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Standard Guide for Locating Combustion Test Methods for Polymeric Materials[1]

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1. Scope*

1.1 This guide provides assistance in locating test methods and related documents for determining the combustion properties of polymeric materials used for various applications.

1.2 This guide includes standardized North American and global test methods promulgated by ASTM, CSA, NFPA, SAE, Underwriters Laboratories, North American Government Agencies, IEC, and ISO. It does not include industrial tests, user specification tests, nor nonstandard test methods. This list of tests is not exhaustive and the user must assume other tests may exist for specific materials or applications.

1.3 This guide is arranged according to products and systems.

1.4 The test methods described in this guide should be used solely to measure and describe the properties of materials, products, or systems in response to heat and flame under controlled laboratory conditions and should not be considered or used for the description, appraisal, or regulation of the fire hazard of materials, products, or systems under actual fire conditions.

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.* Specific precautionary statements are given in 3.2.

NOTE 1—There are no ISO or IEC standards equivalent to this guide.

NOTE 2—Related IEC and ISO standards are referenced in the appropriate places throughout this guide.

2. Terminology

2.1 The terminology used in reference test methods is not consistent from test to test. The terms used in a particular test method shall be utilized only in reference to that test method and only in a manner connected with the definition of the terms given in that test method.

2.2 For general guidance on terminology for fire tests, reference can be made to the following standards:

2.2.1 ASTM E176, Terminology of Fire Standards *(C1)*.

2.2.2 IEC 60695-4, Fire Hazard Testing—Part 4: Terminology Concerning Fire Tests *(N)*.

2.2.3 ISO Guide 52, Glossary of Fire Terms and Definitions *(N)*.

3. Significance and Use

3.1 Plastics, like many other materials, are combustible. This guide lists the test methods for plastics used in various industries at the present time. These test methods provide some information on the combustibility and burning characteristics of plastics products.

3.2 This guide is intended to assist the user in locating test methods that may provide data of the combustion characteristics of the user's product. (**Warning—**During the course of combustion, gases or vapors, or both, are evolved that may be hazardous to personnel. Adequate precautions should be taken to protect the operator during execution of any of these test methods.)

3.3 The user of this guide is responsible for obtaining the current (latest) edition of any test method selected for use.

4. Source

4.1 The source for the test method is given in Annex A1 as indicated by the letter designations in italics in the text.

5. Aircraft Interiors

5.1 ASTM D 3032, Test Methods for Hookup Wire Insulation, Vertical Flame Test, Section 18 (*C8*).

5.2 FAR 14 CFR 25.853, Paragraphs (a), (b), (c), and (d) and Appendix F, Air Worthiness Standards—Transport Category Airplanes, Compartment Interiors *(D)*.

5.3 ISO 2156, Aircraft—Fire-Resisting Electrical Cables—Methods of Test *(N)*.

5.4 ISO 2685, Aircraft—Environmental Conditions and Test Procedures for Airborne Equipment—Resistance to Fire in Designated Fire Zones *(N)*.

5.5 SAE-AMS 3851A, Fire Resistance Properties for Aircraft Materials *(B)*.

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***A Summary of Changes section appears at the end of this standard.**

5.6 SAE-AMS 3852A, Fire Resistance Properties for Aircraft Materials *(B)*.

6. Automotive Interiors

6.1 ASTM D5132, Test Method for Horizontal Burning Rate of Polymeric Materials Used in Occupant Compartments of Motor Vehicles *(C5)*.

6.2 DOT Motor Vehicle Safety Standard No. 302, Flammability of Materials—Passenger Cars, Multipurpose Passenger Vehicles, Trucks and Buses *(A)*.

6.3 ISO 3795, Road Vehicles and Tractors and Machinery for Agriculture and Forestry—Determination of Burning Behaviour of Interior Materials *(N)*.

6.4 SAE J369, Flammability of Polymeric Interior Materials—Horizontal Test Method *(B)*.

7. Building Materials and Construction

7.1 ASTM E84, Test Method for Surface Burning Characteristics of Building Materials *(C1)*.

7.2 ASTM E108, Test Methods for Fire Tests of Roof Coverings *(C1)*.

7.3 ASTM E119, Test Methods for Fire Tests of Building Construction and Materials *(C1)*.

7.4 ASTM E136, Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C *(C1)*.

7.5 ASTM E162, Test Method for Surface Flammability of Materials Using a Radiant Heat Energy Source *(C1)*.

7.6 ASTM E603, Guide for Room Fire Experiments *(C1)*.

7.7 ASTM E800, Guide for Measurement of Gases Present or Generated During Fires *(C1)*.

7.8 ASTM E814, Test Method for Fire Tests of Through-Penetration Fire Stops *(C1)*.

7.9 ASTM E970, Test Method for Critical Radiant Flux of Exposed Attic Floor Insulation Using a Radiant Heat Energy Source *(C1)*.

7.10 ASTM E1354, Test Method for Heat and Visible Smoke Release Rates for Materials and Products Using an Oxygen Consumption Calorimeter *(C1)*.

7.11 ASTM E1623, Test Method for Determination of Fire and Thermal Parameters of Materials, Products and Systems Using an Intermediate Scale Calorimeter (ICAL) *(C1)*.

