BRITISH STANDARD

BS 7952:2001

Specification for chemical firelighters in solid form used for the ignition of solid fuels in residential heating and cooking appliances

ICS 75.160.10; 97.180

Committees responsible for this British Standard

The preparation of this British Standard was entrusted to Technical Committee RHE/28, Domestic solid mineral fuel appliances, upon which the following bodies were represented:

British Association for Chemical Specialists
British Charcoal Group
Caravan Club
Consumer Policy Committee of BSI
Department of Trade and Industry

This British Standard, having been prepared under the direction of the Engineering Sector Committee, was published under the authority of the Standards Committee and comes into effect on
15 May 2001

BSI 05-2001

The following BSI references relate to the work on this standard:
Committee reference RHE/28
Draft for comment 99/701872 DC

ISBN 0 580 33243 8

Amendments issued since publication

Amd. No.	Date	Comments

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Foreword

This standard has been prepared under the direction of the Refrigerating, Heating and Air Conditioning Standards Policy Committee, RHE/-. It is a new standard and no other standard is superseded.

This standard deals with chemical firelighters in solid form used to light solid fuels in residential heating and cooking appliances, excluding barbecue appliances, and specifies the safety, performance, packaging and marking requirements for the product. Methods of test for verifying the requirements are also given as normative annexes.

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 this 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 and ii, pages 1 to 21 and a back cover.

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1 Scope

This British Standard specifies the safety, performance, packaging and marking requirements including the methods of test for chemical firelighters in solid form used to light solid fuels in residential heating and cooking appliances.

NOTE These chemical firelighters may somtimes be used to light campfires or bonfires.

This British Standard neither covers firelighters used to light solid fuels in barbecue appliances nor gas powered firelighters.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of this British Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. For undated references the latest edition of the publication referred to applies.

BS 1251, *Specification for open fireplace components.*

BS 1846-1, *Glossary of terms relating to solid fuel burning equipment — Part 1: Domestic appliances*.

BS 2000-57, *Methods of test for petroleum and its products — Part 57: Petroleum products — Determination of the smoke point of kerosine*.

BS 2000-107, *Methods of test for petroleum and its products — Part 107: Determination of sulfur — Lamp combustion method.*

BS 2000-156, *Methods of test for petroleum and its products — Part 156: Liquid petroleum products — Determination of hydrocarbon types — Fluorescent indicator adsorption method*.

BS 2000-170, *Methods of test for petroleum and its products — Part 170: Petroleum products and other liquids — Determination of flash point — Abel closed cup method.*

BS 3900-A8, *Methods of test for paints — Part A8: Test for flash/no flash (closed cup equilbrium method).*

BS 3900-A9, *Methods of test for paints — Part A9: Determination of flashpoint (closed cup equilibrium method).*

BS 3900-A13, *Methods of test for paints — Part A13: Test for flash/no flash (rapid equilibrium method).*

BS 4834:1990, *Specification for inset open fires without convection with or without boilers, burning solid mineral fuels.*

BS 6999, *Specification for vitreous-enamelled low-carbon-steel flue pipes, other components and accessories for solid-fuel-burning appliances with a rated output of 45 kW.*

BS EN ISO 13736, *Petroleum products and other liquids — Determination of flash point — Abel closed cup method*.

BS EN 22719, *Methods of test for petroleum and its products — Petroleum products and lubricants. Determination of flash point — Pensky-Martens closed cup method*.

EN 57, *Petroleum products — Determination of flash point — Abel-Pensky closed tester*.

ISO 1516, *Test for flash/no flash (closed cup equilibrium method)* [Equivalent to BS 3900-A8:1986 (1991)].

ISO 1523, *Determination of flash point (closed cup equilibrium method)*
[Equivalent to BS 3900-A9:1986 (1991)].

ISO 2719, *Petroleum products and lubricants — Determination of flash point — Pensky-Martens closed cup method* [Equivalent to BS EN 22719:1994].

ISO 3679, *Paints, varnishes, petroleum and related products — Determination of flash point — Rapid equilibrium method.*

ISO 3680, *Test for flash/no flash (rapid equilibrium method)* [Equivalent to BS 3900-A13:1986 (1991)].

3 Definitions

For the purposes of this British Standard the definitions given in BS 1846-1 apply together with the following:

3.1
consumer package
the individual packaging unit, as purchased by the consumer, which can normally contain several individual firelighters

3.2
outer case
the packaging unit, as supplied to the wholesaler or retailer, that normally contains several individual consumer packages

4 Performance

4.1 Burning characteristics

When tested in accordance with the test method described in Annex A the firelighter shall ignite readily after application of a naked flame to a broken edge or corner. Once ignited the firelighter shall burn steadily, without flaring, sudden deflagrations, sparking, spitting, popping, dripping, explosion or loss of integrity until the firelighter is totally consumed.

4.2 Ignition time

When tested in accordance with the test method described in Annex B the mean time taken from initial ignition of the firelighter to achieving a radiation intensity of 315 W/m^2 from the fire shall not exceed 60 minutes.

5 Safety

5.1 Flash point

When determined in accordance with the test method described in Annex C, the flash point of any liquid fuel constituent of the firelighter shall be greater than or equal to 38 °C.

5.2 Firelighter Composition

5.2.1 The firelighter shall not contain any substance or preparation classified as very toxic, toxic, corrosive, explosive, oxidizing, sensitizing or class 1 or 2 carcinogen in accordance with the Classification, Packaging & Labelling of Dangerous Preparations Directive 88/379/EEC of 7th June 1988.

5.2.2 When determined in accordance with the appropriate test method specified in BS 2000 the properties of any liquid fuel constituent used in the preparation of the firelighter shall conform to the following.

a) Aromatic content $\leq$ 25 % (m/m) determined in accordance with BS 2000-156:1997.

b) Sulfur content $\leq$ 0.2 % (m/m) determined in accordance with BS 2000-107:1993.

c) Smoke point $\geq$ 20 mm determined in accordance with BS 2000-57:1995.

