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**Reaction to fire tests for floorings —**

**Part 1:  
Determination of the burning behaviour  
using a radiant heat source**

*Essais de réaction au feu des revêtements de sol —*

*Partie 1: Détermination du comportement au feu à l'aide d'une source de  
chaleur rayonnante*



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Case postale 56 • CH-1211 Geneva 20  
Tel. + 41 22 749 01 11  
Fax + 41 22 749 09 47  
E-mail [copyright@iso.ch](mailto:copyright@iso.ch)  
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## Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this part of ISO 9239 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 9239-1 was prepared by the European Committee for Standardization (CEN) in collaboration with Technical Committee ISO/TC 92, *Fire safety*, Subcommittee SC 1, *Fire initiation and growth*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

Throughout the text of this document, read "...this European Standard..." to mean "...this International Standard...".

This second edition cancels and replaces the first edition (ISO 9239-1:1997), which has been technically revised.

ISO 9239 consists of the following parts, under the general title *Reaction to fire tests for floorings*:

- *Part 1: Determination of the burning behaviour using a radiant heat source*
- *Part 2: Determination of flame spread at a heat flux level of 25 kW/m<sup>2</sup>*

Annex A forms a normative part of this part of ISO 9239. Annexes B and C are for information only.

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## Foreword

The text of EN ISO 9239-1:2002 has been prepared by Technical Committee CEN/TC 127 "Fire safety in buildings", the secretariat of which is held by BSI, in collaboration with Technical Committee ISO/TC 92 "Fire safety".

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 July 2002, and conflicting national standards shall be withdrawn at the latest by December 2003.

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

## Introduction

The measurements in this test method provide a basis for estimating one aspect of fire exposure behaviour of floorings. The imposed radiant flux simulates the thermal radiation levels likely to impinge on the floor of a corridor whose upper surfaces are heated by flames or hot gases or both, during the early stages of a developing fire in an adjacent room or compartment under wind-opposed flame spread conditions.

The test specimen is placed in a horizontal position below a gas-fired radiant panel inclined at 30° where it is exposed to a defined heat flux. A pilot flame is applied to the hotter end of the specimen. The test principle is illustrated in Figure 1. Following ignition, any flame front which develops is noted and a record is made of the progression of the flame front horizontally along the length of the specimen in terms of the time it takes to spread to defined distances. If required, the smoke development during the test is recorded as the light transmission in the exhaust stack.

The results are expressed in terms of flame spread distance versus time, the critical heat flux at extinguishment and smoke density versus time.

### Safety warning:

The possibility of a gas-air fuel explosion in the test chamber should be recognized. Suitable safeguards consistent with sound engineering practice should be installed in the panel fuel supply system. These should include at least the following:

- a gas feed cut-off which is immediately activated when air and/or gas supply fail;
- a temperature sensor or a flame detection unit directed at the panel surface that stops fuel flow when the panel flame goes out.

Attention is drawn to the possibility that toxic or harmful gases may be produced during exposure of the specimens. In view of the potential hazard from products of combustion, the exhaust system should be designed and operated so that the laboratory environment is protected from smoke and gas. The operator should be instructed to minimize his exposure to combustion products by following sound safety practice, for example ensuring that the exhaust system is working properly, wearing appropriate clothing including gloves, etc.

## 1 Scope

This European Standard specifies a method for assessing the wind-opposed burning behaviour and spread of flame of horizontally mounted floorings exposed to a heat flux radiant gradient in a test chamber, when ignited with pilot flames. Annex A gives details of assessing the smoke development, when required.

This method is applicable to all types of flooring e.g. textile carpet, cork, wood, rubber and plastics coverings as well as coatings. Results obtained by this method reflect the performance of the flooring, including any substrate if used. Modifications of the backing, bonding to a substrate, underlay or other changes of the flooring may affect test results.

This European Standard is applicable to the measurement and description of the properties of floorings in response to heat and flame under controlled laboratory conditions. It should not be used alone to describe or appraise the fire hazard or fire risk of floorings under actual fire conditions.

Information on the precision of the test method is given in annex B.

## 2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 13238, *Reaction to fire tests for building products — Conditioning procedures and general rules for selection of substrates*

EN 60584-1, *Thermocouples — Part 1: Reference tables (IEC 60584-1:1995)*

EN ISO 13943, *Fire safety — Vocabulary (ISO 13943:2000)*

## 3 Terms and definitions

For the purposes of this European Standard, the definitions given in EN ISO 13943, together with the following terms and definitions, apply.

### 3.1

#### **heat flux ( $\text{kW/m}^2$ )**

incident heat power per unit area; this includes both radiant heat flux and convective heat flux

### 3.2

#### **critical heat flux at extinguishment (CHF)**

incident heat flux ( $\text{kW/m}^2$ ) at the surface of a specimen at the point where the flame ceases to advance and may subsequently go out. The heat flux value reported is based on interpolations of measurements with a non-combustible calibration board

### 3.3

#### **heat flux at X min (HF-X)**

heat flux ( $\text{kW/m}^2$ ) received by the specimen at the most distant spread of flame position observed during the first X minutes of the test

### 3.4

#### **critical heat flux**

heat flux at which the flame extinguishes (CHF) or the heat flux after the test period of 30 min (HF-30), whichever is the lower value (i.e. the flux corresponding with the furthest extent of spread of flame within 30 min)

### 3.5

#### **flux profile**

curve relating heat flux on the specimen plane to distance from the zero point

The zero point of the heat flux profile is specified as the inner edge of the hottest side of the specimen holder.