7.12 ASTM E1725, Test Methods for Fire Tests of Fire Resistive Barrier Systems for Electrical System Components *(C1)*.

7.13 ASTM E1740, Test Method for Determining the Heat Release Rate and Other Fire-Test-Response Characteristics of Wallcovering Composites Using a Cone Calorimeter *(C1)*.

7.14 DASMA 107, Room Fire Test Standard for Garage Doors Using Foam Plastic Insulation *(N)*.

7.15 FM Standard 4880, Factory Mutual Building Corner Fire Test Procedure *(L)*.

7.16 FM Standard 4450, Approval Standard for Class I Insulated Steel Deck Roofs *(L)*.

7.17 ISO 834 Fire-resistance Tests—Elements of Building Construction *(N)*.

7.18 ISO 1182, Fire Tests—Building Materials—Non-Combustibility Test *(N)*.

7.19 ISO 1716, Reaction to Fire Tests for Building Products—Determination of the Gross Calorific Value *(N)*.

7.20 ISO 5657, Reaction to Fire Tests—Ignitability of Building Products Using a Radiant Heat Source *(N)*.

7.21 ISO/TR 5658-1, Reaction to Fire Tests—Spread of Flame—Part 1: Guidance on Flame Spread *(N)*.

7.22 ISO 5658-2, Reaction to Fire Tests—Spread of Flame—Part 2: Lateral Spread on Building Products in Vertical Configuration *(N)*.

7.23 ISO 5660-1, Fire Tests—Reaction to Fire—Part 1: Rate of Heat Release from Building Products (Cone Calorimeter Method) *(N)*.

7.24 ISO 5924, Fire Tests—Reaction to Fire—Smoke Generated by Building Products (Dual-Chamber Test) *(N)*.

7.25 ISO 6944, Fire Resistance Test—Ventilation Ducts *(N)*.

7.26 ISO 9705 Fire Tests—Full Scale Room Test for Surface Products *(N)*.

7.27 ISO 11925-2, Reaction to Fire Tests—Ignitability of Building Products Subjected to Direct Impingement of Flame—Part 2: Single Flame Source Test *(N)*.

7.28 ISO 11925-3, Reaction to Fire Tests—Ignitability of Building Products Subjected to Direct Impingement of Flame—Part 3: Multi-Source Test *(N)*.

7.29 ISO/TR 12470, Fire Resistance Tests—Guidance on the Application and Extension of Results *(N)*.

7.30 NFPA 251, Methods of Tests of Fire Endurance of Building Construction and Materials *(J)*.

7.31 NFPA 252, Fire Tests of Door Assemblies *(J)*.

7.32 NFPA 255, Surface Burning Characteristics of Building Materials *(J)*.

7.33 NFPA 256, Fire Tests of Roof Coverings *(J)*.

7.34 NFPA 257, Fire Tests of Window Assemblies *(J)*.

7.35 NFPA 259, Test Method for Potential Heat of Building Materials *(J)*.

7.36 NFPA 265, Methods of Fire Tests for Evaluation of Room Fire Growth Contribution of Textile Wall Coverings *(J)*.

7.37 NFPA 268, Test Method for Determining Ignitibility of Exterior Wall Assemblies Using a Radiant Heat Energy Source *(J)*.

7.38 NFPA 269, Test Method for Determining Toxic Potency Data for Use in Fire Hazard Modeling *(J)*.

7.39 NFPA 285, Standard Method of Test for the Evaluation of Flammability Characteristics of Exterior Nonload Bearing Wall Assemblies Containing Combustible Components Using the Intermediate Scale Multi-Story Test Apparatus *(J)*.

7.40 UBC Standard 26-3, Room Fire Test Standard for Interior of Foam Plastic Systems *(M)*.

7.41 UBC Standard 26-4, Method of Test for the Evaluation of Flammability Characteristics of Exterior, Nonload-Bearing Wall Panel Assemblies Using Foam Plastic Insulation *(M)*.

