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**Fire resistance tests — Elements of  
building construction —**

**Part 10:  
Specific requirements to determine  
the contribution of applied fire  
protection materials to structural  
steel elements**

*Essais de résistance au feu — Éléments de construction —*

*Partie 10: Exigences spécifiques pour déterminer la contribution des  
matériaux de protection appliqués aux éléments des structures en  
acier*



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# Contents

	Page
<b>Foreword</b> .....	<b>v</b>
<b>Introduction</b> .....	<b>vi</b>
<b>1 Scope</b> .....	<b>1</b>
<b>2 Normative references</b> .....	<b>1</b>
<b>3 Terms and definitions</b> .....	<b>2</b>
<b>4 Symbols and abbreviated terms</b> .....	<b>4</b>
<b>5 Test equipment</b> .....	<b>5</b>
5.1 General.....	5
5.2 Furnace.....	5
5.3 Loading equipment.....	5
<b>6 Test conditions</b> .....	<b>5</b>
6.1 General.....	5
6.2 Support and loading conditions.....	5
<b>7 Test specimens</b> .....	<b>11</b>
7.1 General.....	11
7.2 Specimen design and preparation.....	12
7.3 Composition of test component materials.....	16
7.4 Selection of test specimens.....	19
<b>8 Installation of the test specimens</b> .....	<b>20</b>
8.1 Loaded beams.....	20
8.2 Unloaded beams.....	21
8.3 Loaded columns.....	21
8.4 Unloaded columns.....	21
8.5 Test specimen installation patterns.....	21
8.6 Furnace load.....	22
<b>9 Conditioning of the test specimens</b> .....	<b>22</b>
<b>10 Application of instrumentation</b> .....	<b>23</b>
10.1 General.....	23
10.2 Instrumentation for measurement of furnace temperature.....	23
10.3 Instrumentation for measurement of steel temperatures.....	25
10.4 Instrumentation for measurement of furnace pressure.....	29
10.5 Instrumentation for measurement of deformation.....	30
10.6 Instrumentation for measurement of load.....	30
<b>11 Test procedure</b> .....	<b>30</b>
11.1 General.....	30
11.2 Furnace temperature and pressure.....	30
11.3 Application and control of load.....	30
11.4 Measurements and observations.....	31
<b>12 Test results</b> .....	<b>31</b>
12.1 Acceptability of test results.....	31
<b>13 Presentation of test results</b> .....	<b>32</b>
<b>14 Test report</b> .....	<b>33</b>
14.1 General.....	33
<b>Annex A (normative) Measurement of properties of passive fire protection materials</b> .....	<b>35</b>
<b>Annex B (normative) Measurement of properties of reactive protection materials</b> .....	<b>38</b>
<b>Annex C (normative) Selection of test specimens - passive fire protection</b> .....	<b>40</b>

<b>Annex D (normative) Principle of selection of test specimens - reactive fire protection</b>	<b>46</b>
<b>Annex E (normative) Fixing of thermocouples to steelwork and routing cables</b>	<b>52</b>
<b>Annex F (informative) Test method to the smouldering fire (slow heating curve)</b>	<b>54</b>
<b>Annex G (informative) Tables of section factors</b>	<b>57</b>
<b>Bibliography</b>	<b>61</b>

## 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 WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 92, *Fire safety*, Subcommittee SC 2, *Fire containment*.

ISO 834 consists of the following parts, under the general title *Fire resistance tests — Elements of building construction*:

- *Part 1: General requirements*
- *Part 2: Guidance on measuring uniformity of furnace exposure on test samples* [Technical Report]
- *Part 3: Commentary on test method and guide to the application of the outputs from the fire-resistance test* [Technical Report]
- *Part 4: Specific requirements for loadbearing vertical separating elements*
- *Part 5: Specific requirements for loadbearing horizontal separating elements*
- *Part 6: Specific requirements for beams*
- *Part 7: Specific requirements for columns*
- *Part 8: Specific requirements for non-loadbearing vertical separating elements*
- *Part 9: Specific requirements for non-loadbearing ceiling elements*
- *Part 10: Specific requirements to determine the contribution of applied fire protection materials to structural steel elements*
- *Part 11: Specific requirements for the assessment of fire protection to structural steel elements*
- *Part 12: Specific requirements for separating elements evaluated on less than full scale furnaces*

## Introduction

This part of ISO 834 specifies a method for testing fire protection systems applied to structural steel members employed in buildings as beams, columns, or tension members. This part of ISO 834 is intended for use in conjunction with the assessment protocol described in ISO 834-11.

