NFPA® 853

Standard for the Installation of Stationary Fuel Cell Power Systems

2015 Edition

NFPA, 1 Batterymarch Park, Quincy, MA 02169-7471
An International Codes and Standards Organization

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ISBN: 978-145591025-0 (Print)
ISBN: 978-145591026-7 (PDF)

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NFPA® 853

Standard for the

Installation of Stationary Fuel Cell Power Systems

2015 Edition

This edition of NFPA 853, *Standard for the Installation of Stationary Fuel Cell Power Systems,* was prepared by the Technical Committee on Electric Generating Plants. It was issued by the Standards Council on June 11, 2014, with an effective date of July 1, 2014, and supersedes all previous editions.

This edition of NFPA 853 was approved as an American National Standard on July 1, 2014.

Origin and Development of NFPA 853

In 1997, the Technical Committee on Electric Generating Plants appointed a Task Group on Fuel Cells to begin work on this document. The Standards Council officially approved the project in January 1998. The Council recognized that fuel cells were becoming a popular means of producing electricity and that there were no installation standards for this technology. NFPA 853 addresses fire protection for siting, fuel supplies and storage, ventilation, and general fire protection requirements.

The scope of the 2003 edition was changed significantly from that of the 2000 edition. The 2000 edition did not cover fuel cells smaller than 50 kW; the 2003 edition covered stationary fuel cell power systems of any size.

The changes to the 2007 edition of NFPA 853 were clarifications of existing requirements. The use of the concept of lower flammable limit was changed to correctly distinguish it from lower explosive limit.

The changes to the 2010 edition of NFPA 853 included clarification on the distance that is required between fuel cell power system(s) and stored combustible materials. In addition, several clarifications of existing requirements were made.

The changes to the 2015 edition of NFPA 853 include clarification of ventilation air and its application, subdividing it into three categories: circulation air, dilution air, and primary air. New definitions have also been provided.

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NOTE: Membership on a committee shall not in and of itself constitute an endorsement of the Association or any document developed by the committee on which the member serves.

Committee Scope: This Committee shall have primary responsibility for documents on fire protection for electric generating plants and high voltage direct current (HVDC) converter stations, except for electric generating plants using nuclear fuel.

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NOTICE: An asterisk (*) following the number or letter designating a paragraph indicates that explanatory material on the paragraph can be found in Annex A.

A reference in brackets [ ] following a section or paragraph indicates material that has been extracted from another NFPA document. As an aid to the user, the complete title and edition of the source documents for extracts in mandatory sections of the document are given in Chapter 2 and those for extracts in informational sections are given in Annex C. Extracted text may be edited for consistency and style and may include the revision of internal paragraph references and other references as appropriate. Requests for interpretations or revisions of extracted text shall be sent to the technical committee responsible for the source document.

Information on referenced publications can be found in Chapter 2 and Annex C.

Chapter 1 Administration

1.1 Scope.

1.1.1 This standard shall apply to the design, construction, and installation of stationary fuel cell power systems.

1.1.2 The scope of this document shall include the following:

(1) A singular prepackaged, self-contained power system unit
(2) Any combination of prepackaged, self-contained power system units
(3) Power system units comprising two or more factory-matched modular components intended to be assembled in the field
(4) Engineered and field-constructed power systems that employ fuel cells

1.2 Purpose. This document shall provide fire prevention and fire protection requirements for safeguarding life and physical property associated with buildings or facilities that employ stationary fuel cell power systems. This standard shall apply to stationary fuel cells of all sizes.

1.3 Application. This standard shall not apply to portable fuel cells or to fuel cell power systems that are used on any movable structure or vehicle unless the structure or vehicle is made stationary.

1.4 Retroactivity. The provisions of this standard reflect a consensus of what is necessary to provide an acceptable degree of protection from the hazards addressed in this standard at the time the standard was issued.

1.4.1 Unless otherwise specified, the provisions of this standard shall not apply to facilities, equipment, structures, or installations that existed or were approved for construction or installation prior to the effective date of the standard. Where specified, the provisions of this standard shall be retroactive.

1.4.2 In those cases where the authority having jurisdiction determines that the existing situation presents an unacceptable degree of risk, the authority having jurisdiction shall be permitted to apply retroactively any portions of this standard deemed appropriate.

1.4.3 The retroactive requirements of this standard shall be permitted to be modified if their application clearly would be impractical in the judgment of the authority having jurisdiction, and only where it is clearly evident that a reasonable degree of safety is provided.

1.5 Equivalency. Nothing in this standard is intended to prevent the use of systems, methods, or devices of equivalent or superior quality, strength, fire resistance, effectiveness, durability, and safety over those prescribed by this standard.

1.5.1 Technical documentation shall be submitted to the authority having jurisdiction to demonstrate equivalency.

1.5.2 The system, method, or device shall be approved for the intended purpose by the authority having jurisdiction.

1.6* Units and Formulas. Metric units in this document shall be in accordance with the International System of Units, which is officially abbreviated SI in all languages.

Chapter 2 Referenced Publications

2.1 General. The documents or portions thereof listed in this chapter are referenced within this standard and shall be considered part of the requirements of this document.

2.2 NFPA Publications. National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.

NFPA 15, *Standard for Water Spray Fixed Systems for Fire Protection,* 2012 edition.

NFPA 24, *Standard for the Installation of Private Fire Service Mains and Their Appurtenances,* 2013 edition.

NFPA 30, *Flammable and Combustible Liquids Code,* 2015 edition.

NFPA 31, *Standard for the Installation of Oil-Burning Equipment,* 2011 edition.

NFPA 52, *Vehicular Gaseous Fuel Systems Code,* 2013 edition.

NFPA 54, *National Fuel Gas Code,* 2015 edition.

NFPA 55, *Compressed Gases and Cryogenic Fluids Code,* 2013 edition.

NFPA 58, *Liquefied Petroleum Gas Code,* 2014 edition.

NFPA 70®, National Electrical Code®, 2014 edition.

NFPA 72®, National Fire Alarm and Signaling Code, 2013 edition.

NFPA 80, *Standard for Fire Doors and Other Opening Protectives,* 2013 edition.

NFPA *101®, Life Safety Code®,* 2015 edition.

NFPA 241, *Standard for Safeguarding Construction, Alteration, and Demolition Operations,* 2013 edition.

NFPA 259, *Standard Test Method for Potential Heat of Building Materials,* 2013 edition.

2.3 Other Publications.

2.3.1 ANSI Publications. American National Standards Institute, Inc., 25 West 43rd Street, 4th Floor, New York, NY 10036.

ANSI/ASME A13.1, *Scheme for the Identification of Piping Systems*, 2007 (R2013).

ANSI CSA FC 1, *American National Standard for Fuel Cell Power Systems*, 2014.

2.3.2 ASME Publications. American Society of Mechanical Engineers, Two Park Avenue, New York, NY 10016-5990.

ASME/ANSI B31.3, *Process Piping*, 2012.

2.3.3 ASTM Publications. ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959.

ASTM E108, *Standard Test Methods for Fire Tests of Roof Coverings*, 2011.

ASTM E119, *Standard Test Methods for Fire Tests of Building Construction and Materials*, 2012.

2.3.4 UL Publications. Underwriters Laboratories Inc., 333 Pfingsten Road, Northbrook, IL 60062-2096.

UL 263, *Standard for Fire Tests of Building Construction and Materials*, 2011.

UL 790, *Standard Test Methods for Fire Tests of Roof Coverings*, 2004, revised 2008.

2.3.5 Other Publications.

Merriam-Webster's Collegiate Dictionary, 11th edition, Merriam-Webster, Inc., Springfield, MA, 2003.

2.4 References for Extracts in Mandatory Sections.

NFPA 33, *Standard for Spray Application Using Flammable or Combustible Materials*, 2011 edition.

NFPA 80, *Standard for Fire Doors and Other Opening Protectives*, 2013 edition.

NFPA 91, *Standard for Exhaust Systems for Air Conveying of Vapors, Gases, Mists, and Noncombustible Particulate Solids*, 2010 edition.

NFPA 221, *Standard for High Challenge Fire Walls, Fire Walls, and Fire Barrier Walls*, 2015 edition.

NFPA 801, *Standard for Fire Protection for Facilities Handling Radioactive Materials*, 2014 edition.

Chapter 3 Definitions

3.1 General. The definitions contained in this chapter shall apply to the terms used in this standard. Where terms are not defined in this chapter or within another chapter, they shall be defined using their ordinarily accepted meanings within the context in which they are used. *Merriam-Webster's Collegiate Dictionary*, 11th edition, shall be the source for the ordinarily accepted meaning.

3.2 NFPA Official Definitions.

3.2.1* Approved. Acceptable to the authority having jurisdiction.

3.2.2* Authority Having Jurisdiction (AHJ). An organization, office, or individual responsible for enforcing the requirements of a code or standard, or for approving equipment, materials, an installation, or a procedure.

3.2.3 Labeled. Equipment or materials to which has been attached a label, symbol, or other identifying mark of an organization that is acceptable to the authority having jurisdiction and concerned with product evaluation, that maintains periodic inspection of production of labeled equipment or materials, and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner.

3.2.4* Listed. Equipment, materials, or services included in a list published by an organization that is acceptable to the authority having jurisdiction and concerned with evaluation of products or services, that maintains periodic inspection of production of listed equipment or materials or periodic evaluation of services, and whose listing states that either the equipment, material, or service meets appropriate designated standards or has been tested and found suitable for a specified purpose.

3.2.5 Shall. Indicates a mandatory requirement.

3.2.6 Should. Indicates a recommendation or that which is advised but not required.

3.2.7 Standard. An NFPA Standard, the main text of which contains only mandatory provisions using the word "shall" to indicate requirements and that is in a form generally suitable for mandatory reference by another standard or code or for adoption into law. Nonmandatory provisions are not to be considered a part of the requirements of a standard and shall be located in an appendix, annex, footnote, informational note, or other means as permitted in the NFPA Manuals of Style. When used in a generic sense, such as in the phrase "standards development process" or "standards development activities," the term "standards" includes all NFPA Standards, including Codes, Standards, Recommended Practices, and Guides.

3.3 General Definitions.

3.3.1 Air.

3.3.1.1 *Circulation Air.* The portion of supply air, the source of which is the outside/outdoors, plus any recirculated air that has been treated and is acceptable for use by the power system ventilation system that is used to cool equipment located in areas unclassified per *NFPA 70*, Article 500-516.

3.3.1.2 *Dilution Air.* The portion of supply air, the source of which is the outside/outdoors, plus any recirculated air that has been treated and is acceptable for use by the power system ventilation system that is used to cool equipment or dilute normal and abnormal releases to below a flammable level located in areas classified per *NFPA 70*, Article 500-516.

3.3.1.3 *Exhaust Air.* Air removed from a space or power system and not reused.

3.3.1.4 *Primary Air.* The portion of supply air, the source of which is the outside/outdoors, plus any recirculated air that has been treated and is acceptable for use by the power system for the purpose of conversion of fuel and air to power and heat.

3.3.1.5 *Ventilation Air.* The portion of supply air, the source of which is the outside/outdoors, plus any recirculated air that has been treated and is acceptable for use by the power system ventilation system that can be used for circulation, dilution, and/or primary air applications.

3.3.2 Booster. An electrically driven, sealed gas, in-line, pressure-boosting device that supplies fuel that is consumed by a continuous process without intermediate storage.

3.3.3 Combustible. Capable of undergoing combustion.

3.3.4 Compressor. A device used for increasing the pressure and density of a gas.

3.3.5* Distributed Integrated Controls (DIC). Systems or integrated controls used to monitor and control the functions of equipment, systems, or plants.

3.3.6 Evaluation.

3.3.6.1 ***Base Flood Evaluation.*** A reference point based on the depth or peak elevation of flooding, including wave height, which has a 1 percent (100 year) or greater chance of occurring in any given year.

3.3.6.2* ***Fire Risk Evaluation.*** A detailed engineering review of a plant's construction features and operating process conducted to ensure that applicable fire prevention and fire protection requirements for safeguarding life and physical property are met.

3.3.7 Fire Damper. A device, installed in an air distribution system, that is designed to close automatically upon detection of heat to interrupt migratory airflow and to restrict the passage of flame. [**221,** 2015]

3.3.8 Fire Prevention. Measures directed toward avoiding the inception of fire. [**801,** 2014]

3.3.9 Fire Protection. Methods of providing for fire control or fire extinguishment. [**801,** 2014]

3.3.10 Flammable Liquid. A liquid that has a closed-cup flash point that is below 37.8°C (100°F) and a maximum absolute vapor pressure of 2068 mm Hg (40 psi) at 37.8°C (100°F).

3.3.11 Flash Point. The minimum temperature at which a liquid or a solid emits vapor sufficient to form an ignitable mixture with air near the surface of the liquid or the solid.

3.3.12* Fuel Cell Power System. A generator system that converts the chemical energy of reactants (a fuel and oxidant) by an electrochemical process to electric energy (direct current or alternating current electricity) and thermal energy.

3.3.12.1* ***Engineered and Field-Constructed Fuel Cell Power System.*** A fuel cell power system that is not preassembled or does not have factory-matched components.

3.3.12.2* ***Pre-Engineered and Matched Modular Components Fuel Cell Power System.*** A fuel cell power system that has components that are assembled in a factory in separate modules, such as the fuel cell stack, reformer, and inverter.

3.3.12.3 ***Prepackaged, Self-Contained Fuel Cell Power System.*** A fuel cell power system that is designed as one unit, assembled in a factory, and shipped to site.

3.3.13 Gas.

3.3.13.1* ***Digester Gas.*** The biogas derived by fermentation of organic wastes, such as sewage, animal and food waste, and industrial organic waste.

