# NFPA® 17A

# Standard for Wet Chemical Extinguishing Systems

## 2009 Edition


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

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**NFPA® 17A**

**Standard for**

# Wet Chemical Extinguishing Systems

**2009 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, and acted on by NFPA at its June Association Technical Meeting held June 2–5, 2008, in Las Vegas, NV. It was issued by the Standards Council on July 24, 2008, with an effective date of September 5, 2008, and supersedes all previous editions.

This edition of NFPA 17A was approved as an American National Standard on September 5, 2008.

## Origin and Development of NFPA 17A

The Dry Chemical Extinguishing Systems Committee was activated in 1952. 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 Committee was asked to assume responsibility for the project. In May 1983, the Dry Chemical Extinguishing Systems 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 1990 edition was a partial revision of the 1986 edition.

The 1998 edition of this 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.

The changes to the 2009 edition consist of clarification of inspection, maintenance, and service requirements and qualifications for service personnel.

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*This list represents the membership at the time the Committee was balloted on the final text of this edition. Since that time, changes in the membership may have occurred. A key to classifications is found at the back of the document.*

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 the design, installation, operation, testing, maintenance, and use of dry and wet chemical extinguishing systems for fire protection.

## Contents

# NFPA 17A

## Standard for

# Wet Chemical Extinguishing Systems

## 2009 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.

Changes other than editorial are indicated by a vertical rule beside the paragraph, table, or figure in which the change occurred. These rules are included as an aid to the user in identifying changes from the previous edition. Where one or more complete paragraphs have been deleted, the deletion is indicated by a bullet (•) between the paragraphs that remain.

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 B. 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 B.

## 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.

**1.3 Application.** Minimum requirements are specified for restaurant, commercial, and institutional hoods, plenums, ducts, and associated cooking appliances.

**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 English units as given in this standard is followed by a parenthetical equivalent value in metric units, the primary English 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 English quantity by the conversion factor and then round the result if necessary to the appropriate number of significant digits.

**1.7* Qualifications.** Only persons properly trained shall be considered competent to design, install, and service pre-engineered 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®*, 2008 edition.
*NFPA 72®, National Fire Alarm Code®*, 2007 edition.
NFPA 96, *Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations,* 2008 edition.

**2.3 Other Publications.**

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

ANSI/UL 300, *Fire Testing of Fire Extinguishing Systems for Protection of Commercial Cooking Equipment*, 2005.

**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,* 2009 edition.
NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems,* 2008 edition.
*NFPA 72®, National Fire Alarm Code®*, 2007 edition.
NFPA 820, *Standard for Fire Protection in Wastewater Treatment and Collection Facilities,* 2008 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.** A document, the main text of which contains only mandatory provisions using the word "shall" to indicate requirements and which is in a form generally suitable for mandatory reference by another standard or code or for adoption into law. Nonmandatory provisions shall be located in an appendix or annex, footnote, or fine-print note and are not to be considered a part of the requirements of a standard.

**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.

**3.3.5 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.

**3.3.6* 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**, 2008]

**3.3.7 Liquid Agent.** See 3.3.22, Wet Chemical.

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

**3.3.9 Manual.**

**3.3.9.1*** ***Manufacturer's Listed Installation and Maintenance Manual.*** The pamphlet referenced as part of the listing of the wet chemical extinguishing system.

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

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

**3.3.11 Operation.**

**3.3.11.1** ***Automatic Operation.*** Operation without human intervention. This operation includes, but is not limited to, heat, rate of heat rise, smoke, or pressure change. [**25,** 2008]

**3.3.11.2** ***Manual Operation.*** Operation of a system or its components through human action. [**25,** 2008]

**3.3.12 Pipe.** Circular conduit for conveying the extinguishing agent to the discharge nozzle(s). Wherever *pipe* is used in this standard, it shall be understood also to mean *tube*. [**17,** 2009]

