BS EN ISO 16852:2016

BSI Standards Publication

Flame arresters — Performance requirements, test methods and limits for use

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National foreword

This British Standard is the UK implementation of EN ISO 16852:2016. It supersedes BS EN ISO 16852:2010 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee EXL/23, Explosion and fire precautions in industrial and chemical plant.

A list of organizations represented on this committee 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.

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Flame arresters - Performance requirements, test methods and limits for use (ISO 16852:2016)

Arrête-flammes - Exigences de performance, méthodes d'essai et limites d'utilisation (ISO 16852:2016)

Flammendurchschlagsicherungen - Leistungsanforderungen, Prüfverfahren und Einsatzgrenzen (ISO 16852:2016)

This European Standard was approved by CEN on 19 September 2016.

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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European foreword

This document (EN ISO 16852:2016) has been prepared by Technical Committee ISO/TC 21 “Equipment for fire protection and fire fighting” in collaboration with Technical Committee CEN/TC 305 “Potentially explosive atmospheres — Explosion prevention and protection” the secretariat of which is held by DIN.

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 May 2017, and conflicting national standards shall be withdrawn at the latest by May 2017.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN ISO 16852:2010.

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(s).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this document.

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

Endorsement notice

The text of ISO 16852:2016 has been approved by CEN as EN ISO 16852:2016 without any modification.

Annex ZA
(informative)

Relationship between this European Standard and the Essential Requirements of EU Directive 2014/34/EU concerning equipment and protective systems intended for use in potentially explosive atmospheres

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association to provide a means of conforming to Essential Requirements of the New Approach Directive 2014/34/EU concerning equipment and protective systems intended for use in potentially explosive atmospheres

Once this standard is cited in the Official Journal of the European Union 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 2014/34/EU concerning equipment and protective systems intended for use in potentially explosive atmospheres

Essential Requirements (ERs) of Directive 2014/34/EU	Clause(s)/subclause(s) of this EN	Qualifying remarks/Notes
1.0.1 Principles of integrated explosion safety	Clause 5; 6.2	
1.0.2 Design and manufacture considerations	6.2; 7.1	
1.0.3 Special checking and maintenance conditions	Annex C	
1.0.4 Surrounding area conditions	6.2	
1.0.5 Marking	12.2	
1.0.6 Instructions	7.4; 8.4; 9.3; 10.3; 12.1	
1.1.1 Operational stresses on material	6.2; 7.1; Annex C	
1.1.2 Reaction of material	6.2; Annex C	
1.1.3 Wear of material	6.2; 7.1	
1.2.1 Design and construction for safe operation	5.1; 6.2; 6.3; 6.4; 6.5; 7.1;	
1.2.3 Enclosed structures and prevention of leaks	6.6	
1.2.5 Additional mans of protection	12.1	
1.2.8 Overloading of equipment	7.3.4; 10.1; 11.1	
1.2.9 Flameproof enclosure systems	6.3; 6.4; 7.3.2.3	

1.3.1 Hazards arising from different ignition sources	6.2	
1.3.2 Hazards arising from static electricity	Annex B; Annex C	
1.4.1 External effects	6.2	
1.4.2 Mechanical, thermal and chemical stresses	6.2	
1.6.4 Hazards arising from connections	6.4	
3.0.1 Dimensioning	6; 7; 8; 9; 10; 11	
3.0.2 Design and position	6; 7; 8; 9; 10; 11	
3.1.2 Shock waves	6.5; 7.3.3	

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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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

The committee responsible for this document is ISO/TC 21, *Equipment for fire protection and firefighting*.

This second edition cancels and replaces the first edition (ISO 16852:2008), which has been technically revised with the following changes:

— Clause 1: information concerning existing standard from IMO (International Maritime Organization) for maritime application added;

— 3.18: definition of dynamic flame arrester revised;

— Clause 4: abbreviation for the time t_{Ppeak} added;

— 6.5: production test procedure for flame arresters of welded construction and of cast components revised;

— 6.7: flow measurement (air) revised;

— 7.3.3.2 and 7.3.3.4: in the flame transmission test for stable and unstable detonation without restriction the deflagration tests with $L_u/D = 5$ deleted;

— 7.3.3.2: formula for the calculation of the average value p_{md} added;

— Figure 1 and Figure 3: figures for the test apparatus for deflagration tests of end-of-line flame arrester and of pre-volume flame arresters revised;

— Figure 6 and Figure 7: figures for the test apparatus for short time burning test and for endurance burning test revised;

— 7.3.4: short time burning test for inline flame arresters revised;

— 7.3.5: test pressure for the endurance burning test of inline flame arresters added;

— 7.4.5: limits for use of short time burn flame arresters added;

— 8.3: flame transmission test for liquid product detonation flame arresters revised;

— Clause 9: “Specific requirements for dynamic flame arresters (high velocity vent valves)” revised;

— Clause 11: “Test of flame arresters installed on or within gas conveying equipment” added;

— 12.1: “Instructions for use” revised;

— 12.2: “Marking” revised;

— Figure A.1: pipe lengths revised;

— Annex C: “Best practice” revised;

— Annex D: “Use of in-line stable detonation flame arresters” deleted;

— Bibliography: updated.

