

# NFPA®

# 75

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## Standard for the Fire Protection of Information Technology Equipment

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# 2024



# NFPA® 75

## Standard for the Fire Protection of Information Technology Equipment

### 2024 Edition



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## NFPA® 75

### Standard for the

## Fire Protection of Information Technology Equipment

### 2024 Edition

This edition of NFPA 75, *Standard for the Fire Protection of Information Technology Equipment*, was prepared by the Technical Committee on Electronic Computer Systems. It was issued by the Standards Council on December 1, 2023, with an effective date of December 21, 2023, and supersedes all previous editions.

This edition of NFPA 75 was approved as an American National Standard on December 21, 2023.

### Origin and Development of NFPA 75

The Committee on Electronic Computer Systems was formed by the action of the NFPA Board of Directors in January 1960, following a request for standardization of fire protection recommendations by the computer industry.

The committee first submitted the *Standard for the Protection of Electronic Computer Systems* to the 1961 NFPA Annual Meeting, and it was tentatively adopted. At the 1962 Annual Meeting, it was officially adopted as an NFPA standard. Revisions were adopted in 1963, 1964, 1968, 1972, 1976, 1981, 1987, and 1989. The document was completely rewritten for the 1992 edition. The document was revised in 1995, 1999, and again in 2003. The 2003 edition incorporated the *Manual of Style for NFPA Technical Committee Documents* revisions.

In editions of this standard prior to 2003, the terms *electronic computer/data processing equipment* and *electronic computer system* were used where the current terms *information technology equipment* and *information technology equipment system*, respectively, are used. Similarly, the terms *computer room* and *computer area* were replaced by *information technology equipment room* and *information technology equipment area*, respectively. The title was changed from *Standard for the Protection of Electronic Computer/Data Processing Equipment* to *Standard for the Protection of Information Technology Equipment*. While the title and some terminology were changed in the 2003 edition to more closely align this standard's terminology with terminology being used in other standards, such as *NFPA 70, National Electrical Code*, and *UL 60950, Safety of Information Technology Equipment*, the scope of this standard and any definitions associated with those like terms remained the same.

For the 2009 edition, Section 4.2, Telecommunications Risks, was updated; many of the UL references were updated; new requirements were added for signage to indicate that equipment will remain energized where continuous power is provided; and flame spread indexes were provided for many of the materials listed in the standard.

For the 2013 edition, the title was again changed, to *Standard for the Fire Protection of Information Technology Equipment*, to better reflect the scope of the document and to be clear that the standard is strictly for fire protection. The 2013 edition featured a new section on the emerging use of aisle containment systems for information technology equipment and how such systems must be assessed for their interaction with fire protection features. A number of definitions were extracted from *NFPA 70* to define words used in the body of the standard that previously were not defined.

The 2017 edition of the standard was revised to permit performance-based designs for specific provisions of the standard. Chapter 4 was revised to state the approaches that are permitted to be followed (prescriptive or performance-based), and a new Chapter 5 was added that details the requirements when a performance-based approach is selected. This was done to account for changes in the operation of data centers that can require more flexibility than is often provided by prescriptive approaches.

Extensive annex material that provides guidance on designing detection for high airflow environments, including detector sensitivity and spacing, was added to the standard based on Fire Protection Research Foundation reports.

For the 2020 edition of the standard, air sampling detector port location and coverage was clarified. The requirement for inside hose stream was deleted as the fire department utilizes their own hose and will most likely not use the inside hose located in the structure. New Chapter 13, Modular Data Centers, was added to specify which requirements from other chapters apply to modular data centers. The requirements for 1- and 2-hour fire barriers were clarified for structures that contain multiple occupancies. Battery requirements were extracted from Chapter 52 of NFPA 1, *Fire Code*.

For the 2024 edition, requirements for ITE immersion cooling equipment have been added in Chapter 8 to increase safety around this technology. ITE immersion cooling is becoming more prevalent, and safety standards are needed to cover equipment being used and developed for use with ITE. All requirements for lithium-ion batteries in Chapter 11 have been removed, as NFPA 855, *Standard for the Installation of Stationary Energy Storage Systems*, already covers the protection requirements for lithium-ion batteries located within energy storage systems. Off-gas detection requirements have been added to Chapter 11 for situations where those systems are installed. There were previously no requirements for these types of detection systems that are being used in the field, and it was important to address their installation from a safety standpoint. A new Annex F has been developed based on optional tests already included in NFPA 76, *Standard for the Fire Protection of Telecommunications Facilities*, because these tests are also used in data centers and contain important guidance for users of this standard.

