1015	1015	1115	1115	1115	1115
Flow	M	mm	900	900	900	1000	1000	1035	1035
Return	R	mm	881	881	881	980	980	922	922
Flue	T	mm	503	503	503	553	553	524	524
Flue Connection	ØiC	mm	151	151	151	181	181	201	201
Draught Tube Opening	Øb	mm	130	130	130	145	145	180	180
Flow/Return/ Connection - PN6	N1/N2/ N3	DN	50	50	50	50	50	65	65
Boiler Drain	N4	in	3/4"	3/4"	3/4"	3/4"	3/4"	1/2“	1/2“
Condense Drain	N5	in	3/4"	3/4"	3/4"	3/4"	3/4"	1"	1"
Sensor Pockets	N6/N7	in	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"
Air Vent Tapping	N9	in	-	-	-	-	-	-	-
CLEARANCES									
Burner Depth	W	mm	238	238	262	262	580	580	580
Front Access	X	mm	455	455	455	455	455	455	455
Side Access	Y*	mm	350	350	350	350	350	350	350
Rear Access	Z***	mm	500	500	500	500	500	500	500
Side Clearance	Y**	mm	300	300	300	300	300	300	300

***Y Dimension**

It is recommended this clearance is maintained at least on 1 side for rear access to pipe connections and flue.

Where two boilers are used the minimum space between boilers is 60mm to facilitate fitting the casing.

****Y Dimension**

Where using side mounted control panels this is the minimum recommended clearance to facilitate access to thermostats and switches.

*****Z Dimension**

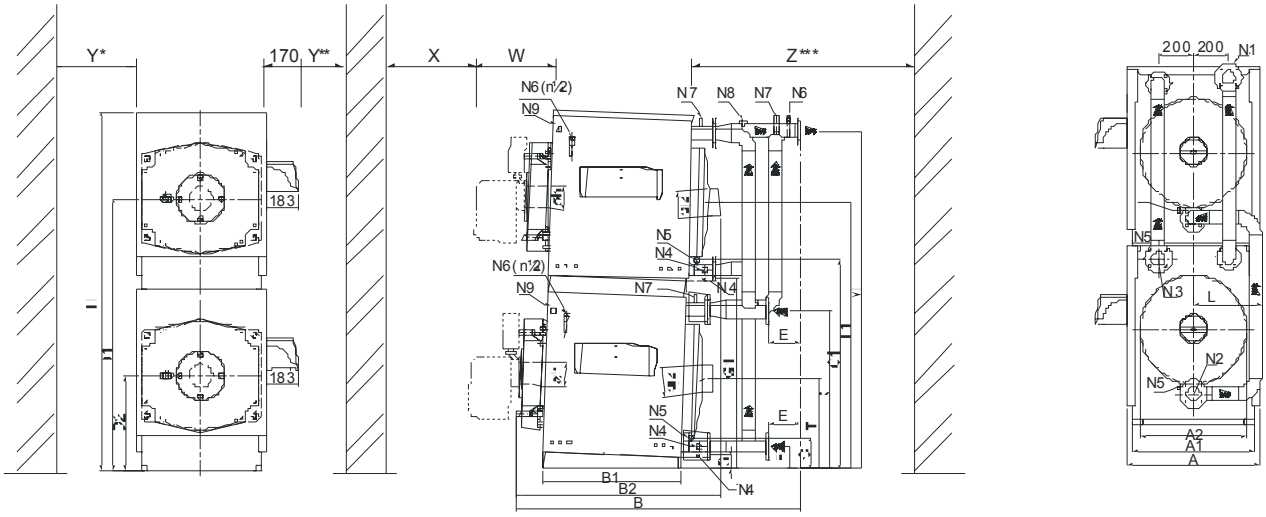
This dimension is a minimum recommendation permitting access to rear of boiler for maintenance. It may not however be adequate for the flue installation.

Where necessary the dimension must be increased accordingly.

NOTE!

When installing more than 2 boilers it is recommended that only 2 are close spaced with side access provided between the 2nd and 3rd boilers.

Figure 3.2 Ansty Dual Boiler Models



ANSTY DUAL									
Model			**AD150**	**AD180**	**AD240**	**AD320**	**AD440**	**AD540**	**AD640**
Casing Width	A	mm	746	746	746	846	846	976	976
Frame Width	A1	mm	680	680	680	780	780	920	920
Overall Length	B	mm	1642	1642	1642	1647	1982	1996	1996
Body Length	B1	mm	785	785	785	785	1040	1040	1040
Boiler Length	B2	mm	1188	1188	1188	1192	1463	1484	1484
Condense Drain	C	mm	174	174	174	174	174	77	77
Condense Drain	C1	mm	1163	1163	1163	1263	1274	1166	1166
Burner	D	mm	530	530	530	580	580	550	550
Burner	D1	mm	1520	1520	1520	1670	1670	1640	1640
	E	mm	173	173	173	173	201	201	201
Return	F	mm	126	126	126	126	126	133	133
Boiler Drain	G	mm	126	126	126	126	126	59	59
Boiler Drain	G1	mm	-	-	-	-	-	1165	1165
Boiler Height	H	mm	2004	2004	2004	2204	2204	2204	2204
Manifold to Centre	L	mm	388	388	388	388	388	606	606
Flow	M	mm	1889	1889	1889	2089	2089	2125	2125
Return	R	mm	881	881	881	980	980	922	922
Flue	T	mm	503	503	503	553	553	524	524
Flue	T1	mm	1492	1492	1492	1642	1644	1614	1614
Flue Connection	ØiC	mm	151	151	151	181	181	201	201
Draught Tube Opening	Øb	mm	130	130	130	145	145	180	180
Flow/Return/ Connection - PN6	N1/N2/ N3	DN	50	50	50	50	80	80	80
Boiler Drain	N4	in	3/4"	3/4"	3/4"	3/4"	3/4"	1/2"	1/2"
Condense Drain	N5	in	3/4"	3/4"	3/4"	3/4"	3/4"	1"	1"
Sensor Pockets	N6/N7	in	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"
Gauge Tapping	N8	in	1"	1"	1"	1"	1"	1"	1"
Air Vent Tapping	N9	in	-	-	-	-	-	-	-
CLEARANCES									
Burner Depth	W	mm	238	238	262	262	580	580	580
Front Access	X	mm	455	455	455	455	455	455	455
Side Access	Y*	mm	350	350	350	350	350	350	350
Rear Access	Z***	mm	1000	1000	1000	1000	1000	1000	1000
Side Clearance	Y**	mm	300	300	300	300	300	300	300

***Y Dimension**

It is recommended this clearance is maintained at least on 1 side for rear access to pipe connections and flue.

Where two boilers are used the minimum space between boilers is 60mm to facilitate fitting the casing.

****Y Dimension**

Where using side mounted control panels this is the minimum recommended clearance to facilitate access to thermostats and switches.

*****Z Dimension**

This dimension is a minimum recommendation permitting access to rear of boiler for maintenance. It may not however be adequate for the flue installation.

Where necessary the dimension must be increased accordingly.

NOTE!

When installing more than 2 boilers it is recommended that only 2 are close spaced with side access provided between the 2nd and 3rd boilers.

Figure 3.3 - Technical Data - Ansty Single

	Boiler Model		A75	A90	A120	A160	A220	A270	A320
ENERGY	Heat output to water - Gross Non condensing 80/60ºC	kW Btu/hr x 1000	67.7 231	81.2 277	108.2 369.2	144.3 492.3	198.5 677.3	243.6 831.2	280.1 989.8
	Heat output to water—Gross Condensing 50/30ºC	kW Btu/hr x 1000	75 255.9	90 307.1	120 409.4	160 545.9	220 750.6	270 921.2	320 1091.8
	Heat input (net) - Gross	kW Btu/hr x 1000	78.5 267.8	94.3 321.7	126.3 430.9	168.3 574.2	230.4 786.1	282.7 964.6	336.7 1148.8
	Heat input (net) - Net	kW Btu/hr x 1000	69.8 238.2	83.7 285.6	112.2 382.8	149.5 510.1	204.7 698.4	251.2 856.8	299.1 1020.5
WATER	Water Content	litres UK gal	97 21	97 21	97 21	112 25	149 33	230 51	230 51
	Design Flow Rate @ 11ºC Δt	l/min UK gal/min	98 22.5	117 25.7	156 34.3	208 45.8	287 63.1	352 77.4	417 91.7
	Waterside pressure drop @ 11ºC Δt	mbar in wg	0.8 0.3	1 0.4	1.2 0.5	1.3 0.5	1.5 0.6	1.6 0.6	1.8 0.7
	Design Flow Rate @ 20ºC Δt	l/min UK gal/min	54 11.9	64 14.1	86 18.9	115 25.3	158 34.8	194 42.7	229 50.4
	Waterside pressure drop @ 20ºC Δt	mbar in wg	0.25 0.1	0.3 0.1	0.36 0.1	0.39 0.2	0.45 0.2	0.48 0.2	0.54 0.2
	Minimum flow rate	l/min UK gal/min	27 5.9	32 7.0	43 9.5	57 12.5	79 17.4	97 21.3	115 25.3
	Maximum water pressure	bar psig	5 72.5	5 72.5	5 72.5	5 72.5	5 72.5	5 72.5	5 72.5
	Maximum water flow temperature	ºC	100	100	100	100	100	100	100
GAS	Combustion resistance	mbar in wg	0.7 1.75	0.9 2.25	1.5 3.75	2.5 6.25	2.8 7	3 7.5	3.8 9.5
	Input rate Natural Gas (G20)	m³/h ft³/h	7.38 260.61	8.86 312.9	11.87 419.2	15.82 558.7	21.66 764.9	26.58 938.7	31.65 1117.7
	Nominal inlet pressure required Natural gas - inlet to gas train	mbar in wg	20 8	20 8	20 8	20 8	20 8	20 8	20 8
	Approx. flue gas volume At NTP natural gas	m³/h ft³/h	98 3461	118 4167	158 5580	210 7416	288 10170	352 12431	420 14832
	Approx. flue gas temp - nat. gas @ 30º return temp.	ºC ºF	45 113	45 113	45 113	45 113	45 113	45 113	45 113
FLUE	Flue connection O/D	mm in	151 5.95	151 5.95	151 5.95	181 7.13	181 7.13	201 7.91	201 7.91
	Flue draught requirements		Balanced Condition at Boiler Outlet						
ELEC	Electrical supply—boiler / burner		230V 1PH 50Hz						
	Start Current	Amps	2.6	2.6	4.5	4.5	4.8	4.8	4.8
	Run Current	Amps	0.7	0.7	1.4	1.4	1.3	1.3	1.3