**3.3.13* Pre-Engineered Systems.** Those having predetermined flow rates, nozzle pressures, and quantities of extinguishing agent. These systems have the specific pipe size, maximum and minimum pipe lengths, flexible hose specifications, number of fittings, and number and types of nozzles prescribed by a testing laboratory. The maximum and minimum pipe lengths and the number of fittings shall be permitted to be expressed in equivalent feet of pipe. The hazards protected by these systems are specifically limited as to type and size by a testing laboratory, based on actual fire tests. Limitations on hazards that are permitted to be protected by these systems and piping and nozzle configurations are contained in the manufacturer's listed installation and maintenance manual, which is part of the listing of the system.

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

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

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

**3.3.17 Signal.** A status indication communicated by electrical or other means. [*72,* 2007]

**3.3.18 Trained.** One who has undergone the instructions necessary to safely design, install, and reliably perform the maintenance and recharge service in accordance with the manufacturer's listed manual. [**17**, 2009]

**3.3.19 Transport Canada (TC).** Has jurisdiction over design and transportation of compressed gas cylinders and cartridges.

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

**3.3.21 Wet Agent.** See 3.3.22, Wet Chemical.

**3.3.22* 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 listed installation and maintenance manual, or alternate components that are listed for use with the specific extinguishing system, shall be used.

**4.2 Detectors.** Detectors shall be listed or approved devices that are capable of detecting 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.

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

**4.3.1.6** 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.

**4.4.1.1** Operating devices shall be designed for the service they will encounter and shall not be rendered inoperative or susceptible to accidental operation.

**4.4.1.2** Operating devices shall be designed to function properly through a minimum temperature range from 32°F to 120°F (0°C to 49°C) or marked to indicate their temperature limitations.

**4.4.2 Manual Actuators.**

**4.4.2.1** Manual actuators shall not require a force of more than 40 lbs (178 N).

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

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

**4.4.2.4** These instructions shall be permitted to include the use of pictographs and shall have lettering at least ¼ in. (6.35 mm) in height. *(See 5.2.1.4.)*

**4.4.2.5** All remote manual operating devices shall be identified as to the hazard they protect.

**4.4.3 Shutoff Devices.**

**4.4.3.1** On activation of any cooking equipment fire-extinguishing system, all sources of fuel and electric power that produce heat to all equipment protected by the system shall be shut down.

**4.4.3.2** Gas appliances not requiring protection but located under the same ventilation equipment shall also be shut off.

**4.4.3.3** Steam supplied from an external source shall not be required to be shut down.

**4.4.3.4** Solid fuel cooking operations shall not be required to shut down.

**4.4.3.5** Exhaust fans and dampers shall not be required to be shut down on system actuation as the systems have been tested under both zero- and high-velocity flow conditions.

**4.4.3.6** If the expellant gas is used to pneumatically operate these devices, the gas shall be taken prior to its entry into the wet chemical tank.

**4.4.3.7** Shutoff devices shall require manual resetting prior to fuel or power being restored.

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

**4.5.1* General.** 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 listed installation and maintenance manual.

**4.6 Wet Chemical.**

**4.6.1*** The type of wet chemical used in the system shall be listed for the particular system and recommended by the manufacturer of the wet chemical system.

**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.

## Chapter 5 System Requirements

**5.1 General.**

**5.1.1** Wet chemical fire-extinguishing systems shall comply with ANSI/UL 300.

**5.1.2 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

**5.1.3 Applications.** The manufacturer's listed installation and maintenance manual shall be consulted for system limitations and applications for which wet chemical extinguishing systems are considered satisfactory protection.

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

**5.1.5** 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 to protect all hazards that can be simultaneously involved

**5.1.5.1** 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.

**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** When a listed releasing mechanism is used employing a single line for mechanical detection and remote manual control, the remote manual control shall be installed inline, prior to all detection devices, so malfunction of one does not impede operation of the other.