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**Committee Scope:** This Committee shall have primary responsibility for documents on the protection of electronic computer equipment, components, and associated records.

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## NFPA 75

## Standard for the

## Fire Protection of Information Technology Equipment

2024 Edition

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

## Chapter 1 Administration

**1.1 Scope.** This standard covers the requirements for the protection of information technology equipment (ITE) and ITE areas.

**▲ 1.2\* Purpose.** The purpose of this standard is to set forth the minimum requirements for the protection of ITE and ITE areas from damage by fire or its associated effects — namely, smoke, corrosion, heat, and water.

**1.3\* Application.** The application of this standard is based on the risk considerations outlined in Chapter 4.

**1.3.1** A documented risk assessment shall be the basis for implementation of this standard.

**▲ 1.3.2\*** The mere presence of ITE shall not constitute the need to invoke the requirements of this standard.

**1.3.3** If applied, the requirements of this standard shall include the installation of ITE in modular data centers, fabricated containers, and other groupings.

**1.4 Retroactivity.**

**1.4.1** 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.

**1.4.2** 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.

**1.5 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. Technical documentation shall be submitted to the authority having jurisdiction to demonstrate equivalency. The system, method, or device shall be approved for the intended purpose by the authority having jurisdiction.

## 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 1, *Fire Code*, 2024 edition.

NFPA 10, *Standard for Portable Fire Extinguishers*, 2022 edition.

NFPA 12, *Standard on Carbon Dioxide Extinguishing Systems*, 2022 edition.

NFPA 12A, *Standard on Halon 1301 Fire Extinguishing Systems*, 2022 edition.

NFPA 13, *Standard for the Installation of Sprinkler Systems*, 2022 edition.

NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*, 2023 edition.

NFPA 70®, *National Electrical Code®*, 2023 edition.

NFPA 72®, *National Fire Alarm and Signaling Code®*, 2022 edition.

NFPA 76, *Standard for the Fire Protection of Telecommunications Facilities*, 2024 edition.

NFPA 80, *Standard for Fire Doors and Other Opening Protectives*, 2022 edition.

NFPA 90A, *Standard for the Installation of Air-Conditioning and Ventilating Systems*, 2024 edition.

NFPA 101®, *Life Safety Code®*, 2024 edition.

NFPA 105, *Standard for Smoke Door Assemblies and Other Opening Protectives*, 2022 edition.

NFPA 220, *Standard on Types of Building Construction*, 2024 edition.

NFPA 232, *Standard for the Protection of Records*, 2022 edition.

NFPA 259, *Standard Test Method for Potential Heat of Building Materials*, 2023 edition.

NFPA 750, *Standard on Water Mist Fire Protection Systems*, 2023 edition.

NFPA 770, *Standard on Hybrid (Water and Inert Gas) Fire-Extinguishing Systems*, 2021 edition.

NFPA 855, *Standard for the Installation of Stationary Energy Storage Systems*, 2023 edition.

NFPA 1225, *Standard for Emergency Services Communications*, 2022 edition.

NFPA 2001, *Standard on Clean Agent Fire Extinguishing Systems*, 2022 edition.

### 2.3 Other Publications.

**2.3.1 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*, 2023.

ASTM E136, *Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750°C*, 2022.

ASTM E814, *Standard Test Method for Fire Tests of Penetration Firestop Systems*, 2013a, reapproved 2017.

ASTM E1354, *Standard Test Method for Heat and Visible Smoke Release Rates for Materials and Products Using an Oxygen Consumption Calorimeter*, 2023.

ASTM E1537, *Standard Test Method for Fire Testing of Upholstered Furniture*, 2022.

ASTM E2652, *Standard Test Method for Assessing Combustibility of Materials Using a Tube Furnace with a Cone-Shaped Airflow Stabilizer; at 750°C*, 2022.

ASTM E2965, *Standard Test Method for Determination of Low Levels of Heat Release Rate for Materials and Products Using an Oxygen Consumption Calorimeter*, 2022a.

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

UL 72, *Tests for Fire Resistance of Record Protection Equipment*, 2020.