3.3.13.2* ***Landfill Gas.*** The biogas derived from decomposition of municipal solid waste (landfill).

3.3.14 Hazardous Material (Chemical). A substance that, by reason of being explosive, flammable, poisonous, corrosive, oxidizing, irritating, or otherwise harmful, is likely to cause death or injury.

3.3.15 Installation. The location where a fuel cell power system is sited as a unit or built as an assembly.

3.3.15.1* ***Indoor Installation.*** A fuel cell power system completely surrounded and enclosed by walls, a roof, and a floor.

3.3.15.2 ***Outside or Outdoor Installation.*** A power system installation that is not located inside a building or that has only partial weather protection (maximum coverage of a roof and up to 50 percent enclosing walls).

3.3.15.3 ***Portable Fuel Cell Installation.*** A fuel cell generator of electricity that is not fixed in place. A portable appliance utilizes a cord and plug connection to a grid-isolated load and has an integral fuel supply.

3.3.15.4 ***Rooftop Installation.*** A power system installation located on the roof of a building.

3.3.16* Limited Combustible. A building construction material not complying with the definition of noncombustible material that, in the form in which it is used, has a potential heat value not exceeding 3500 Btu/lb (8140 kJ/kg), where tested in accordance with NFPA 259 and complies with (a) or (b): (a) materials having a structural base of noncombustible material, with a surfacing not exceeding a thickness of ⅛ in. (3 mm) that has a flame spread index not greater than 50; and (b) materials, in the form and thickness used, other than as described in (a), having neither a flame spread index greater than 25 nor evidence of continued progressive combustion and of such composition that surfaces that would be exposed by cutting through the material on any plane would have neither a flame spread index greater than 25 nor evidence of continued progressive combustion. (Materials subject to increase in combustibility or flame spread index beyond the limits herein established through the effects of age, moisture, or other atmospheric condition shall be considered combustible.) [**33,** 2011]

3.3.17 Listing Agency. An organization acceptable to the authority having jurisdiction and concerned with product evaluation that maintains periodic inspection of production of listed equipment or materials and whose listing states that the equipment or material either meets appropriate standards or has been tested and found suitable for use in a specified manner.

3.3.18 Lower Flammable Limit (LFL). The lowest concentration of a flammable gas/vapor in air in which flame is propagated.

3.3.19 Noncombustible. Not capable of igniting and burning when subjected to a fire. [**80,** 2013]

3.3.20 Stationary. Permanently connected and fixed in place.

3.3.21 System.

3.3.21.1 ***Automatic Fire Detection System.*** A fire detection system that senses the presence of fire, smoke, or heat and activates a sprinkler system or an automatic alarm system.

3.3.21.2 ***Automatic Sprinkler System.*** A sprinkler system of pipes with water under pressure that allows water to be discharged immediately when a sprinkler head operates.

3.3.21.3 ***Biogas Fuel Cell System.*** A fuel cell system comprised of a conventional biogas source, such as a landfill gas

site or municipal sewage digester site, a fuel cell specific gas cleanup unit, and a prepackaged or matched modular fuel cell power system.

3.3.21.4 ***Direct-Vented System.*** A venting system by which all air for combustion is obtained from the outside atmosphere, and all exhaust air/gases are discharged to the outside atmosphere.

3.3.21.5 ***Duct System.*** A continuous passageway for the transmission of air that, in addition to ducts, includes duct fittings, dampers, fans, and accessory air-managing equipment and appliances.

3.3.21.6 ***Exhaust System.*** An air-conveying system for moving materials from a source to a point of discharge. [**91,** 2010]

3.3.22 Ventilation.

3.3.22.1 ***Mechanical Ventilation.*** The flow of air or gas created by a fan, blower, or other mechanical means that will push or induce the gas stream through a ventilation system.

3.3.22.2 ***Natural Ventilation.*** The flow of air or gases created by the difference in the pressures or gas densities between the outside and inside of a vent, room, or space.

Chapter 4 General Equipment Configuration

4.1* General.

4.2 Prepackaged, Self-Contained Fuel Cell Power Systems.

4.2.1 Prepackaged, self-contained fuel cell power systems shall be designed, tested, and listed in accordance with ANSI CSA FC 1, *American National Standard for Fuel Cell Power Systems.*

4.2.2 Prepackaged, self-contained fuel cell power systems outside the scope of ANSI CSA FC 1, *American National Standard for Fuel Cell Power Systems*, shall meet the provisions of Section 4.3.

4.3 Pre-Engineered Fuel Cell Power Systems.

4.3.1 Pre-engineered fuel cell power systems and matched modular components shall be designed and tested to meet the intent of ANSI CSA FC 1, *American National Standard for Fuel Cell Power Systems.*

4.3.2 Proprietary equipment or materials for which no generally recognized codes or standards exist shall be evaluated based on data from operational experience in the same or comparable service or test records covering the performance of the equipment or materials.

4.4 Engineered and Field-Constructed Fuel Cell Power Systems.

4.4.1 Documentation for engineered and field-constructed fuel cell power systems shall be provided.

4.4.2 Documentation shall include a fire risk evaluation prepared by a registered engineer or third party acceptable to the authority having jurisdiction.

Chapter 5 Siting and Interconnections

5.1 General Siting.

5.1.1 A fuel cell power system(s) and associated equipment, components, and controls shall be sited and installed in accordance with the manufacturer's instructions and meet the following requirements:

(1) It shall be placed on a firm foundation that is capable of supporting the equipment or components.
(2) It shall be anchored, located, and protected so that the system and equipment will not be adversely affected by rain, snow, ice, freezing temperatures, wind, seismic events, and lightning.
(3) It shall be located so the foundation of, and access to, associated components and the fuel cell power system are above the base flood elevation.
(4) It shall be protected against access by unauthorized persons commensurate with the location and installation environment. Fire department access shall be provided.
(5)*It shall be located outside potentially hazardous atmospheres as defined by Article 500 or Article 505 of *NFPA 70*, unless listed and approved for the specific installation.
(6) It shall be sited so the power system and equipment do not affect required building exits during normal operations or fire emergencies.
(7) It shall be located so the power system(s) and components of a matched modular or field-engineered fuel cell power system and their respective vent or exhaust terminations are separated from doors, windows, outdoor air intakes, and other openings into a building.
(8) It shall be located in a manner that allows service, maintenance, and emergency access.
(9) It shall be located 1.5 m (5 ft) away from stored combustible materials, hazardous chemicals, high-piled stock, and other exposures to fire hazards.
(10)*It shall be located or protected to prevent physical damage.
(11) It shall be located such that a fire or failure of one of the systems does not present an exposure hazard to adjacent fuel cell power systems.
(12) Fuel cell power systems and, if provided, their weatherproof enclosures shall be located to maintain manufacturer-specified clearances to structures having combustible walls in accordance with the product listing and the manufacturer's instructions.

5.1.2* Where demonstrated by an engineering analysis that the prescriptive requirements in this section are unnecessary to achieve an equivalent level of safety, approved alternatives shall be permitted.

