

AGA HIGHLIGHT

B & O series

Gas-fired wall-hung
Boilers

WARNING

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AGAhi-light

B 50A, O 45A

Balanced and Open Flue Gas Boilers.

FOR THE INSTALLING ENGINEER

The AGA Hi-Light B50A is a balanced flue boiler, the AGA Hi-Light 045A being its open flue equivalent. Both are suitable for fully pumped open vent systems only.

These instructions cover the installation of both models; those sections which relate only to one model are headed accordingly.

IMPORTANT – PLEASE NOTE PARTICULARLY THE FOLLOWING POINTS:–

- (1) Remakeable joints **MUST** be provided in the hot water pipes immediately outside the boiler casing.
- (2) Whilst handling the boiler, avoid standing it on its gas controls.
- (3) Before firing, check that heat exchanger baffles and combustion chamber linings are correctly positioned.
- (4) A system by-pass is necessary.

INSTALLATION REQUIREMENTS

General

The installation of the boiler must be in accordance with the Gas Safety Regulations, Building Regulations, I.E.E. Regulations and the byelaws of the local Water Undertaking. It should be in accordance also with B.S. Codes of Practice CP 331:3, BS 5376:2, CP 342:1, BS 5449:1 (small bore and micro bore systems), BS 5440:1* and BS 5440:2, and any relevant requirements of the local Gas Region and Local Authority.

*In course of preparation as a revision of CP 337.

Location

The position chosen for the boiler should permit the provision of a satisfactory flue and an adequate air supply. It should also provide adequate space for servicing and air circulation.

A cupboard or compartment used to enclose the boiler must be designed and constructed specifically for this purpose. An existing cupboard or compartment may be used provided that it is modified for the purpose. Details of the essential features of compartment design are given in BS 5376:2.

Balanced Flue Model (B50A)

Balanced Flue boilers may be installed in any room although particular attention is drawn to the requirements of the I.E.E. Regulations with respect to bathroom installations.

Open Flue Model (045A)

Open-flued boilers must not be installed in a bathroom, bedroom or bed-sitting room.

FLUES

Detailed recommendations for flueing are given in CP 337. The following notes are intended to give general guidance only.

Balanced Flue Model (B50A)

The Balanced Flue terminal of the AGA Hi-Light B50A boiler is illustrated in Fig. 1. A hole through the external room wall 280 mm (11") wide x 225 mm (8 7/8") is required. The boiler must be installed so that the flue terminal discharges directly into the external air.

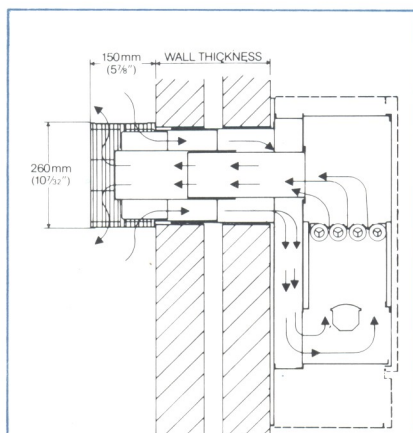


Fig. 1. Section through Balanced Flue Terminal showing airflow through boiler.

Termination should be on a clear expanse of wall; the terminal being preferably not less than 600 mm (2 ft) from a corner, recess or projection.

DO NOT install the terminal:–

- (i) Within 300 mm (1 ft), measured vertically, from the bottom of an openable window, air vent or any other ventilation opening.
- (ii) Less than 300 mm (1 ft) from ground level.

- (iii) Less than 600 mm (2 ft) from any surface facing the terminal.
- (iv) Immediately beneath eaves or a balcony.
- (v) So that air/inlet products outlet duct and terminal of the boiler are within 50 mm (2") of combustible material.

Detailed recommendations on protection of combustible material are given in BS 5440:1.

Terminal Guard

Where the terminal is less than 2 m (6.6 ft) above the level of any ground, balcony, flat roof or place to which people have access, the terminal must be protected by a guard of suitable material.

Terminal guards of approved design are available either from AGA WORKS or direct from the manufacturers – QUINNELL, BARRETT & QUINNELL, 884 Old Kent Road, London SE15. Pattern Number, Type P7.