**5.2.1.3** Automatic detection and system actuation shall be in accordance with the manufacturer's listed 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** An audible or visual indicator shall be provided to show that the system has operated, that personnel response is needed, and that the system is in need of recharge.

**5.2.1.9** The extinguishing system shall 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 as well as provide the function of the extinguishing system.

**5.2.1.10*** A readily accessible means for manual actuation shall be located in a path of egress. When manual actuation is used for cooking-related protection, the manual actuation device shall be installed no more than 48 in. (1200 mm), and no less than 42 in. (1067 mm), above the floor and shall clearly identify the hazard protected.

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

**5.2.1.12** The means for mechanical actuator(s) shall be mechanical and shall not rely on electrical power for actuation.

**5.2.1.13** Electrical power shall be permitted to be used for manual actuation if a reserve power supply is provided or if supervision is provided as per Section 5.3.

**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 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 monitoring and a reserve power supply shall not be required.

**5.3.3** Where fixed automatic fire-extinguishing systems are interconnected or interlocked with the cooking equipment power sources so that if the fire-extinguishing system becomes inoperable due to power failure, all sources of fuel and heat to all cooking appliances serviced by that hood shall automatically shut off, and electrical power monitoring shall not be required.

**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 listed 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 but not where they will be exposed to the fire.

**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 listed 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 5.1.5 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) shall be responsible for the protection of a common exhaust duct(s) 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** A single listed detection device shall be permitted for more than one appliance when installed in accordance with the system's listing.

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

**5.6.1.6** A fusible link or heat detector shall be provided above each protected cooking appliance and in accordance with the extinguishing system manufacturer's listing.

**5.6.1.6.1** 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 5.6.1.6.

**5.6.1.7** 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 4.4.3.

**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 recommendations and that is approved by the authority having jurisdiction.

**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.

## Chapter 6 Plans and Acceptance Tests

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

**6.1.1** 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 listed installation and maintenance manual, or alternate suppliers' components that are listed for use with the specific extinguishing system, shall be used.
(4) Identification of special auxiliary devices acceptable to the system manufacturer and the authority having jurisdiction.
(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.

**6.2* 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.

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

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

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

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

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

**6.3.4** 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

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

**6.3.6** 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.

**6.4 Approval of Installations.** The completed system shall be tested by trained personnel as required by the manufacturer's listed installation and maintenance manual.

**6.4.1** The tests shall determine that the system has been properly installed and will function as intended.

**6.4.2*** Where required by the authority having jurisdiction, the approval tests shall include a discharge test, in accordance with the manufacturer's listed installation manual, to verify that the system is properly installed and functional.

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

## Chapter 7 Inspection, Maintenance, and Recharging

**7.1 General.**

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

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

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

**7.1.2 Expellant Gas.** A method and instructions shall be provided for checking the amount or the pressure of expellant gas to ensure that it is sufficient for the proper operation of the system.

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

**7.1.4* 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 listed installation and maintenance manual:

(1) The system shall be properly recharged.
(2) The system shall be placed in the normal operating condition.
(3) The piping shall be flushed in accordance with the manufacturer's recommended instructions (only following a discharge).

**7.2 Owner's Inspection.**

**7.2.1** On a monthly basis, inspection shall be conducted in accordance with the manufacturer's listed installation and maintenance manual or the owner's manual.

**7.2.2** At a minimum, this "quick check" or 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, shall be inspected physically or electronically to ensure it is in the operable range.
(7) The nozzle blowoff caps, where provided, are intact and undamaged.
(8) Neither the protected equipment nor the hazard has not been replaced, modified, or relocated.

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

**7.2.3.1** Where the corrective action involves maintenance, it shall be conducted by a service technician as outlined in 7.3.1.

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

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

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

**7.3 Maintenance.**

**7.3.1*** 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.

**7.3.1.1** The service technician shall possess a certification document confirming the requirements in 7.3.1 and issued by the manufacturer or testing organization that is acceptable to the authority having jurisdiction.

