



Second Revision No. 1-NFPA 1-2022 [Global Comment]

See attached word document for updates to NFPA 10 extracts.

Supplemental Information

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Submitter Information Verification

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Committee Statement

Committee Statement: NFPA documents are updated to the most current edition to comply with the NFPA Extract Policy. Changes within the extracted text have been reviewed by the technical committee. For substantiation on any technical changes, see the second draft report for the source document.

Request to FCC-AAC: Update the reference in section 2.4 to NFPA 10, 2022 edition.

Response Message: SR-1-NFPA 1-2022

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Extracts from 10 in 1

13.6.1.1 Scope.

13.6.1.1.1

The requirements given herein are minimum. [10:1.1.1]

13.6.1.1.2

The requirements shall not apply to permanently installed systems for fire extinguishment, even where portions of such systems are portable (such as hose and nozzles attached to a fixed supply of extinguishing agent). [10:1.1.2]

13.6.1.3 Listing and Labeling.

13.6.1.3.1*

Portable fire extinguishers used to comply with Section 13.6 shall be listed and labeled and shall meet or exceed all the requirements of UL 711, CAN/ULC-S508, *Standard for the Rating and Fire Testing of Fire Extinguishers*, and one of the following applicable performance standards:

- (1) Carbon dioxide types: UL 154, CAN/ULC-S503, *Standard for Carbon-Dioxide Fire Extinguishers*
- (2) Dry chemical types: UL 299, CAN/ULC-S504, *Standard for Dry Chemical Fire Extinguishers*
- (3) Water types: UL 626, CAN/ULC-S507, *Standard for Water Fire Extinguishers*
- (4) Halon types: CAN/ULC-S512, *Standard for Halogenated Agent Hand and Wheeled Fire Extinguishers*
- (5) Film-forming foam types: UL 8, CAN/ULC-S554, *Water Based Agent Fire Extinguishers*
- (6) Halocarbon types: UL 2129, CAN/ULC-S566, *Standard for Halocarbon Clean Agent Fire Extinguishers*

[10:4.1.1]

A.13.6.1.3.1

Listed and labeled halon portable fire extinguishers currently comply with Section 13.6 and have demonstrated compliance with the requirements of UL-1093, *Standard for Halogenated Agent Fire Extinguishers*, which also includes fire testing and rating criteria. As a result of the “Montreal Protocol on Substances that Deplete the Ozone Layer,” UL has withdrawn UL-1093. This does not imply that extinguishers that are listed and labeled to the requirements of UL-1093 are unsafe for use as fire extinguishers, nor does it mean that UL or the EPA is requiring that halon extinguishers be removed from service. It does mean that UL will not accept new designs of halon extinguishers for testing or UL listing. It also means that no changes or updates are allowed to models

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that are currently listed and that had previously demonstrated compliance with UL 1093. [10:A.4.1.1]

Extinguisher manufacturers are allowed to manufacture their current design of UL-listed halon extinguishers with the UL listing mark until October 2025. Halon extinguishers currently in use will continue to be listed beyond the 2025 date and should be permitted to be used to comply with the requirements of NFPA 10 and this *Code* when installed, inspected, and maintained in accordance with NFPA 10 and this *Code*. [10:A.4.1.1]

13.6.1.3.2*

Each fire extinguisher shall be marked with the following:

- (1) Identification of the listing and labeling organization
- (2) Product category indicating the type of extinguisher
- (3) Extinguisher classification as indicated in Section 5.3 of NFPA 10
- (4) Performance and fire test standards that the extinguisher meets or exceeds

[10:4.1.2]

A.13.6.1.3.2

AHJs should determine the acceptability and credibility of the organization listing or labeling fire extinguishers. Authorities should determine if the organization tests to all the requirements of NFPA 10. Factors such as the structure of the organization, its principal fields of endeavor, its reputation and established expertise, its involvement in the standards-writing process, and the extent of its follow-up service programs should all be assessed before recognition is given. [10:A.4.1.2]

The listing and labeling organization identification marking might be in the form of a symbol of the organization. The product category marking should identify the extinguisher, for example, "Carbon Dioxide Fire Extinguisher," "Dry Chemical Fire Extinguisher," or "Clean Agent Fire Extinguisher." Extinguisher ratings should indicate the classification of fire type, such as A, B, or C, and the associated fire size. An example of an extinguisher rating is 1-A: 5-B:C, which designates a Class A fire (wood) rating with an associated fire size of 1, as described in UL 711, CAN/ULC-S508, *Standard for the Rating and Fire Testing of Fire Extinguishers*; a Class B fire (flammable liquid) rating with an associated fire size of 5, as described in UL 711, CAN/ULC-S508; and a Class C compatible rating as described in UL 711, CAN/ULC-S508. [10:A.4.1.2]

13.6.1.3.2.1

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Halon extinguishers listed and labeled to UL 1093, *Standard for Halogenated Agent Fire Extinguishers*, shall be permitted to be used to comply with the requirements of Section 13.6 when installed, inspected, and maintained in accordance with Section 13.6. [10:4.1.2.2]

13.6.1.3.3 Electrical Conductivity.

Extinguishers listed for the Class C rating shall not contain an agent that is a conductor of electricity. [10:4.1.4]

13.6.1.3.3.1

In addition to successfully meeting the requirements of UL 711, CAN/ULC-S508, *Rating and Fire Testing of Fire Extinguishers*, water-based agents that are listed for the Class C rating shall be tested in accordance with ASTM D5391, *Standard Test for Electrical Conductivity and Resistivity of a Flowing High Purity Water Sample*. [10:4.1.4.1]

13.6.1.3.3.2

Fire extinguishers containing water-based agents that have a conductivity higher than 1.00 $\mu\text{S}/\text{cm}$ at 77°F (25°C) shall be considered a conductor of electricity and therefore shall not be rated Class C. [10:4.1.4.2]

13.6.1.3.3.3

Paragraphs 13.6.1.3.3.1 and 13.6.1.3.3.2 shall apply only to water-based extinguishers manufactured after August 15, 2002. [10:4.1.4.3]

13.6.1.4* Identification of Contents.

A fire extinguisher shall have a label, tag, or stencil attached to it providing the following information:

- (1) The content's product name as it appears on the manufacturer's Material Safety Data Sheet (MSDS)
 - (2) Listing of the hazardous material identification in accordance with *Hazardous Materials Identification System (HMIS)*; *Implementation Manual* [in Canada, *Globally Harmonized System of Classification and Labeling of Chemicals (GHS)*] ~~developed by the National Paint and Coatings Association~~
 - (3) List of any hazardous materials that are in excess of 1.0 percent of the contents
 - (4) List of each chemical in excess of 5.0 percent of the contents
 - (5) Information as to what is hazardous about the agent in accordance with the MSDS
 - (6) Manufacturer's or service agency's name, mailing address, and phone number
- [10:4.2]

A.13.6.1.4

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Federal OSHA regulations require that manufacturers communicate information as to the type of chemicals in a product that can be hazardous and the level of hazard. This information is contained in the MSDS created for each chemical or mixture of chemicals and is summarized on labels or tags attached to the product. Additionally, state and local authorities have enacted similar acts and regulations requiring identification of chemicals and hazardous ingredients in products. MSDSs for fire extinguisher agents are available on request from fire equipment dealers or distributors or the fire equipment manufacturer. [10:A.4.2]

The identification of contents information enables determination of the type of chemicals contained in the fire extinguisher and helps to resolve complications arising from an unusual use of the agent. The *Hazardous Materials Identification System (HMIS)*, developed by the American Coatings Association, uses a three-place format with numerical indexes from 0 to 4. The first place is for “toxic properties,” the second place is for “flammability,” and the third place is for “reactivity” with other chemicals. Most fire extinguishers have a 0 numerical index in the second and third places because they are nonflammable and relatively inert. [10:A.4.2]

Information on the HMIS can be obtained from Label Master, Inc., in Chicago, IL, or from the American Coatings Association in Washington, DC. Extinguisher contents information can be integrated into the standard fire extinguisher label in some form, or it can be on a separate label or tag. The following example is a typical chemical contents identification marking:

CONTENTS:

ABC DRY CHEMICAL/HMIS 1-0-0

MUSCOVITE MICA, MONOAMMONIUM PHOSPHATE

AMMONIUM SULFATE/NUISANCE DUST

IRRITANT/CONTENTS UNDER PRESSURE

[Manufacturer’s Name, Mailing Address, Phone Number]

[10:A.4.2]

13.6.1.5 Obsolete Fire Extinguishers.

The following types of fire extinguishers are considered obsolete and shall be removed from service:

- (1) Soda acid
- (2) Chemical foam (excluding film-forming agents)

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- (3) Carbon tetrachloride, methyl bromide, and chlorobromomethane (CBM)
- (4) Cartridge-operated water
- (5) Cartridge-operated loaded stream
- (6) Copper or brass shell (excluding pump tanks) joined by soft solder or rivets
- (7) Carbon dioxide extinguishers with metal horns
- (8) Solid charge-type AFFF extinguishers (paper cartridge)
- (9) Pressurized water fire extinguishers manufactured prior to 1971
- (10) Any extinguisher that needs to be inverted to operate
- (11) Any extinguisher manufactured prior to 1955
- (12) Any extinguishers with 4B, 6B, 8B, 12B, and 16B fire ratings
- (13) Stored-pressure water extinguishers with fiberglass shells (pre-1976)

[10:4.4]

13.6.1.5.1*

Dry chemical stored-pressure extinguishers with an indicated manufacturing date of 1984 or prior shall be removed from service. [10:4.4.1]

A.13.6.1.5.1

The requirement in 13.6.1.5.1 brings the standard into line with the 1984 changes to UL 299, CAN/ULC-S504, Dry Chemical Fire Extinguishers, and to UL 711, Rating and Fire Testing of Fire Extinguishers.

- (1) *Hose.* The 1984 edition of UL 299 requires extinguishers rated 2A or higher or 20-B or higher to be equipped with a discharge hose. Before this change, almost all 5-lb (2.3 kg) extinguishers and many 10-lb (4.5 kg) extinguishers were equipped with a fixed nozzle on the outlet of the extinguisher valve and without hoses. These extinguishers, rated 2-A to 4-A and 10-B to 60-B₁, are used to comply with the installation requirements now contained in Chapter 6 of NFPA 10. To properly use one of these extinguishers, the user must keep it in the upright position, apply the dry chemical to the base of the fire, and sweep the discharge back and forth. The requirement for the addition of a hose to these extinguishers came out of the novice fire tests sponsored by Underwriters Laboratories (UL) and the Fire Equipment Manufacturers Association. The film footage of these tests shows that those who had never used a fire extinguisher before often used both hands to operate these extinguishers, turning the extinguisher cylinder in a horizontal position while squeezing the handle and lever to open the valve. Sometimes they even inverted the extinguisher. The result of such actions is a partial discharge of the extinguisher contents or possibly only the expellant gas and, therefore, no extinguishment of the fire can be achieved. The addition of a hose also makes it much easier to direct the discharge at the base of the flames and to sweep the discharge from side to side. The requirement to add a hose makes it more likely that the extinguisher will be used in an upright position. In fact, it is almost impossible to do otherwise, since one hand opens the valve and the other hand, which holds the hose, directs the discharge stream to the

fire. It is important to note that field modification of an extinguisher is generally not allowed, since the modification might not have been evaluated to comply with the test requirements in the applicable UL extinguisher standards, and the extinguisher might not operate as intended. Thus, a fixed nozzle cannot simply be removed from an extinguisher and replaced with a hose and nozzle.

- (2) *Minimum Discharge Time.* This requirement, found in the 1984 edition of UL 711, requires a minimum 13-second discharge duration for an extinguisher rated 2-A or higher. The 13-second minimum requirement was the result of recommendations from the novice fire tests mentioned in A.13.6.1.5.1(1). Before 1984, almost all 2-A-rated dry chemical extinguishers had discharge durations of only 8 seconds to 10 seconds. The novice fire tests clearly showed that longer discharge duration resulted in an increased likelihood of extinguishment. The revision to UL 711 mandated a 50 percent to 60 percent increase in the minimum discharge duration for a 2-A-rated dry chemical extinguisher. Modification of extinguishers with a nozzle/hose that gives different or longer discharge duration is not allowed. Such modification would not have been evaluated to comply with the test requirements in the applicable UL extinguisher standards, and the extinguisher might not operate as intended.
- (3) *Pull Pins.* A revision to the extinguisher standards, including UL 299, required a maximum 30 lb (133 N) of force to remove a safety pin or pull pin from an extinguisher. This again came from the novice testing, in which some individuals could not physically remove the pin and actuate the extinguisher. The UL extinguisher standards also included a design requirement so that the pin is be visible from the front of the extinguisher unless noted by the operating instructions.
- (4) *Operating Instructions/Marking.* The extinguisher standards, including the 1984 revision of UL 299, mandated the use of pictographic operating instructions and code symbols on all but Class D extinguishers and wheeled extinguishers. These requirements also came out of the novice fire tests, which showed many individuals taking too long to read and understand the written operating instructions. The novice tests actually developed the pictographic operating instructions and tested them on novice operators for effectiveness. The details of the number of instructions per pictogram came from the test program. The novice fire tests were also the impetus for making the use code symbols for the various classes of fires more understandable. The new pictographic use code symbols were also mandated in 1984 as well as a uniform method of applying A, B, and C symbols to extinguishers with ABC or BC only ratings. The result was a uniform, consistent set of easily understood symbols that made the extinguisher more user friendly.
- (5) *Service Manuals.* The extinguisher standards, including UL 299, for the first time mandated that extinguisher manufacturers have a service manual for their products. In addition, the 1984 edition of UL 299 required a reference to the service/maintenance manual on the extinguisher nameplate. Prior to 1984, service manuals were not required.

[10:A.4.4.1]

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13.6.1.5.1.1

Paragraph 13.6.1.5.1 shall not apply to wheeled-type dry chemical stored-pressure fire extinguishers. [10:4.4.1.1]

13.6.1.5.2*

Any fire extinguisher that can no longer be serviced in accordance with the manufacturer's maintenance manual is considered obsolete and shall be removed from service. [10:4.4.2]

A.13.6.1.5.2

Fire extinguishers manufactured by companies that are no longer in business can remain in use if they meet the requirements of NFPA 10 and this *Code*, and are maintained in accordance with the manufacturer's service manual. When these extinguishers require recharging or maintenance and the required extinguishing agent or necessary repair parts are not available, the extinguishers should be removed from service. [10:A.4.4.2]

13.6.2 Selection of Portable Fire Extinguishers.

13.6.2.1 General Requirements.

The selection of fire extinguishers for a given situation shall be determined by the applicable requirements of Sections 5.2 through 5.5.6 of NFPA 10 and the following factors:

- (1) Type of fire most likely to occur
- (2) Size of fire most likely to occur
- (3) Hazards in the area where the fire is most likely to occur
- (4) Energized electrical equipment in the vicinity of the fire
- (5) Ambient temperature conditions
- (6) Other factors (*see Section H.2 of NFPA 10*)

[10:5.1]

13.6.2.1.1

Portable fire extinguishers shall be installed as a first line of defense to cope with fires of limited size, except as required by 5.5.5.4.5 of NFPA 10. [10:5.1.1]

13.6.2.1.2

The selection of extinguishers shall be independent of whether the building is equipped with automatic sprinklers, standpipe and hose, or other fixed protection equipment. [10:5.1.2]

13.6.2.2 Classification of Fires.

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See 3.3.115.

13.6.2.3 Extinguisher Classification System.

13.6.2.3.1

The classification of fire extinguishers shall consist of a letter that indicates the class of fire on which a fire extinguisher has been found to be effective. [10:5.3.1]

13.6.2.3.1.1

Fire extinguishers classified for use on Class A or Class B hazards shall be required to have a rating number preceding the classification letter that indicates the relative extinguishing effectiveness. [10:5.3.1.1]

13.6.2.3.1.2

Fire extinguishers classified for use on Class C, Class D, or Class K hazards shall not be required to have a number preceding the classification letter. [10:5.3.1.2]

13.6.2.3.2

Fire extinguishers shall be selected for the class(es) of hazards to be protected in accordance with 13.6.2.3.2.1 through 13.6.2.3.2.5. (*For specific hazards, see Section 5.5.4 of NFPA 10.*) [10:5.3.2]

13.6.2.3.2.1*

Fire extinguishers for the protection of Class A hazards shall be selected from types that are specifically listed and labeled for use on Class A fires. (*For halon agent-type extinguishers, see 13.6.2.3.2.6.*) [10:5.3.2.1]

A.13.6.2.3.2.1

Examples of extinguishers for protecting Class A hazards are as follows:

- (1) Water type
- (2) Halogenated agent type (*For halogenated agent-type fire extinguishers, see 13.6.2.3.2.6.*)
- (3) Multipurpose dry chemical type
- (4) Wet chemical type

[10:A.5.3.2.1]

13.6.2.3.2.2*

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Fire extinguishers for the protection of Class B hazards shall be selected from types that are specifically listed and labeled for use on Class B fires. *(For halon agent–type extinguishers, see 13.6.2.3.2.6.)* [10:5.3.2.2]

A.13.6.2.3.2.2

Examples of extinguishers for protecting Class B hazards are as follows:

- (1) Aqueous film-forming foam (AFFF)
- (2) Film-forming fluoroprotein foam (FFFP)
- (3) Carbon dioxide
- (4) Dry chemical type
- (5) Halogenated agent type *(For halogenated agent–type fire extinguishers, see 13.6.2.3.2.6.)*

[10:A.5.3.2.2]

13.6.2.3.2.3*

Fire extinguishers for the protection of Class C hazards shall be selected from types that are specifically listed and labeled for use on Class C hazards. *(For halon agent–type fire extinguishers, see 13.6.2.3.2.6.)* [10:5.3.2.3]

A.13.6.2.3.2.3

The use of dry chemical fire extinguishers on wet energized electrical equipment (such as rain-soaked utility poles, high-voltage switch gear, and transformers) could aggravate electrical leakage problems. The dry chemical in combination with moisture provides an electrical path that can reduce the effectiveness of insulation protection. The removal of all traces of dry chemical from such equipment after extinguishment is recommended.

[10:A.5.3.2.3]

13.6.2.3.2.4*

Fire extinguishers and extinguishing agents for the protection of Class D hazards shall be of the types specifically listed and labeled for use on the specific combustible metal hazard.

[10:5.3.2.4]

A.13.6.2.3.2.4

The following information pertains to Class D hazards:

- (1) Chemical reaction between burning metals and many extinguishing agents (including water) can range from explosive to inconsequential, depending in part on the type, form, and quantity of metal involved. In general, the hazards from a metal fire are significantly increased when such extinguishing agents are applied. The advantages and limitations of a wide variety of commercially available metal fire extinguishing agents

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are discussed in NFPA 484 and in Section 6, Chapter 9, of the NFPA *Fire Protection Handbook*. The MSDS of the Class D hazard being protected or the extinguisher manufacturer should be consulted.

- (2) The agents and fire extinguishers discussed in this section are of specialized types, and their use often involves special techniques peculiar to a particular combustible metal. A given agent will not necessarily control or extinguish all metal fires. Some agents are valuable in working with several metals; others are useful in combating only one type of metal fire. The AHJs should be consulted in each case to determine the desired protection for the particular hazard involved.
- (3) Certain combustible metals require special extinguishing agents or techniques. See NFPA 484 for additional information. If there is doubt, NFPA 484 or the NFPA *Fire Protection Guide to Hazardous Materials* should be consulted. (NFPA 49 and NFPA 325 have been officially withdrawn from the *National Fire Codes*, but the information is contained in the NFPA *Fire Protection Guide to Hazardous Materials*.)
- (4) Reference should be made to the manufacturer's recommendations for use and special techniques for extinguishing fires in various combustible metals.
- (5) Fire of high intensity can occur in certain metals. Ignition is generally the result of frictional heating, exposure to moisture, or exposure from a fire in other combustible materials. The greatest hazard exists when these metals are in the molten state or in finely divided forms of dust, turnings, or shavings.

[10:A.5.3.2.4]

The properties of a wide variety of combustible metals and the agents available for extinguishing fires in these metals are discussed in NFPA 484, ~~and~~ the NFPA *Fire Protection Handbook*, and the SFPE Handbook of Fire Protection Engineering.

[10:A.5.3.2.4]

13.6.2.3.2.5

Fire extinguishers for the protection of Class K hazards shall be selected from types that are specifically listed and labeled for use on Class K fires. [10:5.3.2.5]

13.6.2.3.2.6*

Use of halon agent fire extinguishers shall be limited to applications where a clean agent is necessary to extinguish fire efficiently without damaging the equipment or area being protected, or where the use of alternative agents has the potential to cause a hazard to personnel in the area. [10:5.3.2.6]

A.13.6.2.3.2.6

Halon agent is highly effective for extinguishing fire and evaporates after use, leaving no residue. Halon agent is, however, included in the Montreal Protocol list of controlled substances developed under the United Nations Environment Program. Where agents

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other than halon can satisfactorily protect the hazard, they should be used instead of halon. Halon use should be limited to extinguishment of unwanted fire; it should not be used for routine training of personnel. [10:A.5.3.2.6]

13.6.2.3.2.6.1*

Placement of portable fire extinguishers containing halogenated agents shall conform to minimum confined space volume requirement warnings contained on the fire extinguisher nameplates. [10:5.3.2.6.1]

A.13.6.2.3.2.6.1

UL 2129, ~~ULC~~/CAN/~~ULC~~-S566, *Standard for Halocarbon Clean Agent Fire Extinguishers*,⁷ and ~~ULC~~/CAN/~~ULC~~-S512, *Standard for Halogenated Agent Hand and Wheeled Fire Extinguishers*, require halocarbon and halogenated agent nameplates to provide safety guidelines for avoiding overexposure to agent vapors when the agents are discharged into confined spaces. The UL minimum volume requirement for confined spaces is based on exposure to the agent in the absence of a fire and does not include considerations of fire or agent decomposition products. ULC/CAN-S512 has been withdrawn from the standards directory and although new listings to this standard are not anticipated, extinguishers listed prior to the Montreal Protocol are still listed. [10:A.5.3.2.6.1]

13.6.2.3.2.7*

Wheeled fire extinguishers shall be considered for hazard protection in areas in which a fire risk assessment has shown the following:

- 1) High hazard areas are present
- 2) Limited available personnel are present, thereby requiring an extinguisher that has the following features:
 - (a) High agent flow rate
 - (b) Increased agent stream range
 - (c) Increased agent capacity

[10:5.3.2.7]

A.13.6.2.3.2.7

Wheeled fire extinguishers are available in capacities of 33 gal (125 L) for foam units and range from 30 lb to 350 lb (13.6 kg to 158.8 kg) for other types of extinguishers. These fire extinguishers are capable of delivering higher agent flow rates and greater agent stream range than normal portable-type fire extinguishers. Wheeled fire extinguishers are capable of furnishing increased fire-extinguishing effectiveness for high hazard areas and have added importance where a limited number of people are available. [10:A.5.3.2.7]

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13.6.2.4 Classification of Hazards.

13.6.2.4.1 Classifying Occupancy Hazard.

Rooms or areas shall be classified as being light hazard, ordinary hazard, or extra hazard. [10:5.4.1]

13.6.2.4.1.1* Light Hazard.

Light hazard occupancies shall be classified as locations where the quantity and combustibility of Class A combustibles and Class B flammables are low and fires with relatively low rates of heat release are expected. These occupancies consist of fire hazards having normally expected quantities of Class A combustible furnishings, and/or the total quantity of Class B flammables typically expected to be present is less than 1 gal (3.8 L) in any room or area. [10:5.4.1.1]

A.13.6.2.4.1.1

Light hazard occupancies can include some buildings or rooms occupied as offices, classrooms, churches, assembly halls, guest room areas of hotels or motels, and so forth. This classification anticipates that the majority of content items are either noncombustible or so arranged that a fire is not likely to spread rapidly. Small amounts of Class B flammables used for duplicating machines, art departments, and so forth, are included, provided that they are kept in closed containers and safely stored. [10:A.5.4.1.1]

13.6.2.4.1.2* Ordinary Hazard.

Ordinary hazard occupancies shall be classified as locations where the quantity and combustibility of Class A combustible materials and Class B flammables are moderate and fires with moderate rates of heat release are expected. These occupancies consist of fire hazards that only occasionally contain Class A combustible materials beyond normal anticipated furnishings, and/or the total quantity of Class B flammables typically expected to be present is from 1 gal to 5 gal (3.8 L to 18.9 L) in any room or area. [10:5.4.1.2]

A.13.6.2.4.1.2

Ordinary hazard occupancies could consist of dining areas, mercantile shops and allied storage, light manufacturing, research operations, auto showrooms, parking garages, workshop or support service areas of light hazard occupancies, and warehouses containing Class I or Class II commodities as defined by NFPA 13. [10:A.5.4.1.2]

A Class I commodity is defined by NFPA 13 as a noncombustible product that meets one of the following criteria:

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- (1) It is placed directly on wooden pallets.
 - (2) It is placed in single-layer corrugated cartons, with or without single-thickness cardboard dividers, with or without pallets.
 - (3) It is shrink-wrapped or paper-wrapped as a unit load, with or without pallets.
- [10:A.5.4.1.2]

A Class II commodity is defined by NFPA 13 as a noncombustible product that is in slatted wooden crates, solid wood boxes, multiple-layered corrugated cartons, or equivalent combustible packaging material, with or without pallets. [10:A.5.4.1.2]

13.6.2.4.1.3* Extra Hazard.

Extra hazard occupancies shall be classified as locations where the quantity and combustibility of Class A combustible material are high or where high amounts of Class B flammables are present and rapidly developing fires with high rates of heat release are expected. These occupancies consist of fire hazards involved with the storage, packaging, handling, or manufacture of Class A combustibles, and/or the total quantity of Class B flammables expected to be present is more than 5 gal (18.9 L) in any room or area. [10:5.4.1.3]

A.13.6.2.4.1.3

Extra hazard occupancies could consist of woodworking; vehicle repair; aircraft and boat servicing; cooking areas; individual product display showrooms; product convention center displays; and storage and manufacturing processes such as painting, dipping, and coating, including flammable liquid handling. Also included is warehousing or in-process storage of other than Class I and Class II commodities. [10:A.5.4.1.3]

13.6.2.4.1.4

Limited areas of greater or lesser hazard shall be protected as required. [10:5.4.1.4]

13.6.2.4.2* Selection of Fire Extinguishers.

A.13.6.2.4.2

All buildings have Class A fire hazards. In any occupancy, there could be a predominant hazard as well as special hazard areas requiring extinguishers with ratings to match those hazards. For example, a hospital will have need for Class A fire extinguishers covering patient rooms, corridors, offices, and so forth, but will need Class B fire extinguishers in laboratories and where flammable anesthetics are stored or handled, Class C fire extinguishers in electrical switch gear or generator rooms, and Class K extinguishers in kitchens. [10:A.5.5]

13.6.2.4.2.1 General.

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Where fire extinguishers have more than one letter classification (such as 3-A:40-B:C), they shall be permitted to satisfy the requirements of each letter class. [10:5.5.1]

13.6.2.4.2.2 Selection for Building Protection.

Fire extinguishers for building protection shall be selected for Class A fires, regardless of the presence of any fixed fire suppression systems. [10:5.5.2]

13.6.2.4.2.3[‡] Selection by for Occupancy Hazards.

Fire extinguishers shall be provided selected for the protection of both the building structure and the occupancy hazards contained therein regardless of the presence of any fixed fire suppression systems. [10:5.4.2.3]

A.13.6.2.4.2

All buildings have Class A fire hazards. In any occupancy, there could be a predominant hazard as well as special hazard areas requiring extinguishers with ratings to match those hazards. For example, a hospital will generally have need for Class A fire extinguishers covering patient rooms, corridors, offices, and so forth, but will need Class B fire extinguishers in laboratories and where flammable anesthetics are stored or handled, Class C fire extinguishers in electrical switch gear or generator rooms, and Class K extinguishers in kitchens. [10:A.5.4.2]

13.6.2.4.2.1

Required building protection shall be provided by fire extinguishers for Class A fires. [10:5.4.2.1]

13.6.2.4.2.2.1^{*}

Occupancy Fire extinguishers for occupancy hazard protection shall be provided by fire extinguishers for such Class A, B, C, D, or K fire potentials hazards present or anticipated as might be pto be present. [10:5.3.14.2.2]

A.13.6.2.4.2.2

If fire extinguishers intended for different classes of fires are grouped, their intended use should be marked conspicuously to aid in the choice of the proper fire extinguisher at the time of a fire. In an emergency, the tendency is to reach for the closest fire extinguisher. If this fire extinguisher is of the wrong type, users could endanger themselves and the property they are endeavoring to protect. Wherever possible, it is preferable to have only those fire extinguishers available that can be safely used on any type of fire in the immediate vicinity. [10:A.5.4.2.2]

13.6.2.4.2.3.2

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Fire extinguishers ~~provided~~selected for building protection shall be permitted to also be considered ~~for the protection of occupancies having a Class A fire potential~~for occupancy hazard protection. [10:5.4.2-35.5.3.2]

13.6.2.4.2.4

~~Buildings having an occupancy hazard subject to Class B or Class C fires, or both, shall have a standard complement of Class A fire extinguishers for building protection, plus additional Class B or Class C fire extinguishers, or both. [10:5.4.2.4]~~

13.6.2.4.2.5

~~Where fire extinguishers have more than one letter classification (such as 2-A:20-B:C), they shall be permitted to satisfy the requirements of each letter class. [10:5.4.2.5]~~

13.6.2.5 Selection for Specific Hazards.

13.6.2.5.1 Class B Fires.

13.6.2.5.1.1* Extinguishers for Pressurized ~~Flammable Liquids~~ and Pressurized Gas Fires.

~~Large-capacity dry chemical extinguishers of 10 lb (4.54 kg) or greater and with a discharge rate of 1 lb/sec (0.45 kg/sec) or more shall be selected to protect these hazards. [10:5.5.4.1]~~

A.13.6.2.5.1.1

Pressurized flammable liquids and pressurized gas fires are considered to be a special hazard. Class B fire extinguishers containing agents other than dry chemical are relatively ineffective on this type of hazard due to stream and agent characteristics. The system used to rate the effectiveness of fire extinguishers on Class B fires (flammable liquids in depth) is not applicable to these types of hazards. It has been determined that special nozzle design and rates of agent application are required to cope with such hazards. [10:A.5.5.14.1]

13.6.2.5.1.1.1* ~~Extinguishers for Pressurized Flammable Liquids and Pressurized Gas Three-Dimensional~~ Fires.

