

Safety of domestic gas appliances —

Part 13: Specification for convector heaters

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- British Non-ferrous Metals Federation
- Consumer Standards Advisory Committee of BSI
- Consumers Association
- Department of Energy (Energy Efficiency Office)
- Department of the Environment (Building Research Establishment)
- Department of Trade and Industry (Mechanical and Electrical Engineering Division)
- Department of Trade and Industry (Consumer Safety Unit, C S Division)
- Health and Safety Executive
- Institution of Gas Engineers
- Liquefied Petroleum Gas Industry Technical Association (UK)
- National Brassfoundry Association
- National Gas Consumers Council
- Royal Society for the Prevention of Accidents
- Society of British Gas Industries

The following bodies were also represented in the drafting of the standard, through subcommittees and panels:

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Foreword

This Part of BS 5258 has been prepared under the direction of the Gas Standards Committee to meet the need for a standard specifying the safety requirements and associated methods of test for gas-fired convector heaters burning 1st, 2nd and 3rd family gases.

Since 1974, discussions have been proceeding in the Technical Committee CEN/TC 62 of the European Committee for Standardization towards a harmonized European standard for gas-fired convector heaters; however, it has not yet proved possible for this European standard to be agreed and it has therefore been decided that this Part of BS 5258 should be published. While the requirements and methods of test given in this Part of BS 5258 follow existing UK practice, they are in no way intended to prejudice UK participation in European standardization or the implementation of any resultant European standard or Harmonization Document of which the UK approves.

Requirements for the safety and performance of 1st family gas convector heaters were previously given in BS 1250-1 and BS 1250-4 while those for 3rd family appliances were given in BS 2773; these standards have now been withdrawn and the relevant safety requirements, revised where necessary, have been incorporated in this Part of BS 5258 together with requirements for 2nd family appliances. Where technically appropriate, the requirements have been harmonized with other Parts of BS 5258. Thermal performance requirements for these appliances are the subject of BS 6332-4.

In common with other Parts of BS 5258 currently being revised, this Part can be applied to all production appliances through a recognized scheme of quality assurance, whereas earlier Parts were written with type approval in mind. The intention is that all appliances manufactured in accordance with this standard will be safe in normal use when installed and maintained in accordance with the relevant British Standard codes of practice and with the manufacturer's instructions. Furthermore, such servicing as may be necessary to maintain the appliance in a safe condition should be able to be carried out by a competent fitter without difficulty.

The codes of practice relevant to this Part of BS 5258 are BS 5440-1 and BS 5440-2, BS 5871 and BS 5482-1, BS 5482-2 and BS 5482-3.

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

The following Parts of BS 5258 are already published or are, 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: 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).*

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

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

Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 30, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

Section 1. General

1 Scope

This Part of BS 5258 specifies safety requirements and describes associated methods of test for domestic gas-fired convector heaters having an input rating not exceeding 25 kW and of the following flue types:

- a) open-flued (natural draught and fan-powered);
- b) balanced-flued (natural draught and fan-powered);
- c) Se-duct.

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.

This Part of BS 5258 is not applicable to:

- 1) flueless appliances;
- 2) the special requirements for appliances with premixed gas and air burners;
- 3) type C₂ appliances burning 3rd family gases (these appliances are not manufactured at present);
- 4) appliances that incorporate their own butane container.

NOTE The titles of the publications referred to in this standard are listed on the page 30.

2 Definitions

For the purposes of this Part of BS 5258, the definitions given in BS 1179:1967, BS 1179-6 and in the relevant British Standard codes of practice 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

rated heat input

the manufacturer's declared heat input for the appropriate reference test gas

2.3

setting pressure

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

2.4

cold condition

a condition of the appliance required for some tests and obtained by allowing the unlit appliance to attain equilibrium at room temperature

2.5

hot condition

a condition of the appliance required for some tests and obtained by heating to thermal equilibrium at the adjustment pressure, any thermostat remaining fully open

2.6

equivalent length

the length of straight flue whose resistance to flow of products of combustion is equal to that of the actual flue

2.7

limits of tolerance of supply voltage

0.90 times the minimum rated voltage and 1.10 times the maximum rated voltage of the appliance

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 the 1st, 2nd and 3rd gas families respectively.

For the purposes of this Part of BS 5258, the following categories of appliances are permitted.

- a) Categories I_T, I_N, I_L, I_{L/B}, and I_{L/P}
- b) Categories II_{TN}, II_{NL}, II_{NL/B}, and II_{NL/P}
- c) Categories III, III_{TNL/B}, and III_{TNL/P}

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.* These comprise the following.
 - 1) Natural draught appliances.
 - 2) Fan-powered appliances with draught diverter.