Figure 3.4 - Technical Data - Ansty Dual

	Boiler Model		AD150	AD180	AD240	AD320	AD440	AD540	AD640
ENERGY	Heat output to water - Gross Non condensing 80/60ºC	kW Btu/hr x 1000	136.0 464	163.2 556.8	218.5 745.5	294.1 1003.5	398.9 1361	489.5 1670.2	580.2 1979.6
	Heat output to water—Gross Condensing 50/30ºC	kW Btu/hr x 1000	150 511.8	180 614.2	240 818.9	320 1091.8	440 1501.3	540 1842.5	640 2183.7
	Heat input (net) - Gross	kW Btu/hr x 1000	157.8 538.4	189.4 646.2	254.9 869.7	343.1 1070.7	462.9 1579.4	568.1 1938.1	673.3 2297.3
	Heat input (net) - Net	kW Btu/hr x 1000	140.2 478.4	168.2 573.9	226.4 772.5	304.8 1040	411.2 1403	504.7 1722	598.1 2040.7
WATER	Water Content	litres UK gal	194 43	194 43	194 43	224 49	298 66	460 101	460 101
	Design Flow Rate @ 11ºC Δt	l/min UK gal/min	196 43.1	234 51.5	312 68.6	416 91.5	574 126.3	704 154.9	834 183.5
	Waterside pressure drop @ 11ºC Δt	mbar in wg	1.6 0.64	2 0.8	2.4 0.96	2.6 1.04	3 1.2	3.2 2.66	3.6 1.44
	Design Flow Rate @ 20ºC Δt	l/min UK gal/min	108 23.8	128 28.2	172 37.8	230 50.6	316 69.5	388 85.4	458 100.7
	Waterside pressure drop @ 20ºC Δt	mbar in wg	0.5 0.2	0.6 0.24	0.72 0.29	0.78 0.31	0.9 0.36	0.98 0.39	1.08 0.43
	Minimum flow rate	l/min UK gal/min	54 5.9	64 7.0	86 9.5	114 12.5	158 17.4	194 21.3	230 25.3
	Maximum water pressure	bar psig	5 72.5	5 72.5	5 72.5	5 72.5	5 72.5	5 72.5	5 72.5
	Maximum water flow temperature	ºC	100	100	100	100	100	100	100
GAS	Combustion resistance	mbar in wg	0.7 1.75	0.9 2.25	1.5 3.75	2.5 6.25	2.8 7	3 7.5	3.8 9.5
	Input rate Natural Gas (G20)	m³/h ft³/h	14.83 253.7	17.8 628.6	23.96 846.1	32.25 1138.9	43.51 1536.6	53.4 1885.8	63.29 2235.1
	Nominal inlet pressure required Natural gas - inlet to gas train	mbar in wg	20 8	20 8	20 8	20 8	20 8	20 8	20 8
	Approx. flue gas volume At NTP natural gas	m³/h ft³/h	196 6922	236 8334	316 11160	420 14832	576 20340	704 24862	840 29664
	Approx. flue gas temp - nat. gas @ 30º return temp.	ºC ºF	45 113	45 113	45 113	45 113	45 113	45 113	45 113
FLUE	Flue connection O/D 2 Connections	mm in	151 11.9	151 11.9	151 11.9	181 14.26	181 14.26	201 15.82	201 15.82
	Flue draught requirements		Balanced Condition at Boiler Outlet						
ELEC	Electrical supply—boiler / burner		230V 1PH 50Hz						
	Start Current	Amps	2.6	2.6	4.5	4.5	4.8	4.8	4.8
	Run Current	Amps	0.7	0.7	1.4	1.4	1.3	1.3	1.3

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 Figures 3.1 and 3.2 for recommended clearances.

The boiler room, or compartment, housing the boiler (s) - whether specifically constructed for the purpose, or a modification of an existing space - should be in accordance with the requirements of 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 Ansty condensing boiler is of all welded circular construction containing a series of fire tubes between the combustion chamber and outer shell and therefore 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.

The compartment housing the boiler must have permanent air vents communicating directly with the outside air at both high and low level. Refer to **Section 7.0** for details.

5.0 GAS SUPPLY

5.1 Gas Service Pipes

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

5.2 Gas Meters

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

5.3 Gas Supply Pipes

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

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

5.4 Boosted Gas Supplies

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

5.5 Boiler House Gas Control Valve

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

6.0 FLUE SYSTEM

6.1 General Requirements

Detailed recommendations for flue systems are given in **BS 6644**, **IGE/UP/10,** "Flues for Commercial and Industrial Gas-Fired Boilers and Air Heaters."
The following notes are intended to give general guidance only.

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

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

Ansty 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 Figures 3.3 and 3.4.

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 13.0: SERVICING** for further information**.**

6.6 Flue Discharge

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

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

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

6.7 Surface 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 100mm above floor level) = 25 °C.
2) At mid-level (1.5m above floor level)

= 32 °C.

3) At ceiling level (or 100mm 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 utilized providing design extraction rates comply with Figure 7.1

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

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

Forced Draught Boilers	Flow Rate per 1000 kW total rated heat input (gross)	
	Inlet air (Combustion Ventilation)	Extract air (Ventilation)
	m^3/s	m^3/s
Volume	0.9	0.6

Figure 7.1 Mechanical Ventilation Flow Rates

8.0 WATER CIRCULATION SYSTEM

8.1 General

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

1) In a combined central heating and hot water system, the hot water storage vessel must be of the indirect cylinder or calorifier type. The hot water storage vessel should be insulated preferably with not less than 75mm (3 in) thick mineral fibre, or its thermal equivalent.

2) Circulating pipework not forming part of the useful heating surface should be insulated to help prevent heat loss and possible freezing, particularly where pipes are run through roof spaces and ventilated cavities. Cisterns situated in areas, which may be exposed to freezing conditions, should also be insulated. Insulation exposed to the weather should be rendered waterproof.

3) Drain valves must be located in accessible positions which permit the draining of the whole system, including the boiler and hot water storage vessel.

4) Each boiler has a flanged flow and return connection located on the rear section of the boiler. A75 - A220, 50mm NB, A270 - A320 65mm NB. Mating flanges are supplied suitable for welding to pipe.

5) Multiple boilers should be connected by flow and return headers. Headers should be connected to the system in a "reverse return" arrangement (the water flow in each header is in the same direction) to ensure equal flow in each module.

8.2 Pressure Relief Valve (Safety Valve)

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

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

8.3 Open Vent and Cold Feed Pipe

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

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

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

8.4 Altitude Gauge (Water Pressure Gauge)

Every boiler or group of boilers should be provided with a gauge complete with isolating valve. See Figure B1.1 in Appendix B for typical position.

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

Figure 8.3 Cold Feed and Vent Pipe Sizes (mm)

8.5 Thermometer

See Figure B1.1 in Appendix B for typical position.

A thermometer complete with pocket should be fitted in the pipework to indicate water flow temperature.

8.6 Drain Valves

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

B1.1, Appendix B for recommended positions.

8.7 Circulating Pump

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

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

8.8 Minimum Water Flow Rates

Minimum water flow rates are shown in Figure 3.3 & 3.4. These flow rates should be maintained through the boiler at all times whilst the boiler is firing. If the water flow rate is allowed to fall below the minimum, the boiler heat exchanger could fail due to the resultant scale formation. Particular attention should be paid to the restriction of external flow circuits during periods of low heat demand.

8.9 Control Schemes

8.9.1 Temperature Controls

An adjustable control thermostat is supplied with each boiler and should be set to operate within the range 30-90°C for standard applications. A temperature limiter, (hand reset limit thermostat) is also fitted to the boiler and must be set at 110°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.

8.9.2 Water Flow Controls

Any external mixing valve/shunt pump or similar controls should **ALWAYS ENSURE** that the minimum water flow rate as shown in Figures 3.3 and 3.4 is maintained.

8.9.3 Frost Protection

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

8.10 Unvented Systems

See Figure B1.1 in Appendix B for typical layout of a Unvented (Pressurised) Hot Water System. For system design refer to **BS 7074 Part 2.**

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

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

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

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

8.11 Modular Boiler Control Schemes

For modular boiler installations, Hamworthy Heating can supply a unique boiler management control system called the 'Marshall HE'. This system comprises: a wall mounted master control unit, which houses the main interface processor and will control up to 8 stages. See Figure B1.1 in Appendix B. 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.

The burner requires a single phase supply and should be wired in accordance with the instructions provided by the burner manufacturer.

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

All boilers are fitted with v.f.c. contacts as standard 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.

