

**NFPA<sup>®</sup>**

# 17A

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Standard for  
Wet Chemical  
Extinguishing Systems

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**2021**



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## NFPA® 17A

### Standard for

## Wet Chemical Extinguishing Systems

### 2021 Edition

This edition of NFPA 17A, *Standard for Wet Chemical Extinguishing Systems*, was prepared by the Technical Committee on Dry and Wet Chemical Extinguishing Systems. It was issued by the Standards Council on March 15, 2020, with an effective date of April 4, 2020, and supersedes all previous editions.

This edition of NFPA 17A was approved as an American National Standard on April 4, 2020.

### Origin and Development of NFPA 17A

On April 6, 1983, the Standards Council received a request to assign the subject of wet chemical extinguishing systems to the appropriate committee. Listed systems had been available for some time. After the Foam Committee declined the request, the Dry Chemical Extinguishing Systems Committee, which had been activated in 1952, was asked to assume responsibility for the project. In May 1983, that committee voted to accept the assignment and requested that the Standards Council expand the Committee Scope to include the new topic. The Committee also requested that the new document be identified as NFPA 17A, *Standard for Wet Chemical Extinguishing Systems*. A subcommittee met in June 1983 to develop the text. In November 1984, the Council approved a request to change the name of the Committee to the Committee on Dry and Wet Chemical Extinguishing Systems. The first edition of NFPA 17A was in 1986; the 1990 edition was a partial revision of the 1986 edition.

The 1994 edition was rewritten to more clearly state the requirements and to separate the mandatory requirements from the nonmandatory recommendations to assist in making the document more usable, enforceable, and adoptable.

The 1998 edition of the standard was revised to clarify the requirements for protection of unclosable openings and equipment shutdown.

The changes to the 2002 edition consisted of an editorial reformatting of the standard to comply with the *Manual of Style for NFPA Technical Committee Documents*. Technical changes included clarification of requirements for fuel and power shutoff upon actuation of the system and rewriting the requirement for simultaneous systems operation.

Changes to the 2009 edition clarified inspection, maintenance, and service requirements and qualifications for service personnel.

Revisions to the 2013 edition of this standard clarified requirements for inspection and maintenance and added new requirements for installation acceptance.

For the 2017 edition, redundant language within NFPA 17A and NFPA 96 was eliminated for correlation purposes. Other sections were deleted for correlation purposes with NFPA 96. New annex material was added to identify the areas of protection for the discharge nozzles. Changes also were made requiring the authority having jurisdiction to approve used components in the system. A requirement was added for a placard to be placed near all Class K portable fire extinguishers indicating that the fire protection system must be activated before a portable fire extinguisher is used.

The major revision for the 2021 edition of NFPA 17A is the addition of a new chapter addressing wet chemical extinguishing systems for mobile equipment. Since the application in the previous editions of the standard was limited to the protection of cooking equipment and its exhaust systems, the new Chapter 6 parallels similar requirements in NFPA 17 and addresses issues specific to wet chemical extinguishing systems. Other revisions include new provisions on the methodology of how to test for blocked piping, a new requirement that impairments be communicated in a timely manner, and modified language throughout the standard to correlate provisions between NFPA 96 and NFPA 17A.

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**Committee Scope:** This Committee shall have primary responsibility for documents on the design, installation, operation, testing, maintenance, and use of dry and wet chemical extinguishing systems for fire protection.

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## NFPA 17A

## Standard for

## Wet Chemical Extinguishing Systems

2021 Edition

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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. 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 and extracted publications can be found in Chapter 2 and Annex D.

## Chapter 1 Administration

**1.1\* Scope.** The provisions of this standard apply to the design, installation, operation, testing, and maintenance of pre-engineered wet chemical fire-extinguishing systems that discharge wet chemical from fixed nozzles and piping by means of expellant gas. It contains only the essential requirements and recommendations needed to make the standard workable in the hands of those skilled in this field.

**1.2 Purpose.** This standard is prepared for the use and guidance of those charged with the purchasing, designing, installing, testing, inspecting, approving, listing, operating, or maintaining of pre-engineered wet chemical fire-extinguishing systems in order that such equipment will function as intended throughout its life.

**Δ 1.3\* Application.**

**N 1.3.1** Minimum requirements are specified for hoods, plenums, ducts, and associated cooking appliances. (See Chapter 5.)

**N 1.3.2** Minimum requirements are specified for mobile equipment systems. (See Chapter 6.)

**1.4 Retroactivity.**

**1.4.1** 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.

**1.4.2** 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.

**1.5 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.

**1.6 Units and Formulas.**

**1.6.1** When a primary value for measurement in U.S. customary units as given in this standard is followed by a parenthetical equivalent value in metric units, the primary U.S. customary value stated is to be regarded as the requirement.

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

**1.6.1.2** The conversion procedure used for the SI units is to multiply the primary U.S. customary quantity by the conversion factor and then round the result if necessary to the appropriate number of significant digits.

**1.7\* Qualifications.** Only trained persons shall be considered competent to design or lay out, install, and service wet chemical systems.

## 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*®, 2020 edition.

NFPA 72®, *National Fire Alarm and Signaling Code*®, 2019 edition.

NFPA 96, *Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations*, 2021 edition.

**2.3 Other Publications.**

**Δ 2.3.1 UL Publications.** Underwriters Laboratories Inc., 333 Pfingsten Road, Northbrook, IL 60062-2096.

UL 300, *Fire Testing of Fire Extinguishing Systems for Protection of Commercial Cooking Equipment*, 2019.

UL 1254, *Pre-Engineered Dry and Wet Chemical Extinguishing System Units*, 2019.

### 2.3.2 Other Publications.

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

### 2.4 References for Extracts in Mandatory Sections.

NFPA 17, *Standard for Dry Chemical Extinguishing Systems*, 2021 edition.

NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*, 2020 edition.

NFPA 72®, *National Fire Alarm and Signaling Code*®, 2019 edition.

NFPA 96, *Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations*, 2021 edition.

NFPA 820, *Standard for Fire Protection in Wastewater Treatment and Collection Facilities*, 2020 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 Auxiliary Equipment.** Listed equipment used in conjunction with the wet chemical systems, for example, to shut down power, fuel, or ventilation to the hazard being protected or to initiate signaling devices.

**3.3.2 Discharge Nozzle.** Device from which the extinguishing agent is discharged to provide for suppression of a fire in the designated hazard.

#### 3.3.3 Duct.

**3.3.3.1 Branch Duct.** The duct work that contains the exhaust air from a single hood or hazard area.

**3.3.3.2 Common Duct.** The duct work containing the exhaust air from two or more branch ducts.

**3.3.4 Expellant Gas.** The medium used to discharge extinguishing agent from its container.

**N 3.3.5 Hose.** A flexible circular conduit for conveying extinguishing agent to discharge nozzles.

**3.3.6 Indicator.** A mechanical or electrical device that shows when an extinguishing system or critical component of it is ready to operate or if it has already operated.

**3.3.7\* 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, 2020]

**3.3.8 Liquid Agent.** See 3.3.24, Wet Chemical.

**3.3.9 Maintenance.** Work, including, but not limited to, repair, replacement, and service, performed to ensure that equipment operates properly. [72, 2019]

#### 3.3.10 Manual.

**3.3.10.1\* Manufacturer's Design, Installation, and Maintenance Manual.** The document referenced for design, installation, and maintenance of the listed wet chemical extinguishing system equipment.

**3.3.10.2 Owner's Manual.** A pamphlet containing the manufacturer's recommendations for inspection and operation of the extinguishing system.

**N 3.3.11\* Mobile Equipment.** Wheeled, skid-mounted, track-mounted, or rail-mounted equipment capable of moving or being moved, not including mobile or temporary cooking operations.

**3.3.12\* Operating Devices.** Mechanical, electrical, or pneumatic devices involved in the operation of a system.

#### 3.3.13 Operation.

**3.3.13.1 Automatic Operation.** Operation without human intervention. [25, 2020]

**3.3.13.2 Manual Operation.** Operation of a system or its components through human action. [25, 2020]

**Δ 3.3.14\* Pipe.** A rigid circular conduit for conveying the extinguishing agent to the discharge nozzle(s). [17, 2021]

**3.3.15\* Pre-Engineered Systems.** Those systems having predetermined flow rates, nozzle pressures, and quantities of extinguishing agent and having specific pipe size, maximum and

minimum pipe lengths, flexible hose specifications, number of fittings, and number and types of nozzles.

**3.3.16 Recharge.** The replacement of the extinguishing agent and expellant gas.

**3.3.17 Servicing.** Performing maintenance, recharging, or hydrostatic testing.

**3.3.18 Shutoff Devices.** Devices that operate simultaneously with the extinguishing system to shut off fuel and power to equipment protected by the system and other equipment required to be shut off upon operation of the system.

