Technical Specification

ISO/TS 16733-2

Second edition
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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: Feux de dimensionnement

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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

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Foreword

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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 document 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).

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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 4, *Fire safety engineering.*

This second edition cancels and replaces the first edition (ISO/TS 16733-2:2021), which has been technically revised.

The main changes are as follows:

— revision of 10.4.

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.

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.

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 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 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 https://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.

3.3
design fire scenario
specific *fire scenario* (3.9) on which a deterministic fire safety engineering analysis is conducted

Note 1 to entry: As the number of possible fire scenarios can be very large, it is necessary to select the most important scenarios (the design fire scenarios) for analysis. The selection of design fire scenarios is tailored to the fire-safety design objectives, and accounts for the likelihood and consequences of potential scenarios.