
British Standard

Safety of domestic gas appliances

Part 5. Specification for gas fires

Foreword

This revision of BS 5258 : Part 5 has been prepared under the direction of the Gas Standards Committee and supersedes BS 5258 : Part 5 : 1975 which is withdrawn. In format and requirements it follows closely the first edition but whereas that was written with type approval in mind, this revision will apply to all production appliances through a recognized scheme of quality assurance.

Since BS 5258 : Part 5 was first published in 1975, the thermal performance requirements, previously given in BS 1250 : Part 4 have been made the subject of BS 6332 : Part 2 which also relates to production appliances. Because of interrelation between safety and performance requirements, care has been taken to ensure that the requirements for gas fires given in this revision are compatible with those in BS 6332 : Part 2.

Unlike BS 5258 : Part 5 : 1975 this revision makes no provision for the acceptance of new designs, materials or methods of assembly as equivalent to those specified nor does it provide for new features to be checked against manufacturers' claims. This omission is not intended to inhibit innovation; such provisions are considered more appropriate to the conditions of a certification scheme.

Other developments since 1975 have included the publication of new British Standards for gas taps, flame supervision devices and multifunctional controls. These standards are BS 5494, BS 6047 : Part 1 and BS 6067 respectively, and are referred to in this revision. The constructional details of gas taps are now given in BS 5494.

Many relevant codes of practice have also been revised and published as new British Standards. At present the appropriate British Standard codes of practice are: BS 5871; BS 5440 : Parts 1 and 2; and BS 5482 : Parts 1 and 3.

Attention is drawn to the requirements of the Gas Safety (Installation and Use) Regulations, Electrical Equipment (Safety) Regulations, Heating Appliances (Fireguard) Regulations and various Building Regulations.

The following Parts of BS 5258 are already published or, as indicated by an asterisk, in preparation:

- Part 1 Central heating boilers and circulators
- Part 2 Cooking appliances
- Part 4 Fanned-circulation ducted-air heaters
- Part 5 Specification for gas fires
- Part 6 Refrigerators and food freezers
- Part 7 Storage water heaters
- Part 8 Combined appliances: gas fire/back boiler
- Part 9* Combined appliances: air heater/circulator
- Part 10 Flueless space heaters (excluding catalytic combustion heaters) (3rd family gases)
- Part 11 Flueless catalytic combustion heaters (3rd family gases)
- Part 12 Decorative gas log and other fuel effect appliances (2nd and 3rd family gases)
- Part 13 Specification for convector heaters
- Part 14 Specification for barbecues (3rd family gas)
- Part 15* Specification for combination boilers

Compliance with a British Standard does not of itself confer immunity from legal obligations.

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Section one. General

1 Scope

This Part of BS 5258 specifies safety requirements and describes associated methods of test for 1st, 2nd and 3rd family radiant and radiant convector gas fires designed to discharge their products of combustion via a flue system recess into an open flue and thence to the outside air. Catalytic heaters are not included.

In specifying requirements for appliances burning 2nd family gases it is assumed that a meter governor will be fitted and for appliances burning 3rd family gases it is assumed that the gas supply from the container will be governed by a pressure regulator complying with BS 3016. The requirements for controls relate to controls fitted as part of, or supplied with, particular appliances; they do not necessarily provide a complete specification for controls intended for general use.

NOTE. The titles of the publications referred to in this standard are listed on the inside back cover.

2 Definitions

For the purposes of this Part of BS 5258, the definitions given in BS 1179 : 1967 and BS 1179 : Part 6 apply, together with the following.

2.1 adjustment pressure. The pressure, measured at the test point, that is required to obtain the rated heat input using the reference test gas.

2.2 hot condition. A condition of the appliance required for some tests and obtained by heating the appliance for 1 h at the adjustment pressure, any thermostat remaining fully open.

2.3 cold condition. A condition of the appliance required for some tests and obtained by allowing the unlit appliance to attain equilibrium at room temperature.