5.1.3 Fire protection for systems and areas under construction shall comply with NFPA 241.

5.2 Outdoor Installations.

5.2.1 For outdoor installations, a fuel cell power system and related components shall be designed and constructed for outdoor installation.

5.2.2 Air intakes to a fuel cell power system shall be located so the system is not adversely affected by other exhausts, gases, or contaminants.

5.2.3 The exhaust outlet(s) from process areas or areas that contain fuel-bearing components of a fuel cell power system shall be located at least 4.6 m (15 ft) from heating, ventilating, and air-conditioning (HVAC) air intakes, windows, doors, and other openings into buildings.

5.2.3.1 The exhaust outlet(s) shall not be directed onto walkways or other paths of travel for pedestrians.

5.2.3.2 The area classification around outlets from processes or compartments that contain fuel-bearing components shall be in accordance with Article 500 or Article 505 of *NFPA 70*.

5.2.4 Security barriers, fences, landscaping, and other enclosures shall not affect the required air flow into or exhaust out of the fuel cell power system and its components.

5.2.5 Fuel cell power systems shall not be located in areas that are used or are likely to be used for combustible, flammable, or hazardous materials storage.

5.3 Indoor Installations. A fuel cell power system and its associated components that are not located in areas designed for industrial uses shall be located in a room that meets the conditions of 5.3.1 through 5.3.6.

5.3.1 The room shall be separated from the remainder of the building by fire barrier walls and horizontal assemblies with a minimum of a 1-hour fire resistance rating in accordance with ASTM E119, *Standard Test Methods for Fire Tests of Building Construction and Materials*, or ANSI/UL 263, *Standard for Fire Tests of Building Construction and Materials*.

5.3.2 Electrical and piping penetrations and joints associated with the room shall be sealed with approved materials that have a 1-hour fire resistance rating.

5.3.3 Openings between the room and other occupied spaces shall be protected by fire doors and dampers.

5.3.4 Fire doors shall be installed in accordance with NFPA 80 and shall have a minimum fire resistance rating equivalent to that of the barrier.

5.3.5 Fire dampers shall be installed in accordance with NFPA 80.

5.3.6 Each room shall be provided with egress in accordance with NFPA *101* or the locally adopted building code.

5.4 Rooftop Installation.

5.4.1 Fuel cell power systems and components located on rooftops shall be installed in accordance with Section 5.2.

5.4.2 The roofing material under and within 30.5 cm (12 in.) horizontally from a fuel cell power system or component shall be noncombustible or shall have a Class A rating when tested in accordance with ASTM E108, *Standard Test Methods for Fire Tests of Roof Coverings,* or UL 790, *Standard Test Methods for Fire Tests of Roof Coverings*.

5.5 Interconnections with Other Building Systems.

5.5.1 All electrical connections and wiring to the power system(s) or components of matched modular or field-engineered fuel cell power systems shall be in accordance with *NFPA 70*.

5.5.1.1 The installation requirements of fuel cell power systems shall be in accordance with Article 692 of *NFPA 70*.

5.5.2 Fuel gas connections to the power system(s) or components of a matched modular or field-engineered fuel cell power system shall be in accordance with Chapter 6.

5.5.3 The location of the manual fuel shutoff valve required by Chapter 6 shall be marked at the location of the primary disconnecting means of the building or supplied circuits.

Chapter 6 Fuel Supplies and Storage Arrangements

6.1 General.

6.1.1 The installation and location of fuel cell power system fuel supplies, associated fuel piping, and components and their connection to a stationary fuel cell power system shall be in accordance with this chapter.

6.1.2 All gaseous fuel piping outside the fuel cell power system shall be marked or identified in accordance with ANSI/ASME A13.1, *Scheme for Identification of Piping Systems*.

6.2 Natural Gas Fuel Supplies.

6.2.1 Natural Gas.

6.2.1.1 Piping, valves, and fittings from the outlet of the supplier's piping to the outlet of the fuel cell power system's shutoff valve shall be in accordance with NFPA 54.

6.2.1.2* Where deodorized gas is stored, piping shall be configured to prohibit reverse flow of natural gas into other buildings or source piping.

6.2.2 Compressed Natural Gas (CNG). The design, location, and installation of piping, valves, and fittings from the outlet of the point of delivery from the supplier to the inlets of the equipment shutoff valves shall be in accordance with NFPA 52.

6.3 Liquefied Petroleum Gas (LP-Gas) Systems and Storage.

6.3.1 The design, location, and installation of liquefied petroleum gas (LP-Gas) storage and piping systems shall comply with NFPA 58.

6.3.2 In the determination of separation distances from the fuel cell power system to LP-Gas containers required by NFPA 58, the power system shall be considered a building.

6.4* Hydrogen Fuel Systems and Storage.

6.4.1 Gaseous Hydrogen Storage. The design, location, and installation of gaseous hydrogen storage shall comply with NFPA 55.

6.4.2 Liquid Hydrogen Storage. The design, location, and installation of liquid hydrogen storage shall comply with NFPA 55.

6.4.3 Hydrogen Piping. Hydrogen piping, valves, and fittings from the hydrogen storage system to the fuel cell power system shall conform to ASME/ANSI B31.3, *Process Piping*, and 6.4.3.1 through 6.4.3.7.

6.4.3.1* An accessible manual shutoff valve shall be located in the hydrogen piping to the fuel cell power system within 1.8 m (6 ft) of the storage container.

6.4.3.2* The hydrogen supply piping to the fuel cell power system shall be provided with a second accessible manual shutoff valve that is located within 1.8 m (6 ft) of the power system, unless the power system is enclosed by a room with a 1-hour fire resistance rating as described in Section 5.3. If the hydrogen storage is within 1.8 m (6 ft) of the fuel cell power system, the valve described in 6.4.3.1 shall be considered to meet this requirement.

6.4.3.3 If the power system is enclosed by a room with a 1-hour fire resistance rating, the valve shall be located outside the room.

6.4.3.4 For indoor installation of a power system, where the fuel supply is stored outdoors, an automatic shutoff valve interlocked with gas detection shall be located outside the building that houses the power system in accordance with 8.1.5.

6.4.3.5 Piping, valves, regulators, or other equipment shall be located so that they are not subject to physical damage or otherwise be protected against physical damage.

6.4.3.6 Areas classified as Class I, Division 2 due to hydrogen piping shall be provided with ventilation to the outdoors.

6.4.3.7 Hydrogen containers and associated piping shall be electrically grounded and bonded in accordance with *NFPA 70*.

6.5* Biogas Fuel Systems.

6.5.1 Biogas fuel systems, including landfill gases, anaerobic digester gases, and other gases derived from the decomposition of organic materials, shall be permitted to be used as a fuel supply for a fuel cell power system.

6.5.2 Additional fuel gas cleanup equipment shall be considered part of the associated equipment.

6.5.3 Biogas fuel system storage tanks and their associated equipment, piping, valves, and regulators shall be designed and installed in accordance with NFPA 54.

