BRITISH STANDARD

BS 7937:2000

Specification for portable fire extinguishers for use on cooking oil fires (class F)

ICS 13.220.10

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by Technical Committee FSH/2, Fire extinguishers, to Subcommittee FSH/2/11, Portable fire extinguishers (manufacture), upon which the following bodies were represented:

British Compressed Gases Association
British Fire Consortium
Buying Agency
Chief and Assistant Chief Fire Officers
Consumer Policy Committee of BSI
Department of the Environment, Transport and the Regions — (Central Transport Group)
Department of the Environment, Transport and the Regions — (Highways Agency)
Fire Extinguishing Trades Association
Home Office
Institute of Petroleum
London Fire and Civil Defence Authority
Loss Prevention Council
Loss Prevention Certification Board
Nationwide Fire Services
Society of Chemical Industry
Society of Motor Manufacturers and Traders

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The following BSI references relate to the work on this standard:
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Contents

Foreword

This British Standard has been prepared by Technical Committee FSH/2/11. It specifies additional requirements for extinguishers to those of BS EN 3–1 to 6 and the requirements of BS EN 3-1 to 6 which are not applicable.

BS EN 3 only allows extinguishers with nominal charges of 1 kg, 2 kg, 3 kg, 4 kg, 6 kg, 9 kg, 12 kg, 2 l, 3 l, 6 l and 9 l. However, for the purposes of this standard, extinguishers with other nominal charges are permitted.

Annexes A, B, C and E are normative. Annex D is informative.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 9 and a back cover.

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1 Scope

This British Standard specifies requirements for portable fire extinguishers to be used on class F fires in cooking appliances that involve cooking media (vegetable or animal oils and fats).

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions 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 381C:1996, *Specification for colours for identification, coding and special purposes.*

BS EN 2, *Classification of fires.*

BS EN 3-1:1996, *Portable fire extinguishers — Part 1: Description, duration of operation, class A and B fire test.*

BS EN 3-2:1996, *Portable fire extinguishers — Part 2: Tightness, dielectric test, tamping test, special provisions.*

BS EN 3-3:1996, *Portable fire extinguishers — Part 3: Construction, resistance to pressure, mechanical tests.*

BS EN 3-4:1996, *Portable fire extinguishers — Part 4: Charges, minimum required fire.*

BS EN 3-5:1996, *Portable fire extinguishers — Part 5: Specification and supplementary tests.*

BS EN 3-6:1996, *Portable fire extinguishers — Part 6: Provisions for the attestation of conformity of portable fire extinguishers in accordance with EN 3 Part 1 to Part 5.*

3 Terms and definitions

For the purpose of this British Standard, the terms and definitions given in BS EN 2 and BS EN 3-1 to 6 and the following apply.

3.1

class F fire

fire in cooking appliance that involves combustible cooking media (vegetable or animal oils and fats)

3.2

wet chemical

extinguishing medium which includes, but is not limited to, aqueous solutions of potassium acetate, potassium carbonate, potassium citrate or combinations of these materials

3.3

powder

extinguishing medium capable of fluidization

3.4

auto-ignition

non-piloted initiation of combustion caused solely by the elevation in temperature of the material

3.5

non-piloted ignition

ignition without the application of direct heat to the vapour emission of a material

3.6

pre-burn time

designated period which follows ignition during which time combustion can stabilize throughout the material

3.7

range of discharge

distance from the nozzle to the point on the ground beyond which 50 % of the discharge falls for water based extinguishers

4 Extinguisher types

Portable fire extinguishers for use on cooking oil fires shall be one of the following types, described by the type of extinguishing medium they contain:

a) water based, including foam and wet chemical;

b) powder type extinguishers;

c) carbon dioxide type extinguishers;

d) halogenated hydrocarbon type extinguishers;

e) clean agent extinguishers.