**3.3.19 Signal.** An indication of a condition communicated by electrical, visible, visual, audible, wireless, or other means. [72, 2019]

**3.3.20 Trained.** A person who has undergone the instructions necessary to safely design, install, and reliably perform the maintenance and recharge service in accordance with the manufacturer's design, installation, and maintenance manual. [17, 2021]

**3.3.21 Transport Canada (TC).** The department that has jurisdiction over design and transportation of compressed gas cylinders and cartridges in Canada.

**3.3.22 U.S. Department of Transportation (DOT).** The department that has jurisdiction over the design and transportation of compressed gas cylinders and cartridges in the United States.

**3.3.23 Wet Agent.** See 3.3.24, Wet Chemical.

**3.3.24\* Wet Chemical.** Normally an aqueous solution of organic or inorganic salts or a combination thereof that forms an extinguishing agent.

## Chapter 4 Components

**4.1 General.** Only system components referenced or permitted in the manufacturer's design, installation, and maintenance manual or alternative components that are listed for use with the specific extinguishing system shall be used.

Δ **4.1.1** Used components shall not be permitted to be installed in new systems.

**4.2\* Detectors.** Detectors shall be listed devices that detect heat.

**4.3 Discharge Nozzles.** (See also Section 5.5.)

**4.3.1** Discharge nozzles shall be listed for their intended use.

**4.3.1.1** Discharge nozzles shall be provided with an internal strainer or a separate listed strainer located immediately upstream of the nozzle.

**4.3.1.2** Discharge nozzles shall be of brass, stainless steel, or other corrosion-resistant materials or be protected inside and out against corrosion.

**4.3.1.3** Discharge nozzles shall be made of noncombustible materials and shall withstand the expected fire exposure without deformation.

**4.3.1.4\*** Discharge nozzles shall be permanently marked for identification.

**4.3.2 Protective Covers for Discharge Nozzles.**

**4.3.2.1** All discharge nozzles shall be provided with caps or other suitable devices to prevent the entrance of grease vapors, moisture, environmental contaminants, or other foreign materials into the piping.

**4.3.2.2** The protection device shall blow off, blow open, or blow out upon agent discharge.

**4.4 Operating Devices.**

**4.4.1** Operating devices shall be listed.

**4.4.2** All operating devices shall be designed for the service they will encounter, shall not be rendered inoperative or susceptible to accidental operation, and shall operate at least from 32°F to 120°F (0°C to 49°C).

**4.4.3 Manual Actuators.**

**4.4.3.1** Manual actuators shall not require a force of more than 40 lbf (178 N) to initiate operation.

**4.4.3.2** Manual actuators shall not require a movement of more than 14 in. (356 mm) to initiate operation.

**4.4.3.3** All manual actuators shall be provided with operating instructions.

**4.4.3.4** These instructions shall be permitted to include the use of pictographs and shall have lettering at least ¼ in. (6.35 mm) in height.

**4.4.3.5** All readily accessible manual operating devices shall identify the hazards they protect.

**4.4.3.6\*** A placard shall be conspicuously placed near each Class K extinguisher that states that the fire protection system shall be activated prior to using the fire extinguisher.

**4.4.4 Shutoff Devices.**

Δ **4.4.4.1** Upon actuation of any fire-extinguishing system for a cooking operation, all sources of fuel and electric power that produce heat to all equipment protected by the system shall automatically shut off.

**4.4.4.2** Gas appliances not requiring protection but located under the same ventilation equipment where protected appliances are located shall also be automatically shut off upon actuation of the extinguishing system.

**4.4.4.3** Steam supplied from an external source shall not be required to automatically shut off. [96:10.4.2]

**4.4.4.4** Solid fuel cooking operations shall not be required to be shut down. [96:10.4.5]

**4.4.4.5** If the expellant gas is used to pneumatically operate shutoff devices, the gas connection shall be prior to entry into the wet chemical tank.

**4.4.4.6** Shutoff devices shall require manual resetting prior to fuel or power being restored. [96:10.4.4]

Δ **4.4.4.6.1** Where an electrical gas valve is used for shutting off gas to appliances, a manually reset relay shall be used to restore electrical power to the gas valve. [96:10.4.4.1]

**4.4.4.7** A hood exhaust fan(s) shall continue to operate after the extinguishing system has been activated unless fan shutdown is required by a listed component of the ventilation

system or by the design of the extinguishing system. [96:8.2.3.1]

**4.4.4.7.1** When the fire-extinguishing system activates, makeup air supplied internally to a hood shall be shut off. [96:8.3.2]

#### 4.5 Pipe and Fittings, Tubing, and Hose.

▲ **4.5.1\*** Pipe and associated fittings shall be of noncombustible material having physical and chemical characteristics compatible with the wet chemical solution.

**4.5.2** Galvanized pipe and fittings shall not be used unless specifically listed with the system.

**4.5.3** The pressure rating of the pipe fittings and connection joints shall withstand the maximum expected pressure in the piping system.

**4.5.4\*** Pipe, tubing, hose, and types of fitting materials shall be in accordance with the manufacturer's design, installation, and maintenance manual.

#### 4.6 Wet Chemical.

**4.6.1\*** The wet chemical used in the system shall be listed for the particular system, and the system manufacturer shall be required to specify that particular chemical in the manufacturer's design, installation, and maintenance manual.

**4.6.2** Wet chemical solutions of different formulations or different manufacturers shall not be mixed.

**4.7 Electrical Wiring and Equipment.** Electrical wiring and equipment shall be installed in accordance with *NFPA 70* or the requirements of the authority having jurisdiction.

**4.8 Indicators.** Wet chemical systems shall be provided with an audible or visual indicator to show that the system is in a ready condition or is in need of recharging.

#### 4.9 Assembly.

**4.9.1\*** During assembly, the piping system shall be examined internally to detect and remove contaminants or other foreign materials.

**4.9.2** All extinguishing agent storage containers shall be examined to ensure that they are fastened securely to their mounting brackets.

### Chapter 5 System Requirements

▲ **5.1 General.** Wet chemical fire-extinguishing systems for the protection of cooking operations shall be listed and shall meet or exceed the requirements of UL 1254, *Pre-Engineered Dry and Wet Chemical Extinguishing System Units*, and UL 300, *Fire Testing of Fire Extinguishing Systems for Protection of Commercial Cooking Equipment*.

**5.1.1 Use.** Hazards and equipment that can be protected using wet chemical extinguishing systems shall include the following:

- (1) Restaurant, commercial, and institutional hoods
- (2) Plenums, ducts, and filters with their associated cooking appliances
- (3) Special grease removal devices
- (4) Odor control devices
- (5) Energy recovery devices installed in the exhaust system

**5.1.2\* Applications.** NFPA 96 and the manufacturer's design, installation, and maintenance manual shall be consulted for system limitations and applications for which wet chemical extinguishing systems for commercial cooking operations are considered satisfactory protection.

**5.1.2.1** Each protected cooking appliance, individual hood, and branch exhaust duct directly connected to the hood shall be protected by a system or systems designed and installed for simultaneous operation.

**5.1.2.2** Where two or more hazards can be simultaneously involved in fire by reason of their proximity, the hazards shall be protected by either of the following:

- (1) Individual systems installed on each hazard to operate simultaneously
- (2) A single system designed and installed to protect all hazards that can be simultaneously involved

**5.1.2.3** Any hazard that will allow fire propagation from one area to another shall constitute a single fire hazard.

#### 5.2 System Actuation.

**5.2.1** All systems shall have both automatic and manual methods of actuation. [96:10.5.1]

**5.2.1.1** The automatic and manual means of system actuation, external to the control head or releasing device, shall be separate and independent of each other so that a failure of one will not impair the operation of the other.

**5.2.1.2** The manual means of system activation shall be permitted to be common with the automatic means if the manual activation device is located between the control head or releasing device and the first fusible link.

**5.2.1.3** Automatic detection and system actuation shall be in compliance with this standard and the manufacturer's design, installation, and maintenance manual.

**5.2.1.4** All devices necessary for proper operation of the system shall function simultaneously with the system operation.

**5.2.1.5** Operation of any manual actuator shall be all that is required to bring about the full operation of the system.

**5.2.1.6** At least one manual actuator shall be provided for each system.

**5.2.1.7** All operating devices shall be designed, located, installed, or protected so that they are not subject to mechanical, environmental, or other conditions that could render them inoperative or cause inadvertent operation of the system.