Large-capacity dry chemical extinguishers of 10 lb (4.54 kg) or greater and a discharge rate of 1 lb/sec (0.45 kg/sec) or more shall be ~~used~~selected to protect these hazards. [10:5.5.4.21.1]

A.13.6.2.5.1.1.1

A three-dimensional Class B fire involves Class B materials in motion, such as pouring, running, or dripping flammable liquids, and generally includes vertical as well as one or more horizontal surfaces. Fires of this nature are considered to be a special hazard. The system used to rate fire extinguishers on Class B fires (flammable liquids in depth) is not

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directly applicable to this type of hazard. The installation of fixed systems should be considered where applicable. [10:A.5.5.4.2]

~~13.6.2.5.2 Three-Dimensional Fires.~~

~~Large capacity dry-chemical extinguishers of 10 lb (4.54 kg) or greater and having a discharge rate of 1 lb/sec (0.45 kg/sec) or more shall be used to protect these hazards. [10:5.5.2]~~

Commented [CE1]: Moved to 13.6.2.5.1.1.1

~~13.6.2.5.3~~ 2 Obstacle Fires.

Selection of a fire extinguisher for this type of hazard shall be based on one of the following:

- (1) Extinguisher containing a vapor-suppressing foam agent
- (2)* Multiple extinguishers containing non-vapor-suppressing Class B agents intended for simultaneous application
- (3) Larger capacity extinguishers of 10 lb (4.54 kg) or greater and with a minimum discharge rate of 1 lb/sec (0.45 kg/sec)

[10:5.5.4.3]

A.13.6.2.5.3(2)

Where multiple extinguishers are utilized, simultaneous discharge from multiple locations to eliminate any blind spots created by an obstacle should be employed. [10:A.5.5.4.3(2)]

13.6.2.5.43* Water-Soluble ~~Flammable-Liquid~~ Fires (Polar Solvents).

Aqueous film-forming foam (AFFF) and film-forming fluoroprotein foam (FFFP) foam types of fire extinguishers shall not be ~~used-selected~~ for the protection of water-soluble flammable or combustible liquids, ~~such as alcohols, acetone, esters, ketones, and so forth,~~ unless specifically referenced on the fire extinguisher's nameplate. [10:5.5.4.4]

A.13.6.2.5.3

Examples of water-soluble flammable liquids include alcohols, acetone, esters, and ketones. [10:A.5.5.4.4]

13.6.2.5.54* Class K Cooking Media Fires.

Fire extinguishers provided for the protection of cooking appliances that use combustible cooking media (e.g., vegetable or animal oils and fats) shall be listed and labeled for Class K fires. [10:5.5.4.5]

A.13.6.2.5.54

Fire extinguishers for cooking media (vegetable or animal oils and fats) traditionally followed Table 6.3.1.1 of NFPA 10 for extra hazard, requiring a minimum 40-B--rated

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sodium bicarbonate or potassium bicarbonate dry chemical extinguisher. The evolution of high-efficiency cooking appliances and the change to hotter-burning vegetable shortening has created a more severe fire hazard. Testing has shown that wet chemical extinguishers have several times the cooking fire-extinguishing capability of a minimum 40-B rated sodium bicarbonate or potassium bicarbonate dry chemical extinguisher, which has prompted the creation of a new classification and a new listing test protocol. The test protocol is found in UL 711, CAN/ULC-S508. [10:A.5.5.4.5]

See NFPA 96 for further information. Persons in cooking areas need specific training on the use of extinguishers as an essential step for personal safety. Class K fire extinguishers equipped with extended wand-type discharge devices should not be used in a manner that results in subsurface injection of wet chemical extinguishing agents into hot cooking media. Subsurface injection causes a thermodynamic reaction comparable to an explosion. Class K fire extinguishers are no longer manufactured with extended wand-type discharge devices. [10:A.5.5.4.5]

13.6.2.5.54.1

Class K fire extinguishers manufactured after January 1, 2002, shall not be equipped with ~~extended-extended~~ wand-type discharge devices. [10:5.5.4.5.1]

13.6.2.5.54.2

Fire extinguishers installed specifically for the protection of cooking appliances that use combustible cooking media (e.g., animal or vegetable oils and fats) without a Class K rating shall be removed from service. [10:5.5.4.5.2]

13.6.2.5.54.3*

Where a hazard is protected by an automatic fire protection system, a placard shall be ~~conspicuously~~ placed near the extinguisher that states that the fire protection system shall be actuated prior to using the fire extinguisher. [10:5.5.4.5.3]

A.13.6.2.5.54.3

Figure A.13.6.2.5.54.3(a) and Figure A.13.6.2.5.54.3(b) show the recommended wording for the Class K placard. Recommended size is 7⁵/₈ in. × 11 in. (194 mm × 279 mm). [10:A.5.5.4.5.3]

Figure A.13.6.2.5.54.3(a) Typical Class K Placard in English and Spanish. [10:Figure A.5.5.4.5.3(a)]

INSERT FIGURE

Figure A.13.6.2.5.5.3(b) Typical Class K Placard in English and French. [10:Figure A.5.5.4.5.3(b)]

INSERT FIGURE

13.6.2.5.65* Electronic Equipment Fires.

~~Fire extinguishers for the protection of delicate electronic equipment shall be selected from types specifically listed and labeled for Class C hazards. (See 13.6.2.3.2.3.) [10:5.5.6]~~

A.13.6.2.5.6-5

Where occupancies are required to have extinguishers installed, this section is applicable to areas where the electronic equipment is located. Delicate electronic equipment includes, but is not limited to, telecommunications, computers, servers, robotics, and reproduction equipment. [10:A.5.5.4.6]

~~Extinguishers provided for the protection of delicate electronic equipment are typically halogenated agent and water mist extinguishers with Class A ratings. [10:A.5.5.4.6]~~

13.6.2.5.5.1

~~Fire extinguishers for the protection of delicate electronic equipment shall be selected from types specifically listed and labeled for Class C hazards. (See 13.6.2.3.2.3.) [10:5.5.4.6]~~

Commented [CE2]: Text is moved from 13.6.2.5.5

13.6.2.5.65.12*

Dry chemical fire extinguishers shall not be installed for the protection of delicate electronic equipment. [10:5.5.4.6.26.1]

A.13.6.2.5.65.2.1

Dry chemical residue will probably not be able to be completely and immediately removed, and, in addition, multipurpose dry chemical exposed to temperatures in excess of 250°F (121°C) or relative humidity in excess of 50 percent can cause corrosion.

~~The use of other clean agent types of extinguishing agents can help to minimize or eliminate collateral equipment damage and associated clean-up concerns. [10:A.5.5.4.6.26.1]~~

13.6.2.5.7-6 Areas Containing Oxidizers.

13.6.2.5.76.1

Only water or foam extinguishers shall be in-stalled in areas where pool chemicals containing chlorine or bromine are stored. [10:5.5.4.7.1]

13.6.2.5.76.2

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Multipurpose dry chemical fire extinguishers shall not be installed in areas where pool chemicals containing chlorine or bromine are stored. [10:5.5.4.7.2]

13.6.2.5.7.3

Fire extinguishers intended for use ~~on oxidizer fires~~ where oxidizers are stored or used shall be selected and installed based on the specific recommendations contained within the material's safety data sheet (SDS) for the oxidizer, surrounding conditions, and NFPA 400. [10:5.5.4.7.3]

13.6.2.5.8-7 Class D Combustible Metal Fires.

13.6.2.5.7.1

Fire extinguishers or containers of Class D extinguishing agents provided for the protection of Class D fires shall be listed and labeled for Class D fires. [10:5.5.4.8.1]

13.6.2.5.8.12*

Class D fire extinguishers and agents shall be compatible with the specific metal for which protection is provided. [10:5.5.4.8.21]

A.13.6.2.5.8.1-2

Other nonlisted agents can be used if acceptable to the AHJ. Other nonlisted agents include specially dried sand, dolomite, soda ash, lithium chloride, talc, foundry flux, and zirconium silicate or other agents shown to be effective. Consult NFPA 484 for use and limitations of these agents and other nonlisted alternatives. [10:A.5.5.4.8.21]

13.6.2.6 Selection for Specific Locations.

13.6.2.6.1*

Where portable fire extinguishers are required to be installed, the following documents shall be reviewed for the occupancies outlined in their respective scopes:

- (1) This Code
- (2) NFPA 2, ~~Hydrogen Technologies Code~~
- (3) NFPA 22, ~~Standard for Water Tanks for Private Fire Protection~~
- (4) NFPA 30, ~~Flammable and Combustible Liquids Code~~
- (5) NFPA 30A, ~~Code for Motor Fuel Dispensing Facilities and Repair Garages~~
- (6) NFPA 33, ~~Standard for Spray Application Using Flammable or Combustible Materials~~
- (7) NFPA 40, ~~Standard for the Storage and Handling of Cellulose Nitrate Film~~
- (8) NFPA 45, ~~Standard on Fire Protection for Laboratories Using Chemicals~~
- (9) NFPA 51, ~~Standard for the Design and Installation of Oxygen-Fuel Gas Systems for Welding, Cutting, and Allied Processes~~
- (10) NFPA 51B, ~~Standard for Fire Prevention During Welding, Cutting, and Other Hot Work~~

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- (11) NFPA 52, ~~Vehicular Natural Gas Fuel Systems Code~~
- (12) NFPA 58, ~~Liquefied Petroleum Gas Code~~
- (13) NFPA 59, ~~Utility LP Gas Plant Code~~
- (14) NFPA 59A, ~~Standard for the Production, Storage, and Handling of Liquefied Natural Gas (LNG)~~
- (15) NFPA 72, ~~National Fire Alarm and Signaling Code~~
- (16) NFPA 75, ~~Standard for the Fire Protection of Information Technology Equipment~~
- (17) NFPA 76, ~~Standard for the Fire Protection of Telecommunications Facilities~~
- (18) NFPA 96, ~~Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations~~
- (19) NFPA 99, ~~Health Care Facilities Code~~
- (20) NFPA 99B, ~~Standard for Hypobaric Facilities~~
- (21) NFPA 101, ~~Life Safety Code~~
- (22) NFPA 102, ~~Standard for Grandstands, Folding and Telescopic Seating, Tents, and Membrane Structures~~
- (23) NFPA 115, ~~Standard for Laser Fire Protection~~
- (24) NFPA 120, ~~Standard for Fire Prevention and Control in Coal Mines~~
- (25) NFPA 122, ~~Standard for Fire Prevention and Control in Metal/Nonmetal Mining and Metal Mineral Processing Facilities~~
- (26) NFPA 130, ~~Standard for Fixed Guideway Transit and Passenger Rail Systems~~
- (27) NFPA 140, ~~Standard on Motion Picture and Television Production Studio Soundstages, Approved Production Facilities, and Production Locations~~
- (28) NFPA 150, ~~Standard on Fire and Life Safety in Animal Housing Facilities~~
- (29) NFPA 160, ~~Standard for the Use of Flame Effects Before an Audience~~
- (30) NFPA 232, ~~Standard for the Protection of Records~~
- (31) NFPA 241, ~~Standard for Safeguarding Construction, Alteration, and Demolition Operations~~
- (32) NFPA 301, ~~Code for Safety to Life from Fire on Merchant Vessels~~
- (33) NFPA 302, ~~Fire Protection Standard for Pleasure and Commercial Motor Craft~~
- (34) NFPA 303, ~~Fire Protection Standard for Marinas and Boatyards~~
- (35) NFPA 307, ~~Standard for the Construction and Fire Protection of Marine Terminals, Piers, and Wharves~~
- (36) NFPA 326, ~~Standard for the Safeguarding of Tanks and Containers for Entry, Cleaning, or Repair~~
- (37) NFPA 385, ~~Standard for Tank Vehicles for Flammable and Combustible Liquids~~
- (38) NFPA 400, ~~Hazardous Materials Code~~
- (39) NFPA 403, ~~Standard for Aircraft Rescue and Fire-Fighting Services at Airports~~
- (40) NFPA 407, ~~Standard for Aircraft Fuel Servicing~~
- (41) NFPA 408, ~~Standard for Aircraft Hand-Portable Fire Extinguishers~~
- (42) NFPA 409, ~~Standard on Aircraft Hangars~~
- (43) NFPA 410, ~~Standard on Aircraft Maintenance~~
- (44) NFPA 418, ~~Standard for Heliports~~

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- (45) NFPA 423, *Standard for Construction and Protection of Aircraft Engine Test Facilities*
 - (46) NFPA 484, *Standard for Combustible Metals*
 - (47) NFPA 495, *Explosive Materials Code*
 - (48) NFPA 498, *Standard for Safe Havens and Interchange Lots for Vehicles Transporting Explosives*
 - (49) NFPA 501A, *Standard for Fire Safety Criteria for Manufactured Home Installations, Sites, and Communities*
 - (50) NFPA 502, *Standard for Road Tunnels, Bridges, and Other Limited Access Highways*
 - (51) NFPA 505, *Fire Safety Standard for Powered Industrial Trucks Including Type Designations, Areas of Use, Conversions, Maintenance, and Operations*
 - (52) NFPA 655, *Standard for Prevention of Sulfur Fires and Explosions*
 - (53) NFPA 731, *Standard for the Installation of Premises Security Systems*
 - (54) NFPA 801, *Standard for Fire Protection for Facilities Handling Radioactive Materials*
 - (55) NFPA 804, *Standard for Fire Protection for Advanced Light Water Reactor Electric Generating Plants*
 - (56) NFPA 805, *Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants*
 - (57) NFPA 820, *Standard for Fire Protection in Wastewater Treatment and Collection Facilities*
 - (58) NFPA 909, *Code for the Protection of Cultural Resource Properties — Museums, Libraries, and Places of Worship*
 - (59) NFPA 914, *Code for the Protection of Historic Structures*
 - (60) NFPA 1123, *Code for Fireworks Display*
 - (61) NFPA 1125, *Code for the Manufacture of Model Rocket and High Power Rocket Motors*
 - (62) NFPA 1126, *Standard for the Use of Pyrotechnics Before a Proximate Audience*
 - (63) NFPA 1141, *Standard for Fire Protection Infrastructure for Land Development in Wildland, Rural, and Suburban Areas*
 - (64) NFPA 1192, *Standard on Recreational Vehicles*
 - (65) NFPA 1194, *Standard for Recreational Vehicle Parks and Campgrounds*
 - (66) NFPA 1221, *Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems*
 - (67) NFPA 1901, *Standard for Automotive Fire Apparatus*
 - (68) NFPA 1906, *Standard for Wildland Fire Apparatus*
 - (69) NFPA 1925, *Standard on Marine Fire-Fighting Vessels*
 - (70) NFPA 5000, *Building Construction and Safety Code*
- [10:5.65.5.1]

A.13.6.2.6.1

Where portable fire extinguishers are required to be installed, the following documents should be reviewed for the occupancies outlined in their respective scopes:

- (1) NFPA 77, *Recommended Practice on Static Electricity*

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- (2) NFPA 402, *Guide for Aircraft Rescue and Fire-Fighting Operations*
- (3) NFPA 610, *Guide for Emergency and Safety Operations at Motorsports Venues*
- (4) NFPA 850, *Recommended Practice for Fire Protection for Electric-Generating Plants and High-Voltage Direct Current Converter Stations*
- (5) NFPA 921, *Guide for Fire and Explosion Investigations*
- (6) NFPA 1452, *Guide for Training Fire Service Personnel to Conduct Community Risk Reduction for Residential Occupancies*

[10:A.5.65.5.1]

13.6.2.6.2

In no case shall the requirements of the documents in 13.6.2.6.1 be less than those specified in Section 13.6 and Chapter 2. [10:5.65.5.2]

13.6.3 Installation of Portable Fire Extinguishers.

13.6.3.1 General.

13.6.3.1.1* Number of Extinguishers.

The minimum number of fire extinguishers needed to protect a property shall be determined as outlined in 13.6.3. [10:6.1.1]

A.13.6.3.1.1

The following items affect distribution of portable fire extinguishers:

- (1) Area and arrangement of the building occupancy conditions
- (2) Severity of the hazard
- (3) Anticipated classes of fire
- (4) Other protective systems or devices
- (5) Distances to be traveled to reach fire extinguishers

[10:A.6.1.1]

In addition, the following factors should be considered:

- (1) Anticipated rate of fire spread
- (2) Intensity and rate of heat development
- (3) Smoke contributed by the burning materials

[10:A.6.1.1]

Wheeled fire extinguishers have additional agent and range and should be considered for areas where the additional protection is needed. Portable fire extinguishers offer the occupant a means to assist in evacuation of a building or occupancy. They are useful to knock down the fire if it occurs along the evacuation route. If possible, the individual property should be surveyed for actual protection requirements. [10:A.6.1.1]

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13.6.3.1.1.1

The installation of extinguishers shall be independent of whether the building is equipped with automatic sprinklers, standpipe and hose, or other fixed protection equipment. [10:6.1.1.1]

13.6.3.1.1.2

Additional extinguishers shall be permitted to be installed to provide more protection ~~as necessary~~. [10:6.1.1.2]

13.6.3.1.1.3

Fire extinguishers having ratings less than those specified in Table 13.6.3.2.1.1 and Table 13.6.3.3.1.1 shall be permitted to be installed, provided they are not used in fulfilling the minimum protective requirements of this subsection, except as modified in 13.6.3.2.1.4, 13.6.3.2.1.5, and 13.6.3.3.1.1.1. [10:6.1.1.3]

13.6.3.1.1.4

Where multiple fire extinguishers with different ratings or operating characteristics are co-located to protect multiple hazard classes or specific hazards, each extinguisher shall be provided with clear and legible signage or placards to indicate their specific hazard use or protection rating. [10:6.1.1.4]

13.6.3.1.1.4.1

Individual signage or placards shall be provided for each extinguisher in the grouping and shall be placed immediately above or adjacent to each installed extinguisher. [10:6.1.1.4.1]

13.6.3.1.1.4.2

Where extinguishers are installed in cabinets, the required signage or placard shall be permitted to be placed on the face of the cabinet door provided it does not interfere with cabinet visibility, conspicuity, or fire resistance rating. [10:6.1.1.4.2]

13.6.3.1.2 Extinguisher Readiness.

Portable fire extinguishers shall be maintained in a fully charged and operable condition and shall be kept in their designated places at all times when they are not being used. [10:6.1.2]

13.6.3.1.3 Placement.

13.6.3.1.3.1

Fire extinguishers shall be conspicuously located where they are readily accessible and immediately available in the event of fire. [10:6.1.3.1]

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13.6.3.1.3.2

Fire extinguishers shall be located along normal paths of travel, including exits from areas. [10:6.1.3.2]

13.6.3.1.3.3 ~~Visibility. Visual Obstructions.~~

13.6.3.1.3.3.1

Fire extinguishers shall be installed in locations where they are visible except as permitted by 13.6.3.1.3.3.2 or 13.6.3.1.3.3.3. [10:6.1.3.3.1]

13.6.3.1.3.3.2*

In rooms and in locations where visual obstructions cannot be completely avoided, signs or other means shall be provided to indicate the extinguisher location. [10:6.1.3.3.2]

A.13.6.3.1.3.3.2

The primary means for identifying locations of fire extinguishers should be by the installation of the fire extinguisher signs that are specifically designed for that purpose. Examples of other means of identifying the fire extinguisher locations include arrows, lights, or coding of the wall or column. [10:A.6.1.3.3.2]

13.6.3.1.3.3.3

Fire extinguishers shall be permitted to be installed in fire extinguisher cabinets provided the extinguisher is visible or signs or other means are provided to indicate the extinguisher location. [10:6.1.3.3.3]

13.6.3.1.3.3.4

~~Signs~~ Where signs or other means are used to indicate fire extinguisher location they shall be located in close proximity to the extinguisher. [10:6.1.3.3.34]

13.6.3.1.3.3.4-5

~~Signs~~ Where signs or other means are used to indicate fire extinguisher location they shall be visible from the normal path of travel. [10:6.1.3.3.45]

13.6.3.1.3.4*

Portable fire extinguishers other than wheeled extinguishers shall be installed using any of the following means:

- (1)* Securely on a hanger intended for the extinguisher
- (2) In a bracket incorporating releasing straps or bands supplied by the extinguisher manufacturer

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- (3) In a listed bracket incorporating releasing straps or bands approved for such purpose
- (4) In approved cabinets or wall recesses

[10:6.1.3.4]

A.13.6.3.1.3.4

In situations where it is necessary that fire extinguishers be provided temporarily, a good practice is to provide portable stands ~~on uprights with feet~~, on which the fire extinguishers can be installed. Portable stands should be designed to comply with the mounting heights for extinguishers. (See 13.6.3.1.3.9.) [10:A.6.1.3.4]

A.13.6.3.1.3.4(1)

Hangers not intended for extinguishers should not be installed [e.g., a 5 lb (2.3 kg) extinguisher hanger should not be used with a 10 lb (4.5 kg) extinguisher].
[10:A.6.1.3.4(1)]

13.6.3.1.3.4.1

Hangers and brackets shall not be fabricated in the field. [10:6.1.3.4.1]

13.6.3.1.3.5

Wheeled fire extinguishers shall be located in designated locations. [10:6.1.3.5]

13.6.3.1.3.6

Fire extinguishers installed in or on vehicles ~~or under other conditions where they are subject to dislodgement~~ shall be installed in approved strap-type brackets specifically designed for this application. [10:6.1.3.6]

13.6.3.1.3.7

Fire extinguishers installed under conditions where they are subject to dislodgement shall be installed in approved strap-type brackets specifically designed to prevent dislodgement.
[10:6.1.3.7]

13.6.3.1.3.8

Fire extinguishers installed under conditions or in locations where they are subject to physical damage (e.g., from impact, vibration, the environment) shall be protected against such damage. [10:6.1.3.78]

13.6.3.1.3.8-9 Installation Height.

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13.6.3.1.3.89.1

Fire extinguishers having a gross weight not exceeding 40 lb (18.14 kg) shall be installed so that the top of the fire extinguisher is not more than 5 ft (1.53 m) above the floor. [10:6.1.3.89.1]

13.6.3.1.3.89.2

Fire extinguishers having a gross weight greater than 40 lb (18.14 kg) (except wheeled types) shall be installed so that the top of the fire extinguisher is not more than 3½ ft (1.07 m) above the floor. [10:6.1.3.89.2]

13.6.3.1.3.89.3

In no case shall the clearance between the bottom of the hand portable fire extinguisher and the floor be less than 4 in. (102 mm). [10:6.1.3.89.3]

13.6.3.1.3.9-10 Label Visibility.

13.6.3.1.3.910.1

Fire extinguishers shall be installed so that the fire extinguisher's operating instructions face outward. [10:6.1.3.910.1]

13.6.3.1.3.910.2

Hazardous materials identification systems (HMIS) labels, 6-year maintenance labels, hydrostatic test labels, or other labels shall not be located or placed on the front of the extinguisher. [10:6.1.3.910.2]

13.6.3.1.3.910.3*

The restrictions of 13.6.3.1.3.910.2 shall not apply to the original manufacturer's labels, labels that specifically relate to the extinguisher's operation or fire classification, or inventory control labels specific to that extinguisher. [10:6.1.3.910.3]

A.13.6.3.1.3.10.3

An example of an inventory control label could be a label or sticker with a number, symbol, or barcode that correlates with a specific extinguisher's details and location.
[10:A.6.1.3.10.3]

13.6.3.1.3.1011 Cabinets.

13.6.3.1.3.1011.1 Locked Cabinets.

13.6.3.1.3.11.1.1

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Cabinets housing fire extinguishers shall not be locked, except where fire extinguishers are subject to malicious use and cabinets include a means of emergency access. [10:6.1.3.1011.1.1]

13.6.3.1.3.1011.1.2

Cabinets housing fire extinguishers with breakfront panels shall be provided with breaker bars or hammers, designed for accessing the extinguisher during a fire emergency.

The location of fire extinguishers as described in 13.6.3.1.3.3.2 shall be marked conspicuously. [10:6.1.3.1011.2]

13.6.3.1.3.1011.3-2 Location.

13.6.3.1.3.11.32.1

The location of fire extinguishers in cabinets that are not visible from the normal path of travel shall be provided with signs or other means to indicate the extinguisher location. [10:6.1.3.11.2.1]

13.6.3.1.3.11.32.2

Signs or other means as stated in 13.6.3.1.3.11.3.1 shall be visible from the normal path of travel. [10:6.1.3.11.2.2]

13.6.3.1.3.11.43

Fire extinguishers mounted in cabinets or wall recesses shall be placed so that the fire extinguisher's operating instructions face outward. [10:6.1.3.1011.3]

13.6.3.1.3.1011.4*

Where fire extinguishers are installed in closed cabinets that are exposed to elevated temperatures, the cabinets shall be provided with screened openings and drains. [10:6.1.3.1011.4]

A.13.6.3.1.3.1011.4

Vented fire extinguisher cabinets should utilize tinted glass and should be constructed to prevent the entrance of insects and the accumulation of water. Vented fire extinguisher cabinets constructed in this manner lower the maximum internal temperature by 10°F to 15°F (5.6°C to 8.3°C). [10:A.6.1.3.1011.4]

13.6.3.1.3.1011.5

Cabinets or wall recesses for fire extinguishers shall be installed such that the extinguisher mounting heights specified in 13.6.3.1.3.8.1 and 13.6.3.1.3.8.2 are met. [10:6.1.3.1011.5]

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13.6.3.1.3.1011.6*

For fire resistance-rated walls, only surface-mounted cabinets or listed fire-rated cabinets shall be installed. [10:6.1.3.1011.6]

A.13.6.3.1.3.10.611.76

Certain fire resistance-rated cabinets are intended for installation into fire resistance-rated walls. Cabinets that are not fire resistance-rated make the entire fire resistance-rated wall noncompliant, so only surface-mounted cabinets or fire resistance-rated cabinets are appropriate for installation in fire resistance-rated walls.

[10:A.6.1.3.10.611.6]

13.6.3.1.3.1112*

Fire extinguishers shall not be exposed to temperatures outside of the listed temperature range shown on the fire extinguisher label. [10:6.1.3.1112]

A.13.6.3.1.3.11.12

The following precautions should be noted where fire extinguishers are located in areas that have temperatures outside the range of 40°F to 120°F (4°C to 49°C):

- (1) AFFF and FFFP fire extinguishers cannot be protected against temperatures below 40°F (4°C) by adding an antifreeze charge, because it tends to destroy the effectiveness of the extinguishing agent.
- (2) Plain water fire extinguishers should not be protected against temperatures below 40°F (4°C) with ethylene glycol antifreeze. Calcium chloride solutions should not be used in stainless steel fire extinguishers.
- (3) Fire extinguishers installed in machinery compartments, diesel locomotives, automotive equipment, marine engine compartments, and hot processing facilities can easily be subjected to temperatures above 120°F (49°C). Selection of fire extinguishers for hazard areas with temperatures above the listed limits should be made on the basis of recommendations by manufacturers of this equipment.

[10:A.6.1.3.1112]

13.6.3.1.4 Antifreeze.

13.6.3.1.4.1

Fire extinguishers containing only plain water shall be protected to temperatures as low as -40°F (-40°C) by the addition of an antifreeze that is stipulated on the fire extinguisher nameplate. [10:6.1.4.1]

13.6.3.1.4.2

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Calcium chloride solutions shall not be used in stainless steel fire extinguishers. [10:6.1.4.2]

13.6.3.1.5 Electronic Monitoring and Alarm System.

Where an electronic monitoring and alarm system is installed, 13.6.3.1.5.1 and 13.6.3.1.5.2 shall apply. [10:6.1.5]

13.6.3.1.5.1

The connection to the electronic monitoring device shall be continuously supervised for integrity. [10:6.1.5.1]

13.6.3.1.5.2

The power source for the electronic monitoring device shall be supervised for continuity of power. [10:6.1.5.2]

13.6.3.2 Installations for Class A Hazards.

13.6.3.2.1 Fire Extinguisher Size and Placement for Class A Hazards.

13.6.3.2.1.1

Minimal sizes of fire extinguishers for the listed grades of hazards shall be provided on the basis of Table 13.6.3.2.1.1, except as modified by 13.6.3.2.1.4 and 13.6.3.2.1.5. [10:6.2.1.1]

1Table 13.6.3.2.1.1 Fire Extinguisher Size and Placement for Class A Hazards

Criteria	Light Light-Hazard Occupancy	Ordinary Ordinary- Hazard Occupancy	Extra Extra-Hazard Occupancy
Minimum Minimum-rated single extinguisher	2-A	2-A	4-A
Maximum floor area per unit of A	3000 ft ² (279 m ²)	1500 ft ² (139 m ²)	1000 ft ² (92.9 m ²)
Maximum floor area per extinguisher	11,250 ft ² (1045 m ²)	11,250 ft ² (1045 m ²)	11,250 ft ² (1045 m ²)
Maximum travel distance to extinguisher	75 ft (22.9 m)	75 ft (22.9 m)	75 ft (22.9 m)

For SI units, 1 ft = 0.305 m; 1 ft² = 0.0929 m².