6 Consumer Packaging

6.1 The firelighter shall be packaged in such a way as to contain the product, protect it against environmental pollution, ensure safe handling, storage and transportation and ensure the safety of the consumer.

6.2 When tested in accordance with the test method specified in Annex D the consumer package shall maintain its integrity, quality of sealing, freedom from stains and dryness.

7 Product Marking

The consumer package shall be clearly marked with the following:

a) the number and date of this British Standard, i.e. BS 7952:2000[1)];

b) the manufacturer's or supplier's name and address;

c) the product description and intended use;

d) instructions for the safe storage and use of the firelighters;

e) instructions to ensure the environmentally responsible and safe disposal of any unused product and/or packaging;

f) risk and safety phrases;

g) warnings and hazard symbols;

h) product coding, indicating traceability of goods.

NOTE 1 It is essential that warnings and hazard symbols should be in accordance with the Classification, Packaging & Labelling of Dangerous Preparations Directive 88/379/EEC of 7th June 1988.

NOTE 2 It is recommended that the user should be advised not to dispose of any consumer packaging that contains any marking, warning or instructions until all the firelighters have been used and that a list of the constituents of the firelighter should be indicated on the packaging.

[1)] Marking BS 7952:2000 on or in relation to a product represents a manufacturer's declaration of conformity, i.e. a claim by or on behalf of the manufacturer that the product meets the requirements of the standard. The accuracy of the claim is solely the claimant's responsibility. Such a declaration is not to be confused with third-party certification of conformity.

Annex A (normative)
Method of test for determining the burning characteristics of a firelighter

A.1 General

The purpose of the test shall be to establish the ease of ignition of a firelighter and to assess the manner in which it burns in accordance with the test procedure specified in **A.3**. The test shall be carried out in duplicate on separate pieces of firelighter removed from two individual consumer packages and the mean time for the ignition of the firelighter shall be calculated from the test results as specified in **A.4**.

A.2 Test apparatus

The following test apparatus is required:

a) a laboratory fume cupboard which is operated at the minimum extraction rate necessary to just safely evacuate the products of combustion produced by the burning firelighter;

b) a laboratory tripod and wire gauze for supporting the burning firelighter within the fume cupboard;

c) a stopwatch calibrated in seconds, for measuring the ignition time.

NOTE In the interest of safety it is recommended that the tester's face and hands should be adequately protected when undertaking this test.

A.3 Test procedure

Carry out the test in a laboratory where the ambient air temperature is maintained within 20 ± 5 °C. Switch on the extractor fan of the fume cupboard and operate it at the minimum extraction rate necessary to just safely evacuate the products of combustion produced by the burning firelighter. Set up the wire gauze on the tripod inside the fume cupboard. Select one individual unopened consumer package of firelighters from a newly opened outer case. Remove one piece of firelighter from the consumer package and place on the wire gauze, on the tripod. Apply a naked flame for a period not exceeding five seconds either to a broken edge or to one corner of the firelighter in accordance with the firelighter manufacturer's instructions. Simultaneously start the stopwatch on first application of the flame.

Measure the time, in seconds, from first applying the flame until ignition of the firelighter is achieved.

Observe the firelighter during the period from ignition to burning to extinction and note any signs of flaring, sudden deflagrations, sparking, spitting, popping, dripping, loss of integrity or explosion.

Repeat this procedure using another piece of firelighter removed from a second individual unopened consumer package chosen from the same previously opened outer case.

A.4 Treatment of results

Calculate and record from the results of the duplicate tests the mean time, in seconds, from first applying the flame until ignition of the firelighter is achieved.

Record also any signs of flaring, sudden deflagrations, sparking, spitting, popping, dripping, loss of integrity or explosion observed during the tests.

Annex B (normative)
Method of test for ignition performance of a firelighter

B.1 General

The purpose of the test shall be to establish the ignition performance of firelighters intended for use in residential heating appliances burning solid fuel using a standardized test installation and a standardized test fuel as specified in **B.2** and **B.3** respectively. The test procedure as specified in **B.4** shall be carried out at least in triplicate and the mean value and the standard deviation of the ignition times obtained from the tests shall be calculated as specified in **B.5**.

B.2 Test installation

B.2.1 *Test Setting*

The arrangement of the test setting shall be as specified in Figure B.1 and Figure B.2. The materials for constructing the metal box and gather are only suggestions and any materials, which are fit for purpose, may be employed in their construction. The setting consists of a metal box into which is fitted a refractory fireback conforming to BS 1251. The height of the knee of the fireback above the hearth level shall be (520 ± 10) mm which can be achieved by placing the fireback on a shaped concrete plinth of the required thickness. An open fire conforming to **B.2.2** shall be fitted into the refractory fireback. The void surrounding the fireback shall be filled with exfoliated mica insulation. The setting incorporates a tiled surround as shown (hearth is optional) which shall be fixed rigidly to the frame of the box. The flue shall be constructed from a vitreous enamelled steel fluepipe conforming to BS 6999 and having a nominal internal diameter of 150 mm. The height of the fluepipe shall be between 1 370 mm and 1 830 mm and shall be fitted with its socket end downwards so that it fits over the metal gather as shown in Figure B.1a).

The whole test setting shall be positioned so that it is sheltered from draughts and such that the sensing element of the moll thermopile is not exposed to sunlight or other radiation which may affect its readings.

The products of combustion shall be removed by a suitable extraction system, which terminates in a hood located above the outlet end of the flue. Removal of the combustion gases from the hood may be by either natural draught or an extraction fan provided that the system has no effect upon the draught in the flue.