6.6* Liquid Fuels. The design of liquid fuel piping systems and the location and storage of liquid fuels shall be in accordance with NFPA 30.

6.7 Solid Fuels. Solid fuels acceptable to the authority having jurisdiction shall be permitted to be used as fuel for fuel cell power systems.

Chapter 7 Ventilation and Exhaust

7.1 General.

7.1.1 All fuel cell power systems shall be provided with a source of air in accordance with this chapter, with the exception of the following:

(1) Fuel cell power systems installed outdoors
(2) Listed prepackaged or pre-engineered and matched modular fuel cell power systems that have a sealed, direct ventilation and exhaust system that is installed in accordance with the terms of the listing and manufacturer's installation instructions

7.1.2* The ventilation and exhaust system shall be designed to provide a negative or neutral pressure in the room, with respect to the building.

7.1.3 The ventilation air and exhaust air system(s) shall meet the requirements specified in Sections 5.1, 7.2, and 7.3.

7.1.4 If mechanical ventilation is required, a control interlock shall be provided to shut down the unit upon loss of ventilation.

7.2 Ventilation Air.

7.2.1* A separate mechanical building ventilation system shall be provided for the area where a fuel cell power system is located.

7.2.2 If it can be verified, natural ventilation shall be permitted to provide all required ventilation air.

7.2.3 The inlets for all primary, ventilation, and exhaust air system(s) shall be designed to prevent foreign matter from entering and/or accumulating.

7.3 Exhaust Systems.

7.3.1 An exhaust system shall be provided for the area where a fuel cell power system is located.

7.3.2 The fuel cell power system exhaust system shall be designed so that all harmful emissions are exhausted to a safe location.

7.3.3 The building ventilation exhaust rate from the room shall not be less than 0.3 $m^3/min \cdot m^2$ (1 cfm/ft^2) of floor area and not less than 4.25 m^3/min (150 cfm).

7.3.4 If mechanical exhaust for either the fuel cell power system or the building is required, a control interlock shall be provided to shut down the fuel cell power system upon loss of either exhaust.

7.3.5 The exhaust outlet(s) shall be located as specified in 5.2.3.

7.3.6 The discharge for exhaust from the fuel cell power system and building air system(s) shall be designed to prevent foreign matter from entering and accumulating.

7.4 Process Purging and Venting.

7.4.1 Pressure tanks and piping intended to be purged, pressure regulators, relief valves, and other potential sources of combustible gas shall be vented to the outside of the building, terminating at least 4.6 m (15 ft) from air intakes, windows, doors, or other building openings.

7.4.2 The vent shall be designed to prevent entry of water or foreign objects.

Chapter 8 Fire Protection

8.1 Fire Protection and Detection.

8.1.1 Site Fire Protection.

8.1.1.1 Sites that have flammable or combustible liquid fuel storage shall have fire hydrants provided in accordance with NFPA 30 and NFPA 24.

8.1.1.2 The hydrants specified in 8.1.1.1 shall have a water supply of at least 946 L/min (250 gpm) for 2 hours.

8.1.1.3 Fuel cell power systems that do not have flammable or combustible liquid fuel storage and are located outside buildings that have yard or city hydrant protection shall be considered to have required site protection.

8.1.1.4 If fuel cell power systems are sited at locations that do not have hydrant protection, power systems shall be protected in accordance with a fire risk evaluation.

8.1.1.5 Fuel cell power systems located inside buildings shall be protected in accordance with 8.1.5.

8.1.2* Fuel Cell Fire Protection and Detection. Fuel cell systems designed and constructed in accordance with Section 4.4 shall be provided with an automatic fire detection and alarm system in accordance with *NFPA 72*.

8.1.3 Electrical Equipment and Components.

8.1.3.1 Transformers installed in compartments, in modules, or in rooms that contain fuel cell power systems shall be the dry type.

8.1.3.2 All transformers shall be installed in accordance with *NFPA 70*.

8.1.3.3 Oil-filled transformers that have at least 1892 L (500 gal) capacity shall be protected by one of the following:

(1) A minimum spatial separation of 7.6 m (25 ft) between each transformer containment area and other structures
(2) A 2-hour-rated fire barrier between adjacent noncombustible or limited combustible structures, transformers, or switchgear that extend 30.5 cm (1 ft) above the transformer or structure and 61 cm (2 ft) beyond the sides
(3) An automatic deluge water spray system designed in accordance with NFPA 15 to provide a minimum density of 10.2 $L/min \cdot m^2$ (0.25 gpm/ft^2) over all surfaces of the transformer

8.1.3.4 Transformers filled with a listed less flammable liquid that also bear a certification from a listing agency shall be permitted to be installed at least 1.5 m (5 ft) from noncombustible walls and 3.0 m (10 ft) from doors, fire escapes, and windows, provided installation is also in accordance with the listing agency requirements.

8.1.4 Control Rooms and Distributed Integrated Controls Equipment. If a separate room or building is provided for a fuel cell power system's monitoring and control, the room or building shall be constructed in accordance with the appropriate building code and shall comply with NFPA *101*.

8.1.5 Indoor Installation.

8.1.5.1 Indoor liquid fuel pumps shall be protected by an automatic fire suppression system.

8.1.5.2* Liquid fuel systems shall be provided with curbing, diking, or drainage in accordance with NFPA 30.

8.1.5.3 When an automatic fire suppression system is provided, it shall be interconnected to shut off the fuel supply when the suppression system is activated.

8.1.5.4* Combustible gas detector(s) shall be installed in the fuel cell power system enclosure, the exhaust system, or the room that encloses the fuel cell power system installation in accordance with the detector manufacturer's instructions and local regulation.

8.1.5.5* A combustible gas detector that meets the requirements of 8.1.5.4 shall be provided for all indoor or separately enclosed fuel gas compressors (fuel gas boosters).

8.1.5.6 When gaseous or liquefied hydrogen is piped into the room or area from outside, hydrogen detector(s) shall be installed in accordance with 8.1.5.7.

8.1.5.7 The following criteria for combustible gas detection systems, including detection specific to hydrogen, shall be met:

(1) The location of the detection device(s) shall be based on leakage sources and fuel type.
(2) The combustible gas detection system shall be arranged to alarm at 25 percent of the lower flammable limit (LFL) and be interlocked to shut down the power system fuel supply at 60 percent LFL.
(3) The LFL used shall be the lowest flammability limit of the gas or gas mixture.

8.1.5.8* Where leak detection is provided, fuel cell power systems that do not use gaseous fuels and do not generate flammable gas mixtures in any part of their systems shall not be required to have combustible gas detection to be installed.