UL 242, *Nonmetallic Containers for Waste Paper*, 2018.

UL 723, *Test for Surface Burning Characteristics of Building Materials*, 2018.

UL 900, *Air Filter Units*, 2022.

UL 1315, *Containers for Waste Paper*, 2022.

UL 1449, *Surge Protective Devices*, 2022.

UL 1479, *Fire Tests of Penetration Firestops*, 2021.

UL 60950, *Information Technology Equipment*, 2000, including revisions through October 30, 2007.

UL 60950-1, *Information Technology Equipment — Safety — Part 1: General Requirements*, 2019.

UL 62368-1, *Audio/Video, Information and Communication Technology Equipment — Part 1: Safety Requirements*, 2021.

### 2.3.3 Other Publications.

*Merriam-Webster's Collegiate Dictionary*, 11th edition, Merriam-Webster, Inc., Springfield, MA, 2020.

## 2.4 References for Extracts in Mandatory Sections.

NFPA 1, *Fire Code*, 2024 edition.

NFPA 70®, *National Electrical Code®*, 2023 edition.

NFPA 90A, *Standard for the Installation of Air-Conditioning and Ventilating Systems*, 2024 edition.

NFPA 101®, *Life Safety Code®*, 2024 edition.

NFPA 111, *Standard on Stored Electrical Energy Emergency and Standby Power Systems*, 2022 edition.

NFPA 855, *Standard for the Installation of Stationary Energy Storage Systems*, 2023 edition.

NFPA 5000®, *Building Construction and Safety Code®*, 2024 edition.

## Chapter 3 Definitions

### 3.1 General.

**3.1.1** The definitions contained in this chapter shall apply to the terms used in this standard.

**3.1.2** 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.

**3.1.3** *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 phrases “standards development process” or “standards development activities,” the term “standards” includes all NFPA standards, including codes, standards, recommended practices, and guides.

### Δ 3.3 General Definitions.

**3.3.1 Abandoned Cables.** Installed cable that is not terminated at equipment other than a termination fitting or a connector and is not identified for future use with a tag. [70, 2023]

**3.3.2 Air Space.** The space below a raised floor or above a suspended ceiling used to circulate environmental air within the ITE room or ITE area.

**3.3.3 Automated Information Storage System (AISS).** An enclosed storage and retrieval system that moves recorded media between storage and ITE systems.

#### 3.3.4 Battery Types, Stationary.

Δ **3.3.4.1 Lithium-Ion Battery.** A storage battery that consists of lithium ions imbedded in a carbon graphite or nickel metal-oxide substrate. The electrolyte is a carbonate mixture or a gelled polymer. The lithium ions are the charge carriers of the battery. [1, 2024]

Δ **3.3.4.2 Nickel Cadmium (NiCad) Battery.** An alkaline storage battery in which the positive active material is nickel oxide, the negative contains the cadmium, and the electrolyte is potassium hydroxide. [1, 2024]

**3.3.4.3\* Valve-Regulated Lead-Acid (VRLA).** A lead-acid battery consisting of sealed cells furnished with a valve that opens to vent the battery whenever the internal pressure of the battery exceeds the ambient pressure by a set amount. [1, 2024]

**3.3.4.4\* Vented (Flooded).** A lead-acid battery consisting of cells that have electrodes immersed in liquid electrolyte.

**3.3.5 Business Interruption.** The effect on business operations from the time that equipment was initially lost or damaged until it has been restored to the former level of operation.

**3.3.6 Communications Circuit.** A metallic, fiber, or wireless circuit that provides voice/data (and associated power) for communications-related services between communications equipment. [70, 2023]

**3.3.7 Communications Equipment.** The electronic equipment that performs the telecommunications operations for the transmission of audio, video, and data, and includes power equipment (e.g., dc converters, inverters, and batteries), technical support equipment (e.g., computers), and conductors dedicated solely to the operation of the equipment. [70, 2023]

#### 3.3.8 Detector.

**3.3.8.1 Heat Detector.** A fire detector that detects either abnormally high temperatures or rate of temperature rise, or both.

**3.3.8.2 Smoke Detector.** A device that senses visible or invisible particles of combustion.

**3.3.9 Electronically Interconnected.** Units that must be connected by a signal channel to complete a system or perform an operation.