B.2.2 *Open Fire*

The open fire shall be the London/Fulham Mk II 400 mm inset fire as shown in Figure B.3 and is used without a deepening bar or plate and fitted with a cast iron bottomgrate as shown in Figure B.3. The gas burner as shown in Figure B.3 is not required for this test. The fire is set back as far as possible in the setting. It is not necessary to screw the firefront to the hearth or to seal the fire to the setting although the latter is recommended to aid security of the fire.

B.2.3 *Radiation intensity measurement*

The radiation intensity emitted from the fire shall be measured using a calibrated Moll type Thermopile securely positioned as shown in Figure B.4. The e.m.f. generated by the thermopile shall be measured using a potentiometric chart recorder calibrated in 0.1 mV intervals.

The radiation intensity *RI*, expressed in W/m^2 is given by the equation:

$$RI = (m/f) \times 10{,}000$$

where

m is the electrical output of the moll thermopile in millivolts (mV).

f is the thermopile factor in millivolts per watt per square centimetre(mV/Wcm^2).

For thermopiles which are not temperature compensated a water cooled backing plate shall be fitted as shown in Figure B.5 so that a flow of approximately 25 ml/min of water at ambient temperature of 15 ± 3 °C can be passed during the test.

B.2.4 ***Timer***

A stop watch calibrated in seconds is required for measuring the ignition time of the fuel beginning from when the firelighter(s) is first lit.

B.2.5 ***Weighing Apparatus***

A calibrated balance with a capacity of 10 kg accurate to 0.01 kg is required for weighing the mass of the test fuel.

B.3 Test Fuel

The fuel used shall be Test Fuel A whose specification and preparation shall be as specified in Appendix B of BS 4834:1990.

B.4 Test Procedure

B.4.1 ***Preparation of ignition charge***

Take a sample of between 8 kg to 10 kg mass of test fuel. From this sample select (1.0 ± 0.1) kg of smaller sized (i.e. less than 35 mm size, judged by eye) fuel, and (1.0 ± 0.1) kg of larger sized fuel (i.e. greater than 35 mm size) out of the sample. Keep the two selected sized portions of fuel separate, this 2 kg of fuel is the ignition charge.

B.4.2 ***Method***

The test shall be carried out in a cold test setting i.e. one in which the radiation intensity, as measured by the Moll thermopile, does not exceed 16 W/m^2 and which has been cleared of residue from a previous test. If the test is to be repeated on the same day, carefully clear out and discard the burning fuel from the grate and position a fan in front of the test setting to aid its cooling until the measured radiation intensity is below the specified level.

Place a single layer of the selected small sized fuel, from the ignition charge, on the centre of the grate to cover approximately two-thirds of the total grate area.

Place the required number of firelighters on the layer of fuel so that their longitudinal axes are parallel to the front of the appliance unless otherwise specified by the firelighter manufacturer. Record the number of firelighters used in the test.

Set the air control (ashpit cover) to 19 mm open, using a suitable spacer. Begin recording the millivolt output from the moll thermopile.

Ignite the firelighter(s) by application of a flame in accordance with the firelighter manufacturer's instructions, simultaneously start the stopwatch. Allow at least one minute for the flames to spread over the body (or bodies) of the firelighter(s) then carefully cover the burning firelighter(s) with the remainder of the ignition charge, placing the smaller sized fuel pieces closest to the firelighter(s).

NOTE Before lighting the firelighter(s) it may be convenient to surround but not completely cover the topmost surface of the firelighter(s) with some of the remaining smaller sized fuel from the ignition charge. Some of the larger sized fuel from the ignition charge may aso be placed around the outside but slightly away from the firelighter(s) to provide support for the smaller sized fuel.

Record the actual time taken for the flames to spread over the body (or bodies) of the firelighter(s) from first applying the flame. Observe the radiation intensity from the fire and when it attains 158 W/m^2 open the ashpit cover fully. Record the time taken, in minutes and seconds, from the time the firelighter(s) were first lit until the radiation intensity reaches 158 W/m^2.

Continue to observe the radiation intensity from the fire and record the time taken, in minutes and seconds, from the time the firelighter(s) were first lit until the radiation intensity reaches 315 W/m^2. This is the ignition time.

Repeat this procedure a further twice using another two separate batches of size selected test fuel.

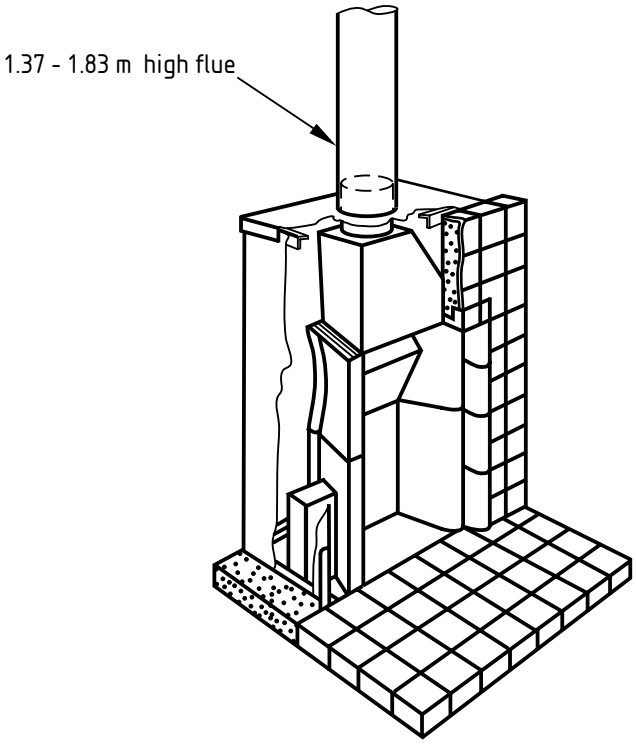
B.5 Results

Using the three determined values of the ignition times calculate their mean value and their standard deviation.