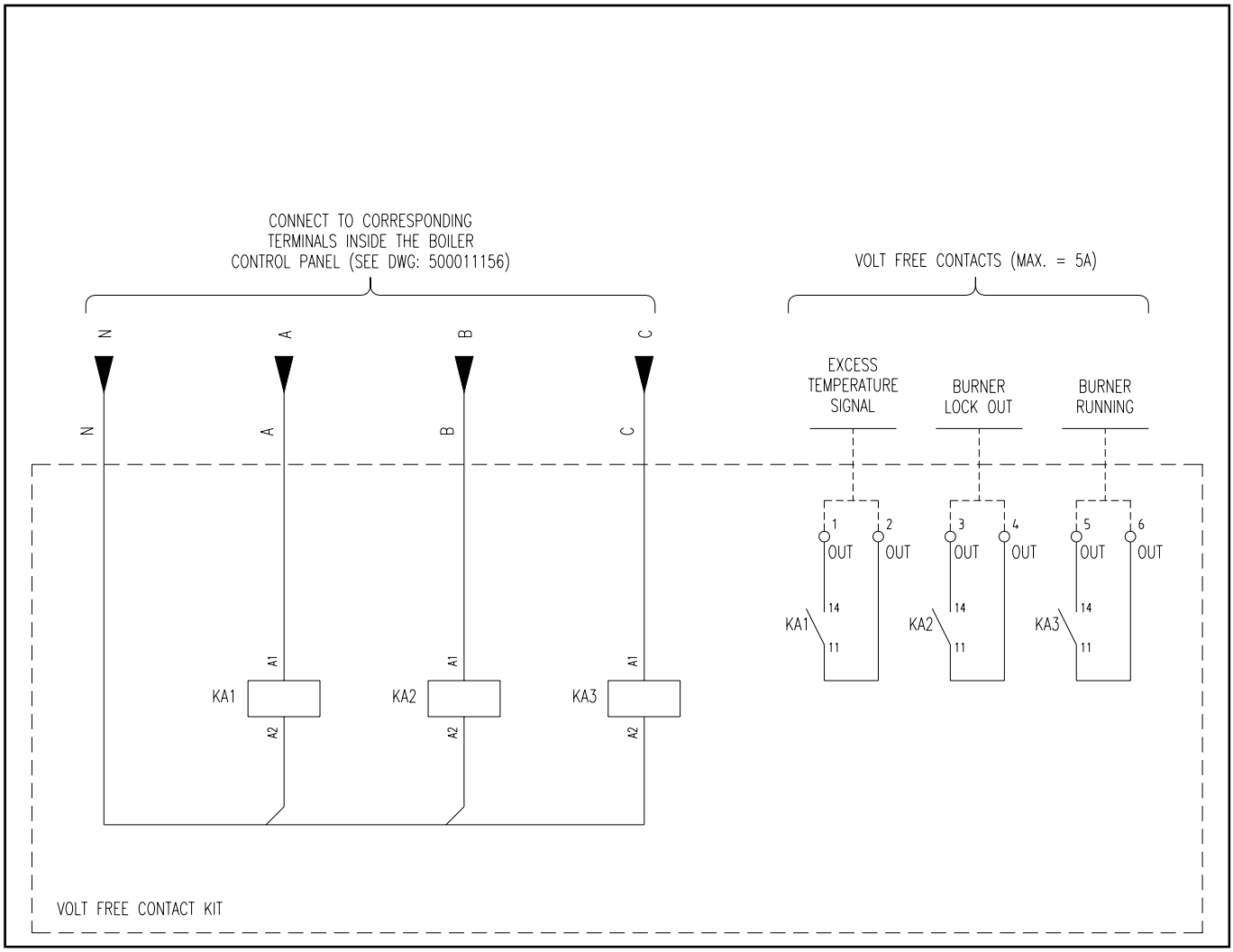


Figure 9.2 – Volt Free Contact Set and Wiring

10.0 BOILER ASSEMBLY

10.1 DUAL BOILERS. ASSEMBLY INSTRUCTIONS.

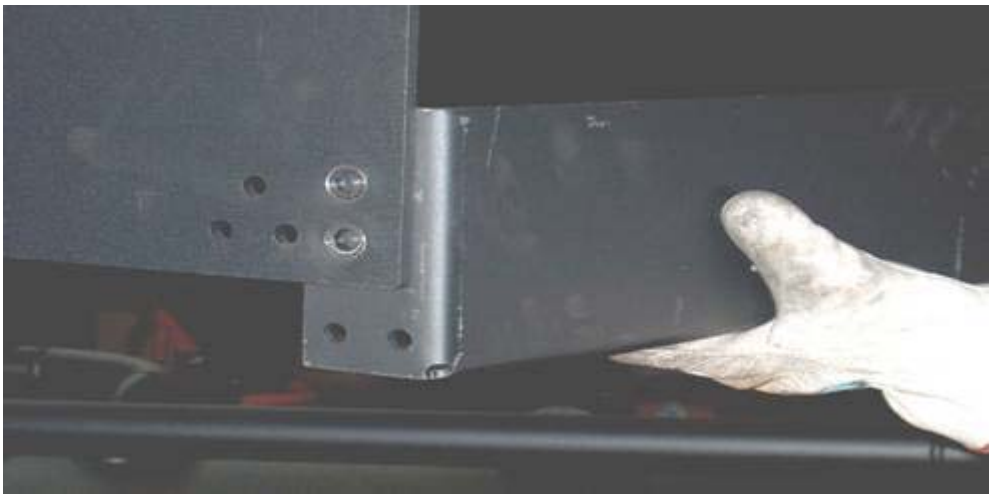
(NOTE: This assembly instruction relates to Ansty Dual Boilers only. For Ansty Single installations ignore this Section and move straight to Section 10.2, Casing Assembly Instructions)

10.1.1 - Check that the following items have been delivered in the quantities stated;

2 x Single Boiler Units
2 x Casing Assembly boxes (standard kit for the upper boiler and special kit for the lower boiler)
2 x Control Panels
2 x Burners
1 x Pipework and Bracket Kit

10.1.2 - Select one of the boilers to form the lower section (both modules are identical, so either can be used). Remove from pallet and locate in desired position within plant room.

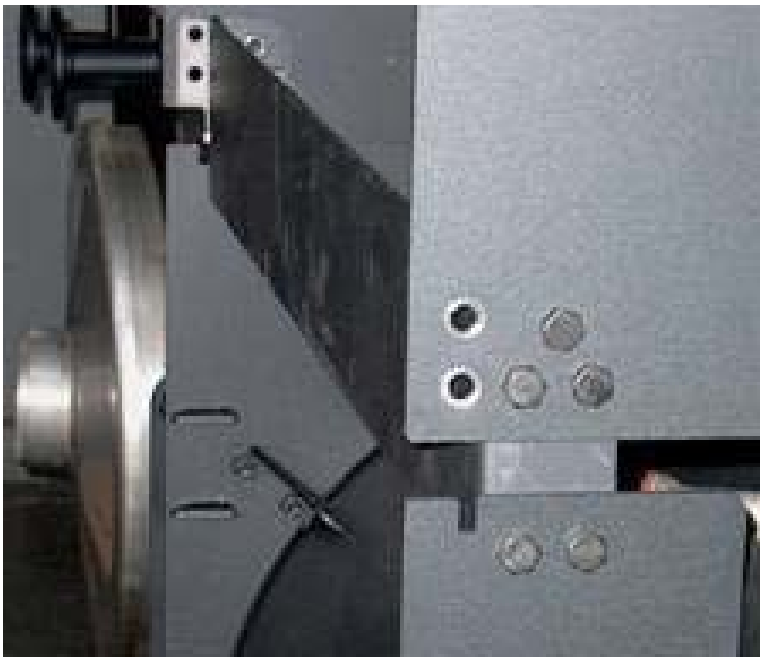
10.1.3 - Using a suitably rated hoist and frame elevate the upper boiler slightly from the delivery pallet.



10.1.4 - Remove from the upper boiler the existing bracing bracket on the lower left and right hand sides. These brackets travel front to rear of the boiler on either side as indicated in Figure 10.1.4.

10.1.5 - From the pipework kit locate the replacement brackets, nuts and bolts for fitting to the upper boiler.

10.1.6 - Fit to the boiler both left and right hand brackets ensuring the three bolts at either end are **not** fully tightened to allow for movement when locating to the lower boiler.



10.1.7. - Using the suitably rated hoist and frame elevate and locate the upper boiler above the lower boiler. Lower the upper boiler into position.

10.1.8 - Align the bolt holes as shown and bolt through. When all four corners have been positioned and the bolts fitted, fully tighten the bolts on both the upper and lower boilers. The upper boiler should now be securely fitted as shown in Figure 10.1.8

10.1.9 - Ansty AD540 and AD640 Models only. To fill gap between upper and lower boilers fit rear junction plate as indicated in figure 10.1.9.

IMPORTANT NOTE: THIS JUNCTION PLATE IS ONLY SUPPLIED WITH TYPE 5 ANSTY BOILERS (Ansty AD540 & AD 640 MODELS). For all other models this instruction should be ignored.

10.1.10 - When correctly located the upper and lower boiler front plates should touch. However, the rear plates should have a small gap to ensure the correct slope of the boilers is maintained.

10.1.11 - Once the two boilers are securely fastened together the hoist may be released and the casings, burners, controls and pipework fitted.

10.2 CASING ASSEMBLY

Unpack casing parts and insulation jacket from cardboard packaging. Care must be taken not to lose packet of fixings which is attached to polythene dust cover.

10.2.1 Boiler Shell Insulation

Wrap the fibre glass insulation jacket (A) around the boiler shell locating the holes in the jacket about the uppermost fittings and wrapping it around the boiler, fastening it at the bottom with the spring clip supplied (Spring clip located in polythene bag in control panel packaging). See Fig 10.2.1

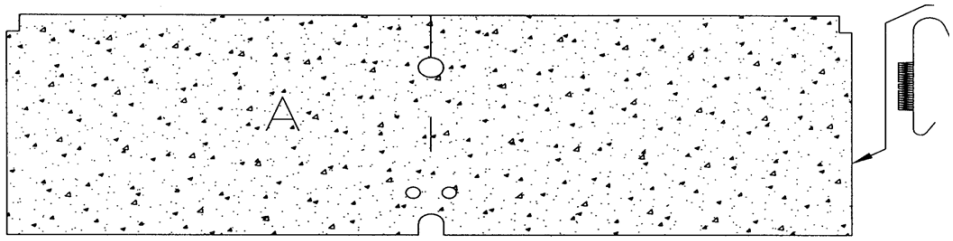
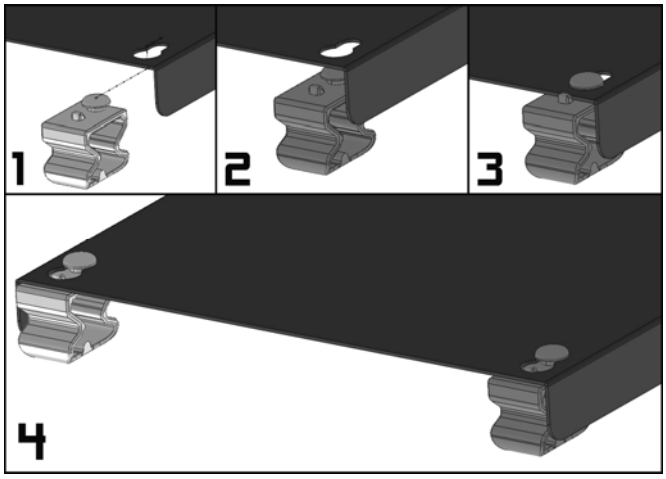


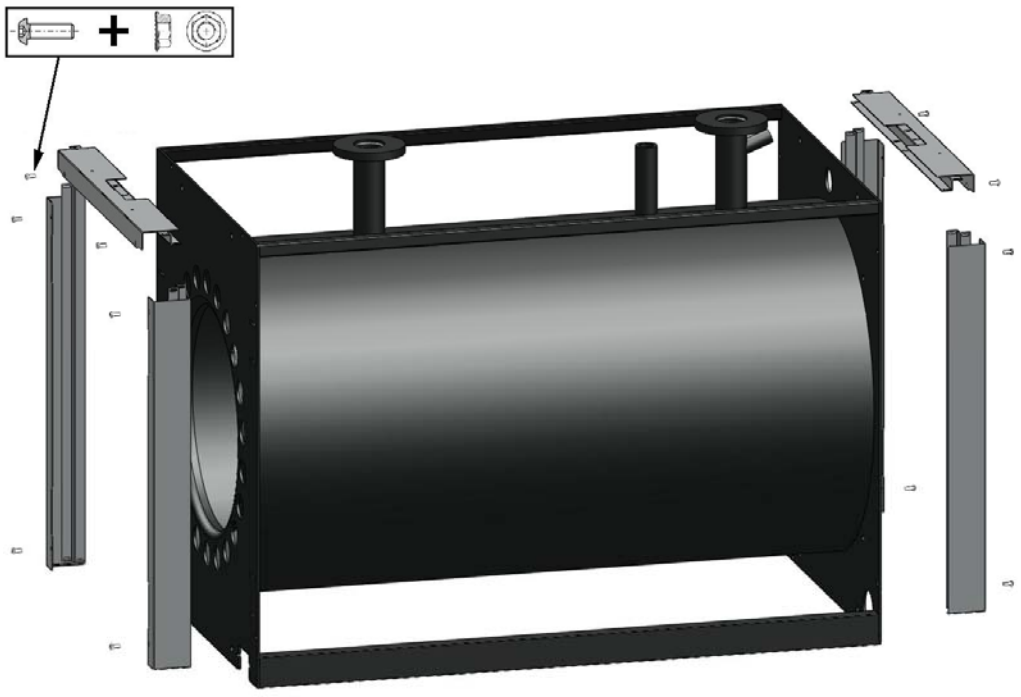
Figure 10.2.1 - Insulation Jacket in Flat Pattern.