8.1.5.9 Systems employing liquid fuels shall require leak detection.

8.2 Fire Prevention and Emergency Planning. A written fire prevention and emergency plan shall be provided and shall include the following, commensurate with the size and location of the fuel cell power system:

(1) Written information on fire prevention procedures, plant emergency alarms, and egress procedures
(2) Requirements to conduct and document inspections and to identify and address needed remedial actions to correct conditions that increase fire hazards
(3) Written description of the general housekeeping practices and the control of transient combustibles
(4) Written procedures for the handling and storage of flammable and combustible liquids and gases
(5) Written procedures for the control of potential ignition sources
(6) A written procedure that addresses impairments to fire protection systems and other materials, systems, or equipment that affect the level of fire hazards associated with the installation and that also addresses at least identification of equipment not available for service, personnel to be notified, and required enhancement of fire surveillance
(7) Requirements needed to complete a fire report, including an investigation and notification of corrective action to be taken
(8) Listing of frequency and requirements for periodic inspection, testing, and maintenance of the fuel cell power system emergency systems
(9) Signage prohibiting smoking and nonprocess ignition services within protective enclosures and signage that designates areas where smoking is permitted
(10) Posting of the location of the operating instructions and the location of the emergency controls
(11) Requirements for the availability of portable flammable gas detectors at the service entrance to the fuel cell power system installations
(12) Signage providing instructions on the types of fire-suppressing materials that are prohibited and where they are prohibited
(13) Standard color or distinctive marking on all fuel piping and components, with marking in accordance with ANSI A13.1, *Scheme for Identification of Piping Systems*
(14) Written fire emergency plan that includes the following:
    (a) Response to fire alarms and fire system supervisory alarms and notification of personnel identified in the plan
    (b) Evacuation of employees and visitors not directly involved in fire-fighting activities for the fire area
    (c) Coordination with security forces or other designated personnel to admit public fire department and control traffic and personnel
    (d) Fire extinguishment activities and identification of fire water application concerns on operating equipment
    (e) Periodic drills to verify viability of the plan
    (f) Operator activities during fire emergencies

Chapter 9 Fuel Cell Power Systems 50 kW or Less

9.1 Chapter Scope. This chapter identifies additional requirements or modifications to Chapters 1 through 8 as they relate directly to fuel cell power systems 50 kW or less.

9.2 Outdoor Installations.

9.2.1 The exhaust outlets of the system shall be located at least 3 m (10 ft) from HVAC air intakes, windows, doors, and other openings into buildings.

9.2.2 The exhaust outlet(s) shall not be directed onto walkways or other paths of travel for pedestrians.

9.3 Indoor Installations.

9.3.1 Fuel cell systems that are supplied by natural gas, propane, or fuel oil and that are located in residences shall not be required to have fire-rated separations.

9.3.2 Fuel cells that are supplied by methanol, ethanol, or other alcohol fuels and that are located in residences shall not be required to have fire-rated separations if the fuel cell power system meets requirements 9.3.6.1 through 9.3.6.4.

9.3.3 Clearances from combustible construction and other combustible materials shall be in accordance with manufacturer's instructions; NFPA 31, NFPA 54, or NFPA 58.

9.3.4 Indoor use of fuel cell power systems that operate without ventilation air from the outside shall be provided with limit controls that will not permit room ambient oxygen levels to drop below 18 percent unless it can be demonstrated by other means that the oxygen level will not drop below 18 percent.

9.3.5 The exhaust system materials shall be compatible with the exhaust gas and any resulting condensate.

9.3.6 Fuel cell power systems using a flammable liquid as a fuel shall be located outside unless they meet the requirements for indoor installations in Chapters 1 through 8 or meet all the requirements in 9.3.6.1 through 9.3.6.4.

9.3.6.1 The fuel cell power system enclosure plus the connected indoor liquid fuel piping shall contain less than 0.019 m^3 (5 gal) of liquid fuel during all modes of operation, standby, and shutdown.

9.3.6.2 The bulk fuel storage shall be located outside.

9.3.6.3 The indoor fuel piping shall be of solid pipe or tube or all-welded, soldered, or brazed construction up through the fuel cell power system enclosure.

9.3.6.4 The fuel cell power system shall be equipped with leakage detection and automatic isolation of the indoor fuel piping from the outdoor bulk fuel supply upon detection of fuel leakage using pump stoppage, valve closure, or other appropriate means as determined by the manufacturer. Outdoor bulk fuel storage located at an elevation above the fuel cell power system shall be equipped with an automatic isolation valve at the tank.

9.3.7 Fuel cell power systems that use hydrogen shall be installed in accordance with the manufacturer's instructions and NFPA 55.

9.3.7.1 Fuel cell systems supplied with a hydrogen fuel supply not exceeding a total of 11.33 m^3 (400 scf) shall not be required to have fire-rated separation.

9.4 Ventilation and Exhaust.

9.4.1 A direct-vented fuel cell power system operating at negative pressure with respect to the room shall not require additional mechanical exhaust from the room or area.

9.4.2 Where the total abnormal gas emission or concentration from the fuel cell power system is nontoxic and cannot attain 25 percent of LFL under normal room or area ventilation, the fuel cell power system shall not be required to supply additional ventilation and exhaust.

9.5 Fire Protection. The requirements of Chapter 8 shall not apply to 50 kW or smaller systems except as modified in 9.5.1 and 9.5.2.

9.5.1 Combustible gas detection shall be installed in accordance with 8.1.5.4 through 8.1.5.6 except where the fuel gas system is listed for indoor use and the fuel is odorized natural gas or LP-Gas.

9.5.2 Fuel cell power systems that meet the requirements of Section 4.2 or Section 4.3 shall not require a written fire prevention and emergency plan.

Annex A Explanatory Material

Annex A is not a part of the requirements of this NFPA document but is included for informational purposes only. This annex contains explanatory material, numbered to correspond with the applicable text paragraphs.

A.1.6 For a full explanation, see IEEE/ASTM SI10, *American National Standard for Metric Practice.*

A.3.2.1 Approved. The National Fire Protection Association does not approve, inspect, or certify any installations, procedures, equipment, or materials; nor does it approve or evaluate testing laboratories. In determining the acceptability of installations, procedures, equipment, or materials, the authority having jurisdiction may base acceptance on compliance with NFPA or other appropriate standards. In the absence of such standards, said authority may require evidence of proper installation, procedure, or use. The authority having jurisdiction may also refer to the listings or labeling practices of an organization that is concerned with product evaluations and is thus in a position to determine compliance with appropriate standards for the current production of listed items.

A.3.2.2 Authority Having Jurisdiction (AHJ). The phrase "authority having jurisdiction," or its acronym AHJ, is used in NFPA documents in a broad manner, since jurisdictions and approval agencies vary, as do their responsibilities. Where public safety is primary, the authority having jurisdiction may be a federal, state, local, or other regional department or individual such as a fire chief; fire marshal; chief of a fire prevention bureau, labor department, or health department; building official; electrical inspector; or others having statutory authority. For insurance purposes, an insurance inspection department, rating bureau, or other insurance company representative may be the authority having jurisdiction. In many circumstances, the property owner or his or her designated agent assumes the role of the authority having jurisdiction; at government installations, the commanding officer or departmental official may be the authority having jurisdiction.