N **3.3.10\* Energy Storage System (ESS).** One or more devices installed as a system capable of storing energy and providing electrical energy into the premises wiring system or an electric power production and distribution network. [70, 2023]

**3.3.11 Fire-Resistant-Rated Construction.** Construction in which the structural members, including walls, partitions, columns, floors, and roof construction, have fire resistance ratings of time duration not less than that specified in this standard.

**3.3.12 Fire Risk Analysis.** A process to characterize the risk associated with fire that addresses the fire scenario or fire scenarios of concern, their probability, and their potential consequences.

Δ **3.3.13\* Information Technology Equipment (ITE).** Equipment and systems rated 1000 volts or less, normally found in offices or other business establishments and similar environments classified as ordinary locations, that are used for creation and manipulation of data, voice, video, and similar signals that are not communications equipment and do not process communications circuits. [70, 2023]

**3.3.14 Interconnecting Cables.** Signal and power cables for operation and control of a system.

**3.3.15\* ITE Area.** An area of a building where the ITE room is located, including support rooms served by the same special air-conditioning/air-handling equipment as the ITE room.

N **3.3.16 ITE Immersion Cooling Liquid.** An insulating liquid (dielectric) used for the purpose of cooling ITE through direct contact that is contained within the ITE system.

**3.3.17 ITE Room.** A room within the ITE area that contains the ITE.

**3.3.18\* ITE System.** Any electronic digital or analog computer, along with all peripheral, support, memory, programming, or other directly associated equipment, records, storage, and activities.

**3.3.19 Leak Detection System.** A device or arrangement of sensors that detects the presence of liquids.

#### 3.3.20 Material.

**3.3.20.1 Combustible Material.** A material that, in the form in which it is used and under the conditions anticipated, will ignite and burn; a material that does not meet the definition of noncombustible or limited-combustible.

**3.3.20.2 Limited-Combustible Material.** See 6.2.2.

Δ **3.3.20.3\* Maximum Allowable Quantity (MAQ).** The quantity of hazardous material permitted in a control area. [1, 2024]

**3.3.20.4 Noncombustible Material.** See 6.2.1.

**3.3.21\* Modular Data Center (MDC).** Prefabricated units, rated 1000 volts or less, consisting of an outer enclosure housing multiple racks or cabinets of information technology equipment (ITE) (e.g., servers) and various support equipment, such as electrical service and distribution equipment, HVAC systems, and the like. [70, 2023]

**N 3.3.22 Off-Gas.** The event in which the [battery] cell case vents due to a rise in internal pressure of the cell. [855, 2023]

**3.3.23 Optical Fiber Cable.** A factory assembly or field assembly of one or more optical fibers having an overall covering. [70, 2023]

**Δ 3.3.24 Plenum.** A compartment or chamber to which one or more ducts are connected and that forms part of the air distribution system. [90A, 2024]

**3.3.25\* Raceway.** An enclosed channel of metallic or nonmetallic materials designed expressly for holding wires, cables, or busbars, with additional functions as permitted in *NFPA 70*.

**3.3.26\* Raised Floor.** A platform with removable panels where equipment is installed, with the intervening space between it and the main building floor used to house the interconnecting cables and at times is used as a means for supplying conditioned air to the ITE and the room.

### 3.3.27 Records.

**3.3.27.1 Important Records.** Records that could be reproduced only at considerable expense and labor or only after considerable delay.

**3.3.27.2 Vital Records.** Records that are irreplaceable, such as records of which a reproduction does not have the same value as an original; records needed to sustain the business promptly or to recover monies used to replace buildings' equipment, raw materials, finished goods, and work in progress; and records needed to avoid delay in restoration of production, sales, and service.

**3.3.28 Remote Disconnect Control.** An electric device and circuit that controls a disconnecting means through a relay or equivalent device. [70, 2023]

**3.3.29 Separate Fire Division.** A portion of a building cut off from all other portions of the building by fire walls, fire doors, and other approved means adequate to prevent any fire that can occur in one fire division from extending to another fire division.

**3.3.30\* Support Equipment.** Permanently installed equipment that is essential to the operation of ITE, as well as equipment temporarily used for maintenance, installation, or deinstallation of ITE.