Where water based models are produced with or without freezing point depressant, they shall be treated as separate and distinct models for the purposes of range of operating temperatures, electrical conductivity and fire rating tests.

NOTE Other assessments relating to the design and construction of the product may be cross referred where possible.

5 General requirements

Portable fire extinguishers for use on cooking oil fires shall conform to the requirements of this standard and BS EN 3 with the exception of the clauses given in Table 1.

Table 1 — Exceptions to the requirements of BS EN 3

BS EN 3 part number	Clause number	Title
1	**6.1**	Duration of operation
2	**6.3**	Hose assembly
4	**3.1**	Nominal charges
5	Clause **3**	Effective range of operating temperature and resistance of mechanical parts
	5.1	External corrosion
	Clause **7**	Extinguisher identification

6 Portability and use

Extinguishers shall have a maximum gross mass of 20 kg and be capable of single user operation.

All extinguishers rated 15F, 25F or 75F shall be equipped with a rigid discharge lance of 0.4 m minimum rigid length and have a flexible discharge hose of 0.4 m minimum length.

7 Discharge

7.1 Duration of discharge

The duration of discharge when measured by the method described in BS EN 3-1:1996, annex A shall not be less than the values given in Table 2.

Table 2 — Duration of discharge

Size l or kg	Minimum duration of operation *s*
≤ 1	15
> 1 ≤ 3	25
> 3 ≤ 6	40
> 6	60

7.2 Range of discharge

The minimum range of discharge shall be 1 m when the extinguisher is tested in accordance with annex A.

8 Test fire ratings

8.1 General

Portable fire extinguishers for use on cooking oil fires shall have a class F test fire rating.

NOTE Extinguishers may also have class A and B fire ratings (see **8.2** and **8.3**).

8.2 Class A fire rating

The class A fire test rating shall be determined in accordance with BS EN 3-1:1996, **B.2**.

8.3 Class B fire rating

The class B fire test rating shall be determined in accordance with BS EN 3-1:1996, **B.3**.

8.4 Class F fire rating

8.4.1 *General*

Extinguishers shall have a class F fire rating in accordance with Table 3 when tested in accordance with annex B.

8.5 Efficiency tests

A class F fire rating shall be achieved when two fire tests of a series are extinguished in accordance with annex B. A series shall be complete after three fires, or when the first two fires are extinguished or not. Each series shall be completed before the next is commenced. Although there is no restriction on the number of series that may be carried out on the same type of extinguisher without modifications, a series shall consist of consecutive fires and results shall not be discounted.

Table 3 — Fire rating and quantity of agent for class F extinguishers

Rating	Volume of cooking oil in test fire l	Test apparatus mm	Maximum agent quantity l or kg
5F	$5\ ^{+1}_{0}$	Type A 300 dia	2
15F	$15\ ^{+1}_{0}$	Type B X = 448 Y = 224	3
25F	$25\ ^{+1}_{0}$	Type B X = 578 Y = 289	6
75F	$75\ ^{+1}_{0}$	Type B X = 1 000 Y = 500	9
Liquid agents shall be measured in litres (l). NOTE Dimensions for type A apparatus shown in Figure B.1 have a manufactured tolerance of ±10 mm.			

9 Effective range of operating temperatures and requirements for mechanical parts

9.1 General

Portable fire extinguishers shall have a minimum operating temperature range of 0 °C to +60 °C (T(max) °C).

NOTE A temperature below 0 °C may be specified by the manufacturer.

Portable fire extinguishers shall be capable of operating and be resistant to shock throughout the marked operating temperature range, after testing in accordance with annex C.

9.2 Operational requirements

Portable fire extinguishers shall conform to the following requirements.

a) The force required to remove the safety device shall be between 20 N and 100 N in accordance with BS EN 3-5:1996, **4.2**.

b) The force or energy required to activate the operating device(s) shall be in accordance with BS EN 3-5:1996, Table 1.

c) The discharge shall commence within 10 s of the opening of the control valve in accordance with BS EN 3-5:1996, **3.2**.

d) The discharge duration shall conform to the appropriate minimum value in Table 2.

e) Not less than 90 % of the nominal charge of the agent shall be discharged from the extinguisher after continuous discharge including all expelling gas in accordance with BS EN 3-1:1996, **6.2**.

