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Interested committees:

Title: Draft BS ISO 23693-3 Determination of the resistance to gas explosions of passive fire protection materials. Part 3: Tubular and I-section substrates subject to elastic deformation only.

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Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

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Submission of Comments

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Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
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1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/ Figure/Table/Note	Type of comment	Comment (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	



DRAFT International Standard

ISO/DIS 23693-3

Determination of the resistance to gas explosions of passive fire protection materials —

Part 3: Tubular and I-section substrates subject to elastic deformation only

ICS: 13.220.50

ISO/TC 92/SC 2

Secretariat: **ANSI**

Voting begins on:
2025-05-22

Voting terminates on:
2025-08-14

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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).

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For an explanation of the voluntary nature of standards, 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 www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 92, *Fire Safety*, Subcommittee SC 2, *Fire Containment*.

A list of all parts in the ISO 23693 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Determination of the resistance to gas explosions of passive fire protection materials —

Part 3: Tubular and I-section substrates subject to elastic deformation only

1 Scope

ISO 23693 part 1 aims to simulate the mechanical loads that could be imparted to passive fire protection (PFP) materials and systems by explosions resulting from releases of flammable gas, pressurised liquefied gas, flashing liquid fuels, or dust that may precede a fire. Explosions can give rise to pressure and drag forces and damage to PFP materials in a gas explosion can be caused by the direct effects of pressure and drag loads and by the deflection of the substrate supporting the PFP material. This part of the ISO 23693 series deals with tests to assess the performance of PFP material to the combined effects of pressure and drag loads that occur in the flow path of a gas explosion. This part of the standard excludes specimens whereby the substrate is subject to plastic deformation or brittle failure.

2 Normative references

ISO 23693-1:2021, *Determination of the resistance to gas explosions of passive fire protection materials — Part 1: General requirements*

3 Terms and Definitions

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

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

3.1 congested region

In an explosion test rig a region that is occupied by items that provide obstacles to flow ahead of the flame, thereby increasing flame velocity the rate at which energy is released and the overpressure produced

3.2 drag load

load on items resulting from the flow of gas generated by a gas explosion

3.3 idealised start time

a straight line is drawn from the coordinate of (time, maximum overpressure) to the coordinate (time, 10 % maximum overpressure). The line is extended until it crosses the horizontal axis. That time is the idealised start time.

3.4 overpressure

difference between actual pressure and ambient pressure

3.5**pressure load**

the load on an object resulting from the overpressure generated by a gas explosion

3.6**projected area**

the part of the vent area that the instrumented test specimen covers

3.7**rise time**

time for the pressure in a blast wave to rise to the peak overpressure

3.8**side-on overpressure**

the overpressure measured at right angles to the direction of travel of a blast wave. It can also be described as incident or free field overpressure.

3.9**stagnation pressure**

the pressure at a location perpendicular to the flow where the velocity of the explosion gases have been reduced to zero.

3.10**streamlined housing**

a housing that a pressure transducer can be mounted into that if aligned with the direction of travel of the blast wave and flow generated by a gas explosion that allows the side-on overpressure to be measured

3.11**substrate**

the section to which the PFP materials are attached or mounted

4 Explosion loads

Methods for generating explosive loads are described in Part 1. Due to the nature of the specimen being tested, it will be exposed to a combination of overpressure and drag loads. High aspect ratio objects such as pipes or structural members exposed to the effects of a gas explosion are likely to receive a combination of pressure and drag loads. Pressure loads come from the overpressure generated by the explosion; the drag loads are generated by the high velocity gas flow around the object. To ensure that PFP systems applied to this type of object can survive a gas explosion it is necessary to test them against a combination of pressure and drag loads.

To achieve a combination of drag and pressure loads, the test specimen shall be located in, or near, the vent of a confined gas explosion or at the edge of the congested region of an unconfined gas explosion, where the velocity of the gas flow will produce a drag load.

The pressure load is obtained by measuring the side-on overpressure.

Drag load is characterised either by measuring the stagnation pressure on an instrumented tubular positioned so as to receive the same drag load as the specimen being tested or by instrumenting the specimen being tested. When the instrumented tubular is used, it shall be located in the same position as the specimen during a calibration test conducted under the same test conditions.

The drag load on an object in a flow is given by the equation below:

$$D_L = C_d A P_{dyn}$$

Where: