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**Fire detection and alarm systems —**  
**Part 9:**  
**Test fires for fire detectors**

*Systèmes de détection et d'alarme d'incendie —*  
*Partie 9: Essais sur foyers pour détecteurs d'incendie*



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Published in Switzerland

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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 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](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 21, *Equipment for fire protection and fire fighting*, Subcommittee SC 3, *Fire detection and alarm systems*.

This second edition cancels and replaces the first edition (ISO/TS 7240-9:2012), which has been technically revised.

The main changes are as follows:

- The content has been reworded to include reproductions of clauses from other Parts of the ISO 7240 series so that this document can be considered a catalogue of information.

A list of all parts in the ISO 7240 series can be found on the ISO website.

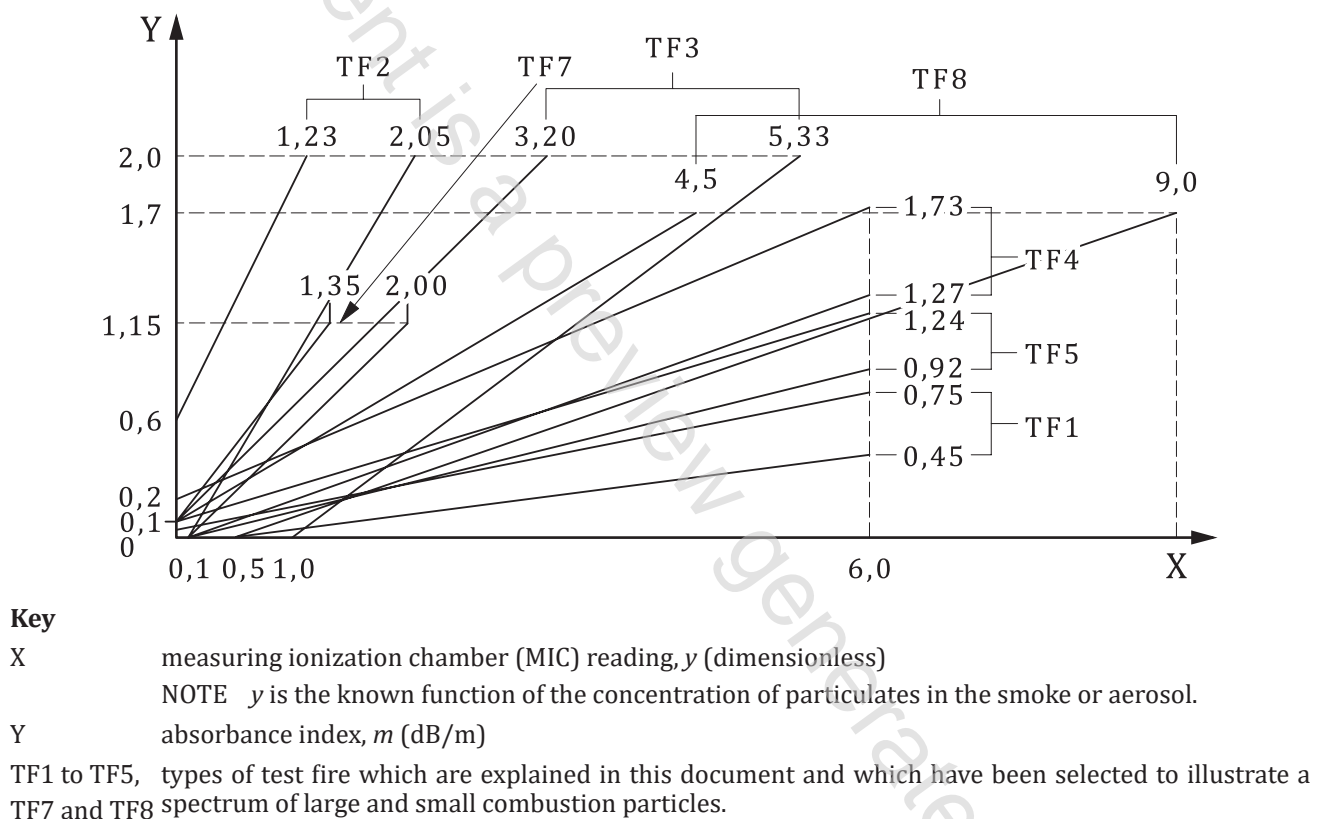
Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html).