7.42 UBC Standard 8-2, Method of Test for Evaluating Room Fire Growth Contribution of Textile Wall Covering *(M)*.

7.43 UL263, Standard for Fire Tests of Building Construction and Materials *(G)*.

7.44 UL723, Standard for Test for Surface Burning Characteristics of Building Materials *(G)*.

7.45 UL790, Standard for Tests for Fire Resistance of Roof Covering Materials *(G)*.

7.46 UL1040, Fire Test of Insulated Wall Construction *(G)*.

7.47 UL1256, Standard for Fire Test of Roof Deck Constructions *(G)*.

7.48 UL1715, Standard for Fire Test of Interior Finish Material *(G)*.

7.49 UL1820, Fire Test of Pneumatic Tubing for Flame and Smoke Characteristics *(G)*.

7.50 UL1887, Fire Test of Plastic Sprinkler Pipe for Flame and Smoke Characteristics *(G)*.

7.51 UL1975, Fire Tests for Foamed Plastics Used for Decorative Purposes *(G)*.

7.52 UL2043, Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces *(G)*.

7.53 UL2079, Standard for Tests for Fire Resistance of Building Joint Systems *(G)*.

8. Conveyor Belting

8.1 MSA, Flame Tests for Conveyor Belting and Hose *(E)*.

8.2 ASTM D378, Test Methods for Rubber (Elastomeric) Belting, Flat Type *(C6)*.

8.3 ISO 340, Conveyor Belts—Flame Retardation—Specifications and Test Method *(N)*.

9. Electrical Cable and Insulation

9.1 ASTM D350, Test Methods for Flexible Treated Sleeving Used for Electrical Insulation *(C7)*.

9.2 ASTM D876, Test Methods for Nonrigid Vinyl Chloride Polymer Tubing Used for Electrical Insulation *(C7)*.

9.3 ASTM D2633, Methods of Testing Thermoplastic Insulations and Jackets for Wire and Cable *(C8)*.

9.4 ASTM D2671, Test Methods for Heat-Shrinkable Tubing for Electrical Use *(C8)*.

9.5 ASTM D3874, Test Method for Ignition of Materials by Hot Wire Sources *(C8)*.

9.6 ASTM D5424, Test Method for Smoke Obscuration of Insulating Materials Contained in Electrical or Optical Fiber Cables When Burning in a Vertical Cable Tray Configuration *(C8)*.

9.7 ASTM D5537, Test Method for Heat Release, Flame Spread and Mass Loss Testing of Insulating Materials Contained in Electrical or Optical Fiber Cables When Burning in a Vertical Cable Tray Configuration *(C8)*.

9.8 ASTM D6113, Test Method for Using a Cone Calorimeter to Determine Fire-Test-Response Characteristics of Insulating Materials Contained in Electrical or Optical Fiber Cables *(C8)*.

9.9 Bureau of Mines Schedule 2G Electric Motor-Drive *(E)*.

9.10 CSA C22.2 No. 0.3-M, Test Methods for Electrical Wire and Cables *(H)*.

9.11 CSA C22.2 No. 198.3, Coated Electrical Sleeving; Section 5.7 "VW-1/FT-1 (Vertical-Wire) Flame" *(H)*.

9.12 IEC 60112, Method for Determining the Comparative and the Proof Tracking Indices of Solid Insulating Materials Under Moist Conditions *(N)*.

9.13 IEC 60332, Tests on Electric Cables Under Fire Conditions *(N)*.

9.14 IEC 60332-1, Tests on Electric Cables Under Fire Conditions—Part 1: Fire Test for a Single, Vertical Insulated Wire or Cable *(N)*.

9.15 IEC 60332-2, Tests on Electric Cables Under Fire Conditions, Part 2: Test on a Single Small Vertical Insulated Copper Wire or Cable *(N)*.

9.16 IEC 60332-3, Tests on Electric Cables Under Fire Conditions, Part 3: Tests on Bunched Wires or Cables *(N)*.

9.17 IEC 60587, Test Methods for Evaluating Resistance to Tracking and Erosion of Electrical Insulating Materials Used Under Severe Ambient Conditions *(N)*.

9.18 IEC 60695-2-3, Bad Connection Test with Heaters *(N)*.

9.19 IEC 60707, Methods of Test for the Determination of the Flammability of Solid Electrical Insulating Materials When Exposed to an Ignition Source *(N)*.

9.20 IEC 60754-2, Test on Gases Evolved During Combustion of Electric Cable—Part 2: Determination of Degree of Acidity of Gases Evolved During the Combustion of Materials Taken from Electric Cables by Measuring pH and Conductivity *(N)*.

9.21 IEC 61034-1, Measurement of Smoke Density of Cables Burning under Defined Conditions Part 1: Test Apparatus *(N)*.

9.22 IEC 61034-2, Measurement of Smoke Density of Cables Burning Under Defined Conditions—Part 2: Test Procedure and Requirements *(N)*.

9.23 IEC 61300, Fibre Optic Interconnecting Devices and Passive Components—Basic Test and Measurement Procedures—Part 2-36: Tests—Flammability (Fire Hazard) *(N)*.

9.24 IEEE 383, Standard for Type Test of Class IE Electrical Cable, Field Splices and Connections for Nuclear Power Generating Stations *(F)*.

9.25 IEEE 1202, Flame Testing of Cables for Use in Cable Tray in Industrial and Commercial Occupancies *(F)*.

9.26 ISO 2156, Aircraft—Fire-Resisting Electrical Cables—Methods of Test *(N)*.

9.27 MIL-C7078C, General Specification for Cable, Electric Aerospace Vehicle *(I)*.

9.28 NFPA 262, Method of Test for Fire and Smoke Characteristics of Wires and Cables *(J)*.

9.29 SAE J558, Low Tension Cable Flame Test *(B)*.

9.30 UL224, Extruded Insulating Tubing; Section 14 "All-Tubing Flame Test" and Section 15 "Optional VW-1 (Vertical Wire) Flame Test" *(G)*.

9.31 UL493, Thermoplastic-Insulated Underground Feeder and Branch-Circuit Cables; Section 13 "Flame Test" and Section 14 "Vertical-Tray Flame Test" *(G)*.

9.32 UL510, Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape, Section 4 "Flame Test" *(G)*.

9.33 UL588, Standard for Christmas-Tree and Decorative Lighting Outfits, Section 48 "Downward Burning Rate Test" *(G)*.

9.34 UL651, Schedule 40 and 80 PVC Conduit; Section 13" Flame" *(G)*.

9.35 UL719, Non-Metallic-Sheathed Cables; Section 12" Flame Test" and Section 13 "Vertical-Tray Flame Test" *(G)*.

9.36 UL910, Test for Flame-Propagation and Smoke-Density Values for Electrical and Optical-Fiber Cable Used in Spaces Transporting Environmental Air *(G)*.