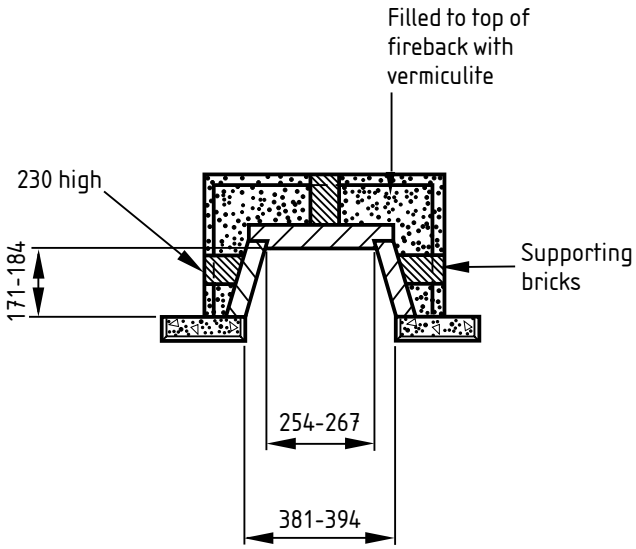
If the standard deviation of the three determinations of the ignition time is greater than 5 minutes, then a fourth determination shall be made and a new mean and standard deviation calculated. If the standard deviation of the four determinations is lower than that of the initial three determinations then the mean result of the four results shall be reported and a comment made in the report that "four tests were done due to abnormal spread of results". If the standard deviation of the four determinations is greater than that of the three initial determinations then a fifth determination shall be made and the mean result of all five tests shall be reported. If five tests are undertaken then a comment shall be put in the report stating "repeatable results were difficult to obtain".

Also report the number of firelighters used in the tests and the length of time taken for the flames to spread over the body or bodies of the firelighter(s).