Note: For maximum floor area explanations, see E.3.3 of NFPA 10. [10:Table 6.2.1.1]

13.6.3.2.1.2

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The minimum number of extinguishers for Class A hazards shall be sufficient to meet the requirements of 13.6.3.2.1.2.1 through 13.6.3.2.1.2.3. [10:6.2.1.2]

13.6.3.2.1.2.1

The minimum number of fire extinguishers for Class A hazards for each floor of a building shall be determined by dividing the total floor area by the maximum area to be protected per extinguisher as determined by Table 13.6.3.2.1.1. (*See Annex E of NFPA 10.*) [10:6.2.1.2.1]

13.6.3.2.1.2.2

Fire extinguishers shall be located so that the maximum travel distances shall not exceed 75 ft (22.9 m), except as modified by 13.6.3.2.1.4. [10:6.2.1.2.2]

13.6.3.2.1.2.3

Where the quantity of extinguishers required to satisfy 13.6.3.2.1.2.2 exceeds the number calculated in 13.6.3.2.1.2.1, additional extinguishers shall be installed. [10:6.2.1.2.3]

~~13.6.3.2.1.3~~

~~Smaller fire extinguishers that are rated on Class B and Class C fires but do not have a minimum 1-A rating shall not be used to meet the requirements of 13.6.3.2.1. [10:6.2.1.3]~~

13.6.3.2.1.4.3

Fire extinguishers of lesser rating shall be permitted to be installed but shall not be considered as fulfilling any part of the requirements of Table 13.6.3.2.1.1, except as permitted in 13.6.3.2.1.4.3.1 and 13.6.3.2.1.4.3.2. [10:6.2.1.3.1]

13.6.3.2.1.4.3.1

Up to two water-type extinguishers, each with 1-A rating, shall be permitted to be used to fulfill the requirements of one 2-A rated extinguisher. [10:6.2.1.3.1.1]

13.6.3.2.1.4.3.2

Two 2¹/₂ gal (9.46 L) water-type extinguishers shall be permitted to be used to fulfill the requirements of one 4-A rated extinguisher. [10:6.2.1.3.1.2]

13.6.3.2.1.5.4

Up to one-half of the complement of fire extinguishers specified in Table 13.6.3.2.1.1 shall be permitted to be replaced by uniformly spaced 1¹/₂ in. (38 mm) hose stations for use by the occupants of the building. [10:6.2.1.4]

13.6.3.2.1.5.4.1

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Where hose stations are so provided, they shall conform to NFPA 14. [10:6.2.1.4.1]

13.6.3.2.1.54.2

The location of hose stations and the placement of fire extinguishers shall be such that the hose stations do not replace more than every other fire extinguisher. [10:6.2.1.4.2]

13.6.3.2.1.65

Where the area of the floor of a building is less than that specified in Table 13.6.3.2.1.1, at least one fire extinguisher of the minimum size required shall be provided. [10:6.2.1.5]

13.6.3.2.1.76

The protection requirements shall be permitted to be fulfilled with fire extinguishers of higher rating, provided the travel distance to such larger fire extinguishers does not exceed 75 ft (22.9 m) and the maximum floor area per unit of A is not exceeded. [10:6.2.1.6]

13.6.3.3 Installations for Class B Hazards.

13.6.3.3.1 Spill Fires.

13.6.3.3.1.1*

Minimum ratings of fire extinguishers for the listed grades of hazard shall be provided in accordance with Table 13.6.3.3.1.1. [10:6.3.1.1]

A.13.6.3.3.1.1

The ratings used in Table 6.3.1.1 are based on the fire test standard UL 711, *Standard for Rating and Fire Testing of Fire Extinguishers*. These test fires are conducted in square pans containing a flammable liquid. The flammable liquids in the pans are not in motion, and these fires do not have objects in them to interfere with the application of the extinguishing agent. A spill fire can be protected in accordance with Table 6.3.1.1. [10:A.6.3.1.1]

2Table 13.6.3.3.1.1 Fire Extinguisher Size and Placement for Class B Hazards

Type of Hazard	Basic Minimum Extinguisher Rating	Maximum Travel Distance to Extinguishers	
		ft	m
Light	5-B	30	9.14
	10-B	50	15.25
Ordinary	10-B	30	9.14
	20-B	50	15.25
Extra	40-B	30	9.14

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	80-B	50	15.25
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Note: The specified ratings do not imply that fires of the magnitudes indicated by these ratings will occur, but, rather, they are provided to give the operators more time and agent to handle difficult spill fires that have the potential to occur.

[10:Table 6.3.1.1]

13.6.3.3.1.1.1

Two or more fire extinguishers of lower rating shall not be used to fulfill the protection requirements of Table 13.6.3.3.1.1, except as permitted by 13.6.3.3.1.1.2 and 13.6.3.3.1.1.3.

[10:6.3.1.1.1]

13.6.3.3.1.1.2

Up to three AFFF or FFFP fire extinguishers of at least 2½ gal (9.46 L) capacity shall be permitted to be used to fulfill extra hazard requirements. [10:6.3.1.1.2]

13.6.3.3.1.1.3

Two AFFF or FFFP fire extinguishers of at least 1.6 gal (6 L) capacity shall be permitted to be used to fulfill ordinary hazard requirements. [10:6.3.1.1.3]

13.6.3.3.1.2

Fire extinguishers of lesser rating, designed for small specific hazards within the general hazard area, shall be permitted to be installed but shall not be considered as fulfilling any part of the requirements of Table 13.6.3.3.1.1, unless permitted by 13.6.3.3.1.1.1 or 13.6.3.3.1.1.2.

[10:6.3.1.2]

13.6.3.3.1.3

Fire extinguishers shall be located so that the maximum travel distances do not exceed those specified in Table 13.6.3.3.1.1. [10:6.3.1.3]

13.6.3.3.1.4

The protection requirements shall be permitted to be fulfilled with fire extinguishers of higher ratings, provided the travel distance to such larger fire extinguishers does not exceed 50 ft (15.25 m). [10:6.3.1.4]

13.6.3.3.2 Flammable Liquids of Appreciable Depth.

13.6.3.3.2.1

Portable fire extinguishers shall not be installed as the sole protection for flammable liquid hazards of appreciable depth where the surface area exceeds 10 ft² (0.93 m²). [10:6.3.2.1]

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~~13.6.3.3.2.2*~~

~~Where personnel who are trained in extinguishing fires in the protected hazards are located on the premises and capable of responding immediately, the maximum surface area shall not exceed 20 ft² (1.86 m²). [10:6.3.2.2]~~

~~A.13.6.3.3.2.2~~

~~Where such personnel are not available, the hazard should be protected by fixed systems. [10:A.6.3.2.2]~~

13.6.3.3.2.3.2

For flammable liquid hazards of appreciable depth, a Class B fire extinguisher shall be provided on the basis of at least 2 numerical units of Class B extinguishing potential per 1 ft² (0.09 m²) of flammable liquid surface of the largest hazard area. [10:6.3.2.32]

13.6.3.3.2.4.3

AFFF- or FFFP-type fire extinguishers shall be permitted to be provided on the basis of 1-B of protection per 1 ft² (0.09 m²) of hazard. *(For fires involving water-soluble flammable liquids, see 5.5.3.4.4 of NFPA 10.)* [10:6.3.2.43]

13.6.3.3.2.5.4

Two or more fire extinguishers of lower ratings, other than AFFF- or FFFP-type fire extinguishers, shall not be used in lieu of the fire extinguisher required for the largest hazard area. [10:6.3.2.54]

13.6.3.3.2.6.5

Up to three AFFF- or FFFP-type fire extinguishers shall be permitted to fulfill the requirements, provided the sum of the Class B ratings meets or exceeds the value required for the largest hazard area. [10:6.3.2.65]

13.6.3.3.2.7.6

Travel distances for portable fire extinguishers shall not exceed 50 ft (15.25 m). *(See Annex E of NFPA 10.)* [10:6.3.2.76]

13.6.3.3.2.76.1

Scattered or widely separated hazards shall be individually protected. [10:6.3.2.76.1]

13.6.3.3.2.76.2

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A fire extinguisher in the proximity of a hazard shall be located to be accessible in the presence of a fire without undue danger to the operator. [10:6.3.2.76.2]

13.6.3.3.3 Obstacle, Gravity/Three-Dimensional, and Pressure Fire Hazards.

13.6.3.3.3.1

Where hand portable fire extinguishers are in-stalled or positioned for obstacle, gravity/three-dimensional, or pressure fire hazards, the actual travel distance to hazard shall not exceed 30 ft (9 m) unless otherwise specified. (See 5.5.5.16.1 of NFPA 10.) [10:6.3.3.1]

13.6.3.3.3.2

Where wheeled fire extinguishers of 125 lb (56.7 kg) agent capacity or larger are installed or positioned for obstacle, gravity/three-dimensional, or pressure fire hazards, the actual travel distance to hazard shall not exceed 100 ft (30.5 m) unless otherwise specified. (See 5.5.3.16.1 of NFPA 10.) [10:6.3.3.2]

13.6.3.4* Installations for Class C Hazards.

A.13.6.3.4

Electrical equipment should be de-energized as soon as possible to prevent reignition. [10:A.6.4]

13.6.3.4.1

Fire extinguishers with Class C ratings shall be required where energized electrical equipment can be encountered. [10:6.4.1]

13.6.3.4.2

The requirement in 13.6.3.4.1 shall include situations where fire either directly involves or surrounds electrical equipment. [10:6.4.2]

13.6.3.4.3

Because fire is a Class A or Class B hazard, the fire extinguishers shall be sized and located on the basis of the anticipated Class A or Class B hazard. [10:6.4.3]

13.6.3.5 Installations for Class D Hazards.

13.6.3.5.1*

Fire extinguishers or extinguishing agents with Class D ratings shall be provided for fires involving combustible metals. [10:6.5.1]

A.13.6.3.5.1

Where Class D fire hazards exist, it is common practice to place bulk quantities of extinguishing agent near the potential Class D hazard. Depending on the type of metal present, the Class D agent selected for the protection of the hazard might not be a listed fire-extinguishing agent. In the case of the production of lithium metal, the agent of choice is lithium chloride, which is feed stock to the electrolytic cell where the lithium metal is manufactured. The use of lithium chloride on a lithium fire will not poison the electrolytic cell so the cell would not have to be drained and relined with fire brick. There are several Class D agents that have been shown to be effective on specific Class D fires. Additional information on Class D agents is provided in NFPA 484. [10:A.6.5.1]

The operation of Class D fire extinguishers is much different from that of dry chemical extinguishers rated for Class A, B, or C. The extinguishing agent from a Class D extinguisher should be applied to avoid spreading the combustible metal material and/or suspending the metal product in the air, which can result in an explosion, by slowly applying the agent. The application of a Class D agent on burning metals is intended to control the fire and assist in the formation of oxide crust that limits combustion. This is accomplished by first encircling the combustible metal material with the agent and then covering the burning metal in a smothering action. It is important to note that metal fires involving large quantities of metal beyond the incipient stage are nearly impossible to control or extinguish with a Class D agent. In most cases, the metal will continue to burn in a controlled fashion after application of the agent until it is completely oxidized. Disturbing the oxide crust can result in reignition and open burning if complete extinguishment, oxidation of the metal, or exclusion of oxygen has not occurred. Fires involving alkali earth metal and transitional metals will begin to form an oxide crust as they burn, which will limit open burning without the application of an extinguishing agent. Application of water or other extinguishing agents can result in an adverse reaction, including the potential for an explosion. Burning metals can also draw moisture from concrete or asphalt, which also maintains the potential for explosion. Large amounts of combustible metal materials involved in a fire can remain hot for some time and vigorously reignite if disturbed prior to complete extinguishment of the combustible metal materials. (See A.13.6.2.3.2.4.) [10:A.6.5.1]

13.6.3.5.2

Fire extinguishers or extinguishing agents (media) shall be located not more than 75 ft (22.9 m) of travel distance from the Class D hazard. (See Section E.6 of NFPA 10.) [10:6.5.2]

13.6.3.5.3*

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Portable fire extinguishers or extinguishing agents (media) for Class D hazards shall be provided in those work areas where combustible metal powders, flakes, shavings, chips, or similarly sized products are generated. [10:6.5.3]

A.13.6.3.5.3

See NFPA 484 for additional information. [10:A.6.5.3]

13.6.3.5.4*

Size determination shall be on the basis of the specific combustible metal, its physical particle size, area to be covered, and recommendations by the fire extinguisher manufacturer based on data from control tests. [10:6.5.4]

A.13.6.3.5.4

See NFPA 484 for additional information. [10:A.6.5.4]

13.6.3.6 Installations for Class K Hazards.

13.6.3.6.1*

Class K fire extinguishers shall be provided for hazards where there is a potential for fires involving combustible cooking media (vegetable or animal oils and fats). [10:6.6.1]

A.13.6.3.6.1

Examples of hazards where Class K extinguishers are needed include, but are not limited to, fryers, griddles, and stove tops. [10:A.6.6.1]

13.6.3.6.2

Maximum travel distance shall not exceed 30 ft (9.1 m) from the hazard to the extinguishers. [10:6.6.2]

13.6.3.6-37 Solid-Fuel Cooking Appliances.

All solid fuel cooking appliances (whether or not under a hood) with fire boxes of 5 ft³ (0.14 m³) volume or less shall have at least a listed 2-A rated water-type fire extinguisher or a 1.6 gal (6 L) wet chemical fire extinguisher that is listed for Class K fires. [10:6.6-37]

13.6.4 Inspection, Maintenance, and Recharging.

13.6.4.1* General.

A.13.6.4.1

Subsection 13.6.4 is concerned with the rules governing inspection, maintenance, and recharging of fire extinguishers. These factors are of prime importance in ensuring

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operation at the time of a fire. The procedure for inspection and maintenance of fire extinguishers varies considerably. Minimal knowledge is necessary to perform a monthly “quick check” or inspection in order to follow the inspection procedure as outlined in 13.6.4.2. [10:A.7.1]

13.6.4.1.1 Responsibility.

The owner or designated agent or occupant of a property in which fire extinguishers are located shall be responsible for inspection, maintenance, and recharging. (See 13.6.4.1.2.) [10:7.1.1]

13.6.4.1.2 Personnel.

13.6.4.1.2.1*

Persons performing maintenance and recharging of extinguishers shall be certified. [10:7.1.2.1]

A.13.6.4.1.2.1

Persons performing maintenance and recharging of extinguishers should meet one of the following criteria:

- (1) Factory training and certification for the specific type and brand of portable fire extinguisher being serviced
- (2) Certification by an organization acceptable to the AHJ
- (3) Registration, licensure, or certification by a state or a local AHJ

[10:A.7.1.2.1]

Certification confirms that a person has fulfilled specific requirements as a fire extinguisher service technician and has earned the certification. For the purpose of Section 13.6, certification is the process of an organization issuing a document confirming that an applicant has passed a test based on the chapters and annexes of NFPA 10. The organization administering the test issues an official document that is relied upon as proof of passing the test. Ultimately, the document issued by the organization administering the test must be acceptable to the AHJ. Some AHJs do not rely on outside organizations and establish their own local licensing programs that include a test. [10:A.7.1.2.1]

13.6.4.1.2.1.1

Persons training to become certified shall be permitted to perform maintenance and recharging of extinguishers under the direct supervision and in the immediate presence of a certified person. [10:7.1.2.1.1]

13.6.4.1.2.1.2*

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Certification requires that a person pass a test administered by an organization acceptable to the AHJ. [10:7.1.2.1.2]

A.13.6.4.1.2.1.2

Industrial facilities that establish their own maintenance and recharge facilities and that provide training to personnel who perform these functions are considered to be in compliance with this requirement. Examples include power generation, petrochemical, and telecommunications facilities. A letter from the facility management can be used as the certification document. [10:A.7.1.2.1.2]

13.6.4.1.2.1.3

The test shall, at a minimum, be based upon knowledge of the chapters and annexes of NFPA 10. [10:7.1.2.1.3]

13.6.4.1.2.1.4

The testing process shall permit persons to use NFPA 10 during the test. [10:7.1.2.1.4]

13.6.4.1.2.1.5

Persons passing the test required in 13.6.4.1.2.1.2 shall be issued a document or a certificate. [10:7.1.2.1.5]

13.6.4.1.2.1.6

The document or certificate shall be made available when requested by the AHJ. [10:7.1.2.1.6]

13.6.4.1.2.2*

Persons performing maintenance and recharging of extinguishers shall be trained and shall have available the appropriate manufacturer's servicing manual(s), the correct tools, recharge materials, lubricants, and manufacturer's replacement parts or parts specifically listed for use in the fire extinguisher. [10:7.1.2.2]

A.13.6.4.1.2.2

Industrial facilities that establish their own maintenance and recharge facilities and that provide training to personnel who perform these functions are considered to be in compliance with this requirement. Examples include power generation, petrochemical, and telecommunications facilities. A letter from the facility management can be used as the certification document. [10:A.7.1.2.1.2]

13.6.4.1.2.3*

Persons performing inspections shall not be required to be certified. [10:7.1.2.3]

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A.13.6.4.1.2.3

This requirement is not intended to prevent service technicians from performing the inspections. [10:A.7.1.2.3]

13.6.4.1.3 Replacement ~~While Servicing~~ Fire Extinguishers.

Fire extinguishers removed from service ~~for maintenance or recharging~~ shall be immediately replaced by a fire~~with~~ extinguishers that are suitable for the type of hazard(s) being protected and shall be of at least equal rating. [10:7.1.3]

13.6.4.1.3.1

When the removal and replacement of fire extinguishers from installed locations is necessary or desired, the owner or owner's agent shall be notified. [10:7.1.3.1]

13.6.4.1.4 Tags or Labels.

13.6.4.1.4.1

Tags or labels intended for recording inspections, maintenance, or recharging shall be affixed so as not to obstruct the fire extinguisher use, fire extinguisher classification, or manufacturer's labels. [10:7.1.4.1]

13.6.4.1.4.2

Labels indicating fire extinguisher use or classification or both shall be permitted to be placed on the front of the fire extinguisher. [10:7.1.4.2]

13.6.4.2 Inspection.

13.6.4.2.1 Inspection Frequency.

13.6.4.2.1.1*

Fire extinguishers shall be manually inspected when initially placed in service. [10:7.2.1.1]

A.13.6.4.2.1.1

Frequency of fire extinguisher inspections should be based on the need of the area in which fire extinguishers are located. The required monthly inspection is a minimum. [10:A.7.2.1.1]

13.6.4.2.1.2*

Fire extinguishers and Class D extinguishing agents shall be inspected either manually or by means of an electronic monitoring device/system at intervals not exceeding 31 days. [10:7.2.1.2]

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A.13.6.4.2.1.2

Inspections should be performed on extinguishers 12 times per year, at regular intervals not exceeding 31 days. [10:A.7.2.1.2]

13.6.4.2.1.2.1

Fire extinguishers and Class D extinguishing agents shall be inspected at least once per calendar month. [10:7.2.1.2.1]

13.6.4.2.1.3*

Fire extinguishers and Class D extinguishing agents shall be manually inspected daily or weekly when conditions exist that indicate the need for more frequent inspections. [10:7.2.1.3]

A.13.6.4.2.1.3

Inspections should be more frequent if any of the following conditions exist:

- (1) High frequency of fires in the past
- (2) Severe hazards
- (3) Susceptibility to tampering, vandalism, or malicious mischief
- (4) Possibility of, or history of, theft of fire extinguishers
- (5) Locations that make fire extinguishers susceptible to mechanical injury
- (6) Possibility of visible or physical obstructions
- (7) Exposure to abnormal temperatures or corrosive atmospheres
- (8) Characteristics of fire extinguishers, such as susceptibility to leakage

[10:A.7.2.1.3]

More frequent inspections could be enhanced through electronic monitoring of the fire extinguisher. [10:A.7.2.1.3]

13.6.4.2.1.4

Extinguishers that are electronically monitored for location only, such as those monitored by means of a switch to indicate when the extinguisher is removed from its bracket or cabinet, shall be manually inspected in accordance with 13.6.4.2.2. [10:7.2.1.4]

13.6.4.2.2 Inspection Procedures.

Periodic inspection or electronic monitoring of fire extinguishers shall include a check of at least the following items:

- (1) Location in designated place
- (2) Visibility of the extinguisher or means of indicating the extinguisher location
- (3) Access to the extinguisher
- (4) Pressure gauge reading or indicator in the operable range or position

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- (5) Fullness determined by weighing or hefting
 - (6) Condition of tires, wheels, carriage, hose, and nozzle for wheeled extinguishers
 - (7) Indicator for nonrechargeable extinguishers using push-to-test pressure indicators
- [10:7.2.2]

13.6.4.2.2.1

The owner or the owner's agent shall determine the method of extinguisher inspection such as manual inspection, electronic monitoring, or any combination of the two. [10:7.2.2.1]

13.6.4.2.2.2

Any method(s) of inspection other than manual inspection shall require the approval of the authority having jurisdiction. [10:7.2.2.2]

13.6.4.2.2.3*

In addition to 13.6.4.2.2, fire extinguishers shall be visually inspected in accordance with 13.6.4.2.2.4 if they are located where any of the following conditions exists:

- (1) High frequency of fires in the past
 - (2) Severe hazards
 - (3) Locations that make fire extinguishers susceptible to mechanical injury or physical damage
 - (4) Exposure to abnormal temperatures or corrosive atmospheres
- [10:7.2.2.3]

A.13.6.4.2.2.3

Fire extinguishers in vehicles should be inspected at the beginning of a shift or whenever the vehicle is used. The inspection should ensure that the extinguisher is charged and ready for use. Extinguishers in compartments or trunks can become damaged or otherwise compromised because of weather exposure, other items in the compartment that are not secured, or other factors. [10:A.7.2.2.3]

13.6.4.2.2.4

Where required by 13.6.4.2.2.3, the following inspection procedures shall be in addition to those addressed in 13.6.4.2.2:

- (1) Verify that operating instructions on nameplates are legible and face outward
 - (2) Check for broken or missing safety seals and tamper indicators
 - (3) Examine for obvious physical damage, corrosion, leakage, or clogged nozzle
- [10:7.2.2.4]

13.6.4.2.2.5 Inspection Procedure for Containers of Class D Extinguishing Agent.

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Periodic inspection of containers of Class D extinguishing agent used to protect Class D hazards shall include verification of at least the following:

- (1) Located in designated place
- (2) Visibility of the container or means of indicating the container location
- (3) Access to the container
- (4) Lid is sealed
- (5) Fullness by hefting or weighing
- (6) No obvious physical damage to container

[10:7.2.2.5]

13.6.4.2.3 Corrective Action.

When an inspection of any fire extinguisher reveals a deficiency in any of the conditions in 13.6.4.2.2 or 13.6.4.2.2.4, immediate corrective action shall be taken. [10:7.2.3]

13.6.4.2.3.1 Rechargeable Fire Extinguishers.

When an inspection of any rechargeable fire extinguisher reveals a deficiency in any of the conditions in 13.6.4.2.2(3), 13.6.4.2.2(4), 13.6.4.2.2(5), or 13.6.4.2.2(1) through 13.6.4.2.2(3), the extinguisher shall be subjected to applicable maintenance procedures. [10:7.2.3.1]

13.6.4.2.3.2 Nonrechargeable Dry Chemical Fire Extinguisher.

When an inspection of any nonrechargeable dry chemical fire extinguisher reveals a deficiency in any of the conditions listed in 13.6.4.2.2(3), 13.6.4.2.2(4), 13.6.4.2.2(6), or 13.6.4.2.2(1) through 13.6.4.2.2(4)(3), the extinguisher shall be removed from further use, discharged, and destroyed at the direction of the owner or returned to the manufacturer. [10:7.2.3.2]

13.6.4.2.3.3 Nonrechargeable Halon Agent Fire Extinguisher.

When an inspection of any nonrechargeable fire extinguisher containing a halon agent reveals a deficiency in any of the conditions listed in 13.6.4.2.2(3), 13.6.4.2.2(4), 13.6.4.2.2(6), or 13.6.4.2.2(1) through 13.6.4.2.2(4)(3), the extinguisher shall be removed from service, shall not be discharged, and shall be returned to the manufacturer, a fire equipment dealer, or a distributor to permit recovery of the halon. [10:7.2.3.3]

13.6.4.2.4 Inspection Record Keeping.

13.6.4.2.4.1 Manual Inspection Records.

13.6.4.2.4.1.1

Where manual inspections are conducted, records for manual inspections shall be kept on a tag or label attached to the fire extinguisher, on an inspection checklist maintained on file, or by an electronic method. [10:7.2.4.1.1]

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13.6.4.2.4.1.2

Where manual inspections are conducted, the month and year the manual inspection was performed and the initials of the person performing the inspection shall be recorded.

[10:7.2.4.1.2]

13.6.4.2.4.1.3

Where an external visual examination is performed in accordance with 7.3.2.1.1, a record in accordance with 13.6.4.3.2 shall be required in lieu of the record required by 13.6.4.2.4.1.2.

[10:7.2.4.1.3]

13.6.4.2.4.1.34

Personnel making manual inspections shall keep records of all fire extinguishers inspected, including those found to require corrective action. [10:7.2.4.1.34]

13.6.4.2.4.1.45

Records for manual inspection shall be kept to demonstrate that at least the last 12 monthly inspections have been performed. [10:7.2.4.1.45]

13.6.4.2.4.2 Electronic Inspection Records.

13.6.4.2.4.2.1

Where electronically monitored systems are employed for inspections, records shall be kept for fire extinguishers found to require corrective action. [10:7.2.4.2.1]

13.6.4.2.4.2.2

Records for electronic monitoring shall be kept to demonstrate that at least the last 12 monthly inspections have been performed. [10:7.2.4.2.2]

13.6.4.2.4.2.3

For electronically monitored fire extinguishers, where the extinguisher causes a signal at a control unit when a deficiency in any of the conditions listed in 13.6.4.2.2 occurs, record keeping shall be provided in the form of an electronic event log at the control panel.

[10:7.2.4.2.3]

13.6.4.3 Extinguisher Maintenance.

13.6.4.3.1 Maintenance Procedures.

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Where required by another section of this *Code* or NFPA 10, maintenance procedures shall include the procedures detailed in the manufacturer's service manual and a thorough examination of the basic elements of the fire extinguisher, including the following:

- (1) Mechanical parts of all fire extinguishers
- (2) Extinguishing agent
- (3) Expelling means
- (4) Physical condition

[10:7.3.1]

13.6.4.3.2* Annual Maintenance Record Keeping.

A.13.6.4.3.2

In addition to the required tag or label, a permanent file record should be kept for each fire extinguisher. This file record should include the following information, as applicable:

- (1) Maintenance date and the name of the person and the agency performing the maintenance
- (2) Date of the last recharge and the name of the person and the agency performing the recharge
- (3) Hydrostatic retest date and the name of the person and the agency performing the hydrostatic test
- (4) Description of dents remaining after passing of the hydrostatic test
- (5) Date of the 6-year maintenance for stored-pressure dry chemical and halogenated agent types (See 13.6.4.3.6.)

[10:A.7.3.4]

It is recognized that an electronic bar coding system is often acceptable to the AHJ in lieu of a tag or label for maintenance record keeping. [10:A.7.3.4]

Under special circumstances, or when local requirements are in effect, additional information can be desirable or required. [10:A.7.3.4]



Second Revision No. 2-NFPA 1-2022 [Global Comment]

See attached word document for updates to NFPA 13 extracts.

Supplemental Information

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
13-22_extract_updates_for_NFPA_1-24_OCP_From_Task_Group_.docx	For staff use	
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Submitter Information Verification

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Committee Statement

Committee Statement: NFPA documents are updated to the most current edition to comply with the NFPA Extract Policy. Changes within the extracted text have been reviewed by the technical committee. For substantiation on any technical changes, see the second draft report for the source document.

Request to FCC-AAC: Update the reference in section 2.4 to NFPA 13, 2022 edition.

Response Message: SR-2-NFPA 1-2022

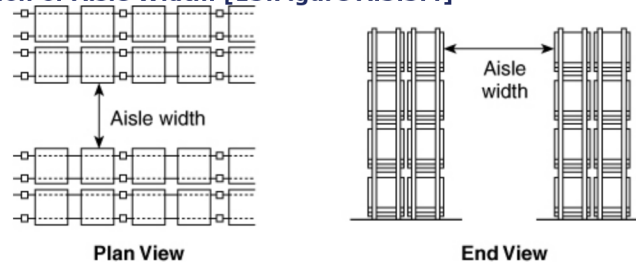
3.3.11* Aisle Width.

The horizontal dimension between the face of the loads in racks under consideration. [13,20192022] (FCC-OCP)

A.3.3.11 Aisle Width.

See Figure A.3.3.11. [13,20192022]

Figure A.3.3.11 Illustration of Aisle Width. [13:Figure A.3.3.4]



3.3.69 Commodity.

The combination of products, packing material, and container that determines commodity classification. [13,20192022] (FCC-OCP)

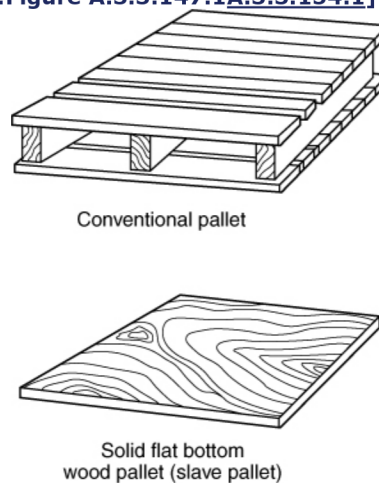
3.3.76* Conventional PalletsPallet.

A material-handling aid designed to support a unit load with openings to provide access for material-handling devices. (See Figure A.3.3.76.) [13,20192022] (FCC-OCP)

A.3.3.76 Conventional PalletsPallet.

See Figure A.3.3.76. [13,20192022]

Figure A.3.3.76 Typical Pallets. [13:Figure A.3.3.147.1A.3.3.154.1]



3.3.76* Core (Rolled Paper).

The central tube around which paper is wound to form a roll. [13, 2019] (FCC-OCP)

3.3.213 Packaging.

A commodity wrapping, cushioning, or container. [13, 2019] (FCC-OCP)

3.3.238.1 Double-Row Racks.

Racks less than or equal to 12 ft (3.7 m) in depth or single-row racks placed back to back having an aggregate depth up to 12 ft (3.7 m), with aisles having an aisle width of at least 3.5 ft (1.1 m) between loads on racks. [13,20192022] (FCC-OCP)

3.3.238.3 Multiple-Row Racks.

Racks greater than 12 ft (3.7 m) in depth or single- or double-row racks separated by aisles less than 3.5 ft (1.1 m) wide having an overall width greater than 12 ft (3.7 m). [13,20192022] (FCC-OCP)

3.3.238.4* Portable Racks.

Racks that are not fixed in place and can be arranged in any number of configurations. [13,20192022] (FCC-OCP)

3.3.238.5 Single-Row Racks.

Racks that have no longitudinal flue space and that have a depth up to 6 ft (1.8 m) with aisles having a width of at least 3.5 ft (1.1 m) between loads on racks. [13,20192022] (FCC-OCP)

3.3.267* Solid Shelving.