10.2.2 Assembly of the Staves casing

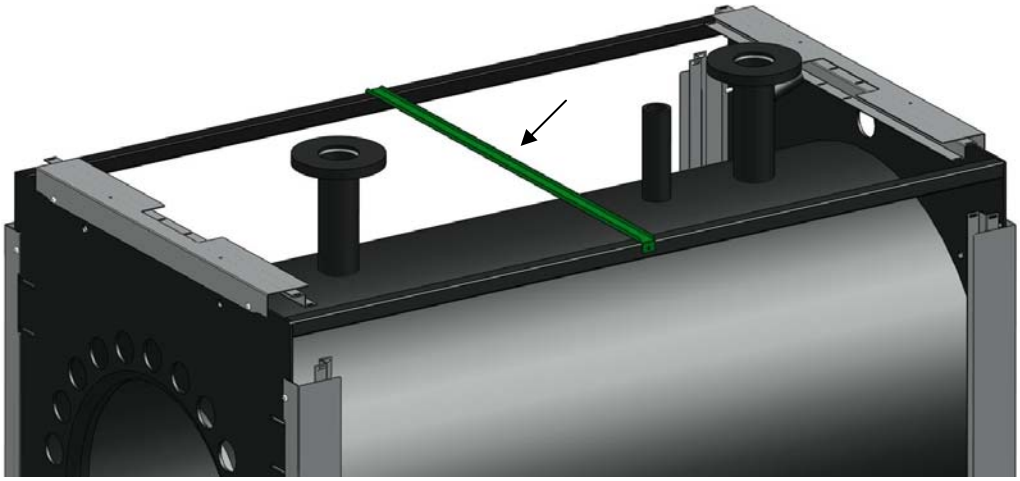
1) Prepare the staves by inserting the four stoppers, as shown in fig. 10.2.2



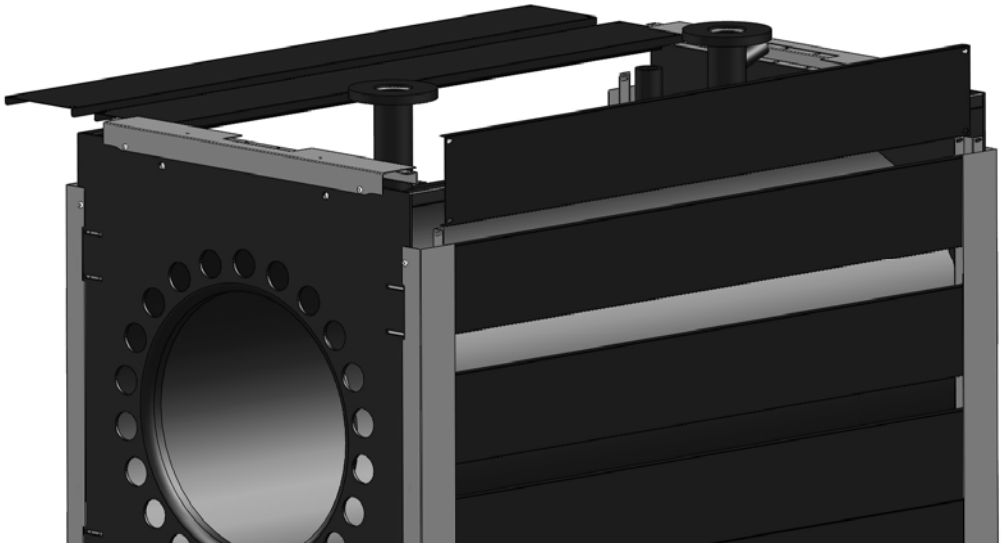
2) Fasten the uprights and the beams to the plates by means of appropriate screws and nuts.



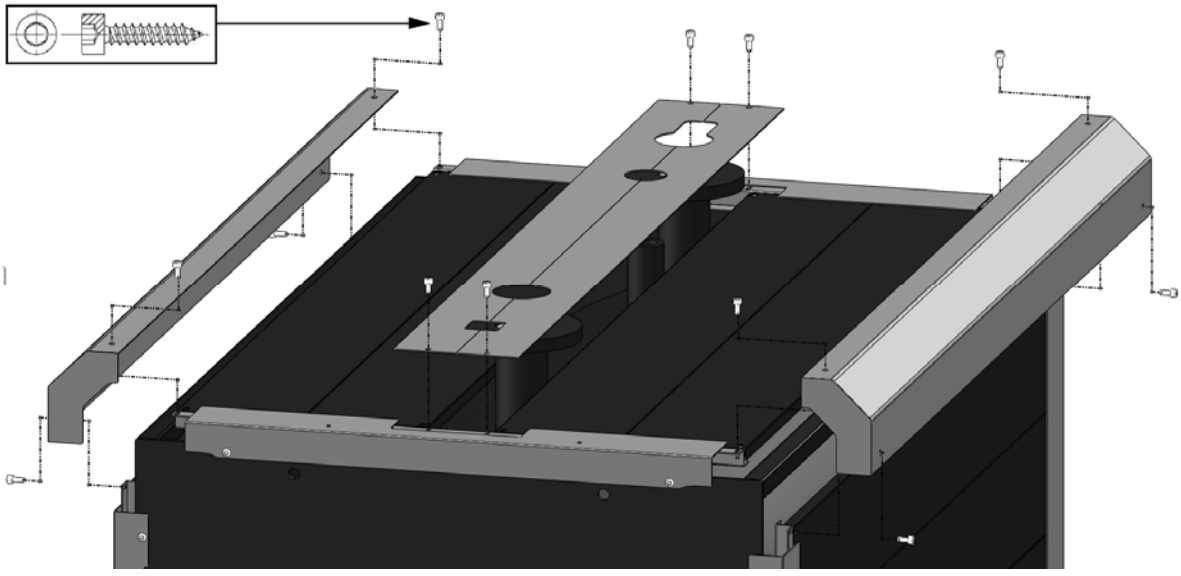
NOTE : the beam shown in fig , if supplied in the package, must be placed between the two tube panels in order to support the staves.



3) Insert the staves, with the previously installed stoppers, between the uprights and the beams, as shown in fig 10.2.3

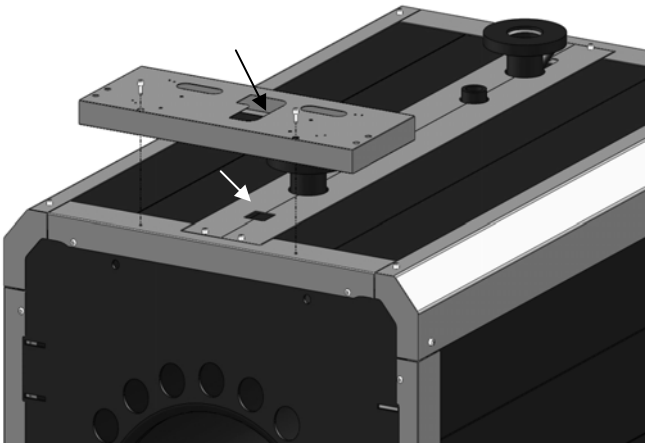


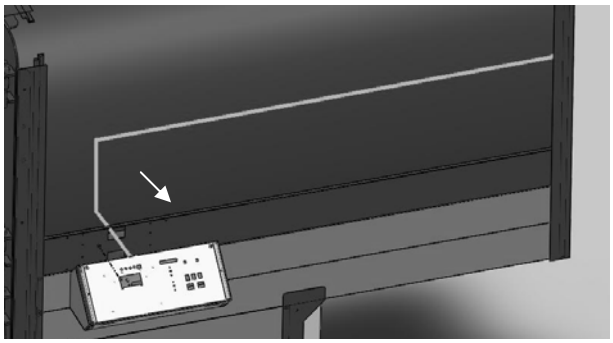
4) After all of the staves have been inserted, install the closing frame using the self-locking screws.
NOTE: If the boiler has upper connections it is necessary to install the special central covers, as shown in fig 10.2.4. If this is not the case, completely cover the upper part with staves and close the boiler with the side frames.



Control Panel Installation:

The control panel supplied with the boiler must be installed on the special support supplied in the kit, which must be fastened to the boiler front beam. Pass the cables through the loopholes within the structure (see fig 10.2.5).





NOTE: if the panel supporting stave is included in the kit (containing the screw holes and the capillary eyelets) it is recommended that you use it to facilitate adjustment; in this case the panel can be installed both on the left-hand and the right-hand side of the wall.

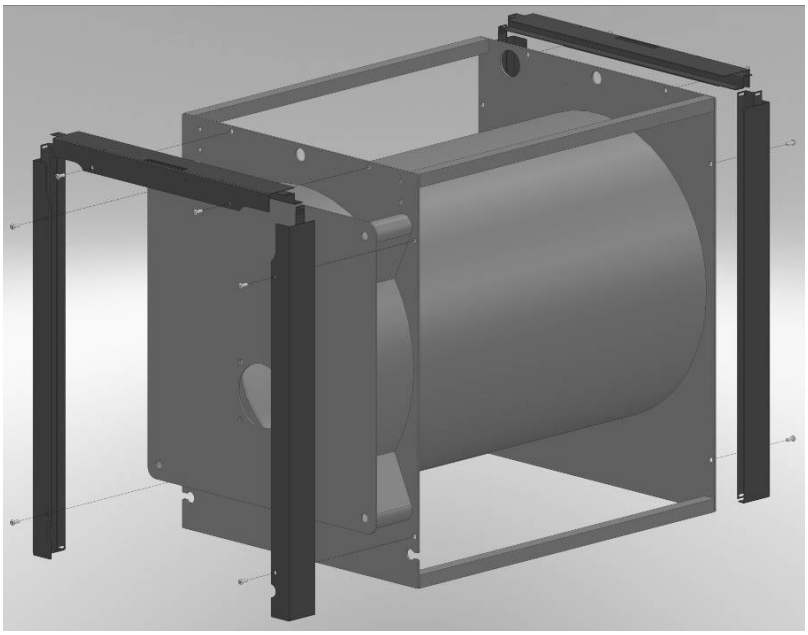
Stacked Boilers:

For stacked boilers, 2 kits are supplied: the standard kit for the upper boiler and a special kit for the lower boiler. The main difference is the control panel support stave is to be mounted where preferred and the two closing frames supplied in lieu of the upper staves which are not applicable.

Boilers with rear connections :

For boilers with rear connections it is necessary to cover the top of the boiler with the staves and then close with the side frames as follows :-

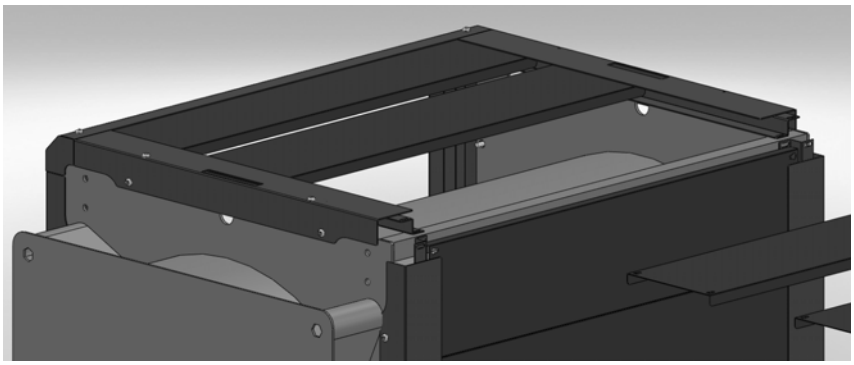
1) Fix the vertical and transversal frames to the tube plates using the supplied screws and nuts.



