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

Part 1: Selection of design fire scenarios

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

Partie 1: Sélection de scénarios d'incendie de dimensionnement

Reference number
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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 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 16733-1:2015), which has been technically revised.

The main changes are as follows:

— Annex C has been removed as the content is now included in ISO/TS 16733-2;

— revised to reference updated content in ISO 23932-1.

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.

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Introduction

Selection of the fire scenarios requiring analysis is critical in fire-safety engineering. The number of possible fire scenarios in any built environment (a building or other structure) can be very large and it is not always possible to quantify them all. In order for these fire scenarios to be made amenable to analysis, they are reduced from this large set of possibilities to a small set of design fire scenarios.

The characterization of a fire scenario comprises a description of fire initiation, the growth phase, the fully-developed phase, decay and extinction, together with the likely smoke and fire spread routes. This includes a description of the interaction with the proposed fire protection features for the built environment. The possible consequences of each fire scenario should be considered.

This document introduces a methodology for the selection of design fire scenarios that is tailored to the fire-safety design objectives. Several fire-safety objectives can be 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 can be required to assess the adequacy of a proposed design for each objective.

Following selection of the design fire scenarios, a description of the assumed characteristics of the fire on which the scenario quantification is based is needed. These assumed fire characteristics are referred to as “the design fire”. The design fire should be appropriate to the objectives of the fire-safety engineering analysis and result in a design solution that is commensurate with credible worst case scenarios.

Users of this document should be appropriately qualified and competent in the fields of fire-safety engineering and risk assessment. Users need to understand the parameters within which specific methodologies can 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 which is based on the quantification of the behaviour of fire and on knowledge of the consequences of such behaviour on life, property, heritage and the environment. ISO 23932-1 provides the process (necessary steps) and essential elements to design a robust, performance-based fire-safety programme.

ISO 23932-1 is supported by a set of fire-safety engineering standards on the methods and data needed for the steps in a fire-safety engineering design. It is summarized in ISO 23932-1:2018, Clause 4 and shown in Figure 1.

The following International Standards on fire-safety engineering are tied to the steps in the fire safety engineering design process outlined in ISO 23932-1: ISO 16730-1, ISO 16732-1, ISO 20414, ISO 20710-1, ISO 24678-1, ISO 24678-2, ISO 24678-3, ISO 24678-4, ISO 24678-5, ISO 24678-6, ISO 24678-7, ISO 24678-9 and ISO 24679-1.

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

Part 1: Selection of design fire scenarios

1 Scope

This document describes a methodology for the selection of design fire scenarios for use in fire-safety engineering analyses of any built environment, including

— buildings,

— structures, and

— transportation systems.

This document specifies procedures for selecting a manageable number of design fire scenarios using a qualitative or semi-quantitative approach.

NOTE See ISO 16732-1 for a full quantitative approach using risk assessment.

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*

ISO 16730-1, *Fire safety engineering — Procedures and requirements for verification and validation of calculation methods — Part 1: General*

ISO 16732-1, *Fire safety engineering — Fire risk assessment — Part 1: General*

ISO 23932-1, *Fire safety engineering — General principles — Part 1: General*

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 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
design fire
quantitative description of assumed fire characteristics within the *design fire scenario* (3.2)

Note 1 to entry: A design fire is, typically, an idealized description of the variation with time of important fire variables such as the heat release rate, flame spread rate, smoke production rate, toxic gas yields and temperature.

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