PD ISO/TR 16730-2:2013

BSI Standards Publication

Fire safety engineering — Assessment, verification and validation of calculation methods

Part 2: Example of a fire zone model

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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 — Assessment, verification and validation of calculation methods —

Part 2: Example of a fire zone model

Ingénierie de la sécurité incendie — Évaluation, vérification et validation des méthodes de calcul —

Partie 2: Exemple d'un modèle de zone

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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.

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The committee responsible for this document is ISO/TC 92, *Fire safety*, Subcommittee SC 4, *Fire safety engineering*.

ISO 16730 consists of the following parts, under the general title *Fire safety engineering — Assessment, verification and validation of calculation methods*:

— *Part 2: Example of a fire zone model* (Technical report)

— *Part 3: Example of a CFD model* (Technical report)

— *Part 4: Example of a structural model* (Technical report)

— *Part 5: Example of an Egress model* (Technical report)

The following parts are under preparation:

— *Part 1: General* (revision of ISO 16730:2008)

Introduction

Certain commercial entities, equipment, products, or materials are identified in this document in order to describe a procedure or concept adequately or to trace the history of the procedures and practices used. Such identification is not intended to imply recommendation, endorsement, or implication that the entities, products, materials, or equipment are necessarily the best available for the purpose. Nor does such identification imply a finding of fault or negligence by the International Standards Organization.

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TECHNICAL REPORT **ISO/TR 16730-2:2013(E)**

Fire safety engineering — Assessment, verification and validation of calculation methods —

Part 2: Example of a fire zone model

1 Scope

This part of ISO 16730 shows how ISO 16730-1 is applied to a calculation method for a specific example. It demonstrates how technical and users' aspects of the method are properly described in order to enable the assessment of the method in view of verification and validation.

The example in this part of ISO 16730 describes the application of procedures given in ISO 16730-1 for a fire zone model (CFAST).

The main objective of the specific model treated here is the simulation of a fire in confined compartments with a natural or forced ventilation system.

2 General information on the zone model considered

The name given to the zone model considered in this Technical Report is "CFAST". CFAST is a two-zone fire model capable of predicting the environment in a multi-compartment structure subjected to a fire. It calculates the time-evolving distribution of smoke and fire gases and the temperature throughout a building during a user-prescribed fire. This Technical Report describes the equations which constitute the model, the physical basis for these equations, and an evaluation of the sensitivity and predictive capability of the model.

The modelling equations take the mathematical form of an initial value problem for a system of ordinary differential equations (ODEs). These equations are derived using the conservation of mass, the conservation of energy (equivalently, the first law of thermodynamics), the ideal gas law, and relations for density and internal energy. These equations predict as functions of time quantities such as pressure, layer height, and temperature given the accumulation of mass and enthalpy in the two layers. The model then consists of a set of ODEs to compute the environment in each compartment and a collection of algorithms to compute the mass and enthalpy source terms required by the ODEs.