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Fire safety engineering — Guidance for use of fire zone models

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National foreword

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A list of organizations represented on this committee can be obtained on request to its secretary.

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**Fire safety engineering — Guidance
for use of fire zone models**

*Ingénierie de la sécurité incendie — Guide pour l'utilisation de modèles
incendie de zone*



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ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
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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;
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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order to decide whether it will be confirmed for a further three years, revised to become an International Standard, or withdrawn.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 13447 was prepared by Technical Committee ISO/TC 92, *Fire safety*, Subcommittee SC 4, *Fire safety engineering*.

Introduction

This Technical Specification is intended for the use of fire safety practitioners and regulators who use or assess one- or two-zone fire models as part of a fire safety design or analysis. Examples of users include fire safety engineers, authorities having jurisdiction, such as territorial authority officials; and fire service personnel. It is expected that users of this Technical Specification are appropriately qualified and competent in the fields of fire dynamics. It is particularly important that the model users understand the theoretical background and limitations of zone fire models.

In addition to the typical clauses (1, 2, 3 and 4, this Technical Specification includes the following clauses.

- 5: Describes fire zone models in general including underlying principles and assumptions
- 6: Discusses input parameters and data sources of fire zone models
- 7: Discusses sensitivity of fire zone models to input variations
- 8: Gives guidance on use and limitations of fire zone models

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Fire safety engineering — Guidance for use of fire zone models

1 Scope

This Technical Specification provides guidance for assessing the use of fire zone models for calculating gas temperature and concentrations and smoke layer position due to fire within an enclosure. It contains general guidance to be read in conjunction with specific model documentation provided by the model developers. It is not a basis for justifying the use of any particular model.

It is important that users of fire zone models understand the theoretical basis of a model and are capable of assessing the accuracy and validity of the results.

Zone models may also include additional sub-models for predicting related phenomena such as sprinkler, thermal or smoke detector activation, mechanical ventilation, glass fracture or flame spread. A detailed discussion of these related sub-models is beyond the scope of this Technical Specification.

NOTE An overview of features covered by various zone models can be found in a survey by Olenick and Carpenter.^[1]

This Technical Specification is not intended as a basis for regulation.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. 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*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 13943 and the following apply.

3.1

zone model

calculation model for predicting the environment resulting from a fire in an enclosure where one or more distinct gaseous zones represent layers formed by thermal stratification of buoyant gases

4 Symbols (and abbreviated terms)

\dot{Q} (kW)	Time-dependent rate of heat release
\dot{m} (g/s)	Time-dependent fuel mass loss rate
Δh_c (kJ/g)	Effective heat of combustion