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Fire safety engineering — Performance of structures in fire

Part 8: Example of a probabilistic assessment of a concrete building

bsi.

National foreword

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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).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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*.

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.

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Introduction

This document provides an example of the application of ISO 24679-1. The procedure in this document is intended to follow the principles outlined in ISO 24679-1. The clauses of ISO 24679-1 which are considered relevant to this document are identified and the clause titles are kept the same and in the same order.

The purpose of this document is to demonstrate the application of the steps outlined in ISO 24679-1 for fire safety engineering, performance of structures in fire, applying probabilistic methods.

The analysis shows how the achievement of the fire safety objectives, with respect to structural fire resistance, can be demonstrated through probabilistic analysis. The building is based on a demonstration case for Eurocode 2[2] and is thus conformant with the design requirements of EN 1992-1-2[5]. For this type of building, a probabilistic analysis would generally not be performed. However, probabilistic analysis can demonstrate the achievement of the fire safety objectives for situations which are not conformant with standard design guidance.

This document only presents an example application of a probabilistic analysis. More advanced applications considering system behaviour and stochastic fire exposure are possible. These more advanced procedures will generally result in an improved understanding of the reasonably foreseeable structural behaviour in case of fire, and can, for example, be used for an in-depth analysis of the post-fire structural performance.

Probabilistic methods make engineering assumptions more explicit. This pushes the engineer to question their competence and promotes an in-depth communication with stakeholders on the intended structural performance in case of fire.

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Fire safety engineering — Performance of structures in fire —

Part 8: Example of a probabilistic assessment of a concrete building

1 Scope

This document provides an example of a probabilistic assessment of a concrete building by revisiting the structural fire analysis of the concrete building presented in ISO/TR 24679-6, using probabilistic approaches. Specifically, the most heavily-loaded concrete column is analysed probabilistically, using the evaluation in ISO/TR 24679-6 as a starting point.

This report only addresses the fire safety objectives related to the structural performance. The analysis within this document therefore forms only part of the overall building fire safety strategy.

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 24679-1, *Fire safety engineering — Performance of structures in fire — Part 1: General*

3 Terms, definitions and symbols

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 24679-1 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/

3.2 Symbols

e	average eccentricity
E	load effect
E_d	design value of E
E_k	characteristic load
f	out-of-straightness
f_{ck}	characteristic concrete compressive strength

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