2.4 limits of tolerance of the supply voltage. 0.90 times the minimum rated voltage and 1.10 times the maximum rated voltage of the appliance.

2.5 rated heat input. The manufacturer's declared heat input for the appropriate reference test gas.

2.6 setting pressure. The pressure, measured at the test point, that is specified by the manufacturer for the purpose of adjusting the appliance heat input.

3 Classification of appliances

3.1 Classification by category

The category system of appliance classification is described in A.1.3 of BS 4947 : 1984 by which an appliance is denoted by a category number, I, II or III, according to the number of gas families that it is designed to burn and

the families are identified by subscripts, T, N and L for 1st, 2nd and 3rd gas families respectively.

For the purposes of this Part of BS 5258, there are no restrictions on the categories of appliances that are permitted, but within a given category the changes that are allowed in adapting an appliance from operation on one gas or gas family to operation on another are limited, as follows.

(a) *Change of gas family.*

- (1) Adjustment of governor setting or exchange of governor springs or immobilization of the governor (when fitted).
- (2) Exchange of injectors or non-aerated burner assemblies.
- (3) Adjustment of aeration.
- (4) Exchange or adjustment of auxiliary components (e.g. pilots, igniters, restrictors).

(b) *Change of gas group within 1st family.*

- (1) Adjustment of governor setting.
- (2) Exchange of injectors or restrictors or non-aerated burner assemblies.
- (3) Adjustment of aeration.

NOTE. Gas groups within the first family are defined in BS 4947.

(c) *Change of gases within 3rd family.*

- (1) Adjustment of aeration.

3.2 Classification by flue type

For the purposes of this Part of BS 5258, appliances are also classified into the following types according to the flue system for which they are designed and the source of the combustion air:

- (a) *Type A : flueless appliances.*
- (b) *Type B : open-flued appliances.*
- (c) *Type C : room-sealed appliances.* These comprise the following.
 - (1) Type C₁ : balanced-flue appliances.
 - (2) Type C₂ : Se-duct or U-duct appliances.

NOTE. The definitions of these types of appliance are given in BS 1179 : Part 6.

This Part of BS 5258 covers type B appliances only.

4 General requirements

The appliance shall comply with this Part of BS 5258 when tested using the specified test gases of the appropriate gas family. Full details of the test gases are given in BS 4947.

An appliance designed to burn 1st family gases shall be suitable for gas groups G4 and G5 with or without a change of injectors or jets.

Appliances designed to burn 3rd family gases may be designed for use with either commercial butane or commercial propane, or both.

5 General conditions of test

5.1 Test room

The room shall be adequately ventilated but free from draughts likely to affect the performance of the appliance. If the test results are influenced by the temperature of the ambient air, the room temperature shall be maintained at $20 \pm 5^\circ\text{C}$.

5.2 Preparation of appliance

The appliance shall be installed and adjusted in accordance with the manufacturer's instructions, using the appropriate reference test gas at the following inlet pressure.

Family	Test gas	Inlet pressure
1st	TGA	mbar* 17.5
2nd	NGA	20
3rd	LPGA	28
	LPGC	37
* 1 mbar = 0.1 kPa = 10^3 N/m^2 .		

Before any tests are made the appliance shall be operated at its full working temperature for a period sufficient to dry the insulation and remove any temporary finish that might interfere with observations.

5.3 Test conditions

5.3.1 The test conditions given in **5.3.2** to **5.3.7** shall apply except where otherwise specified in section two.

5.3.2 Those tests for which no particular flue suction is specified shall be carried out with a standard test box (see figure 1). To remove the products of combustion this shall be fitted with a 125 mm nominal diameter uninsulated round flue pipe to a height of 3 m measured from the base of the test box.

5.3.3 The gas connections and system up to and including the burner shall be examined for soundness both before and after test. The test results are deemed invalid unless the system is sound (see **7.1**).