Shelving that is fixed in place, slatted, wire mesh, or other type of shelves located within racks. The area of a solid shelf is defined by perimeter aisle or flue space on all four sides or by the placement of loads that block openings that would otherwise serve as the required flue spaces. Solid shelves having an area equal to or less than 20 ft² (1.9 m²) are defined as open racks. Shelves of wire mesh, slats, or other materials more than 50 percent open and where the flue spaces are maintained are defined as open racks. [13,20192022] (FCC-OCP)

A.3.3.267 Solid Shelving.

The placement of loads affects the calculated area of the shelf. It is the intent to apply this definition to loads on the rack where 6 in. (150 mm) nominal flues are not provided on all four sides, regardless of whether shelving materials are present. See 20.5.3.1.2 of NFPA 13 for additional allowances for double-row racks up to 25 ft (7.6 m) and for multiple-row racks of any height without a longitudinal flue space. [13,20192022]

3.3.275* Storage Aids.

Commodity storage devices, such as pallets, dunnage, separators, and skids. [13, 2019] (FCC-OCP)

3.3.276.4 High-Piled Storage.

Solid-piled, palletized, rack storage, bin box, and shelf storage in excess of 12 ft (3.7 m) in height of Class I through Class IV commodities more than 12 ft (3.7 m) in height and solid-piled, palletized, rack storage, bin box, and shelf storage of Group A plastic commodities more than 5 ft (1.5 m) in height. [13,20192022] (FCC-OCP)

3.3.276.6 Laced Tire Storage.

Tires stored where the sides of the tires overlap, creating a woven or laced appearance. [See Figure A.34.9.1(g).] [13,20192022] (FCC-OCP)

3.3.276.7* Miscellaneous Tire Storage.

The storage of rubber tires that is incidental to the main use of the building; storage areas do not exceed 2000 ft² (186 m²), and on-tread storage piles, regardless of storage method, do not exceed 25 ft (7.6 m) in the direction of the wheel holes. Acceptable storage arrangements include (a) on-floor, on-side storage up to 12 ft (3.7 m) high; (b) on-floor, on-tread storage up to 5 ft (1.5 m) high; (c) double-row or multirow fixed or portable rack storage on-side or on-tread up to 5 ft (1.5 m) high; (d) single-row fixed or portable rack storage on-side or on-tread up to 12 ft (3.7 m) high; and (e) laced tires in racks up to 5 ft (1.5 m) in height. [13,20192022] (FCC-OCP)

A.3.3.276.7 Miscellaneous Tire Storage.

The limitations on the type and size of storage are intended to identify those situations where tire storage is present in limited quantities and incidental to the main use of the building. Occupancies such as aircraft hangars, automobile dealers, repair garages, retail storage facilities, automotive and truck assembly plants, and mobile home assembly plants are types of facilities where miscellaneous storage could be present. [13,20192022]

3.3.276.8 On-Side Tire Storage.

Tires stored horizontally or flat. [13,20192022] (FCC-OCP)

3.3.276.9 On-Tread Tire Storage.

Tires stored vertically or on their treads. [13,20192022] (FCC-OCP)

3.3.276.10 Palletized Tire Storage.

Storage on portable racks of various types utilizing a conventional pallet as a base. [13,20192022] (FCC-OCP)

3.3.289.1 Rubber Tires.

Pneumatic tires for passenger automobiles, aircraft, light and heavy trucks, trailers, farm equipment, construction equipment (off-the-road), and buses. [13,20192022] (FCC-OCP)

34.2.1*

Commodity classification and the corresponding protection requirements shall be determined based on the makeup of individual storage units. [13:20.3.1]

34.2.1.1

The type and amount of materials used as part of the product and its primary packaging as well as the storage pallet shall be considered in the classification of the commodity. [13:20.3.1.1]

34.2.1.2

When specific test data of commodity classification by a nationally recognized testing agency are available, the data shall be permitted to be used in determining classification of commodities. [13:20.3.1.2]

34.2.1.3

For the same storage arrangement, the following commodity classification ranking shall apply from lowest (Class I) to highest (exposed expanded plastic) severity as follows:

- (1) Class I
- (2) Class II
- (3) Class III
- (4) Class IV
- (5) Cartoned nonexpanded plastic
- (6) Cartoned expanded plastic
- (7) Exposed nonexpanded plastic
- (8) Exposed expanded plastic

[13: 20.3.1.3]

34.2.1.4

Protection criteria for commodities listed in 34.2.1.3 shall be permitted to protect lower commodities in the same list. [13:20.3.1.4]

34.2.2 Pallet Types.

34.2.2.1 General.

When loads are palletized, the use of wood or metal pallets, or listed pallets equivalent to wood, shall be assumed in the classification of commodities. [13:20.3.2.1]

34.2.2.2 Plastic Pallet.

A pallet having any portion of its construction consisting of a plastic material that has not been listed as equivalent to wood shall increase the class of commodity determined for a storage load in accordance with 20.3.2.2.1 or 20.3.2.2.2 of NFPA 13. [13:20.3.2.2]

34.3* Commodity Classes.

A.34.3

Specification of the type, amount, and arrangement of combustibles for any commodity classification is essentially an attempt to define the potential fire severity, based on its burning characteristics, so the fire can be successfully controlled by the prescribed sprinkler protection for the commodity class. In actual storage situations, however, many storage arrays do not fit precisely into one of the fundamental classifications; therefore, the user needs to make judgments after comparing each classification to the existing storage conditions. Storage arrays consist of thousands of products, which makes it impossible to specify all the acceptable variations for any class. As an alternative, a variety of common products are classified in this annex based on judgment, loss experience, and fire test results.[13:20.4]

Table A.34.3(a) provides examples of commodities not addressed by the classifications in Section 34.3. The commodities listed in Table A.34.3(a) are outside the scope of NFPA 13 protection.[13:20.4]

Table A.34.3(a) includes lithium ion batteries. Lithium ion batteries have been a research project within the NFPA Research Foundation. As a result, the following reports have been published:

- (1) *Lithium Ion Batteries Hazard and Use Assessment*, published July 2011 and available at the NFPA Research Foundation web site.

- (2) *Flammability Characterization of Lithium-ion Batteries in Bulk Storage*, published March 2013; and available at www.fmglobal.com/researchreports.
- (3) *Lithium Ion Batteries Hazard and Use Assessment Phase IIB, Flammability Characterization of Li-ion Batteries for Storage Protection*, published April 2013 and available at the NFPA Research Foundation web site.
- (4) *Lithium Ion Batteries Hazard and Use Assessment — Phase III*, published November 2016 and available at the NFPA Research Foundation web site.

[13:20.4]

Table A.34.3(b) is an alphabetized list of commodities with corresponding classifications. **[13:20.4]**

Table A.20.4.1, Table A.20.4.2, Table A.20.4.3, Table A.20.4.4, and Table A.20.4.5.1 of NFPA 13 provide examples of commodities within a specific class. **[13:20.4]**

[13:A.20.4]

Table A.34.3(a) Examples of Commodities Not Addressed by Classifications in Section 34.3

Ammunition Components

- Bulk primers and powder

Batteries

- Lithium and other similar exotic metals
- Lithium-ion and other rechargeable batteries that contain combustible electrolyte

Boat Storage

- Stored on racks

Boxes, Crates

- Empty, wood slatted*

Carpet Rolls

Combustible Metals — unless specifically identified otherwise

Compressed or Liquefied Flammable Gases (i.e., filled propane cylinders) — unless specifically identified otherwise

Explosives

- Blasting primers and similar items

Fertilizers (nitrates)

Fireworks

- Consumer and display

Flammable and Combustible Liquids — unless specifically identified otherwise

- Liquids that contain greater than 20 percent alcohol

Hanging Garments, Bulk Storage

Lighters (butane)

- Loose in large containers (Level 3 aerosol)

Storage Container

- Large container storage of household goods

*Should be treated as idle pallets.

[13:Table A.20.4(a)]

Table A.34.3(b) Alphabetical Listing of Commodity Classes

Product Heading	Product	NFPA 13
Batteries	Dry cells (excludes lithium, lithium-ion, and other similar exotic metals or combustible electrolyte); without blister packing (if blister packed refer to commodity classification definitions)	Class I

Product Heading	Product	NFPA 13
	Vehicle; any size (e.g., automobile or truck); empty plastic casing	Group A Nonexpanded
	Vehicle; large (e.g., truck or larger); dry or wet (excludes lithium-ion and other cells containing combustible electrolyte) cells	Group A Nonexpanded
	Vehicle; small (e.g., automobile); wet (excludes lithium-ion and other cells containing combustible electrolyte) cells	Class I
Empty Containers	Noncombustible	Class I
	PET, bottles or jars	Class IV
	Rigid plastic (not including PET), up to 32 oz. (1 L)	Group A Nonexpanded
	Rigid plastic (not including PET), greater than 32 oz. (1 L)	Group A Expanded
	Wood; solid sided (e.g., crates, boxes)	Class II
Film Rolls, Including Photographic	Film (polypropylene, polyester, polyethylene); rolled on any reel type	Group A Nonexpanded
	Film; 35 mm metal film cartridges in polyethylene cans; cartoned	Class III
	Film; motion picture or bulk rolls in polycarbonate, polyethylene or in metal cans; polyethylene bagged; cartoned	Class II
	Film; rolls in polycarbonate plastic cassettes; cartoned	Class IV
	Photographic paper; sheets; bagged in polyethylene; cartoned	Class III
Flammable/Combustible Liquids	Aerosol; Level 1	Class III
	Lighters; butane; blister-packed; cartoned	Group A Nonexpanded
	Liquids; up to 20 percent alcohol (e.g., alcoholic beverages, flavoring extracts); greater than 5 gal (20 L) plastic containers with wall thickness greater than 1/4 in. (6 mm)	Group A Nonexpanded
	Liquids; up to 20 percent alcohol (e.g., alcoholic beverages, flavoring extracts); metal, glass or ceramic containers	Class I
	Liquids; up to 20 percent alcohol (e.g., alcoholic beverages, flavoring extracts); plastic containers greater than 5 gal (20 L) and wall thickness up to 1/4 in. (6 mm)	Class II
	Liquids; up to 20 percent alcohol (e.g., alcoholic beverages, flavoring extracts); up to 5 gal (20 L) plastic bottles or jars	Class I
	Liquids; up to 20 percent alcohol (e.g., alcoholic beverages, flavoring extracts); wood containers	Class II
Food Products — Frozen	Frozen foods; nonwaxed or nonplastic packaging	Class I
	Frozen foods; plastic trays	Class III
	Frozen foods; waxed or plastic-coated paper packaging	Class II
Food Products — Non-Frozen	Butter (stick or whipped spread) or margarine (up to 50 percent oil)	Class III
	Dry foods (such as baked goods, candy, cereals, cheese, chocolate, cocoa, coffee, grains, granular sugar, nuts, etc.); bagged or cartoned	Class III
	Foods (e.g., coffee, fish products, fruit, meat products, nuts, poultry, etc.); metal cans	Class I
	Fruits and vegetables (noncombustible semi-liquids); crushed; plastic containers up to 5 gal (20 L)	Class I

Product Heading	Product	NFPA 13
	Fruits and vegetables; fresh; wood spacers, non-plastic trays or containers	Class I
	Margarine; over 50 and up to 80 percent oil	Group A Nonexpanded
	Meat; fresh; no plastic packaging; exposed	Class I
	Meat; fresh; no plastic packaging; cartoned	Class II
	Meat; fresh; plastic trays	Class III
	Milk; any container; stored in solid plastic crates	Group A Nonexpanded
	Milk; paper containers, or plastic bottles or jars up to 5 gal (20 L) plastic bottles or jars	Class I
	Salt; bagged	Class I
	Salt; cartoned	Class II
	Snack foods (e.g., potato chips); plasticized aluminum bags; cartoned	Group A Nonexpanded
Furniture and Bedding	Syrup; wooden container	Class II
	Furniture and bedding; with foam cushioning	Group A Expanded
	Furniture; metal (e.g., file cabinets or desks with plastic trim); cartoned	Class I
	Furniture; wood (e.g., doors, windows, cabinets, etc.); no plastic coverings or foam cushioning	Class III
	Furniture; wood; plastic coverings nonexpanded plastic trim	Class IV
	Box spring; standard (minimal plastic materials)	Class III
	Box spring; wrapped in plastic cover	Class IV
Housing Materials/Appliances	Mattress; foam (in finished form)	Group A Expanded
	Appliances; major (e.g., stoves, refrigerators); no appreciable plastic interior or exterior trim; cartoned	Class II
	Appliances; major (e.g., stoves, refrigerators); no appreciable plastic interior or exterior trim; exposed	Class I
	Appliances; no appreciable plastic exterior trim (interior of unit can have appreciable plastic)	Class III
	Carpet tiles; cartoned	Group A Nonexpanded
	Fiberglass insulation; paper-backed rolls; bagged or unbagged	Class IV
	Floor coverings; vinyl, stacked tiles	Class IV
	Floor coverings; vinyl; rolled	Group A Nonexpanded
	Gypsum board	Class I
	Housing materials (such as sinks, countertops, etc.); noncombustible, cartoned or crated	Class II
	Paint; oil-based; friction-top metal containers; cartoned	Class IV
	Paint; water-based (latex); friction-top metal containers; cartoned	Class I
	Roofing shingles; asphalt-coated fiberglass	Class III
	Roofing shingles; asphalt-impregnated felt	Class IV
Miscellaneous	Ammunition; small arms and shotgun; cartoned	Class IV
	Charcoal; mineral spirit impregnated; bagged	Group A Expanded

Product Heading	Product	NFPA 13
	Charcoal; standard (non-mineral spirit impregnated); bagged	Class III
	Leather hides; baled	Class II
	Leather; finished products (e.g., shoes, jackets, gloves, bags, luggage, belts)	Class III
	Motors; electric	Class I
	Shock absorbers; metal dust cover	Class II
	Shock absorbers; plastic dust cover	Class III
	Skis; composite materials (plastic, fiberglass, foam, etc.)	Class IV
	Tobacco products; cartoned	Class III
	Toys; stuffed; foam or synthetic	Group A Expanded
	Transformer; dry or empty (i.e., void of oil)-filled	Class I
Noncombustible Liquids	Liquids or semi-liquids; PET containers greater than 5 gal (20 L) having a nominal wall thickness greater than 0.25 in. (6 mm)	Class IV
	Liquids or semi-liquids; PET containers up to 5 gal (20 L) or greater than 5 gal (20 L) having a nominal wall thickness up to 0.25 in. (6 mm)	Class I
	Liquids or semi-liquids (e.g., crushed fruits and vegetables); plastic containers up to 5 gal (18.9 L) capacity	Class I
	Liquids or semi-liquids; plastic (except PET) containers greater than 5 gal (20 L) capacity having a nominal wall thickness greater than 0.25 in. (6 mm)	Group A Nonexpanded
	Liquids or semi-liquids; plastic (except PET) containers greater than 5 gal (20 L) capacity having a nominal wall thickness up to 0.25 in. (6 mm)	Class II
	Liquids; cardboard drink boxes, plastic-coated, wax-coated, and/or aluminum-lined; exposed or on corrugated carton trays with plastic sheeting	Class I
	Liquids; cardboard drink boxes, plastic-coated, wax-coated, and/or aluminum-lined; stored in plastic containers	Group A Nonexpanded
	Liquids; glass bottles or jars; cartoned	Class I
	Liquids; pharmaceuticals (nonflammable); glass bottles or jars; cartoned	Class II
	Liquids; plastic bottles or jars; stored in open or solid plastic crates	Group A Nonexpanded
Paper Products	Book signatures (paper part of book without hard cover)	Class II
	Cartons (i.e., cardboard flats); corrugated; partially assembled	Class IV
	Cartons (i.e., cardboard flats); corrugated; unassembled in neat piles	Class III
	Cartons; wax-coated, single-walled corrugated	Group A Nonexpanded
	Cellulosic paper products; nonwax-coated (e.g., books, cardboard games, cartoned tissue products, magazines, newspapers, paper cups, paper plates, paper towels, plastic-coated paper food containers, stationery)	Class III
	Cellulosic paper products; wax-coated (e.g., paper plates, cups); loosely packed; cartoned	Group A Nonexpanded

Product Heading	Product	NFPA 13
	Cellulosic paper products; wax-coated (e.g., paper plates, cups); nested; cartoned	Class IV
	Matches; paper-type; cartoned	Class IV
	Matches; wooden; cartoned	Group A Nonexpanded
	Rolled; lightweight; in storage racks	Class IV
	Rolled; medium or heavyweight; in storage racks or on-side	Class III
	Tissue products; plastic-wrapped; cartoned	Class III
	Tissue products; plastic-wrapped; exposed	Group A Nonexpanded
Plastic/Rubber	ABS (Acrylonitrile-butadiene-styrene copolymer)	Group A Nonexpanded
	Acetal (polyformaldehyde)	Group A Nonexpanded
	Acrylic (polymethyl methacrylate)	Group A Nonexpanded
	Automobile bumpers and dashboards	Group A Expanded
	Butyl rubber	Group A Nonexpanded
	Cellulose Acetate	Class IV
	Cellulose Acetate Butyrate	Group A Nonexpanded
	Chloroprene rubber	Class IV
	Containers; nonexpanded plastic gridded or solid; collapsed or nested with no air spaces	Group A Nonexpanded
	ECTFE (ethylene-chlorotrifluoro-ethylene copolymer)	Class IV
	EPDM (ethylene-propylene rubber)	Group A Nonexpanded
	ETFE (ethylene-tetrafluoroethylene copolymer)	Class IV
	Ethyl Cellulose	Group A Nonexpanded
	FEP (fluorinated ethylene-propylene copolymer)	Class IV
	FRP (fiberglass-reinforced polyester)	Group A Nonexpanded
	Melamine (melamine formaldehyde)	Class III
	Nitrile Rubber (acrylonitrile-butadiene rubber)	Group A Nonexpanded
	Nylon (nylon 6, nylon 6/6)	Group A Nonexpanded
	PCTFE (polychlorotrifluoroethylene)	Class III
	PET (Polyethylene Terephthalate — thermoplastic polyester)	Group A Nonexpanded
	Phenolic	Class III
	Plastics; stored in fully closed and solid (no openings), metal containers	Class I
	Polybutadiene	Group A Nonexpanded
	Polycarbonate	Group A Nonexpanded
	Polyester elastomer	Group A Nonexpanded
	Polyethylene	Group A Nonexpanded
	Polypropylene	Group A Nonexpanded
	Polystyrene; foam products (plates, cups, etc.)	Group A Expanded
	Polystyrene; rigid products	Group A Nonexpanded
	Polyurethane	Group A Expanded
	PTFE (polytetrafluoroethylene)	Class III

Product Heading	Product	NFPA 13
	PVC (polyvinyl chloride) products, up to 20 percent plasticizer	Class III
	PVC (polyvinyl chloride) products, greater than 20 percent plasticizer	Group A Nonexpanded
	PVC resins; bagged	Class III
	PVDC (polyvinylidene chloride)	Class III
	PVDF (polyvinylidene fluoride)	Class III
	PVF (polyvinyl fluoride)	Group A Nonexpanded
	Rubber; natural in blocks; cartoned	Group A Nonexpanded
	Rubber; natural; expanded	Group A Expanded
	Rubber; natural; nonexpanded	Group A Nonexpanded
	Rubber; synthetic (santoprene)	Group A Nonexpanded
	SAN (styrene acrylonitrile)	Group A Nonexpanded
	SBR (styrene-butadiene rubber)	Group A Nonexpanded
	Silicone rubber	Class IV
	Urea (urea formaldehyde)	Class III
Plastic Containers	Bottles or jars (except PET) greater than 1 gal (4 L) containing noncombustible solids	Group A Nonexpanded
	Bottles or jars (except PET) up to 1 gal (4 L) containing noncombustible solids	Group A, cartoned (treat as cartoned even if exposed) Nonexpanded
Powders/Pills	Pharmaceutical pills; glass bottles or jars; cartoned	Class II
	Pharmaceuticals pills; plastic bottles or jars; cartoned	Class IV
	Polyvinyl Alcohol (PVA) resins; bagged	Class IV
	Powders; combustible (ordinary such as sugar or flour); free-flowing; bagged	Class II
	Powders; noncombustible free-flowing powdered or granular materials (cement, calcium chloride, clay, iron oxide, sodium chloride, sodium silicate, etc.)	Class I
	Powders; noncombustible; glass bottles or jars; cartoned	Class I
	Powders; noncombustible; PET bottles or jars	Class II
	Powders; noncombustible; plastic (other than PET) bottles or jars; exposed	Group A Nonexpanded
	Powders; noncombustible; plastic bottles or jars greater than 1 gal (4 L) capacity	Group A Nonexpanded
	Powders; noncombustible; plastic bottles or jars up to 1 gal (4 L) capacity; cartoned	Class IV
Textile Materials/Products	Cloth; natural fibers; baled	Class III
	Cloth; synthetic cloth	Group A Nonexpanded
	Clothing; natural fibers (e.g., wool, cotton) and viscose	Class III
	Cotton; cartoned	Class III
	Diapers; cotton or linen	Class III
	Diapers; plastic or nonwoven fabric; cartoned	Class IV

Product Heading	Product	NFPA 13
	Diapers; plastic or nonwoven fabric; plastic-wrapped; exposed	Group A Nonexpanded
	Fabric; rayon and nylon	Group A Nonexpanded
	Fabric; synthetic (except rayon and nylon); greater than 50/50 blend	Group A Nonexpanded
	Fabric; synthetic (except rayon and nylon); up to 50/50 blend	Group A Nonexpanded
	Fabric; vinyl-coated (e.g., tablecloth); cartoned	Group A Nonexpanded
	Fibers; rayon and nylon; baled	Class IV
	Fibers; synthetic (except rayon and nylon); baled	Group A Nonexpanded
	Thread or yarn; rayon and nylon; wood or paper spools	Class IV
	Thread or yarn; rayon or nylon; plastic spools	Group A Nonexpanded
	Thread or yarn; synthetic (except rayon and nylon); greater than 50/50 blend; paper or wood spools	Group A Nonexpanded Plastic
	Thread or yarn; synthetic (except rayon and nylon); greater than 50/50 blend; plastic spools	Group A Nonexpanded
	Thread or yarn; synthetic (except rayon and nylon); up to 50/50 blend; plastic spools	Group A Nonexpanded
	Thread or yarn; synthetic (except rayon and nylon); up to 50/50 blend; wood or paper spools	Group A Nonexpanded Plastic
Wax Products	Candles	Group A Expanded
	Paraffin or petroleum wax; blocks	Group A Expanded
Wire/Cable/Spools	Spools; plastic; empty	Group A Nonexpanded
	Spools; wood; empty	Class III
	Wire or cable; PVC insulated; metal or wood spools	Class II
	Wire or cable; PVC insulated; plastic spools	Class IV
	Wire; bare; metal spools, exposed	Class I
	Wire; bare; metal spools; cartoned	Class II
	Wire; bare; plastic spools; cartoned	Class IV
	Wire; bare; plastic spools; exposed	Group A Nonexpanded
	Wire; bare; wood or cardboard spools	Class II
Wood Products	Wood patterns	Class IV
	Wood products (e.g., fiberboard, lumber, particle board, plywood, pressboard with smooth ends and edges); bundled solid blocks	Class II
	Wood products (e.g., fiberboard, lumber, particle board, plywood, pressboard with smooth ends and edges); unbundled or non-solid blocks	Class III
	Wood products (e.g., toothpicks, clothespins and hangers)	Class III

[13:Table A.20.4(b)]

34.3.1* Class I.

A Class I commodity shall be defined as a noncombustible product that meets one of the following criteria:

- (1) Placed directly on wood pallets
- (2) Placed in single-layer corrugated cartons, with or without single-thickness cardboard dividers, with or without pallets

(3) Shrink-wrapped or paper-wrapped as a unit load with or without pallets [13:20.4.1]

A.34.3.1

See NFPA 13, Table A.20.4.1.[13:A.20.4.1]

34.3.2* Class II.

A Class II commodity shall be defined as a noncombustible product that is in slatted wooden crates, solid wood boxes, multiple-layered corrugated cartons, or equivalent combustible packaging material, with or without pallets. [13:20.4.2]

A.34.3.2

See NFPA 13, Table A.20.4.2.[13:20.4.2]

34.3.3* Class III.

A.34.3.3

See NFPA 13, Table A.20.4.3.[13:20.4.3]

34.3.3.1

A Class III commodity shall be defined as a product fashioned from wood, paper, natural fibers, or Group C plastics with or without cartons, boxes, or crates and with or without pallets. [13:20.4.3.1][13:20.4.3]

34.3.3.2

A Class III commodity shall be permitted to contain a limited amount (5 percent or less by weight of nonexpanded plastic or 5 percent or less by volume of expanded plastic) of Group A or Group B plastics. [13:20.4.3.2]

34.3.3.3

Class III commodities containing a mix of both Group A expanded and nonexpanded plastics shall comply with Figure 34.3.3.3(a) where they are within cartons, boxes, or crates or with Figure 34.3.3.3(b) where they are exposed. [13:20.4.3.3]

Figure 34.3.3.3(a) Commodities, Cartoned or Within a Wooden Container, Containing a Mixture of Expanded and Nonexpanded Group A Plastics. [13:Figure 20.4.3.3(a)]

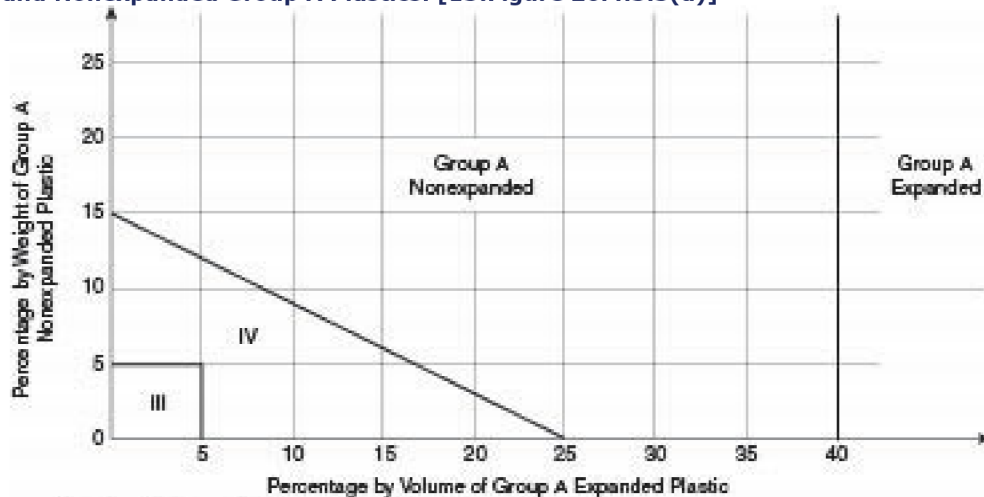
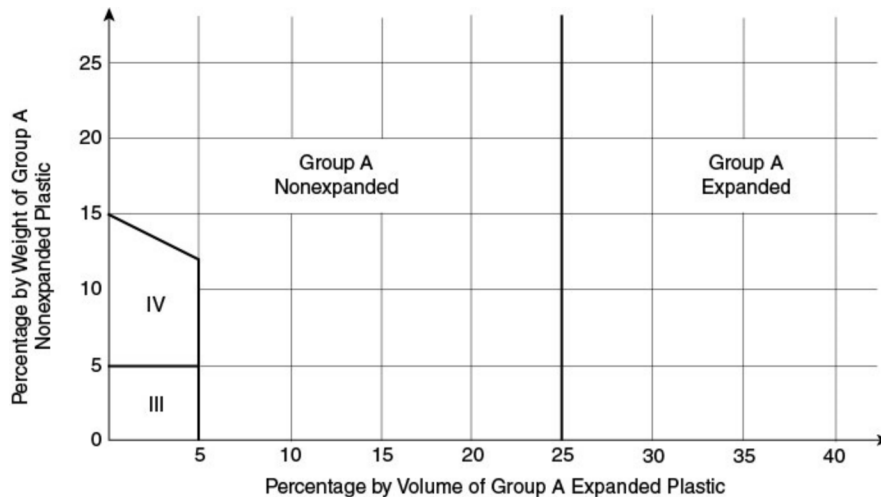


Figure 34.3.3.3(b) Exposed Commodities Containing a Mixture of Expanded and Nonexpanded Group A Plastics. [13:Figure 20.4.3.3(b)]



III - Class III Commodity. Refer to 20.3.2 if a plastic pallet is used.

IV - Class IV Commodity. Refer to 20.3.2 if a plastic pallet is used.

34.3.4* Class IV. [13:20.4.4]

34.3.4.1

A Class IV commodity shall be defined as a product, with or without pallets, that meets one of the following criteria:

- (1) Constructed partially or totally of Group B plastics
- (2) Consists of free-flowing Group A plastic materials
- (3) Cartoned, or within a wooden container, that contains greater than 5 percent and up to 15 percent by weight of Group A nonexpanded plastic
- (4) Cartoned, or within a wooden container, that contains greater than 5 percent and up to 25 percent by volume of expanded Group A plastics
- (5) Cartoned, or within a wooden container, that contains a mix of Group A expanded and nonexpanded plastics and complies with Figure 34.3.3.3(a)
- (6) Exposed, that contains greater than 5 percent and up to 15 percent by weight of Group A nonexpanded plastic
- (7) Exposed, that contains a mix of Group A expanded and nonexpanded plastics and complies with Figure 34.3.3.3(b)

[13:20.4.4.1]

34.3.4.2

The remaining materials shall be permitted to be noncombustible, wood, paper, natural fibers, or Group B or Group C plastics. [13:20.4.4.2]

34.3.5* Classification of Plastics, Elastomers, and Rubber.