**5.2.1.8** Upon activation of an automatic fire-extinguishing system, an audible alarm or visual indicator shall be provided to show that the system has actuated. [96:10.6.1]

**5.2.1.9** Where a fire alarm signaling system is serving the occupancy where the extinguishing system is located, the activation of the automatic fire-extinguishing system shall activate the fire alarm signaling system in accordance with the requirements of NFPA 72. [96:10.6.2]

▲ **5.2.1.10\*** At least one readily accessible means for manual actuation shall be located in the path of egress or at a location acceptable to the AHJ. [17:5.7.1.7]

**5.2.1.10.1** Each manual actuation device shall be installed no more than 48 in. (1200 mm) and no less than 42 in. (1067 mm) above the floor.

**5.2.1.10.2\*** The manual actuation device shall clearly identify the hazard protected and be provided with instructions for its use. [96:10.5.1.2]

**N 5.2.1.10.3\*** Manual actuation devices installed in locations where accidental operation could occur shall be provided with a guard where required by the authority having jurisdiction. [96:10.5.1.3]

**5.2.1.11** Automatic systems protecting only common exhaust ducts shall not require a manual actuator.

**5.2.1.12** The means for manual actuation shall be mechanical and shall not rely on electrical power for actuation, unless in accordance with 5.2.1.13.

**5.2.1.13** Electrical power shall be permitted to be used for manual actuation if electrical supervision and a reserve power supply are provided in accordance with 5.3.1.

### 5.3 Supervision.

**5.3.1** Where electrical power is required to operate the fixed automatic fire-extinguishing system, the system shall be monitored by a supervisory alarm with a reserve power supply provided.

**5.3.1.1** Where supervision of any or all of the following is provided, it shall be designed and installed to give an indication of trouble in the following:

- (1) Automatic detection system
- (2) Electrical actuation circuit
- (3) Electrical power supply

**5.3.1.2** Signals indicating the failure of supervised devices or equipment shall give prompt and positive indication of any failure and shall be distinct from signals indicating operation or hazardous conditions.

**5.3.2** Where fixed automatic fire-extinguishing systems include automatic mechanical detection and actuation as a backup detection system, electrical power required for automatic operation shall not require monitoring or a reserve power supply.

**Δ 5.3.3** Electrical power monitoring shall not be required for fixed automatic fire-extinguishing systems that are interconnected or interlocked with the cooking equipment power sources if all sources of fuel and heat to cooking appliances serviced by that hood automatically shut off during a power failure.

### 5.4\* System Location.

**5.4.1** Wet chemical containers and expellant gas assemblies shall be located within the temperature range specified in the manufacturer's design, installation, and maintenance manual.

**5.4.2** If ambient temperatures outside the manufacturer's operating temperature range are expected, protection shall be provided to maintain the temperature within the listed range.

**5.4.3** Wet chemical containers and expellant gas assemblies shall not be located where they could be subjected to mechanical, chemical, or other damage.

**5.4.4** Where damage due to chemical or mechanical exposure is expected, protective devices such as enclosures or guards

acceptable to the authority having jurisdiction shall be provided.

**5.4.5** Wet chemical containers and expellant gas assemblies shall be accessible for inspection, maintenance, and recharge.

**5.4.6** Wet chemical containers and expellant gas assemblies shall be located per the manufacturer's limitations where they will not be exposed to the fire in the protected area or otherwise rendered inoperable by mechanical damage.

**5.5\* Discharge Nozzles.** All discharge nozzles shall be located to minimize damage or misalignment and be within the limitations and constraints of the manufacturer's design, installation, and maintenance manual. (See Section 4.3.)

### 5.6 Special Requirements.

**5.6.1** Systems protecting two or more hoods or plenums, or both, that meet the requirements of 5.1.2.2 shall be installed to ensure the simultaneous operation of all systems protecting the hoods, plenums, and associated cooking appliances located below the hoods.

**5.6.1.1** The building owner(s) or the owner's agent shall be responsible for the protection of any common exhaust ducts used by more than one tenant.

**5.6.1.2** The tenant shall be responsible for the protection of common exhaust duct(s) serving hoods located within the tenant's space and up to the point of connection to the building owner's common exhaust duct.

**5.6.1.3** The tenant's common duct shall be considered a branch duct to the building owner's common duct.

**5.6.1.4** At least one fusible link or heat detector shall be installed within each exhaust duct opening in accordance with the manufacturer's listing.

**5.6.1.5** Other than appliances that use a downdraft ventilation system, a fusible link or heat detector shall be provided above each protected appliance or in accordance with the extinguishing system manufacturer's design, installation, and maintenance manual.

**5.6.1.5.1** Appliances that use a downdraft ventilation system shall be provided with a fusible link or heat detector for each protected cooking appliance located in the plenum area or in accordance with the extinguishing system manufacturer's design, installation, and maintenance manual.

**5.6.1.5.2** Fusible links or heat detectors located at or within 12 in. (305 mm) into the exhaust duct opening and above the protected appliance shall be permitted to meet the requirements of 5.6.1.5.

**5.6.1.5.3** The maximum distance between detection devices shall not exceed 36 in. (914 mm) unless permitted by the manufacturer's design, installation, and maintenance manual.

**5.6.1.5.4** A single listed detection device shall be permitted for more than one appliance when installed in accordance with the system's listing.

**5.6.1.6** Where the pipe or other conduit penetrates a duct or hood, the penetration shall have a liquidtight continuous external weld or shall be sealed by a listed device.

## 5.6.2 Protection of Common Exhaust Duct.

5.6.2.1 Common exhaust ducts shall be protected by one of the following methods:

- (1)\* Simultaneous operation of all independent hood, duct, and appliance protection systems
- (2)\* Simultaneous operation of any hood, duct, and appliance protection system and the system(s) protecting the entire common exhaust duct

5.6.2.1.1 A fusible link or other mechanically operated heat detection device from the common duct fire-extinguishing system shall be located at each branch-duct to common-duct connection where electrical operation of the common duct fire-extinguishing system does not meet the requirements of 5.3.1.

5.6.2.1.2 Where a fusible link or mechanically operated heat detector is located at a branch-duct to common-duct connection, an access panel shall be installed in accordance with NFPA 96 to enable servicing of the detector where the detector is not accessible from the branch duct connection to the exhaust hood.

5.6.2.2 All sources of fuel or heat to appliances served by the common exhaust duct shall be shut down upon actuation of any protection system in accordance with 4.4.4.

5.6.3\* Ignition sources contained within any exhaust system shall be protected and have a separate detection system that is in accordance with the manufacturer's specifications and that is approved by the authority having jurisdiction.

5.6.3.1 Either a common extinguishing system shall be provided to protect both the ignition source(s) contained within an exhaust system and the exhaust system itself, or separate extinguishing systems shall be provided to protect the exhaust system and the ignition sources which shall be arranged for simultaneous automatic operation upon actuation of any one of those systems.

5.6.3.1.1 Any equipment installed in the path of exhaust products that provides secondary filtration or air pollution control shall be provided with an approved automatic fire-extinguishing system, installed in accordance with the fire-extinguishing system manufacturer's instructions. [96:9.3.3]

5.6.4\* Movable cooking equipment shall be provided with a means to ensure that it is correctly positioned in relation to the appliance discharge nozzle during cooking operations.

## N Chapter 6 Systems for the Protection of Mobile Equipment

### N 6.1 General.

N 6.1.1 Wet chemical systems for the protection of mobile equipment shall comply with the requirements of this chapter.

N 6.1.2 This chapter shall not apply to mobile and temporary cooking operations. (See Chapter 17 of NFPA 96.)

### N 6.2 Components.

N 6.2.1 Requirements for components for the protection of mobile equipment shall be in addition to those requirements in Chapter 4, except that detection equipment for the protection of mobile equipment shall be approved and in accordance with 6.2.2.

N 6.2.2 Automatic detection equipment for mobile equipment shall be capable of detecting heat, flame, combustible vapors, or an abnormal condition that has produced or is likely to produce fire.

N 6.2.3 Only the flexible hose and hose fittings of the type identified in the manufacturer's design, installation, and maintenance manual shall be used.

### N 6.3 System Requirements.

N 6.3.1 **General.** Wet chemical fire-extinguishing systems for mobile equipment protection shall be listed and shall meet or exceed the requirements of the listing.

N 6.3.2 **Use.** The types of hazards and equipment that shall be permitted to be protected with a wet chemical extinguishing system include mobile equipment where the presence of flammable or combustible solids, liquids, or gases represents a hazard.

N 6.3.3 **Applications.** The manufacturer's design, installation, and maintenance manual shall be consulted for system limitations and applications.

N 6.3.3.1 Only pre-engineered systems that have been listed for such use shall be installed on mobile equipment.

N 6.3.3.2 Compartments or areas that could be subject to fire shall be protected in accordance with the manufacturer's design, installation, and maintenance manual.

N 6.3.3.3 Where two or more hazards can be simultaneously involved in fire by reason of their proximity, the hazards shall be protected by either of the following:

- (1) Individual systems installed on each hazard to operate simultaneously
- (2) A single system designed and installed to protect all hazards that can be simultaneously involved

N 6.3.3.4 Any hazard that allows fire propagation from one area to another shall constitute a single fire hazard.

