

BRITISH STANDARD 4834 : 1972

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SPECIFICATION FOR
INSET OPEN FIRES
WITHOUT CONVECTION

BRITISH STANDARDS INSTITUTION

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INSET OPEN FIRES
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BRITISH STANDARDS INSTITUTION

Incorporated by Royal Charter

2 PARK STREET, LONDON, W1A 2BS

Telex: 266933

Telephone: 01-629 9000

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The Institution desires to call attention to the fact that this British Standard does not purport to include all the necessary provisions of a contract.

In order to keep abreast of progress in the industries concerned, British Standards are subject to periodical review. Suggestions for improvements will be recorded and in due course brought to the notice of the committees charged with the revision of the standards to which they refer.

This standard makes reference to the following British Standards:

- BS 21. Pipe threads.
- BS 410. Test sieves.
- BS 1016. Methods for the analysis and testing of coal and coke.
- BS 1017. The sampling of coal and coke.
- BS 1251. Open fireplace components.
- BS 1387. Steel tubes and tubulars suitable for screwing to BS 21 pipe threads.
- BS 2779. Fastening threads of BSP sizes.
- BS 3377. Back boilers for use with domestic solid fuel appliances.
- BS 3456. The testing and approval of household and electrical appliances.
- BS 4086. Recommendations for maximum surface temperatures of heated domestic equipment.
- BS 4892. Guide to the measurement of thermal radiation by means of the thermopile radiometer.
- CP 403. Open fires, heating stores and cookers burning solid fuel.

British Standards are revised, when necessary, by the issue either of amendment slips or of revised editions. It is important that users of British Standards should ascertain that they are in possession of the latest amendments or editions.

The following BSI references relate to the work on this standard:
Committee reference SFE/13 Draft for comment 70/26120

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CO-OPERATING ORGANIZATIONS

The Solid Fuel Industry Standards Committee, under whose supervision this British Standard was prepared, consists of representatives from the following Government departments and scientific and industrial organizations:

- Association of Consulting Engineers
- British Cast Iron Research Association
- *British Coke Research Association
- *British Ironfounders' Association
- British Mechanical Engineering Confederation
- *British Steel Industry
- Chamber of Coal Traders
- Chemical Industries Association
- *Coal Utilisation Council
- Coke Oven Managers' Association
- Combustion Engineering Association
- Council of Ironfoundry Associations
- Department of the Environment
- Department of Trade and Industry
- *Domestic Solid Fuel Appliances Approval Scheme
- Electricity Council, the Central Electricity Generating Board and the Area Boards in England and Wales
- *Gas Council
- Heating and Ventilating Contractors' Association
- Institute of British Foundrymen
- Institute of Fuel
- Institution of Gas Engineers
- *Institution of Heating and Ventilating Engineers
- Institution of Mechanical Engineers
- *Low Temperature Coal Distillers' Association of Great Britain Ltd.
- *National Coal Board
- Society of British Gas Industries
- Water-tube Boilermakers' Association
- *Women's Advisory Council on Solid Fuel

The scientific and industrial organizations marked with an asterisk in the above list, together with the following, were directly represented on the committee entrusted with the preparation of this British Standard:

- British Ceramic Research Association
- Ceramic Fireplace Tile Council
- Copper Cylinder and Boiler Manufacturers
- Institution of Municipal Engineers
- National Federation of Builders' and Plumbers' Merchants
- National Fireplace Manufacturers' Association
- Royal Institute of British Architects
- Solid Smokeless Fuels Federation
- Vitreous Enamel Development Council
- Women's Advisory Committee of BSI

BRITISH STANDARD SPECIFICATION FOR INSET OPEN FIRES WITHOUT CONVECTION

FOREWORD

This British Standard applies to all inset open fires without convection for burning solid fuels. It specifies constructional and performance standards which are applicable to inset open fires, both without and with boilers.

It constitutes a revision of BS 2845, Parts 1 and 2, and of BS 3128, bringing the requisite provisions into a single standard, together with the presentation of quantities in metric (SI) units. For these reasons, it has not been considered necessary to indicate in detail the changes from the previous standards.

As is the case with all solid fuel appliances, correct installation is important and reference should be made to the relevant British Standard Code of Practice, CP 403.