These appliances use a fan to move air for combustion and products of combustion through the combustion chamber and heat exchanger. The draught diverter is connected to a secondary flue in accordance with relevant codes of practice for construction and termination. Examples are shown in Figure 1(a) and Figure 1(b).

3) Fan-powered appliances without draught diverter.

These appliances use a fan to move air for combustion and products of combustion through the combustion chamber, heat exchanger and the flue system. Examples are shown in Figure 2(a) and Figure 2(b).

4) Fan-powered appliances with integral fan in the secondary flue.

The flow of air for combustion and products of combustion through the appliance is produced by natural convection. The appliance is fitted with a draught diverter or suitable flue break and a fan in the secondary flue is used to evacuate the products of combustion through the flue. Examples are shown in Figure 3(a) and Figure 3(b).

c) *Type C: room-sealed appliances.* These comprise the following.

1) Type C₁: balanced-flued appliances, which may be either natural draught or fan-powered. Fan-powered type C₁ appliances will usually be as shown in Figure 4(a) and Figure 4(b). Alternative arrangements of air intake and products outlet ducts to those shown will occur in practice.

2) Type C₂: Se-duct appliances.

NOTE 1 The definitions of these types of appliances are given in BS 1179-6.

NOTE 2 This Part of BS 5258 does not cover type A appliances or type C₂ appliances burning 3rd family gases.

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.