5.3.4 The appliance shall be at room temperature at the start of each test.

5.3.5 During testing, the initial adjustment of the appliance shall not be altered.

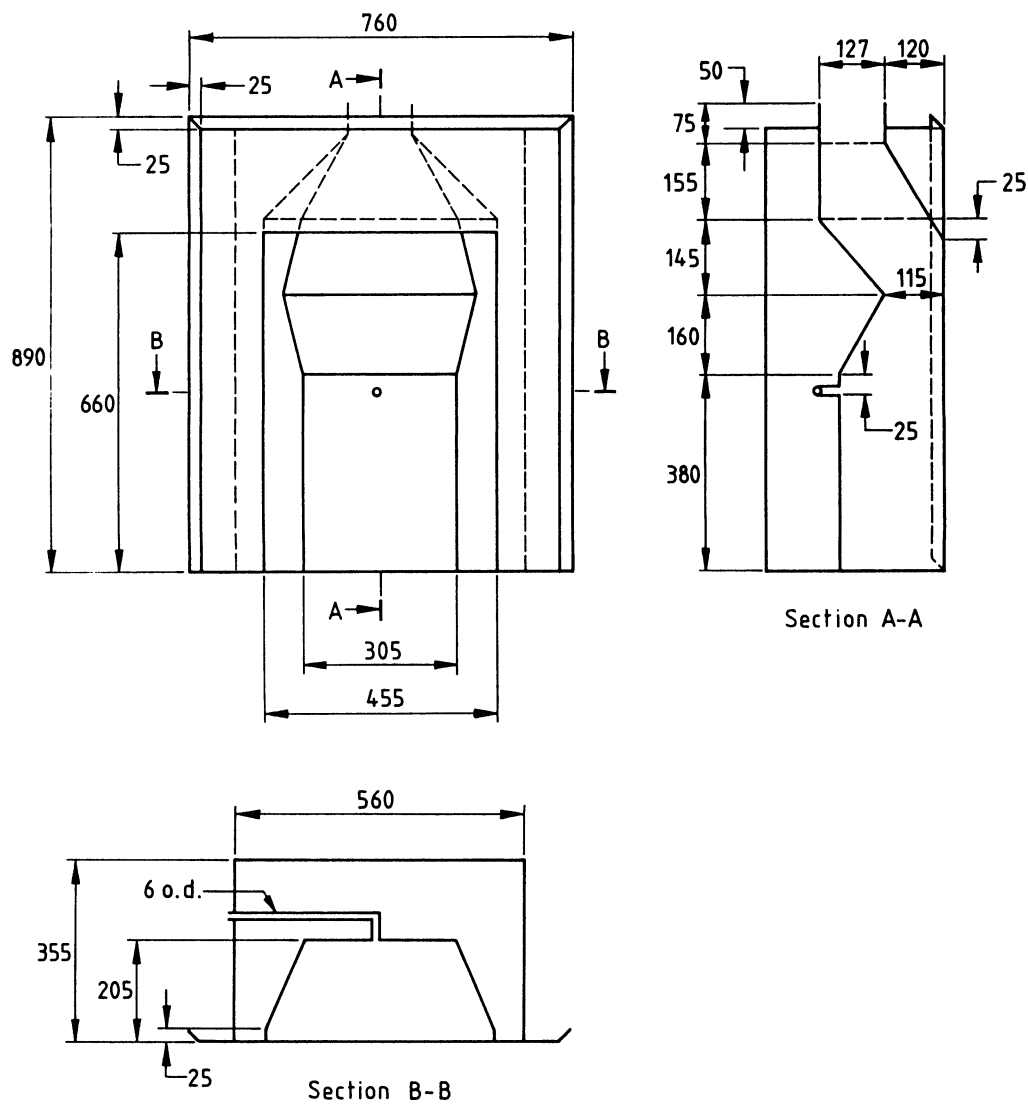
5.3.6 Precautions shall be taken to prevent thermostats or other variable controls from acting to interfere with the gas flow, except as necessitated by the test.

5.3.7 Test pressures shall be measured correct to 0.2 mbar and controlled so that the variation does not exceed ± 0.2 mbar.