**N 3.3.31 Thermal Runaway.** Self-heating of an electrochemical system in an uncontrollable fashion. [855, 2023]

**3.3.32 Uninterruptible Power Supply (UPS).** A device or system that provides quality and continuity of ac power through the use of a stored-energy device as the backup power source during any period when the normal power supply is incapable of performing acceptably. [111, 2022]

**3.3.33 Zone.** A physically identifiable area (such as barriers or separation by distance) within an information technology equipment room, with dedicated power and cooling systems for the information technology equipment or systems. [70, 2023]

## 3.4 Aisle Containment.

**3.4.1\* Aisle.** The passageway between ITE or between ITE and a wall that allows personnel access to the ITE for service or operation of the equipment.

**3.4.2\* Aisle Containment.** An HVAC method deployed in the occupied area of an air-cooled ITE space utilizing physical separation of hot exhaust air from cooler intake air between equipment cabinets, rows of ITE, or associated power and cooling infrastructure; containment is typically above and at both ends of a hot aisle or a cold aisle, in whole or part.

**3.4.3\* Cold Aisle.** The aisle in front of the airflow intakes on the ITE where HVAC cooling airflow is controlled.

**3.4.4\* Hot Air Collar.** An air conveyance assembly used to direct heated exhaust air from ITE cabinet(s), enclosure(s), or rack(s) directly to a return air path.

**3.4.5\* Hot Aisle.** The aisle at the rear of the ITE where heated exhaust air is controlled and directed into the aisle for return to the HVAC equipment.

## Chapter 4 Fire Protection Approaches

**4.1 Fire Protection Approach.** The fire protection approach for ITE systems, ITE rooms, and ITE areas shall be permitted to be determined based on an evaluation of fire risks and hazards associated with the site and services provided and the business continuity planning and disaster restoration capabilities of the ITE specific to the site.

**4.1.1** The fire protection approach shall be established with consideration given to the following factors:

- (1) Exposure threat to facility occupants, the general public, emergency responders, and exposed property from a fire occurring at the facility, adjacent to or within ITE areas
- (2) The importance of the continuity of the data being stored or processed by the ITE
- (3) Methods and equipment employed as part of a risk management or business continuity strategy that allow data to remain viable during and after an event or to be replaced or restored
- (4) The potential for a given protection strategy to result in a service or data disruption or inhibit the ability of the data provider to restore operation and access to the data in a timely manner post-event

**4.1.2** The fire protection approach shall be developed in conjunction with the considerations in 4.2.3 resulting in the use of one or both of the following strategies within ITE areas:

- (1) Prescriptive-based approaches in accordance with this standard
- (2) A fire risk-based approach in accordance with 4.1.3 and Section 4.2

**4.1.3** A fire risk-based approach shall be permitted to be used to determine the construction, fire suppression, fire detection, and utility requirements for ITE systems, ITE rooms, and ITE areas where specifically permitted by this standard that are necessary to achieve the purpose of this standard. (See Section 1.2.)

## 4.2 Fire Risk Assessment.

**4.2.1\*** The fire risk assessment permitted by 4.1.2 shall be documented and acceptable to the authority having jurisdiction (AHJ).

**4.2.2** The fire risk assessment shall include an evaluation of the risk management considerations outlined in 4.2.3.

Δ 4.2.3\* The following elements shall be considered to determine the level of acceptable fire risk documented as part of the fire risk assessment (*see also Annex C*):

- (1)\* Life safety aspects of the computing function
- (2) Life safety of occupants of ITE areas and adjacent spaces, emergency responders, and the general public
- (3) Fire threat of the installation to occupants or exposed property
- (4) Continuity of service, operation, and data access
- (5) Size and value of ITE areas
- (6) Economic loss from loss of function or loss of records
- (7) Economic loss from value of damaged equipment
- (8) Loss of customer data hosted on ITE
- (9) Regulatory impact
- (10) Reputation impact
- (11) Construction and compartmentation of ITE areas
- (12) Fire suppression and detection features provided for ITE areas
- (13) Response time to an alarm
- (14) Local firefighting capabilities
- (15) Redundant infrastructure, including off-site processing systems

4.2.4 The fire risk assessment shall cover the entire ITE area, including all adjacent exposures.

4.2.5 An approved performance-based approach, in accordance with Chapter 5, shall be permitted to be applied selectively to specifically identified areas, hazards, or equipment or to specific fire protection requirements for an entire ITE area.

