

# NFPA® 2010

## Standard for Fixed Aerosol Fire-Extinguishing Systems

### 2015 Edition



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**NFPA® 2010**  
**Standard for**  
**Fixed Aerosol Fire-Extinguishing Systems**  
**2015 Edition**

This edition of NFPA 2010, *Standard for Fixed Aerosol Fire-Extinguishing Systems*, was prepared by the Technical Committee on Aerosol Extinguishing Technology. It was issued by the Standards Council on November 11, 2014, with an effective date of December 1, 2014, and supersedes all previous editions.

This edition of NFPA 2010 was approved as an American National Standard on December 1, 2014.

**Origin and Development of NFPA 2010**

In 1995, at the request of the Technical Committee on Alternative Protection Options to Halon, the NFPA Standards Council voted to proceed with a new project to provide guidance on the subject of fine-aerosol extinguishing technology. In 1996 the Standards Council reviewed the status of that project and voted to postpone the appointment of a startup roster for a fine-aerosol technology project until the technology had actual field use and experience. Over the next 5 years, field use and experience support material was accumulated, and in 2001 the Standards Council, responding to a public request, established a new project on fine-aerosol extinguishing technology. In 2003 the Technical Committee on Aerosol Extinguishing Technology submitted a draft document titled *Fixed Aerosol Extinguishing Systems* for inclusion in the Annual 2005 cycle. That document became NFPA 2010, *Standard for Fixed Aerosol Fire-Extinguishing Systems*.

The 2010 edition of NFPA 2010 featured a reorganization of Chapters 8 and 9 to separate the requirements for systems into categories, which include, general requirements applicable to all systems, condensed aerosol system requirements, and dispersed aerosol system requirements. Several clarifications were made throughout the document as well.

The 2015 edition revises the frequency of system inspections and adds references to third-party approval standards.



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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 design, installation, operation, testing, maintenance, and use of fire extinguishing systems that utilize aerosol extinguishing agents. It shall not address documents on safeguarding against the fire and explosion hazards associated with the manufacturing, handling, and storage of combustible or flammable aerosol products covered by other committees.



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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 D. 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 D.

**Chapter 1 Administration****1.1 Scope.**

**1.1.1** This standard contains the requirements for the design, installation, operation, testing, and maintenance of condensed and dispersed aerosol fire-extinguishing systems for total flooding applications.

**1.1.2** This standard also covers performance requirements and methods of testing for condensed aerosol systems, dispersed aerosol systems, and associated components.

**1.2 Purpose.** This standard is prepared for the use by and guidance of those charged with purchasing, designing, installing, testing, inspecting, approving, listing, operating, and maintaining fixed aerosol fire-extinguishing systems, so that such equipment will function as intended throughout its life.

**1.3 Retroactivity.**

**1.3.1** The provisions of this document are considered necessary to provide a reasonable level of protection from loss of life and property from fire. They reflect situations and the state of the art at the time the standard was issued.

**1.3.2** Unless otherwise noted, it is not intended that the provisions of this document be applied to facilities, equipment, structures, or installations that were existing or approved for construction or installation prior to the effective date of this document.

**1.4 Equivalency.** Nothing in this standard is intended to prevent the use of new methods or devices, provided sufficient technical data are submitted to the authority having jurisdiction to demonstrate that the new method or device is equivalent

in quality, effectiveness, durability, and safety to that prescribed by this standard.

**1.5 Units and Formulas.**

**1.5.1\*** Metric units of measurement in this standard are in accordance with the modernized metric system known as the International System of Units (SI).

**1.5.2** If a value for measurement as given in this standard is followed by an equivalent value in other units, the first stated is to be regarded as the requirement. A given equivalent value could be approximate.

**1.6 New Technology.**

**1.6.1** Nothing in this standard shall be intended to restrict new technologies or alternate arrangements, provided the level of safety prescribed by this standard is not lowered.

**1.6.2** Materials or devices not specifically designated by this standard shall be utilized in complete accord with all conditions, requirements, and limitations of their listings.

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

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

NFPA 2001, *Standard on Clean Agent Fire Extinguishing Systems*, 2015 edition.

**2.3 Other Publications.**

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

ASME *Boiler and Pressure Vessel Code*, 2013.

ANSI/ASME B1.20.1, *Standard for Pipe Threads, General Purpose*, 1983, reaffirmed 2006.

ASME B31.1, *Power Piping Code*, 2012.

**2.3.2 ASTM Publications.** ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

ASTM A53/A53M, *Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless*, 2012.

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

CGA C-6, *Standard for Visual Inspection of Steel Compressed Gas Cylinders*, 2007.

**2.3.4 IEEE Publications.** IEEE, Three Park Avenue, 17th Floor, New York, NY 10016-5997.

ANSI/IEEE C2, *National Electrical Safety Code*, 2012.

**2.3.5 IMO Publications.** International Maritime Organization, 4 Albert Embankment, London, SE1 7SR, United Kingdom.

IMO MSC/Circ.1270, *Guidelines for the Approval of Fixed Aerosol Fire-Extinguishing Systems Equivalent to Fixed Gas Fire-Extinguishing Systems, as Referred to in SOLAS 74, for Machinery Spaces*, 2008.



**2.3.6 ISO Publications.** International Organization for Standardization, 1, rue de Varembe, Case postale 56, CH-1211 Geneve 20, Switzerland.

ISO 7–1, *Pipe threads where pressure-tight joints are made on the threads — Part 1: Dimensions, tolerances and designation*, 1994.

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

ANSI/UL 1254, *Pre-Engineered Dry Chemical Extinguishing System Units*, 2013.

ANSI/UL 2166, *Standard for Halocarbon Clean Agent Extinguishing System Units*, 2012.

ANSI/UL 2775, *Standard for Fixed Condensed Aerosol Extinguishing System Units*, 2014.

**2.3.8 U.S. Government Publications.** U.S. Government Printing Office, Washington, DC 20402.

Title 29, Code of Federal Regulations, Part 1910, Subpart S.

Title 46, Code of Federal Regulations, Subchapter C, Parts 24–28.

Title 46, Code of Federal Regulations, Subchapter J, “Electrical Engineering.”

Title 49, Code of Federal Regulations, Parts 171–190.

Title 49, Code of Federal Regulations, Part 172.101, Subpart B.

Title 49, Code of Federal Regulations, Part 173.34(e) (10).

Title 49, Code of Federal Regulations, Parts 178.36 and 178.37.

### 2.3.9 Other Publications.

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

### 2.4 References for Extracts in Mandatory Sections.

NFPA 10, *Standard for Portable Fire Extinguishers*, 2013 edition.

NFPA 13, *Standard for the Installation of Sprinkler Systems*, 2013 edition.

NFPA 51B, *Standard for Fire Prevention During Welding, Cutting, and Other Hot Work*, 2014 edition.

NFPA 68, *Standard on Explosion Protection by Deflagration Venting*, 2013 edition.

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

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

NFPA 820, *Standard for Fire Protection in Wastewater Treatment and Collection Facilities*, 2012 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\* 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.

**3.2.4 Shall.** Indicates a mandatory requirement.

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

**3.2.6 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 Actuating Mechanism.** A mechanism whose automatic or manual operation leads to the discharge of extinguishing agent.

#### 3.3.2 Aerosol.

**3.3.2.1 Condensed Aerosol.** An extinguishing medium consisting of finely divided solid particles, generally less than 10 microns in diameter, and gaseous matter, generated by a combustion process of a solid aerosol-forming compound.

**3.3.2.2 Dispersed Aerosol.** An extinguishing medium consisting of fine particles of chemicals, generally less than 10 microns in diameter, already resident inside a pressurized agent storage container, suspended in a halocarbon or an inert gas.

**3.3.3 Agent Quantity.** Mass of solid aerosol-forming compound required to achieve the design application density within the protected volume within the specified discharge time.