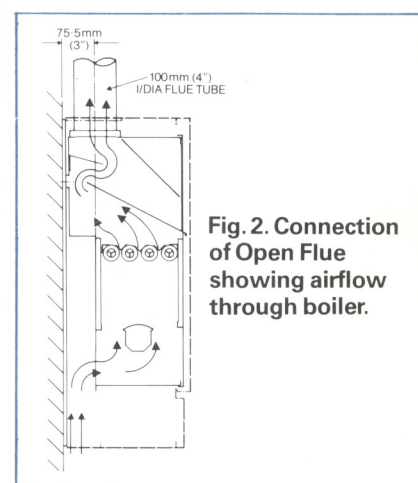


Fig. 2. Connection of Open Flue showing airflow through boiler.

Open Flue Model (see fig. 2)(045A)

The flue pipe must be 100 mm dia. (4 in) and fitted into the socket outlet of the integral draught diverter/flue connector. Vitreous lined cast iron, or steel or asbestos cement should form the initial connection to lined brick flues. BS Codes of Practice deal fully with the subject of satisfactory flueing of gas appliances and their recommendations are to be followed.

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INSTALLING ENGINEERS cont...

The following points are of particular importance:-

(i) The flue should be composed of or lined with, a non-porous acid-resisting material i.e. glazed earthenware pipe or any flue liner tested and found satisfactory by British Gas.

(ii) The flue should be adequate in cross section and its route to the terminal as direct as possible. Resistance in the form of change of direction should be kept to a minimum. Sharp bends and horizontal runs should be avoided wherever practicable but, if either is unavoidable, insulated or double walled pipe should be used, particularly if the flue is external.

(iii) The initial length of the flue pipe from the appliance should be vertical for at least 600 mm (2 ft) and should preferably be internal.

(iv) Flue pipes and fittings must not be closer than 25 mm (1 in) to combustible material and where passing through a combustible partition such as a ceiling or roof must be enclosed in a non-combustible sleeve providing an annular space of at least 25 mm (1 in). Spaces around flue pipes passing through walls or floors should be sealed against the passage of smoke and flame.

(v) If an existing suitable flue is used, it should be well swept before making connection.

The flue should terminate in a freely exposed position at least 600 mm (2 ft) above pitched roof level or above the parapet of a flat roof and should be fitted with a terminal which has been tested and found satisfactory by British Gas. The terminal must not be installed within 600 mm (2 ft) of an openable window, air vent or any other ventilation opening.

DO NOT terminate on or adjacent to the face of a wall.

The Local Gas Region should be consulted where any doubt arises as to the suitability or the termination of a flue.

Note: SHARED FLUES

Before attempting to commence any work on this type of system the Local Gas Region must be consulted.

AIR SUPPLY

Detailed recommendations for air supply are given in BS 5440:2. The following notes are intended to give general guidance.

Balanced Flue Model (B50A)

The room in which the balanced flue model is installed does not require a purpose provided air vent.

Where such an appliance is installed in a purpose made cupboard or compartment air vents are required (for the purpose of cooling the appliance) in the cupboard or compartment at high and low level. These may communicate with a room or direct to outside air and their

minimum effective areas must be as follows:-

Position of air vents	Air from room	Air direct from outside
High level	174 cm ² (27 in ²)	87 cm ² (13.5 in ²)
Low level	174 cm ² (27 in ²)	87 cm ² (13.5 in ²)

Note - Both air vents must communicate with the same room or must both be through the same wall direct to outside air.

Open Flue Model (045A)

The room in which an open-flued boiler is installed must be provided with a permanent air vent. This vent should be either direct to outside air or to an adjacent room which itself has a permanent air vent of at least the same size direct to outside air. The minimum effective area of the air vent in the outside wall must be 87 cm² (13.5 in²). Where such an appliance is installed in a purpose made cupboard or compartment air vents are required in the cupboard or compartment at high and low level which may communicate with a room or direct to outside air. The minimum effective area of the air vents is as follows:-

Position of air vents	Air from room	Air direct from outside
High level	164 cm ² (25 in ²)	82 cm ² (12.5 in ²)
Low level	328 cm ² (50 in ²)	164 cm ² (25 in ²)

Note - Both air vents must communicate with the same room or must both be through the same wall direct to outside air. Where compartment air vents are open to a room, the room must itself be provided with a permanent air vent as previously specified.

Effect of an Extract Fan

If there is any type of extract fan fitted in the same room as an open-flued boiler, there is a possibility that, if adequate air inlets are not provided, spillage of the products from the flue could occur when the fan is in operation. Where such installations are found a test for spillage should be carried out with the fan on and all doors and windows in the room containing the boiler closed. Any extra air inlets that might be required will depend on the capacity of the fan.