### N 6.3.4 Shutoff Devices.

N 6.3.4.1 The system shall be permitted to incorporate a time delay feature that will delay the actuation of the system until the equipment can be brought to a safe location or cease operation.

N 6.3.4.2 Where systems protect hazards that are normally heated, the power or fuel supply to heaters shall be shut off automatically upon actuation of the extinguishing systems in accordance with the requirements of 6.3.4.4.

N 6.3.4.3 Where systems protect hazards that have flowing flammable or combustible fluids or gases, the systems shall be provided with automatic means to ensure shutoff of power and fuel to the hazards upon actuation of the extinguishing systems in accordance with the requirements of 6.3.4.4.

N 6.3.4.4 Where systems protect mobile equipment that is occupiable, the power or fuel supply shall be shut off automatically upon actuation of the extinguishing systems, only where a hazard analysis is performed that shows the safety of the operator and any passengers are not at risk.

N 6.3.4.5 Where systems protect hazards that have conveyors moving flammable or combustible materials or commodities,

the conveyors shall be automatically shut off upon actuation of the extinguishing systems.

#### **N 6.3.5 System Actuation.**

**N 6.3.5.1** Each protected compartment or area shall be provided with a listed fire detection device of the type identified in the manufacturer's design, installation, and maintenance manual to automatically actuate the extinguishing system or provide a signal to the operator.

**N 6.3.5.2** All systems shall have both automatic and manual methods of actuation except as permitted by 6.3.5.2.1.

**N 6.3.5.2.1** Only manual actuation shall be permitted to be the sole method of actuation where acceptable to the authority having jurisdiction.

**N 6.3.5.3** The automatic and manual means of system actuation, external to the control head or releasing device, shall be separate and independent of each other so that a failure of one will not impair the operation of the other.

**N 6.3.5.4** Automatic detection and system actuation shall be in compliance with this standard and the manufacturer's design, installation, and maintenance manual.

**N 6.3.5.5** All devices necessary for proper operation of the system shall function simultaneously upon system actuation.

**N 6.3.5.6** Operation of any manual actuator shall be the only operation required to bring about the full operation of the system.

**N 6.3.5.7** At least one manual actuator shall be provided for each system.

**N 6.3.5.7.1** At least one easily accessible manual actuator or operating device shall be provided for use by the equipment operator.

**N 6.3.5.7.2** Where the manual actuator required by 6.3.5.7.1 is not accessible from ground level, an additional manual actuator or operating device shall be located so that it is in the path of egress and operable from ground level.

**N 6.3.5.8** All operating devices shall be designed, located, installed, or protected so that they are not subject to mechanical, environmental, or other conditions that could render them inoperative or cause inadvertent operation of the system.

**N 6.3.5.9** Upon actuation of an automatic fire-extinguishing system, an audible alarm or visual indicator shall be provided to show that the system has activated. [96:10.6.1]

**N 6.3.5.10** The manual actuation device shall clearly identify the hazard protected and be provided with instructions for its use. [96:10.5.1.2]

**N 6.3.5.11** If the system is provided with a discharge delay, both audible and visual alarms shall be provided to warn of the impending system discharge.

#### **N 6.3.6 Supervision.**

**N 6.3.6.1** Where electrical power is required to operate the fixed automatic fire-extinguishing system, the system shall be monitored by a supervisory alarm provided with a reserve power supply.

**N 6.3.6.1.1** Where supervision of any or all of the following is provided, it shall be designed and installed to give an indication of trouble:

- (1) Automatic detection system
- (2) Electrical actuation circuit
- (3) Electrical power supply

**N 6.3.6.1.2** Signals indicating failure of supervised devices or equipment shall give prompt and positive indication and shall be distinct from signals indicating operation or hazardous conditions.

#### **N 6.3.7 System Location.**

**N 6.3.7.1** All discharge nozzles shall be located to minimize the likelihood of damage or misalignment and be within the limitations and constraints of the manufacturer's design, installation, and maintenance manual. (See Section 4.3.)

**N 6.3.7.2** Wet chemical containers and expellant gas assemblies shall be located within the temperature range specified in the manufacturer's design, installation, and maintenance manual.

**N 6.3.7.2.1** If ambient temperatures outside the manufacturer's operating temperature range are expected, protection shall be provided to maintain the temperature within the listed range.

**N 6.3.7.2.2** The agent storage container shall be marked to indicate the listed minimum and maximum temperature limitations of the fire suppression system equipment. [17:5.1.2.3.1]

**N 6.3.7.3** Wet chemical containers and expellant gas assemblies shall not be located where they could be subjected to mechanical, chemical, or other damage.

**N 6.3.7.4** Where damage due to chemical or mechanical exposure is expected, protective devices such as enclosures or guards acceptable to the authority having jurisdiction shall be provided.

**N 6.3.7.5** Wet chemical containers and expellant gas assemblies shall be accessible for inspection, maintenance, and recharge.

**N 6.3.7.6** Wet chemical containers and expellant gas assemblies shall be located per the manufacturer's limitations where they will not be exposed to the fire in the protected area or otherwise rendered inoperable by mechanical damage, unless approved by the authority having jurisdiction.

**N 6.3.8 System Discharge.** In the event of system discharge, the mobile equipment being protected shall not be returned to service until the system is recharged and operational.

## **Chapter 7 Plans and Acceptance Tests**

**7.1\* Specifications.** Specifications for wet chemical fire-extinguishing systems shall be drawn up by or under the supervision of a trained person and with the advice of the authority having jurisdiction.

**7.1.1** The following items shall be included in the specifications:

- (1) Designation of the authority having jurisdiction and indication of whether plans are required
- (2) Statement that the installation conforms to this standard and meets the approval of the authority having jurisdiction

- (3) Indication that only equipment referenced in the manufacturer's design, installation, and maintenance manual or alternative suppliers' components that are listed for use with the specific extinguishing system shall be used
- (4) Identification of special auxiliary equipment
- (5) List of the specific tests, if any, that are required
- (6) Identification of the hazard to be protected, including such information as physical dimensions, cooking appliances, energy sources for each appliance, and air-handling equipment

**7.2\* Review and Certification.** Design and installation of systems shall be performed only by persons properly trained and qualified to design and/or install the specific system being provided. The installer shall provide certification to the authority having jurisdiction that the installation complies with the terms of the listing and the manufacturer's instructions and/or approved design.

**7.3 Plans.** Where plans are required, the responsibility for their preparation shall be entrusted only to trained persons.

**7.3.1** The plans shall be drawn to an indicated scale or shall be suitably dimensioned and shall be reproducible.

**7.3.2** The plans shall contain sufficient detail to enable the authority having jurisdiction to evaluate the protection of the hazard(s).

**7.3.3** The details on the system shall include the following:

- (1) Size, length, and arrangement of connected piping
- (2) Description and location of nozzles

**7.3.4** Information shall be submitted pertaining to the following:

- (1) The location and function of detection devices
- (2) Operating devices
- (3) Auxiliary equipment
- (4) Electrical circuitry

**7.3.5 Approval of Plans.** Where plans are required, they shall be submitted to the authority having jurisdiction for approval before work starts.

**7.3.6** Where field conditions necessitate any substantial change from the approved plan, the as-installed plans shall be submitted to the authority having jurisdiction for approval.

#### **7.4 Approval of Installations.**

**7.4.1 General.** It shall be verified that the appliances, hoods, and ducts are properly protected with nozzles and positioned in accordance with the manufacturer's design, installation, and maintenance manual.

#### **7.4.2 Mechanical Components.**

**7.4.2.1** It shall be verified that pipe sizes and nozzles are in accordance with the manufacturer's design, installation, and maintenance manual.

**7.4.2.2** It shall be verified that piping supports are securely fastened.

**7.4.3 Appliances.** It shall be verified that the installed appliances are the same and in the same locations as the approved system design.

#### **7.4.4 Piping Integrity Test.**

**7.4.4.1** Prior to the test required by 7.4.4.2, piping shall be physically checked for tightness.

**7.4.4.2\*** A test using nitrogen or dry air shall be performed on the piping network at a pressure not to exceed the normal operating pressure of the extinguishing system.

**7.4.4.2.1** The test shall verify that nitrogen or dry air has discharged out of each nozzle in the system.

**7.4.4.2.2** The method of verification shall be acceptable to the authority having jurisdiction.

**7.4.4.2.3** The piping shall not be hydrostatically tested.

**7.4.5 Labeling.** The labeling of devices with proper designations and instructions shall be verified.

**7.4.6 Building Alarm System.** Where the system is connected to a building alarm system, verification that alarm-sounding or notification devices and remote annunciation devices are functional shall be required.