**3.3.4 Automatic.** Capable of performing a function without the necessity of human intervention. [101, 2015]

**3.3.5\* Automatic/Manual Switch.** Means of converting the system from automatic to manual actuation.

#### 3.3.6 Classifications for Fires.

**3.3.6.1 Class A Fires.** Fires in ordinary combustible materials, such as wood, cloth, paper, rubber, and many plastics. [10, 2013]

**3.3.6.2 Class B Fires.** Fires in flammable liquids, combustible liquids, petroleum greases, tars, oils, oil-based paints, solvents, lacquers, alcohols, and flammable gases. [10, 2013]

**3.3.6.3 Class C Fires.** Fires that involve energized electrical equipment. [10, 2013]

### 3.3.7 Clearance.

**3.3.7.1 Electrical Clearance.** The unobstructed air distance between extinguishing system equipment, including piping and nozzles, and unenclosed or uninsulated live electrical components not at ground potential.

**3.3.7.2 Thermal Clearance.** The air distance between a condensed aerosol generator and any structure or components sensitive to the temperature developed by the generator.

**3.3.8 Coolant.** A heat-absorbing medium or process.

### 3.3.9 Density.

**3.3.9.1\* Design Application Density ( $g/m^3$ ).** Extinguishing application density, including a safety factor, required for system design purposes.

**3.3.9.2\* Extinguishing Application Density ( $g/m^3$ ).** Minimum mass of a specific aerosol-forming compound per cubic meter of enclosure volume required to extinguish fire involving particular fuel under defined experimental conditions excluding any safety factor.

**3.3.9.3 Particulate Density.** The density of solid particulate in grams per cubic meter after discharge of the aerosol system at the design application density. This information is used to assess the degrees of visibility obscuration and the potential health effects of accidental exposure to the agent.

**3.3.10 Discharge Port.** A passage such as nozzles or openings on an aerosol generator where aerosol is released when the generator is actuated.

**3.3.11 Disconnect Switch.** A manually operated switch, electrically supervised and secured from unauthorized use, that prevents the automatic or manual electrical actuation of the aerosol generators during maintenance by electrically opening the releasing circuit.

**3.3.12 Enclosure.** A confined or partially confined volume. [68, 2013]

**3.3.13 Generator.** In condensed aerosol systems, a device for creating a fire-extinguishing medium by pyrotechnical means.

**3.3.14 Generator Casing.** The surface of the generator, excluding the surface containing the discharge ports.

**3.3.15 Hold Time.** Period of time during which an extinguishant is required to maintain an even distribution throughout the protected volume in an amount at least at the extinguishing application density.

**3.3.16 Hot Work.** Work involving burning, welding, or a similar operation that is capable of initiating fires or explosions. [51B, 2014]

**3.3.17\* Inspection.** A visual examination of a system or portion thereof to verify that it appears to be in operating condition and is free of physical damage. [820, 2012]

**3.3.18\* Maintenance.** Work performed to ensure that equipment operates as directed by the manufacturer.

**3.3.19 Manual.** Requiring intentional intervention to accomplish a function.

**3.3.20\* Mass Median Aerodynamic Diameter (MMAD).** The measurement, with the geometric standard deviation, used to describe the particle size distribution of any aerosol statistically, based on the weight and size of the particles.

**3.3.21 Normally Occupied.** An area or space where, under normal circumstances, persons are present.

**3.3.22 Normally Unoccupied.** An area or space not normally occupied by people but that can be entered occasionally for brief periods.

**3.3.23 Pipe.** Circular conduit for conveying the extinguishing agent, to the discharge nozzle(s) or conveying pneumatic control agent. Wherever pipe is used in this standard, it shall be understood also to mean tube.

**3.3.24 Protected Volume.** Volume enclosed by the building elements around the protected enclosure, minus the volume of any permanent impermeable building elements within the enclosure.

**3.3.25 Release.** The physical discharge or emission of aerosol as a consequence of the condensed aerosol generator's actuation or operation of the dispersed aerosol agent container.

**3.3.26 Solid Aerosol-Forming Compound.** A solid mixture of oxidant, combustible component and technical admixtures that produces a condensed aerosol upon actuation.