Plastics, elastomers, and rubber shall be classified as Group A, Group B, or Group C. [13:20.4.5]

34.3.5.1 Group A.

The following materials shall be classified as Group A:

- (1) ABS (acrylonitrile-butadiene-styrene copolymer)
- (2) Acetal (polyformaldehyde)
- (3) Acrylic (polymethyl methacrylate)
- (4) Butyl rubber
- (5) Cellulosics (cellulose acetate, cellulose acetate butyrate, ethyl cellulose)

- (6) EPDM (ethylene-propylene rubber)
- (7) FRP (fiberglass-reinforced polyester)
- (8) Natural rubber
- (9) Nitrile-rubber (acrylonitrile-butadiene-rubber)
- (10) Nylon (nylon 6, nylon 6/6)
- (11) PET (thermoplastic polyester)
- (12) Polybutadiene
- (13) Polycarbonate
- (14) Polyester elastomer
- (15) Polyethylene
- (16) Polypropylene
- (17) Polystyrene
- (18) Polyurethane
- (19) PVC (polyvinyl chloride — highly plasticized, with plasticizer content greater than 20 percent) (rarely found)
- (20) PVF (polyvinyl fluoride)
- (21) SAN (styrene acrylonitrile)
- (22) SBR (styrene-butadiene rubber)

[13:20.4.5.1]

34.3.5.2*

Group A plastics shall be further subdivided as either expanded or nonexpanded. [13:20.4.5.2]

34.3.5.3

A Group A expanded plastic commodity shall be defined as a product, with or without pallets, that meets one of the following criteria:

- (1) Cartoned, or within a wooden container, that contains greater than 40 percent by volume of Group A expanded plastic
- (2) Exposed, that contains greater than 25 percent by volume of Group A expanded plastic[13:20.4.5.3]

34.3.5.4

A Group A nonexpanded plastic commodity shall be defined as a product, with or without pallets, that meets one of the following criteria:

- (1) Cartoned, or within a wooden container, that contains greater than 15 percent by weight of Group A nonexpanded plastic
- (2) Cartoned, or within a wooden container, that contains greater than 25 percent and up to 40 percent by volume of Group A expanded plastic
- (3) Cartoned, or within a wooden container, that contains a mix of Group A nonexpanded and expanded plastics, in compliance with Figure 34.3.3.3(a)
- (4) Exposed, that contains greater than 15 percent by weight of Group A nonexpanded plastic
- (5) Exposed, that contains greater than 5 percent and up to 25 percent by volume of Group A expanded plastic
- (6) Exposed, that contains a mix of Group A nonexpanded and expanded plastics, in compliance with Figure 34.3.3.3(b)

[13:20.4.5.4]

34.3.5.5

The remaining materials shall be permitted to be noncombustible, wood, paper, natural or synthetic fibers, or Group A, Group B, or Group C plastics. [13:20.4.5.5]

34.3.6 Group B.

The following materials shall be classified as Group B:

- (1) Chloroprene rubber
- (2) Fluoroplastics (ECTFE — ethylene-chlorotrifluoro-ethylene copolymer; ETFE — ethylene tetrafluoroethylene copolymer; FEP — fluorinated ethylene-tetrafluoroethylene-propylene-copolymer)
- (3) Silicone rubber

[13:20.4.6]

34.3.7 Group C.

The following materials shall be classified as Group C:

- (1) Fluoroplastics (PCTFE — polychlorotrifluoroethylene; PTFE — polytetrafluoroethylene)
- (2) Melamine (melamine formaldehyde)
- (3) Phenolic
- (4) PVC (polyvinyl chloride — flexible — PVCs with plasticizer content up to 20 percent)
- (5) PVDC (polyvinylidene chloride)
- (6) PVDF (polyvinylidene fluoride)
- (7) Urea (urea formaldehyde)

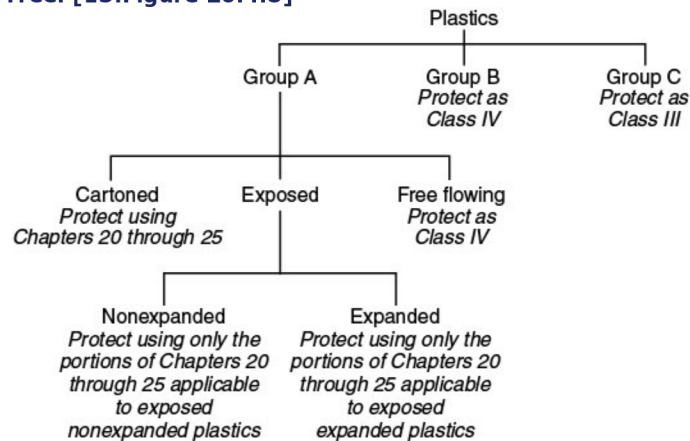
[13:20.4.7]

34.3.8*

Plastic commodities shall be protected in accordance with Figure 34.3.8. (See Section C.21 of NFPA 13.)

[13:20.4.8]

Figure 34.3.8 Decision Tree. [13:Figure 20.4.8]



34.3.8.1

Group B plastics and free-flowing Group A plastics shall be protected the same as Class IV commodities.

[13:20.4.8.1]

34.3.8.2

Group C plastics shall be protected the same as Class III commodities. [13:20.4.8.2]

34.3.9 Rubber Tires.

Pneumatic tires for passenger automobiles, aircraft, light and heavy trucks, trailers, farm equipment, construction equipment (off-the-road), and buses shall be protected as rubber tire storage in accordance with Chapters 20 through 25 of NFPA 13. [13:20.4.9]

34.3.10* Classification of Rolled Paper Storage.

For the purposes of this *Code*, the classifications of paper described in 34.3.10.1 through 34.3.10.4 shall apply and shall be used to determine the sprinkler system design criteria in accordance with Chapters 20 through 25 of NFPA 13. [13:20.4.10]

A.34.3.10

Paper Classification. These classifications were derived from a series of large-scale and laboratory-type small-scale fire tests. It is recognized that not all paper in a class burns with exactly the same characteristics. [13:A.20.4.10] Paper can be soft or hard, thick or thin, or heavy or light and can also be coated with various materials. The broad range of papers can be classified according to various properties. One important property is basis weight, which is defined as the weight of a sheet of paper of a specified area. Two broad categories are recognized by industry — paper and paperboard. Paperboard normally has a basis weight of 20 lb (9.1 kg) or greater measured on a 1000 ft² (93 m²) sheet. Stock with a basis weight less than 20 lb/1000 ft² (0.1 kg/m²) is normally categorized as paper. The basis weight of paper is usually measured on a 3000 ft² (280 m²) sheet. The basis weight of paper can also be measured on the total area of a ream of paper, which is normally the case for the following types of printing and writing papers:

- (1) *Bond paper* — 500 sheets, 17 in. × 22 in. (425 mm × 550 mm) = 1300 ft² (120 m²) per ream
- (2) *Book paper* — 500 sheets, 25 in. × 38 in. (625 mm × 950 mm) = 3300 ft² (305 m²) per ream
- (3) *Index paper* — 500 sheets, 25-1/2 in. × 30-1/2 in. (640 mm × 765 mm) = 2700 ft² (250 m²) per ream
- (4) *Bristol paper* — 500 sheets, 22 1/2 in. × 35 in. (565 mm × 890 mm) = 2734 ft² (255 m²) per ream
- (5) *Tag paper* — 500 sheets, 24 in. × 36 in. (600 mm × 900 mm) = 3000 ft² (280 m²) per ream

[13:20.4.10A.20.4.10]

For the purposes of this *Code*, all basis weights are expressed in lb/1000 ft² (kg/93 m²) of paper. To determine the basis weight per 1000 ft² (93 m²) for papers measured on a sheet of different area, the following formula should be applied:

$$\frac{\text{Basis weight}}{1000 \text{ ft}^2} = \text{basis weight} \times 1000 \text{ measured area} \quad [\text{A.34.3.10a}]$$

Example: To determine the basis weight per 1000 ft² (93 m²) of 16 lb (7.3 kg) bond paper:

$$\left(\frac{16 \text{ lb}}{1300 \text{ ft}^2} \right) 1000 = \frac{12.3 \text{ lb}}{1000 \text{ ft}^2} \quad [\text{A.34.3.10b}]$$

[13:A.20.4.10]

Large- and small-scale fire tests indicate that the burning rate of paper varies with the basis weight. Heavyweight paper burns more slowly than lightweight paper. Full-scale roll paper fire tests were conducted with the following types of paper:

- (1) *Linerboard* — 42 lb/1000 ft² (0.2 kg/m²) nominal basis weight
- (2) *Newsprint* — 10 lb/1000 ft² (0.05 kg/50 g/m²) nominal basis weight
- (3) *Tissue* — 5 lb/1000 ft² (0.2 kg/20 g/m²) nominal basis weight

[13:A.20.4.10]

The rate of firespread over the surface of the tissue rolls was extremely rapid in the full-scale fire tests. The rate of firespread over the surface of the linerboard rolls was slower. Based on the overall results of these full-scale tests, along with additional data from small-scale testing of various paper grades, the broad range of papers has been classified into three major categories as follows:

- (1) *Heavyweight* — Basis weight of 20 lb/1000 ft² (0.098 kg/100 g/m²) or greater
- (2) *Mediumweight* — Basis weight of 10 lb to 20 lb/1000 ft² (0.05 kg/50 g/m² to 0.098 kg/m²)
- (3) *Lightweight* — Basis weight of less than 10 lb/1000 ft² (0.05 kg/50 g/m²) and tissues regardless of basis weight

[13:A.20.4.10]

The following SI units were used for conversion of U.S. customary units:

1 lb = 0.45 kg

1 in. = 25 mm
 1 ft = 0.3 m
 1 ft² = 0.09 m² [13:A.20.4.10]
 [13:A.20.4.10]

The various types of papers normally found in each of the four major categories are provided in Table A.34.3.10. [13:A.20.4.10]

Table A.34.3.10 Paper Classification

Heavyweight	Mediumweight	Lightweight	Tissue
Linerboards	Bond and reproduction	Carbonizing tissue	Toilet tissue
Medium	Vellum	Cigarette	Towel tissue
Kraft roll wrappers	Offset	Fruit wrap	
Milk carton board	Tablet	Onion skin	
Folding carton board	Computer		
Bristol board	Envelope		
Tag	Book		
Vellum bristol board	Label		
Index	Magazine		
Cupstock	Butcher		
Pulp board	Bag		
	Newsprint (unwrapped)		

[13: Table A.20.4.10]

34.3.10.1 Heavyweight Class.

Heavyweight class shall be defined so as to include paperboard and paper stock having a basis weight [weight per 1000 ft² (93 m²)] of 20 lb (9.1 kg) to 100 g/m². [13:20.4.10.1]

34.3.10.2 Mediumweight Class.

Mediumweight class shall be defined so as to include all the broad range of papers having a basis weight [weight per 1000 ft² (93 m²)] of 10 lb to 20 lb (4.5 kg to 9.1 kg) to 100 g/m². [13:20.4.10.2]

34.3.10.3 Lightweight Class.

Lightweight class shall be defined so as to include all papers having a basis weight [weight per 1000 ft² (93 m²)] of 10 lb (4.5 kg) to 50 g/m². [13:20.4.10.3]

34.3.10.4 Tissue. [13:20.4.10.4]

34.3.10.4.1

Tissue shall be defined so as to include the broad range of papers of characteristic gauzy texture, which, in some cases, are fairly transparent. [13:20.4.10.4.1]

34.3.10.4.2

For the purposes of this *Code*, tissue shall be defined as the soft, absorbent type, regardless of basis weight — specifically, crepe wadding and the sanitary class including facial tissue, paper napkins, bathroom tissue, and toweling. [13:20.4.10.4.2]

34.3.11* Plastic Motor Vehicle Components.

Group A plastic automotive components and associated packaging material consisting of exposed, expanded Group A plastic dunnage, instrument panels, and plastic bumper fascia shall be permitted to be protected as defined in Chapter 23 of NFPA 13. [13:20.4.11:20.5.4]

34.3.12 Retail Display/Storage of Up to Cartoned Group A Plastics.

Group A plastics combined with Class I through IV in a retail/storage environment (big box retail) that combines customer-picking areas with storage above within the retail area shall be permitted to be protected in accordance with retail display/storage of up to cartoned group A plastics in Chapters 20 to 23 Group A plastics combined with Class I through Class IV commodities in a display/storage arrangement shall be permitted to be protected as display/storage of up to Group A plastics in accordance with Section 26.3 of NFPA 13. [13:20.4.12:20.4.11]

34.3.12.1 Baled Cotton.

~~A natural seed fiber wrapped and secured in industry-accepted materials, usually consisting of burlap, woven polypropylene, or sheet polyethylene, and secured with steel, synthetic or wire bands, or wire; also includes linters (lint removed from the cottonseed) and motes (residual materials from the ginning process) shall be protected as baled cotton in accordance with Chapter 21.~~Baled cotton shall be protected in accordance with Section 26.5 of NFPA 13. (See ~~Table A.3.3.13~~Table A.3.3.23 of NFPA 13.) [**13:20.4.12.1**20.4.11.1]

34.3.13 Carton Records Storage.

A Class III commodity consisting predominantly of paper records in cardboard cartons shall be permitted to be protected as cartoned record storage in accordance with ~~Chapter 21 or 23~~Section 26.6 of NFPA 13.
[**13:20.4.13**20.4.12]

34.3.14.1

Protection requirements shall not be based on the overall commodity mix in a fire area. [**13:20.4.14.1**20.4.13.1]

34.3.14.2

Unless the requirements of 34.3.14.3 or 34.3.14.4 are met, mixed commodity storage shall be protected by the requirements for the highest classified commodity and storage arrangement. [**13:20.4.14.2**20.4.13.2]

34.3.14.3

The protection requirements for the lower commodity class shall be permitted to be utilized where all of the following are met:

- (1) Up to 10 pallet loads of a higher hazard commodity, as described in 34.3.1 and 34.3.7, shall be permitted to be present in an area not exceeding 40,000 ft² (3720 m²).
- (2) The higher hazard commodity shall be randomly dispersed with no adjacent loads in any direction (including diagonally).
- (3) Where the ceiling protection is based on Class I or Class II commodities, the allowable number of pallet loads for Class IV or Group A plastics shall be reduced to five. [**13:20.4.14.3**20.4.13.3]

34.3.14.4 Mixed Commodity Segregation.

The protection requirements for the lower commodity class shall be permitted to be utilized in the area of lower commodity class, where the higher hazard material is confined to a designated area and the area is protected to the higher hazard in accordance with the requirements of this *Code*. [**13:20.4.14.4**20.4.13.4]



Second Revision No. 4-NFPA 1-2022 [Global Comment]

See attached word document for updates to NFPA 80 extracts.

Supplemental Information

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
80-22_extract_updates_for_NFPA_1-24_OCP_for_ballot.pdf	For ballot	

Submitter Information Verification

Committee: FCC-OCP

Submittal Date: Mon Mar 21 09:34:43 EDT 2022

Committee Statement

Committee Statement: NFPA documents are updated to the most current edition to comply with the NFPA Extract Policy. Changes within the extracted text have been reviewed by the technical committee. For substantiation on any technical changes, see the second draft report for the source document.

Request to FCC-AAC: Update the reference in section 2.4 to NFPA 80, 2022 edition.

Response Message: SR-4-NFPA 1-2022

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NFPA 80 extracts to be updated in NFPA 1

3.3.127 Fire Door Assembly.

Any combination of a fire door, a frame, hardware, and other accessories that together provide a specific degree of fire protection to the opening. [80,2019]

Chapter 12 Features of Fire Protection

12.4 Fire Doors and Other Opening Protectives.

12.4.1*

The installation and maintenance of assemblies and devices used to protect openings in walls, floors, and ceilings against the spread of fire and smoke within, into, or out of buildings shall comply with Section 12.4 and NFPA 80. [80:1.1]

A.12.4.1

See Annex K of NFPA 80 for general information about fire doors. [80:A.1.1]

12.4.1.1*

With the exception of fabric fire safety curtain assemblies, Section 12.4 addresses assemblies that have been subjected to standardized fire tests. (See *Chapter 20 of NFPA 80.*) [80:1.1.1]

A.12.4.1.1

No fire test standard requirement currently exists to which fabric fire safety curtain assemblies can be tested. Only the curtain fabric is tested in accordance with ASTM E119, *Standard Test Methods for Fire Tests of Building Construction and Materials*, or UL 263, *Fire Tests of Building Construction and Materials*. The perimeter and internal framework and all supporting, guide, and operating components used in specific applications are not tested. Variations in size of proscenium openings and the amount of side and head clearances available for individual stages dictate the number of variations in design of the assemblies. [80:A.1.1.1]

12.4.1.2*

Incinerator doors, record room doors, and vault doors are not covered in Section 12.4. [80:1.1.2]

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A.12.4.1.2

For requirements on their installation, see NFPA 82 and NFPA 232. [80:A.1.1.2]

12.4.1.3*

Requirements for horizontally sliding, vertically sliding, and swinging doors as used in this *Code* do not apply to hoistway doors for elevators and dumbwaiters. [80:1.1.3]

A.12.4.1.3

For requirements on the installation of hoistway doors for elevators and dumbwaiters, see the applicable sections of ASME A17.1/CSA B44-2016, *Safety Code for Existing Elevators and Escalators*, or ASME A17.3/CSA B44-2015, *Safety Code for Existing Elevators and Escalators*. [80:A.1.1.3]

12.4.1.4*

Section 12.4 does not cover fire resistance glazing materials and horizontally sliding accordion or folding assemblies fabricated for use as walls and tested as wall assemblies in accordance with ASTM E119, *Standard Test Methods for Fire Tests of Building Construction and Materials*, or UL 263, *Fire Tests of Building Construction and Materials*. [80:1.1.4]

A.12.4.1.4

The fire performance evaluation of these assemblies is tested in accordance with ASTM E119, *Standard Test Methods for Fire Tests of Building Construction and Materials*, or UL 263, *Fire Tests of Building Construction and Materials*, for horizontal access doors; NFPA 252, UL 10B, *Safety-Fire Tests of Door Assemblies*, or UL 10C, *Standard for Positive Pressure Fire Tests of Door Assemblies*, for fire doors and shutters; NFPA 257 or UL 9, *Safety-Fire Tests of Window Assemblies*, for fire windows and glass block; and NFPA 288 for doors in horizontal fire-rated assemblies. It is not the intent of this section to establish the degree of protection required or to constitute the approval of any product. These are determined by the AHJ. [80:A.1.1.4]

12.4.2 Care and Maintenance of Fire Doors and Other Opening Protectives.

12.4.2.1*

Subsection 12.4.2 shall cover the inspection, testing, and maintenance of fire doors, fire shutters, fire windows, and opening protectives other than fire dampers, fabric fire safety curtains, and fire protective curtain assemblies. [80:5.1.1.1]

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A.12.4.2.1

See Chapter 19 of NFPA 80 for fire dampers and, Chapter 20 of NFPA 80 for fabric fire safety curtains, ~~and Chapter 21 of NFPA 80 for fire protective curtain assemblies.~~ [80:A.5.1.1.1]

12.4.2.2

The requirements of Section 12.4 shall apply to new and existing installations. [80:5.1.1.2]

12.4.2.3 Operability.

12.4.2.3.1*

Doors, shutters, and windows shall be operable at all times. [80:5.1.2.1]

A.12.4.2.3.1

Operability issues may include proper operation and function of latching hardware and closing devices. Latching hardware should not be modified to prevent positive latching. [80:A.5.1.2.1]

12.4.2.3.2

Doors, shutters, and windows shall be kept closed and latched or arranged for automatic closing. [80:5.1.2.2]

12.4.2.3.3 Prevention of Door Blockage.

12.4.2.3.3.1

Door openings and their surrounding areas shall be kept clear of anything that could obstruct or interfere with the free operation of the door. [80:5.1.2.3.1]

12.4.2.3.3.2

Where necessary, a barrier shall be built to prevent the piling of material against sliding doors. [80:5.1.2.3.2]

12.4.2.3.3.3

Blocking or wedging of doors in the open position shall be prohibited. [80:5.1.2.3.3]

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12.4.2.4 Replacement.

Where it is necessary to replace fire doors, shutters, windows or their frames, glazing materials, hardware, and closing mechanisms, replacements shall meet the requirements for fire protection and shall be installed and tested as required by this section for new installations. [80:5.1.3]

12.4.2.5 Field Labeling.

12.4.2.5.1

Field labeling shall be performed only by individuals or companies that have been certified or listed, or by individuals or companies that are representatives of a labeling service that ~~by the listing agency that~~ maintains periodic inspections of production of ~~the~~-labeled equipment or materials ~~under review~~, and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner. [80:5.1.4.1]

12.4.2.5.2

Individuals performing the service shall provide proof of qualifications to the AHJ prior to performing work, as described in 12.4.2.5.1. [80:5.1.4.2]

12.4.2.5.3

At a minimum, field labels shall contain the following information:

- (1) The words “field inspected” or “field labeled”
- (2) The words “fire door” or “fire door frame”
- (3) The marking of a third-party certification agency
- (4) The fire protection rating
- (5) A unique serial number (if provided by the listing agency)
- (6) The fire test standard designation to which the assembly was tested

[80:5.1.4.3]

12.4.2.5.4

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Field modifications shall not be permitted to be made to a non-fire-rated door assembly to achieve a fire rating unless the field modification is completed under label service. [80:5.1.4.4]

12.4.2.5.5

Doors in which a field modification in accordance with 12.4.2.5.4 has been completed shall be labeled. [80:5.1.4.5]

12.4.2.5.6

When an opening with a non-fire-rated door requires a fire door, the door assembly shall be replaced. [80:5.1.4.6]

12.4.2.6* Field Modifications.

12.4.2.6.1*

In cases where a field modification to a fire door or a fire door assembly is desired, and is not permitted by 4.1.3.2 through 4.1.3.2.5 of NFPA 80, the laboratory with which the product or component being modified is listed shall be contacted through the manufacturer and a written or graphic description of the modifications shall be presented to that laboratory. [80:5.1.5.1.1]

A.12.4.2.6-1 [Reassociate annex to 12.4.2.6]

Field modifications beyond the scope of the prescriptive allowances permitted by ~~4.1.3.2.5.1.5.2.2~~ through ~~4.1.3.2.5.1.5.2.2.5~~ of NFPA 80 typically result in voiding the fire rating of the assembly. Paragraph 12.4.2.6 provides an alternative method whereby proposed modifications can be documented and presented to the labeling agency prior to work commencing. Where the proposed modification(s) are within the parameters of the manufacturer's procedures and will not degrade the fire resistance of the assembly, the labeling agency is permitted to authorize such modifications without a requirement for a subsequent field inspection. [80:A.5.1.5.1]

Generally, the replacement of hardware components on swinging doors (hinges, pivots, door closers, etc.) is not considered to be a field modification, provided the replacement hardware does not require additional cutting, mortising, or boring into the doors and frames and the hardware meets the criteria specified elsewhere in NFPA 80. Likewise, the installation of surface-mounted items like protection plates is not considered to be field modifications. Cutting doors for vision panels, enlarging existing cutouts for vision panels, and trimming doors in height or width are examples of field modifications. Similarly, installing hardware components that require additional cutting and mortising of the doors or frames are examples of field modifications. [80:A.5.1.5.1]

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12.4.2.6.2

Field modifications shall be permitted without a field visit from the laboratory upon written authorization from that laboratory. [80:5.1.5.1.2]

12.4.2.6.3

When the manufacturer is no longer available, the laboratory shall be permitted to provide an engineering evaluation supporting the field modification. [80:5.1.5.1.3]

12.4.2.7-8 Removal of Door or Window.

Where a fire door or fire window opening no longer functions as an opening, or the door or window is removed and not replaced, the opening shall be filled to maintain the required rating of the wall assembly. [80:5.1.6]

12.4.2.89* Inspection and Testing.

A.12.4.2.8-9

Doors, shutters, and windows are of no value unless they are properly maintained and closed or are able to close at the time of fire. A periodic inspection and maintenance program is generally the responsibility of the building owner. [80:A.5.2]

12.4.2.89.1* Installation Inspection.

Upon completion of the installation, door, shutters, and window assemblies shall be inspected and tested in accordance with 12.4.2.8.4. [80:5.2.1]

A.12.4.2.89.1

Hinges, catches, closers, latches, and stay rollers are especially subject to wear. [80:A.5.2.1]

12.4.2.89.2* Inspection Records.

A record of all inspections and testing shall be signed by the inspector and kept for inspection by the AHJ. [80:5.2.2]

A.12.4.2.89.2

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Newer technology includes use of barcodes and other electronic devices. This section recognizes that completed and filed barcode reports should be considered signed by the inspector. [80:A.5.2.2]

Some inspection organizations will utilize inspection markers or tags to identify completion of the inspections. These markers are intended to be different from any approved or listed field labeling service. The marker or tag is not to take the place of the inspection records as required by 12.4.2.89.2. [80:A.5.2.2]

12.4.2.89.2.1

Records of acceptance tests shall be retained for the life of the assembly. [80:5.2.2.1]

12.4.2.89.2.2*

Unless a longer period is required by 12.4.2.10, records shall be retained for a period of at least 3 years. [80:5.2.2.2]

A.12.4.2.89.2.2

In many cases, AHJs are not able to inspect each building in their jurisdiction each year. Inspection and testing records need to be retained during the intervening periods between the AHJ's formal visits to provide evidence that the inspections and testing were performed as required by ~~the~~ this Code. Additionally, maintenance records documenting that the necessary corrective actions have been made in accordance with ~~the~~ this Code should be stored with the inspection and testing records for the same period of time. Retaining the records for 7 years allows the AHJ the ability to look back over an extended period of time to verify that the fire door assemblies are being properly maintained. [80:A.5.2.2.2]

12.4.2.89.2.3*

The records shall be on a medium that will survive the retention period. Paper or electronic media shall be permitted. ~~[72:14.6.2.3]~~ [80:5.2.2.3]

A.12.4.2.89.2.3

Installation of new fire door assemblies should be documented in the same manner and level of detail as the periodic inspections and testing of fire door assemblies required by 12.4.2.8.39.2 and 12.4.2.8.49.3. Records of new fire door assemblies should be retained with the periodic inspections and testing records for the facility. [80:A.5.2.2.3]

12.4.2.89.2.4

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A record of all inspections and testing shall be provided that includes, but is not limited to, the following information:

- (1) Date of inspection
- (2) Name of facility
- (3) Address of facility
- (4) Name of person(s) performing inspections and testing
- (5) Company name and address of inspecting company
- (6) Signature of inspector of record
- (7) Individual record of each inspected and tested fire door assembly
- (8)* Opening identifier and location of each inspected and tested fire door assembly
- (9)* Type and description of each inspected and tested fire door assembly
- (10)* Verification of visual inspection and functional operation
- (11) Listing of deficiencies in accordance with 12.4.2.~~8-39.2~~, 12.4.2.~~910~~, and 12.4.2.~~1011~~

[80:5.2.2.4]

A.12.4.2.~~89~~.2.4(8)

Each fire door assembly inspected and tested should be assigned a unique identifier code (e.g., door number as assigned by the facility) that can be used to track the assembly's compliance and maintenance records throughout the lifetime of its installation. Identifier codes could be a door assembly number, barcode, or other code that is unique to each fire door assembly. [80:A.5.2.2.4(8)]

A.12.4.2.~~89~~.2.4(9)

To aid the AHJ during the review of the inspections and testing reports, the records should include a description of the type of fire door assembly as follows:

Type 6: Swinging door with builders hardware

Type 7: Swinging fire door with fire door hardware

Type 8: Horizontally sliding fire door

Type 9: Special purpose horizontally accordion or folding door

Type 10: Vertically sliding fire door

Type 11: Rolling steel door

Type 12: Fire shutter

Type 13: Service counter fire door

Type 14: Hoistway doors for elevators and dumbwaiter

Type 15: Chute door

Type 16: Access door

Type 17: Fire window

[80:A.5.2.2.4(9)]

A.12.4.2.89.2.4(10)

Functional operation of fire door assemblies should include testing of the closing device, complete closure of the fire door, and full engagement of latch(es) where required by door type. Functional testing of automatic-closing or power-operated fire door assemblies and electrically controlled latching hardware or release devices might need to be coordinated with the facility during other electrically controlled system tests. [80:A.5.2.2.4(10)]

12.4.2.89.3 Acceptance Testing.

12.4.2.89.3.1*

Acceptance testing of fire door and window assemblies shall be performed by a qualified person with knowledge and understanding of the operating components of the type of assembly being subject to testing. [80:5.2.3.1]

A.12.4.2.89.3.1

Visual inspection and functional testing of fire door and fire window assemblies require the persons performing the inspections and testing to be thoroughly knowledgeable of the various components and systems that are used to create fire-rated assemblies. In the case of swinging doors with builders hardware, these assemblies are comprised of labeled and listed components from several

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manufacturers. Often, the listing of the door leaf determines which products are permitted to be installed on an assembly. Inspectors of swinging doors with builders hardware need be able to recognize which components can or cannot be used on specific assemblies, which requires training and experience on behalf of the persons performing the inspections. Additionally, AHJs need to be able to rely on the competency, expertise, experience, and knowledge of the fire door inspectors in their jurisdiction. [80:A.5.2.3.1]

12.4.2.89.3.2*

Before testing, a visual inspection shall be performed to identify any damaged or missing parts that can create a hazard during testing or affect operation or resetting. [80:5.2.3.2]

A.12.4.2.89.3.2

Any fire door or fire window assembly or component that has a history of reoccurring failures should be evaluated for possible replacement or other corrective measures. [80:A.5.2.3.2]

12.4.2.89.3.3

Acceptance testing shall include the closing of the door by all means of activation. [80:5.2.3.3]

12.4.2.89.3.4

A record of these inspections and testing shall be made in accordance with 12.4.2.89.2. [80:5.2.3.4]

12.4.2.89.3-54 Swinging Doors with Builders Hardware or Fire Door Hardware.

12.4.2.89.3-54.1

Fire door assemblies shall be visually inspected from both sides to assess the overall condition of door assembly. [80:5.2.3.5.1]

12.4.2.89.3-54.2

As a minimum, the following items shall be verified:

- (1) Labels are clearly visible and legible.
- (2) No open holes or breaks exist in surfaces of either the door or frame.
- (3) Glazing, vision light frames, and glazing beads are intact and securely fastened in place, if so equipped.

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- (4) ~~The door, frame, hinges, hardware, and noncombustible threshold are secured, aligned, and in working order with no visible signs of damage.~~
- (5) ~~No parts are missing or broken.~~
- (6) ~~Door clearances do not exceed clearances listed in 4.8.4 and 6.3.1.7 of NFPA 80.~~
- (7) ~~The self-closing device is operational; that is, the active door completely closes when operated from the full open position.~~
- (8) ~~If a coordinator is installed, the inactive leaf closes before the active leaf.~~
- (9) ~~Latching hardware operates and secures the door when it is in the closed position.~~
- (10) ~~Auxiliary hardware items that interfere or prohibit operation are not installed on the door or frame.~~
- (11)* ~~No field modifications to the door assembly have been performed that void the label.~~
- (12) ~~Meeting edge protection, gasketing and edge seals, where required, are inspected to verify their presence and integrity.~~
- (13) ~~Signage affixed to a door meets the requirements listed in 4.1.4 3 of NFPA 80.~~

~~[80:5.2.3.5.2]~~

~~A.12.4.2.89.3.54.2(11)~~

~~Aftermarket devices that are intended to alter the function and operation of door hardware could violate the listing and degrade the fire protection performance of the doorway. For example, magnetic strips that are marketed to apply over strike plates for quick school lockdowns directly defeat the purpose of the latching to hold the door in the closed position. Manufacturers and listing agencies should be consulted prior making any modifications or adding any devices to fire doors. [80:A.5.2.3.5.2(11)]~~

12.4.2.89.3.54.32* _ Inspection Mark.