NOTE 1. BS 4947 gives guidance on the measurement of heat input rate.

NOTE 2. The test gases (and, where appropriate, their conditions of application) to be used are specified in the relevant clauses of section two. For 3rd family gas appliances, test gases LPGA and LPGB are used with the appliance adjusted for butane and test gases LPGC and LPGE with the appliance adjusted for propane.

NOTE 3. In general, except for tests involving governor performance, the appliance governor, if any, may be put out of operation and the specified test pressure obtained by adjustment of the gas pressure at the inlet to the appliance.



NOTE. Any joints inside the recess should be sealed.
Dimensions are in millimetres.

Figure 1. Standard test box

Section two. Safety requirements and associated methods of test

6 General design and construction

6.1 Materials, fittings and finishes

Materials, fittings and finishes, the failure of which may affect the safe operation of the appliance, shall be appropriate to the conditions arising in the part of the appliance in which they are used. The appliance shall be free from swarf, grit or other foreign matter.

Asbestos-containing materials shall not be used.

6.2 Removal and reassembly of parts by user

The correct assembly of parts that are intended to be removable by the user, for example for cleaning or replacement, shall be obvious. It shall be difficult to assemble such parts incorrectly.

Parts that are not intended to be removed by the user and that on removal may result in a hazard, e.g. injector jets, shall require the use of tools for their removal.

6.3 Materials in contact with gas

6.3.1 Copper tubing. Copper tubing shall not be used where it would be exposed to temperatures above 100 °C.

6.3.2 Jointing compounds. Jointing compounds shall comply with BS 5292.

6.4 Aeration adjustment

There shall be no means of adjusting the primary aeration of category I_T or category I_N appliances. For other categories, the means of adjusting the primary aeration shall be pre-set and locked by the manufacturer.

Any aeration adjuster shall not be capable of closing the air inlet completely and shall not be capable of being set in such a manner as to cause gas to spill from the burner venturi throat.

6.5 Insulation

Thermal or acoustic insulation shall be non-combustible (see BS 476 : Part 4), securely located and protected against mechanical damage and condensate.

6.6 Stability

6.6.1 Requirement. A gas fire which in accordance with the manufacturer's instructions can be installed without being fixed to a wall shall not fall forwards when subjected to the tests described in 6.6.2.

6.6.2 Method

(a) Stand the appliance (without any connection being made to the gas supply or the flue spigot) on a horizontal plane provided with a stop to prevent the front supports of the fire from moving forward and level it in accordance with the manufacturer's instructions. Apply a horizontal force of 6 N to the top of the appliance in the forward direction.

(b) With the appliance standing on the level plane as described in (a) but with the 'stop' for preventing the front supports of the fire moving forward removed, tilt the fire forward on the front supports to an angle of 5° to the vertical.

6.7 Refractories

The bricks, radiants and burner shall be so located with respect to each other that, at the limit of movement allowed, the performance of the appliance shall be satisfactory.

6.8 Guards

The appliance shall be provided with a guard complying with BS 1945.

6.9 Spacing

If, on installation, it is required to leave a gap between the back of the fire and the closure plate, suitable stops shall be incorporated on, or be supplied with, the appliance.

6.10 Assembly of appliance casing

Where screws are used for the assembly of any part of the appliance casing which is removable for general servicing, they shall be fitted with spring steel fasteners or have at least 2½ threads engagement.

6.11 Assembly of gas-carrying parts

Drillings for bolts and screws shall not connect with fuel gasways. The residual wall thickness shall be at least 1 mm.

Brackets for supporting components shall not be interposed in any gas-carrying joints.

NOTE. The niting plate is not considered to be a gas-carrying joint. Solder that has a melting point below 450 °C after application shall not be used for the connection of gas-carrying parts.

Gas-carrying components which may be removed during servicing shall be designed so that when replaced they form an assembly which is sound. This requirement is assessed by removing and replacing the relevant components five times, following which the requirements of 7.1 shall be met. If required by the servicing instructions any gaskets or seals shall be replaced.