SPECIFICATION

1. GENERAL REQUIREMENTS

1.1 SCOPE

This British Standard specifies constructional and performance requirements and methods of test for inset open fires with or without boilers. It applies to all solid fuel burning inset open fires not specifically designed to give space heating by convection.

NOTE. The titles of the British Standards referred to in this standard are listed on page 2.

1.2 MATERIALS OF CONSTRUCTION

The materials from which the component parts of the appliance are made shall be suitable for the purpose. This implies that the assembled appliance will be durable in use.

After testing, the appliance shall be examined for permanent damage. This shall be negligible.

1.3 GENERAL DIMENSIONS

The appliance shall be designed for use either with fireplace components as specified in BS 1251, assembled in accordance with CP 403, or with special fireplace components which shall be supplied with it. BS 1251 specifies fireplace components for use with fires nominally sized 350 mm, 400 mm and 450 mm. A fire of any other size will thus require special components.

In order that the firefront may fit with the fireplace surround the dimension D in Fig. 1 shall be within ± 3 mm of the nominal size.

1.4 BOTTOMGRATE

The air space between the bars of the bottomgrate shall be 13 ± 2 mm. The bottomgrate shall be easily removable and shall be either designed or suitably marked to avoid incorrect fitting. The construction shall be such that the total sideways movement does not exceed 3 mm. The support of the bottomgrate shall be such that a minimum of obstruction is offered to the complete removal of ash from the ashpit.

When the appliance is installed in accordance with the manufacturer's instructions:

(1) it shall not be possible to pass a 31 mm diameter sphere, nor at any point other than a corner a 19 mm diameter sphere, from above the bottomgrate into the ashpit;

(2) it shall be possible to locate the bottomgrate so that there is a clearance of not less than 6 mm between it and the fireback or boiler.

If the appliance is supplied with its own fireback or with a boiler flue set, the bottomgrate shall be installed therein for the tests (1) and (2) above. Otherwise it shall first be tested in a model fireback of the maximum dimensions specified in BS 1251; secondly, with the bottomgrate trimmed to suitable dimensions, if adjustable, in a model fireback of the mean dimensions in BS 1251. Test (2) above applies only to the latter.

1.5 FRONT FIREBARS AND FALLPLATE

An appliance with front firebars, other than a deepening bar, should preferably be provided with a fallplate or front cover, which shall be so constructed that when in the closed position it cannot be accidentally pushed open, for example by movement of the fuel. An appliance fitted with such a fallplate or front cover does not comply with the requirements of this standard unless it is also fitted with front firebars. The upper edge of the fallplate shall not project above the upper edge of the topmost firebar.

The space between any front firebars, and that between the bottom bar and the firefront, shall be such that a probe of 19 mm diameter cannot be inserted horizontally between them. The firebars shall be horizontal from side to side and shall slope downwards and inwards towards the fuelbed.

The front firebars shall not be capable of incorrect location.

1.6 DEEPENING BAR

If a deepening bar, i.e. a single bar, is provided it shall be so constructed as to prevent fuel and ash spillage. It shall be positively located when in position for use and, if intended to be removable, shall be capable of easy removal at all times.

The bar shall be horizontal from side to side, shall slope downwards and inwards towards the fuelbed, and its lower edge shall be not more than 25 mm above the top of the firefront at any point.

1.7 DEEPENING PLATE

If a deepening plate is provided it shall not be capable of incorrect location and shall remain firmly in place.

1.8 CLOSURE PLATE

If a closure plate is provided it shall not be capable of incorrect location. It shall remain firmly in place and not obstruct the free passage of the products of combustion.

1.9 AIR CONTROL

The appliance shall be so constructed that when it is correctly installed the primary air shall enter the ashpit only through the designed air inlet(s).

For an overnight burning appliance, if the hearth forms the base of the ashpit, the firefront shall incorporate a sealing strip.

The design of the fire shall be such that the complete closure of the air control is not likely to be prevented by spilled ash or fuel.

The air control shall be capable of maintaining any position in which it is intended to be set. It shall be capable of adjustment to at least three intermediate positions between fully closed and fully open. Two of these shall be between the fully closed position and that in which 30 % of the air inlet area of the fully open position is obtained. It is strongly recommended that means of fine control, especially in the nearly closed position, be provided.