**3.3.27 Total Flooding Extinguishing System.** A system arranged to discharge an extinguishant into an enclosure to achieve a uniform distribution of that extinguishant, at or above the design application density, throughout the enclosure volume.

**3.3.28\* Unoccupiable.** An area or space that cannot be occupied due to dimensional or other physical constraints.

**3.4 Special Definitions for Marine Systems.** The following definitions shall be applicable to marine aerosol extinguishing systems.

**3.4.1\* A-60 Class Division.** A bulkhead or deck designed to resist the passage of smoke and flame for 1 hour, including limiting the temperature rise on the unexposed side to 180°C (325°F).

**3.4.2 Heat-Sensitive Material.** A material whose melting point is below 1700°F (926.7°C). [13, 2013]

**3.4.3 Marine System.** An aerosol system installed on a merchant vessel, ship, barge, boat, pleasure craft, offshore platform, or other floating structure.

### 3.4.4 Space.

**3.4.4.1 Cargo Space.** A space for the carriage or storage of items or products that are transported by the vessel.

**3.4.4.2 Machinery Space.** A space protected by an aerosol system containing an internal combustion engine or mechanical equipment for handling, pumping, or transferring flammable or combustible liquids as a fuel to internal combustion engines.

**3.4.5 Supervisory Condition.** An abnormal condition in connection with the supervision of other systems, processes, or equipment. [72, 2013]

**3.4.6 Supervisory Signal.** A signal that results from the detection of a supervisory condition. [72, 2013]

### 3.4.7 Vessel.

**3.4.7.1 Inspected Vessel.** A vessel operated on the navigable waterways of the United States that is subject to the regulations in 46 CFR, which require it to be certificated and inspected as a passenger ship, cargo ship, oceanographic ship, or tank vessel.



**3.4.7.2 Uninspected Vessel.** A vessel operated on the navigable waterways of the United States that is subject to the regulations in 46 CFR Subchapter C, Parts 24–28, including pleasure craft, tugboats, towing vessels, and certain fishing vessels.

## Chapter 4 General

### 4.1 General Information.

**4.1.1** The fire extinguishing agents addressed in this standard shall be electrically nonconductive.

**4.1.2** The design, installation, service, and maintenance of aerosol systems shall be performed by persons skilled in aerosol fire-extinguishing system technology.

### 4.2 Use and Limitations.

#### 4.2.1 Aerosol Systems.

**4.2.1.1\*** All aerosol systems and automatic extinguishing units shall be installed and used to protect hazards within the limitations of and in accordance with their listing.

**4.2.1.2** Aerosol systems and automatic extinguishing units referenced in 4.2.1.1 shall comply with the following or equivalent listing standard:

- (1) UL Subject 2775, *Standard for Fixed Condensed Aerosol Extinguishing System Units*, for condensed aerosol
- (2) ANSI/UL 1254, *Pre-Engineered Dry Chemical Extinguishing System Units*, for dispersed aerosol
- (3) ANSI/UL 2166, *Standard for Halocarbon Clean Agent Extinguishing System Units*, for dispersed aerosol

**4.2.2** Aerosol fire-extinguishing agents shall not be used on fires involving the following materials unless the agents have been tested to the satisfaction of the authority having jurisdiction:

- (1) Deep-seated fires in Class A materials
- (2) Certain chemicals or mixtures of chemicals, such as cellulose nitrate and gunpowder, that are capable of rapid oxidation in the absence of air
- (3) Reactive metals such as lithium, sodium, potassium, magnesium, titanium, zirconium, uranium, and plutonium
- (4) Metal hydrides
- (5) Chemicals capable of undergoing autothermal decomposition, such as certain organic peroxides and hydrazine

**4.2.3** Condensed aerosol generators shall not be used to protect classified hazards or similar spaces containing flammable liquids or dusts that can be present in explosive air–fuel mixtures unless the generators are specifically listed for use in those environments.

**4.2.4** The aerosol generators shall not be employed at less than the minimum safe distances specified in the listing of the product.

**4.2.4.1** The minimum safe distance between the condensed aerosol generator discharge ports and personnel shall be based on an aerosol agent discharge temperature, at that distance, not exceeding 75°C (167°F).