CLEARANCE AROUND BOILER CASE

A vertical flat area is required for the boiler as follows:- 508 mm wide x 800 mm high (20" x 31½").

In addition the following minimum clearances must be left for installation and servicing:-

At the top	50 mm (2")
At the bottom	150 mm (6")
At the front	650 mm (25½")
At each side	5 mm (⅜")

The minimum side clearances are subject to the provision of connections in

the flow and return pipes, above or below the boiler, to permit its subsequent removal should this ever become necessary.

GAS CONNECTION

Connect as required by CP. 331 parts 2 and 3 to the isolating gas tap that is fitted to the boiler.

The gas supply and meter must be checked to ensure that they are adequate for the boiler rating and any other appliances that are, or are to be, connected. Do not use, pipes of a smaller size than the boiler gas connection.

Do not connect the boiler to a pre-payment meter.

Test the complete installation for soundness as described in the above code or in consultation with the Local Gas Region.

ELECTRICAL CONNECTION

All site wiring must conform to current I.E.E. regulations for the electrical equipment of buildings, Local Gas Region regulations, Local Authority requirements and, in Scotland, the electrical provision of Building Regulations applicable in Scotland. A 240v 50Hz AC supply, adequately earthed, is required near to the boiler, preferably by means of a double pole switch or unswitched plug and socket fused 3 amp. Minimum cross sectional area of incoming cable 0.75 mm² (e.g. 24/0.2 mm 3 core PVC insulated cable). All site wiring must be clear of sharp edges and hot surfaces and must be secured. All external wiring within the boiler casing should have a heat resistant sleeve. The control box of the boiler has connections for wiring to the electric supply and an external control system and it is recommended that connection is made to a system junction box as shown in Fig. 3. The boilers are suitable for use with all types of control system but it is recommended that controls are selected that isolate the boiler electrically at times of no demand.

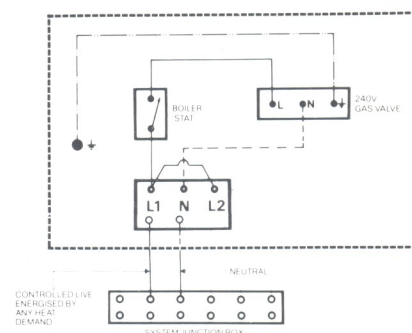


Fig. 3. Internal wiring and connections to AGA Hi-Light B50A and 045A.

FIXING THE BOILER (BOTH MODELS)

The boiler is supplied assembled complete except for balanced flue terminal components which are separately packed.

Note: The standard balanced flue terminal is suitable for wall thickness of 9" (228 mm) to 14" (356 mm) only – other sizes to suit walls of 4½" (114 mm) or 15"-20" (381 mm – 508 mm) thickness are available to order. A template of the fixing holes and the terminal position is printed on the carton. (See Fig. 4.)

To Remove Casing

1. After removal from carton, lay boiler on its back.
2. Pull off white front plate and remove black user access panel.
3. Remove two screws which locate bottom corners of casing assembly to its back plate.
4. Slide casing assembly towards top of back plate and lift off.

Preparing to Mount the Boiler on the Wall. (Both Models)

Using the template provided on the carton, mark out the positions on the wall of the four fixing holes (both models) and flue terminal aperture (balanced flue model only). With No.12 masonry drill, drill holes at least 2¼" deep to accept plugs provided for fixing screws and carefully cut brickwork as necessary.

Fixing of Flow and Return Pipes. (Also see notes on System Design Overleaf)

The flow connection must be made to the LH side of the heat exchanger (viewed from the front) and the return connection to the RH side. Each pipe

may be routed upward or downward from the boiler through the apertures provided in the top and bottom of the casing. The flow pipe on the LH side of the boiler must be cranked back towards the back plate to clear these cut-outs.

Note: Remakeable joints must be provided in the flow and return pipes external to the casing. To ensure this, fittings should be secured into the boiler connections, and primary lengths of pipe fitted, before the boiler is hung on the wall.

Fixing Boiler and Making Flue Connection

(a) Balanced Flue Model (B50A)

1. Fit the air duct inner section to the boiler back panel ensuring that fibre glass seal is airtight around the aperture.
2. Remove front cover plate from boiler.
3. Fit exhaust duct inner section to inside of flue collector ensuring the six screws pull the fibre glass gasket tight enough to make an airtight joint.
4. Fit into the wall the four wall plugs and fixing screws provided and lift appliance on to fixing screws via the keyhole slots in the back panel so that the inner sections of the terminal project into the prepared hole in the wall, and tighten screws.
5. Use a spirit level to ensure the return header tank is level from front to back.