9.3 External corrosion

Portable fire extinguishers shall be tested in accordance with the external corrosion test in BS EN 3-5:1996, **H.1** and shall conform to **9.2** and the following additional requirements.

a) The mechanical operation of all working parts shall be unimpaired.

b) The pressure indicator, if fitted, shall remain functional.

c) There shall be no corrosion of the metal of the extinguisher likely to impair its operation or safety.

d) The extinguisher shall meet the functioning test and burst pressure requirements of BS EN 3-3:1996, **6.1** and **6.3**.

9.4 Electrical non-conductivity

All water based extinguishers shall conform to the requirements of the dielectric test in BS EN 3-2:1996, clause **4**.

10 Marking

10.1 Colour

The extinguisher body shall be red in accordance with BS 381C:1996, Ref. No. 537. There shall be an area of between 3 % and 10 % of the external area of the body coloured canary yellow, in accordance with BS 381C:1996, Ref. No. 309.

10.2 Marking

NOTE 1 See the example in annex D.

The marking on portable fire extinguishers shall be in contrasting colours to the background. The marking shall be divided into five parts as shown in Figure D.1.

The marking required for parts 1, 2, 3 and 5 shall be contained on the same label or in the same frame. The label (or frame) shall be in such a position that it can be clearly read when the extinguisher is on its mounting bracket.

NOTE 2 The marking required for part 4 may be placed elsewhere on the portable fire extinguisher.

The height, H, of the lettering (determined by reference to an upper case letter X) shall be not less than:

— 3 mm for portable fire extinguishers having a charge ≤3 kg or ≤3 l;

— 5 mm for portable fire extinguishers having a charge >3 kg or >3 l.

The height of the lettering in parts 1, 2, 3 and 4 shall be in the following proportions subject to a tolerance of $^{+10}_{0}$ %:

— part 1: $1.5 \times H$ for the words "fire extinguisher"
$0.75 \times H$ for the other information;

— part 2: $1 \times H$;

— part 3: $1 \times H$;

— part 4: $0.5 \times H$.

The height of the frame containing part 5 shall not exceed ⅓ of the total height of parts 1, 2 and 3.

Part 1 shall contain the following information in sequence:

— first line: the words "Fire Extinguisher" or "Fire Extinguisher plus medium";

— second line: the type of extinguishing medium and the nominal charge;

— third line: the fire rating or ratings achieved.

Part 2 shall contain the following information.

— The instructions for use, which shall include one or more pictograms each with an explanation.

— The text of the instructions for use for the different actions to be carried out shall be shown one after another vertically from top to bottom.

— The pictograms shall all be located in the same position with regard to the relevant texts and the direction of the movements to be carried out shall be indicated by arrows.

— Pictograms representing the type of fires on which the extinguisher may be used (see annex E) shall be arranged horizontally on one line under the instructions for use.

— The pictograms representing the types of fire shall appear in square boxes of size 20 mm minimum for portable fire extinguishers with a charge of ≤3 kg or ≤3 l and 25 mm minimum for portable fire extinguishers with a charge of >3 kg or >3 l. A square containing a code letter shall appear at the corner of each pictogram as shown in annex E.

Part 3 shall contain information relating to any restrictions or dangers of use in particular in relation to toxicity and electrical risk.

The following cautionary statement shall be included: "Discharge entire contents onto the fire from at least 1 m distance".