A.3.2.4 Listed. The means for identifying listed equipment may vary for each organization concerned with product evaluation;

some organizations do not recognize equipment as listed unless it is also labeled. The authority having jurisdiction should utilize the system employed by the listing organization to identify a listed product.

A.3.3.5 Distributed Integrated Controls (DIC). The DIC is made up of a collection of modules, each with its own function, interconnected to process data for a specific operation or function. Also referred to as distributed control system (DCS).

A.3.3.6.2 Fire Risk Evaluation. The evaluation results in a list of required fire protection elements to be provided based on acceptable means for separation or control of common or special hazards (e.g., temperature and pressure), the control or elimination of ignition sources, the detection and suppression of fires, and the safeguarding of life.

A.3.3.12 Fuel Cell Power System. The system is composed of all or some of the systems shown in Figure B.1.

A.3.3.12.1 Engineered and Field-Constructed Fuel Cell Power System. The power system is engineered and designed for the assembly of various components from various sources and is installed on site. *(See Figure B.1 for a schematic of a typical fuel cell power system.)*

A.3.3.12.2 Pre-Engineered and Matched Modular Components Fuel Cell Power System. The modules are matched to be installed in the field.

A.3.3.13.1 Digester Gas. Digester gas can contain approximately 50 percent methane and approximately 25 percent carbon dioxide (CO_2). Trace contaminants can include sulfur (S) and chlorine (Cl) compounds.

A.3.3.13.2 Landfill Gas. Landfill gas is approximately 50 percent methane and approximately 20 percent CO_2. Trace contaminants can include sulfur (S), chlorine (Cl), water (H_2O), and oxygen (O_2) introduced by air leakage into the collection system.

A.3.3.15.1 Indoor Installation. An indoor installation can be a separate building, room, or area within a building.

A.3.3.16 Limited Combustible. For more information, see NFPA 259. Materials that have neither a flame spread index greater than 25 nor evidence of continued progressive combustion should be tested in accordance with ASTM E84, *Standard Test Method for Surface Burning Characteristics of Building Materials,* or ANSI/UL 723, *Standard for Test for Surface Burning Characteristics of Building Materials.*

A.4.1 Fuel cell technology is evolving at a rapid rate, and codes and standards criteria are needed to help acceptance of the new technology. Currently, there is only one standard for testing fuel cell power systems, which is ANSI CSA FC 1, *American National Standard for Fuel Cell Power Systems.* ANSI CSA FC 1 applies to a specific size fuel cell power system that is prepackaged and assembled as one complete unit. The constraints of ANSI CSA FC 1 limit the ability to test and list larger power plants or power systems that use fuels other than natural gas or LP-Gas or that are not prepackaged and self-contained.

NFPA 853 provides additional guidance for acceptance of power system installations that are not within the scope of ANSI CSA FC 1, commensurate with the need to protect life safety and property and the need of the adoption agencies to be able to uniformly evaluate power system installations outside the scope of available equipment standards.

A.5.1.1(5) For additional information on hazardous atmospheres, see NFPA 497.

A.5.1.1(10) Installations should consider mechanical damage and exposure to falling ice and other objects.

A.5.1.2 The siting of a fuel cell power system depends on many variables relating to the unit size, fuel, and failure mode.

A.6.2.1.2 One method of doing so would be the use of check valves.

A.6.4 Hydrogen is a colorless, odorless, highly flammable gas or liquid. The flammable range in air at atmospheric pressure is 4.0 percent to 75 percent by volume. It has a vapor density of 0.1. Being lighter than air, it can dissipate in open areas but be very explosive in confined spaces. Hydrogen burns with an intensely hot nonluminous flame that makes it very difficult to judge the boundaries of a fire. Liquid hydrogen is similar to other cryogens that have a high liquid-to-gas volume expansion ratio [1 to 848 at 20°C (68°F)].

A.6.4.3.1 The shutoff valve should be in a location that is identified and easily accessed by authorized personnel such that the valve can be operated in the event of an impending emergency. A cylinder valve on unmanifolded cylinder storage installations meets the intent of 6.4.3.1.

A.6.4.3.2 The shutoff valve should be outside of the storage containment area in a location that is identified and easily accessed by authorized personnel such that the valve can be operated in the event of an impending emergency. An inlet shutoff valve on the fuel cell system meets the intent of 6.4.3.2.

A.6.5 Biogas consists primarily of methane (about 50 percent), carbon dioxide (about 40 percent), hydrogen sulfide, water, and small amounts of organic compounds, including halogenated compounds.

A.6.6 Examples of such liquid fuels include diesel, JP-4, JP-5, ethanol, and naphtha methanol.

A.7.1.2 The building ventilation and fuel cell power system and exhaust system design should consider the manufacturer's air requirements for the fuel cell power system(s) and any additional equipment that is located within the space.

A.7.2.1 This system is to remove exhaust air. This system can also be the source of supply for fuel cell power system ventilation air (primary, circulation, and dilution systems).

A.8.1.2 Units meeting ANSI CSA FC.1, *American National Standard for Fuel Cell Power Systems,* requirements have internal devices to monitor for overheating, and smoke and combustible gas releases, interlocked to shut down the fuel cell by isolating the fuel supply. The fire detection and alarm for engineered and field-constructed fuel cell power systems should provide for these internal hazards as well as hazards outside the fuel cell. If a fire alarm system is provided for the site or facility where a prepackaged and pre-engineered fuel cell is installed, the process monitors interlocked to shut down the fuel cell should be monitored by the fire alarm system.

A.8.1.5.2 The combination of curbs and drains should be sized to handle the combined discharge from automatic sprinklers and a fuel spill for a minimum of 10 minutes.

A.8.1.5.4 A fuel cell power system that includes an internal combustible gas detector meets this requirement if it is supported by a separate safety analysis.

A.8.1.5.5 Fuel gas boosters (within the fuel cell enclosure containing fuel) containing members are addressed in ANSI FC1 as part of the leak detection and mitigation strategy.

A.8.1.5.8 An example of such a system is a direct methanol fuel cell power system.

Annex B Typical Fuel Cell Power System

This annex is not a part of the requirements of this NFPA document but is included for informational purposes only.