**7.4.7 Review of Manual Release Devices.** Verification that all manual devices (manual pull stations) are readily accessible and accurately identified shall be required.

**7.4.8 System Operational Tests.** System operational tests shall be performed in accordance with the manufacturer's design, installation, and maintenance manual and include functional tests of the automatic detection system, the manual release devices, the gas shutoff, the shutoff of makeup air supplied internally to a hood, and the electrical power shutdown.

#### **7.4.9 Releasing Control Panel.**

**7.4.9.1** Where a releasing control panel is provided, verification that it is connected to a dedicated circuit and labeled properly shall be required.

**7.4.9.2** Where a releasing control panel is provided, verification that it is readily accessible and restricted from unauthorized personnel shall be required.

#### **7.4.10 Return of System to Operational Condition.**

**7.4.10.1** Verification that each extinguishing agent storage container is reconnected and the system has been returned to its fully operational condition shall be required.

**7.4.10.2** After completion of functional testing, if the system is connected to an alarm-receiving office, the alarm-receiving office and all concerned personnel at the end user's facility shall be notified that the fire system test is complete and that the system has been returned to full-service operational condition.

**7.4.10.3\*** The installing contractor shall complete and sign an acceptance test report acceptable to the authority having jurisdiction.

**7.4.10.4** The owner shall be provided with a copy of the manufacturer's design, installation, and maintenance manual or the owner's manual.

## Chapter 8 Inspection, Maintenance, and Recharging

**8.1 General.** The responsibility for inspection, testing, maintenance, and recharging of the fire protection system shall ultimately be that of the owner(s) of the system, provided that this responsibility has not been transferred in written form to a management company, tenant, or other party.

### 8.2 Owner's Inspection.

**8.2.1** On a monthly basis, inspection shall be conducted in accordance with 8.2.2 and the owner's manual.

**8.2.1.1** The system owner shall maintain the design and installation documents and maintenance manual or owner's manual on the premises and shall make them available for review, upon request, by the authority having jurisdiction.

**8.2.2** At a minimum, the inspection shall include verification of the following:

- (1) The extinguishing system is in its proper location.
- (2) The manual actuators are unobstructed.
- (3) The tamper indicators and seals are intact.
- (4) The maintenance tag or certificate is in place.
- (5) No obvious physical damage or condition exists that might prevent operation.
- (6) The pressure gauge(s), if provided, has been inspected physically or electronically to ensure it is in the operable range.
- (7) The nozzle blowoff caps, where provided, are intact and undamaged.
- (8) The hazard has not changed, including replacement, modification, and relocation of protected equipment.

**8.2.3** If any deficiencies are found, appropriate corrective action shall be taken immediately.

**8.2.3.1** Where the corrective action involves maintenance, it shall be conducted by a service technician as outlined in 8.3.1.

**8.2.4** Personnel making inspections shall keep records for those extinguishing systems that were found to require corrective actions.

**8.2.5** At least monthly, the date the inspection is performed and the initials of the person performing the inspection shall be recorded.

**8.2.6** The records shall be retained for the period between the semiannual maintenance inspections.

### 8.3 Maintenance.

**8.3.1\*** A service technician who performs maintenance on an extinguishing system shall be trained and shall have passed a written or online test that is acceptable to the authority having jurisdiction.

**8.3.1.1** The service technician shall possess a certification document confirming the requirements in 8.3.1 and issued by the manufacturer or testing organization that is acceptable to the authority having jurisdiction.

**8.3.2\*** A service technician who has the applicable manufacturer's design, installation, and maintenance manual and service bulletins shall service the wet chemical fire-extinguishing system at intervals of no more than 6 months as outlined in 8.3.3.

**8.3.3\*** At least semiannually and after any system activation, maintenance shall be conducted in accordance with the manufacturer's design, installation, and maintenance manual.

**8.3.3.1** Maintenance shall include the following:

- (1) A check to see that the hazard has not changed
- (2) An examination of all detectors, the expellant gas container(s), the agent container(s), the releasing devices, the piping, the hose assemblies, the nozzles, the signals, all auxiliary equipment, and the liquid level of all nonpressurized wet chemical containers
- (3) The test outlined in 8.3.3.1.1 to verify that the agent distribution piping is not obstructed

**N 8.3.3.1.1\*** A test using nitrogen or dry air shall be performed on the piping network at a pressure not to exceed the normal operating pressure of the extinguishing system and to verify that nitrogen or dry air has discharged out of each nozzle in the system. [17:10.4.3.1]

**N 8.3.3.1.1.1** The method of verification shall be acceptable to the authority having jurisdiction. [17:10.4.3.2]

**N 8.3.3.1.1.2** Piping shall not be hydrostatically tested. [17:10.4.3.3]

**8.3.3.2\*** Where maintenance of any wet chemical containers reveals conditions such as, but not limited to, corrosion or pitting in excess of the manufacturer's limits; structural damage; fire damage; or repairs by soldering, welding, or brazing, the affected container shall be hydrostatically tested in accordance with Section 8.5 or replaced in accordance with the instructions of the manufacturer or the listing agency.

**8.3.3.3** Where maintenance of any wet chemical system components reveals corrosion or pitting in excess of the manufacturer's limits, structural damage, or fire damage, the affected part(s) shall be replaced.

**8.3.3.4\*** All wet chemical systems shall be tested, which shall include operation of the detection system signals and releasing devices, including manual stations and other associated equipment.

**8.3.3.5** Parts that are found during maintenance that could cause an impairment or failure of operation of the system shall be replaced by listed components as required by Section 4.1 in accordance with the manufacturer's instructions.

**Δ 8.3.3.5.1** Until such repairs are accomplished, the systems shall be tagged as impaired and both the owner or owner's representative responsible for the system and the authority having jurisdiction shall be notified of the impairment by the end of the following business day.

**8.3.3.5.2** When all repairs have been accomplished and the system has been restored to full operating conditions, all previously notified parties shall be informed that the system is in the full operating condition.

**8.3.3.6** The maintenance report, including any recommendations, shall be filed with the owner or with the owner's representative.

**8.3.3.6.1** The owner or owner's representative shall retain all maintenance reports for a period of 1 year after the next maintenance of that type required by the standard.

**8.3.3.7\*** Each wet chemical system shall have a tag or label securely attached, indicating the month and year the maintenance is performed and identifying the person performing the service. Only the current tag or label shall remain in place.

**8.3.4\*** Fixed temperature-sensing elements of the fusible metal alloy type or glass bulb type shall be replaced at least semiannually from the date of installation or more frequently, if necessary, and shall be destroyed when removed.

**8.3.4.1\*** Replacement fixed temperature-sensing elements shall be listed and shall be the same temperature ratings as the ones being replaced unless temperature readings dictate a need for a change.

**8.3.4.2** The year of manufacture and the date of installation of the fixed temperature-sensing element shall be marked on the system inspection tag, and the tag shall be signed or initialed by the installer.

**8.3.5** Fixed temperature-sensing elements other than the fusible metal alloy type shall be permitted to remain continuously in service, provided they are inspected and cleaned or replaced, if necessary, in accordance with the manufacturer's instructions, every 12 months or more frequently to ensure proper operation of the system.

**8.3.5.1** At a minimum, maintenance of restorable-type heat detectors shall include the following:

- (1) A visual inspection to determine whether there is damage to the detector or buildup of foreign debris
- (2) An operational/functional test in accordance with the detector manufacturer's testing instructions
- (3) A calibration verification test, if applicable, in accordance with the detector manufacturer's instructions

**8.3.5.2** Nonrestorable heat detectors shall be functionally tested in accordance with the manufacturer's instructions.

**8.3.5.3** Heat detectors and all associated wiring that show signs of fire damage shall be tested in accordance with the manufacturer's instructions and replaced if necessary.

**8.3.6 Expellant Gas.** The manufacturer's design, installation, and service manual shall provide the method and instructions for checking the amount or the pressure of expellant gas to ensure that it is sufficient for proper operation of the system.

**8.3.7 Access.** System access for inspection or maintenance that requires opening panels in fire chases, ducts, or both shall not be permitted while any appliance(s) or equipment protected by that system is in operation.

## 8.4 Recharging.

**8.4.1\* Recharge.** After any discharge or if insufficient charge is noted during an inspection or maintenance procedure, the following procedures shall be conducted in accordance with the manufacturer's design, installation, and maintenance manual:

- (1) The system shall be recharged.
- (2) The system shall be placed in the normal operating condition.
- (3) Following a discharge, the piping shall be flushed and blown out with dry air or nitrogen in accordance with the manufacturer's design, installation, and maintenance manual.

**8.4.2\* Storage.** Recharging supplies of wet chemical shall be stored in the original closed shipping container supplied by the manufacturer.

