BRITISH STANDARD

BS EN
3-9:2006

Portable fire extinguishers —

Part 9: Additional requirements to EN 3-7 for pressure resistance of CO_2 extinguishers

The European Standard EN 3-9:2006 has the status of a British Standard

ICS 13.220.10

BSI
British Standards

National foreword

This British Standard was published by BSI. It is the UK implementation of EN 3-9:2006. It partially supersedes BS EN 3-3:1996. BS EN 3-9:2006, together with BS EN 3-8:2006, updates and amends the requirements that were previously contained in BS EN 3-3:1996, which is now withdrawn.

The UK participation in its preparation was entrusted to Technical Committee FSH/2, Fire extinguishers.

A list of organizations represented on FSH/2 can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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Contents

Foreword

This document (EN 3-9:2006) has been prepared by Technical Committee CEN/TC 70 “Manual means of fire fighting equipment”, the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by June 2007, and conflicting national standards shall be withdrawn at the latest by June 2007.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive 97/23/CE.

For relationship with EU Directive 97/23/CE, see informative Annex ZA, which is an integral part of this document.

This document is included in a series of European Standards planned to cover:

a) classification of fires (EN 2)

b) mobile fire extinguishers (EN 1866)

EN 3 consists of the following parts, under the general title "*Portable fire extinguishers*"

— *Part 1*[1)]*: Description, duration of operation, class A and B fire test*

— *Part 2*[1)]*: Tightness, dielectric test, tamping test, special provisions*

— *Part 3: Construction, resistance to pressure, mechanical tests*

— *Part 4*[1)]*: Charges, minimum required fire*

— *Part 5*[1)]*: Specification and supplementary tests*

— *Part 6: Provisions for the attestation of conformity of portable fire extinguishers in accordance with EN 3 part 1 to part 5*

— *Part 7: Characteristics, performance requirements and test methods*

— *Part 8*[2)]*: Additional requirements to EN 3-7 for the construction, resistance to pressure and mechanical tests for extinguishers with a maximum allowable pressure equal to or lower than 30 bar*

— *Part 9*[2)]*: Additional requirements to EN 3-7 for pressure resistance of CO_2 extinguishers*

— *Part 10* [3)]*: Provisions for evaluating of conformity of a portable fire extinguisher to EN 3 part 7*

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

[1)] Withdrawn and replaced by EN 3-7.

[2)] EN 3-8 and 3-9 update and amend EN 3-3. On publication of these EN 3-3 will be withdrawn.

[3)] In preparation. EN 3-10 updates and amends EN 3-6. On publication of EN 3-10 EN 3-6 will be withdrawn.

1 Scope

This European Standard specifies the rules of design, assembling, inspection and testing of CO_2 portable fire extinguishers as far as the pressure risk is concerned.

NOTE Annex A gives the classification of the different parts forming the assembly of the portable extinguisher.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 3-7:2004, *Portable fire extinguishers — Part 7: Characteristics, performance requirements and test methods*

EN 3-8:2006, *Portable fire extinguishers — Part 8: Additional requirements to EN 3-7 for the construction, resistance to pressure and mechanical tests for extinguishers with a maximum allowable pressure equal to or lower than 30 bar*

EN 629-1:1996, *Transportable gas cylinders — 25E taper thread for connection of valves to gas cylinders — Part 1: Specification*

EN ISO 11116-1:1999, *Gas cylinders — 17E taper thread for connection of valves to gas cylinders — Part 1: Specifications (ISO 11116-1:1999)*

EN ISO 15245-1:2001, *Gas cylinders — Parallel threads for connection of valves to gas cylinders — Part 1: Specification (ISO 15245-1:2001)*

ISO 6718:1991, *Bursting discs and bursting disc devices*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 3-7:2004, EN 3-8:2006 and the following apply.

3.1
filling ratio
maximum allowable fill measured in kg/l

4 Materials

4.1 General

Non metallic materials for bodies of operating devices are not permitted by this European Standard.

4.2 Material compatibility

Materials of components that may be in contact with the contents shall be compatible with both the contents and the material of other components.

5 Design

5.1 Cylinder and operating devices

The thread of the cylinder and operating device shall be in accordance with and marked with the appropriate code, see Annex C.

Operating devices with parallel threads shall include a means of automatically venting any pressure from the extinguisher before complete disengagement.

NOTE By nature of their shape taper threads naturally vent before complete disengagement.

5.2 Filling ratio

There is a relationship between the filling ratio, the maximum allowable pressure and the maximum allowable temperature depending on the pressure-temperature curves of carbon dioxide. Commonly used filling ratios are 0,667, 0,675 and 0,750, and the corresponding maximum allowable pressures at 60 °C are shown in Annex B.