B.1 Figure B.1 presents a generalized stationary fuel cell power system schematic. *(For more information, see the definitions of various types of fuel cell power systems in Section 3.3.)*

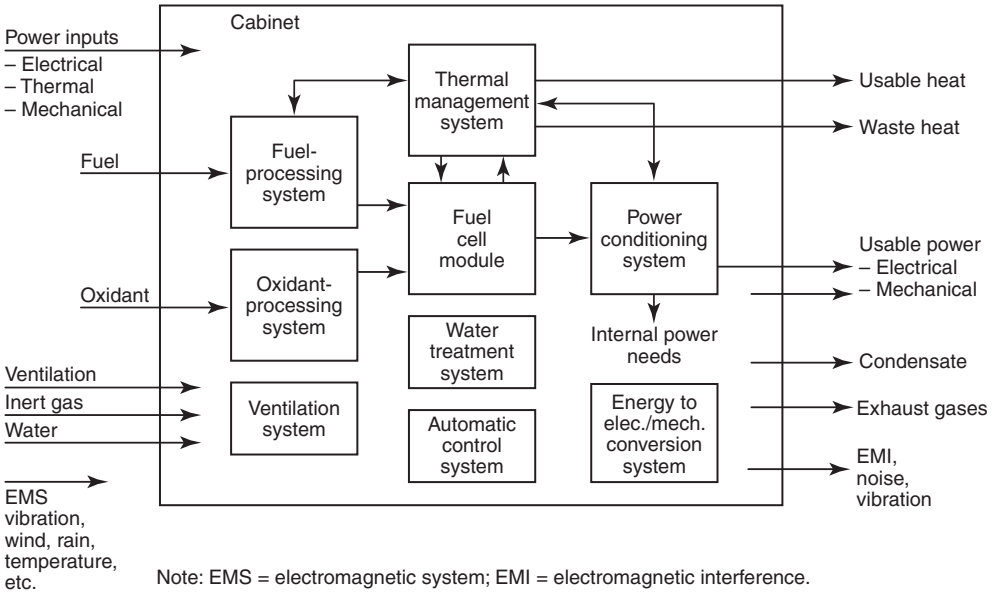

FIGURE B.1 Typical Fuel Cell Power System.

Annex C Informational References

C.1 Referenced Publications. The documents or portions thereof listed in this annex are referenced within the informational sections of this standard and are not part of the requirements of this document unless also listed in Chapter 2 for other reasons.

C.1.1 NFPA Publications. National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.

NFPA 259, *Standard Test Method for Potential Heat of Building Materials*, 2013 edition.

NFPA 497, *Recommended Practice for the Classification of Flammable Liquids, Gases, or Vapors and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas*, 2012 edition.

C.1.2 Other Publications.

C.1.2.1 ANSI Publications. American National Standards Institute, Inc., 25 West 3rd Street, 4th Floor, New York, NY 10036.

ANSI CSA FC 1, *American National Standard for Fuel Cell Power Systems*, 2014.

C.1.2.2 ASTM Publications. ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959.

ASTM E84, *Standard Test Method for Surface Burning Characteristics of Building Materials*, 2012c.

IEEE/ASTM SI10, *American National Standard for Metric Practice*, 2010.

C.1.2.3 UL Publications. Underwriters Laboratories Inc., 333 Pfingsten Road, Northbrook, IL 60062-2096.

ANSI/UL 723, *Standard for Test for Surface Burning Characteristics of Building Materials*, 2010.

C.2 Informational References. The following documents or portions thereof are listed here as informational resources only. They are not a part of the requirements of this document.

C.2.1 CGA Publications. Compressed Gas Association, 14501 George Carter Way, Suite 103, Chantilly, VA 20151-2923.

CGA G-5, *Hydrogen*, 2011.

CGA G-5.4, *Standard for Hydrogen Piping Systems at Consumer Locations*, 2012.

CGA G-5.5, *Hydrogen Vent Systems*, 2004.

C.3 References for Extracts in Informational Sections. (Reserved)

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Sequence of Events for the Standards Development Process

As soon as the current edition is published, a Standard is open for Public Input

Step 1: Input Stage

- Input accepted from the public or other committees for consideration to develop the First Draft
- Committee holds First Draft Meeting to revise Standard (23 weeks)
  Committee(s) with Correlating Committee (10 weeks)
- Committee ballots on First Draft (12 weeks)
  Committee(s) with Correlating Committee (11 weeks)
- Correlating Committee First Draft Meeting (9 weeks)
- Correlating Committee ballots on First Draft (5 weeks)
- First Draft Report posted

Step 2: Comment Stage

- Public Comments accepted on First Draft (10 weeks)
- If Standard does not receive Public Comments and the Committee does not wish to further revise the Standard, the Standard becomes a Consent Standard and is sent directly to the Standards Council for issuance
- Committee holds Second Draft Meeting (21 weeks)
  Committee(s) with Correlating Committee (7 weeks)
- Committee ballots on Second Draft (11 weeks)
  Committee(s) with Correlating Committee (10 weeks)
- Correlating Committee First Draft Meeting (9 weeks)
- Correlating Committee ballots on First Draft (8 weeks)
- Second Draft Report posted

Step 3: Association Technical Meeting

- Notice of Intent to Make a Motion (NITMAM) accepted (5 weeks)
- NITMAMs are reviewed and valid motions are certified for presentation at the Association Technical Meeting
- Consent Standard bypasses Association Technical Meeting and proceeds directly to the Standards Council for issuance
- NFPA membership meets each June at the Association Technical Meeting and acts on Standards with "Certified Amending Motions" (certified NITMAMs)
- Committee(s) and Panel(s) vote on any successful amendments to the Technical Committee Reports made by the NFPA membership at the Association Technical Meeting

Step 4: Council Appeals and Issuance of Standard

- Notification of intent to file an appeal to the Standards Council on Association action must be filed within 20 days of the Association Technical Meeting
- Standards Council decides, based on all evidence, whether or not to issue the Standards or to take other action

Committee Membership Classifications[1,2,3,4]

The following classifications apply to Committee members and represent their principal interest in the activity of the Committee.

1. M *Manufacturer:* A representative of a maker or marketer of a product, assembly, or system, or portion thereof, that is affected by the standard.
2. U *User:* A representative of an entity that is subject to the provisions of the standard or that voluntarily uses the standard.
3. IM *Installer/Maintainer:* A representative of an entity that is in the business of installing or maintaining a product, assembly, or system affected by the standard.
4. L *Labor:* A labor representative or employee concerned with safety in the workplace.
5. RT *Applied Research/Testing Laboratory:* A representative of an independent testing laboratory or independent applied research organization that promulgates and/or enforces standards.
6. E *Enforcing Authority:* A representative of an agency or an organization that promulgates and/or enforces standards.
7. I *Insurance:* A representative of an insurance company, broker, agent, bureau, or inspection agency.
8. C *Consumer:* A person who is or represents the ultimate purchaser of a product, system, or service affected by the standard, but who is not included in (2).
9. SE *Special Expert:* A person not representing (1) through (8) and who has special expertise in the scope of the standard or portion thereof.

NOTE 1: "Standard" connotes code, standard, recommended practice, or guide.

NOTE 2: A representative includes an employee.

NOTE 3: While these classifications will be used by the Standards Council to achieve a balance for Technical Committees, the Standards Council may determine that new classifications of member or unique interests need representation in order to foster the best possible Committee deliberations on any project. In this connection, the Standards Council may make such appointments as it deems appropriate in the public interest, such as the classification of "Utilities" in the National Electrical Code Committee.

NOTE 4: Representatives of subsidiaries of any group are generally considered to have the same classification as the parent organization.