**4.2.4.2** The minimum safe distance between the condensed aerosol generator discharge ports and combustible materials shall be based on an aerosol agent discharge temperature, at that distance, not exceeding 200°C (392°F).

**4.2.4.3** In addition to the requirements in 4.2.4.1 and 4.2.4.2, the minimum safe distance requirements in 6.1.4.2.1 addressing the generator casing temperature shall apply.

**4.2.5** The aerosol generators shall not be employed at less than the minimum safe distances specified in the listing of the product.

**4.2.6** Where a total flooding system is used, a fixed enclosure shall be provided about the hazard that allows a specified agent design application density to be achieved and maintained for a specified period of time.

**4.2.7** The potential adverse effects of agent particulate residue on sensitive equipment and other objects shall be considered where aerosol extinguishing agents are used in spaces containing that type of equipment.

**4.2.8** Temperatures for use of aerosol extinguishing agents shall be within the manufacturer's listed limits.

**4.3\* Environmental Factors.** When a type of agent is being selected to protect a hazard area, the potential adverse effects of the agent on the environment shall be considered.

### 4.4 Compatibility with Other Agents.

**4.4.1\*** Mixing of agents in the same container shall be permitted only if the system is listed.

**4.4.2** Unless specifically approved as an agent blend or mixture, systems employing the simultaneous discharge of different agents to protect the same enclosed space shall not be permitted.

**4.4.3** Where unrelated extinguishing or suppression systems are provided and can operate prior to or during the hold time of the aerosol system, the combination of systems shall not compromise the overall level of suppression effectiveness.

## Chapter 5 Safety Requirements

### 5.1\* Review Requirement.

**5.1.1\*** Any agent that is to be recognized by this standard, or proposed for inclusion in this standard, shall first be evaluated in a manner equivalent to the process used by the U.S. Environmental Protection Agency's (EPA) Significant New Alternatives Policy (SNAP) Program.

### 5.1.2 Health Effects.

**5.1.2.1** Determination for use of an agent in spaces that are normally occupied or normally unoccupied shall include a thorough evaluation of the potential adverse health effect(s) of the agent.

**5.1.2.2** Potential adverse health effects shall be assessed for the particulate density, the size of the particulates (i.e., mean mass aerodynamic diameter), and the concentration of gases expected after actuation of the aerosol extinguishing system at the design application density.

### 5.2 Hazards to Personnel.

**5.2.1\* Potential Hazards.** The following potential hazards shall be considered for individual systems: noise, turbulence, reduced visibility, cold temperature, potential toxicity, thermal hazard, and irritation to persons in the protected space and other areas where the aerosol agent can migrate.

**5.2.2 Unnecessary Exposure.** Unnecessary exposure to aerosol agent, even at concentrations below an adverse-effect level, and to their decomposition products shall be avoided.

**5.2.3 PredischARGE Alarms and Time Delays.**

**5.2.3.1\*** A predischARGE alarm and time delay shall be provided in accordance with the requirements of 6.4.5.6.

**5.2.3.2 Alarm Failure.**

**5.2.3.2.1** In the event of failure of the predischARGE alarm and time delay, means shall be provided to limit exposure to agents approved for use in normally occupied spaces to no longer than 5 minutes.

**5.2.3.2.2** The effect of reduced visibility on egress time shall be considered.

**5.2.4\* Toxicity.**

**5.2.4.1 General.** No fire suppression system shall be used that is carcinogenic, mutagenic, or teratogenic at application densities expected during use.

**5.2.4.2\* Condensed Aerosols.** Condensed aerosol extinguishing systems approved for normally occupied spaces shall be permitted in amounts where the aerosol particulate density does not exceed the adverse-effect level as determined by a scientifically accepted technique and any aerosol agent produced does not exceed the excursion limit for the critical toxic effect.

**5.2.4.3 Dispersed Aerosols.** Dispersed aerosol extinguishing systems approved for normally occupied spaces shall be permitted in amounts where the aerosol particulate concentration does not exceed the adverse-effect level as determined by a scientifically accepted technique, and any carrier gas used shall meet the safe exposure requirements in accordance with NFPA 2001.