9.37 UL1277, Electrical Power and Control Tray Cables With Optional Optical-Fiber Members; Section 14 "Vertical-Tray Flame Test" *(G)*.

9.38 UL1441, Coated Electrical Sleeving; Section 5.7 "VW-1/FT-1 (Vertical-Wire) Flame" *(G)*.

9.39 UL1581, Reference Standard for Electrical Wires, Cables, and Flexible Cord; Section 1060 "Vertical Flame Test," Section 1061 "Cable Flame Test," Section 1080 "VW-1 (Vertical-Specimen) Flame Test," Section 1090 "Horizontal-Specimen Appliance-Wire Flame Test," Section 1100 "Horizontal-Specimen/FT2 Flame Test," Section 1160 "Vertical-Tray Flame Test," and Section 1164 "FT4/IEEE 1202 Vertical-Tray Flame Test" *(G)*.

9.40 UL1660, Liquid-Tight Flexible Nonmetallic Conduit, Section 7 "Vertical-Specimen Flame Test" *(G)*.

9.41 UL1666, Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts *(G)*.

9.42 UL1685, Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cable *(G)*.

9.43 UL2043, Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces *(G)*.

10. Electrical Products: Components or Parts

10.1 ASTM D5425, Guide for Development of Fire Hazard Assessment Standards of Electrotechnical Products *(C8)*.

10.2 IEC 60695-1-1, Guidance for Assessing Fire Hazard of Electrotechnical Products—General Guidance *(N)*.

10.3 IEC 60695-1-2, Guidance for Preparation of Requirements and Specifications for Assessing Fire Hazard of Electrotechnical Products—Guidance for Electronic Components *(N)*.

10.4 IEC 60695-1-3, Guidance for Preparation of Requirements and Specifications for Assessing Fire Hazard of Electrotechnical Products—Guidance for Use of Preselection Procedures *(N)*.

10.5 IEC 60695-2-1/0, Glow-Wire Test Methods—General *(N)*.

10.6 IEC 60695-2-1/1, Glow-Wire End-Product Test and Guidance *(N)*.

10.7 IEC 60695-2-1/2, Glow-Wire Flammability Test on Materials *(N)*.

10.8 IEC 60695-2-1/3, Glow-Wire Ignitability Test on Materials *(N)*.

10.9 IEC 60695-2-2, Needle-Flame Tests *(N)*.

10.10 IEC 60695-9-1, Fire Hazard Testing—Surface Spread of Flame—General Guidance *(N)*.

10.11 IEC 60695-11-10, Fire Hazard Testing—Part 11-10: Test Flames—50W Horizontal and Vertical Flame Test Methods *(N)*.

10.12 IEC 60695-11-20, Fire Hazard Testing—Part 11-20: Test Flames—500W Flame Test Methods *(N)*.

10.13 UL94, Test for Flammability of Plastic Materials for Parts in Devices and Appliances *(G)*.

10.14 UL746C, Polymeric Materials—Use in Electrical Equipment Evaluations; Section 51 "Flammability—12 mm Flame Test," Section 52 "Flammability—¾ Inch Flame Test," Section 53 "Flammability—5 Inch Flame Test," and Section 54 "Enclosure Flammability—746-5VS Test." *(G)*.

10.15 UL1694, Tests for Flammability of Small Polymeric Component Materials *(G)*.

11. Fabrics or Film

11.1 ASTM D1230, Test Method for Flammability of Apparel Textiles *(C2)*.

11.2 ASTM D4151, Test Method for Flammability of Blankets *(C2)*.

11.3 ASTM D4723, Index of and Descriptions of Textile Heat and Flammability Test Methods and Performance Specifications *(C9)*.

11.4 ASTM F1358, Test Methods for Effects of Flame Impingement on Materials Used in Protective Clothing Not Designated Primarily for Flame Resistance *(C11)*.

11.5 ISO 6940, Textile Fabrics—Burning Behaviour—Determination of Ease of Ignition of Vertically Oriented Specimens *(N)*.

11.6 ISO 6941, Textile Fabrics—Burning Behaviour—Measurement of Flame Spread Properties of Vertically Oriented Specimens *(N)*.

11.7 ISO 10047, Textiles—Determination of Surface Burning Time of Fabrics *(N)*.

11.8 ISO 12952-1, Textiles—Burning Behaviour of Bedding Items—Part 1: General Test Methods for the Ignitabiity by a Smoulding Cigarette *(N)*.

11.9 ISO 12952-2, Textiles—Burning Behaviour of Bedding Items—Part 2: Specific Test Methods for the Ignitability by a Smoulding Cigarette *(N)*.

11.10 ISO 12952-3, Textiles—Burning Behaviour of Bedding Items—Part 3: General Test Methods for the Ignitability by a Small Open Flame *(N)*.

11.11 ISO 12952-4, Textiles—Burning Behaviour of Bedding Items—Part 4: Specific Test Methods for the Ignitability by a Small Open Flame *(N)*.

