



Standard Guide for Obtaining Data for Deterministic Fire Models¹

This standard is issued under the fixed designation E 1591; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This guide describes data required as input for mathematical fire models.

1.2 Guidelines are presented on how the data can be obtained.

1.3 The emphasis in this guide is on compartment zone fire models.

1.4 The values stated in SI units are to be regarded as the standard.

1.5 *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.*

2. Referenced Documents

2.1 ASTM Standards:

C 177 Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus²

C 518 Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus²

C 835 Test Method for Total Hemispherical Emittance of Surfaces from 20 to 1400°C²

D 2395 Test Methods for Specific Gravity of Wood and Wood-Base Materials³

D 3286 Test Method for Gross Calorific Value of Coal and Coke by the Isoperibol Bomb Calorimeter⁴

D 3417 Test Method for Heats of Fusion and Crystallization of Polymers by Thermal Analysis⁵

E 176 Terminology of Fire Standards⁶

E 408 Test Methods for Total Normal Emittance of Surfaces Using Inspection-Meter Techniques⁷

E 472 Practice for Reporting Thermoanalytical Data⁸

E 473 Terminology Relating to Thermal Analysis⁹

E 537 Test Method for Assessing the Thermal Stability of Chemicals by Methods of Differential Thermal Analysis⁹

E 603 Guide for Room Fire Experiments⁶

E 793 Test Method for Heats of Fusion and Crystallization by Differential Scanning Calorimetry⁹

E 906 Test Method for Heat and Visible Smoke Release Rates for Materials and Products⁶

E 967 Practice for Temperature Calibration of Differential Scanning Calorimeters and Differential Thermal Analyzers⁹

E 968 Practice for Heat Flow Calibration of Differential Scanning Calorimeters⁹

E 1142 Terminology Relating to Thermophysical Properties⁹

E 1321 Test Method for Determining Material Ignition and Flame Spread Properties⁶

E 1354 Test Method for Heat and Visible Smoke Release Rates for Materials and Products Using an Oxygen Consumption Calorimeter⁶

E 1623 Test Method for Determination of Fire and Thermal Parameters of Materials, Products, and Systems Using an Intermediate Scale Calorimeter (ICAL)⁶

3. Terminology

3.1 *Definitions*—For definitions of terms appearing in this guide, refer to Terminology E 176.

4. Significance and Use

4.1 This guide is intended primarily for users and developers of mathematical fire models. It is also useful for people conducting fire tests, making them aware of some important applications and uses for small-scale fire test results. The guide thus contributes to increased accuracy in fire model calculations, which depend greatly on the quality of the input data.

4.2 The emphasis of this guide is on zone models of compartment fires. However, other types of mathematical fire models need many of the same input variables.

NOTE 1—Mathematical fire models in this guide are referred to by their acronyms (see 5.4).

¹ This guide is under the jurisdiction of ASTM Committee E-5 on Fire Standards and is the direct responsibility of Subcommittee E05.33 on Fire Safety Engineering. Current edition approved April 10, 2000. Published May 2000. Originally published as E 1591–94. Last previous edition E 1591–94.

² Annual Book of ASTM Standards, Vol 04.06.

³ Annual Book of ASTM Standards, Vol 04.10.

⁴ Annual Book of ASTM Standards, Vol 05.05.

⁵ Annual Book of ASTM Standards, Vol 08.02.

⁶ Annual Book of ASTM Standards, Vol 04.07.

⁷ Annual Book of ASTM Standards, Vol 15.03.

⁸ Discontinued; see 1995 Annual Book of ASTM Standards, Vol 14.02.

⁹ Annual Book of ASTM Standards, Vol 14.02.