Note: If it is not, shim between the wall face and the boiler back plate to achieve this.

6. From outside the building, slide air duct outer section into air duct inner

section until flange of terminal is in contact with the wall. Make good wall around terminal.

7. Drill brickwork and fit wall plugs through two holes in outer flange of terminal.
8. Slide exhaust duct outer section as far as possible onto exhaust duct inner section.
9. Fit terminal grille and secure with fixing screws into wall plugs.

(b) Open Flue Model (O45A)

1. Fit into wall the four wall plugs and fixing screws provided and lift appliance onto fixing screws via the keyhole slots in the rear flange. Tighten screws.
2. Fit flue pipe to appliance flue socket sealing all joints with fire cement.

Connections of Services: Both Models.

1. Flush all water circuits without the pump in position and then connect to the boiler. When viewed from the boiler front, the boiler 'return' is on the RH side and the required pipework should be fitted to leave the boiler via the optional cut-outs in the boiler casing. Fill the system with water and flush out. Refill the system, venting the pump and radiators, etc., and check for water soundness.
2. The boiler is fitted with a gas servicing tap. Connect the gas supply to the servicing tap.
3. With the front cover plate removed, examine the position of the electrode relative to the pilot shield and check that

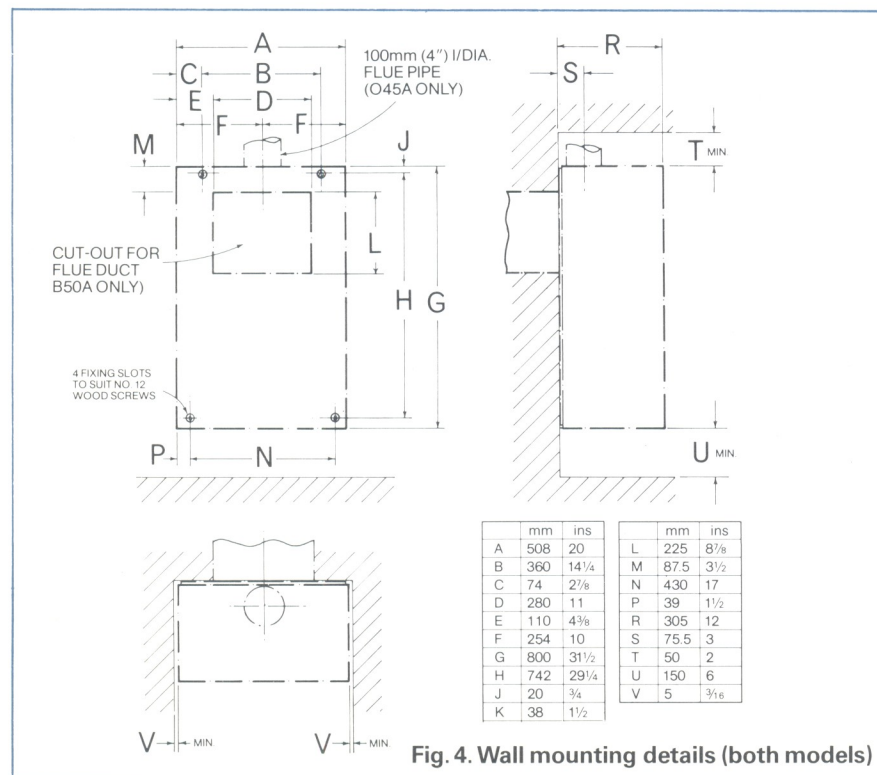


Fig. 4. Wall mounting details (both models)

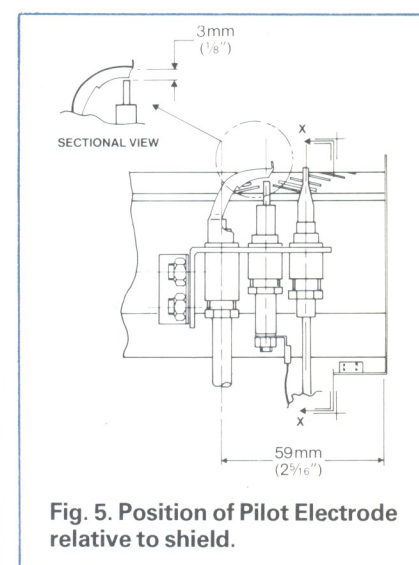


Fig. 5. Position of Pilot Electrode relative to shield.

it conforms to the position shown in Fig 5.