11.12 ISO 12992, Plastics—Vertical Flame Spread Determination for Film and Sheet *(N)*.

11.13 NFPA 701, Flame Resistant Test for Textiles and Films *(J)*.

11.14 NFPA 705, Recommended Practice for a Field Flame Test for Textiles and Films *(J)*.

11.15 UL214, Test for Flame Propagation of Fabrics and Films *(G)*.

11.16 UL2154, Fire Tests of Surgical Fabrics *(G)*.

12. Floor Coverings

12.1 ASTM D2859, Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials *(C1)*.

12.2 ASTM E648, Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source *(C1)*.

12.3 DOC FF1–70, Standard for Surface Flammability of Carpets and Rugs *(I)*.

12.4 ISO 6925, Textile Floor Coverings—Burning Behaviour—Tablet Test at Ambient Temperature *(N)*.

12.5 ISO 9239-1, Reaction to Fire Tests—Horizontal Surface Spread of Flame on Floor-Covering Systems—Part 1: Determination of the Burning Behaviour Using a Radiant Heat Source *(N)*.

12.6 NFPA 253, Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source *(J)*.

13. Furnishings

13.1 ASTM E1352, Test Method for Cigarette Ignition Resistance of Mock-Up Upholstered Furniture Assemblies *(C1)*.

13.2 ASTM E1353, Test Methods for Cigarette Ignition Resistance of Components of Upholstered Furniture *(C1)*.

13.3 ASTM E1474, Test Method for Determining the Heat Release Rate of Upholstered Furniture and Mattress Components or Composites Using a Bench Scale Oxygen Consumption Calorimeter *(C1)*.

13.4 ASTM E1537, Test Method for Fire Testing of Upholstered Furniture *(C1)*.

13.5 ASTM E1590, Test Method for Fire Testing of Mattresses *(C1)*.

13.6 ASTM E1822, Test Method for Fire Testing of Stacked Chairs *(C1)*.

13.7 ASTM F1534, Test Method for Determining Changes in Fire-Test-Response Characteristics of Cushioning Materials After Water Leaching *(C12)*.

13.8 ASTM F1550, Test Method for Determination of Fire-Test-Response Characteristics of Components or Composites of Mattresses or Furniture for Use in Correctional Facilities After Exposure to Vandalism, by Employing a Bench Scale Oxygen Consumption Calorimeter *(C12)*.

13.9 BS 5852 Fire Tests for Furniture *(O)*.

13.10 California Technical Bulletin No. 106, Requirements, Test Procedures, and Apparatus for Testing the Resistance of a Mattress or Mattress Pad to Combustion Which Might Result From a Smoldering Cigarette *(K)*.

13.11 California Technical Bulletin No. 116, Requirements, Test Procedures, and Apparatus for Testing the Flame Retardance of Upholstered Furniture *(K)*.

13.12 California Technical Bulletin No. 117, Requirements, Test Procedures, and Apparatus for Testing the Flame Retardance of Resilient Filling Materials Used in Upholstery Furniture *(K)*.

13.13 California Technical Bulletin No. 121, Flammability Test Procedure for Mattresses for Use in High Risk Occupancies *(K)*.

13.14 California Technical Bulletin No. 129, Flammability Test Procedures for Mattresses for Use in Public Buildings *(K)*.

13.15 California Technical Bulletin No. 133, Flammability Test Procedure for Seating Furniture for Use in High Risk and Public Occupancies *(K)*.

13.16 DOC FF4-72, Flammability Standard for Mattresses *(I)*.

13.17 ISO 7176-16, Wheelchairs—Part 16: Resistance to Ignition of Upholstered Parts—Requirements and Test Methods *(N)*.

13.18 ISO 8191/1, Furniture—Assessment of Ignitability of Upholstered Furniture—Ignition Source: Smoulding Cigarette *(N)*.

13.19 ISO 8191/2, Furniture—Assessment of Ignitability of Upholstered Furniture—Ignition Source: Match-Flame Equivalent *(N)*.

13.20 NFPA 260, Methods of Tests and Classification System for Cigarette Ignition Resistance of Components of Upholstered Furniture *(J)*.

13.21 NFPA 261, Method of Test for Determining Resistance of Mock-Up Upholstered Furniture Material Assemblies to Ignition by Smoldering Cigarettes *(J)*.

13.22 NFPA 272, Method of Test for Heat and Visible Smoke Release Rates for Materials and Products Using an Oxygen Consumption Calorimeter *(J)*.

13.23 NFPA 266, Method of Test for Fire Characteristics of Upholstered Furniture Exposed to Flaming Ignition Source *(J)*.

13.24 NFPA 267, Method of Test for Fire Characteristics of Mattresses and Bedding Assemblies Exposed to Flaming Ignition Source *(J)*.

13.25 UL1056, Fire Test of Upholstered Furniture *(G)*.

13.26 UL1895, Fire Test of Mattresses *(G)*.

13.27 UL2060, Fire Test of Mattresses with Bed Clothes Using a Furniture Calorimeter *(G)*.

14. Gaskets

14.1 ASTM C1166, Test Method for Flame Propagation of Dense and Cellular Elastomeric Gaskets and Accessories *(C1)*.

14.2 ASTM F495, Test Method for Weight Loss of Gasket Materials Upon Exposure to Elevated Temperatures *(C6)*.

15. Hose

15.1 CFR Title 30, Part 18, Section 18.65, Standard Test Procedures, Conveyor Belt and Hose Products Flame Test, Bureau of Mines Schedule 2G *(E)*.