Part 4 shall contain at least the following:

— an instruction to refill after any operation;

— an instruction to check periodically and to use only products and spare parts recommended by the manufacturer for refilling and maintenance;

— the identification of the extinguishing medium and, in particular, identification and percentages of additives for water based media;

— if applicable, the identification of the propellant gas;

— the number(s) or reference(s) of the approval;

— the manufacturer's model designation;

— temperature limits;

— a warning against the risk of freezing (if applicable);

— a reference to this standard (i.e. BS 7937:2000[1)]);

— the year of manufacture.

Part 5 shall contain:

— the name and address of the portable fire extinguisher manufacturer and/or supplier.

[1)] Marking BS 7937:2000 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 responsiblity. Such a declaration is not to be confused with third-party certification of conformity.

Annex A (normative)

Range of discharge

The test shall be carried out in a draught free environment.

With the extinguisher nozzle positioned 1 m above a level surface continuously discharge the extinguisher, measure the range from the centre of the discharge pattern formed at ground level to the horizontal datum point at the nozzle.

Annex B (normative)

Class F fire test

B.1 General

WARNING Attention is drawn to the need to take precautions to safeguard the health of personnel conducting the tests against the risk of fire and inhalation of smoke and any toxic products of combustion.

The ambient temperature of the test facility prior to ignition shall be between 0 °C and 30 °C.

To carry out these tests the operator shall be dressed in normal work-wear, having no special heat proofing characteristics.

NOTE 1 A helmet, gloves and approved non-reflective visor may be used.

Cartridge type extinguishers shall be pressurized 6 s before the commencement of the discharge of the extinguisher.

NOTE 2 Respiratory protection may be worn to protect the operator from the effects of the repeated testing over a period of time. Such protection is not intended to permit an otherwise intolerable exposure to any fumes and/or smoke from a single fire.

B.2 Class F test fire

B.2.1 *Method of fire fighting*

The extinguisher shall be discharged continuously onto the apparatus.

The operator shall be no nearer than 2 m after the pre-burn time. The attack shall take place from only one direction or side of the fire tray.

B.2.2 *Apparatus*

B.2.2.1 *General*

The cooking oil test fires shall be conducted using a steel tray to simulate a deep fat fryer.

B.2.2.2 *5F fire test tray*, constructed of steel sheet, at least (2.0 ± 0.25) mm thick and (170 ± 10) mm deep and mounted on a support structure (see Figure B.1 and Table 3).

B.2.2.3 *15F, 25F and 75F fire test tray*, constructed of steel sheet at least (2.0 ± 0.25) mm thick and (250 ± 10) mm deep (see Figure B.2 and Table 3). The tray shall have liquid-tight joints, and the reinforcing angle shall be continuous around the perimeter of the tray to produce a turned-out edge level with the top of the tray. The width of the top edge shall be (45 ± 10) mm wide. The tray shall be mounted on a supporting structure which raises the top of the tray to a height of (1 000 ± 12) mm above the floor.

B.2.2.4 *Thermocouple*, to monitor the oil temperature, located (25 ± 5) mm below the fuel surface, but not closer than 75 mm to the test fire tray's walls.

B.2.3 *Materials*

B.2.3.1 *Pure sunflower oil*, with a minimum auto-ignition temperature of 340 °C.

B.2.4 *Procedure*

Fire tests shall be carried out indoors.

Heat the oil in the fire test tray using a suitable heating arrangement until non-piloted auto-ignition occurs.

Auto-ignition shall occur in (3 ± 0.5) h from the start of heating of the apparatus.

When auto-ignition occurs turn off the heat source and allow the fuel to burn freely for $120\ ^{+10}_{0}$ s before commencement of fire fighting.

After each test, clean the apparatus thoroughly and renew with fresh fuel prior to subsequent fire testing.

B.2.5 *Observations*

During the test, record the following information (the times shall commence from the time of non-piloted ignition):

a) time of self re-ignition following complete discharge of extinguisher (where applicable);

b) any overflowing of the tray;

c) that oil fuel remains in the tray at the end of the test to prove that extinguishment has occurred, and not fuel starvation;

d) fuel temperature monitored at auto-ignition;

e) ejection of burning material from the apparatus.