**5.2.5\* Reduced Visibility.** Safety measures shall be used such that occupants can evacuate under conditions of low visibility caused by the discharged agent.

**5.2.6 Thermal Hazards.**

**5.2.6.1** Condensed aerosol generators shall not be employed at less than the minimum safe distance from personnel and combustible materials as specified in the listing of the product.

**5.2.6.2** Protective gloves shall be worn by personnel removing discharged condensed aerosol generators.

**5.2.7 Safety Requirements.**

**5.2.7.1** Personnel shall not enter a protected space during or after agent discharge.

**5.2.7.2\*** Safeguards shall be provided to ensure prompt evacuation of and prevent entry into post-system discharge atmospheres and also to provide means for prompt rescue of any trapped personnel.

**5.2.7.3\*** Consideration shall be given to the possibility of an aerosol agent migrating to adjacent areas outside of the protected space.

**5.3 Electrical Clearances.**

**5.3.1** All system components shall be located to maintain no less than minimum clearances from energized electrical parts.

**5.3.1.1** The following references shall be considered as the minimum electrical clearance requirements for the installation of aerosol extinguishing systems:

- (1) ANSI/IEEE C2
- (2) NFPA 70
- (3) 29 CFR 1910, Subpart S

**5.3.2** Where the design basic insulation level (BIL) is not available, and where nominal voltage is used for the design criteria, the highest minimum clearance listed for this group shall be used.

**5.3.3** The selected clearance to ground shall satisfy the greater of the switching surge or BIL duty, rather than being based on nominal voltage.

**5.3.4** The clearance between uninsulated, energized parts of the electrical system equipment and any portion of the aerosol extinguishing system shall not be less than the minimum clearance provided elsewhere for electrical system insulations on any individual component.

## Chapter 6 Components

### 6.1 Condensed Aerosol System Agent Supply.

#### 6.1.1 Quantity.

**6.1.1.1 Primary Agent Supply.** The primary agent supply shall be determined by calculating the required mass of the solid aerosol-forming compound needed to meet the design application density and shall be at least sufficient for the largest single hazard protected or group of hazards to be protected simultaneously.

**6.1.1.2 Reserve Agent Supply.** Where required, a reserve agent supply shall consist of as many multiples of the primary agent supply as the authority having jurisdiction considers necessary.

**6.1.2 Quality.** Agent properties shall meet the standards of quality of the agent's listing.

**6.1.2.1** Each batch of agent manufactured shall be tested and certified to the specifications of its listing.

**6.1.2.2** Agents shall maintain their integrity for the useful life limits established by the listing within the approved temperature range and conditions of service that they will encounter.

#### 6.1.3 Aerosol Generator Arrangement.

**6.1.3.1** Aerosol generators and accessories shall be located and arranged so that inspection, testing, and other maintenance activities are facilitated and interruption of protection is held to a minimum.

**6.1.3.2** Aerosol generators shall be located within or as close as possible to the hazard or hazards they protect.

**6.1.3.3** Aerosol generators shall not be located where they can be rendered inoperable or unreliable due to mechanical damage or exposure to chemicals or harsh weather conditions unless enclosures or protective measures are employed.

**6.1.3.4** Aerosol generators shall be securely installed according to the manufacturer's listed installation manual.



### 6.1.4 Condensed Aerosol Generators.

#### 6.1.4.1 Safety.

**6.1.4.1.1** The aerosol-forming compound shall be stored in aerosol generators designed to safely contain the pyrotechnic reaction required to produce the aerosol agent.

**6.1.4.1.2** The aerosol generators shall discharge aerosol within the temperature and minimum safe distance parameters from personnel and combustibles established in the listing tests.

#### 6.1.4.2 Minimum Safe Distance.

**6.1.4.2.1** The generator shall not be installed at less than the minimum safe distances as specified in the manufacturer's installation instructions.

**6.1.4.2.2** In addition to the requirements of 6.1.4.2.1, the minimum safe distance requirements in 4.2.4 addressing the agent stream temperature shall apply.

