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Fire safety engineering — Examples of fire safety objectives, functional requirements and safety criteria

Ingénierie de la sécurité incendie — Exemples d'objectifs de sécurité incendie, d'exigences fonctionnelles et de critères de sécurité

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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).

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For an explanation on 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 the following URL: www.iso.org/iso/foreword.html.

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

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Introduction

The vast majority of fire safety designs rely on prescriptive specifications written into regional, national, or local regulations. Currently, various engineering approaches are also allowed by these regulations, although information needed for an engineering approach is still generally obtained from conventional test methods. Fire safety engineering (FSE) is a discipline increasingly being used throughout the world in support of performance-based design, i.e. the reliance on engineering methods to determine whether a given design meets stated performance objectives. ISO 23932 provides general principles for 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 people and based on knowledge of the consequences of such behaviour on life safety, property and the environment.

The difference between prescriptive and performance-based approaches to fire safety design is highlighted in ISO 23932 by emphasizing the development of quantifiable fire safety design objectives and related functional requirements as the first step in a performance-based analysis. According to ISO 23932, the fire safety objectives include, for example, safety of life, conservation of property, continuity of operations, protection of the environment and preservation of heritage.

In ISO 23932, it is also mentioned that explicit performance criteria should be developed for each functional requirement. Performance criteria are engineering metrics that are expressed in deterministic or probabilistic (e.g. measures of fire risk) form to determine if each functional requirement has been satisfied by the fire safety design.

As a preliminary work prior to producing ISO standardized documents for fire safety objectives, functional requirements and safety criteria, ISO/TC 92/SC 4 decides to collect the examples of those from the existing documents that have been developed in different countries in the course of moving towards performance-based fire safety design. So far, three countries have responded to the solicitation for such documents, i.e. Japan, France and New Zealand. The development of these documents, as summarized below, was motivated by the attempts to rationalize the existing fire safety design practices based on prescriptive building by making use of fire safety engineering methods.

Japan: First developed by the Building Research Institute during the Ministry of Construction's project for developing a performance-based fire safety design method, 1981 to 1986, and subsequently improved by the committee on fire safety design in Architectural Institute of Japan, of which the report was published in 2000.

France: Developed in the collaborative research project to establish the bases to introduce fire safety engineering into fire safety design, which was conducted with the sponsorship of French ministry for construction and home office from 2005 to 2011, involving research institutes, fire brigades, practitioners, designers and owners.

New Zealand: Developed by a working group made up of external fire experts and staff from the regulatory agency. The group was set up to research and develop a suitable fire safety design framework, in the course of amending the New Zealand Building Codes corresponding to the introduction of the Building Act 2004.

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Fire safety engineering — Examples of fire safety objectives, functional requirements and safety criteria

1 Scope

This document compiles examples of fire safety design objectives, functional requirements and safety criteria from Japan, France and New Zealand.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

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

— IEC Electropedia: available at http://www.electropedia.org/

— ISO Online browsing platform: available at http://www.iso.org/obp

3.1
functional requirements
statement of the means to achieve specified fire safety objectives, taking into account the features of a built environment

Note 1 to entry: Mandatory functional requirements are required by building codes or national regulations; voluntary functional requirements are expressed by other interested/affected parties.

3.2
mandatory objectives
fire safety objectives, such as life safety and protection of the environment, which are required by building codes or national regulations

3.3
performance criteria
quantitative engineering specifications, which form an agreed basis for assessing the safety of a built environment design

3.4
safety factor
multiplicative adjustment applied to calculated values to compensate for uncertainty in methods, calculations, input data and assumptions

3.5
verification
process of determining that a fire safety design complies with the fire safety requirements by examining the design in the light of safety criteria

3.6
voluntary objectives
fire safety objectives, which are requirements expressed by interested/affected parties, beyond mandatory objectives

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