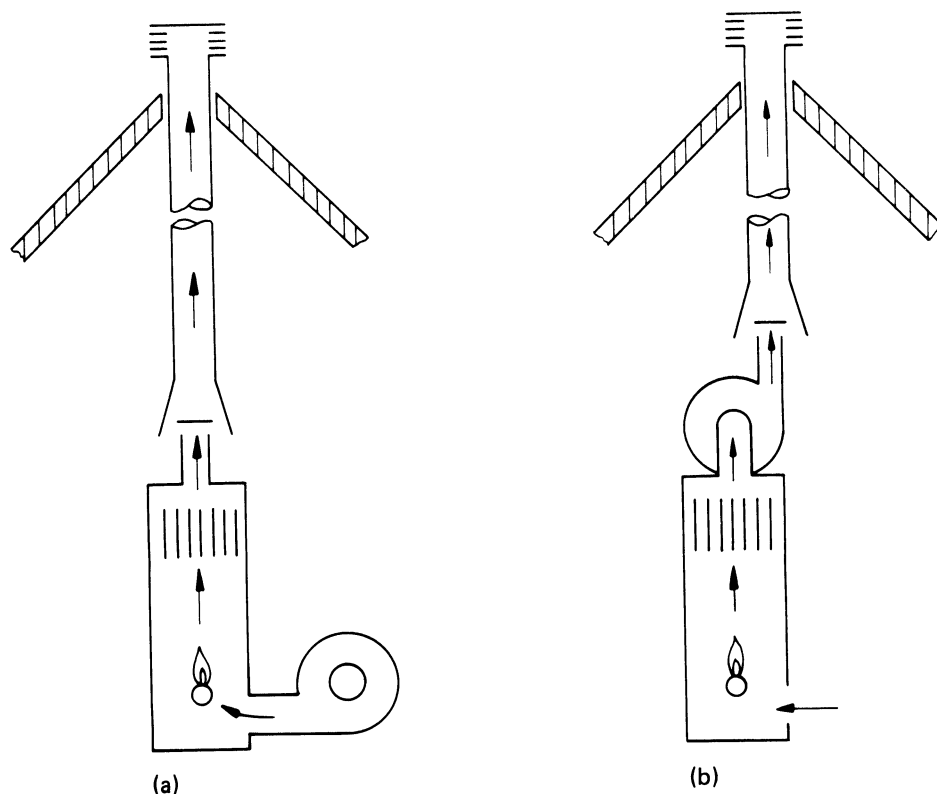


Figure 1 — Fan-powered type B appliances with draught diverter

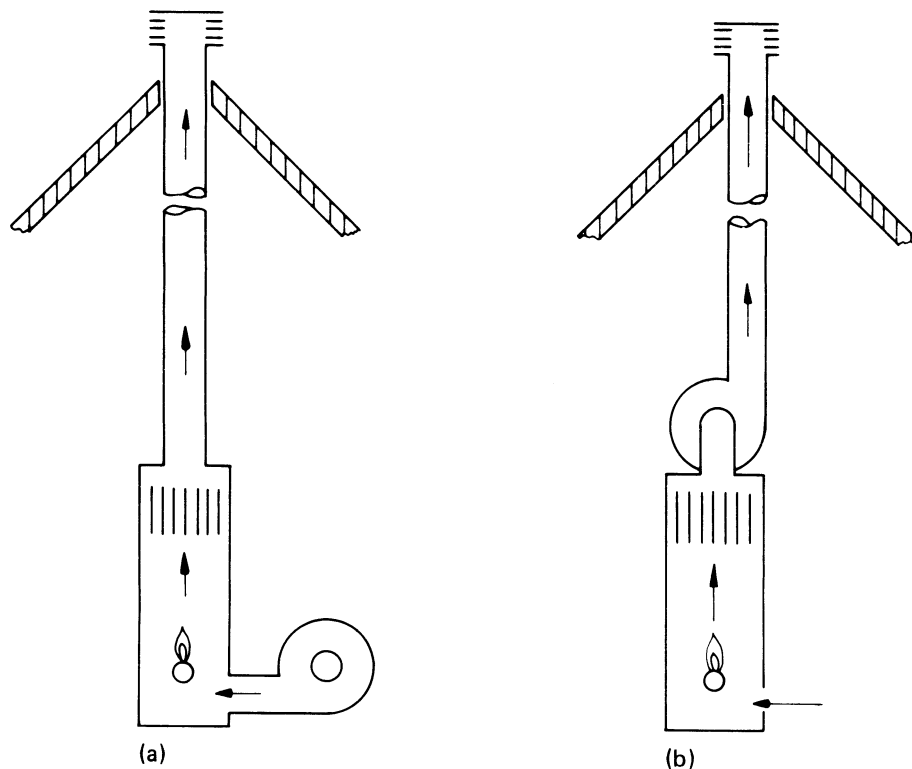


Figure 2 — Fan-powered type B appliances without draught diverter or other type of flue break

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 ± 5 °C.

5.2 Preparation of appliance

The appliance shall be set up taking due account of the manufacturer's instructions, with particular reference to minimum clearances around the appliance. It shall then be adjusted in accordance with the manufacturer's instructions, using the appropriate reference test gas at the following inlet pressure.

The appliance shall be connected to the appropriate flue as specified in 5.4.

Family	Test gas	Inlet pressure
		mbar ^a
1st	TGA	17.5
2st	NGA	20.0
3rd	LPGA	28.0
	LPGA	37.0

^a 1 mbar = 10^2 N/m² = 100 Pa.

Except where otherwise specified in section 2, an appliance requiring an electrical supply shall be connected to a supply at rated voltage.

