



Standard Guide for Evaluating the Predictive Capability of Deterministic Fire Models¹

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1. Scope

1.1 This guide provides a methodology for evaluating the predictive capabilities of a fire model for a specific use. The intent is to cover the whole range of deterministic numerical models which might be used in evaluating the effects of fires in and on structures.

1.2 The methodology is presented in terms of four areas of evaluation:

1.2.1 Defining the model and scenarios for which the evaluation is to be conducted,

1.2.2 Verifying the appropriateness of the theoretical basis and assumptions used in the model,

1.2.3 Verifying the mathematical and numerical robustness of the model, and

1.2.4 Quantifying the uncertainty and accuracy of the model results in predicting of the course of events in similar fire scenarios.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

1.4 This fire standard cannot be used to provide quantitative measures.

2. Referenced Documents

2.1 *ASTM Standards:*²

E176 Terminology of Fire Standards

E603 Guide for Room Fire Experiments

E1591 Guide for Obtaining Data for Deterministic Fire Models

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

2.2 *International Standards Organization Standards:*³

ISO/IEC Guide 98 (2008) Uncertainty of measurement – Part 3: Guide to the expression of uncertainty in measurement

ISO 13943 (2008) Fire safety – Vocabulary

ISO 16730 (2008) Fire safety engineering – Assessment, verification and validation of calculation methods

3. Terminology

3.1 *Definitions:* For definitions of terms used in this guide and associated with fire issues, refer to terminology contained in Terminology E176 and ISO 13943. In case of conflict, the definitions given in Terminology E176 shall prevail.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *model evaluation*—the process of quantifying the accuracy of chosen results from a model when applied for a specific use.

3.2.2 *model validation*—the process of determining the degree to which a calculation method is an accurate representation of the real world from the perspective of the intended uses of the calculation method.

3.2.2.1 *Discussion*—The fundamental strategy of validation is the identification and quantification of error and uncertainty in the conceptual and computational models with respect to intended uses.

3.2.3 *model verification*—the process of determining that the implementation of a calculation method accurately represents the developer's conceptual description of the calculation method and the solution to the calculation method.

3.2.3.1 *Discussion*—The fundamental strategy of verification of computational models is the identification and quantification of error in the computational model and its solution.

3.2.4 The precision of a model refers to the deterministic capability of a model and its repeatability.

3.2.5 The accuracy refers to how well the model replicates the evolution of an actual fire.

³ Available from American National Standards Institute, 11 West 42nd Street, 13th Floor, New York, NY 10036.