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**Fire safety engineering — Selection  
of design fire scenarios and design  
fires —**

**Part 2:  
Design fires**

*Ingénierie de la sécurité incendie — Sélection de scénarios d'incendie  
et de feux de dimensionnement —*

*Partie 2: Feu de dimensionnement*



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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 92, *Fire safety*, Subcommittee SC 4, *Fire safety engineering*.

A list of all parts in the ISO 16733 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 guidance for the specification of design fires for use in fire safety engineering analysis. A design fire is linked to a specific scenario that is tailored to the fire-safety design objective. There can be several fire safety objectives being addressed, including safety of life (for occupants and rescue personnel), conservation of property, protection of the environment and preservation of heritage. A different set of design fire scenarios and design fires can be required to assess the adequacy of a proposed design for each objective.

The procedure for the selection of the design fire scenarios is described in ISO 16733-1. The design fire can be thought of as an engineering representation of a fire or a “load” that is used to determine the consequences of a given fire scenario. The set of assumed fire characteristics are referred to as “the design fire”. In this document, various formulae are presented to calculate different phenomena. Formulae other than those presented here can also be applicable for a given application.

It is important that the design fire be appropriate to the objectives of the fire-safety engineering analysis. It should challenge the fire safety systems in a specific built environment and result in a final design solution that satisfies performance criteria associated with all the relevant design objectives.

Users of this document should be appropriately qualified and competent in the field of fire safety engineering. It is important that users understand the parameters within which specific methodologies may be used.

ISO 23932-1 provides a performance-based methodology for engineers to assess the level of fire safety for new or existing built environments. Fire safety is evaluated through an engineered approach based on the quantification of the behaviour of fire and based on knowledge of the consequences of such behaviour on life safety, property, heritage and the environment. ISO 23932-1 provides the process (necessary steps) and essential elements for designing a robust, performance-based fire safety programme.

ISO 23932-1 is supported by a set of ISO fire safety engineering standards available on the methods and data needed for the steps in a fire safety engineering design summarized in ISO 23932-1:2018, Clause 4 and shown in [Figure 1](#). This system of standards provides an awareness of the interrelationships between fire evaluations when using the set of ISO fire safety engineering standards.

Each document includes language in the introductory material of the document to tie it to the steps in the fire safety engineering design process outlined in ISO 23932-1. Selection of design fire scenarios and design fires form part of conformance with ISO 23932-1, and all the requirements of ISO 23932-1 apply to any application of this document.

This document provides a more comprehensive treatment of the content of ISO 16733-1:2015, Annex C.

# Fire safety engineering — Selection of design fire scenarios and design fires —

## Part 2: Design fires

### 1 Scope

This document provides guidance for the specification of design fires for use in fire safety engineering analysis of building and structures in the built environment. The design fire is intended to be used in an engineering analysis to determine consequences in fire safety engineering (FSE) analyses.

### 2 Normative references

The following documents, in whole or in part, are normatively referenced in 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 13943, *Fire safety — Vocabulary*

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 13943 and the following apply.

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

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

#### 3.1

##### **combustion efficiency**

ratio of the amount of heat release in incomplete combustion to the theoretical heat of complete combustion

Note 1 to entry: Combustion efficiency can be calculated only for cases where complete combustion can be defined.

Note 2 to entry: Combustion efficiency is dimensionless and is usually expressed as a percentage.

#### 3.2

##### **design fire**

quantitative description of assumed fire characteristics within a *design fire scenario* (3.3)

Note 1 to entry: Typically, an idealized description of the variation with time of important fire variables, such as heat release rate and toxic species yields, along with other important input data for modelling such as the fire load density.