## Introduction

This document provides a summary of the standard test fires defined in other Parts of the ISO 7240 series and where they are used. It has been published to provide a convenient catalogue of test fires. The formal definition and description of each test fire remains within the individual Parts of the ISO 7240 series. All text which has been reproduced from other Parts of the ISO 7240 series is written in italic font.

The combustibles selected represent a spectrum of large ( $m$ ) and small ( $y$ ) combustion particles for both grey and black smoke. These include burning liquids, plastics and cellulosic (wood) materials, and glowing and smouldering fabrics.

[Figure 1](#) shows the limits of  $m$  vs  $y$  where they are defined for the relevant test fires. This figure illustrates how the test fires are designed to represent a reasonable cross-section of fire types and thus ensure that the response characteristics of the detectors being assessed are broadly capable of detecting the majority of common fires that can occur in practice.



**Figure 1 — Composite of ISO test fires TF1 to TF5, TF7 and TF8 profile curves:  
 $m$  versus  $y$**

The test fires described in this document are intended to be applicable for the evaluation of all automatic fire detectors (smoke, heat, flame, etc.). TF7 has completed its original purpose, but has been maintained for reference now and in the future. The test fires described are or have been employed on a selective basis for use in concert with a specified International Standard covering the particular type of detector. For example, test fire TF6, methylated spirits, has been used to evaluate the response of point-type heat detectors. Test fires TF1 through TF5 have been selected to evaluate the response of system-connected smoke detectors. Test fire TF7 has been selected in lieu of test fire TF2 to evaluate the response of smoke alarms intended primarily for installation in residential-type occupancies. Test fires TF2, TF3 and TF9 are suitable for testing the response of a detector to carbon monoxide. Carbon monoxide output curves are also shown for TF4, TF5 and TF8.

Table 1 shows the test fires that are employed in product standards (indicated with a tick).

Note that the test fires are adjusted to meet the characteristics of each detector. Therefore, even if they have the same name, their end-of-test conditions and test validity criteria can differ depending on the applicable product standards. When test fires are applied, they use the conditions and criteria described in the latest relevant product standard.

Based on original test fires (TF1 to TF9), modified test fires have been developed to evaluate new principles of fire detectors such as TF2A and TF2B, etc. The new modified test fires are expected to be added to the series of test fires within a few years.

**Table 1 — Test fires employed in product standards**

Product standards	TF1	TF2	TF2A	TF2B	TF3	TF3A	TF3B	TF4	TF5	TF5A	TF5B	TF6	TF7	TF8	TF9
ISO 7240-5:2018															
ISO 7240-6: 2011		✓			✓										✓
ISO 7240-7: 2018		✓			✓			✓	✓						
ISO 7240-8: 2014		✓			✓			✓	✓						
ISO 7240-10: 2012									✓			✓			
ISO 7240-12: 2014		✓			✓			✓	✓						
ISO 7240-15: 2014	✓	✓			✓			✓	✓					✓	
ISO 7240-20: 2010		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				
ISO 7240-22: 2017		✓						✓							
ISO 7240-27:2018		✓			✓			✓	✓					✓	
ISO 12239: 2010		✓			✓			✓	✓						



# Fire detection and alarm systems —

## Part 9: Test fires for fire detectors

### 1 Scope

This document provides a catalogue of test fires and is intended to enhance comprehensive understanding of fire detection test methods. It describes a series of test fires to which fire detectors, such as smoke, heat and flame detectors, are subjected, as specified in other Parts of the ISO 7240 series.

This document does not specify normative requirements regarding the test methods for the test fires.

### 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 7240-1, *Fire detection and alarm systems — Part 1: General and definitions*

### 3 Terms, definitions and abbreviated terms

#### 3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 7240-1 and the following 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/>

##### 3.1.1

##### **sensitivity**

relative degree of response of a smoke detector

Note 1 to entry: A high sensitivity denotes response to a lower concentration of smoke particles than a low sensitivity under identical smoke build-up conditions.

#### 3.2 Abbreviated terms

For the purposes of this document, the following abbreviations apply.

a.s.d.	aspirating smoke detector
MIC	measuring ionization chamber
TF	test fire