**7.3.2*** A service technician who has the applicable manufacturer's listed installation and maintenance manual and service bulletins shall service the wet chemical fire-extinguishing system at intervals no more than 6 months apart as outlined in 7.3.3.

**7.3.3*** At least semiannually, maintenance shall be conducted in accordance with the manufacturer's listed installation and maintenance manual.

**7.3.3.1** 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), releasing devices, piping, hose assemblies, nozzles, signals, all auxiliary equipment, and the liquid level of all nonpressurized wet chemical containers
(3)*Verification that the agent distribution piping is not obstructed

**7.3.3.2*** Where semiannual maintenance of any wet chemical containers or system components reveals conditions such as, but not limited to, corrosion or pitting in excess of the manufacturer's limits; structural damage or fire damage; or repairs by soldering, welding, or brazing, the affected part(s) shall be replaced or hydrostatically tested in accordance with the recommendations of the manufacturer or the listing agency.

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

**7.3.3.4** Where the maintenance of the system(s) reveals defective parts that could cause an impairment or failure of proper operation of the system(s), the affected parts shall be replaced or repaired in accordance with the manufacturer's recommendations.

**7.3.3.4.1** Until such repairs are accomplished, the systems shall be tagged as noncompliant, and the owner or owner's representative responsible for the system and the authority having jurisdiction shall be notified of the impairment.

**7.3.3.4.2** 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.

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

**7.3.3.5.1** 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.

**7.3.3.6*** 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.

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

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

**7.3.5** 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.

**7.3.5.1** At a minimum, inspection and testing for 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

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

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

**7.4 Recharging.**

**7.4.1** All extinguishing systems shall be recharged after use or as indicated by an inspection or maintenance procedure.

**7.4.2** Systems shall be recharged in accordance with the manufacturer's listed installation and maintenance manual.

**7.4.3** After any discharge, the system piping shall be flushed in accordance with the procedures detailed in the manufacturer's listed installation and maintenance manual.

**7.5* Hydrostatic Testing.**

**7.5.1** 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

*Exception No. 1: Auxiliary pressure containers not exceeding 2 in. (0.05 m) outside diameter and less than 2 ft (0.6 m) in length.*

*Exception No. 2: Auxiliary pressure containers bearing the DOT "3E" marking.*

**7.5.2** 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 by the manufacturer.

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

**7.5.2.2** The test procedure shall be in accordance with the manufacturer's detailed written hydrostatic test instructions.

**7.5.2.3*** 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.

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

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

## 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 manufacturer's listed installation and maintenance manual.

**A.1.6.1.1** See IEEE/ASTM SI 10, *Standard for Use of the International System of Units (SI): The Modern Metric System.*

**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.

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 respective 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.3.3.6 Inspection.** This is done by seeing 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.3.3.9.1 Manufacturer's Listed 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 pamphlet also requires that the wet chemical extinguishing system be designed, installed, inspected, maintained, and serviced in accordance with this standard.

**A.3.3.10 Operating Devices.** Including "actuating devices" initiating operation (automatic detection devices or systems and manual actuation devices such as manual pulls or strike buttons) or "operating devices" responding to the actuation (release mechanisms, shutoff devices, alarms, and auxiliary equipment).

**A.3.3.13 Pre-Engineered Systems.** These systems have the specific pipe size, maximum and minimum pipe lengths, flexible hose specifications, number of fittings, and number and types of nozzles prescribed by a testing laboratory. The maximum and minimum pipe lengths and the number of fittings shall be permitted to be expressed in equivalent feet of pipe. The hazards protected by these systems are specifically limited as to type and size by a testing laboratory, based on actual fire tests. Limitations on hazards that are permitted to be protected by these systems and piping and nozzle configurations are contained in the manufacturer's listed installation and maintenance manual, which is part of the listing of the system.