**6.1.4.2.2.1** The minimum safe distance between the generator casing and personnel shall be the distance from the generator casing to where the temperature does not exceed 75°C (167°F) during and after discharge.

**6.1.4.2.2.2** The minimum safe distance between the generator casing and combustible materials shall be the distance from the generator casing to where the temperature does not exceed 200°C (392°F) during and after discharge.

**6.1.4.3** Aerosol generators shall be listed for the intended use.

**6.1.4.3.1** Listing criteria shall include area coverage, height limits, placement, storage temperature limits, useful lifetime limits, thermal safety parameters, and orientation.

**6.1.4.3.2** Aerosol generators shall be sealed in a manner that is corrosion resistant to the atmosphere in the intended application.

**6.1.4.3.3** Sealing methods shall provide an unobstructed opening upon system operation.

**6.1.4.4** Each aerosol generator shall have a permanent nameplate or other permanent marking that indicates the mass of aerosol-forming compound contained within, the manufacturer, date of manufacture, and date of mandatory replacement of the generator based on useful life limits established in the listing.

**6.1.4.5** The aerosol generators used in these systems shall comply with the requirements of the U.S. Department of Transportation (DOT) or the Canadian Transport Commission and shall be classified IAW 49 CFR 172.101, Subpart B, or the Canadian equivalent.

**6.1.4.6** Storage and use temperatures shall be within the manufacturer's listed limits.

### 6.2 Dispersed Aerosol System Agent Supply.

#### 6.2.1 Quantity.

**6.2.1.1 Primary Agent Supply.** The amount of agent in the system primary agent supply needed to meet the design application density shall be at least sufficient for the largest single hazard protected or group of hazards to be protected simultaneously.

**6.2.1.2 Reserve Agent Supply.** Where required, a reserve agent supply shall consist of as many multiples of the primary

agent supply as the authority having jurisdiction considers necessary.

**6.2.2 Quality.** Agent properties shall meet the standards of quality of the agent's listing.

**6.2.2.1** Each batch of agent manufactured shall be tested and certified to the specifications of its listing.

**6.2.2.2** Agent shall remain homogeneous in storage and use within the listed temperature range and conditions of service that it will encounter for the useful life of the material.

#### 6.2.3 Storage Container Arrangement.

**6.2.3.1** Storage containers and accessories shall be located and arranged so that inspection, testing, recharging, and other maintenance activities are facilitated and interruption of protection is held to a minimum.

**6.2.3.2\*** Storage containers shall be located as close as possible to or within the hazard or hazards they protect.

**6.2.3.3** Agent storage containers shall not be located where they can be rendered inoperable or unreliable due to mechanical damage or exposure to chemicals or harsh weather conditions unless enclosures or protective measures are employed.

**6.2.3.4** Storage containers shall be securely installed and secured according to the manufacturer's listed installation manual and in a manner that provides for convenient individual servicing or content weighing.

**6.2.3.5** Where storage containers are connected to a manifold, automatic means, such as a check valve, shall be provided to prevent agent loss and to ensure personnel safety if the system is operated when any containers are removed for maintenance.

#### 6.2.4 Agent Storage Containers.

##### 6.2.4.1 Container Description.

**6.2.4.1.1** Agent shall be stored in containers designed to hold that specific agent throughout the intended operating and storage temperature ranges.

**6.2.4.1.2** Containers shall be charged to a fill density or superpressurization level within the range specified in the manufacturer's listed manual.

**6.2.4.2** Each dispersed aerosol agent storage container shall have the following information:

- (1) The type and net weight of aerosol-forming material marked on a permanent nameplate or other permanent marking
- (2) The type and net weight of halocarbon-dispersing medium or the type and pressurization level of the inert gas-dispersing medium
- (3) The name of the manufacturer
- (4) The date of manufacture
- (5) The date of mandatory replacement of the contents based on useful life limits established in the listing

**6.2.4.3** The containers used in these systems shall be designed to meet the requirements of the DOT or the Canadian Transport Commission, if used as shipping containers.