4. A set of three angled steel baffles lie along the tops of the finned heat exchanger tubes. These baffles are secured in position at our factory but, before fixing the boiler, check that they are correctly positioned as Fig. 6.

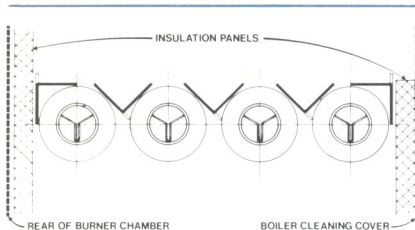


Fig. 6. Position of Baffles on header.

Note: To check heat exchanger baffles on the open flue model it is necessary first to remove the lower plate of the air inlet to the downdraught diverter.

5. Replace front cover and check that asbestos rope seal makes an airtight joint.

6. Remove control box cover and make electrical connections to control box from mains and system controls – see wiring diagram (Fig. 3).

INITIAL LIGHTING INSTRUCTIONS AND TESTS (See Fig. 7).

1. Isolate electricity at wall socket or spur box and turn boiler thermostat to OFF.
2. Purge the air from the gas supply making sure that gas is available at appliance gas tap D. **CAUTION, NO SMOKING OR NAKED LIGHTS.** Undo the union at the appliance gas tap D, open the tap and purge all the air from the supply pipe. Close appliance gas tap, and remake union, turn gas tap on and check for gas soundness. (See CP.331: Part 3).

WARNING: Use a soap solution to locate gas leaks. NEVER use a naked flame.

3. Take off white casing front panel and remove inspection window J on boiler front panel, place a lighted taper near the pilot light and main burner, open appliance gas tap D. No gas should be passing, the burner should not light. Close appliance gas tap D. Replace inspection window J, and white casing front panel.

4. Remove the plug of the pressure test nipple K and connect a pressure gauge.
5. Open the appliance gas tap D, push in and hold gas valve button L allowing a few seconds for gas to reach the pilot burner. Press button A on Piezo electric generator for a few times until pilot burner is alight.

Hold in button L for at least 30 seconds after the pilot has lit. When button L is released the pilot should remain alight and the flame should envelop the tip of the thermocouple and be about $\frac{3}{4}$ " long. If necessary, it can be adjusted on the gas valve by turning screw N. Then push knob M down and release.

6. Check the piping to the pilot burner for gas soundness. Replace the inspection window J on the boiler front panel.

7. Check that:

- (a) The system is full of water and all valves fully open.

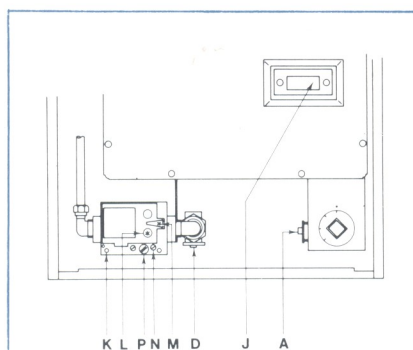


Fig. 7. Lighting controls.

- (b) Any room thermostat is on.

- (c) Any programmer or time switch is set to continuous heating.

Then connect and switch on the electricity supply.

8. Turn boiler thermostat to required setting. The main burner should light and all gas connections should be tested for soundness. Check that the pump is running.

9. When the burner has been alight for at least 10 minutes, check the gas pressure at the burner. Adjust if necessary (see burner pressure in Technical Information overleaf). The governor is in the gas control valve. Remove tall plastic protection cover P and turn screw clockwise to increase pressure. Replace cover P. Check that the gas pressure at the burner is unaffected when other gas appliances are used.

Note: If for any reason a gas rate check is required, turn OFF all other appliances using gas and using the meter test dial and a watch, check that the gas input to the boiler is as indicated on the date plate. (CP.332: Part 2 gives full details of the method).

10. When system reaches operating temperature check for water leaks and preferably drain the system whilst it is hot in order to make flushing more effective.

11. Check operation of the flame failure device to ensure that the burner shuts down within 24 seconds (the appliance should be at working temperature).

12. When the water system reaches working temperature check that the boiler thermostat operates satisfactorily. Check that any room temperature controls and programmer or time switch are fully operative. Check for water soundness.

13. To obtain the optimum performance from the boiler it is necessary to maintain a boiler "flow" and "return" temperature differential of between 10°C (18°F) and 14°C (25°F). Checks should be made by the installer to see that this differential is obtained after the boiler "flow" temperature is stabilised.