Dimensions in millimetres



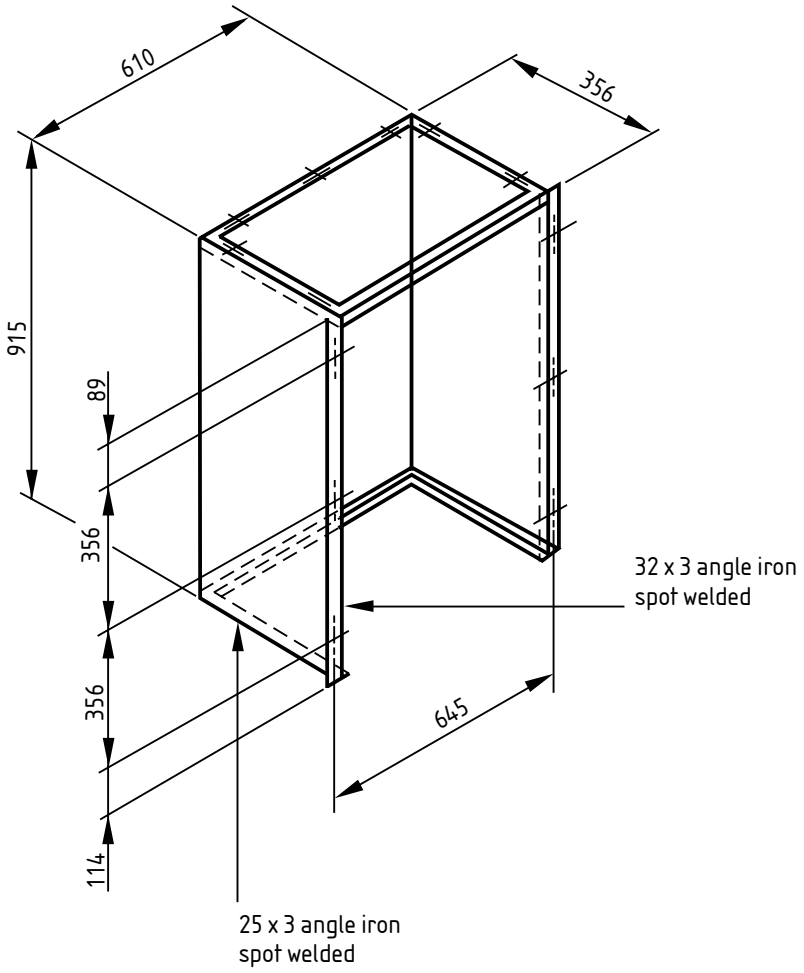
a) Assembly



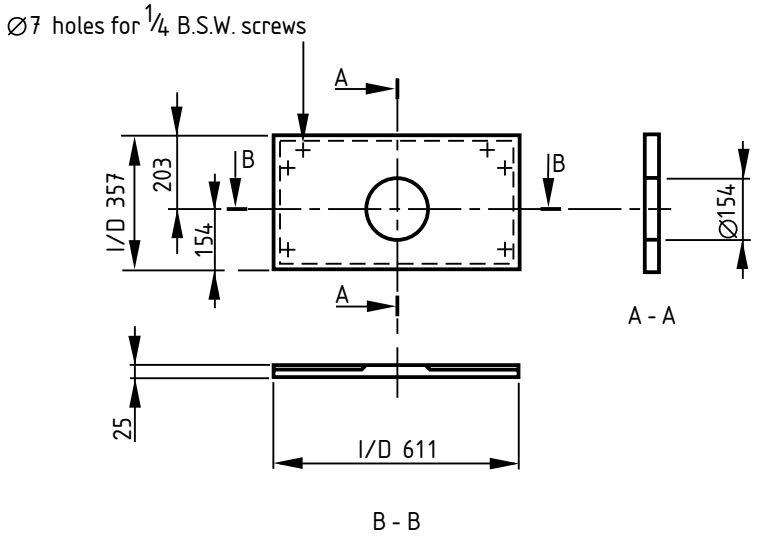
b) Method of supporting fireback

Figure B.1 — Arrangement of test setting

Dimensions in millimetres



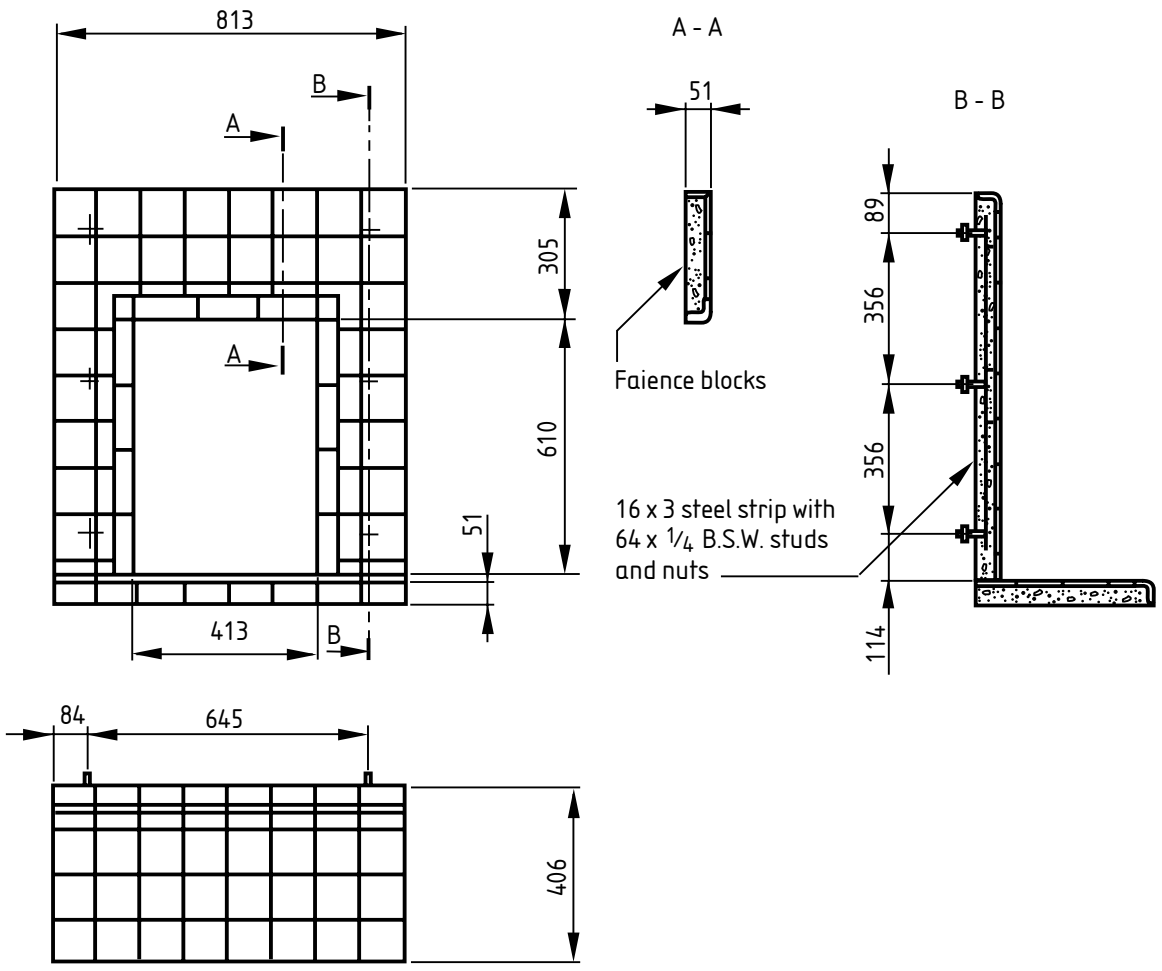
c) Metal box (back and sides in one piece)



d) Top of box

Figure B.1 — Arrangement of test setting *(continued)*

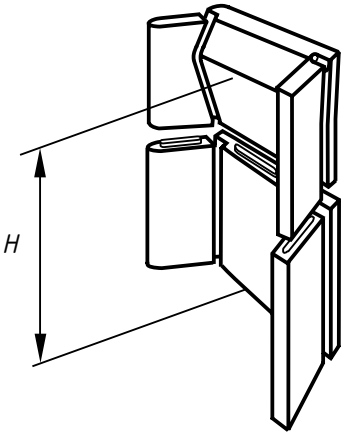
Dimensions in millimetres



e) Tiled surround and hearth

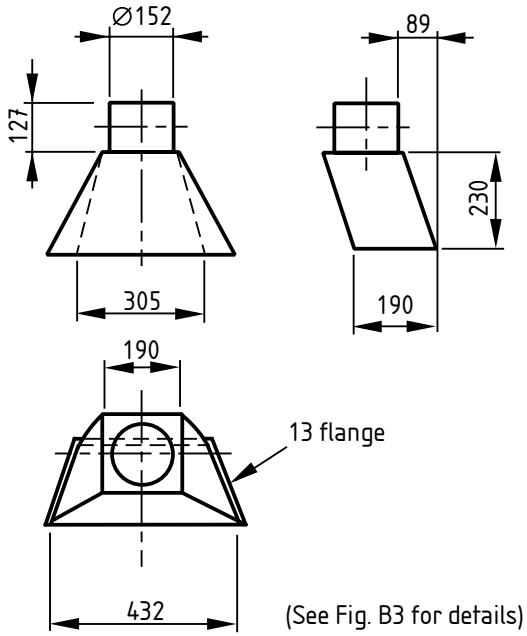
Figure B.1 — Arrangement of test setting *(continued)*