15.2 ISO 8030, Rubber and Plastic Hoses—Method of Test for Flammability *(N)*.

15.3 ISO 13774, Rubber and Plastic Hoses for Fuels for Internal-Combustion Engines—Method of Test for Flammability *(N)*.

15.4 RMA—CGA Flame Test for Welding Hose *(P)*.

15.5 SAE AS 1055D, Fire Testing of Flexible Hose, Tube Assemblies, Coils, Fittings, and Similar System Components *(B)*.

15.6 SAE AIR 1377, Fire Test Equipment for Flexible Hose and Tube Assemblies *(B)*.

15.7 UL1114, Marine (USCG Type A) Flexible Fuel-Line Hose *(G)*.

15.8 UL1820, Fire Test of Pneumatic Tubing for Flame and Smoke Characteristics *(G)*.

16. Combustion Characteristics

16.1 ASTM D635, Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position *(C3)*.

16.2 ASTM D1929, Test Method for Determining Ignition Temperature of Plastics *(C3)*.

16.3 ASTM D2584, Test Method for Ignition Loss of Cured Reinforced Resins *(C3)*.

16.4 ASTM D2843, Test Method for Density of Smoke from the Burning or Decomposition of Plastics *(C3)*.

16.5 ASTM D2863, Test Method for Measuring the Minimum Oxygen Concentration to Support Candle-Like Combustion of Plastics (Oxygen Index) *(C3)*.

16.6 ASTM D3014, Test Method for Flame Height, Time of Burning, and Loss of Mass of Rigid Thermoset Cellular Plastics in a Vertical Position *(C3)*.

16.7 ASTM D3675, Test Method for Surface Flammability of Flexible Cellular Materials Using a Radiant Heat Energy Source *(C4)*.

16.8 ASTM D3801, Test Method for Measuring the Comparative Burning Characteristics of Solid Plastics in a Vertical Position *(C4)*.

16.9 ASTM D4804, Test Method for Determining the Flammability Characteristics of Nonrigid Solid Plastics *(C4)*.

16.10 ASTM D4986, Test Method for Horizontal Burning Characteristics of Cellular Polymeric Materials *(C4)*.

16.11 ASTM D5025, Specification for a Laboratory Burner Used for Small-Scale Burning Tests on Plastic Materials *(C4)*.

16.12 ASTM D5048, Test Method for Measuring the Comparative Burning Characteristics and Resistance to Burn-Through of Solid Plastics Using 125-mm Flame *(C4)*.

16.13 ASTM D5207, Practice for Calibration of 20-mm (50-W) and 125-mm (500-W) Test Flames for Small-Scale Burning Tests on Plastic Materials *(C5)*.

16.14 ASTM E1321, Test Method for Determining Material Ignition and Flame Spread Properties *(C1)*.

16.15 ASTM E1354, Test Method for Heat and Visible Smoke Release Rates for Materials and Products Using an Oxygen Consumption Calorimeter *(C1)*.

16.16 CSA C22.2 No. 0.17-92, Evaluation of Properties of Polymeric Materials *(H)*.

16.17 IEC 60695-2-4/0, Diffusion Type and Premixed Type Flame Test Methods *(N)*.

16.18 IEC 60695-2-4/1, 1 kW Nominal Pre-Mixed Test Flame and Guidance *(N)*.

16.19 IEC 60695-2-4/2, 500 W Nominal Test Flames and Guidance *(N)*.

16.20 IEC 60695-3-1, Fire Hazard Testing—Examples of Fire Hazard Assessment Procedures and Interpretation of Results—Combustion Characteristics and Survey of Test Methods for Their Determination *(N)*.

16.21 IEC 60695-11-10, Fire Hazard Testing—Part 11-10: Test Flames—50W Horizontal and Vertical Flame Test Methods *(N)*.

16.22 IEC 60695-11-20, Fire Hazard Testing—Part 11-20: Test Flames—500W Flame Test Methods *(N)*.

16.23 ISO 181 Plastics—Determination of Flammability Characteristics of Rigid Plastics in the Form of Small Specimen in Contact with an Incandescent Rod *(N)*.

16.24 ISO 871 Plastics—Determination of Temperature of Evolution of Flammable Gases from a Small Sample of Pulverized Material *(N)*.

16.25 ISO 1210 Plastics—Determination of Flammability Characteristics of Plastics in the Form of Small Specimen in Contact with a Small Flame *(N)*.

16.26 ISO 3582 Cellular Plastics and Cellular Rubber Materials—Laboratory Assessment of Horizontal Burning Characteristics of Small Specimens Subjected to a Small Flame *(N)*.

16.27 ISO 4589-1, Plastics—Determination of Burning Behavior by Oxygen Index—Part 1: Guidance *(N)*.

16.28 ISO 4589-2, Plastics—Determination of Burning Behaviour by Oxygen Index—Part 2: Ambient-Temperature Test *(N)*.

16.29 ISO 4589-3, Plastics—Determination of Burning Behaviour by Oxygen Index—Part 3: Elevated-Temperature Test *(N)*.

16.30 ISO 9772 Cellular Plastics—Determination of Horizontal Burning Characteristics of Small Specimens Subjected to a Small Flame *(N)*.