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

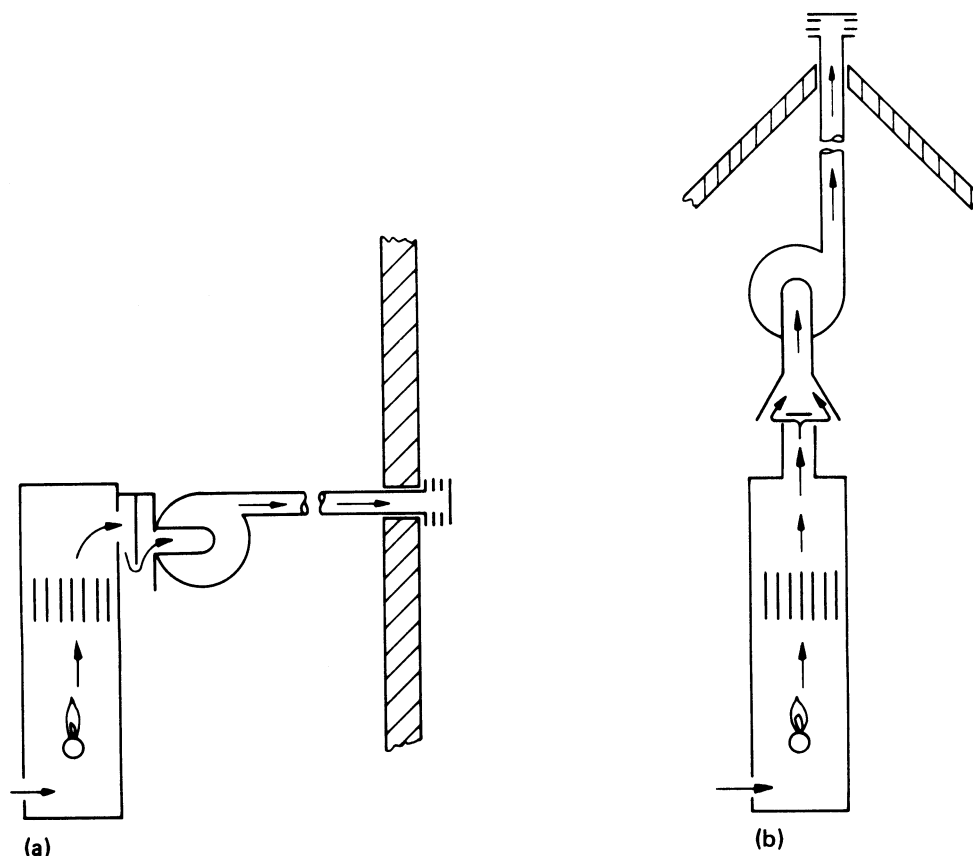


Figure 3 — Type B appliances with integral fan in the secondary flue

5.3 Installation on test flue

5.3.1 Type B appliances

5.3.1.1 Natural draught. Except where otherwise specified in section 2, the appliance shall be connected to a 1 m vertical secondary flue of the same nominal diameter as the flue outlet. The vertical flue shall be a single wall flue pipe complying with BS 715.

An appliance with a horizontal flue shall be fitted in accordance with the manufacturer's instructions and thereafter the vertical flue shall be fitted. The manufacturer's instructions shall include the maximum length of horizontal run and the method of adaptation to a vertical flue.

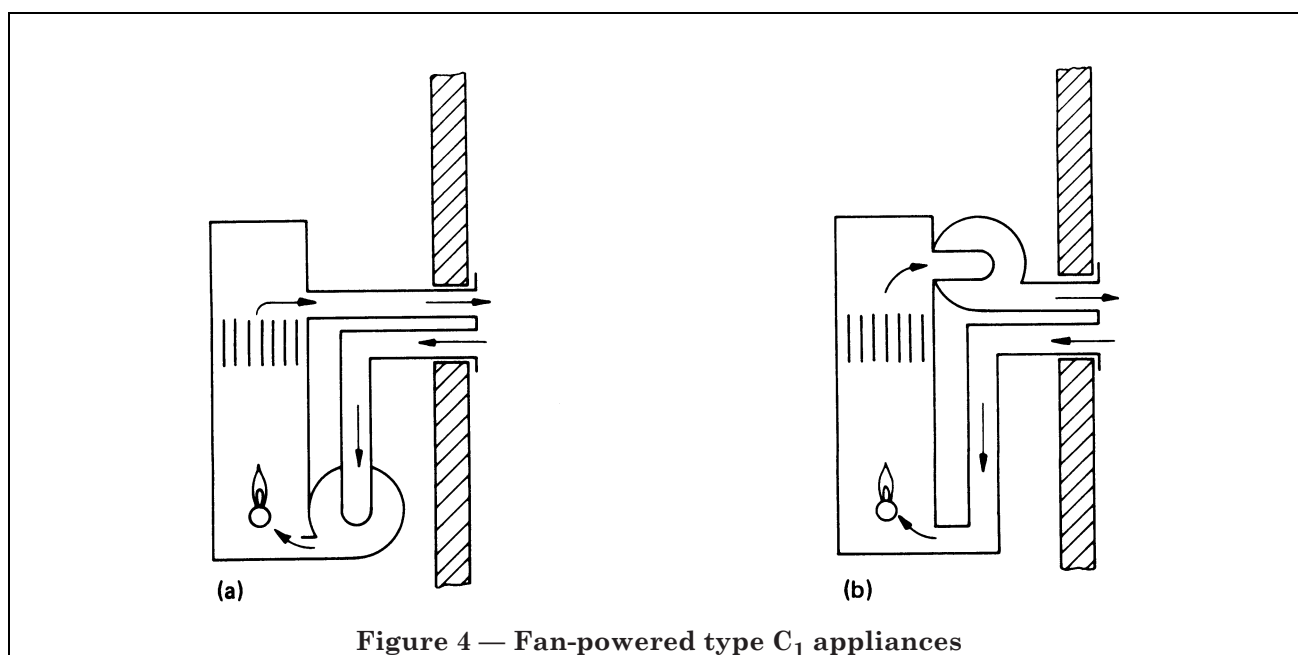
5.3.1.2 Fan-powered with draught diverter. Except where otherwise specified in section 2, an appliance with a vertical flue outlet shall be connected to a 1 m vertical secondary flue of the same nominal diameter as the flue outlet.