**8.4.2.1** These containers shall not be opened until the system is recharged.

**8.4.2.2** Wet chemical supplies shall be maintained within the manufacturer's specified storage temperature range.

## 8.5\* Hydrostatic Testing.

**Δ 8.5.1** The following parts of wet chemical extinguishing systems shall be subjected to a hydrostatic pressure test at intervals not exceeding 12 years:

- (1) Wet chemical containers
- (2) Auxiliary pressure containers
- (3) Hose assemblies

**N 8.5.1.1** Parts of wet chemical extinguishing systems that meet the following criteria shall be exempt from the hydrostatic pressure test requirement of 8.5.1:

- (1) Auxiliary pressure containers not exceeding 2 in. (0.05 m) outside diameter and less than 2 ft (0.6 m) in length
- (2) Auxiliary pressure containers bearing the DOT "3E" marking

**8.5.2** Wet chemical containers, auxiliary pressure containers, and hose assemblies shall be subjected to a hydrostatic test pressure equal to the marked factory test pressure or the test pressure specified in the manufacturer's design, installation, and maintenance manual.

**8.5.2.1** No leakage, rupture, or movement of hose couplings shall be permitted.

**8.5.2.2** The pressure in a hydrostatic test of a cylinder shall be maintained for a minimum of 30 seconds, but for no less time than is required for complete expansion of the cylinder and to complete the visual examination of the cylinder.

**8.5.2.3\*** Prior to being refilled or transported, in accordance with DOT or TC requirements, containers bearing DOT or TC markings shall be retested or replaced in accordance with the appropriate DOT or TC requirements.

**8.5.3** Wet chemical agent removed from the containers prior to hydrostatic testing shall be discarded.

**8.5.4** To protect the hazard during hydrostatic testing, if there is no connected reserve, alternative protection acceptable to the authority having jurisdiction shall be provided.

## 8.6 Service Collar.

**8.6.1** Each system container that has undergone maintenance that includes internal examination or has been recharged shall have a verification-of-service collar located around the neck of the container. [17:11.3.1.3.5]

**8.6.2** The collar shall not interfere with the operation of the system container discharge valve. [17:11.3.1.3.6]

**8.6.3** The collar shall include the following information:

- (1) Month and year the service was performed, indicated by a perforation such as done by a hand punch

(2) Name of the agency performing the maintenance or recharge  
[17:11.3.1.3.7]

▲ **8.6.4** Cartridge- or cylinder-operated wet chemical system containers shall not be required to comply with 8.6.1 through 8.6.3.

**8.6.5** The collar shall be a single circular piece of uninterrupted material forming a hole of a size that does not permit the collar assembly to move over the neck of the container unless the valve is completely removed.

## 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.1.1** The wet chemical systems described in this standard are designed to discharge wet chemical from fixed nozzles and piping by means of expellant gas. The intent of the standard is to present the design considerations applicable to these systems.

The wet chemicals produced by various manufacturers usually are not identical in all characteristics, and each manufacturer designs equipment for use with a specific wet chemical. Therefore, system design principles applicable to the products of one manufacturer are not applicable to the products of another manufacturer. As a result, it is not practical to include system design details as part of this standard. However, such system design details are an integral part of the listing of the systems and are included in the manufacturers' design, installation, and maintenance manuals.

**A.1.3** See Annex B for recommendations for installation of vehicle fire suppression system applications.

**A.1.6.1.1** See IEEE/ASTM SI 10, *American National Standard for Metric Practice*.

**A.1.7** Although training and qualification might be available elsewhere, it is recommended that such training and qualification be performed by the manufacturer of the equipment being installed or serviced or by the manufacturer's agent.

It might be necessary for many of those charged with the purchasing, inspecting, testing, approving, operating, and maintaining of this equipment to consult an experienced fire protection engineer competent in this field, in order to discharge their duties effectively.

**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.3.2.3 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.3.3.7 Inspection.** This is done by verifying that the system is in place, that it has not been activated or tampered with, and that there is no obvious physical damage or condition to prevent operation.

**A.3.3.10.1 Manufacturer's Design, Installation, and Maintenance Manual.** It contains a description of the hazards that can be protected as well as the limitations of the wet chemical extinguishing system. This manual also requires that the wet chemical extinguishing system be designed, installed, inspected, maintained, and serviced in accordance with NFPA 17A.

■ **A.3.3.11 Mobile Equipment.** Mobile equipment is intended to include vehicles.

**A.3.3.12 Operating Devices.** Operating devices include "actuating devices," which initiate operation (automatic detection devices or systems), and manual pulls or strike buttons that respond to the actuation (release mechanisms, shutoff devices, alarms, and auxiliary equipment).

■ **A.3.3.14 Pipe.** Wherever *pipe* is used in this standard, it is understood to also mean *tube*. [17, 2021]

**A.3.3.15 Pre-Engineered Systems.** Pre-engineered systems should be listed by a testing laboratory. The maximum and minimum pipe lengths and the number of fittings should be permitted to be expressed in equivalent feet (meters) of pipe. The hazards protected by these systems should be limited as to type and size based on actual fire tests. Limitations on hazards that are permitted to be protected by these systems are contained in the manufacturer's design, installation, and maintenance manual, which is part of the listing of the system.

**A.3.3.24 Wet Chemical.** The terms *liquid agent* and *wet agent* are used interchangeably with *wet chemical*.

**A.4.2** Fixed temperature-sensing element brackets should be installed so that the brackets do not shield the detector from the heat of the cooking appliances.

**A.4.3.1.4** Stamping part numbers into the body of the nozzle is an acceptable method of meeting the identification requirement.

**A.4.4.3.6** NFPA 10, Annex A, provides recommendations for placards. [96:A.10.2.2]

**A.4.5.1** Pre-engineered systems do not need calculations for flow rate, pressure drop, and nozzle pressure, since they have been tested for fire extinguishment with minimum and maximum piping limitations and minimum and maximum temperature limitations. These limitations have been verified by testing laboratories and are published in the manufacturer's design, installation, and maintenance manual. Therefore, it is not necessary for a professional engineer or architect to seal the design of these systems.

**A.4.5.4** Piping and fittings should be installed in accordance with good commercial practices. Care should be taken to avoid possible restrictions due to foreign matter, faulty fabrication, or improper installation. The following is considered a good practice:

- (1) Prior to assembly, pipe should be reamed and cleaned internally by means of swabbing, using a suitable nonflammable cleaner.
- (2) Once piping is assembled and prior to nozzle installation, the entire piping system should be blown out with nitrogen or dry air.
- (3) The piping system should be securely supported and should not be subject to mechanical, chemical, or other damage.
- (4) All piping should be installed in pipe hangers or brackets and fastened to rigid surfaces.
- (5) Piping mounting brackets, hangers, and support fixtures should be installed in a manner that ensures nozzles are properly aligned and that prevents nozzles from being moved out of alignment.
- (6) A union should be installed between the extinguishing agent storage container and the supply line.

**A.4.6.1** A wet chemical solution generally includes, but is not limited to, a potassium carbonate-based, potassium acetate-based, potassium citrate-based solution or a combination thereof and is mixed with water to form an alkaline solution capable of being discharged through piping or tubing when under expellant gas pressure.

The solution's effect on fires in common cooking oils and fats is to combine with these materials to form a vapor suppression foam that floats on a liquid surface, such as in deep fat fryers, effectively preventing re-ignition of the grease.

**Extinguishing Mechanisms.** Wet chemical solution applied to flammable liquid surfaces results in the rapid spread of a vapor-suppressing foam on the fuel surface. The foam extinguishes and secures the flame by forming a barrier between the liquid fuel and oxygen. This barrier excludes oxygen from the fuel source and eliminates the release of flammable vapors from the fuel surface. The cooling effect of this solution also lowers the temperature of the flammable fuel, further decreasing fuel vapor release.

**CAUTION:** Wet chemical, when discharged, is in the form of a fine spray. Some of the agent can settle on surrounding surfaces and can have a corrosive effect on electrical components and cooking equipment. Prompt cleanup will minimize staining or corrosion.

**A.4.9.1** Contaminants and foreign materials can affect the extinguishing agent distribution due to a reduction in the effective nozzle orifice area.

**A.5.1.2** Pre-engineered systems protect hazards posed by the duct, plenum, and cooking surfaces of appliances and are defined by the manufacturer's design, installation, and maintenance manual. Fires that start outside the protected area might not be extinguished by the pre-engineered system.

**A.5.2.1.10** Mounting location is recommended to be a minimum of 10 ft (3 m) and a maximum of 20 ft (6 m) from the protected hood. [96:A.10.5.1.1]

**A.5.2.1.10.2** Section 10.2 of NFPA 96 specifies that the automatic fire-extinguishing system is the primary protection for commercial cooking operations. It also requires that signage be provided at portable fire extinguishers stating that "the fire protection system shall be activated prior to using the fire extinguisher." The correct response to a fire, particularly one involving a deep-fat fryer that contains a large quantity of hot grease, requires that the source of heat energy, whether electric or gas, be shut down so that the grease can cool. The fire-extinguishing system does that automatically on activation. Although a portable fire extinguisher might initially knock down the fire, it does not shut down the source of heat. Unless the grease cools below its autoignition temperature, the fire is likely to resume.