It also incorporates the Technical Corrigenda ISO 16852:2008/Cor 1:2008 and ISO 16852:2008/Cor 2:2009.

Introduction

Flame arresters are safety devices fitted to openings of enclosures or to pipe work and are intended to allow flow but prevent flame transmission. They have widely been used for decades in the chemical and oil industry, and a variety of national standards is available. This International Standard was prepared by an international group of experts, whose aim was to establish an international basis by harmonizing and incorporating recent national developments and standards as far as reasonable.

This International Standard addresses manufacturers (performance requirements) and test institutes (test methods), as well as customers (limits for use).

Only relatively general performance requirements are specified and these are kept to a strict minimum. Experience has shown that excessively specific requirements in this field often create unjustified restrictions and prevent innovative solutions.

The hazard identification of common applications found in industry leads to the specification of the test methods. These test methods reflect standard practical situations and, as such, form the heart of this International Standard because they also allow classification of the various types of flame arresters and then determination of the limits of use.

A considerable number of test methods and test conditions had to be taken into account for two main reasons.

a) Different types of flame arresters are covered with respect to the operating principle (static, hydraulic, liquid, dynamic) and each type clearly needs its specific test set-up and test procedure.

b) It is necessary to adapt flame arresters to the special conditions of application (gas, installation) because of the conflicting demands of high flame quenching capability and low pressure loss; this situation is completely different from the otherwise similar principle of protection by flameproof enclosure (of electrical equipment), where the importance of process gas flow through gaps is negligible; importance being placed on the flame quenching effect of the gap.

Consequently, in this International Standard, the testing and classification related to the gas groups and the installation conditions have been subdivided more than is usually the case. In particular,

— explosion group IIA is subdivided into sub-groups IIA1 and IIA,

— explosion group IIB is subdivided into sub-groups IIB1, IIB2, IIB3 and IIB, and

— the type “detonation arrester” is divided into four sub-types, which take into account specific installation situations.

The test conditions lead to the limits for use which are most important for the customer. This International Standard specifies this safety relevant information and its dissemination through the manufacturer’s written instructions for use and the marking of the flame arresters.

The limits for use are also a link to more general (operational) safety considerations and regulations, which remain the responsibility of national or corporate authorities. Annex B and Annex C offer some guidance in this field.

Flame arresters — Performance requirements, test methods and limits for use

1 Scope

This International Standard specifies the requirements for flame arresters that prevent flame transmission when explosive gas-air or vapour-air mixtures are present. It establishes uniform principles for the classification, basic construction and information for use, including the marking of flame arresters, and specifies test methods to verify the safety requirements and determine safe limits of use.

This International Standard is valid for pressures ranging from 80 kPa to 160 kPa and temperatures ranging from −20 °C to + 150 °C.

NOTE 1 For flame arresters with operational conditions inside the scope, but outside atmospheric conditions, see 7.4.

NOTE 2 In designing and testing flame arresters for operation under conditions other than those specified above, this International Standard can be used as a guide. However, additional testing related specifically to the intended conditions of use is advisable. This is particularly important when high temperatures and pressures are applied. The test mixtures might need to be modified in these cases.

NOTE 3 An additional standard IMO MSC/Circ. 677 for maritime application from IMO (International Maritime Organization) exists.

This International Standard is not applicable to the following:

— external safety-related measurement and control equipment that might be required to keep the operational conditions within the established safe limits;

NOTE 4 Integrated measurement and control equipment, such as integrated temperature and flame sensors as well as parts which, for example, intentionally melt (retaining pin), burn away (weather hoods) or bend (bimetallic strips), is within the scope of this International Standard.

— flame arresters used for explosive mixtures of vapours and gases, which tend to self-decompose (e.g. acetylene) or which are chemically unstable;

— flame arresters used for carbon disulphide, due to its special properties;

— flame arresters whose intended use is for mixtures other than gas-air or vapour-air mixtures (e.g. higher oxygen-nitrogen ratio, chlorine as oxidant, etc.);

— flame arrester test procedures for internal-combustion compression ignition engines;

— fast acting valves, extinguishing systems and other explosion isolating systems.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60079-1, *Explosive atmospheres — Part 1: Equipment protection by flameproof enclosures "d"*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.