The system should be balanced so that the minimum flow required through the boiler is achieved when supplying DHW only.

To Turn OFF Boiler

Short Period: Switch OFF electricity supply at the wall socket. To relight, switch ON electricity at the wall socket.

Long Period: Switch OFF electricity supply at the wall socket and push in control button F (Fig. 7). To relight follow the procedure stated under 5 above.

N.B. In the event of the boiler being switched OFF for long periods during very cold weather, the advice of the local Gas Region or Installer should be obtained.



Agaheat Appliances

Glynwed Domestic & Heating Appliances Limited
P.O. Box 30, Ketley, Telford, Salop TF1 1BR
Telephone: Telford 3973 (STD. 0952)

M&C/11/78/10M/W8230

GLYNWED

Address Service Enquiries to:-

Agaheat Appliances, Planet Works, P.O. Box No. 2,
Corporation Road, Audenshaw, Manchester M34 5LT. Tel: 061-320 8122

FOR THE ARCHITECT AND DESIGNER

The boilers are lightweight, wall-hung models with low water content. Their maximum outputs are adjustable from a minimum of 35,000 Btu/h and a maximum of 45,000 Btu/h (Open Flue) or 50,000 Btu/h (Balanced Flue) by setting the burner pressure at commissioning. (See accompanying table). Both are suitable for open vented, fully-pumped systems only. The AGA Hi-light B50A and 045A are designed specifically for use with natural gas. The 045A is supplied complete with integrally fitted draught diverter with 100 mm (4") dia. connection and the B50A with a standard balanced flue terminal suitable for walls of 4½" or adjustable to a maximum of 20" are also available. For details of site requirements for such factors as Flues, Air Supply, Clearance around Boiler Case, Gas and Electrical Connections, see appropriate sections in installing Engineers Instructions overleaf.

TECHNICAL INFORMATION AGA Hi-Light B50A and 045A

		FULL OUTPUT			
		Both models			Balanced Flue model only
Heat Output	kW	10.26	11.72	13.2	14.65
	Btu/h	35,000	40,000	45,000	50,000
Heat Input	kW	13.92	16.00	18.3	19.63
	Btu/h	47,500	54,250	62,500	67,000
	Mj/h	50.1	57.6	66.0	70.7
Burner Pressure	m bars	7.0	9.0	11.3	13.3
	in. Wg	2.8	3.6	4.5	5.3

Injector size 3.50 mm (0.1378 in).

Water Connections

Flow (one) Rc ¾ (¾" BSP Int)

Return (one) Rp ¾ (¾" BSP Ext)

(Flow connection is made to the LH side of the boiler body and the return to the RH side, and pipes may enter the boiler casing through their respective openings at the left or right hand side of its top or bottom).

Gas Connections Rp ½ (½" BSP)

Electrical Supply 200/250v, 50Hz, fused 3 amp

Water Capacity 1.6 l. (2.8 Pints)