7 Gas soundness

7.1 Requirement

When tested as described in 7.2 the fully assembled appliance shall be sound at the following internal air pressure.

Family	Air pressure
1st	mbar 50
2nd	50
3rd	150

Where the appliance is for use on more than one gas family, one of which is 3rd family, the test pressure shall be 150 mbar.

The requirement shall be deemed to be met if the leakage rate does not exceed 100 cm³/h over a period of 1 min.

NOTE. One convenient method of measuring the leakage rate is by the bubble leak indicator illustrated in figure 2. A rate of seven bubbles per minute should be equivalent to 100 cm³/h but this should be checked before the indicator is used.

7.2 Method

Connect to the appliance inlet an air supply maintained constant at the appropriate pressure and embodying a suitable meter for measuring air flow.

Test the appliance under the following conditions:

- (a) with all gas taps in the OFF position;
- (b) with all gas taps turned to the ON position, any flame failure device being maintained in the open position by suitable means (e.g. thermal or mechanical) compatible with its normal operation and all injectors and pilots capped off.

8 Heat input

8.1 Definitions and conditions of measurement

For the purposes of 8.1 to 8.3, the heat input is that which would be obtained with a reference gas of the following Wobbe number.

Family	Test gas	Wobbe number*
1st	TGA(4)	MJ/m ³ 27.6
	TGA(5)	25.2
2nd	NGA	50.8
3rd	LPGA	87.5
	LPGC	77.0
* The reference conditions are 1013.25 mbar, 15 °C, dry.		

The heat input shall be measured with the appliance fitted in the standard test box (see figure 1) and 1 h after lighting (see appendix A). The test box shall be fitted with a 125 mm outside diameter flue pipe to a height of 3 m (measured from the base of the test box).

For category I_L appliances, the heat input shall be measured with LPGA only.

8.2 Tolerance

The heat input of the appliance shall be within ± 5 % of the rated heat input with the following pressure applied to the inlet of the appliance and with the appliance adjusted to the manufacturer's recommended setting pressure.

Family	Test gas	Inlet pressure
1st	TGA	mbar 17.5
2nd	NGA	20
3rd	LPGA	28
	LPGC	37
NOTE. The heat input of the type test sample should be within ± 2 % of the maximum rated heat input in order to ensure that the results of other tests are not unduly affected by deviations from the stated test conditions.		

8.3 Adjustment

If any means of adjustment to the heat input of the appliance is provided, it shall be designed to discourage unauthorized interference with the adjusting mechanism and shall not be liable to inadvertent movement.

NOTE. Suitable means of sealing the adjusting mechanism include locknuts, locking wire with seal, a cover screw with a screwdriver slot or any means that require the use of tools to gain access to the adjusting mechanism.

9 Combustion

9.1 General test

9.1.1 Requirement. When tested in accordance with 9.1.2 and 9.1.3, the CO/CO₂ ratio shall not exceed 0.02.

NOTE. For the purposes of this Part of BS 5258, the carbon dioxide and carbon monoxide contents of the products of combustion should be determined with respective accuracies of 0.05 % and 0.001 % of the volume of the sample. The concentration of the two gases can be determined conveniently with adequate accuracy by a variety of methods (see BS 1756) and the ratio is not appreciably affected by dilution of the product of combustion during sampling.

The test gases and conditions are as follows.

Family	Test gas	Conditions
1st	TGA	Minimum operational rate to 115 % of rated heat input
	TGB	Minimum operational rate to adjustment pressure
2nd	NGA	Minimum operational rate to 115 % of rated heat input
	NGB	Minimum operational rate to adjustment pressure
3rd	LPGA	Minimum operational rate to 112 % of rated heat input
	LPGC	Minimum operational rate to 110 % of rated heat input