2) Pass the wires of the bulbs of the control panel through the panel support and then through the cut-out on the front transversal frame.

3) Fix the control panel support to the front transversal frame using suitable bolts.
NOTE: to avoid deformation of the transversal frame, it is recommended to fix the control panel only after the upper staves have been fitted.

4) Insert the staves, with the previously installed stoppers, between the uprights and the beams, as shown in fig 10.2.6 .
NOTE: the picture does not show the control panel support frame which is supposed to have been already fitted at this stage.



5) After all staves have been fitted, fix the closing frames by self-threading screws.

6) If not previously fitted, fit the control panel to its support frame with the screws supplied with the control panel.

10.2.3 ANSTY DUAL THERMOSTAT BULBS.

For Ansty Dual boilers, the position of the boiler control panels should be located on the side of the boiler rather than on the top.

The Bulbs should be positioned as shown in Figure 10.2.7
Key: **N6** Bulb wells - **TR1** and **TR2** are bulbs for boilers regulation - **TS1** 1st boiler safety thermostat - **TS2** 2nd boiler safety thermostat – **TMC** boilers thermometers.

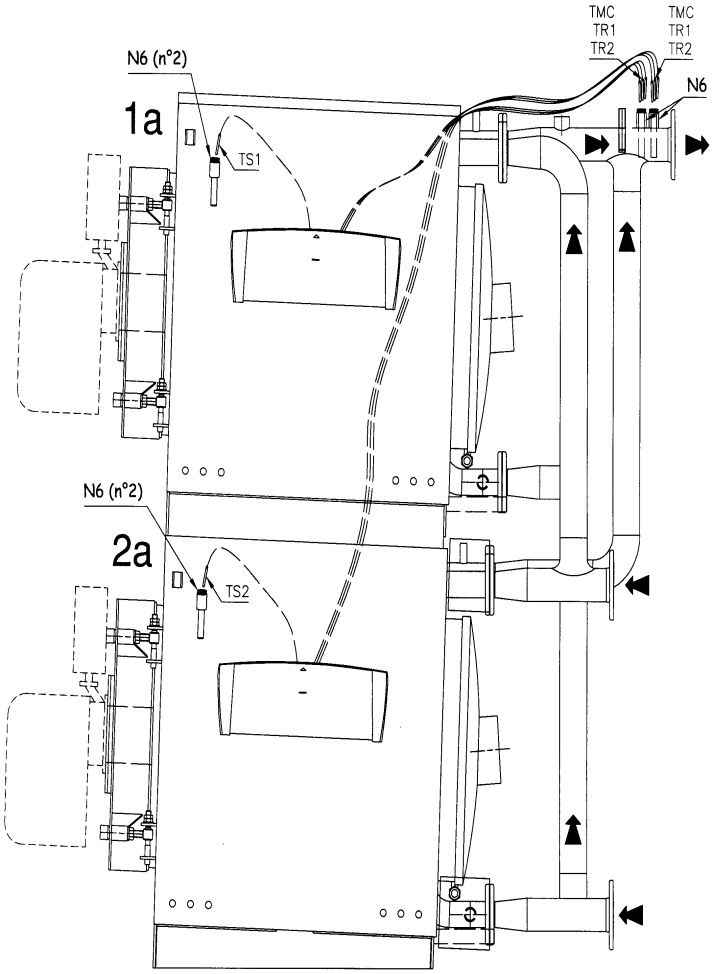
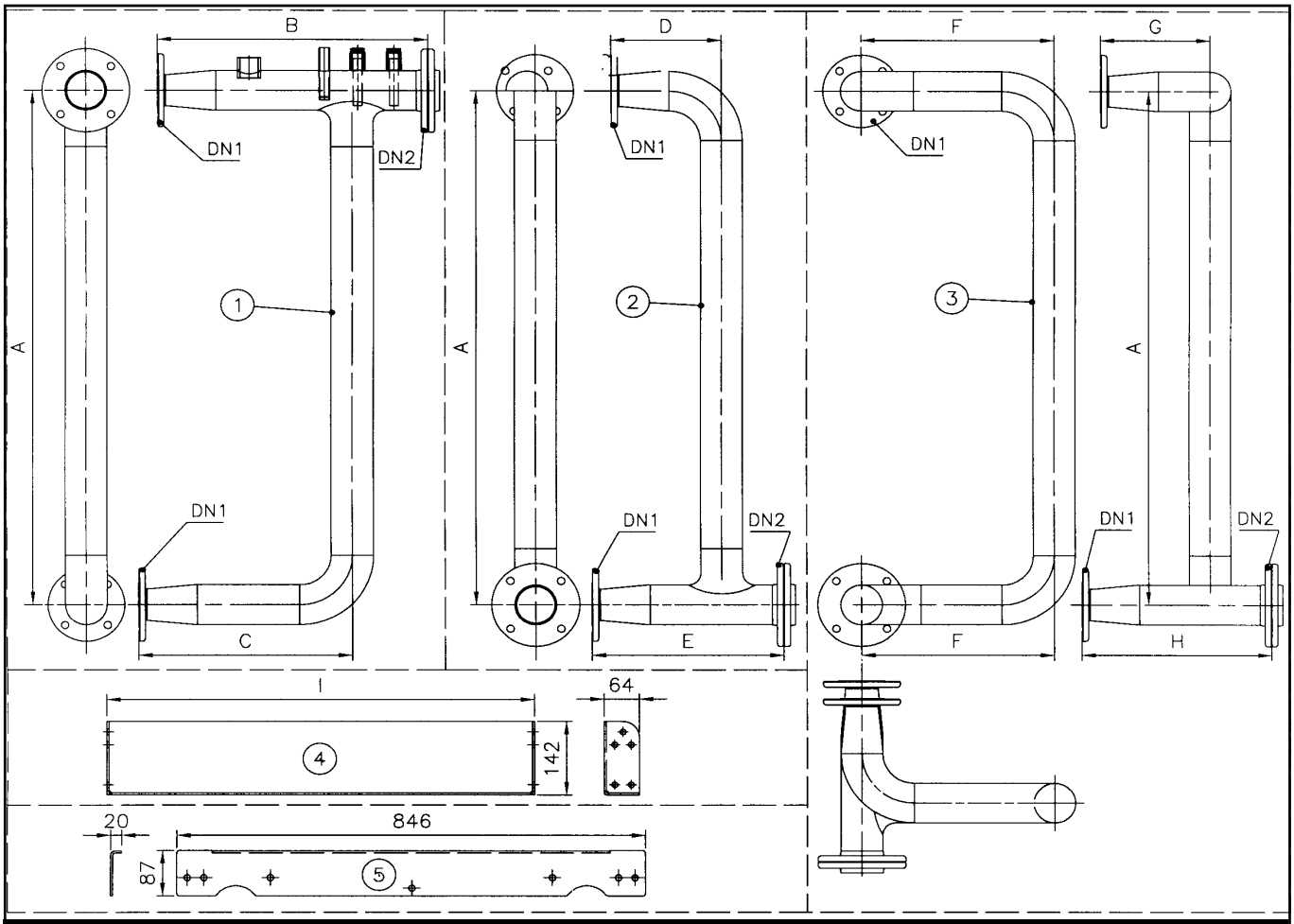


Figure 10.2.7 - Ansty Dual Assembled

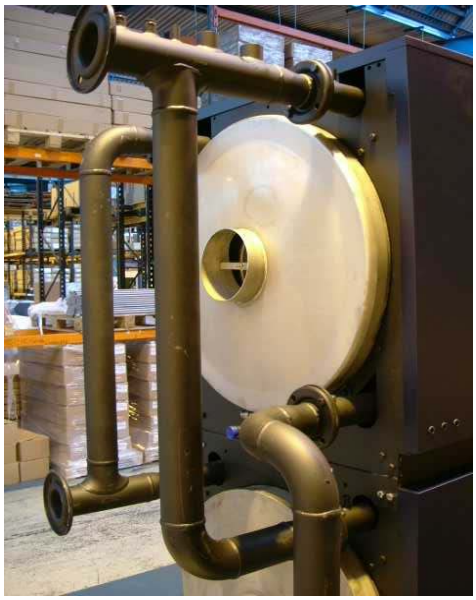
Figure 10.3 PIPEWORK KITS (Ansty Dual Only)



Dimension	A	B	C	D	E	F	G	H	I	DN1	DN2
573405612 TYPE 2 KIT	989	487	385	201	349	350	201	349	772	50	65
573405613 TYPE 3 KIT	1090	487	388	201	355	350	201	355	772	50	65
573405614 TYPE 4 KIT	1090	555	421	228	382	375	227	382	1027	50	80
573405615 TYPE 5 KIT	1090	548	397	234	392	237	234	392	1027	65	80

Item	Description	573405612	573405613	573405614	573405615
1	Flow Header	1	1	1	1
2	Cold Return Header	1	1	1	1
3	Warm Return Header	1	1	1	1
4	Junction Longitudinal Member	2	2	2	2
5	Rear Junction	-	-	-	1
6	Screw M10 x 30	12	12	12	12
7	Washer M10	32	32	32	32
8	Nut M10	20	20	20	20
9	Screw M12 x 45	24	24	12	12
10	Nut M12	24	24	12	12
11	Bolt M16 x 60	-	-	12	12
12	Flange DN 65 PN 6	3	3	-	-
13	Gasket 115 x 76 x 3	3	3	-	-
14	Flange DN 80 PN 6	-	-	3	3
15	Gasket 133 x 90 x 3	-	-	3	3
16	Base 75 x 3	1	1	-	-
17	Base 89 x 4	-	-	1	1

10.3.1 - A box of fixings and gaskets for the pipework assembly kit can be found in the furnace of each boiler. Using nuts and bolts from this box, attach Cold Return Header (item 2 on list, see page 15) to pipe fittings on left hand side of boiler looking from the rear as shown in figure 10.3.1, ensuring that correctly sized gaskets are in place.



10.3.2 - Using nuts and bolts supplied fit Flow Header (Item 1 on list, see page 15) as shown in figure 10.3.2, ensuring that correctly sized gaskets are in place.

10.3.3 - Using nuts and bolts supplied fit Warm Return Header (Item 3 on list, see page 15) as shown in figure 10.3.3, ensuring that correctly sized gaskets are in place.

10.4 Control Panel (Refer to Fig. 10.4.1 & 10.4.2)

The Control Panel supplied with the boiler is made from self-extinguishing plastic and houses the regulation and safety instruments, see Figure 10.4.1

By loosening the two screws in the top of the control panel the upper part of the control panel can be hinged down to gain access to the terminal board and uncoil the thermostat and thermometer capillaries. A copy of the wiring diagram (reproduced on page 18, Figure 10.4.2) is contained inside the control panel.