B.2.6 *Fire test requirements*

Portable fire extinguishers shall conform to the following requirements.

a) Where burning material is ejected, the fire test shall be deemed a failure.

b) The application of the extinguishing media shall not cause burning material to be ejected from the test tray onto the surrounding floor.

c) The fire shall be extinguished and there shall be no re-ignition of the test fire, or any overflow during a 10 min period following the complete discharge of the extinguisher.

Dimensions in millimetres

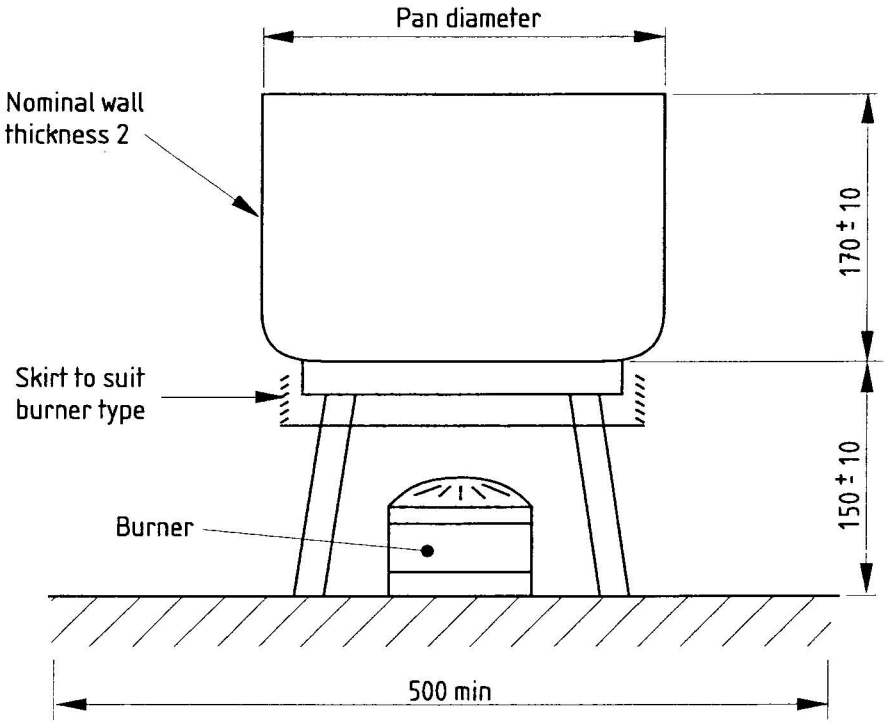

Figure B.1 — Class 5F fire test apparatus

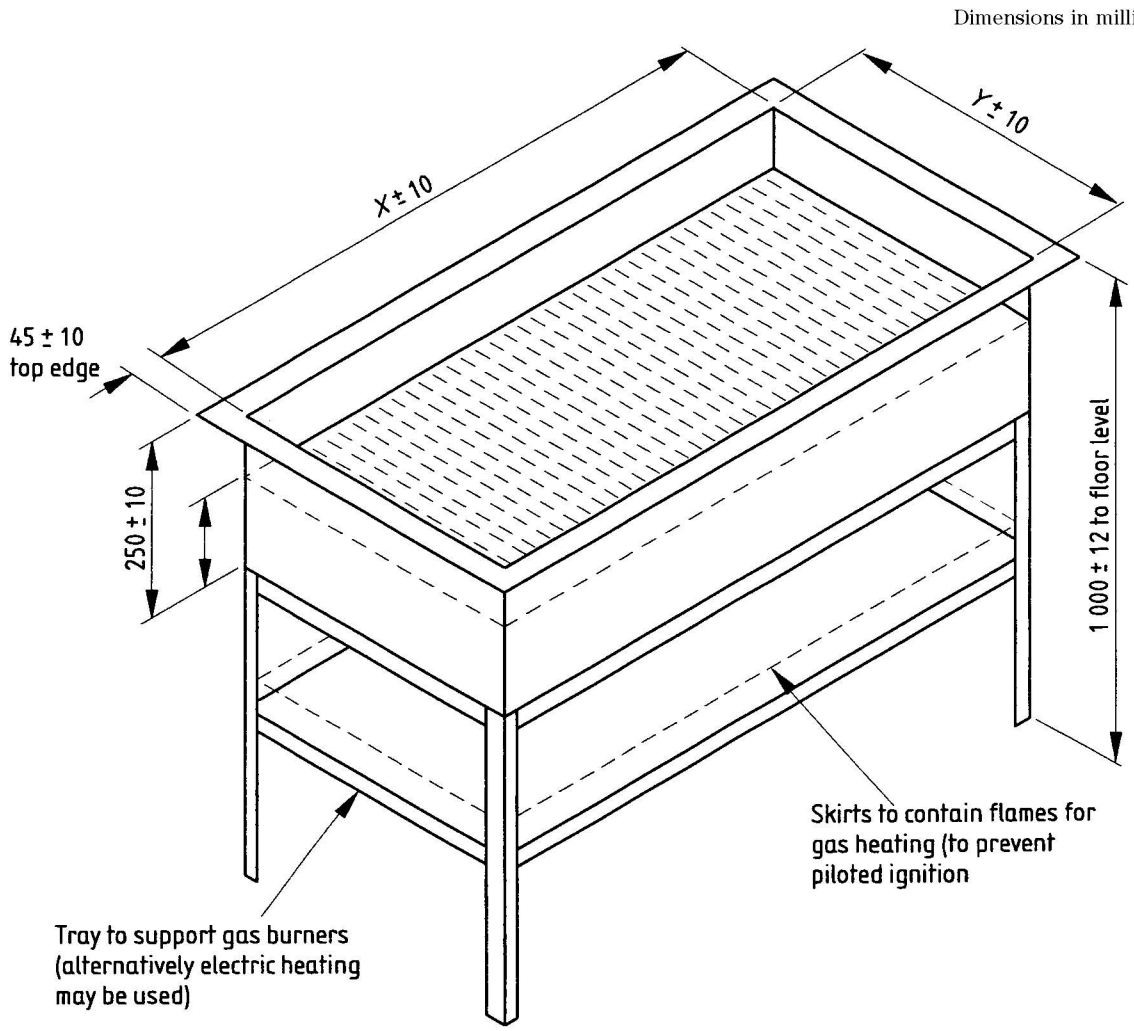

Figure B.2 — General dimensions for the simulated deep fryer class 15F, 25F and 75F

Annex C (normative)
Range of operating temperatures

NOTE See **9.1**.

Submit two extinguishers to each of the combined temperature cycles given in Table C.1.

The extinguishers shall remain upright during the temperature cycling.

Operate the extinguisher within 1 min of its removal from the conditioning chamber. Conduct the test in accordance with BS EN 3-1:1996, **6.1** except for cartridge type extinguishers where activation is by a single action. In this case, the cartridge shall be pierced and the control valve closed immediately for a period of 6 s after which the control valve shall be reopened.

Table C.1 — Temperature cycles

Duration h	Cycle No.1	Cycle No.2
24 ± 1	Store at + 0 °C ± 2 °C	Store at + 60 °C ± 2 °C
24 ± 1	Store at + 20 °C ± 5 °C	Store at + 20 °C ± 5 °C
24 ± 1	Store at + 60 °C ± 2 °C	Store at + 0 °C ± 2 °C
NOTE 1 The storage temperature refers to the ambient temperature within the conditioning chamber. NOTE 2 Temperatures lower than 0 °C may be stipulated by the manufacturer. NOTE 3 Store water based extinguishers at the temperature specified in **9.1**.		