5.3.1.3 Fan-powered without draught diverter. Except where otherwise specified in section 2:

- a) an appliance intended to be used with a flue having a wall termination shall be connected to a flue having the same diameter as the flue outlet and a length appropriate to installation on a wall 300 mm thick;
- b) an appliance intended to be used with a vertical flue having a termination above roof level shall be connected to a 1 m vertical flue having the same diameter as the flue outlet.

Where a flue of maximum height is specified in section 2, it may be more convenient to apply an equivalent suction by means of a fan. The equivalent suction shall be calculated using the formulae given in Appendix A and shall be measured at the outlet of the appliance.

5.3.1.4 Fan-powered with integral fan in secondary flue. Except where otherwise specified in section 2, the appliance shall be connected to a 1 m secondary flue.

Figure 4 — Fan-powered type C_1 appliances

5.3.2 Type C_1 appliances

5.3.2.1 Natural draught. Except where otherwise specified in section 2, the appliance shall be tested in still air conditions with the flue ducts and terminal assembled in accordance with the manufacturer's instructions for installation on a wall 300 mm thick. For all tests, the ducts or wall liner, if provided, shall be insulated by wrapping with a single layer of flexible glass fibre matting of 64 kg/m^3 nominal density and 20 mm nominal thickness.

5.3.2.2 Fan-powered. Except where otherwise specified in section 2, the appliance flue/air ducts and terminal shall be assembled as for installation on a wall 300 mm thick. For all tests, the ducts or wall liner, if provided, shall be insulated by wrapping with a single layer of flexible glass fibre matting of 64 kg/m^3 nominal density and 20 mm nominal thickness.

5.3.3 Type C_2 appliances. Except where otherwise specified in section 2, the appliance shall be tested in still air conditions with the connecting ducts assembled in accordance with the manufacturer's instructions but not connected to a test duct. Due account shall be taken of variations in length of the ducts between the appliance and the Se-duct.

5.4 Test conditions

5.4.1 The test conditions given in 5.4.2 to 5.4.6 shall apply except where otherwise specified in section 2.

5.4.2 The appliance shall be examined for gas soundness both before and after the tests. The test results are deemed invalid unless the system is sound (see 7.1).

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

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

5.4.5 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.

NOTE 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.

5.4.6 Test pressures shall be measured correct to 0.2 mbar and the variation in test pressure shall 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 2. For 3rd family 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.

Section 2. 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.

6.2 Component location

Parts that are intended to be removable by the user, for example for cleaning, shall be readily accessible, shall not require the use of tools for their removal and shall be easy to assemble correctly and difficult to assemble incorrectly.

The burner shall be positively located and so arranged that it cannot be misaligned.

It shall not be possible to loosen complete burner assemblies, jets or injectors without the use of tools.

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 476-4), securely located and protected against mechanical damage and the effects of condensate. Asbestos-containing materials shall not be used for insulation.

6.6 Fans

The direction of rotation of fans shall be clearly marked.

Moving parts of fans shall be so arranged or enclosed as to provide, in normal use, adequate protection against personal injury. Access to such parts, for example for maintenance, shall not be possible without the use of tools. Compliance shall be checked by a test with a standard test finger similar to test finger I specified in BS 3042, but having a circular stop plate with a diameter of 50 mm instead of a non-circular plate.

6.7 Stability

6.7.1 Requirement. When the appliance is installed in accordance with the manufacturer's instructions it shall be stable.

In addition, if the appliance is not provided with means for fixing it to the wall or floor it shall not tilt or topple over when tested as described in **6.7.2**.

6.7.2 Method

6.7.2.1 Stand the appliance on a horizontal plane, without making a connection to the gas supply. Apply a horizontal force of 6 N to the top of the case.

6.7.2.2 Stand the appliance on a plane inclined at 5° to the horizontal with the appliance facing the direction of the incline, without making a connection to the gas supply.

7 Soundness

7.1 Gas soundness

7.1.1 General. All gas-carrying parts of the appliance shall be sound and, when connected, shall form a complete assembly that is sound.

7.1.2 Complete assembly

7.1.2.1 Requirement. When tested as described in **7.1.2.2** the fully assembled appliance shall be sound at the following internal air pressure.

Family	Air pressure
	mbar
1st	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 (see note) does not exceed 130 cm³/h over a period of 1 min.

NOTE A convenient method of measuring the leakage rate is by the bubble leak indicator illustrated in Figure 5.

7.1.2.2 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:

- with all gas taps in the OFF position;
- with all gas taps turned to the ON position and the flame supervision device 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.