Upon completion of inspection, an inspection mark shall be permitted to be applied to the assembly. [80:5.2.3.5.3]

A.12.4.2.89.3.54.3.2

Where a previously applied inspection mark exists, it should be updated or replaced to record the most recent inspection.

[80:A.5.2.3.5.3]

12.4.2.9.5 Swinging Doors with Fire Door Hardware. [80:5.2.3.6]

12.4.2.9.5.1

Fire door assemblies shall be visually inspected from both sides to assess the overall condition of the door assembly. [80:5.2.3.6.1]

12.4.2.8.3.6.6 Horizontally Sliding, Vertically Sliding, and Rolling Doors.

12.4.2.8.3.6.6.1

Fire door assemblies shall be visually inspected from both sides to assess the overall condition of door assembly. [80:5.2.3.6.1]

12.4.2.8.3.6.2

At a minimum, the following items shall be verified:

- (1) Labels are clearly visible and legible.
- (2) No open holes or breaks exist in surfaces of either the door or the frame.
- (3) Slats, endlocks, bottom bar, guide assembly, curtain entry, hood, and flame baffle are correctly installed and intact for rolling steel fire doors.
- (4) Glazing, vision light frames, and glazing beads are intact and securely fastened in place, if so equipped.
- (5) Curtain, barrel, and guides are aligned, level, plumb, and true for rolling steel fire doors.
- (6) Expansion clearance is maintained in accordance with the manufacturer's listing.
- (7) Drop release arms and weights are not blocked or wedged.
- (8) Mounting and assembly bolts are intact and secured.
- (9) Attachments to jambs are with bolts, expansion anchors, or as otherwise required by the listing.
- (10) Smoke detectors, if equipped, are installed and operational.
- (11) No parts are missing or broken.
- (12)* Fusible links, if equipped, are in the correct location; chain/cable, s hooks, eyes, and so forth, are in good condition; the cable or chain is not kinked, pinched, twisted, or inflexible; and links are not painted or coated with dust or grease.
- (13) Auxiliary hardware items that interfere or prohibit operation are not installed on the door or frame.
- (14) No field modifications to the door assembly have been performed that void the label.
- (15) Doors have an average closing speed of not less than 6 in./sec (152 mm/sec) or more than 24 in./sec (610 mm/sec).

[80:5.2.3.6.2]

A.12.4.2.8.3.6.2(12)

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~~Fusible links should not be coated with any materials such as fireproofing, drywall compound, or spray texturing. [80:A.5.2.3.6.2(12)]~~

~~Some older sliding doors were installed with rope in lieu of cable. If the rope needs to be replaced, it should be replaced with a rope of the same size and type. [80:A.5.2.3.6.2(12)]~~

12.4.2.8-3-79.7 Closing Devices.

12.4.2.8-3-79.7.1

All fire doors, fire shutters, and fire window assemblies shall be inspected and tested to check for proper operation and full closure. [80:5.2.3.7-18]

12.4.2.8-3-79.7.2

Resetting of the automatic-closing device shall be done in accordance with the manufacturer's instructions. [80:5.2.3.78.2]

12.4.2.8-3-79.7.3 Rolling Steel Fire Doors.

12.4.2.8-3-79.7.3.1

Rolling steel fire doors shall be drop-tested twice. [80:5.2.3.78.3.1]

12.4.2.8-3-79.7.3.2

The first test shall be to check for proper operation and full closure. [80:5.2.3.78.3.2]

12.4.2.8-3-79.7.3.3

A second test shall be done to verify that the automatic-closing device has been reset correctly. [80:5.2.3.78.3.3]

12.4.2.8-39.7.84*

Fusible links, release devices, and any other moveable parts shall not be painted or coated with other materials that could interfere with the operation of the assembly. [80:5.2.3.89]

A.12.4.2.8-3-89.7.4

Moveable parts of the door assembly can include, but are not limited to, stay rollers, gears, and closing mechanisms. [80:A.5.2.3.89]

12.4.2.8.49.8* Periodic Inspection and Testing.

A.12.4.2.9.8

While the requirement to inspect fire doors applies to new and existing doors, one must consider both the retroactivity clause in Chapter 1 and the applicable code requirements at the time the door was installed when conducting the inspection. There was a time when this Code did not require wired glass to be labeled. It would be inappropriate, for example, to cite a door with wired glass that is not labeled as being deficient if it was installed at a time when labeling was not required. In addition, NFPA 101 permits protective plates up to 48 in. (1220 mm) above the bottom of the door for some existing doors. Where NFPA 101 takes precedent over the referenced standard, it would be inappropriate to cite a door as being deficient in applications where a 48 in. (1220 mm) protective plate is permitted. [80:A.5.2.4]

12.4.2.8.4.9.8.1*

Periodic inspections and testing shall be performed not less than annually. [80:5.2.4.1]

A.12.4.2.8.49.8.1

Doors subject to high-volume use and abuse might warrant an increased frequency of inspection. Components including, but not limited to, hinges, catches, closers, latches, and stay rollers are especially subject to wear. [80:A.5.2.4.1]

12.4.2.9.8.2*

For doors complying with Chapters 11 and 13 in NFPA 80, periodic inspections and testing shall be performed by a trained rolling steel fire door systems technician. [80:5.2.4.2]

A.12.4.2.9.8.2*

Rolling steel fire doors are unique with respect to other fire door types because of the complexity of tension release and automatic closing systems of these doors as opposed to other types of doors that typically open and close as entire units. Special training for periodic inspection and testing is necessary because of the multitude of components involved that must work together for the door to be tested and reset correctly. It is essential that the rolling steel fire door industry maintain oversight of any person involved in periodic inspection and testing of such products. When requested, such a person should be able to produce documented evidence of training. Recognized industry organizations and manufacturers of listed rolling steel fire doors with appropriate training materials and programs are viable options for training individuals about the proper performance of rolling steel fire doors and their applicable codes and

standards. Periodic inspection and testing should be documented on a form that complies with industry standards. The door should be provided with an inspection mark that complies with industry standards indicating when it was last inspected and tested and refers to the inspection and test form for additional information. [80:A.5.2.4.2]

12.4.2.8-49.8.2-3

As a minimum, the provisions of 12.4.2.8-39.3 shall be included in the periodic inspection and testing procedure. [80:5.2.4.23]

12.4.2.8-49.8.3-4

Inspection shall include an operational test for automatic-closing doors and windows to verify that the assembly will close under fire conditions. [80:5.2.4.34]

12.4.2.8-49.8.4-5

The assembly shall be reset after a successful test. [80:5.2.4.4.1]

12.4.2.8-49.8.5-6

Resetting of the release mechanism shall be done in accordance with the manufacturer's instructions. [80:5.2.4.4.25]

12.4.2.8-49.8.67*

Hardware shall be examined, and inoperative hardware, parts, or other defective items shall be replaced without delay. [80:5.2.4.65]

A.12.4.2.8-49.8.6

The determination of the time required for corrective action should be based on a risk analysis and availability of replacement materials. [80:A.5.2.4.65]

12.4.2.8-49.8.7-8

Tin-clad and kalamein doors shall be inspected for dry rot of the wood core. [80:5.2.4.76]

12.4.2.8-49.8.8-9

Chains, cables or ropes employed shall be inspected for excessive wear, stretching, degradation, and binding. [80:5.2.4.87]

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12.4.2.9.8.10

Undamaged and unmarked wired glass in existing labeled fire door assemblies shall be permitted to remain in accordance with codes applicable at the time of installation. [80:5.2.4.8]

12.4.2.~~9~~10 Retrofit Operators.

12.4.2.~~9~~10.1

The operator, governor, and automatic-closing device on rolling steel fire doors shall be permitted to be retrofitted with a labeled retrofit operator under the conditions specified in 12.4.2.~~9~~10.2 through 12.4.2.~~9~~10.5. [80:5.3.1]

12.4.2.~~9~~10.2

The retrofit operator shall be labeled as such. [80:5.3.2]

12.4.2.~~9~~10.3

The retrofit operator shall be installed in accordance with its installation instructions and listing. [80:5.3.3]

12.4.2.~~9~~10.4

The installation shall be acceptable to the AHJ. [80:5.3.4]

12.4.2.~~9~~10.5

The retrofit operator shall be permitted to be provided by a manufacturer other than the original manufacturer of the rolling steel fire door on which it is retrofitted, provided its listing allows it to be retrofitted on that manufacturer's doors. [80:5.3.5]

12.4.2.~~10~~1* _Performance-Based Option.

A.12.4.2.1~~10~~

See Annex J of NFPA 80 for information regarding performance-based inspection, testing, and maintenance options for fire door assemblies. [80:A.5.4]

12.4.2.~~10~~1.1

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As an alternate means of compliance with 12.4.2.9.8~~12.4.2.8.4~~, subject to the AHJ, fire door assemblies shall be permitted to be inspected, tested, and maintained under a written performance-based program. [80:5.4.1]

12.4.2.~~10~~11.2

Goals established under a performance-based program shall provide assurance that the fire door assembly will perform its intended function when exposed to fire conditions. [80:5.4.2]

12.4.2.~~10~~11.3

Technical justification for inspection, testing, and maintenance intervals shall be documented in writing. [80:5.4.3]

12.4.2.~~10~~11.4

The performance-based option shall include historical data acceptable to the AHJ. [80:5.4.4]

12.4.2.~~11~~12 Maintenance.

12.4.2.~~11~~12.1*

Repairs shall be made, and defects that could interfere with operation shall be corrected without delay. [80:5.5.1]

A.12.4.2.~~11~~12.1

The determination of the time required for corrective action should be based on a risk analysis and availability of replacement materials. [80:A.5.5.1]

12.4.2.~~11~~12.2

Damaged glazing material shall be replaced with labeled glazing. [80:5.5.2]

12.4.2.~~11~~12.3

Replacement glazing materials shall be installed in accordance with their individual listing. [80:5.5.3]

12.4.2.~~11~~12.4*

Any breaks in the face covering of doors shall be repaired without delay. [80:5.5.4]

A.12.4.2.1112.4

The determination of the time required for corrective action should be based on a risk analysis and availability of replacement materials.
[80:A.5.5.4]

12.4.2.1112.5

Where a fire door ~~assembly, frame, or any part thereof~~ ~~its appurtenances~~ is damaged to the extent that it could impair the door's proper emergency function, the following actions shall be performed:

- (1) The fire door, ~~frame, door assembly, or any part of its appurtenances~~ thereof shall be repaired with listed or labeled parts or parts obtained from the original manufacturer.
- (2) The fire door assembly shall be tested to ensure emergency operation and closing upon completion of the repairs.

[80:5.5.5]

12.4.2.1112.6

If repairs cannot be made with ~~labeled components or parts~~ that are listed or labeled or that are obtained from the original manufacturer or retrofitted in accordance with 12.4.2.910, the fire door assembly or any part thereof ~~frame, fire door assembly, or appurtenances~~ shall be replaced. [80:5.5.6]

12.4.2.1112.7

When fastener holes are left in a door or frame due to changes or removal of hardware or plant-ons, the holes shall be repaired by the following methods:

- (1) Install steel fasteners that completely fill the holes.
- (2) Fill the screw or bolt holes with the same material as the door or frame.
- (3) Fill holes with material listed for this use and installed in accordance with the manufacturer's procedures.

[80:5.5.7]

12.4.2.1112.8

Holes, other than those as described by 12.4.2.~~11~~12.7, shall be treated as a field modification in accordance with 12.4.2.~~6~~12.1. [80:5.5.8]

12.4.2.12.9

Field painting of rolling steel fire doors and service counter fire doors shall be considered maintenance work. [80:5.5.9]

12.4.2.~~11~~12.910*

Upon completion of maintenance or repair work, fire door assemblies shall be inspected and tested in accordance with 12.4.2.~~8~~39.2. [80:5.5.910]

A.12.4.2.~~11~~12.9-10

Existing fire door assemblies that have been repaired should be inspected and tested immediately upon completion of the repair work to ensure that they are in compliance with this ~~standard~~Code. Records of maintenance work should be maintained with the periodic inspections and testing records for the facility. [80:A.5.5.910]

12.4.2.~~11~~12.910.1

A record of inspections and testing, as required by 12.4.2.~~11~~12.9, shall be made in accordance with 12.4.2.~~89~~.2. [80:5.5.910.1]

12.4.2.~~11~~12.910.2

A record of maintenance performed on existing fire door assemblies shall include the following information:

- (1) Date of maintenance
- (2) Name of facility
- (3) Address of facility
- (4) Name of person(s) performing maintenance
- (5) Company name and address of maintenance personnel
- (6) Signature of maintenance personnel performing the work
- (7) Individual listings of each inspected and tested fire door assembly
- (8)* Opening identifier and location of each repaired fire door assembly
- (9)* Type and description of each repaired fire door assembly
- (10)* Description or listing of the work performed on each fire door assembly

[80:5.5.910.2]

A.12.4.2.1112.910.2(8)

See A.12.4.2.89.2.4(8). [80:A.5.5.910.2(8)]

A.12.4.2.1112.9.2(9)

See A.12.4.2.89.2.4(9). [80:A.5.5.910.2(9)]

A.12.4.2.1112.9.2(10)

When maintenance work on an existing fire door assembly is required as the result of a periodic inspections and testing report to correct deficiencies, the maintenance report should reference the inspections and testing report where the deficiencies were cited to show that the follow up work was performed. Descriptions of the work performed on fire door assemblies should document the nature of the work (i.e., replaced surface mounted door closer, installed new gasketing). Where the work performed included field modifications permitted by the laboratory, in accordance with 12.4.2.6.2 and approved by the AHJ, documentation of the permission and approval should be attached to the maintenance report. [80:A.5.5.910.2(10)]

12.7 Fire Barriers.

12.7.6 Opening Protectives.

12.7.6.2 Minimum Fire Protection Rating.

12.7.6.2.2*

The minimum fire rating for opening protectives in fire barriers, fire-rated smoke barriers, and fire-rated smoke partitions shall be in accordance with Table 12.7.6.2.2, except as otherwise permitted in 12.7.6.2.3 or 12.7.6.2.4. [101:8.3.3.2.2]

1Table 12.7.6.2.2 Minimum Fire Ratings for Opening Protectives in Fire-Resistance-Rated Assemblies and Fire-Rated Glazing Markings

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[illegible]

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Vertical shafts, (including stairways, exits, and refuse chutes)	2	1½	Maximum size tested	D-H-90 or D-H-W-90	NP	2	NP	D-H-W-120	NP	2	NP	W-120
	1	1	Maximum size tested	D-H-60 or D-H-W-60	NP	1	NP	D-H-W-60	NP	1	NP	W-60
Replacement panels in existing vertical shafts	½	⅓	Maximum size tested	D-20 or D-W-20	⅓	⅓	D-H-20	D-W-20	⅓	⅓	OH-20	W-30
Fire barriers	3	3	100 in. ^{2a}	≤100 in. ² , D-H-180 or D-H-W-180	NP	3	NP	D-H-W-180	NP	3	NP	W-180
				>100 in. ² , D-H-W-180								
	2	1½	Maximum size tested	D-H-90 or D-H-W-90	NP	2	NP	D-H-W-120	NP	2	NP	W-120

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	1	$\frac{3}{4}$	Maximum size tested ^e	D-H-45 or D-H-W-45	$\frac{3}{4}$ ^e	$\frac{3}{4}$ ^e		D-H-45	D-H-W-45		$\frac{3}{4}$	$\frac{3}{4}$		OH-45	W-60
	$\frac{1}{2}$	$\frac{1}{3}$	Maximum size tested	D-20 or D-W-20	$\frac{1}{3}$	$\frac{1}{3}$		D-H-20	D-W-20		$\frac{1}{3}$	$\frac{1}{3}$		OH-20	W-30
Horizontal exits	2	$1\frac{1}{2}$	Maximum size tested	D-H-90 or D-H-W-90	NP	2		NP	D-H-W-120		NP	2		NP	W-120
Horizontal exits served by bridges between buildings	2	$\frac{3}{4}$	Maximum size tested ^e	D-H-45 or D-H-W-45	$\frac{3}{4}$ ^e	$\frac{3}{4}$ ^e		D-H-45	D-H-W-45		$\frac{3}{4}$	$\frac{3}{4}$		OH-45	W-120
Exit access corridors ^f	1	$\frac{1}{3}$	Maximum size tested	D-20 or D-W-20	$\frac{3}{4}$	$\frac{3}{4}$		D-H-45	D-H-W-20		$\frac{3}{4}$	$\frac{3}{4}$		OH-45	W-60
	$\frac{1}{2}$	$\frac{1}{3}$	Maximum size tested	D-20 or D-W-20	$\frac{1}{3}$	$\frac{1}{3}$		D-H-20	D-H-W-20		$\frac{1}{3}$	$\frac{1}{3}$		OH-20	W-30
Smoke barriers ^f	1	$\frac{1}{3}$	Maximum size tested	D-20 or D-W-20	$\frac{3}{4}$	$\frac{3}{4}$		D-H-45	D-H-W-20		$\frac{3}{4}$	$\frac{3}{4}$		OH-45	W-60
Smoke partitions _{f,g}	$\frac{1}{2}$	$\frac{1}{3}$	Maximum size tested	D-20 or D-W-20	$\frac{1}{3}$	$\frac{1}{3}$		D-H-20	D-H-W-20		$\frac{1}{3}$	$\frac{1}{3}$		OH-20	W-30

For SI units, 1 in.² = 0.00064516 m².

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NP: Not permitted.

^aFire resistance glazing tested to ASTM E119, *Standard Test Methods for Fire Tests of Building Construction and Materials*, or UL 263, *Fire Tests of Building Construction and Materials*, shall be permitted in the maximum size tested. (See 12.7.6.6.8.)

^bFire-rated glazing in exterior windows shall be marked in accordance with Table 12.7.6.6.3.

^cSee ASME A17.1/CSA B44, *Safety Code for Elevators and Escalators*, for additional information.

^dSee ASME A17.3, *Safety Code for Existing Elevators and Escalators*, for additional information.

^eMaximum area of individual exposed lights shall be 1296 in.² (0.84 m²) with no dimension exceeding 54 in. (1.37 m) unless otherwise tested.
[**80**:Table 4.4.5, Note b, and **80**:4.4.5.1]

^fFire doors are not required to have a hose stream test per UL 10B, *Fire Tests of Door Assemblies*, or UL 10C, *Positive Pressure Fire Tests of Door Assemblies*.

^gFor residential board and care, see 32.2.3.1 and 33.2.3.1 of NFPA 101.

[**101**:Table 8.3.3.2.2]



Second Revision No. 58-NFPA 1-2022 [Global Comment]

See attached word document for updates to NFPA 72 extracts.

Supplemental Information

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
72-22_extract_updates_for_NFPA_1-24_OCP_From_Task_Group.docx	For staff use	
72-22_extract_updates_for_NFPA_1-24_OCP_for_ballot.pdf	For ballot	

Submitter Information Verification

Committee: FCC-OCP

Submittal Date: Fri Mar 25 08:03:22 EDT 2022

Committee Statement

Committee Statement: NFPA documents are updated to the most current edition to comply with the NFPA Extract Policy. Changes within the extracted text have been reviewed by the technical committee. For substantiation on any technical changes, see the second draft report for the source document.

Response Message: Request to FCC-AAC: Update the reference in section 2.4 to NFPA 72, 2022 edition.

Response Message: SR-58-NFPA 1-2022

13.7.1.2* Building Alarm and Signaling Systems.

Protected premises systems that serve the alarm and signaling needs of a building or buildings shall include one or more of the following systems or functions:

- (1) Manual fire alarm signal initiation
- (2) Automatic fire alarm and supervisory signal initiation
- (3) Monitoring of abnormal conditions in fire suppression systems
- (4) Actuation of fire suppression systems
- (5) Actuation of emergency control functions
- (6) Actuation of fire alarm notification appliances
- (7) In-building fire emergency voice/alarm communications
- (8) Automatic carbon monoxide alarm and supervisory signal initiation
- (9) Actuation of carbon monoxide notification appliances
- (10) Guard's tour supervisory service
- (11) Process monitoring supervisory systems
- (12) Actuation of off-premises signals
- (13) Combination systems

[72:23.3.3.1]

A.13.7.1.2

The following functions are included in Annex A to provide guidelines for utilizing building systems and equipment in addition to proprietary fire alarm equipment in order to provide life safety and property protection. Building functions that should be monitored, initiated, or controlled during a fire alarm condition include, but should not be limited to, the following:

- (1) Elevator operation consistent with ANSI/ASME A17.1/CSA B44, *Safety Code for Elevators and Escalators*
- (2) Unlocking of stairwell and exit doors (*see NFPA 80 and NFPA 101*)
- (3) Release of fire and smoke dampers (*see NFPA 90A and NFPA 90B*)
- (4) Monitoring and initiating of ~~self-contained~~ automatic fire extinguishing system(s) or suppression system(s) and equipment in accordance with the applicable NFPA standard(s) (~~see NFPA 11, NFPA 12, NFPA 12A, NFPA 13, NFPA 14, NFPA 15, NFPA 17, NFPA 17A, and NFPA 750~~)

[72:A.23.3.3.1]

13.7.1.3

All apparatus requiring rewinding or resetting to maintain normal operation shall be rewound or reset as promptly as possible after each test and alarm. [72:14.5.4]

13.7.1.6.1

Detection installed for reasons of achieving specific fire safety objectives, but not required by any laws, codes, or standards, shall meet all of the requirements of this *Code*, with the exception of prescriptive spacing criteria of Chapter 17 of *NFPA 72*. [72:17.5.3.3.1]

13.7.1.8.5 Specific Location Requirements.

The installation of smoke alarms and smoke detectors shall comply with 13.7.1.8.5.1 through 13.7.1.8.5.14. [72:29.11.3.4]

13.7.1.8.5.1

Smoke alarms and smoke detectors shall not be located where ambient conditions, including humidity and temperature, are outside the limits specified by the manufacturer's published instructions. [72:29.11.3.4(1)]

13.7.1.8.5.2

Smoke alarms and smoke detectors shall not be located within unfinished attics or garages or in other spaces where temperatures can fall below 40°F (4.4°C) or exceed 100°F (38°C). [72:29.11.3.4(2)]

13.7.1.8.5.3*

Where the mounting surface could become considerably warmer or cooler than the room, such as a poorly insulated ceiling below an unfinished attic or an exterior wall, smoke alarms and smoke detectors shall be mounted on an inside wall. [72:29.11.3.4(3)]

13.7.1.8.5.4*

Smoke alarms and smoke detectors shall not be installed ~~within an area of exclusion determined by a~~ between 10 ft (3.0 m) ~~radial distance and 20 ft (6.1 m) along a horizontal flow path from a stationary or fixed cooking appliance, unless the devices comply with the following:~~ listed for installation in close proximity to cooking appliances. Smoke alarms and smoke detectors installed between 10 ft (3.0 m) and 20 ft (6.1 m) along a horizontal flow path from a stationary or fixed cooking appliance shall be equipped with an alarm silencing means or use photoelectric detection.

- (1) Prior to January 1, 2023, smoke alarms and smoke detectors shall be equipped with an alarm silencing means, use photoelectric detection, or be listed for resistance to common nuisance sources from cooking in accordance with the 8th edition of UL 217, *Smoke Alarms*, the 7th edition of UL 268, *Smoke Detectors for Fire Alarm Systems*, or subsequent editions.
- (2) Effective January 1, 2023, smoke alarms and smoke detectors shall be listed for resistance to common nuisance sources from cooking in accordance with the 8th edition of UL 217, the 7th edition of UL 268, or subsequent editions.

[72:29.11.3.4(4)]

A.13.7.1.8.5.4

As per annex material located in A.29.8.1 of NFPA 72, it is not normally recommended that smoke alarms or smoke detectors be placed in kitchen spaces. This section of the code provides guidelines for safe installation if a need exists to install a smoke alarm or smoke detector in a residential kitchen space or cooking area. [72:A.29.11.3.4(4)]

Within this Code section, a fixed cooking appliance is any appliance that is intended to be permanently connected electrically to the wiring system or the fuel source. A stationary cooking appliance is any appliance that is intended to be fastened in place or located in a dedicated space, and is connected to the supply circuit or fuel source. [72:A.29.11.3.4(4)]

Smoke alarms and smoke detectors that are currently available to consumers are susceptible to particles released into the air during normal cooking procedures. If smoke alarms and smoke detectors are placed too close to the area where the cooking source originates, a high level of nuisance alarms can occur. Frequent nuisance alarms can result in an occupant disabling the smoke alarm or smoke detector. [72:A.29.11.3.4(4)]

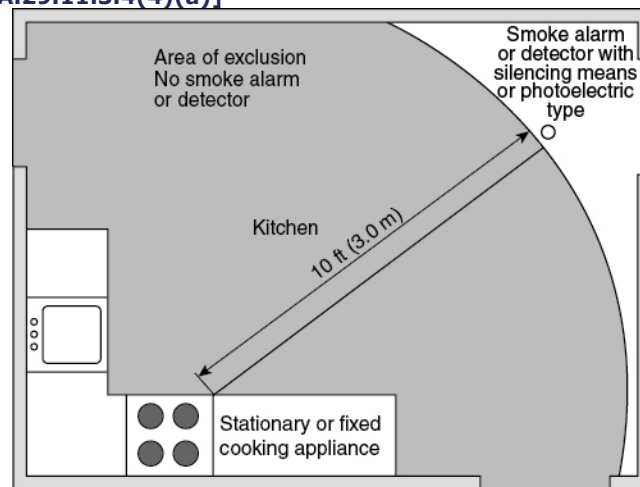
Nuisance alarm studies show that commercially available residential smoke alarms and smoke detectors are susceptible to nuisance alarms when installed too close to cooking appliances. As the horizontal distance between the smoke alarm or smoke detectors and the cooking appliance increases, the frequency of nuisance alarms decreases. Smoke alarms or smoke detectors that use ionization smoke detection have been shown to be more susceptible to cooking nuisance alarms than those that use photoelectric smoke detection when the alarms or detectors are installed within 10 ft (3.0 m) along a horizontal smoke travel path from a cooking appliance. Smoke alarms or smoke detectors that use photoelectric smoke detection produce nuisance alarms when installed less than 10 ft (3.0 m) from a cooking appliance, though to a lesser degree. [72:A.29.11.3.4(4)]

The occurrence of the higher frequency of nuisance alarms observed in smoke alarms or smoke detectors that use ionization detection have been documented in the fire research data. Due to the differences in technology between ionization detection and photoelectric detection, the sensitivity typically used for ionization detection is much higher than that used for photoelectric detection. This sensitivity difference is a result of each type of the detection being required to satisfy UL 217 performance tests. Removing detection technology from consideration, the frequency of nuisance alarms is solely due to the sensitivity of the detection method used. Thus, both ionization and photoelectric detector technologies will produce nuisance alarms due to cooking, but currently available smoke alarms and smoke detectors that use ionization detection typically produce more cooking-related nuisance alarms. [72:A.29.11.3.4(4)]

The higher sensitivities of currently available smoke alarms and smoke detectors that use ionization detection do provide a benefit at the expense of a potentially higher rate of cooking-related nuisance alarms. Research has demonstrated that ionization detection will typically respond faster than photoelectric detection to flaming fires, providing earlier warning to occupants that might allow for quicker intervention or faster egress. In general, the installation of smoke alarms or smoke detectors that use ionization detection will result in increased fire safety at the risk of a higher frequency of nuisance alarms. The installation of smoke alarms or smoke detectors that use photoelectric detection will result in reduced fire safety for flaming fires and a reduced risk of nuisance alarms. Based on the trade-off between faster response to fires and the frequency of nuisance alarms, detectors that utilize both technologies (i.e., ionization, photoelectric, and a combination) are allowed to be installed between 10 ft (3.0 m) and 20 ft (6.1 m) along a horizontal flow path from a standard or fixed cooking appliance if the specific detector is equipped with an alarm silencing means or is of the photoelectric-type. [72:A.29.11.3.4(4)]

Nuisance alarm studies provide data on cooking nuisances that emanate from both fixed cooking appliances and stationary cooking appliances (e.g., stove, oven) as well as portable cooking appliances (e.g., toaster). Based on these studies, which demonstrate the potential of all cooking appliances to generate nuisance sources, a zone of exclusion has been specified surrounding each stationary or fixed cooking appliance. The purpose of this zone is to limit the installation of smoke alarms and detectors in areas where stationary, fixed, or portable cooking appliances will be located within the residential kitchen space such that potential nuisance alarms are minimized. The size of the zone of exclusion is specified to attempt to take into account the unknown and transitory locations of portable cooking appliances. This zone of exclusion is determined by measuring a 10 ft (3.0 m) radial distance from the closest edge of a stationary or fixed cooking appliance. The zone of exclusion is not intended to pass through walls or doorways. Figure A.13.7.1.8.5.4(a) provides an example of the zone of exclusion in a generalized residential kitchen. [72:A.29.11.3.4(4)]

Figure A.13.7.1.8.5.4(a) Example of Zone of Exclusion (gray area) Within Typical Residential Kitchen. [72:Figure A.29.11.3.4(4)(a)]



If other areas of this code require that a smoke alarm or smoke detector be placed within a horizontal flow path distance between 10 ft (3.0 m) and 20 ft (6.1 m) from a stationary or fixed cooking appliance, the following method should be used to determine the distance, and only photoelectric detection or smoke alarms/detectors with alarm silencing means can be installed in this area. [72:A.29.11.3.4(4)]

