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

*Ingénierie de la sécurité contre l'incendie — Sélection de scénarios
d'incendie et de feux de calcul*



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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. 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.

In other circumstances, particularly when there is an urgent market requirement for such documents, a technical committee may decide to publish other types of normative document:

- an ISO Publicly Available Specification (ISO/PAS) represents an agreement between technical experts in an ISO working group and is accepted for publication if it is approved by more than 50 % of the members of the parent committee casting a vote;
- an ISO Technical Specification (ISO/TS) represents an agreement between the members of a technical committee and is accepted for publication if it is approved by 2/3 of the members of the committee casting a vote.

An ISO/PAS or ISO/TS is reviewed after three years in order to decide whether it will be confirmed for a further three years, revised to become an International Standard, or withdrawn. If the ISO/PAS or ISO/TS is confirmed, it is reviewed again after a further three years, at which time it must either be transformed into an International Standard or be withdrawn.

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.

ISO/TS 16733 was prepared by Technical Committee ISO/TC 92, *Fire safety*, Subcommittee SC 4, *Fire safety engineering*.

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, structure or transportation vehicle) can be very large and it is not possible to quantify them all. It is necessary to reduce this large set of possibilities to a manageably small set of fire scenarios that is amenable to analysis. In a deterministic assessment, which is implicitly envisioned in this Technical Specification, a manageable number of design fire scenarios is selected. For a full risk assessment, as described in ISO 16732, the large number of fire scenarios is combined into a set of scenario clusters.

The characterization of a fire scenario involves a description of fire initiation, the growth phase, the fully developed phase and extinction together with likely smoke and fire spread routes. This includes the interaction with the proposed fire-protection features for the built environment. It is necessary to consider the possible consequences of each fire scenario.

This Technical Specification introduces a methodology for the selection of design fire scenarios that is tailored to the fire-safety design objectives and accounts for the likelihood and consequences of potential scenarios.

There can be several fire safety objectives being addressed including life safety, property protection, continuity of operations and environmental protection. 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, it is necessary to describe the assumed characteristics of the fire on which the scenario quantification are based. These assumed fire characteristics are referred to as "the design fire". It is important that the design fire be appropriate to the objectives of the fire-safety engineering analysis and that they result in a design solution that is conservative.

Design fires are usually characterized in terms of time-dependent variables, such as the heat-release rate and effluent production rate. Fire can grow from ignition through to a fully developed stage and finally decay and eventually burnout. The design fire is described by the above variables over the life of the fire.

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

1 Scope

This Technical Specification describes a methodology for the selection of design fire scenarios and design fires that are credible but conservative for use in deterministic fire safety engineering analyses of any built environment including buildings, structures or transportation vehicles.

The selection of design fire scenarios is tailored to the fire-safety design objectives, and accounts for the likelihood and consequences of potential scenarios.

The selection of design fires is also tailored to the fire-safety objectives and to ensuring credible but severe fire exposure conditions.

While this Technical Specification provides more operational information on the selection of design fire scenarios and design fires than ISO/TR 13387-2^[20], it is not intended to replace ISO/TR 13387-2 within the self-consistent set of parts making up ISO/TR 13387.

2 Normative references

The following referenced documents are indispensable for the application 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/TR 13387-1, *Fire safety engineering — Part 1: Application of fire performance concepts to design objectives*

ISO 13943, *Fire safety — Vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 13943, ISO/TR 13387-1 and the following apply.

NOTE Some of the definitions have been updated to reflect the current understanding of the terms as employed in fire safety engineering.

3.1

built environment

building, structure or transportation vehicle

EXAMPLE Examples of structures other than buildings include tunnels, bridges, off-shore platforms and mines.

3.2

design fire

quantitative description of assumed fire characteristics within a design fire scenario

NOTE 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.