Dimensions are in millimetres



H = 520 ±10 otherwise as BS 1251

f) 400 mm fireback



g) Metal gather

Figure B.1 — Arrangement of test setting *(concluded)*

Dimensions in millimetres

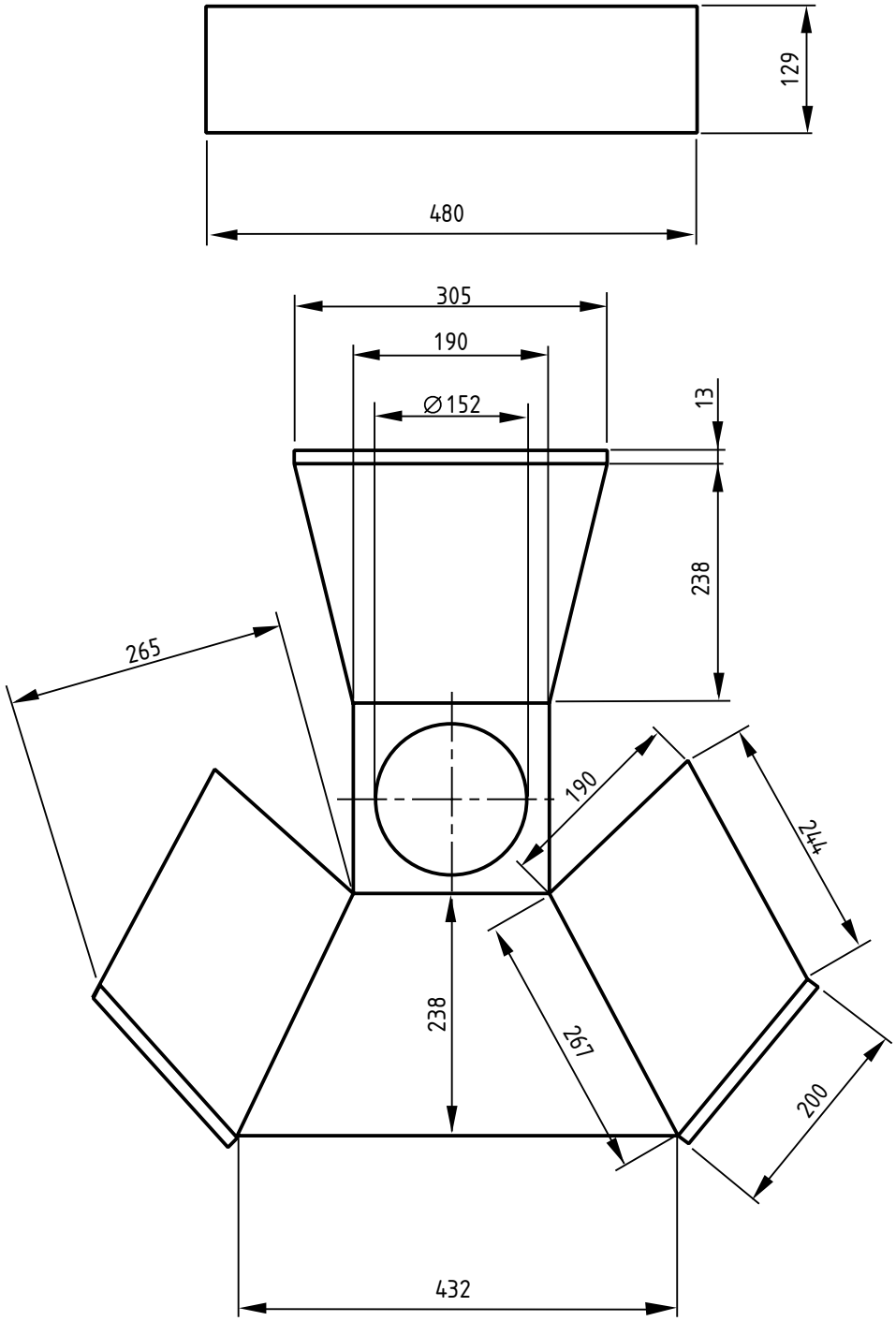
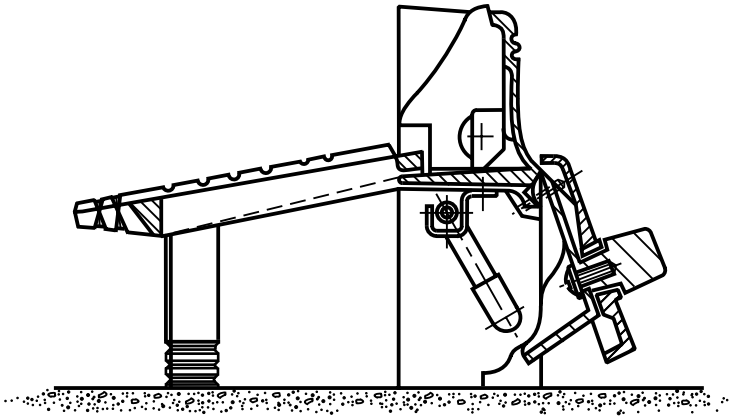


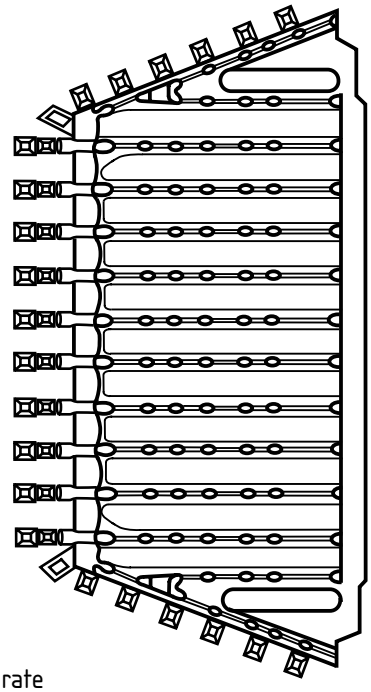
Figure B.2 — Dimensions and development of metal gather