16.31 ISO 9773 Plastics—Determination of Burning Behavior of Flexible Vertical Specimen in Contact with a Small-Flame Ignition Source *(N)*.

16.32 ISO 10093, Plastics—Fire Tests—Standard Ignition Sources *(N)*.

16.33 ISO 10351 Plastics—Method of Test for the Determination of Combustibility of Specimens Using a 125 mm Flame Source *(N)*.

16.34 ISO TR 10840 Plastics—Burning Behaviour—Guidance for Development and Use of Fire Tests *(N)*.

16.35 UL94, Test for Flammability of Plastic Materials for Parts in Devices and Appliances *(G)*.

17. Smoke

17.1 ASTM D2843, Test Method for Density of Smoke from the Burning or Decomposition of Plastics *(C3)*.

17.2 ASTM D5424, Test Method for Smoke Obscuration of Insulating Materials Contained in Electrical or Optical Fiber Cables When Burning in a Vertical Cable Tray Configuration *(C8)*.

17.3 ASTM D5485, Test Method for Determining the Corrosive Effect of Combustion Products Using the Cone Corrosimeter *(C8)*.

17.4 ASTM E662, Test Method for Specific Optical Density of Smoke Generated by Solid Materials *(C1)*.

17.5 ASTM E906, Test Method for Heat and Visible Smoke Release Rates for Materials and Products *(C1)*.

17.6 ASTM E1354, Test Method for Heat and Visible Smoke Release Rates for Materials and Products Using an Oxygen Consumption Calorimeter *(C1)*.

17.7 ASTM E1995, Test Method for Measurement of Smoke Obscuration Using a Conical Radiant Source in a Single Closed Chamber, With the Test Specimen Oriented Horizontally *(C1)*.

17.8 IEC 60695-5-1, Assessment of Potential Corrosion Damage by Fire Effluent—General Guidance *(N)*.

17.9 IEC 60695-5-2, Assessment of Potential Corrosion Damage by Fire Effluent—Guidance on the Selection and Use of Test Methods *(N)*.

17.10 IEC 60695-6-30, Guidance and Test Methods on the Assessment of Obscuration Hazard of Vision Caused by Smoke Opacity from Electrotechnical Products Involved in Fires; Small Scale Static Method—Determination of Smoke Opacity—Description of the Apparatus *(N)*.

17.11 IEC 60695-6-31, Fire Hazard Testing—Part 6-31: Smoke Obscuration—Small Scale Static Method: Materials *(N)*.

17.12 IEC 61034-1, Measurement of Smoke Density of Cables Burning Under Defined Conditions—Part 1: Test Apparatus *(N)*.

17.13 IEC 61034-2, Measurement of Smoke Density of Cables Burning Under Defined Conditions—Part 2: Test Procedure and Requirements *(N)*.

17.14 ISO 5659-1, Plastics—Smoke Generation—Part 1: Guidance on Optical-Density Testing *(N)*.

17.15 ISO 5659-2, Plastics—Smoke Generation—Determination of Optical Density By A Single-chamber Test *(N)*.

17.16 ISO 5924, Fire Tests—Reaction to Fire—Smoke Generated by Building Products (Dual-Chamber Test) *(N)*.

17.17 ISO 11907-1, Plastics—Smoke Generation—Determination of the Corrosivity of Fire Effluents—Part 1: Guidance *(N)*.

17.18 ISO 11907-2, Plastics—Smoke Generation—Determination of the Corrosivity of Fire Effluents—Part 2: Static Method *(N)*.

17.19 ISO 11907-3, Plastics—Smoke Generation—Determination of the Corrosivity of Fire Effluents—Part 3: Dynamic Decomposition Method Using a Travelling Furnace *(N)*.

17.20 ISO 11907-4, Plastics—Smoke Generation—Determination of the Corrosivity of Fire Effluents—Part 4: Dynamic Decomposition Method Using a Conical Radiant Heater *(N)*.

17.21 NFPA 258, Standard Research Test Method for Determining Smoke Generation of Solid Materials *(J)*.

17.22 NFPA 270, Test Method for Measurement of Smoke Obscuration using a Conical Radiant Source in a Single Closed Chamber *(J)*.

17.23 NFPA 271, Method of Test for Heat and Visible Release Rates for Materials and Products Using an Oxygen Consumption Calorimeter *(J)*.

17.24 NFPA 272, Method of Test for Heat and Visible Smoke Release Rates for Materials and Products Using an Oxygen Consumption Calorimeter *(J)*.

17.25 UL2043, Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces *(G)*.

18. Toxicity

18.1 ASTM E1678, Test Method for Measuring Smoke Toxicity for Use in Fire Hazard Analysis *(C1)*.

18.2 IEC 60695-7-1, Guidance on the Minimization of Toxic Hazards Due to Fires Involving Electrotechnical Products—General *(N)*.

18.3 IEC 60695-7-3, Fire Hazard Testing—Toxicity of Fire Effluent—Use and Interpretation of Test Results *(N)*.

18.4 IEC 60695-7-4, Guidance on the Minimization of Toxic Hazards Due to Fires Involving Electrotechnical Products—Unusual Toxic Effects in Fires *(N)*.