### 4.3 Telecommunications Risks.

#### 4.3.1 Telecommunications Risks for the Private Network.

4.3.1.1 To assess and evaluate the damage and interruption potential of the loss of ITE room operations, a risk evaluation shall be conducted on the impact of the loss of data and communications.

4.3.1.2 The provisions of this standard shall apply to those areas housing telecommunications equipment that are part of a private network or where the need for protection has been determined by the risk evaluation outlined in 4.3.1.1.

#### 4.3.2 Telecommunications Risks for the Public Networks.

4.3.2.1 NFPA 76 shall apply to telecommunications facilities that are part of the public network as outlined in the scope of NFPA 76.

4.3.2.2 The provisions of this standard shall not apply to telecommunications facilities that are part of the public network.

## Chapter 5 Performance-Based Design Approach

### Δ 5.1 General.

N 5.1.1 The requirements of Chapter 5 shall apply to recognized performance-based practices.

Δ 5.1.2 The performance-based design approach shall include all of the following components:

- (1) Goals and objectives specified in Section 5.2
- (2) Performance criterion specified in Section 5.3
- (3) Fire risk assessment elements specified in 4.2.3

5.2 **Goals and Objectives.** The performance-based design shall meet the following goals and objectives:

- (1) The performance-based approach allows the alternative means to be utilized for the elements of the ITE systems, ITE rooms, and ITE areas as permitted in this standard.
- (2) The risk analysis, design criteria, design brief, system performance, and testing criteria are developed in accordance with this section.
- (3) The design meets the scope and purpose of the standard as detailed in Sections 1.1 and 1.2.
- (4) The performance-based design provides equivalent performance to the prescriptive requirements of this standard.

Δ 5.3 **Performance Criterion.** ITE systems and ITE areas shall be protected from damage by fire or its associated effects, including smoke, corrosion, heat, and water.

5.4 **Stakeholders.** The stakeholders shall be part of the performance-based design approach and include the owner or owner's representative, a licensed design professional experienced in the design of fire and life safety systems for ITE and ITE areas, insurance representatives, the authority having jurisdiction (AHJ), and representatives of the emergency response entities.

5.5\* **Qualifications.** The performance-based design documents shall be prepared by a licensed design professional with experience in fire protection, and be acceptable to the AHJ.

### Δ 5.6\* Design Brief.

N 5.6.1 The design of the ITE area shall include a design brief that is prepared using recognized performance-based design practices.

5.6.2 Any deviation from a prescriptive requirement shall be detailed in the design brief.

5.6.3 Design specifications and briefs used in the performance-based design shall be clearly stated and shown to be realistic and sustainable.

5.6.4 Specific inspection, testing, or maintenance requirements that are necessary to maintain reliable performance of the fire safety features of the ITE area shall be stated in the design brief.

5.7\* **Independent Review.** The AHJ shall be permitted to require an approved, independent third party to review the proposed design brief based on the documented fire risk assessment accepted by the AHJ to provide an evaluation of the design.

5.8 **Final Determination.** The AHJ shall make the final determination as to whether the performance objectives have been met.

5.9 **Maintenance of Design Features.** The design features required for the ITE area to continue to meet the performance goals and objectives of this standard shall be maintained for the life of the building.

## Chapter 6 Construction Requirements

### 6.1\* Building Construction.

▲ 6.1.1 The ITE area shall be housed in a fully sprinklered building in accordance with NFPA 13 or housed in one of the following:

- (1) A building with Type I (442 or 332) or Type II (222 or 111) construction in accordance with NFPA 220 (for nonsprinklered buildings, see 9.1.1)
- (2) A single-story building with Type II (000) construction in accordance with NFPA 220 (for nonsprinklered buildings, see 9.1.1.1)

6.1.1.1 The building construction requirements in 6.1.1 shall be permitted to be modified where a risk assessment, as outlined in Chapter 4, identifies that an alternative means of construction is acceptable.

6.1.2\* Protection for the building housing the ITE area shall be provided where it is subject to damage from external exposure.

6.1.3\* The ITE area shall be separated from other occupancies within the building, including atria or other open-space construction, by fire-resistant-rated construction.

6.1.3.1 The ITE room shall be separated from other occupancies in the ITE area by fire-resistant-rated construction.

6.1.3.2 The fire resistance rating shall be commensurate with the exposure but not less than 1 hour for both.

6.1.3.3 The fire-resistant-rated enclosures shall extend from the structural floor to the structural floor above or to the roof.