To install a smoke alarm or detector between 10 ft (3.0 m) and 20 ft (6.1 m) from the cooking appliance, an installer must first determine the 10 ft (3.0 m) area of exclusion. Once the area of exclusion is determined, an installer must then determine the horizontal flow distance. This is the horizontal distance along the ceiling from the closest edge of the cooking appliance to the smoke alarm or detector. The horizontal distance can consist of line segments due to impediments, such as interior partitions. Once an impediment is met, the measurement of the distance will then continue along the new horizontal path segment until the distance requirement is met or another impediment is encountered. Figure A.13.7.1.8.5.4(b) provides an example for placement outside a kitchen in a nearby hallway. Figure A.13.7.1.8.5.4(c) provides another example of appropriate placement outside of a kitchen in an adjacent room. [72:A.29.11.3.4(4)]

Figure A.13.7.1.8.5.4(b) Example of Smoke Alarm or Smoke Detector Placement Between 10 ft (3.0 m) and 20 ft (6.1 m) Away in Hallway from Center of Stationary or Fixed Cooking Appliance. [72:Figure A.29.11.3.4(4)(b)]

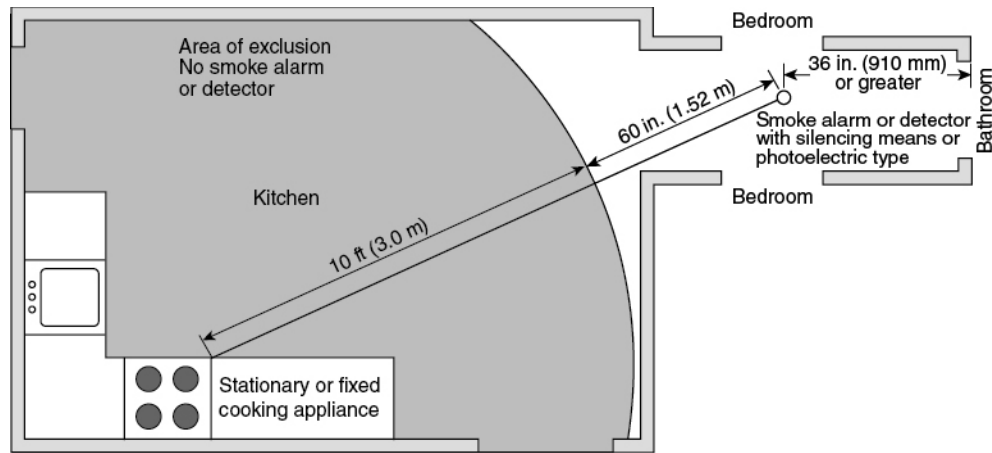
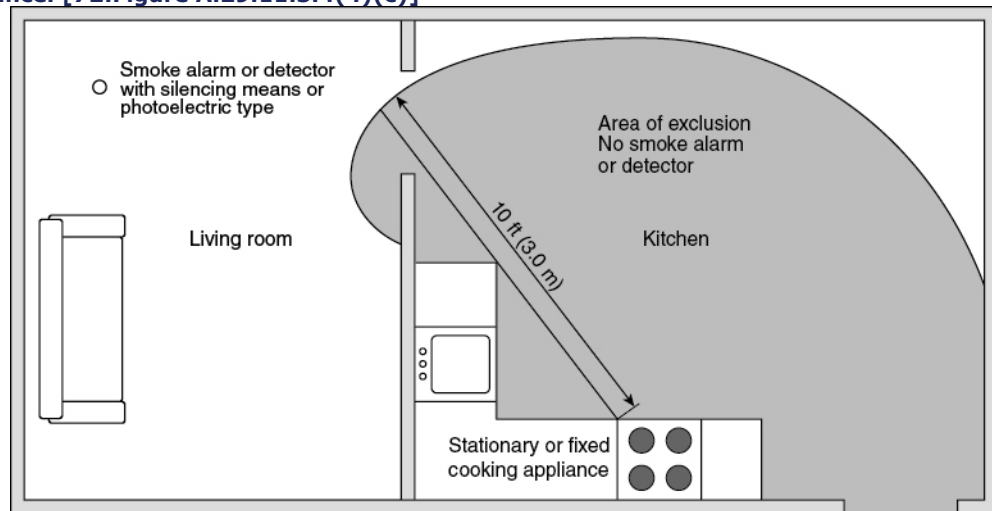


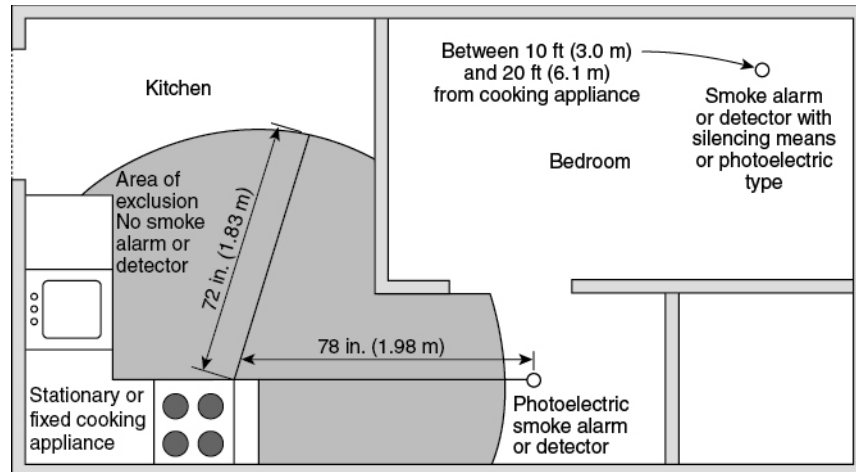
Figure A.13.7.1.8.5.4(c) Example of Smoke Alarm or Smoke Detector Placement Between 10 ft (3.0 m) and 20 ft (6.1 m) Away in Hallway from Center of Stationary or Fixed Cooking Appliance. [72:Figure A.29.11.3.4(4)(c)]



At a horizontal flow path distance of greater than 20 ft (6.1 m), any type of smoke alarm or smoke detector can be installed. [72:A.29.11.3.4(4)]

In rare cases, a residential dwelling can be of such size and configuration that an area of exclusion of 10 ft (3.0 m) from a stationary or fixed cooking appliance excludes the placement of a smoke alarm or smoke detector required by other areas of this Code. In these cases, a smoke alarm or smoke detector using photoelectric detection can be installed at least 72 in. (1.83 m) from the fixed or stationary cooking appliance. Figure A.13.7.1.8.5.4(d) provides an example of this situation in practice where a smoke alarm or smoke detector is required outside of the sleeping area, but the space is in close proximity to the kitchen space. [72:A.29.11.3.4(4)]

Figure A.13.7.1.8.5.4(d) Example of Exception Placement of Photoelectric Smoke Alarm or Smoke Detector at 72 in. (1.83 m) from Stationary or Fixed Cooking Appliance. [72:Figure A.29.11.3.4(4)(d)]



In response to the above noted nuisance alarm studies, the 8th edition of UL 217, *Smoke Alarms*, and the 7th edition of UL 268, *Smoke Detectors for Fire Alarm Systems*, have added a new performance test to help reduce nuisance alarms from normal cooking. This end-product performance and listing requirement aligns with 29.11.3.4(6) of this Code. Smoke alarms complying with these UL standards will be listed "for resistance to common nuisance sources from cooking" and are suitable for installation at distances from cooking appliances outlined in this Code. [72:A.29.11.3.4(4)]

13.7.1.8.5.5

Smoke alarms or smoke detectors that use photoelectric detection shall be permitted for installation at a radial distance greater than 6 ft (1.8 m) from any stationary or fixed cooking appliance when the following conditions are met: Smoke alarms and smoke detectors shall not be installed within an area of exclusion determined by a 10 ft (3.0 m) radial distance along a horizontal flow path from a stationary or fixed cooking appliance. When the 10 ft (3.0 m) area of exclusion would prohibit the placement of a smoke alarm or smoke detector required by other sections of this Code, and when the kitchen or cooking area and adjacent spaces have no clear interior partitions or headers, smoke alarms or smoke detectors shall be permitted for installation at a radial distance between 6 ft (1.8 m) and 10 ft (3.0 m) from any stationary or fixed cooking appliance unless the devices comply with the following:

- (1) The kitchen or cooking area and adjacent spaces have no clear interior partitions or headers. Prior to January 1, 2023, the devices shall use photoelectric detection or be listed for resistance to common nuisance sources from cooking in accordance with the 8th edition of UL 217, the 7th edition of UL 268, or subsequent editions.
- (2) The 10 ft (3.0 m) area of exclusion would prohibit the placement of a smoke alarm or smoke detector required by other sections of NFPA 72. Effective January 1, 2023 the devices shall be listed for resistance to common nuisance sources from cooking nuisance alarms in accordance with the 8th edition of UL 217, the 7th edition of UL 268, or subsequent editions.

[72:29.11.3.4(5)]

13.7.1.8.5.6*

Effective January 1, 2022, smoke alarms and smoke detectors installed between 6 ft (1.8 m) and 20 ft (6.1 m) along a horizontal flow path from a stationary or fixed cooking appliance shall be listed for resistance to common nuisance sources from cooking. [72:29.11.3.4(6)] Smoke alarms and smoke detectors shall not be installed within a 36 in. (910 mm) horizontal path from a door to a bathroom containing a shower or tub unless listed for installation in close proximity to such locations.

A.13.7.1.8.5.6

Studies indicate that smoke alarms and smoke detectors that use ionization detection, photoelectric detection, or a combination of ionization and photoelectric detection, are susceptible to nuisance alarms caused by steam. Some research has been done on the comparative response of these types of detection to steam. Steam particles, in general, are visible, reflect light easily, and are typically produced in a size range that has been shown to be more likely to actuate a photoelectric sensor (Dinaburg and Gottuk, 2015). Thus, it is required that smoke alarms and smoke detectors be installed greater than 36 in. (910 mm) from the bathroom door where possible. Increasing the distance between the smoke alarm or smoke detector and the bathroom door can reduce the frequency of nuisance alarms from bathroom steam. Frequent nuisance alarms can result in the occupant disabling the smoke alarm. Each incremental

increase in separation, up to 10 ft (3.0 m), between the bathroom door and the smoke alarm or smoke detector is expected to reduce the frequency of nuisance alarms. [72:A.29.11.3.4(6)]

13.7.1.8.5.7

Smoke alarms and smoke detectors shall not be installed within a 36 in. (910 mm) horizontal path from a door to a bathroom containing a shower or tub unless listed for installation in close proximity to such locations. [~~72:29.11.3.4(7)~~29.11.3.4(6)]

13.7.1.8.5.8*

Smoke alarms and smoke detectors shall not be installed within a 36 in. (910 mm) horizontal path from the supply registers of a forced air heating or cooling system and shall be installed outside of the direct airflow from those registers. [~~72:29.11.3.4(8)~~29.11.3.4(7)]

A.13.7.1.8.5.8

There are circumstances in which the placement of smoke alarms and detectors cannot physically meet the requirement to be 36 in. (910 mm) or further away from the tip of the fan blade. Consequently, there is an irreconcilable conflict in enforcing all siting requirements of this standard, so the requirement of 29.11.3.4(9) only applies where possible to allow compliance with this standard. A limited study (Gottuk and Gottuk 2015) has indicated that placing alarms closer than 36 in. (910 mm) is not expected to produce an unacceptable risk, and in some cases, could improve performance. [72:A.29.11.3.4(8)]

13.7.1.8.5.9

Smoke alarms and smoke detectors shall not be installed within a 36 in. (910 mm) horizontal path from the tip of the blade of a ceiling-suspended (paddle) fan unless the room configuration restricts meeting this requirement. [72:29.11.3.4(9)]

13.7.1.8.5.10

Where stairs lead to other occupiable levels, a smoke alarm or smoke detector shall be located so that smoke rising in the stairway cannot be prevented from reaching the smoke alarm or smoke detector by an intervening door or obstruction. [~~72:29.11.3.4(10)~~29.11.3.4(9)]

13.7.1.8.5.11

For stairways leading up from a basement, smoke alarms or smoke detectors shall be located on the basement ceiling near the entry to the stairs. [~~72:29.11.3.4(11)~~29.11.3.4(10)]

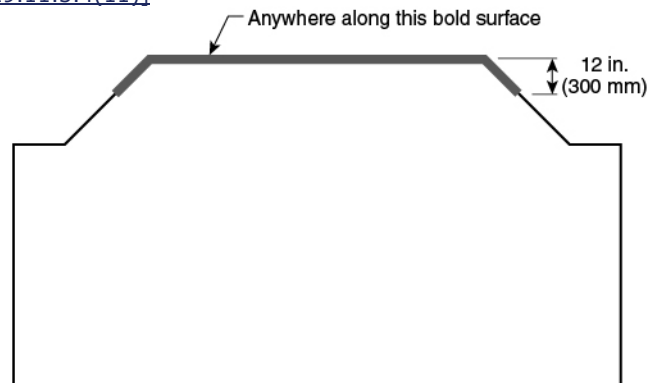
13.7.1.8.5.12*

For tray-shaped ceilings (coffered ceilings), smoke alarms and smoke detectors shall be installed on the highest portion of the ceiling or on the sloped portion of the ceiling within 12 in. (300 mm) vertically down from the highest point. [~~72:29.11.3.4(12)~~29.11.3.4(11)]

A.13.7.1.8.5.12

Figure A.13.7.1.8.5.12 illustrates acceptable smoke alarm or smoke detector mounting locations for tray-shaped ceilings. [72:A.29.11.3.4(11)]

Figure A.13.7.1.8.5.12 Locations Permitted for Smoke Alarms and Smoke Detectors on Tray-Shaped Ceilings.[72:Figure A.29.11.3.4(11)]



13.7.1.8.5.13

Smoke alarms and detectors installed in rooms with joists or beams shall comply with the requirements of ~~13.7.4.3.3.4~~17.7.4.2.4 of *NFPA 72*. [~~72:29.11.3.4(13)~~29.11.3.4(12)]

13.7.1.8.5.14

Heat alarms and detectors installed in rooms with joists or beams shall comply with the requirements of 17.6.3 of *NFPA 72*. [~~72:A.29.11.3.4(14)~~A.29.11.3.4(13)]

13.7.1.13.2 Alarm Annunciation.

Where required by other governing laws, codes, or standards, the location of an operated initiating device shall be annunciated by visible means. [~~72:10.18.1.1~~10.18.1]

13.7.1.13.2.1

Visible annunciation of the location of an operated initiating device shall be by an indicator lamp, alphanumeric display, printout, or other approved means. [~~72:10.18.1.1.1~~10.18.1.1]

13.7.1.13.2.2

The visible annunciation of the location of operated initiating devices shall not be canceled by the means used to deactivate alarm notification appliances. [~~72:10.18.1.1.2~~10.18.1.2]

13.7.1.13.3 Supervisory and Trouble Annunciation.

Where required by other governing laws, codes, or standards, supervisory ~~and/or~~ trouble conditions shall be annunciated by visible means. [~~72:10.18.2.1~~10.18.2]

13.7.1.13.3.1

Visible annunciation shall be by an indicator lamp, an alphanumeric display, a printout, or other means. [~~72:10.18.2.1.1~~10.18.2.1]

13.7.1.13.3.2

The visible annunciation of supervisory ~~and/or~~ trouble conditions shall not be canceled by the means used to deactivate supervisory or trouble notification appliances. [~~72:10.18.2.1.2~~10.18.2.2]

13.7.1.13.4* Annunciator Access and Location.

13.7.1.13.4.1

All required annunciation means shall be readily accessible to responding personnel. [72:10.18.3.1]

13.7.1.13.4.2

All required annunciation means shall be located as required by the AHJ to facilitate an efficient response to the situation. [72:10.18.3.2]

13.7.1.13.5 Alarm Annunciation Display.

Visible annunciators shall be capable of displaying all zones in alarm. [72:10.18.4]

13.7.1.13.5.1

If all zones in alarm are not displayed simultaneously, the zone of origin shall be displayed. [72:10.18.4.1]

13.7.1.13.5.2

If all zones in alarm are not displayed simultaneously, there shall be an indication that other zones are in alarm. [72:10.18.4.2]

13.7.1.13.6* Annunciation Zoning.

13.7.1.13.6.1

For the purpose of alarm annunciation, each floor of the building shall be considered as a separate zone. [72:10.18.5.1]

13.7.1.13.6.2

For the purposes of alarm annunciation, if a floor of the building is subdivided into multiple zones by fire or smoke barriers and the fire plan for the protected premises allows relocation of occupants from the zone of origin to another zone on the same floor, each zone on the floor shall be annunciated separately. [72:10.18.5.2]

13.7.1.13.6.3

Where the system serves more than one building, each building shall be annunciated separately.
[72:10.18.5.3]

13.7.2.30.1*

~~Where required by other governing laws, codes, or standards, carbon monoxide detectors shall be installed in accordance with the following:~~Where carbon monoxide protection of a building is required, carbon monoxide detectors shall be installed in accordance with all of the following, unless a performance-based design in accordance with Section 17.3 of *NFPA 72* is used:

- (1) ~~*On the ceiling in the same room as permanently installed fuel-burning appliances, and~~
- (2) ~~*Centrally located on every habitable level and in every HVAC zone of the building, and~~
- (3) ~~*Outside of each separate dwelling unit, guest room, and guest suite sleeping area within 21 ft (6.4 m) of any door to a sleeping room, with the distance measured along a path of travel, and~~
- (4) ~~*Other locations where required by applicable laws, codes, or standards, or~~
- (5) ~~A performance-based design in accordance with Section 17.3 of *NFPA 72*~~

[72:17.12.1]

A.13.7.2.30.1

Additional documents such as NEMA SB-7, *Applications Guide for Carbon Monoxide Alarms and Detectors*, and the NFPA Fire Protection Research Foundation (FPRF) technical report, *Development of a Technical Basis for Carbon Monoxide Detector Siting*, can also be used as supplemental resources to help with risk assessment, siting, and application considerations. [72:A.17.12.1]

A.13.7.2.30.1(1)

Both permanent and temporary carbon-monoxide-producing devices need to be considered when locating carbon monoxide detectors. This includes accounting for all carbon-monoxide-producing appliances and equipment and temporary/mobile equipment, including vehicles, generators, machinery, engines, internal combustion engines, propane equipment, space heaters, engine-driven tools, grills, fire pits, systems used to generate hydrogen, fuel-burning equipment, and any other permanent and/or transient-type equipment and appliances that can be sources of carbon monoxide. [72:A.17.12.1(1)]

By placing carbon monoxide detectors close to all permanent as well as all temporary carbon-monoxide-producing sources, early detection of carbon monoxide is more likely to occur. Detectors should therefore be located as close as practicable to the carbon-monoxide-producing source, taking into account such factors as detector accessibility for inspection, testing, and maintenance; potential sources of detector damage or contamination; potential nuisance alarm sources; transient backdrafting spillage of flue gases during startup and operation; and ventilation supply and exhaust vents. For early detection, carbon monoxide detectors should be located on the ceiling over carbon-monoxide-producing sources. There is often some buoyancy of the heated combustion gases that can help carry the carbon monoxide to the detector. [72:A.17.12.1(1)]

Carbon monoxide detectors should also be considered throughout the room/space that contains the carbon-monoxide-producing source to help address either limited or no buoyancy of the carbon monoxide, adverse impacts by HVAC systems, as well as ambient airflows in the space that can carry carbon monoxide away from the source rather than up to the ceiling directly over the source.

Carbon monoxide detectors are located on the ceiling above permanently installed fuel-burning appliances because of the buoyancy of the heated combustion gases as compared to normal ambient temperatures. Detectors should be located as close as practical to the permanently installed fuel-burning appliance consistent with considerations of detector accessibility, sources of detector contamination, and nuisance sources. Siting considerations can include transient backdrafting spillage of flue gases during startup and ventilation supply or exhaust vents.

[72:A.17.12.1(1)]

A.13.7.2.30.1(2)

The purpose of detectors centrally located on every habitable level is to detect the migration of carbon monoxide from permanently installed fuel-burning appliances and other sources of carbon monoxide. Other sources of carbon monoxide can include vehicles or other equipment that uses an internal combustion engine, barbecue grills, propane-operated equipment, and systems used to generate hydrogen. Detector location and spacing should be based on an engineering evaluation that considers potential sources and migration of carbon monoxide. HVAC systems should be considered in the locating of carbon monoxide detectors because the HVAC systems provide a good means of mixing and the

~~migration of carbon monoxide. Other considerations when locating carbon monoxide detectors are areas with closed doors and rated demising walls, which can isolate or separate areas within HVAC zones. Additional information for the location of carbon monoxide detectors is available in the Fire Protection Research Foundation (FPRF) technical report, "Development of a Technical Basis for Carbon Monoxide Detector Siting."~~

Carbon monoxide can follow flow paths from its original source to adjacent areas in the building, including moving horizontally and vertically throughout the space, building, and structure, and where carbon monoxide detectors should be located in these adjacent areas needs to be considered. Detector location and spacing should be based on an engineering evaluation that considers potential sources and migration of carbon monoxide, including through exhaust ductwork, HVAC equipment, openings in walls and floors, unprotected penetrations, and elevator shafts. [72:A.17.12.1(2)]

As some of the higher carbon monoxide concentrations are often at the source and within the exhaust ductwork and venting equipment, carbon monoxide detectors should be located along the exhaust path of any carbon-monoxide-producing equipment, appliances, and so forth, extending from the source of the carbon monoxide through the building to the termination of the exhaust at an exterior wall or roof. This should include detectors along any duct branch lines and interconnections to any ductwork and piping used in the exhaust system so carbon monoxide that might exist outside the exhaust path (due to leaks, damage, obstructions, rust, corrosion, etc.) can be detected. [72:A.17.12.1(2)]

The impact of HVAC systems should be taken into account when locating carbon monoxide detectors. HVAC systems can transport as well as mix and dilute carbon monoxide. Consideration should be given to the layout and operation of the HVAC system and whether the HVAC is constantly running or only runs for a portion of the time and, therefore, is not constantly distributing or mixing air in the building. When locating carbon monoxide detectors, other considerations include the presence and impact of closed doors and walls. These can compartmentalize areas within an individual HVAC zone or floor and prevent spread. Their presence can also allow carbon monoxide to accumulate more rapidly in given areas if doors are closed to contain it and not allow it to spread and dilute the concentration. [72:A.17.12.1(2)]

Carbon monoxide can potentially enter the building from an exterior source, such as through make-up air systems. Some of the external sources that should be considered when locating carbon monoxide detectors include adjacent structures, exterior systems, equipment such as vehicles and generators, and interconnections to underground spaces or parking garages. [72:A.17.12.1(2)]

A.13.7.2.30.1(3)

Carbon monoxide detectors should also be located and installed as recommended by the manufacturer's published instructions, including those specific requirements for the spacing between detectors, minimum/maximum spacings to walls and obstructions, minimum/maximum height of a detector in a space, minimum/maximum distances to HVAC vents, reductions in spacing required for high ceilings, and other pertinent information required to help properly design, assess, and install detectors to achieve their intent of detecting carbon monoxide early on to warn occupants of a hazard. [72:A.17.12.1(3)]

A.13.7.2.30.1(4)

Carbon monoxide detectors should also be located and installed as recommended by the manufacturer's published instructions, including those specific requirements for the spacing between detectors, minimum/maximum spacings to walls and obstructions, minimum/maximum height of a detector in a space, minimum/maximum distances to HVAC vents, reductions in spacing required for high ceilings, and other pertinent information required to help properly design, assess, and install detectors to achieve their intent of detecting carbon monoxide early on to warn occupants of a hazard. [72:A.17.12.1(4)]

13.7.2.30.2

Carbon monoxide detectors shall meet the following requirements:

- (1) Carbon monoxide detectors shall be listed in accordance with applicable standards, such as UL 2075, *Gas and Vapor Detectors and Sensors*.
- (2) Carbon monoxide detectors shall be set to respond to the sensitivity limits specified in UL 2034, *Single and Multiple Station Carbon Monoxide Alarms*.

[72:17.12.2]

13.7.2.30.3

All carbon monoxide detectors shall be located and mounted so that accidental operation will not be caused by jarring or vibration. ~~[72:17.12.3]~~[17.12.4]

13.7.2.30.4

The location of carbon monoxide detectors shall be based on an evaluation of potential ambient sources and flows of carbon monoxide, moisture, temperature, dust, or fumes and of electrical or mechanical influences to minimize nuisance alarms. [~~72:17.12.4~~17.12.5]

13.7.2.30.5

The selection and placement of carbon monoxide detectors shall take into account both the performance characteristics of the detector and the areas into which the detectors are to be installed to prevent nuisance and unintentional alarms or improper operation after installation. [~~72:17.12.5~~17.12.6]

~~13.7.2.30.6~~

~~Unless specifically designed and listed for the expected conditions, carbon monoxide detectors shall not be installed where any of the following ambient conditions exist:~~

- ~~(1) Temperature below 32°F (0°C)~~
- ~~(2) Temperature above 100°F (38°C)~~
- ~~(3) Relative humidity outside the range of 10 percent to 95 percent~~

[~~72:17.12.6~~]

13.7.2.30.6

Unless tested and listed for recessed mounting, carbon monoxide detectors shall not be recessed into the mounting surface. [72:17.12.7]

13.7.2.30.7*

Carbon monoxide detectors that are installed in air duct systems shall not be used as a substitute for open area protection. [72:17.12.3]

13.7.2.30.8 Protection During Construction.

13.7.2.30.8.1

Where detectors are installed for signal initiation during construction, they shall be replaced prior to the final commissioning of the system. [72:17.12.8.1]

13.7.2.30.8.2

Where detection is not required during construction, detectors shall not be installed until after all other construction trades have completed cleanup. [72:17.12.8.2]

13.7.2.30.9 Carbon Monoxide Detectors for Control of Carbon Monoxide Spread.

13.7.2.30.9.1

System designers shall consider the spread of carbon monoxide through an occupancy through the HVAC system. [72:17.12.9.1]

13.7.2.30.9.2

Interaction with smoke control systems, if such is provided, shall be coordinated. [72:17.12.9.2]

13.7.3 Fire Alarm Systems.

13.7.3.1 General.

13.7.3.1.1 Equipment.

13.7.3.1.1.1

Equipment constructed and installed in conformity with this *Code* shall be listed for the purpose for which it is used. [72:10.3.1]

13.7.3.1.1.2

System components shall be installed, tested, inspected, and maintained in accordance with the manufacturer's published instructions and this *Code*. [72:10.3.2]

13.7.3.1.1.3*

All devices and appliances that receive their power from the initiating device circuit (IDC) or signaling line circuit (SLC) of a control unit shall be listed for use with the control unit. [72:10.3.3]

13.7.3.1.1.4

All apparatus requiring rewinding or resetting to maintain normal operation shall be restored to normal after each abnormal condition. [72:10.3.4]

13.7.3.2 Documentation and Notification.

13.7.3.2.1 Approval and Acceptance.

The AHJ shall be notified prior to installation or alteration of equipment or wiring. [72:10.20.2]

13.7.3.2.2 Minimum Required Documentation.

13.7.3.2.2.1

Where documentation is required by the authority having jurisdiction, the following list shall represent the minimum documentation required for new systems and additions or alterations to existing systems:

- (1) *Written narrative providing intent and system description
- (2) Riser diagram
- (3) Floor plan layout showing locations of all devices, control equipment, and supervising station and shared communications equipment with each sheet showing the following:
 - (a) Point of compass (north arrow)
 - (b) A graphic representation of the scale used
 - (c) Room use identification
 - (d) Building features that will affect the placement of initiating devices and notification appliances
- (4) Sequence of operation in either an input/output matrix or narrative form
- (5) Equipment technical data sheets
- (6) Manufacturers' published instructions, including operation and maintenance instructions
- (7) Battery capacity and safety margin calculations (where batteries are provided)
- (8) Voltage drop calculations for notification appliance circuits
- (9) Mounting height elevation for wall-mounted devices and appliances
- (10) Where occupant notification is required, minimum sound pressure levels that must be produced by the audible notification appliances in applicable covered areas
- (11) Locations of alarm notification appliances, including candela ratings for visual alarm notification appliances
- (12) *Pathway diagrams between the control unit and the supervising station and shared communications equipment within the protected premises
- (13) Completed record of completion in accordance with 13.7.3.2.3.6 and 13.7.3.2.6.2
- (14) For software-based systems, a copy of site-specific software, including specific instructions on how to obtain the means of system and software access (password)
- (15) Record (as-built) drawings
- (16) Records, record retention, and record maintenance in accordance with Section 7.7 of *NFPA 72*
- (17) Completed record of inspection and testing in accordance with 13.7.3.2.4.6 and 13.7.3.2.6.2

[72:7.2.1]

A.13.7.3.2.2.1(1)

The purpose for a written narrative is to provide a description of the work to be performed and could be as simple as "Install additional three smoke detectors to provide coverage for newly installed meeting room." However, it could be desirable to include why or by whose direction the work is being done, such as "at owner's request," "per specifications dated ...," or "at the direction of" See also Section 23.3 of *NFPA 72* for additional system feature documentation requirements. [72:7.2.1(1)]

A.13.7.3.2.2.1(12)

Paragraph 26.6.2.5 of NFPA 72 allows for the following three communications pathway options when a supervising station fire alarm system is provided:

- (1) Performance-based technologies
- (2) Digital alarm communicator systems
- (3) Radio systems, which includes one-way private and two-way RF systems

[72:7.2.1(12)]

Chapter 26 of NFPA 72 includes several requirements specific to each of these communications pathway alternatives. In order to verify the provided communication path(s), and any shared equipment, comply with Code requirements, the following are examples of information that should be submitted as the minimum documentation for a supervising station fire alarm system:

- (1) Performance-based technologies
 - (1) The type of performance-based transmitter(s) to be used such as IP communicators, cellular radios, and so forth
 - (2) Whether communications with the supervising station will be via a single pathway or a multiple pathway
 - (3) An indication of the use, where applicable, of shared equipment such as routers, modems, and LANs within the protected premises
 - (4) Battery calculations for the shared equipment, which should meet the requirements of 26.6.3.13 of NFPA 72
- (2) Digital alarm communicator system
 - (1) The primary communications pathway, which should be a telephone line
 - (2) The secondary communications pathway, which should comply with 26.6.4.2.4 of NFPA 72
- (3) Radio system
 - (1) The type of radio system that will be used (private one-way or two-way RF)
 - (2) The secondary power provided for the radio transmitter

[72:7.2.1(12)]