5.3 Operating device

The operating device is a pressure accessory that can be fitted with the bursting disc.

The thread of the operating device shall be in accordance with Annex C and shall be stamped, engraved or embossed with the specified code.

5.4 Bursting disc

Extinguishers shall be fitted with a bursting disc, which shall comply with ISO 6718.

The bursting disc at ($T_{\max} \pm 2$) °C shall operate at a pressure between 1,1 PS and the test pressure of the extinguisher PT, including all manufacturing tolerances.

NOTE PS of the extinguisher assembly cannot exceed the PS of any component of the extinguisher assembly.

5.5 Hose and nozzle couplings – Prototype testing

5.5.1 Requirements

The coupling systems given below shall function throughout the operating temperature range of the fire extinguisher. Coupling systems shall be designed and fitted in such a way that they cannot damage the hose. The burst pressure shall be equal to or greater than the appropriate value below when tested in accordance with 5.5.2.

1,5 times the pressure developed at $T_{\max}$, the test being carried out at (20 ± 5) °C – one specimen.

1,25 times the pressure developed at $T_{\max}$, the test being carried out at ($T_{\max} \pm 5$) °C – two specimens:

— operating device/horn – operating device/hose;

— operating device hose/horn – operating device horn/nozzle.

5.5.2 Test conditions

The burst pressure shall be established by increasing the pressure to the minimum allowable burst pressure in a time not less than 30 s maintaining that pressure for a further 30 s during which failure shall not occur and then increasing the pressure at a maximum average rate of 10 bar/s until the point of failure.

5.6 Resistance to impact

5.6.1 Test Conditions

TS_{max} and TS_{min} claimed by the manufacturer shall be used for the tests in 5.6.2 and Annex D.

5.6.2 Requirements

When tested in accordance with D.1, extinguishers shall not show evidence of bursting, breakage or ejection of components.

6 Manufacturing of the assembled extinguisher

The compatibility between the thread of the cylinder and the thread of the operating device shall be checked.

The manufacturer's declared torque between the operating device and the cylinder and the operating device and the bursting disc shall be utilised.

Manufacturing process shall be defined and controlled and shall not adversely affect the design characteristics.

The identification and the traceability of the materials for all pressure retaining parts shall be ensured by the manufacturer after reception of these materials. This is realised by application of adequate procedures, internal to the manufacturer, such as batch control traceability.

7 Final assessment of the assembled extinguisher

7.1 General

The evaluation of the integration of the different parts of the extinguisher shall be checked by:

— document basis at the design stage;

— the duration of operation shall be as follows:

a) at T_{max} duration of operation shall not be more than the value established at a temperature of + 20 °C;

b) at T_{min} duration of operation shall not be more than 2,5 times the value established at + 20 °C.

Compliance shall be demonstrated using an appropriate sampling plan.

7.2 Validation of accessories

Fittings (excluding bursting disc subject to pressure shall meet the following requirements. For fittings in Category I or article 3 § 3 of Directive 97/23/EC, compliance shall be demonstrated by pressure testing components selected from production using an adequate sampling plan.

All fittings (excluding bursting disc) in Category II or higher shall be submitted to a pressure test.

The test pressure PT shall not be less than 1,43 times the maximum allowable pressure PS.

The test pressure shall be maintained for a minimum of 30 s and the fittings shall remain tight and show no dangerous defect.

Fittings include operating devices, hose assemblies. The fittings need not be tested as part of the complete extinguisher but the test equipment connection and blanking features shall replicate the adjacent components.

7.3 Validation of the design maximum filling mass

Check the content of each extinguisher by weight to ensure it is not overfilled.

8 Marking

8.1 Operating device

- The thread code shall be marked (Annex C).

8.2 Cylinder

- The thread code shall be marked (Annex C);
- test pressure in bar, with the letters "PT" before and followed by "BAR" or "bar". This marking shall be stamped, engraved or embossed.

8.3 Extinguisher assembly

The extinguisher assembly shall be marked with:

— mark of the extinguisher manufacturer as registered, for identification;

— serial or batch number of the extinguisher;

— year of manufacture of the extinguisher, which can be represented by the four digits, e.g. 2002;

— tare in kg, including permanently attached accessories (necessary for refilling);

— volume of the body – L;

— maximum allowable pressure of the extinguisher assembly with the letters "PS" before and followed by "BAR" or "bar";

— maximum filling mass – kg;

— contained gas.

— operating temperature range of the extinguisher assembly (T_{min}/ T_{max}).

The markings specified above shall be permanently marked.

See also marking requirements specified in EN 3-7.

