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

*Arrête-flammes — Exigences de performance, méthodes d'essai et limites d'utilisation*



Reference number  
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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](http://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](http://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](http://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  $t_{P_{peak}}$  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;

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- [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.

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## 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.