Annex D (informative)

Example of marking requirements for portable fire extinguishers for use on cooking oil fires

Figure D.1 shows an example of a marking label.

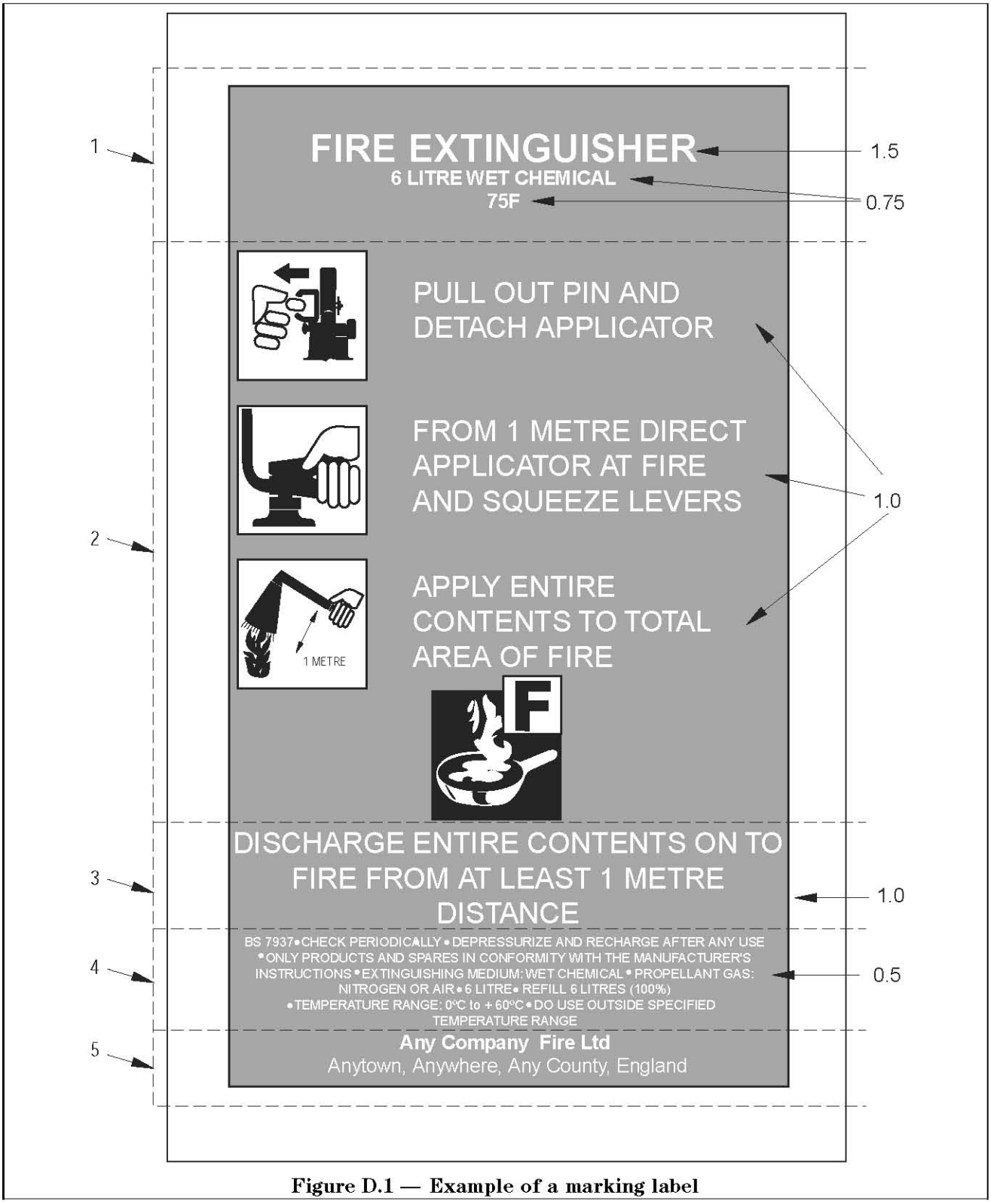

Figure D.1 — Example of a marking label

Annex E (normative)

Pictograms representing the types of fire

Figure E.1 shows pictograms representing the types of fire.