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# Fire resistance tests — Elements of building construction —

## Part 10:

## Specific requirements to determine the contribution of applied fire protection materials to structural steel elements

### 1 Scope

This part of ISO 834 specifies a method for testing fire protection systems applied to structural steel members used in buildings as beams, columns, or tension members. This part of ISO 834 is intended for use in conjunction with the assessment protocol described in ISO 834-11. It applies to steel sections (including hollow sections) and only considers sections without openings in the web. Results from analysis of I or H sections are directly applicable to angles, channels, and T-sections for the same section factor, whether used as individual members, e.g. bracing, or part of a fabricated structural system such as a steel truss construction. This part of ISO 834 does not apply to solid bar, rod, or concrete-filled hollow sections.

This part of ISO 834 describes the fire test procedures that specify the tests which should be carried out to determine the ability of the fire protection system to remain sufficiently coherent and in position for a well-defined range of deformations, furnace, and steel temperatures, such that the efficacy of the fire protection system is not significantly impaired, and to provide data on the thermal characteristics of the fire protection system when exposed to the standard temperature/time curve specified in ISO 834-1.

In special circumstances, where specified in National Building Regulations, there can be a requirement to subject reactive fire protection materials to a smouldering curve. The test and the requirements for its use are described in [Annex G](#).

This part of ISO 834 is applicable to both passive and reactive fire protection systems as defined in the terms and definitions, which are installed or applied in such a way that they remain in place for the intended duration of fire exposure.

The fire test methodology makes provision for the collection and presentation of data which is then used as direct input into ISO 834-11 to determine the limits of direct application to steel sections of various shapes, sizes, and fire resistance periods.

### 2 Normative references

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

ISO 834-1, *Fire-resistance tests — Elements of building construction — Part 1: General requirements*

ISO 834-6, *Fire-resistance tests — Elements of building construction — Part 6: Specific requirements for beams*

ISO 834-7, *Fire-resistance tests — Elements of building construction — Part 7: Specific requirements for columns*

ISO 1182:2010, *Reaction to fire tests for products — Non-combustibility test*

ISO 1716, *Reaction to fire tests for products — Determination of the gross heat of combustion (calorific value)*

ISO 8421-2, *Fire protection — Vocabulary — Part 2: Structural fire protection*

ISO 13943, *Fire safety — Vocabulary*

IEC 584-1, *Thermocouples – Part 1: Reference tables*

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 834-1, ISO 13943, ISO 8421-2, and the following apply.

#### 3.1 characteristic steel temperature

temperature of the structural steel member which is used for the determination of the correction factor for stickability calculated as  $(\text{mean temperature} + \text{maximum temperature})/2$

#### 3.2 design temperature

temperature of the steel member for structural design purposes

#### 3.3 fire protection

protection afforded to the steel member by the fire protection system such that the temperature of the steel member is limited throughout the period of fire exposure

#### 3.4 fire protection system

fire protection material together with any supporting system including mesh reinforcement as tested

Note 1 to entry: The reactive fire protection materials system includes the primer and top coat if applicable.

#### 3.5 fire protection thickness

dry thickness of a single-layer fire protection system or the combined thickness of all layers of a fire protection system

Note 1 to entry: The thickness of elements of the supporting system or joint cover strips are not included in the fire protection thickness.

Note 2 to entry: For reactive fire protection systems, the thickness is the mean dry film thickness of the coating excluding primer and top coat if applicable.

#### 3.6 H section

steel member with wide flanges compared with the section depth whose main function is to carry axial loads parallel to its longitudinal axis which can be combined with bending and shear

#### 3.7 I section

steel joist or girder with short flanges shaped like a letter “I” whose main function is to carry loads transverse to its longitudinal axis

Note 1 to entry: These loads usually cause bending of the beam member. The flanges may be parallel or tapered.