**A.3.3.22 Wet Chemical.** The terms *liquid agent* and *wet agent* are used interchangeably with *wet chemical*.

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

**A.4.5.1** 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 listed installation and maintenance manual.

**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, and effectively prevent reignition of the grease.

*Extinguishing Mechanisms.* Wet chemical solution applied to flammable liquid surfaces will result in the rapid spreading 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.5.2.1.10** Common exhaust ducts normally are located in concealed areas such that the need for manual discharge of the system might not be readily apparent. It is recommended that the number and location of remote controls, if any, be given careful consideration.

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

**A.5.6.2** Examples of acceptable methods of protection are presented in A.5.6.2.1(1) and A.5.6.2.1(2). The figures are not intended to be all-inclusive. For additional guidance, consult the system manufacturer.

**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. Shutdown of all appliances is in accordance with *4.4.3. [See Figure A.5.6.2.1(1).]*

**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.

Scenario No. 1: 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 operated simultaneously. Shutdown of all appliances protected by systems A, B, C, D, and E is in accordance with 4.4.3. *[See Figure A.5.6.2.1(2)(a).]*

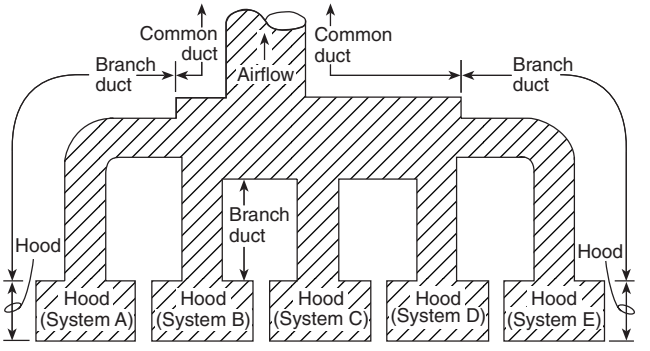


**FIGURE A.5.6.2.1(1) Simultaneous Operation of All Systems.**

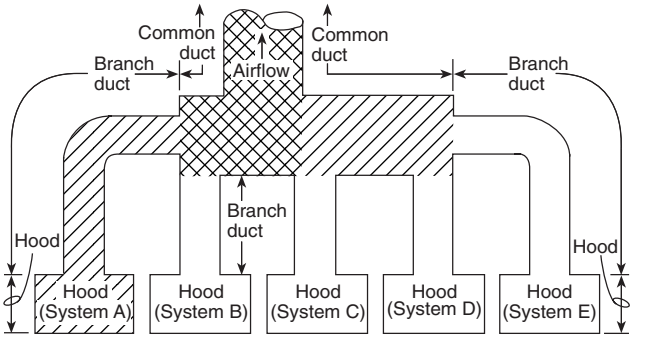


**FIGURE A.5.6.2.1(2)(a) Simultaneous Operation of a Single Cooking Appliance, Hood, or Branch Duct System, and the System Protecting the Entire Common Exhaust Duct.**

Scenario No. 2: System E also provides protection for the entire common exhaust duct. A fire is detected in System C. System C and System E operate simultaneously. Shutdown of all appliances protected by systems A, B, C, D, and E is in accordance with 4.4.3. *[See Figure A.5.6.2.1(2)(b).]*

Scenario No. 3: System E also provides protection for the entire common exhaust duct. A fire detected in System E will result in the actuation of System E only. Shutdown of all appliances protected by Systems A, B, C, D, and E is in accordance with 4.4.3. *[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.