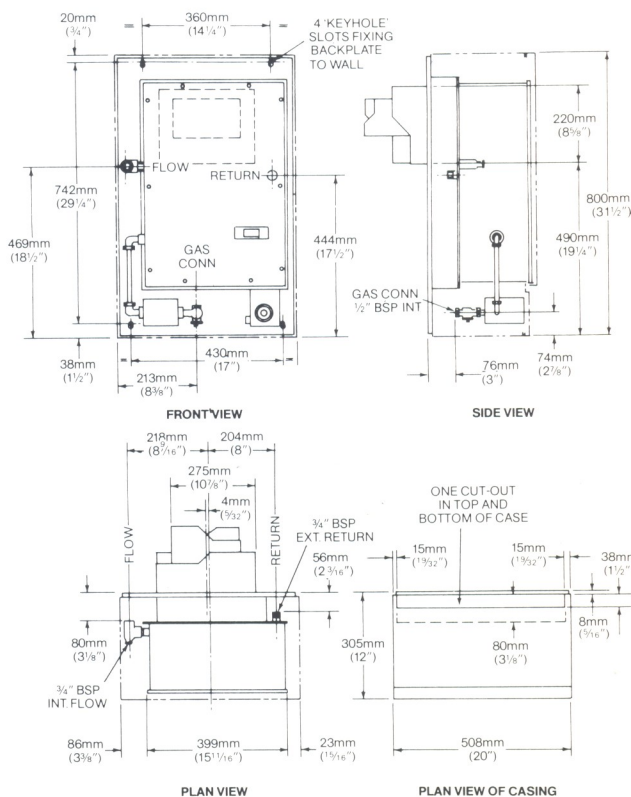
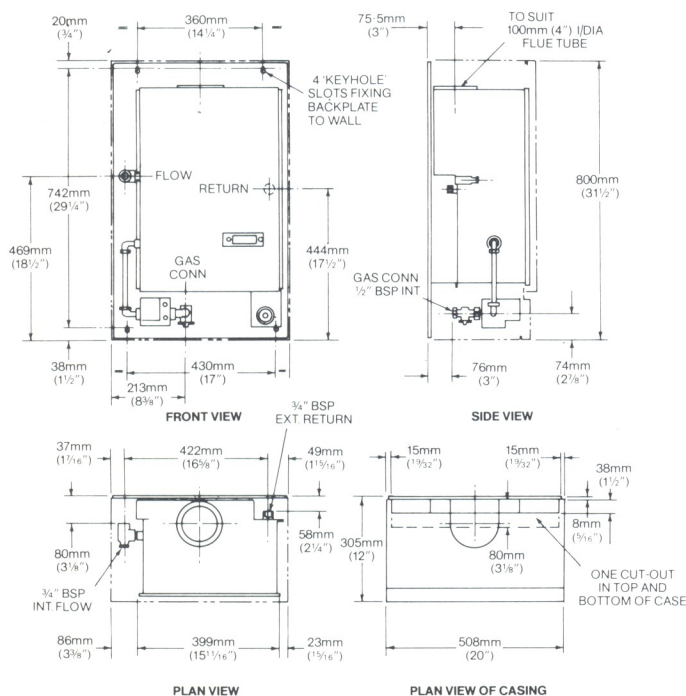
Weight of Complete Boiler (Incl. Casing)

Open Flue Models 32.2Kg (76.5lbs)

Balanced Flue Models 34.9Kg (73lbs)

(Without terminal)

Overall Dimensions: Height 800 mm (31½")
Width 508 mm (20")
Depth 305 mm (12")



SYSTEM DESIGN

Water Circulation Systems

The AGA Hi-light boilers are suitable for use on fully pumped open vented systems only, such as that shown in Fig. 8. Central heating systems should be in accordance with the relevant recommendations given in BS 5376:2. In addition a smallbore or microbore system should comply with the recommendations of BS 5449: Part 1 and must be designed (and subsequently adjusted if necessary) to give a temperature differential across the boiler at full output of $10^{\circ}\text{--}14^{\circ}\text{C}$ ($18^{\circ}\text{--}25^{\circ}\text{F}$).

Hot water systems should be in accordance with the relevant recommendations given in CP 342:1.

Performance

The following is a guide to the size of system the Hi-Light B50A can serve:— 140 litres (31 gals.) indirect cylinder plus 25.2 m^2 (270 ft^2) of radiation surface OR 29 m^2 (312 ft^2) of radiation surface alone (including pipework).

When designing systems for the Hi-light 045A, the above maximum areas of radiation surface must be reduced by 2.9 m^2 (39 ft^2).

NOTE

These examples are based on a radiation surface emission factor of 0.5 kW/m^2 (160 Btu/h/ft^2) and average domestic hot water requirements. They do not include any allowance for a "working margin." For other conditions or requirements adjustments must be made. Radiation surface represents radiators plus the surface area of unlagged pipes.

General

Fig. 8 illustrates a fully pumped system using either twin motorised valves or a 3-port diverter valve, although other control systems are equally appropriate. The following general points should be noted:—

(a) maximum head

The boiler should be connected to a cistern water supply and subject to a maximum head of 283 m (93 ft).

(b) drain tap

A drain tap must be fitted at the lowest point of the system.

(c) domestic hot water cylinders

Domestic Hot Water cylinders should be of the indirect type and suitably lagged.

(d) temperature differential

The system should be designed, and the pump selected and adjusted, to achieve a nominal temperature differential across the boiler of $10^{\circ}\text{--}14^{\circ}\text{C}$ ($18^{\circ}\text{--}25^{\circ}\text{F}$) (i.e. a flow of 140–195 gph for a boiler output of 35,000 Btu/h). Refer to boiler resistance curve (Fig. 9).

(e) control schemes

Independent controls are recommended for air temperature and domestic hot water temperature controlled by a control clock. Such controls may be two-or-three- port motorised valves operated by room thermostat

and cylinder thermostat.

Thermostatic radiator valves may be fitted, making the inclusion of a system by-pass of particular importance.

(f) circulating pump

It is recommended that the selected pump be of a type and manufacture acceptable to British Gas and be adequate to give the required temperature differential between the flow and return.