6.1.3.4 Every opening in the fire-resistant-rated construction shall be protected to limit the spread of fire and to restrict the movement of smoke from one side of the fire-resistant-rated construction to the other. The fire resistance rating for doors shall be as follows:

- (1) 2-hour fire-resistant-rated construction — 1½-hour fire-resistance-rated doors
- (2) 1-hour fire-resistant-rated construction — ¾-hour fire-resistance-rated doors

6.1.3.5 The fire-resistant-rated construction shall be in accordance with NFPA 101 and applicable building and fire codes.

6.1.3.6 Under the following conditions, the fire separation requirements of 6.1.3 through 6.1.3.4 shall be permitted to be evaluated as part of the risk assessment as outlined in Chapter 4:

- (1) The anticipated fire exposures are documented.
- (2) Alternate forms of fire separation are provided based on the anticipated fire exposures.

### 6.2\* Combustibility of Materials.

#### ▲ 6.2.1 Noncombustible Material.

▲ 6.2.1.1 A material that complies with any one of the following shall be considered a noncombustible material:

- (1)\* The material, in the form in which it is used, and under the conditions anticipated, will not ignite, burn, support combustion, or release flammable vapors when subjected to fire or heat.

- (2) The material is reported as passing ASTM E136, *Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750°C*.
- (3) The material is reported as complying with the pass/fail criteria of ASTM E136 when tested in accordance with the test method and procedure in ASTM E2652, *Standard Test Method for Assessing Combustibility of Materials Using a Tube Furnace with a Cone-Shaped Airflow Stabilizer, at 750°C*.

[5000:7.1.4.1.1]

6.2.1.2 Where the term *limited-combustible* is used in this standard, it shall also include the term *noncombustible*.

[5000:7.1.4.1.2]

▲ 6.2.2 Limited-Combustible Material. A material shall be considered a limited-combustible material where one of the following is met:

- (1) The conditions of 6.2.2.1 and 6.2.2.2, and the conditions of either 6.2.2.3 or 6.2.2.4, shall be met.
- (2) The conditions of 6.2.2.5 shall be met.

[5000:7.1.4.2]

6.2.2.1 The material does not comply with the requirements for a noncombustible material in accordance with 6.2.1.

[5000:7.1.4.2.1]

6.2.2.2 The material, in the form in which it is used, exhibits a potential heat value not exceeding 3500 Btu/lb (8141 kJ/kg) when tested in accordance with NFPA 259. [5000:7.1.4.2.2]

▲ 6.2.2.3 The material shall have a structural base of noncombustible material with a surfacing not exceeding a thickness of ⅛ in. (3.2 mm) where the surfacing exhibits a flame spread index not greater than 50 when tested in accordance with ASTM E84, *Standard Test Method for Surface Burning Characteristics of Building Materials*, or UL 723, *Test for Surface Burning Characteristics of Building Materials*. [5000:7.1.4.2.3]

▲ 6.2.2.4\* The material shall be composed of materials that in the form and thickness used neither exhibit a flame spread index greater than 25 nor exhibit evidence of continued progressive combustion when tested in accordance with ASTM E84, *Standard Test Method for Surface Burning Characteristics of Building Materials*, or UL 723, *Test for Surface Burning Characteristics of Building Materials*, and are of such composition that all surfaces that would be exposed by cutting through the material on any plane would neither exhibit a flame spread index greater than 25 nor exhibit evidence of continued progressive combustion when tested in accordance with ASTM E84 or UL 723. [5000:7.1.4.2.4]

■ 6.2.2.5 Materials shall be considered limited-combustible materials where tested in accordance with ASTM E2965, *Standard Test Method for Determination of Low Levels of Heat Release Rate for Materials and Products Using an Oxygen Consumption Calorimeter*, at an incident heat flux of 75 kW/m² for a 20-minute exposure, and both the following conditions are met:

- (1) The peak heat release rate shall not exceed 150 kW/m² for longer than 10 seconds.
- (2) The total heat released shall not exceed 8 MJ/m².

[5000:7.1.4.2.5]

6.2.2.6 Where the term *limited-combustible* is used in this standard, it shall also include the term *noncombustible*.

[5000:7.1.4.2.6]