The Control Thermostats (TR1-TR2) have an operating range of 0°C to 100°C and can be set by the user by means of the front dial.

Safety Limit Thermostat (TS) has a fixed setting of 110° C (+0/-6)°C and can be manually reset.

The burner cables, loosely fed through the casing knockout at an earlier stage of assembly, can now be wired, carefully following the instructions given on the wiring diagram, see Figure 10.4.2.

10.5 CONTROL, ANSTY DUAL

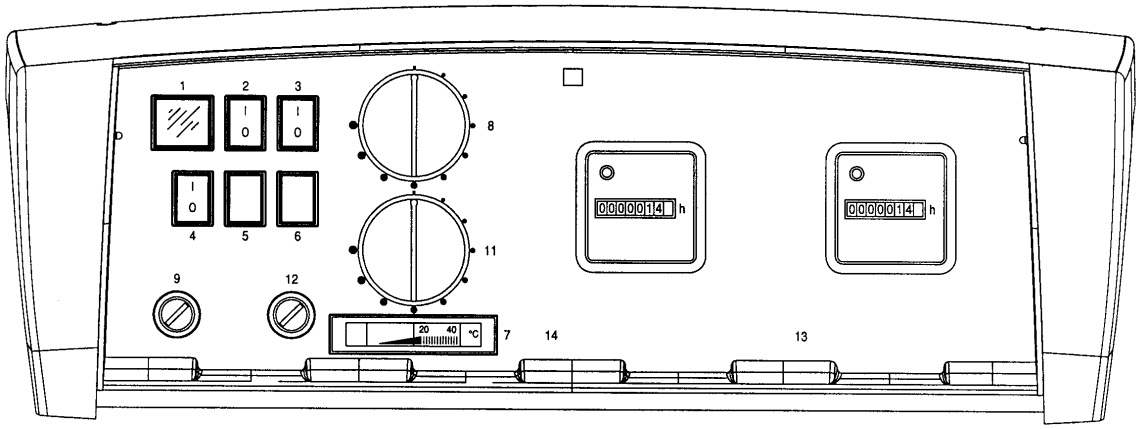
The Ansty Dual System comprises 2 boilers of the same capacity with individual control panels for each unit. Temperature control is achieved via thermostat sensors in the common pipework flow manifold. Each unit can work independently and operate at high and low fire.

Depending on the type of burner fitted, the control panel will provide a flying lead terminating in a four pin plug for connection to a high/low burner.

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.

NOTE: - All cables must exit the boiler casing via the cut out in the bottom right hand edge of the upper front door and must not be routed adjacent to the burner mounting plate.

THE CABLES MUST NOT BE ROUTED ACROSS THE BURNER OR ITS MOUNTING PLATE.



LEGEND

1 PANEL LIVE
2 BURNER SWITCH N. 1
4 HEATING PUMP SWITCH
7 BOILER THERMOMETER
8 BOILER CONTROL THERMOSTAT
9 SAFETY LIMIT THERMOSTAT
11 BURNER HIGH / LOW FLAME THERMOSTAT
12 LIMIT THERMOSTAT TRIP INDICATOR
13 1st STAGE HOURS RUN METER
14 2nd STAGE HOURS RUN METER

Figure 10.4.1 - Ansty Control Panel

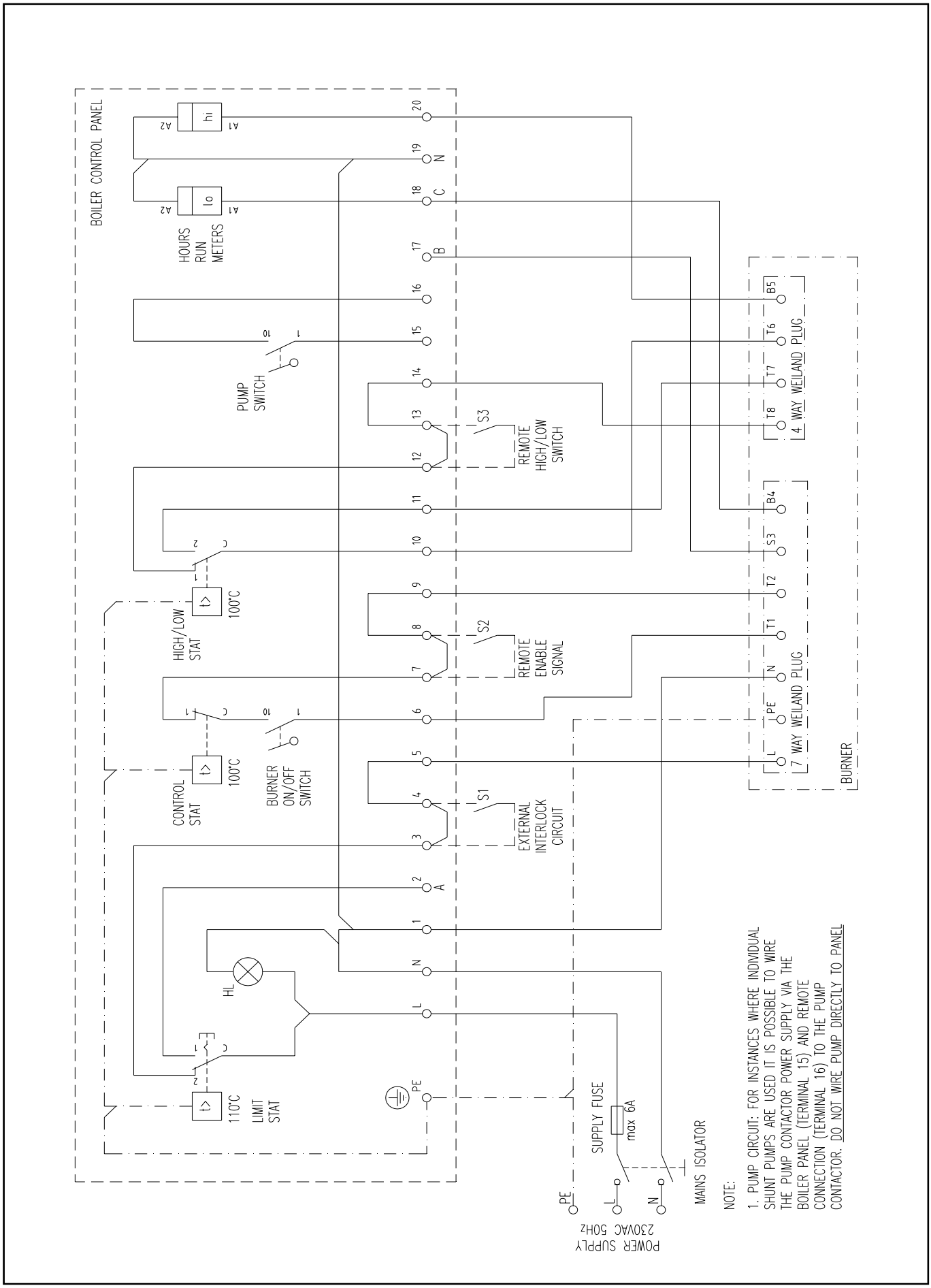


Figure 10.4.2 - Boiler Wiring Diagram

10.6 BURNER CONNECTION

Before installation you are advised to thoroughly clean the inside of all the fuel supply system pipes in order to remove any foreign matter that could affect correct operation of the boiler. See technical specification tables and check the max pressure value inside the furnace.

a) Check the internal and external seal of the gas supply system;
b) Regulate the gas flow according to the power required by the boiler;
c) Check that the boiler is fired by the correct type of fuel;
d) Check that the supply pressure is within the values specified on the burner rating plate;
e) Check that the supply system is sized for the maximum flow rate necessary for the boiler and that it is provided with all control and safety devices provided for by the regulations referred to above;
f) Check that the boiler room vents are sized in order to guarantee the air flow established by the regulations referred to above and that they are in any case sufficient to obtain perfect combustion.

In particular,

g) Check that the feeding line and the gas train comply with the regulations in force;
h) Check that all the gas connections are sealed;
i) Check that the gas pipes are not used as earth connections for electrical appliances.

If the boiler is not going to be used for some time, close the fuel supply cock or cocks.

IMPORTANT: Check that the air gaps between the burner draught tube and the boiler door are suitably filled with thermo-insulating material (see Fig. 10.6.1). The boiler is supplied with a piece of ceramic rope, should this not suit the burner used, use a braid of different diameter but same material.

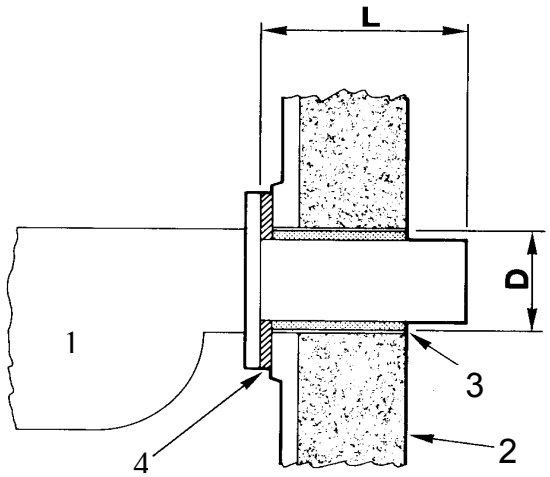


Fig. 10.6.1 - Burner Details

KEY:
1. Burner
2. Boiler door
3. Ceramic fibre material
4. Flange

BOILER MODEL	L – Blast tube length (in mm)	D – Burner hole diameter (in mm)
ANSTY A75 ANSTY DUAL AD150	170-180	130
ANSTY A90 ANSTY DUAL AD180	150 - 250	130
ANSTY A120 ANSTY DUAL AD240	170 - 250	130
ANSTY A160 ANSTY DUAL AD320	267-282	145
ANSTY A220 ANSTY DUAL AD440	267-282	145
ANSTY A270 ANSTY DUAL AD540	216	180
ANSTY A320 ANSTY AD640	216	180

Figure 10.6.2 - Matched Burner/Boiler Combinations (Natural Gas)

BOILER MODEL	BURNER DETAILS			BOILER DETAILS					COMBUSTION CHAMBER DETAILS		
	MAKE	MODEL	MODE	NOMINAL HEAT INPUTS/OUTPUTS					DIMENSIONS		
				HEAT OUTPUT	HIGH FIRE HEAT INPUT (NETT)		MINIMUM HEAT INPUT BELOW WHICH A BURNER MUST NOT OPERATE (NETT)		DIAMETER	LENGTH	BLAST TUBE PENETRATION REFER TO DIM. L FIGURE 10.7.1
				(kW)	(kW)	GAS RATE m^3/hr	(kW)	GAS RATE m^3/hr	(mm)	(mm)	(mm)
A75	RIELLO	R40GS10D R40GS10/M	HI/LO MODULATING	75	69.8	7.38	35	3.7	400	735	170-180
A90	RIELLO	R40GS20D R40GS10/M	HI/LO MODULATING	90	83.7	8.86	35	3.7	400	735	170-180
A120	RIELLO RIELLO	R40GS20D R40GS20/M	HI/LO MODULATING	120	112.2	11.87	65 48	6.9 5	400	735	267-282 267-282
A160	RIELLO RIELLO	R40GS20D R40GS20/M	HI/LO MODULATING	160	149.5	15.82	65 48	6.9 5	500	735	267-282 267-282
A220	RIELLO RIELLO	RS34MZ RS34/MMZ	HI/LO MODULATING	220	204.7	21.66	81 52	8.6 5.5	480	990	216 216
A270	RIELLO RIELLO	RS34MZ RS34/MMZ	HI/LO MODULATING	270	251.2	26.58	81 52	8.6 5.5	550	990	216 216
A320	RIELLO RIELLO	RS34MZ RS34/MMZ	HI/LO MODULATING	320	299.1	31.65	81 70	8.6 7.4	550	990	216 216

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

Heat input values quoted above are based on Natural Gas (G20) with a net CV of 34.06 MJ/m^3 @ 1013mbar and 15^0C.