1.10 ASHPAN

An ashpan shall be provided, constructed of steel not thinner than 0.9 mm. Its capacity shall be not less than 0.0018 m³, 0.0021 m³ and 0.0025 m³ for 350 mm, 400 mm and 450 mm fires respectively.

The capacity is to be assessed with dry sand, levelled and with any open end having the sand at an angle of 45° to the horizontal. Alternatively, the capacity may be assessed geometrically.

The ashpan shall be so designed and constructed to ensure that it:

- (1) collects the ash from the whole area of the bottomgrate so far as is practicable;
- (2) locates in the ashpit in such a way that it allows the free passage of primary air and does not obstruct any primary air control;
- (3) can be easily withdrawn and safely carried whilst full of hot ash;
- (4) does not distort unduly in use.

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1.11 ASHPIT

The height from the bottom of the inside of the ashpan to the underside of the bottomgrate shall at no point be less than 75 mm.

The design of the ashpit cover shall be such that:

- (1) its closure is not prevented by spilled undergrate material;
- (2) it is difficult to dislodge accidentally from the closed position;
- (3) it can be handled easily when hot with the tool(s) provided;
- (4) it maintains an effective seal of the ashpit opening.

1.12 IGNITION BURNER

1.12.1 General. Open fires, with the exception of underfloor air supply fires, shall be designed in one of the following ways.

(1) For the incorporation of an integral gas ignition burner with facilities for right and left hand connection complying with the requirements of 1.12.2. Where an ignition burner is not supplied, the firefront shall be suitably plugged.

(2) For use with an applied underbar igniter complying with the requirements of 1.12.3.

Any burner supplied shall be suitable for use with natural gas.

1.12.2 Integral gas ignition burner. The burner shall comply with the requirements of appendix A.

The threads of the gas supply connection shall comply with the requirements of BS 21 for R $\frac{1}{4}$ or R $\frac{1}{2}$ type threads.

Unless the fire is supplied exclusively with its own surround, the distance between the rear edge of the side of the firefront and the centre line of the burner connection at the point where the burner or pipe leaves the firefront, shall be not less than 64 mm, so that a satisfactory fixing is possible within a surround incorporating a 50 mm return at the fireplace opening (see Fig. 1).

The burner shall be so located that misalignment during fixing is not possible. Flash ignition is recommended, and, if provided, shall be so designed as to avoid undue spillage of gas at the front of the open fire. The burner shall be positioned so that the flames shall pass between the bars along a line about midway between the front and back of the bottom grate.

1.12.3 Underbar igniter. The burner bar and handle tube shall be made of low carbon or alloy steel or other equally durable metal.

The threads of the gas supply connection shall comply with the requirements of BS 21 for $R_c^{1/8}$ type threads.

The dimensions, tolerances and weights of low carbon or alloy steel tubes shall be not less than those specified for *Medium* tube in BS 1387.

The burner shall be supplied with a suitable aeration device (see Fig. 7).

The handle shall afford an adequate grip and shall be made of a non-combustible material. If a metal handle is employed, it shall be designed so as to permit sufficient circulation of cool air to prevent the attainment in normal use of temperatures exceeding 55°C . The handle shall be secure so as not to twist or slip in use.

If the gas connection is in line with the handle tube, the diameter of the flange carrying the connection thread shall be not less than 19 mm and the flange shall not project beyond the face of the handle more than 5 mm. The distance between the centre of the gas connection and the hearth shall be not less than 25 mm.

If the connection is made by means of an elbow, this shall be permanently webbed with a quadrant web as shown in Fig. 8(a), or provided with a flange as shown in Fig. 8(b).

If the gas connection is arranged at an angle to the handle tube, it shall be provided with a flange of 19 mm minimum diameter and 5 mm maximum thickness of shoulder.

In any case, the flange shall be provided with one or more pairs of flats to facilitate assembly and fitting of the gas connection.

With the flame-ports sealed and the burner connected to an air supply at a pressure of 40 mbar, no leakage shall be observed within 10 s, as shown by a bubble leak indicator or by immersing the burner in water.