Dimensions are in millimetres (inches)



Assembly

Space between grate bars
15.9 ±0.8



Bottomgrate

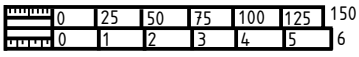
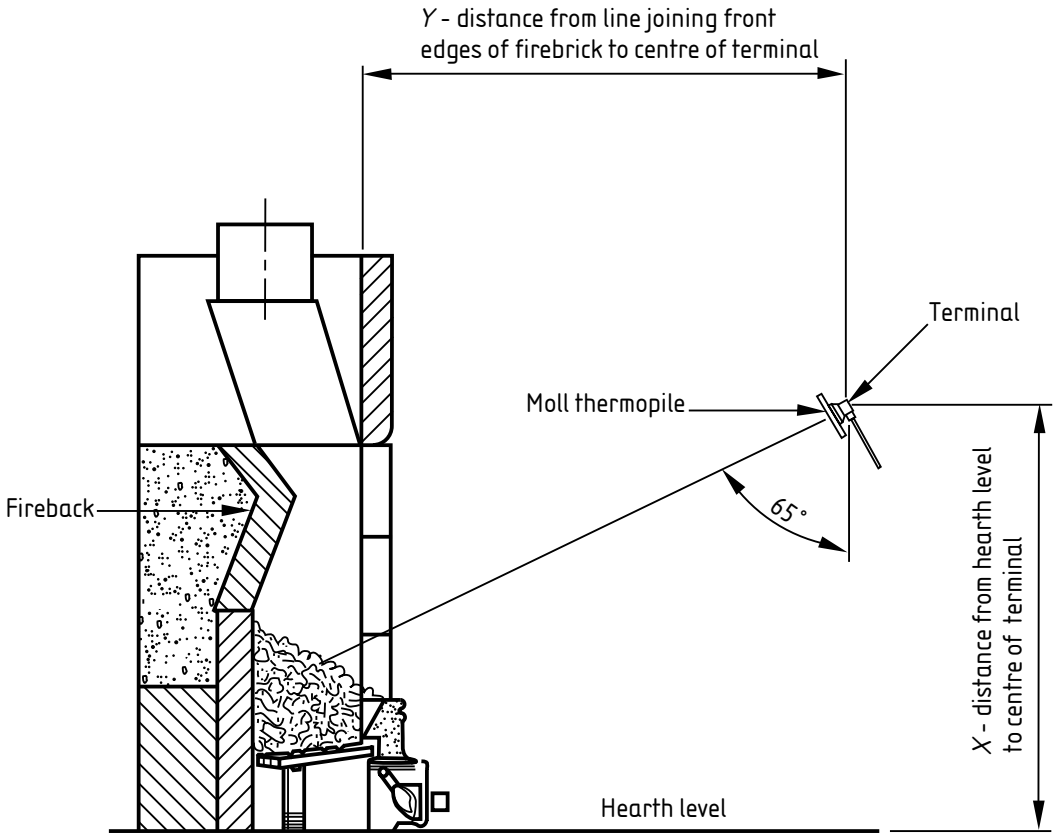


Figure B.3 — The London Fulham MkII Inset Open Fire

Dimensions are in millimetres



Grate	Moll thermopile			
	Land Pyrometers Ltd.		Cambridge Instrument Co. Ltd.	
	X distance	*Y* distance	*X* distance	*Y* distance
	mm	mm	mm	mm
London/Fulham Mark II	684	811	673	787.5