Figure 10.6.2 – Matched Burner Boiler Combinations (Natural Gas)

11.0 COMMISSIONING AND TESTING

11.1 Electrical Installation

Wiring **MUST** be checked by a suitably competent person. An isolator correctly fused should be sited close to the boiler. Refer to the burner instructions.

It should be noted that if a 3 phase supply is required, it should be wired direct to the burner and a separate 230V 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 **IGE/UP/1** or **IGE/UP/1A** as appropriate.

11.3 Water Circulation System

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

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

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

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

11.4 Commissioning The Boiler

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

1) 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 3.3 and Figure 3.4
5) The gas supply pipework is clear of any loose matter, tested for soundness and purged to **IGE/UP/1** or **IGE/UP/1A** as appropriate.

11.4.1 Boiler Checks Prior To Lighting

BEFORE starting the boiler, check the following:

a. Check that fuel supply is turned off.
b. Check that electrical supply is isolated
c. Check that electrical installation conforms to the requirements of these instructions, the IEE Wiring Regulations for electrical installations, and any other local regulations which apply.
d. Check boiler shell is undamaged from transportation.
e. Check all thermostat bulbs are correctly inserted in the appropriate pocket.
f. Check for water leaks and ensure that both boiler and heating system is full of water and properly vented.
g. Check that all drain cocks are closed, and that all isolating valves in flow and return pipework are open.
h. Check soundness of gas installation and that pipework is purged of air, as detailed in I of E Publications IGE/UP/1 or IGE/UP/1A respectively. Check that gas meter is operational and has been checked by the local region of British Gas. Check that gas meter and supply is of sufficient size to meet the input rating of the burner / boiler. Refer to Figure 10.6.2.
i. Check that the burner output is correct for size of boiler in question, referring to Figure 10.6.2 and the manufacturer's technical information supplied with the burner.

Note: -
Refer to the commissioning procedure in the burner manufacturer's 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 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 supplied with the burner.
f. Determine minimum burner gas pressure which corresponds to required burner output (boiler input), as follows: 1) From the manufacturer's technical information (supplied with the burner) take burner pressure corresponding to required burner output. 2) Add combustion resistance (in mbar), given in Figure 3.3 and 3.4 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 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 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, gas flue temperature, and circulating water temperature rise across the boiler. The readings obtained for the appropriate gas should be as indicated in figure B1.2, Target Appliance Readings, which should be taken at both High and Low Settings.
o. After all other adjustments have been made, set burner air pressure switch as instructed in burner 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 safety features.

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

11.5 External Controls

The external controls used in typical boiler installations, for both vented and unvented systems, are shown in Figure B1.1. If different systems or controls are to be used and there are any doubts as to the suitability, contact Hamworthy Heating Technical Department for advice.

11.6 Installation Noise

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

11.7 User Instructions

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

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 **Appendix A.**

The boiler should be serviced at regular intervals, not exceeding 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 or unusual noise from burner 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 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 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 at 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. With the burner door hinged open the combustion chamber and fire tubes are accessible. Carefully remove all turbulators from the fire tubes.
b. Using a suitably sized brush, clean each fire tube straight through to the flue connector box.
c. Remove the cleaning door at the bottom of the flue connector box and clean out deposits with brush and vacuum cleaner.
d. Brush and vacuum combustion chamber.
e. Replace cleaning door ensuring it is correctly sealed.
f. Replace all turbulators in fire tubes, long sections first followed by short sections at front of boiler.
g. Close door and tighten. Replace seal if necessary.
h. Refit burner if necessary. Reconnect fuel and electrical supplies.
i. Turn on fuel supply and check for soundness of fuel supply pipework.
j. Check all flue joints for integrity.
k. Check ventilation ducts / grilles to boiler room and ensure they are clean.
l. Re-commission boiler as detailed in relevant parts of Section 11.0. Commissioning.

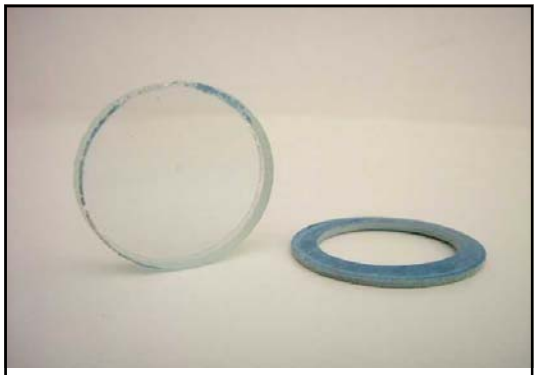
14.0 REPLACEMENT OF PARTS

There are a number of components listed on next page 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 manufacturer's instructions.

14.1 - Replacement Parts / Recommended Spares



1. Sight Glass - HHL Pt No. 573405602
2. Gasket - HHL Pt No. 573405603

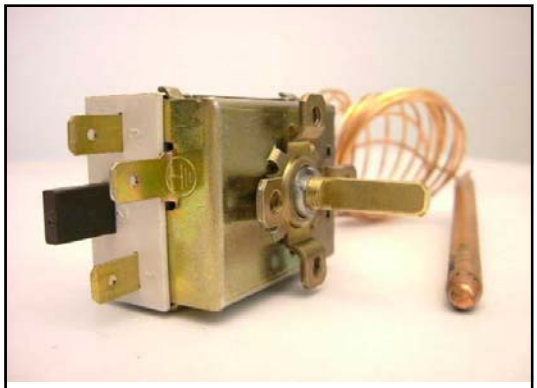
7. Thermometer & Temp. Gauge
HHL Pt No. 573405608

3. Ceramic Insulation* - HHL Pt No. 573405604
4. Ceramic Insulation** - HHL Pt No. 573405605

* For all Ansty Models except A270, A320, AD540 and AD640

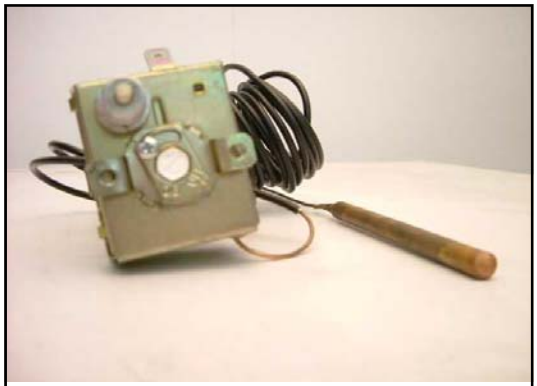
** For Ansty Models A270, A320, AD540 and AD640 only

8. Burner / Pump On/Off Switch
HHL Pt No. 573405609

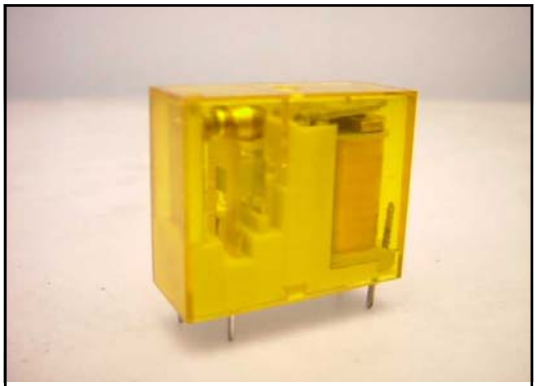


5. Control Thermostat - HHL Pt No. 573405606

9. Rope Seal for Boiler Door - HHL 573405610
10. Flue Collector Seal - HHL Pt No. 573405611



6. Limit Thermostat - HHL Pt No. 573405607



11. Relay - HHL Pt No. 533901204

APPENDIX A - GENERAL REQUIREMENTS

A1.1 Related Documents.

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

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

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

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

British Standards

BS.5854 - Code of practice for flues and flue structures in buildings. See para 5 (3.6).
BS.6644 - Specification for installation of gas fired hot water boilers of rated inputs between 60kW and 2MW.
BS.6700 - Design, Installation, testing and maintenance of services supplying water for domestic use.
BS.6880 - Code of practice for low temperature hot water heating systems of output greater than 45kW.
Part 1: Fundamentals & design considerations.
Part 2: Selection of equipment.
Part 3: Installation, commissioning & Maintenance.
BS 7074: Application, selection and installation of expansion vessels and ancillary equipment for sealed water systems. **Part 2:** Code of practice for low and medium temperature hot water systems.
BS.CP342 - Code of practice for centralised hot water supply. **Part 2**: Buildings other than individual dwellings.

I. Gas E. Publications

IGE/UP/1 Soundness testing and purging of industrial and commercial gas installations.
IGE/UP/1A Soundness testing and direct purging of small low pressure industrial and commercial natural gas installations.
IGE/UP/2 Gas installation pipework, boosters and compressors in industrial and commercial premises.
IGE/UP/10 Installation of gas appliances in industrial and commercial premises.

Health and Safety Executive :-

Guidance note PM5 - Automatically controlled steam and hot water boilers.
CIBSE Publications:- "CIBSE Guide"
It is impractical in this document to specify all relevant information, but the following extracts from the above references are emphasised since failure to comply with these requirements will almost certainly result in an unsatisfactory installation.

A1.2 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).

A1.3 Water Treatment

If the boiler is to be installed in an existing system where there could be frequent losses from the system or if the hardness of the water is greater than 10 F, it will be necessary to use a filter and a softener for system water and control the pH above 8-9.

The most common reactions that occur in heating systems are:

a. Scaling

Scale obstructs heat transfer between the combustion gases and the water, causing an abnormal increase in the temperature of the metal and therefore reducing the life of the boiler.

Scale is found mostly at the points where the wall temperature is highest and the best remedy, at construction level, is to eliminate areas that overheat.

Scale creates an insulating layer, which reduces the thermal transfer of the boiler, affecting system efficiency. This means that the heat produced by burning the fuel is not fully transferred and is lost to the flue. See Fig A1.3

b. Corrosion on the Water Side

Corrosion of the metal surfaces of the boiler on the water-side is due to the passage of dissolved iron through its ions (Fe+). In this process the presence of dissolved gases and in particular of oxygen and carbon dioxide is very important. Corrosion often occurs with softened or de-mineralised water, which has a more aggressive effect on iron (acid water with Ph <7): in these cases, although the system is protected from scaling, it is not protected against corrosion and the water must be treated with corrosion inhibitors.