18.5 ISO/TR 9122-1, Toxicity Testing of Fire Effluent—General *(N)*.

18.6 ISO/TR 9122-2, Toxicity Testing of Fire Effluent—Guidelines for Biological Assays to Determine the Acute Inhalation of Fire Effluents *(N)*.

18.7 ISO/TR 9122-3, Toxicity Testing of Fire Effluents—Methods for the Analysis of Gases and Vapours in Fire Effluents *(N)*.

18.8 ISO/TR 9122-4, Toxicity Testing of Fire Effluents—The Fire Model *(N)*.

18.9 ISO/TR 9122-5, Toxicity Testing of Fire Effluents—Prediction of Toxic Effect of Fire Effluents *(N)*.

18.10 ISO 13344, Determination of the Lethal Toxic Potency of Fire Effluents *(N)*.

18.11 NFPA 269, Test Method for Determining Toxic Potency Data for Use in Fire Hazard Modeling *(J)*.

18.12 U.S. Bureau of Mines (MESA) Interim Fire and Toxicity Criteria for Products Taken Into Underground Coal Mines, Draft No. 2, 9-2-76 *(E)*.

19. Miscellaneous

19.1 ASTM E535, Practice for Preparation of Fire-Test-Response Standards *(C1)*.

19.2 ASTM E1317, Test Method for Flammability of Marine Surface Finishes *(C1)*.

19.3 ASTM G63, Guide for Evaluating Nonmetallic Materials for Oxygen Service *(C10)*.

19.4 MIL-STD-1623D(SH) Fire Performance Requirements and Approval Specification for Interior Materials and Furnishings (Naval Shipboard Use) *(D)*.

19.5 MIL-R-20092L, Rubber or Plastic Sheets and Assembled and Molded Shapes, Synthetic, Foam or Sponge, Open Cell *(D)*.

19.6 UL72, Tests for Fire Resistance of Record Protection Equipment *(G)*.

19.7 UL 22360, Test Method for Determining the Combustibility Characteristics of Plastics Used in Semi-Conductor Tool Constructions

20. Keywords

20.1 burning characteristics; combustion properties; combustion tests; flammability; locating combustion tests; plastics

ANNEX

(Mandatory Information)

A1. REFERENCED DOCUMENTS

TABLE A1.1 Standard Cross-References

ASTM	FM	IEC	ISO	NFPA	UBC	UL
D 635	...	60695-11-10	1210	...	...	94
D 1929	...	...	871	...	...	...
D 2863	...	...	4589	...	...	...
D 3801	...	60695-11-10	1210	...	...	94
D 4804	...	...	9773	...	...	94
D 4986	...	...	9772	...	...	94
D 5048	...	60695-11-20	10351	...	...	94
E 84	...	...	...	255	...	723
E 108	...	...	...	256	...	790
E 119	...	...	...	251	...	263
E 603	...	...	...	...	17-5	1715
	4880	...	...	...	...	1040
	4450	...	...	...	...	1258

(*A*) National Highway Safety Administration, 400 7th St., SW, Washington, DC 20590.

(*B*) Society of Automotive Engineers, Inc., 400 Commonwealth Dr., Warrendale, PA 15096.

(*C*) ASTM, 100 Barr Harbor Dr., West Conshohocken, PA 19428, *Annual Book of ASTM Standards:*

(*C*1) Vol 04.07

(*C*2) Vol 07.01

(*C*3) Vol 08.01

(*C*4) Vol 08.02

(*C*5) Vol 08.03

(*C*6) Vol 09.02

(*C*7) Vol 10.01

(*C*8) Vol 10.02

(*C*9) Vol 07.02

(*C*10) Vol 14.02

(*C*11) Vol 11.03

(*C*12) Vol 15.08

(*D*) Standardization Documents Order Desk, 700 Robbins Ave., Bldg. 4 Section D, Philadelphia, PA 19111-5094.

(*E*) Mine Enforcement and Safety Administration, 4800 Forbes Ave., Pittsburgh, PA 15213.

(*F*) Institute of Electrical and Electronic Engineers, Inc., 445 Hoes Lane, PO Box 1331, Piscataway, NJ 08855.

(*G*) Global Engineering Documents, 15 Inverness Way East, Englewood, CO 80112.

(*H*) Canadian Standards Association, 178 Rexdale Blvd., Toronto, Canada M9W 1R3.

(*I*) Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

(*J*) National Fire Protection Association, One Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9101.

(*K*) State of California Bureau of Home Furnishings, 3485 Orange Grove Ave., North Highlands, CA 95660.

(*L*) Factory Mutual Research Corp., 1151 Boston-Providence Turnpike, Norwood, MA 02062.

(*M*) Uniform Building Code, International Conference of Building Officials, 5360 S. Workman Mill Rd., Whittier, CA 90601.

(*N*) American National Standards Institute, 25 W. 43rd St., 4th Floor, New York, NY 10036.

(*O*) British Standards Institute, 2 Park St., London, W1A 2B5 United Kingdom.

(*P*) Rubber Manufacturers Assn., 1901 Pennsylvania Ave., Boston, MA 02210.

SUMMARY OF CHANGES

Committee D20 has identified the location of selected changes to this standard since the last issue, D 3814 - 99, that may impact the use of this standard. (January 15, 2006)

(*1*) Deleted ASTM D3659, D3713, and D4372.
(*2*) Added UL 22360.
(*3*) Made various editorial corrections throughout.