The pump should be able to meet the requirements of the system design and be fitted in a readily accessible position (See Fig. 8). It may be positioned either on the boiler flow or the return, depending on the system design.

The boiler pressure loss curve (See Fig 9) indicates the loss of head across both boiler models and should be considered when selecting the correct pump size.

Typical recommended selection is as follows:—

— Grundfos 4 - 35 or equivalent

(g) system bypass

A system bypass should be fitted to any installation.

It is intended that the bypass provides a continuous water circuit at all times by connecting the boiler flow and return pipes at the most advantageous point in order to prevent any possibility of 'kettling'. This point is dependant on the system design but it is recommended to be as far away as is practically possible from the boiler.

(h) isolating valves

Isolating valves must be fitted on the inlet and outlet of the circulating pump to facilitate service and replacement of the pump without draining the system.

(i) automatic air separators

These may be fitted but are not considered essential to the operation of a well designed adequately vented system. The Installation Instructions provided by the manufacturer of the Air Separator should be carefully followed.

System balancing

It is standard practice to adjust the D.H.W. cylinder circuit, and each radiator circuit, so that the total water flow is properly divided between them in proportion to their individual heat requirements.

The total water flow through the boiler must be sufficient to maintain a temperature differential across it of $10^{\circ}\text{--}14^{\circ}\text{C}$ ($18^{\circ}\text{--}25^{\circ}\text{F}$). Too small a water flow may result in noise from the boiler.

To ensure satisfactory flow conditions, the system should be balanced, and the pump adjusted to give the necessary minimum flow through the boiler, with ALL CIRCUITS OPEN, but with the BY-PASS valve completely closed. If subsequently, with only the D.H.W. cylinder circuit open, a reduced water flow is indicated by the occurrence of noise from the boiler, the by-pass valve should be opened progressively to whatever extent is found necessary to prevent this.

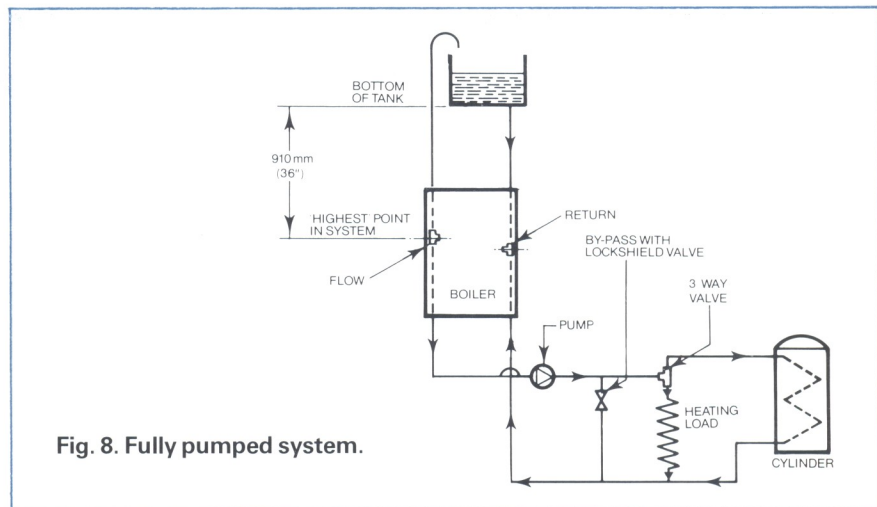


Fig. 8. Fully pumped system.

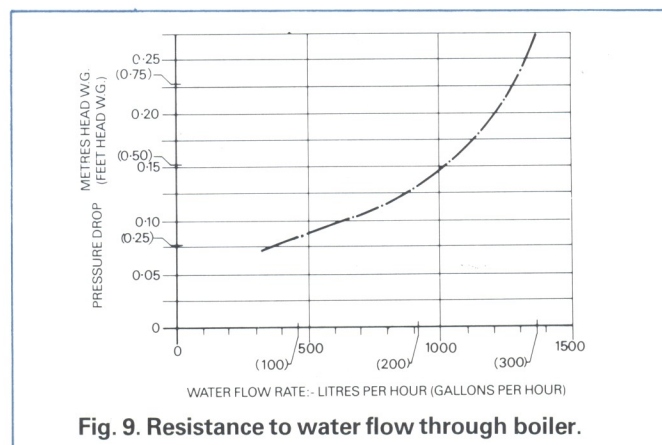


Fig. 9. Resistance to water flow through boiler.