The burner shall be capable of being firmly located during use so that the flames shall pass between the bars along a line about midway between the front and back of the bottom grate.

1.13 BOILER

Any boiler shall comply with the requirements of BS 3377. The manufacturer shall supply the testing authority with a certificate setting out the quality and thickness of the material from which the boiler is constructed and the pressure test to which it has been subjected.

1.14 BOILER FLUE

Any boiler flue shall be accessible for and capable of easy cleaning. Any flue plates which it is necessary to remove shall be easy to remove and replace, and shall not be capable of incorrect location.

If a boiler flue damper is fitted it shall be designed to ensure correct assembly and shall be capable of maintaining any position in which it is intended to be set.

2A

The design and shape of the flue aperture when fully opened shall be such that it cannot be blocked by soot or fly ash.

The lower edge of any boiler flue mouth shall be at least 25 mm above the adjacent top surface of the bottomgrate.

1.15 CHIMNEY-THROAT RESTRICTOR

Any chimney-throat restrictor shall comply with the relevant requirements of BS 1251.

1.16 TOOLS

A suitable operating tool shall be provided where it would otherwise be necessary during normal operation of the appliance to touch any surface with a temperature that exceeds the appropriate value shown in BS 4086.

1.17 FINISH

The finish, other than a temporary finish, shall be durable and capable of being easily cleaned.

Suitable means for protecting the firefront from damage by heat, e.g. liners or firebars, shall be provided.

1.18 FIXING TO HEARTH

Means shall be provided for rigidly fixing the firefront to the back hearth. These shall not involve fixing through the superimposed hearth or into the fireplace surround.

1.19 INSTRUCTIONS

The manufacturer shall provide adequate instructions for the correct assembly, installation and operation of the appliance, and for chimney sweeping.

1.20 ELECTRICAL CONTROLS

Any electrical device shall comply with the requirements of the relevant parts of BS 3456.

1.21 MARKING

An inset open fire complying with the requirements of this British Standard shall carry the following markings:

- (1) Name by which the appliance is identified.
- (2) Identification mark of each part.

In addition the following markings shall be carried on a label attached to the fire, and/or in its container, and/or on the instruction card supplied:

- (3) The number of this British Standard, i.e. BS 4834.
- (4) The nominal size and the word 'Intermittent' or 'Overnight'.

NOTE. Attention is drawn to certification facilities offered by BSI; see the back cover of this standard.

2. PERFORMANCE REQUIREMENTS

In order to comply with the requirements of this British Standard, the appliance shall meet the requirements of the relevant column of Table 1 in two out of three consecutive valid tests carried out in accordance with the methods set out in Section 3.

TABLE 1. PERFORMANCE REQUIREMENTS

Test schedule	Requirements		
	Without boiler	With normal output boiler	With high output boiler
<i>High radiation output (HRO) test</i>			
Average overall efficiency (minimum) %	37*	45*	60
Average output (minimum)†:			
radiation for 350 mm fire kW	2.35	—	—
radiation for 400 mm fire kW	3.1	1.5	1.5
radiation for 450 mm fire kW	3.5	1.8	1.8
boiler kW	—	1.2	2.7
<i>High boiler output (HBO) test</i>			
Average overall efficiency (minimum) %		45	50
Average boiler efficiency (minimum) %		25	35
Average boiler output (minimum) kW		2.3	3.5
<i>Banking test (for overnight burning fires)</i>			
Period h	10	10	10
Fuel consumed during period (maximum) kg	4.0	5.0	5.0
<i>Slow-burning test (for intermittent burning fires only)</i>			
Period h	6	6	6
Fuel consumed during period (maximum) kg	4.0	4.0	4.0

* If the radiation output is more than 0.3 kW greater than that specified for the size of fire and minimum efficiency has not been attained, the fire may be retested with the radiation output reduced to within 0.3 kW above the minimum output specified, if this can be achieved by suitable adjustment.

† The average outputs in the last two columns for radiation and boiler shall be calculated on the mean test bench efficiencies to a combustion rate of 1.13 kg/h for 400 mm fires and of 1.36 kg/h for 450 mm fires, applying a calorific value of 30 240 kJ/kg. The average outputs shall be rounded off to the nearest 0.1 kW.