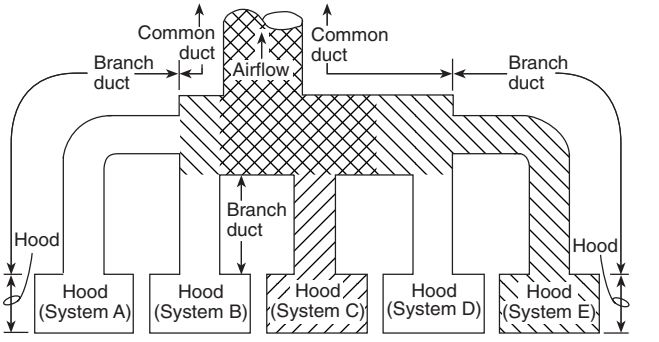


**FIGURE A.5.6.2.1(2)(b) Simultaneous Operation of Two Systems in Which One Also Provides Common Duct Protection.**

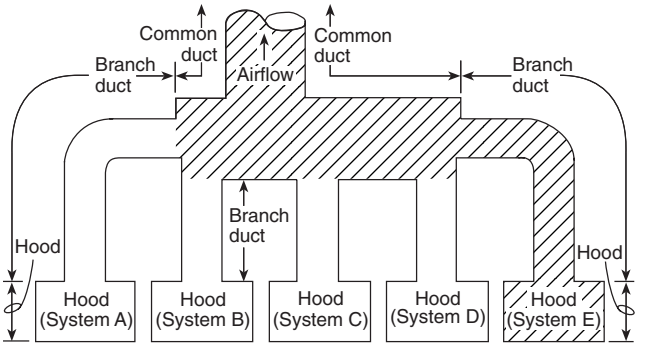


**FIGURE A.5.6.2.1(2)(c) Independent Operation of a System that Protects a Hood and the Common Duct.**

**A.6.1** 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.6.2** It is recommended that system design and installation personnel be certified in accordance with the manufacturer's requirements. It is standard industry practice to provide expiration dates on training certificates.

**A.6.4.2** When a discharge test is required, contact the particular system manufacturer for detailed functional discharge procedures. The use of substitute liquids, such as water, is not endorsed by all of the wet chemical extinguishing system manufacturers.

**A.7.1.1** The characteristics of the system are dependent on the composition of the wet chemical solution and the type of expellant gas, as well as 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.7.1.4** Wet chemical solutions are relatively harmless and normally have no lasting significant effects on the skin, respiratory system, or clothing. They can produce mild, temporary irritation, but the symptoms usually will 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.

Disposal of 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 listed 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.

**A.7.3.1** 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.7.3.2** It is recommended that system maintenance personnel be certified with the manufacturer's requirements. It is standard industry practice to provide expiration dates on training certificates.

**A.7.3.3** Regular service contracts with the equipment manufacturer or an authorized installation or maintenance company are recommended.

**A.7.3.3.1(3)** The following methods can be used to verify that piping is not obstructed:

(1) Disassembly of all piping
(2) Conducting a full or partial discharge test
(3) Utilizing other methods recommended by the manufacturer

**A.7.3.3.2** The hydrostatic testing of wet chemical containers should follow the applicable procedures outlined in Section 7.5.

**A.7.3.3.3** A discharge of the wet chemical normally is not part of this test.

**A.7.3.3.6** Under special circumstances or when local requirements are in effect, additional information can be desirable or required.

**A.7.3.4** The date of manufacture marked on fusible metal alloy–temperature-sensing elements does not limit when they can be used. These devices have unlimited shelf life. The intent of 7.3.4 is to require replacement of fusible metal alloy–temperature-sensing elements that have been installed for up to 1 year in environments subjecting them to contaminant loading, such as grease in restaurant hoods and ducts, that could adversely affect their proper operation.

**A.7.5** DOT- or TC-marked cylinders can be required to be subjected to more frequent testing.

**A.7.5.2.3** 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 Informational References

**B.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.

**B.1.1 NFPA Publications. (Reserved)**

**B.1.2 Other Publications.**

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

IEEE/ASTM SI 10, *Standard for Use of the International System of Units (SI): The Modern Metric System,* 1997.

**B.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.

**B.2.1 U.S. Government Publications.** U.S. Government Printing Office, Washington, DC 20402.

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

**B.3 References for Extracts in Informational Sections. (Reserved)**

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