Annex A
(informative)

Classification of the different parts of an extinguisher

In the framework of New Approach Directive 97/23/EC Pressure Equipment, the different parts forming the assembly of an extinguisher can be classified as indicated in Table A.1.

Table A.1 — Classification of the different parts of a portable fire extinguisher

EN 3	Pressure Equipment Directive		
Part	**Type of equipment**	**Category**	**Table**
Cylinder	Vessel	Category III	Table 2
Operating device	Pressure accessory	Art. 3 § 3 or category I in function of DN or category III when fitted with a safety accessory	Table 7
Hose	Piping	Art. 3 § 3	Table 7
Nozzle	Pressure accessory	Art. 3 § 3	Table 7
Bursting disc	Safety accessory	In at least category III	

Annex B
(informative)

Filling ratio for CO_2

Table B.1 — Filling ratio for CO_2

Filling ratio kg/l	T_{max} °C	PS bar
0,667	60	169,3
0,675	60	173,8
0,750	60	216,1

Annex C
(normative)

Portable CO_2 fire extinguisher thread sizes

Thread code (to be stamped, engraved or embossed on the body and the operating device).

The thread shall correspond to Table C.1.

Table C.1 — Cylinder neck thread dimensions

Thread code	25P	25E	17E
Standard	EN ISO 15245-1	EN 629-1	EN IS0 11116-1

Annex D
(normative)

Impact tests

D.1 General

Resistance to impact by falling weight.

NOTE See 5.6.

The test shall be carried out on four portable fire extinguishers fitted with all accessories that are subject to pressure during normal operation.

Fill the extinguishers with water or a suitable liquid, to between 88 % and 92 % by volume, as fitted for use, i.e. complete with valve and internal fittings.

D.2 Test at TS_{min}

NOTE A low freeze depressant may be added to prevent the freezing of the contained liquid.

Adjust with nitrogen the pressure of two extinguishers to such a pressure, that at TS_{min}, the attained pressure corresponds to the pressure of CO_2 at this temperature in an extinguisher normally filled with CO_2 at its intended fill ratio.

Then condition these two extinguishers for a period of 24 h at (TS_{min} ± 2) °C.

Within 1 min of the removal of each extinguisher from the conditioning chamber it shall be subjected to the impact test.

One extinguisher shall be tested horizontally and the other vertically.

Both extinguishers shall be tested with the safety device in position.

D.3 Test at TS_{max}

Adjust with nitrogen the pressure of two extinguishers to such a pressure that, at $TS_{max,}$ the attained pressure corresponds to the pressure of CO_2 at this temperature in an extinguisher normally filled with CO_2 at its intended fill ratio.

Then condition these two extinguishers for a period of 24 h at TS_{max} ± 2 °C.

Within 1 min of the removal of the extinguisher from the conditioning chamber it shall be subjected to the impact test.

One extinguisher shall be tested horizontally and the other vertically.

Both extinguishers shall be tested with the safety device in position.

D.4 Apparatus

A cylindrical steel weight, with flat surfaces, measuring 75 mm in diameter and weighing 4 kg, placed in a structure which will allow it to free-fall vertically from a height h (in metres) calculated by the following equation, with a minimum of 150 mm:

$$h = M/20$$

where M is the total mass, in kilograms, of the full extinguisher in complete working order.

D.5 Procedure

Place the extinguishers on a flat and rigid surface, one in each of the following positions:

— vertically, in its normal position;

— horizontally, in such a position that the device which seals the unit is pressing against the surface.

For each extinguisher, allow the weight to fall freely from height h, onto the device which seals the unit, the point of impact being determined by the authority carrying out the test.

Annex ZA
(informative)

Relationship between this European Standard and the Essential Requirements of EU Directive 97/23/EC

This European Standard has been prepared under a mandate given to CEN by the European Commission to provide a means of conforming to Essential Requirements of the New Approach Directive.

Once this standard is cited in the Official Journal of the European Communities under that Directive and has been implemented as a national standard in at least one Member State, compliance with the clauses of this standard given in Table ZA.1 confers, within the limits of the scope of this standard, a presumption of conformity with the corresponding Essential Requirements of that Directive and associated EFTA regulations.

Table ZA.1 — Correspondence between this European Standard and Directive 97/23/EC

Clause(s) in EN 3-9	Essential Requirements of Directive 97/23/EC	Qualifying Remarks/Notes
5.1	2.3	Safe handling and operation
6	2.8	Assembly
5.2	2.9	Safe filling
7	3.2.1	Final inspection
8	3.3	Marking and labelling

WARNING — Other requirements and other EU Directives may be applicable to the product(s) falling within the scope of this standard.

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