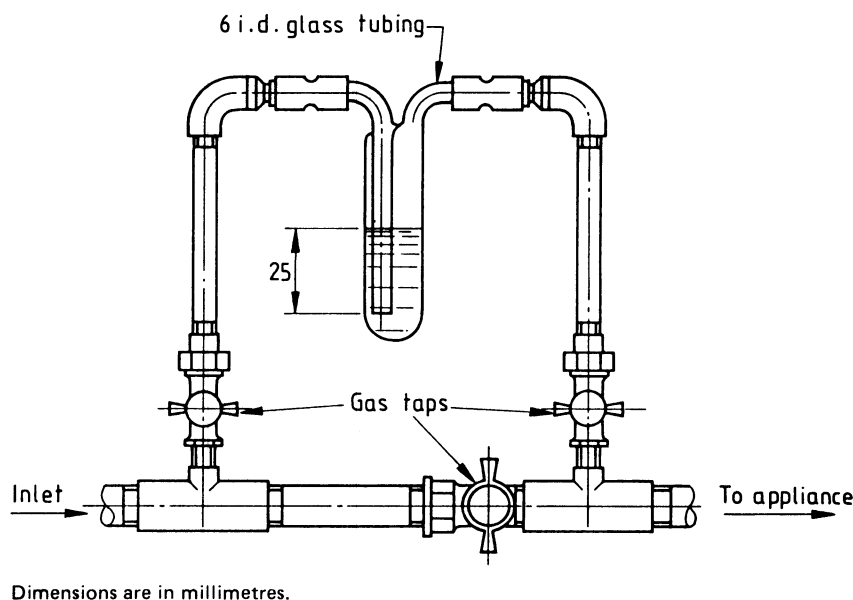


Figure 2. Bubble leak indicator

9.1.2 Minimum operational rate. For the purposes of 9.1.1 to 9.1.3 and of clause 12 the minimum operational rate is defined as follows:

- (a) for any burner or section of a burner which is controlled by a thermostat, the bypass rate;
- (b) for any burner which is manually controlled and which is subdivided into sections under control of a tap (e.g. duplex burners), 30 % of the normal rate of each individual section;
- (c) for any burner which is manually controlled but which is not subdivided into sections (i.e. simplex burners), 20 % of the normal rate;
- (d) for any burner where it is only possible to obtain certain predetermined fixed settings, the lowest rate obtainable.

9.1.3 Method. Fit the appliance to the standard test box (see figure 1) in accordance with the manufacturer's instructions. When the appliance has reached the hot condition at a flue suction of 38 μ bar, make tests at a sufficient number of heat inputs to determine the combustion performance over the whole of the prescribed range. If this is done by plotting a curve of CO/CO₂ against heat input, no extrapolation shall be made. Collect the products of combustion, taking precautions to ensure that the sample drawn is mixed and representative.

9.2 Sealed flue spigot test

9.2.1 Requirement. An appliance shall not give rise to a CO/CO₂ ratio exceeding 0.02 when tested in the hot condition using the appropriate reference test gas at adjustment pressure and by the method described in 9.2.2.

9.2.2 Method. Fit the appliance in the standard test box (see figure 1) with the fire's flue spigot sealed off. When the hot condition is reached, sample the flue gases emitted into the room from the fire.

9.3 Reduced inlet pressure

9.3.1 Requirement. When tested in the hot condition in accordance with the following conditions and by the method described in 9.3.2, a fire shall not give rise to a CO/CO₂ ratio exceeding 0.02 or, if the heat input obtained under the test conditions is less than 50 % of the rated heat input, 0.02 $\times$ half rated input/test rate.

Family	Test gas	Inlet pressure
1st	TGA	mbar 3.7
2nd	NGA	12.5
3rd	LPGA LPGC	25 34

9.3.2 Method. Fit the appliance in accordance with the manufacturer's instructions to the standard test box and flue described in 5.3. When the hot condition is reached, adjust the heat input of the appliance to the minimum operational rate given in 9.1.2 and then reduce the inlet pressure to the value(s) specified in 9.3.1 as appropriate. Collect the products of combustion, taking precautions to ensure that the sample drawn is mixed and representative.