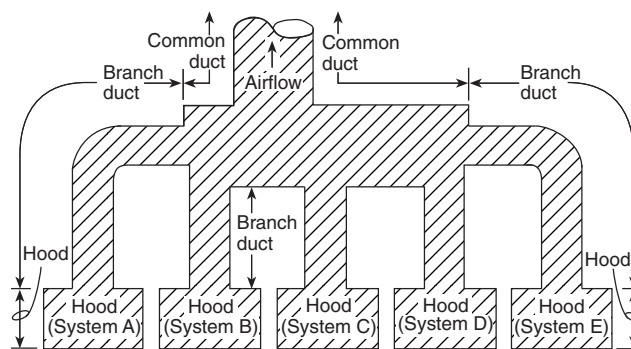
**A.5.2.1.10.3** Installing a guard should reduce the likelihood of an unwanted discharge of the fire-extinguishing system. [96:A.10.5.1.3]

**A.5.4** The phrase "wet chemical containers and expellant gas assemblies" is understood to include stored pressure assemblies.

**A.5.5** All discharge nozzles should be located, installed, supported, and protected so that they are not subject to mechanical, environmental, or other conditions that could render them inoperative.

**A.5.6.2.1(1)** Separate cooking appliance, hood, and branch duct systems are interconnected so that they operate simultaneously.

Scenario: A fire is detected by System A. System A, protecting cooking appliances, a hood, and a branch duct, is actuated. Simultaneously, Systems B, C, D, and E are also actuated. Shut-down of all appliances is in accordance with 4.4.4. [See Figure A.5.6.2.1(1).]



**FIGURE A.5.6.2.1(1) Simultaneous Operation of All Systems.**

**A.5.6.2.1(2)** Simultaneous operation of a single cooking appliance, hood, or branch duct system and the system protecting the entire common exhaust duct should occur as follows.

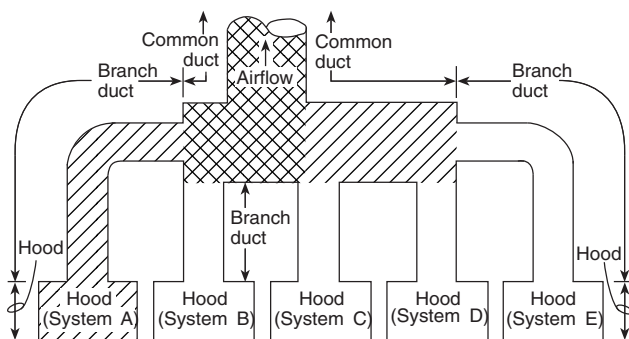
Scenario (a): System 1, protecting the entire common exhaust duct, is separate from Systems A, B, C, D, and E. A fire is detected in System A. System A and System 1 are actuated simultaneously. Shutdown of all appliances protected by systems A, B, C, D, and E is in accordance with 4.4.4. [See Figure A.5.6.2.1(2)(a).]

Scenario (b): System E also provides protection for the entire common exhaust duct. A fire is detected in System C. System C and System E actuate simultaneously. Shutdown of all appliances protected by systems A, B, C, D, and E is in accordance with 4.4.4. [See Figure A.5.6.2.1(2)(b).]

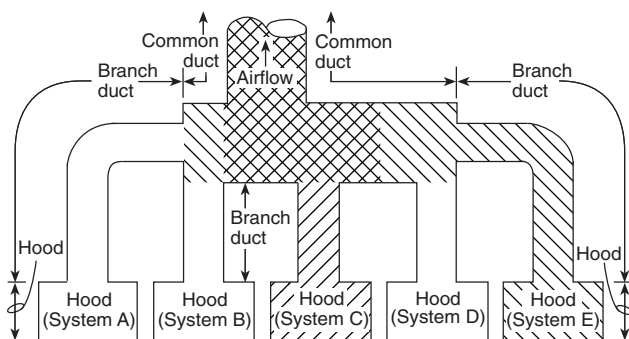
Scenario (c): System E also provides protection for the entire common exhaust duct. A fire detected in System E results in the actuation of System E only. Shutdown of all appliances protected by Systems A, B, C, D, and E is in accordance with 4.4.4. [See Figure A.5.6.2.1(2)(c).]

**A.5.6.3** Examples of ignition sources include, but are not limited to, in-duct electrostatic precipitators and in-line fans, but not external spark arresters or terminal exhaust fans.

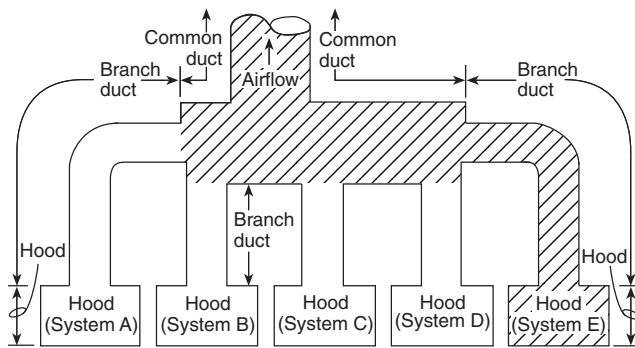
**A.5.6.4** The fire-extinguishing system does not require re-evaluation where the cooking appliances are moved for the purposes of maintenance and cleaning, provided the appliances are returned to their approved design locations prior to cooking operations and any disconnected fire-extinguishing system nozzles attached to the appliances are reconnected in



**FIGURE A.5.6.2.1(2)(a)** Simultaneous Operation of a Single Cooking Appliance, Hood, or Branch Duct System and the System Protecting the Entire Common Exhaust Duct.



**FIGURE A.5.6.2.1(2)(b)** Simultaneous Operation of Two Systems in Which One Also Provides Common Duct Protection.



**FIGURE A.5.6.2.1(2)(c)** Independent Operation of a System That Protects a Hood and the Common Duct.

accordance with the manufacturer's design, installation, and maintenance manual. Wheel chocks that can be fastened to the floor should be installed to ensure that an appliance with casters is returned to the protected position relative to the fire-extinguishing system discharge nozzle(s).

**A.7.1** One of the first steps in the design and installation of a fire-extinguishing system should be to maintain complete and accurate records. Establishment of a job file will provide a means of documentation. A job file should contain all drawings, sketches, checklists, notes, maintenance agreements, and correspondence related to the installation from start to finish. Photographs are encouraged and should include a wide shot that shows the location of all appliances in the protected area at the time of installation. The photographs, as well as any checklists, drawings, or sketches, should be signed and dated.

**A.7.2** Manufacturers of fire suppression system equipment should make available the manufacturer's design, installation, and maintenance manual and product safety bulletins to the authority having jurisdiction upon request.

**A.7.4.4.2** The test is intended to verify that flow is continuous and that the piping and nozzles are reasonably unobstructed. The nitrogen or dry air should be introduced into the piping network at the extinguishing agent container connection using a test cylinder or other suitable source. The quantity of nitrogen or dry air used for this test should be sufficient to verify that each nozzle is unobstructed. Nozzle flow should be verified at each discharge nozzle.

**A.7.4.10.3** Figure A.7.4.10.3 is an example of an acceptance test report.

**A.8.3.1** A reasonable program for qualification of service technicians is for an individual to pass a written or online examination. The test should contain a reasonable number of questions to challenge the individual's knowledge of the subject matter.

**A.8.3.2** It is recommended that system maintenance personnel be certified as outlined in 8.3.1. It is standard industry practice to provide expiration dates on certificates.

