
**Fire safety engineering —
Performance of structures in fire —
Part 1:
General**

*Ingénierie de la sécurité incendie — Performances des structures en
situation d'incendie —
Partie 1: Généralités*

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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).

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).

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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 first edition of ISO 24679-1 cancels and replaces ISO/TS 24679:2011, which has been technically revised.

The main changes compared to the previous edition are as follows:

- The document has been updated to properly structure as a normative document.

A list of all parts in the ISO 24679 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

Fire is an extreme loading condition for structures, which can lead to significant effects on people, property and the environment. Part of the fire safety design of a built environment arises out of the need to provide design strategies that minimize the occurrence and spread of fire and its impact on life, property and the environment. Fire safety of structures is one important component of an overall fire safety design strategy. The role of fire safety of structures is to ensure that elements of a structure, (separating and structural elements) within a built environment, are capable of preventing or delaying fire spread and structural failure, so that the fire safety objectives, such as safety of life (for occupants and firefighters), conservation of property, continuity of operations, preservation of heritage and protection of the environment, are not compromised.

Traditionally, most designs for the fire safety of structures have been based on prescriptive requirements set by building regulations, building codes and associated standards. In prescriptive regulations, this is also known as *fire resistance*. The evaluation of fire resistance of construction elements is mainly determined by fire tests that involve:

- a single fire represented by a standard time-temperature curve (such as that given in ISO 834-1); and
- isolated elements or assemblies with defined boundary conditions and sizes.

In standard fire resistance tests, the thermal fire action continues to increase for the duration of the test according to standardized time-temperature fire curves. These thermal actions do not take into account the real conditions such as real fuel load, enclosure size, ventilation conditions, thermal properties of enclosure boundaries, active fire protection systems and firefighting actions. At the same time, from a mechanical point of view, these tests do not take into account the realistic boundary conditions and, consequently, the mechanical loads are not realistic. For example, possible redistribution of loads to other elements in a structure is not evaluated, since only single elements are tested. In addition, most test furnace facilities cannot take into account of the effect of restraint conditions that the tested element may undergo within a structure in real situation.

Such an assessment method is only able to provide a comparative rating of the construction products and cannot provide all the information required to perform a structural fire analysis of a given built environment.

With the recent advances in fire safety engineering and the opportunity for designers to take advantage of an engineering approach when evaluating the performance of structures in fire, it is becoming necessary to:

- refine the philosophy covered by the fire safety of structures, in the case of real fires, with respect to the whole structure;
- move beyond the sole consideration of individual elements and include the behaviour of the entire structural system;
- consider realistic thermal and mechanical load conditions; and
- include the cooling phase of the fire.

In the approach used in this document, solutions are based on engineering principles founded on a quantification of fire development, heat transfer and thermo-mechanical behaviour, on experts' judgement and on practicability.

An engineering approach offers many benefits, including:

- the provisions for better and more reliable fire safety in the built environment;
- potential cost-effective fire safety measures, and more options with regard to the choice of these measures; and