A1.4 Adequate Water Flow

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

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

If the temperature/flow rates of the application cannot meet those given in Figures 3.3 & 3.4 it may be necessary to incorporate mixing valves and shunt pumps to ensure that the boiler will operate satisfactorily. Figure 3.3 & 3.4 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.

A1.5 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 Figures 10.4.2 for wiring details.

A1.6 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 8.0**
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 8.0** for Pressurised Water Systems.

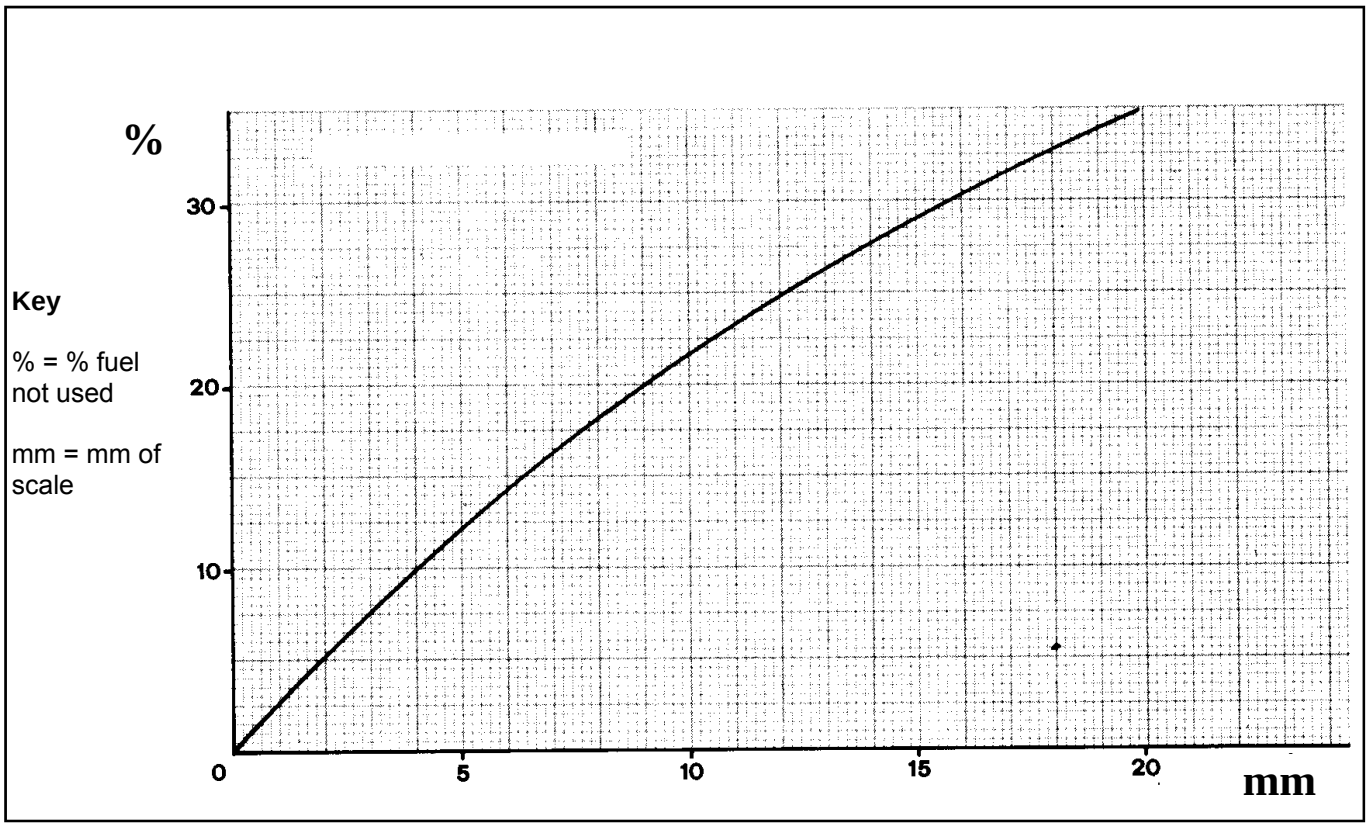


Figure A1.3 - Scale Deposition Chart

APPENDIX B - OPTIONAL EXTRAS

System Temperatures

Each Ansty boiler is equipped with two return connections to maximise the condensing performance of the system. The normal (higher) temperature connection is to suit typical 60/80^{O}C circuits which would supply fixed temperature fan coil units or calorifiers for hot water (DHW) production. The condensing (lower) temperature connection, typically 50/30^{O}C, allows the low return water temperatures to be maintained without the dilution effect of the fixed temperature circuits. The installation of Ansty condensing boilers in commercial heating and hot water systems offers a wide choice of design options and applications. The systems shown here are typical and should be considered for general guidance only.

Example 1

Typical boiler installation comprising constant temperature domestic hot water and variable temperature radiator circuits. Flow rate returning from the calorifier to the high temperature return should equate to the boiler minimum flow rate. Flow rate returning from the compensated radiator circuit may be reduced to zero due to the water mass of the boiler.

Example 2

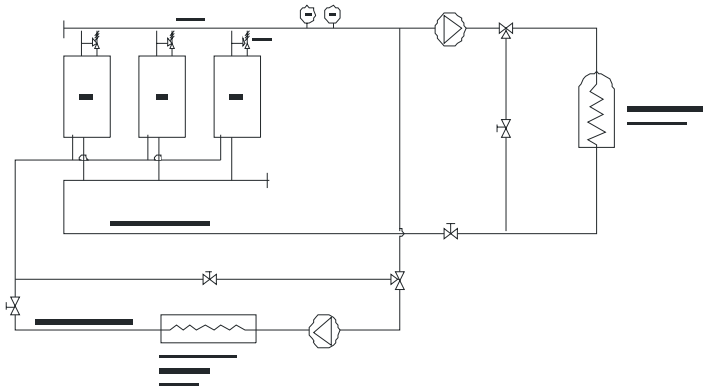
Typical boiler installation comprising constant temperature air handling units and variable temperature radiator circuits. Flow rate returning from the A.H.U. circuit to the high temperature return should equate to the boiler minimum flow rate. Flow rate returning from the compensated radiator circuit may be reduced to zero due to the water mass of the boiler.

Example 3

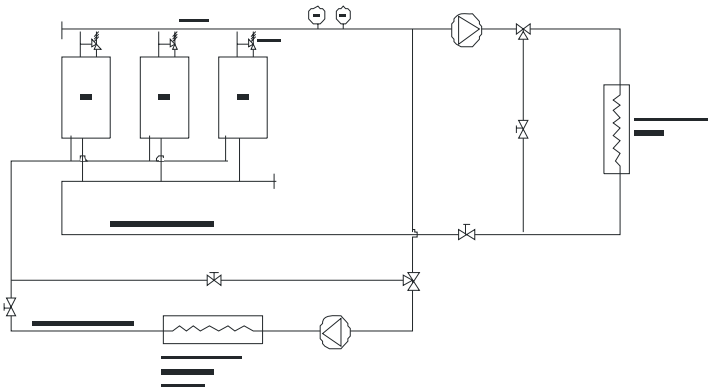
Typical boiler installation comprising variable temperature underfloor heating and variable radiator circuits. Flow rate returning from the compensated radiator circuit and underfloor heating circuit may be zero due to the water mass of the boiler. The high temperature return connections need to be blanked off.

Note: Due to its thermal mass, the Ansty boiler may fire with zero flow conditions. The boiler will switch off its temperature controls until either the boilers internal temperature drops or return water re-commences flow to the boiler.

Example 1 - Compensated Radiator Circuit, with Domestic Hot Water



Example 2 - Compensated Radiator Circuit, with Air Handling Units



Example 3 - Compensated Radiated Circuit, with Underfloor Heating

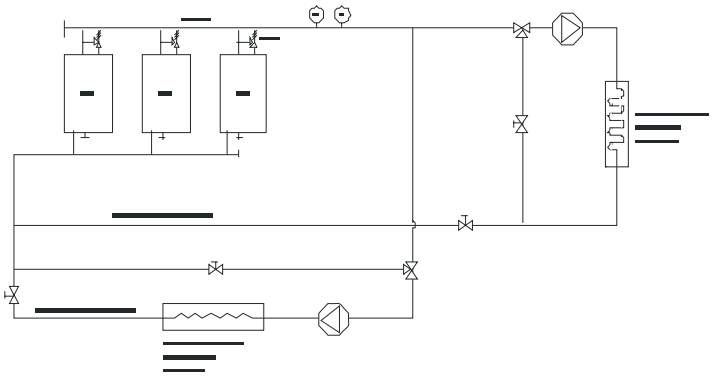


Figure B1.1 – Optional Systems

Fuel Type	BOILER MODEL	A75	A90	A120	A160	A220	A270	A320	A150	A180	A240	A320	A440	A540	A640
Natural Gas G20	CO_2 (DRY)	9 - 10%													
	CO	Less than 100 ppm (air free)													
	Flue Gas Temp Rise ^{O}C	225 ^{O}C													
	Temp Rise Across Boiler	Less than 20^{O}C													

Figure B1.2 – Target Appliance Readings.

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

NOTES

Notes

Hamworthy Heating Accredited Agents

Southern Ireland (Sales & Service)
HEVAC Limited
Naas Road, Dublin 12, Ireland
tel: **00 353 141 91919** fax: **00 353 145 84806**
email: **info@hevac.ie**

Northern Ireland (Sales & Service)
HVAC Supplies Limited
Unit A6, Dargan Court, Dargan Crescent, Belfast BT3 9JP
tel: **028 9077 7737**
email: **hvacsupplies@btconnect.com**

Scotland (Sales & Service)
McDowall Modular Services
2 Penson Road, Queenslie Industrial Estate, Glasgow, G33 4AG
tel: **0141 336 8795** fax: **0141 336 8954**
email:
MMS.McDowallModularServices@hamworthy-heating.com

North East England (Service)
Allison Heating Products
12 Sunnyside Lane, Cleadon Village, Sunderland SR6 7XB
tel: **0191 536 8833** fax: **0191 536 9933**
email: **allison.heating@gmail.com**

Hamworthy Heating Customer Service Centre

Sales
tel: **01202 662552**
email: **sales@hamworthy-heating.com**

Technical Enquiries
tel: **01202 662505**
email: **technical@hamworthy-heating.com**

Servicing
tel: **01202 662555**
email: **service@hamworthy-heating.com**

Spares
tel: **01202 662525**
email: **spares@hamworthy-heating.com**

British engineering excellence from Hamworthy Heating;
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Hamworthy

Customer Service Centre
Hamworthy Heating Limited,
Wessex House,
New Fields Business Park,
Stinsford Road,
Poole,
Dorset,
BH17 0NF

Telephone: **01202 662500**
Fax: **01202 662522**
Email: **service@hamworthy-heating.com**
Website: **www.hamworthy-heating.com**