**A.8.3.3** Regular service contracts are recommended.

## WET CHEMICAL SYSTEM ACCEPTANCE TEST REPORT

### Property Information

Building name: \_\_\_\_\_  
 Address: \_\_\_\_\_  
 Building owner: \_\_\_\_\_  
 Address: \_\_\_\_\_  
 Phone/Fax/E-mail: \_\_\_\_\_

### Designer/Installer Information

Company name: \_\_\_\_\_  
 Address: \_\_\_\_\_  
 Contact person: \_\_\_\_\_  
 Phone/Fax/E-mail: \_\_\_\_\_

Description of hazard protected: \_\_\_\_\_  
 \_\_\_\_\_

System manufacturer/model: \_\_\_\_\_

System Check or Test	Results
Installation in accordance with approved plans, where required, and manufacturer's design, installation, and maintenance manual	
Piping test (7.4.4)	
Proper labeling (7.4.5)	
Proper alarm operation (7.4.6)	
Manual release accessibility (7.4.7)	
Releasing control panel (7.4.9)	
Automatic detection & manual release (7.4.8)	
System properly charged and left in normal "set" condition (7.4.10)	
Manual left with owner (7.4.10.4)	
Date system left in service:	

### Test Witnessed By:

Owner/Authorized agent \_\_\_\_\_ Title \_\_\_\_\_ Date \_\_\_\_\_

Installing contractor \_\_\_\_\_ Title \_\_\_\_\_ Date \_\_\_\_\_

Additional comments:

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**▲ FIGURE A.7.4.10.3 Sample Wet Chemical System Acceptance Test Report.**

**N A.8.3.3.1.1** The test is intended to verify that flow is continuous and that the piping and nozzles are reasonably unobstructed. The nitrogen or dry air should be introduced into the piping network at the extinguishing agent container connection using a test cylinder or other suitable source. The quantity of nitrogen or dry air used for this test should be sufficient to verify that each nozzle is unobstructed. Nozzle flow should be verified at each discharge nozzle. [17:A.10.4.3.1]

**A.8.3.3.2** The hydrostatic testing of wet chemical containers should follow the applicable procedures outlined in Section 8.5.

**A.8.3.3.4** A discharge of the wet chemical normally is not part of this test.

**A.8.3.3.7** Under special circumstances or when local requirements are in effect, additional information can be desirable or required.

**A.8.3.4** The date of manufacture marked on fusible metal alloy temperature-sensing elements does not limit when they can be used. The intent of 8.3.4 is to require replacement of fusible metal alloy temperature-sensing elements that have been installed for up to 6 months in environments subjecting them to contaminant loading, such as grease in restaurant hoods and ducts, that could adversely affect their proper operation.

**A.8.3.4.1** Fixed temperature-sensing elements are manufactured to operate at predetermined temperatures, releasing tension on the detection cable and causing the system to discharge. Fixed temperature-sensing elements are typically listed with the temperature ratings shown in Table A.8.3.4.1.

It is important to select fixed temperature-sensing elements that respond in a timely manner during a fire but that do not result in an unwanted discharge. It is also important to periodically take a temperature reading at each installation location to ensure the replacement devices are appropriate for each location. Improper selection of replacement devices could result in an unwanted discharge or a delayed response.

**A.8.4.1** Wet chemical solutions normally have no lasting significant effects on the skin, respiratory system, or clothing. They can produce mild, temporary skin irritation after prolonged skin exposure, but symptoms usually disappear when contact is eliminated. Irritation of the eyes should be treated by flushing with tap water for 15 minutes or longer. Any condition of prolonged irritation should be referred to a physician for treatment.

**Table A.8.3.4.1 Typical Temperature Ratings of Fixed Temperature-Sensing Elements**

Temperature Class	Maximum Ambient Temperature		Temperature Rating	
	°F	°C	°F	°C
Low	90	32	125–130	52–54
Ordinary	100	38	135–170	57–77
Intermediate	150	66	175–225	79–107
High	225	107	250–300	121–149
Extra high	300	149	325–375	163–191
Very extra high	375	191	400–475	204–246
Ultra high	475	246	500–575	260–302

Treatment of skin irritation due to exposure to wet chemical is best handled by flushing with water.

These systems are investigated to determine that they do not splash burning grease when installed in accordance with the manufacturer's design, installation, and maintenance manual. It is known that potassium carbonate is moderately irritating to the skin and eyes and that repeated skin contact can lead to dermatitis, but this is based on concentrations higher than those used in wet chemical extinguishing system units.

**Δ A.8.4.2** The characteristics of the system depend on the composition of the wet chemical solution, the type of expellant gas, and other factors; therefore it is imperative to use the wet chemical provided by the manufacturer of the system and the type of expellant gas specified by the manufacturer of the system.

Systems are designed on the basis of the flow and extinguishing characteristics of a specific formulation of wet chemical.

Storage of wet chemical solution in containers other than those supplied by the manufacturer can result in agent contamination or deterioration and confusion regarding its identity.

**A.8.5** DOT- or TC-marked cylinders can be required to be subjected to more frequent testing.

**A.8.5.2.3** DOT- or TC-marked containers installed in a system not under the jurisdiction of DOT or TC are not required to follow DOT or TC requirements as long as they remain in operation.

## Annex B Vehicle Fire Suppression Systems

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

**B.1** Only pre-engineered wet chemical systems, including detection systems that have been listed for such use, should be used for vehicle fire suppression systems and should not include cooking appliances inside the vehicle.

**B.2** Compartments or areas that could be subject to fire should be protected in accordance with the manufacturer's design, installation, and maintenance manual.

**B.3** Each protected compartment or area should be provided with a listed fire detection device specified in the manufacturer's design, installation, and maintenance manual to automatically actuate the extinguishing system.

**B.4** Manual actuation should be permitted to be provided only if acceptable to the authority having jurisdiction.

**B.5** Only the flexible hose and hose fittings specified in the manufacturer's design, installation, and maintenance manual should be used.

**B.6** All discharge nozzles should be located to minimize the likelihood of damage or misalignment and within the limitations and constraints of the manufacturer's design, installation, and maintenance manual.

**B.7** Location of agent containers, expellant gas cartridges or cylinders, and a manual actuator station(s) should be appropriate to each application, protected against physical damage, and accessible.

**B.8** At least one easily accessible manual actuator or operating device should be provided for use by the equipment operator.

**B.9** An additional manual actuator or operating device should be located, if practical, so that it is in the path of egress and operable from the ground level.

**B.10** If the system is provided with a discharge delay device, both audible and visual alarms should be provided to warn of impending system discharge.

**B.11** In the event of system discharge, the vehicle being protected should not be returned to service until the system is recharged and operational.

### **Annex C Systems for Protection of Residential Stoves When Used in Other than Commercial Cooking Operations**

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

▲ **C.1** Only pre-engineered wet chemical extinguishing systems, including piping and detection, that have been listed by a nationally recognized testing laboratory to UL 300, *Fire Testing of Fire Extinguishing Systems for Protection of Commercial Cooking Equipment*, or UL 300A, *Outline of Investigation for Extinguishing System Units for Residential Range Top Cooking Surfaces*, should be installed to protect residential stoves where used in other than commercial cooking operations.

**C.2** The area to be protected should be the cook top surface of a residential stove within the dimensions listed in the manufacturer's design, installation, and maintenance manual.

**C.3** Each protected cook top should be provided with a listed fire detection device or devices specified in the manufacturer's design, installation, and maintenance manual to automatically actuate the extinguishing system.

**C.4** Manual actuation should be provided in the path of egress as per the manufacturer's design, installation, and maintenance manual.

**C.5** Only the type of hose/pipe and fittings listed in the manufacturer's design, installation, and maintenance manual and provided as part of the pre-engineered extinguishing system should be used.

**C.6** All discharge nozzles should be located to minimize damage or misalignment and within the limitations and constraints of the manufacturer's design, installation, and maintenance manual.

**C.7** The location of the agent container should be within the limitations and constraints of the manufacturer's design, installation, and maintenance manual and in accordance with Section 5.4.

**C.8** The system should shut off the fuel (gas/electric) to the residential stove being protected.

**C.9** The system should be provided with an audible or visual indicator to show that the system has operated, that personnel response is needed, and that the system is in need of recharge.

**C.10** The extinguishing system should be connected to the fire alarm system, if provided, in accordance with the requirements of NFPA 72 so that the actuation of the extinguishing system will sound the fire alarm.

### **Annex D Informational References**

**D.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.

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

NFPA 10, *Standard for Portable Fire Extinguishers*, 2018 edition.

NFPA 72<sup>®</sup>, *National Fire Alarm and Signaling Code*<sup>®</sup>, 2019 edition.

NFPA 96, *Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations*, 2021 edition.

**D.1.2 Other Publications.**

**D.1.2.1 ASTM Publications.** ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959.

IEEE/ASTM SI 10, *American National Standard for Metric Practice*, 2016.

▲ **D.1.2.2 UL Publications.** Underwriters Laboratories Inc., 333 Pfingsten Road, Northbrook, IL 60062-2096.

UL 300, *Fire Testing of Fire Extinguishing Systems for Protection of Commercial Cooking Equipment*, 2019.

UL 300A, *Outline of Investigation for Extinguishing System Units for Residential Range Top Cooking Surfaces*, 2006.

**D.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.

**D.2.1 U.S. Government Publications.** U.S. Government Publishing Office, 732 North Capitol Street, NW, Washington, DC 20401-0001.

Title 49, Code of Federal Regulations, Parts 170–190.

**D.3 References for Extracts in Informational Sections.**

NFPA 17, *Standard for Dry Chemical Extinguishing Systems*, 2021 edition.

NFPA 96, *Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations*, 2021 edition.