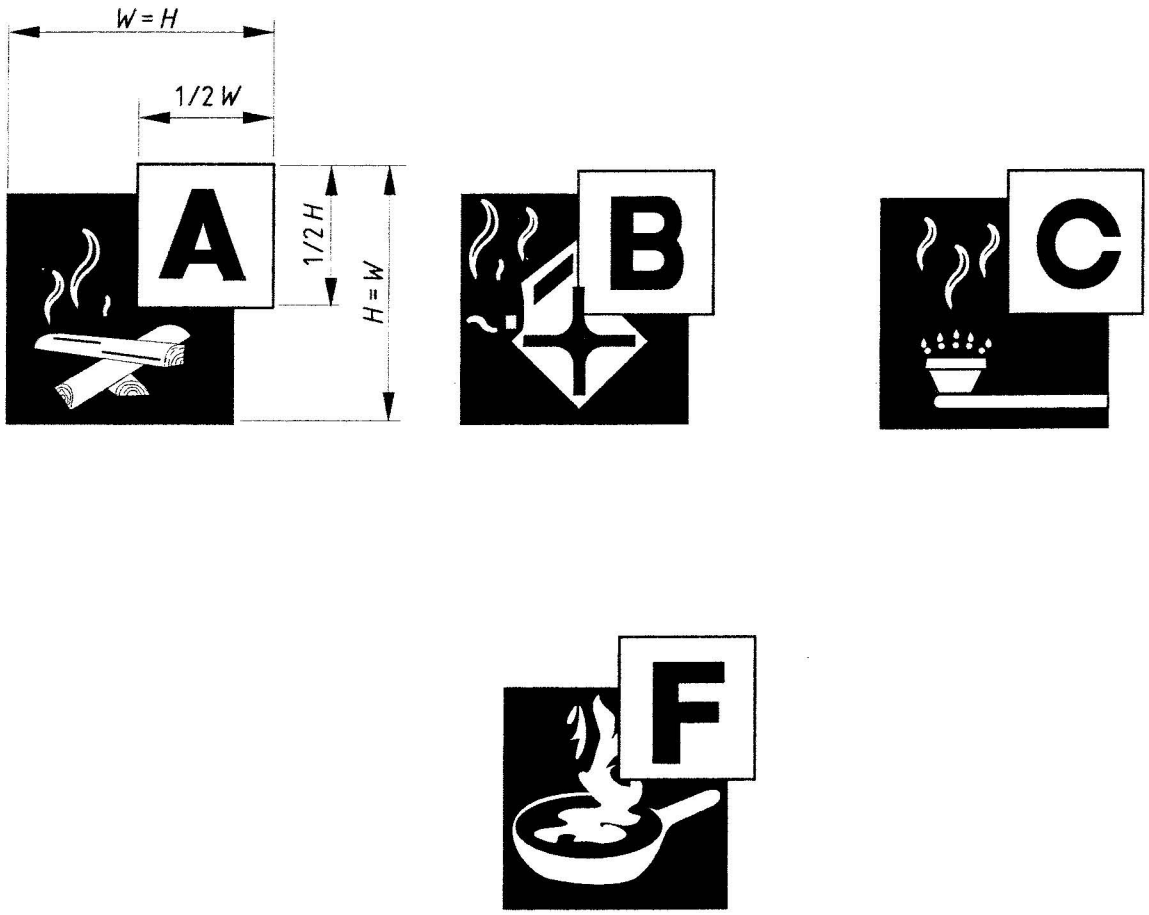

Figure E.1 — Pictograms representing types of fire

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