Figure B.4 — Positioning of Moll thermopile

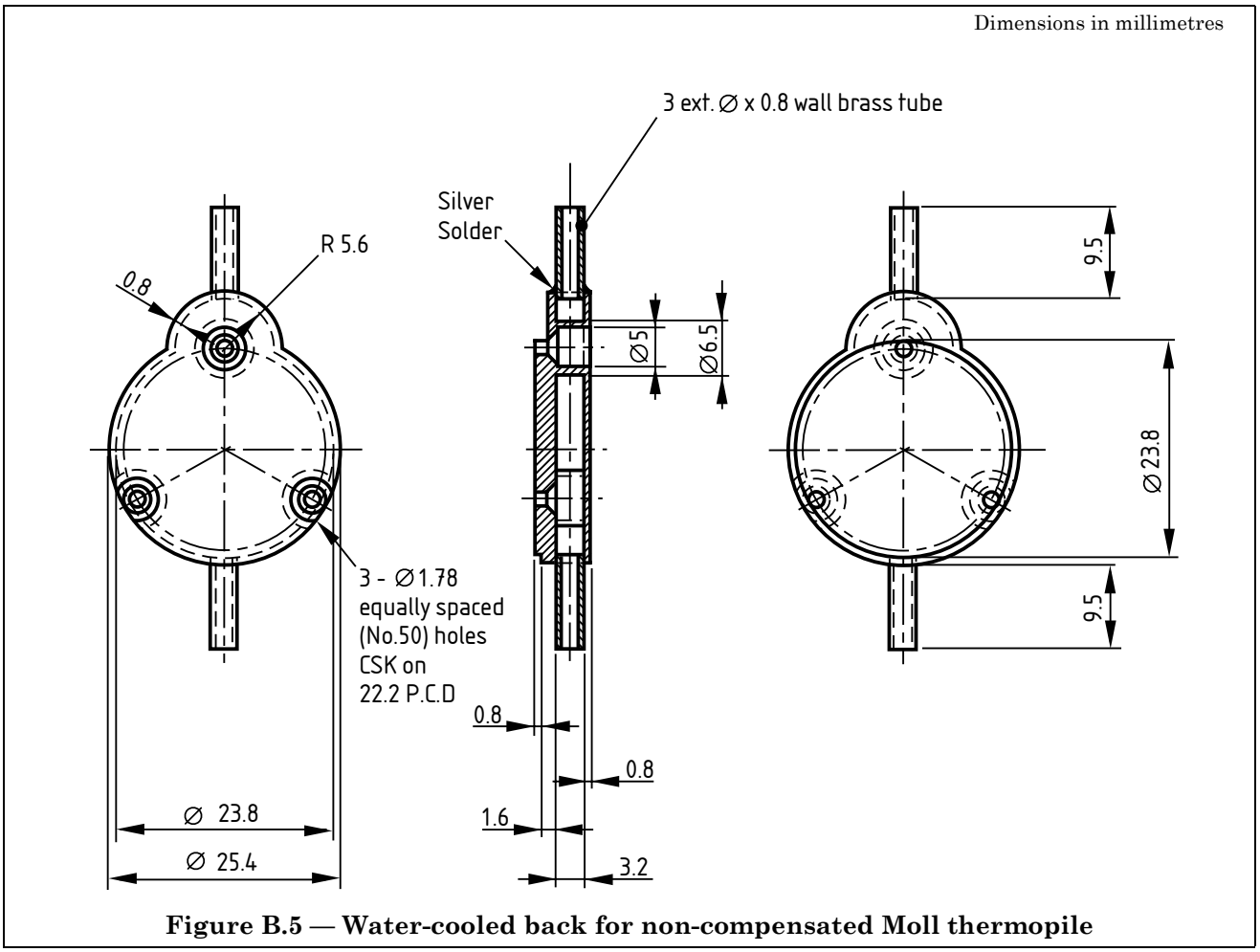


Figure B.5 — Water-cooled back for non-compensated Moll thermopile

Annex C (normative)
Methods for the determination of the flash point of liquid fuel constituents

C.1 General

The flash point of the liquid fuel constituents shall be determined by either:

a) one of the equilibrium methods specified in **C.2**; or

b) one of the non-equilibrium closed cup methods specified in **C.3**.

The use of any method or apparatus referred to in **C.2** or **C.3** is subject to the conditions specified in the appropriate standard particularly having regard to the nature of the substance (e.g. viscosity) and to the flash point range.

C.2 Equilibrium methods

The equilibrium methods referred to in **C.1**a) are those specified in the following British or International standards.

a) BS 3900-A8 [Equivalent to ISO 1516].

b) BS 3900-A9 [Equivalent to ISO 1523].

c) BS 3900-A13 [Equivalent to ISO 3680].

d) ISO 3679.

C.3 Non-equilibrium closed cup methods

C.3.1 *General*

The non-equilibrium closed cup methods referred to in **C.1**b) are either one of those apparatus or methods specified in **C.3.2**, **C.3.3** and **C.3.4**.

NOTE Alternative non-equilibrium closed cup methods are also specified in the following standards.

a) French Standard NF T66-009 using the Abel apparatus.

b) German Standard DIN 51755 using the Abel-Pensky apparatus.

c) American Standard ASTM D-93 using the Pensky-Martens apparatus.

d) American Standard ASTM D-56 using the Tag apparatus.

C.3.2 *Abel Apparatus*

This apparatus shall be used in accordance with the procedures specified in the following standards.

a) BS 2000-170.

b) BS EN ISO 13736.

C.3.3 *Abel-Pensky Apparatus*

This apparatus shall be used in accordance with the procedure specified in EN 57.

C.3.4 *Pensky-Martens Apparatus*

This apparatus shall be used in accordance with the procedure specified in BS EN 22719. [Equivalent to ISO 2719]

Annex D (normative)
Method of test for the evaluation of the consumer package

D.1 Purpose

The purpose of the test is to establish the integrity and suitability of the consumer package for a firelighter, in terms of adequate protection of the contents, prevention of environmental pollution, facilitation of safe handling, storage and transportation and safety of the consumer.

Assessment of suitability shall be on the basis of visual inspection of the firelighter consumer packages as supplied and again following exposure to elevated temperature and relative humidity in accordance with the procedure specified in **D.2**.

D.2 Procedure

From a newly opened outer case select, at random, four individual unopened consumer packages of firelighter. These four consumer packages shall be used for the test.

Visually inspect two of the four selected individual consumer packages for integrity of wrapping, quality of sealing, freedom from liquid fuel stains and dryness.

Subject the two previously inspected consumer packages to an elevated temperature of 35^{+2}_{0} °C and to a relative humidity of (65 ± 2) % for 48 h. Allow the consumer packages to equilibrate at (20 ± 1) °C for 4 hours and then visually re-inspect the consumer packages for any loss of integrity, deterioration in quality of sealing, staining and wetness.

Repeat the procedure with the two remaining consumer packages.

D.3 Treatment of Results

Record whether any loss of integrity, deterioration in quality of sealing, staining and wetness was noted with the consumer packages both before and after being subjected to elevated temperature and relative humidity.

Bibliography

Standards references

NF T66-009:1969, *Petroleum and derivatives — Closed cup flash point of fluidized and cut-back asphalts using the Abel Closed Tester*.

DIN 51755:1974, *Testing of mineral oils and other combustible liquids — Determination of flash point by the Closed Tester according to Abel-Pensky*.

ASTM D-56:1997, *Test method for flash point by Tag Closed Tester*.

ASTM D-93:1997, *Test methods for flash point by Pensky-Martens Closed Tester*.

Other references

Classification, Packaging and Labelling of Dangerous Preparations Directive 88/379/EEC 7th of June 1988.

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