Where the transmitter equipment is located separately from the main fire alarm control unit, an indication of its protection in accordance with 10.4.4 of NFPA 72 should also be provided within the minimum documentation. [72:7.2.1(12)]

13.7.3.2.2.2

System design documents shall identify the name and contact information of the system designer. [72:7.2.2]

13.7.3.2.2.3

All fire alarm drawings shall use symbols described in NFPA 170 or other symbols acceptable to the authority having jurisdiction. [72:7.2.3]

13.7.3.2.3 Completion Documentation.

13.7.3.2.3.1

The requirements of 13.7.3.2.3 shall apply only where required by other governing laws, codes, or standards; by other parts of NFPA 72; or by project specifications or drawings. [72:7.5.1]

13.7.3.2.3.2

Before requesting final approval of the installation, if required by the AHJ, the installing contractor shall furnish a written statement stating that the system has been installed in accordance with approved plans and tested in accordance with the manufacturer's published instructions and the appropriate NFPA requirements. [72:7.5.2]

13.7.3.2.3.3

All systems, including new systems and additions or alterations to existing systems, shall include the following documentation, ~~which shall be delivered to the owner or the owner's representative upon final acceptance of the system:~~

- (1) An owner's manual and manufacturer's published instructions covering all system equipment
- (2) Record (as-built) drawings in accordance with 13.7.3.2.3.5
- (3) A completed record of completion form in accordance with 13.7.3.2.3.6
- (4) For software-based systems, record copy of the site-specific software in accordance with 13.7.3.2.3.7

~~[72:7.5.37.5.3.1]~~

13.7.3.2.3.4

For new emergency communications systems, an owner's manual shall be provided and shall contain the following documentation:

- (1) Detailed narrative description of the system inputs, evacuation signaling, ancillary functions, annunciation, intended sequence of operations, expansion capability, application considerations, and limitations
- (2) Written sequence of operation for the system including an operational input/output matrix
- (3) Operator instructions for basic system operations, including alarm acknowledgment, system reset, interpretation of system output (LEDs, CRT display, and printout), operation of manual evacuation signaling and ancillary function controls, and change of printer paper
- (4) Detailed description of routine maintenance and testing as required and recommended and as would be provided under a maintenance contract, including testing and maintenance instructions for each type of device installed, which includes the following:
 - (a) Listing of the individual system components that require periodic testing and maintenance
 - (b) Step-by-step instructions detailing the requisite testing and maintenance procedures, and the intervals at which those procedures shall be performed, for each type of device installed
 - (c) Schedule that correlates the testing and maintenance procedures that are required by this section
- (5) Service directory, including a list of names and telephone numbers of those who provide service for the system
- (6) Product data sheets for all system equipment

[72:7.5.4]

13.7.3.2.3.5 Record Drawings (As-Built).

13.7.3.2.3.5.1

Record drawings shall consist of current updated shop drawings reflecting the actual installation of all system equipment, components, and wiring. [72:7.5.5.1]

13.7.3.2.3.5.2

A sequence of operations in input/output matrix or narrative form shall be provided with the record drawings to reflect actual programming at the time of completion. [72:7.5.5.2]

13.7.3.2.3.5.3

Where necessary, revised calculations in accordance with 7.4.10 of *NFPA 72* shall be provided depicting any changes due to installation conditions. [72:7.5.5.3]

13.7.3.2.3.5.4

Record drawings shall be turned over to the owner with a copy placed inside the documentation cabinet in accordance with Section 7.7 of *NFPA 72*. [72:7.5.5.4]

13.7.3.2.3.5.5

Record drawings shall include approval documentation resulting from variances, performance-based designs, risk analyses, and other system evaluations or variations. [72:7.5.5.5]

13.7.3.2.3.6 Record of Completion.

13.7.3.2.3.6.1

The record of completion shall be documented in accordance with 13.7.3.2.3.6 using either the record of completion forms, Figure 13.7.3.2.5.2(a) through Figure 13.7.3.2.5.2(f), or an alternative document that contains only the elements of Figure 13.7.3.2.5.2(a) through Figure 13.7.3.2.5.2(f) applicable to the installed system. [72:7.5.6.1]

13.7.3.2.3.6.2

The record of completion documentation shall be completed by the installing contractor and submitted to the authority having jurisdiction and the owner at the conclusion of the job. The record of completion documentation shall be permitted to be part of the written statement required in 13.7.3.2.3.2 and part of the documents that support the requirements of 13.7.3.2.3.8. When more than one contractor has been responsible for the installation, each contractor shall complete the portions of the documentation for which that contractor has responsibility. [72:7.5.6.2]

13.7.3.2.3.6.3

The preparation of the record of completion documentation shall be the responsibility of the qualified and experienced person in accordance with 10.5.2 of *NFPA 72*. [72:7.5.6.3]

13.7.3.2.3.6.4

The record of completion documentation shall be updated in accordance with 13.7.3.2.3.6.6 to reflect all system additions or modifications. [72:7.5.6.4]

13.7.3.2.3.6.5

The updated copy of the record of completion documents shall be maintained in a documentation cabinet in accordance with 7.7.2 of *NFPA 72*. [72:7.5.6.5]

13.7.3.2.3.6.6 Revisions.

13.7.3.2.3.6.6.1

All modifications made after the initial installation shall be recorded on a revised version of the original completion documents, which shall serve as a supplement to the original, unaltered completion documents. [72:7.5.6.6.1]

13.7.3.2.3.6.6.2

The revised record of completion document shall include a revision date. [72:7.5.6.6.2]

13.7.3.2.3.6.6.3*

Where the original or the latest overall system record of completion cannot be obtained, a new system record of completion shall be provided that documents the system configuration as discovered during the current project's scope of work. [72:7.5.6.6.3]

A.13.7.3.2.3.6.6.3

It is the intent that if an original or current record of completion is not available for the overall system, the installer would provide a new record of completion that addresses items discovered about the system. The installer will complete the respective sections related to the overall system that have been discovered under the current scope of work. It is not the intent of this section to require an in-depth evaluation of an existing system solely for the purpose of completing a system-wide record of completion.
[72:A.7.5.6.6.3]

13.7.3.2.3.6.7 Electronic Record of Completion.

13.7.3.2.3.6.7.1

Where approved by the AHJ, the record of completion shall be permitted to be filed electronically instead of on paper. [72:7.5.6.7.1]

13.7.3.2.3.6.7.2

If filed electronically, the record of completion document shall be accessible with standard software and shall be backed up. [72:7.5.6.7.2]

13.7.3.2.3.7 Site-Specific Software.

13.7.3.2.3.7.1

For software-based systems, a copy of the site-specific software shall be provided to the system owner or owner's designated representative. [72:7.5.7.1]

13.7.3.2.3.7.1.1

The site-specific software documentation shall include both the user passcode and either the system programming password or specific instructions on how to obtain the programming password from the system manufacturer. [72:7.5.7.1.1-7.5.7.1.2]

13.7.3.2.3.7.1.2

The passwords provided shall enable currently certified qualified programming personnel to access, edit, modify, and add to the existing ~~system~~ system's site-specific software. [72:7.5.7.1.2-7.5.7.1.3]

13.7.3.2.3.7.2

A copy of the site-specific software shall be stored on-site in nonvolatile, ~~nonerasable, nonrewritable~~ memory. [72:7.5.7.2]

13.7.3.2.3.8* Verification of Compliant Installation.

13.7.3.2.3.8.1

Where required by the AHJ, compliance of the completed installation with the requirements of *NFPA 72* shall be certified by a qualified and impartial third-party organization acceptable to the AHJ. [72:7.5.8.1]

13.7.3.2.3.8.2

Verification of compliant installation shall be performed according to testing requirements and procedures specified in 14.4.1 and 14.4.2 of *NFPA 72*. [72:7.5.8.2]

13.7.3.2.3.8.3

Verification shall ensure that:

- (1) All components and functions are installed and operate per the approved plans and sequence of operation.
- (2) All required system documentation is complete and is archived on site.
- (3) For new supervising station systems, the verification shall also ascertain proper arrangement, transmission, and receipt of all signals required to be transmitted off-premises and shall meet the requirements of 14.4.1 and 14.4.2 of *NFPA 72*.
- (4) For existing supervising station systems that are extended, modified, or reconfigured, the verification shall be required for the new work only, and reacceptance testing in accordance with Chapter 14 of *NFPA 72* shall be acceptable.
- (5) Written confirmation has been provided that any required corrective actions have been completed

[72:7.5.8.3]

13.7.3.2.3.9

Documentation of central station service shall be in accordance with 26.3.4 of *NFPA 72*. [72:7.5.9]

13.7.3.2.3.10

Documentation of remote station service shall be in accordance with 26.5.2 of *NFPA 72*. [72:7.5.10]

13.7.3.2.4 Inspection, Testing, and Maintenance Documentation.

13.7.3.2.4.1

Test plan documentation shall be provided in accordance with 14.2.10 of *NFPA 72*. [72:7.6.1]

13.7.3.2.4.2

Acceptance testing documentation shall be provided in accordance with 14.6.1 of *NFPA 72*. [72:7.6.2]

13.7.3.2.4.3

Reacceptance test documentation shall be provided in accordance with 14.6.1 of *NFPA 72*. [72:7.6.3]

13.7.3.2.4.4

Periodic inspection and testing documentation shall be provided in accordance with 14.6.2 through 14.6.4 of *NFPA 72*. [72:7.6.4]

13.7.3.2.4.5

Impairment documentation shall be provided in accordance with Section 10.20 of *NFPA 72*. [72:7.6.5]

13.7.3.2.4.6 Record of Inspection and Testing.

The record of all inspections, testing, and maintenance as required by 14.6.2.4 of *NFPA 72* shall be documented using either the record of inspection and testing forms, Figure 13.7.3.2.5.2(g) through Figure 13.7.3.2.5.2(l), or an alternative record that includes all the applicable information shown in Figure 13.7.3.2.5.2(g) through Figure 13.7.3.2.5.2(l). [72:7.6.6]

13.7.3.2.5 Records, Record Retention, and Record Maintenance.

13.7.3.2.5.1 Records.

13.7.3.2.5.1.1

A complete record of the tests and operations of each system shall be kept until the next test and for 1 year thereafter unless more stringent requirements are required elsewhere in *NFPA 72*. [72:7.7.1.1]

13.7.3.2.5.1.2*

The records shall be available for examination and, if required, reported to the authority having jurisdiction. Archiving of records by any means shall be permitted if hard copies of the records can be provided promptly when requested. [72:7.7.1.2]

13.7.3.2.5.1.3

If off-premises monitoring is provided, records of all signals, tests, and operations recorded at the supervising station, including the public emergency alarm reporting system, shall be maintained by the off-premise monitoring service provider for not less than 1 year unless more stringent requirements are required elsewhere in *NFPA 72*. [72:7.7.1.3]

13.7.3.2.5.1.4

Required documents regarding system design and function shall be maintained for the life of the system. [72:7.7.1.4]

13.7.3.2.5.1.5

The emergency communications system and fire alarm system as-built plans and other related documentation shall be permitted to be maintained together, including the appearance of both systems on the same drawings. [72:7.7.1.5]

13.7.3.2.5.1.6

Revisions and alterations to systems shall be recorded and records maintained with the original system design documents. [72:7.7.1.6]

13.7.3.2.5.2 Document Accessibility.

13.7.3.2.5.2.1

With every new system, a documentation cabinet shall be installed at the system control unit or at another approved location at the protected premises. [72:7.7.2.1]

13.7.3.2.5.2.2

The documentation cabinet shall be sized so that it can contain all necessary documentation. [72:7.7.2.2]

13.7.3.2.5.2.3*

All record documentation shall be stored in the documentation cabinet. No record documentation shall be stored in the control unit. [72:7.7.2.3]

13.7.3.2.5.2.4

Where the documentation cabinet is not in the same location as the system control unit, its location shall be identified at the system control unit. [72:7.7.2.4]

13.7.3.2.5.2.5

The documentation cabinet shall be prominently labeled SYSTEM RECORD DOCUMENTS. [72:7.7.2.5]

13.7.3.2.5.2.6*

The building owner or the building owner's representative shall, on an annual basis, review any electronic documentation media formats and associated interfacing hardware for compatibility and update, if necessary. [72:7.7.2.6]

13.7.3.2.5.2.7

The contents of the cabinet shall be accessible by authorized personnel only. [72:7.7.2.7]

13.7.3.2.5.2.8

Emergency communications system and fire alarm system record documentation shall be permitted to be maintained together in the same documentation cabinet. [72:7.7.2.8]

13.7.3.2.5.3 Document Security.

13.7.3.2.5.3.1

Security for system's documentation shall be determined by the stakeholders. [72:7.7.3.1]

13.7.3.2.5.3.2*

Where such documents cannot be protected from public access, it shall be permitted to remove sensitive information from record documents provided the owner retains complete documentation that will be made accessible to the authority having jurisdiction at an owner designated location. [72:7.7.3.2]

13.7.3.2.6 Forms.

13.7.3.2.6.1 General.

13.7.3.2.6.1.1

The requirements of 13.7.3.2.6 shall apply only where required by other governing laws, codes, or standards; by other parts of this *Code*; or by project specifications or drawings. [72:7.8.1.1]

13.7.3.2.6.1.2

Where specific forms are required by other governing laws, codes, or standards; by other parts of *NFPA 72*; or by project specifications or drawings, form layouts and content that differ from those in 13.7.3.2.6 shall be permitted provided that the minimum required content is included. [72:7.8.1.2]

13.7.3.2.6.2 Forms for Documentation.

Forms for documentation shall comply with Section 7.8.2 of *NFPA 72*.

13.7.3.3 Manually Actuated Alarm-Initiating Devices.

13.7.3.3.1

Manually actuated alarm-initiating devices shall be listed in accordance with applicable standards such as UL 38, *Manual Signaling Boxes for Fire Alarm Systems*. [72:17.15.1]

13.7.3.3.2

Manually actuated alarm-initiating devices for initiating signals other than for fire alarm shall be permitted if the devices are differentiated from manual fire alarm boxes by a color other than red and labeling. [72:17.15.2]

13.7.3.3.3

Combination manual fire alarm boxes and guard's signaling stations shall be permitted. [72:17.15.3]

13.7.3.3.4

Manually actuated alarm-initiating devices shall be securely mounted. [72:17.15.4]

13.7.3.3.5

Manually actuated alarm-initiating devices shall be mounted on a background of contrasting color. [72:17.15.5]

13.7.3.3.6

The operable part of a manually actuated alarm-initiating device shall be not less than 42 in. (1.07 m) and not more than 48 in. (1.22 m) from the finished floor. [72:17.15.6]

13.7.3.3.7

Manually actuated alarm-initiating devices shall be permitted to be single action or double action. [72:17.15.7]

13.7.3.3.8*

Listed protective covers shall be permitted to be installed over single- or double-action manually actuated alarm-initiating devices. [72:17.15.8]

13.7.3.3.9

Manual fire alarm boxes shall comply with 13.7.3.3.9.1 through 13.7.3.3.9.6. [72:17.15.9]

13.7.3.3.9.1

Manual fire alarm boxes shall be used only for fire alarm initiating purposes. [72:17.15.9.1]

13.7.3.3.9.2

Manual fire alarm boxes shall be installed so that they are conspicuous, unobstructed, and accessible. [72:17.15.9.2]

13.7.3.3.9.3*

Unless installed in an environment that precludes the use of red paint or red plastic, manual fire alarm boxes shall be red in color. [72:17.15.9.3]

13.7.3.3.9.4

Manual fire alarm boxes shall be located within 5 ft (1.5 m) of each exit doorway on each floor. [72:17.15.9.4]

13.7.3.3.9.5*

Additional manual fire alarm boxes shall be provided so that the travel distance to the nearest manual fire alarm box will not exceed 200 ft (61 m), measured horizontally on the same floor. [72:17.15.9.5]

13.7.3.3.9.6

Manual fire alarm boxes shall be mounted on both sides of grouped openings over 40 ft (12.2 m) in width, and within 5 ft (1.5 m) of each side of the grouped opening. [72:17.15.9.6]

13.7.3.3.10

When fire alarm systems are not monitored, an approved permanent sign shall be installed adjacent to each manual fire alarm box. The sign shall read as follows:

Local alarm only:

- (1) Activate alarm
- (2) Exit building
- (3) Call fire department

13.7.3.4* Indication of Central Station Service.

The prime contractor shall conspicuously indicate that the alarm system providing service at a protected premises complies with all the requirements of this *Code* through the use of a systematic follow-up program under the control of the organization that has listed the prime contractor. [72:26.3.4]

13.7.3.4.1

Documentation indicating *Code* compliance of the alarm system shall be issued by the organization that has listed the prime contractor. [72:26.3.4.1]

13.7.3.4.2

The documentation shall include, at a minimum, the following information:

- (1) Name of the prime contractor involved with the ongoing *Code* compliance of the central station service
- (2) *Full description of the alarm system as installed
- (3) Issue and expiration dates of the documentation
- (4) Name, address, and contact information of the organization issuing the document
- (5) Identification of the AHJ(s) for the central station service installation

[72:26.3.4.2]

13.7.3.4.3

The documentation shall be physically posted within 3 ft (1 m) of the control unit, and copies of the documentation shall be made available to the AHJ(s) upon request. [72:26.3.4.3]

13.7.3.4.4

A central repository of issued documentation, accessible to the AHJ, shall be maintained by the organization that has listed the prime contractor. [72:26.3.4.4]

13.7.3.4.5*

Alarm system service that does not comply with all the requirements of Section 26.3 of *NFPA 72* shall not be designated as central station service. [72:26.3.4.5]

13.7.3.4.6*

For the purpose of Section 26.3 of *NFPA 72*, the subscriber shall notify the prime contractor, in writing, of the identity of the authority(ies) having jurisdiction. [72:26.3.4.6]

13.7.3.4.7

The AHJ(s) identified in 13.7.3.4.2(5) shall be notified within 30 calendar days of the expiration or cancellation by the organization that has listed the prime contractor. [72:26.3.4.7]

13.7.3.4.8

The subscriber shall surrender expired or canceled documentation to the prime contractor within 30 days of the termination date. [72:26.3.4.8]

13.7.3.5 Automatic Fire Detection and Alarm Service.

13.7.3.5.1

Automatic fire detectors shall be located, maintained, and tested in accordance with *NFPA 72*.

13.7.4 Automatic Fire Detectors.

13.7.4.1 General Requirements.

13.7.4.1.1

The requirements of 13.7.4.1.1 through 13.7.4.1.4 shall apply to all initiating devices. [72:17.4.1]

13.7.4.1.2 Mechanical Protection.

13.7.4.1.2.1

Initiating devices subject to mechanical damage shall be protected. [72:17.4.2.1]

13.7.4.1.2.2

If guards or covers are employed, they shall be listed for use with the initiating device. [72:17.4.2.2]

13.7.4.1.2.3*

The protection shall not prevent the initiating device from achieving the objectives of the system by adversely affecting the use, operation, or performance of the initiating device. [72:17.4.2.3]

13.7.4.1.3

Initiating devices shall be installed in a manner that provides accessibility for periodic inspection, testing, and maintenance. [72:17.4.3]

13.7.4.1.4

Initiating devices shall be ~~installed in all areas, compartments, or locations where required by other governing laws, codes, or standards~~ supported independently of their attachment to the circuit conductors. [72:17.4.4]

13.7.4.2.1 Recessed Mounting.

Unless tested and listed for recessed mounting, detectors shall not be recessed into the mounting surface. [72:17.5.1]

13.7.4.2.2* Partitions.

Where partitions extend to within 15 percent of the ceiling height, the spaces separated by the partitions shall be considered as separate rooms. [72:17.5.2]

13.7.4.3 Location.

13.7.4.3.1*

Unless otherwise modified by 17.6.3.2.2, 17.6.3.3.2, or 17.6.3.7 of *NFPA 72*, spot-type heat-sensing fire detectors shall be located on the ceiling not less than 4 in. (100 mm) from the sidewall or on the sidewalls between 4 in. and 12 in. (100 mm and 300 mm) from the ceiling. ~~[72:17.6.3.1.3.1]~~

13.7.4.3.2

Unless otherwise modified by 17.6.3.2.2, 17.6.3.3.2, or 17.6.3.7 of *NFPA 72*, line-type heat detectors shall be located on the ceiling or on the sidewalls not more than 20 in. (510 mm) from the ceiling. ~~[72:17.6.3.1.3.2]~~

A.13.7.4.3.3

In high-ceiling areas, such as atriums, where spot-type smoke detectors are not accessible for periodic maintenance and testing, projected beam-type or air sampling-type detectors should be considered where access can be provided. ~~[72:A.17.7.3.2A.17.7.4.2]~~

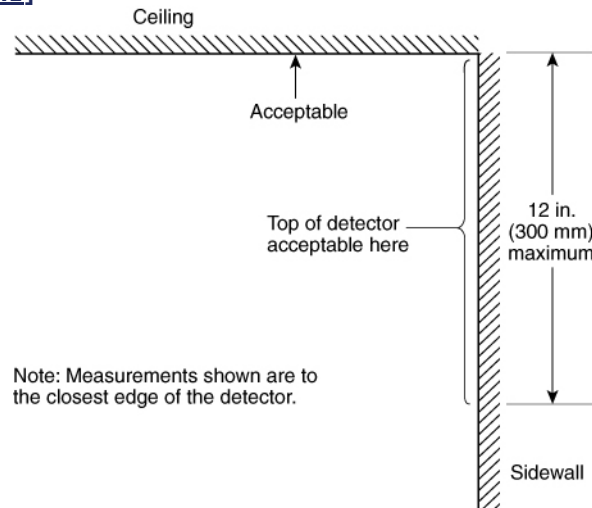
13.7.4.3.3.1*

Spot-type smoke detectors shall be located on the ceiling or, if on a sidewall, between the ceiling and 12 in. (300 mm) down from the ceiling to the top of the detector. ~~[72:17.7.3.2.17.7.4.2.1]~~

A.13.7.4.3.3.1

Refer to Figure A.13.7.4.3.3.1 for an example of proper mounting for detectors. Sidewall detectors mounted closer to the ceiling will respond faster. ~~[72:A.17.7.3.2.1A.17.7.4.2.1]~~

Figure A.13.7.4.3.3.1 Example of Proper Mounting of Smoke Detectors. ~~[72: Figure A.17.7.3.2.1A.17.7.4.2.1]~~



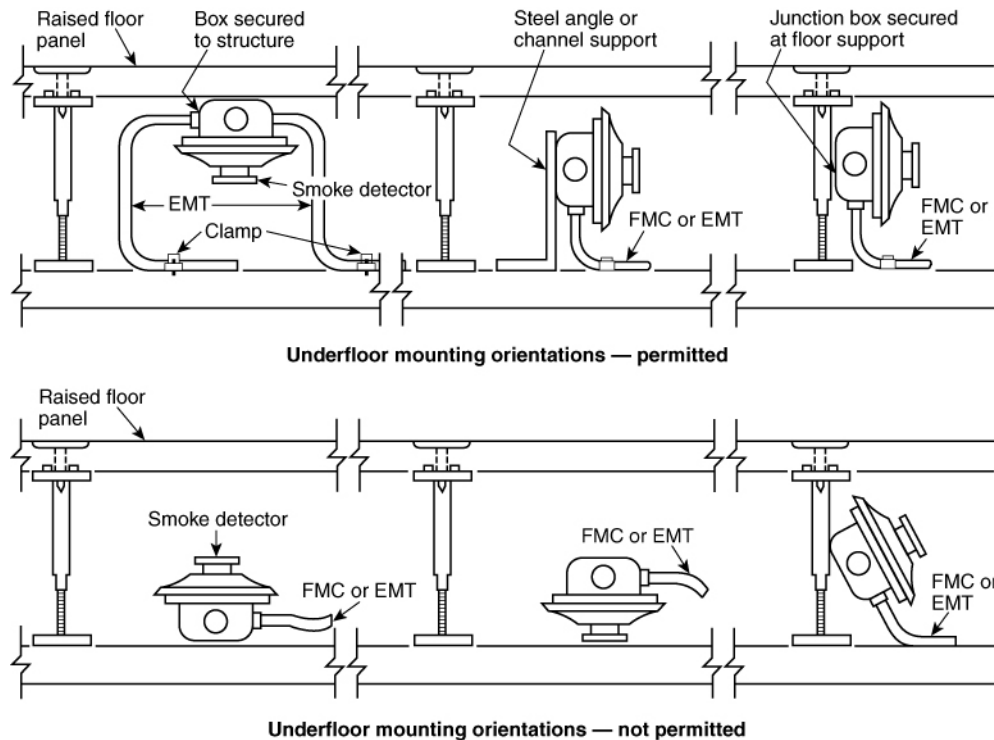
13.7.4.3.3.2*

To minimize dust contamination, smoke detectors, where installed under raised floors, shall be mounted only in an orientation for which they have been listed. ~~[72:17.7.3.2.217.7.4.2.2]~~

A.13.7.4.3.3.2

Figure A.13.7.4.3.3.2 illustrates under-floor mounting installations. ~~[72:A.17.7.3.2.2A.17.7.4.2.2]~~

Figure A.13.7.4.3.3.2 Mounting Installations Permitted (top) and Not Permitted (bottom). ~~[72: Figure A.17.7.3.2.2A.17.7.4.2.2]~~



13.7.4.3.3.3

On smooth ceilings, spacing for spot-type smoke detectors shall be in accordance with 13.7.4.3.3.3.1 through 13.7.4.3.3.3.4. [72:17.7.3.2.3.1 17.7.4.2.3]

13.7.4.3.3.3.1*

In the absence of specific performance-based design criteria, one of the following requirements shall apply:

- (1) The distance between smoke detectors shall not exceed a nominal spacing of 30 ft (9.1 m) and there shall be detectors within a distance of one-half the nominal spacing, measured at right angles from all walls or partitions extending upward to within the top 15 percent of the ceiling height.
- (2) *All points on the ceiling shall have a detector within a distance equal to or less than 0.7 times the nominal 30 ft (9.1 m) spacing (0.7 S).

[72:17.7.3.2.3.1 17.7.4.2.3.1]

A.13.7.4.3.3.3.1

The 30 ft (9.1 m) spacing is a guide for prescriptive designs. The use of such a spacing is based upon customary practice in the fire alarm community. [72:A.17.7.3.2.3.1 A.17.7.4.2.3.1]

Where there are explicit performance objectives for the response of the smoke detection system, the performance-based design methods outlined in Annex B of NFPA 72 should be used.

[72:A.17.7.3.2.3.1 A.17.7.4.2.3.1]

For the purposes of this section, "nominal 30 ft (9.1 m)" should be determined to be 30 ft (9.1 m) ± 5 percent [± 18 in. (460 mm)]. [72:A.17.7.3.2.3.1 A.17.7.4.2.3.1]

A.13.7.4.3.3.3.1(2)

This is useful in calculating locations in corridors or irregular areas [see 17.6.3.1.1 of NFPA 72 and Figure A.17.6.3.1.1(h) of NFPA 72]. For irregularly shaped areas, the spacing between detectors can be greater than the selected spacing, provided the maximum spacing from a detector to the farthest point of a sidewall or corner within its zone of protection is not greater than 0.7 times the selected spacing (0.7S).

[72:A.17.7.3.2.3.1(2) A.17.7.4.2.3.1(2)]

13.7.4.3.3.3.2

In all cases, the manufacturer's published instructions shall be followed. [72:17.7.3.2.3.2 17.7.4.2.3.2]

13.7.4.3.3.3

Other spacing shall be permitted to be used depending on ceiling height, different conditions, or response requirements. [~~72:17.7.3.2.3.3~~17.7.4.2.3.3]

13.7.4.3.3.4

For the detection of flaming fires, the guidelines in Annex B of *NFPA 72* shall be permitted to be used. [~~72:17.7.3.2.3.4~~17.7.4.2.3.4]

13.7.4.3.3.4*

For solid joist and beam construction, spacing for spot-type smoke detectors shall be in accordance with 13.7.4.3.3.4.1 through 13.7.4.3.3.4.5. [~~72:17.7.3.2.4~~17.7.4.2.4]

A.13.7.4.3.3.4

Detectors are placed at reduced spacings at right angles to joists or beams in an attempt to ensure that detection time is equivalent to that which would be experienced on a flat ceiling. It takes longer for the combustion products (smoke or heat) to travel at right angles to beams or joists because of the phenomenon wherein a plume from a relatively hot fire with significant thermal lift tends to fill the pocket between each beam or joist before moving to the next beam or joist. [~~72:A.17.7.3.2.4~~A.17.7.4.2.4]

Though it is true that this phenomenon might not be significant in a small smoldering fire where there is only enough thermal lift to cause stratification at the bottom of the joists, reduced spacing is still recommended to ensure that detection time is equivalent to that which would exist on a flat ceiling, even in the case of a hotter type of fire. [~~72:A.17.7.3.2.4~~A.17.7.4.2.4]

13.7.4.3.3.4.1

Solid joists shall be considered equivalent to beams for smoke detector spacing guidelines. [~~72:17.7.3.2.4.1~~17.7.4.2.4.1]

13.7.4.3.3.4.2

For level ceilings, the following shall apply:

- (1) For ceilings with beam depths of less than 10 percent of the ceiling height ($0.1 H$), the following shall apply:
 - (a) Smooth ceiling spacing shall be permitted.
 - (b) Spot-type smoke detectors shall be permitted to be located on ceilings or on the bottom of beams.
- (2) For ceilings with beam depths equal to or greater than 10 percent of the ceiling height ($0.1 H$), the following shall apply:
 - (a) Where beam spacing is equal to or greater than 40 percent of the ceiling height ($0.4 H$), spot-type detectors shall be located on the ceiling in each beam pocket.
 - (b) Where beam spacing is less than 40 percent of the ceiling height ($0.4 H$), the following shall be permitted for spot detectors:
 - (i) Smooth ceiling spacing in the direction parallel to the beams and at one-half smooth ceiling spacing in the direction perpendicular to the beams
 - (ii) Location of detectors either on the ceiling or on the bottom of the beams
- (3) *For beam pockets formed by intersecting beams, including waffle or pan-type ceilings, the following shall apply:
 - (a) For beam depths less than 10 percent of the ceiling height ($0.1 H$), spacing shall be in accordance with 13.7.4.3.3.4.2(1).
 - (b) For beam depths greater than or equal to 10 percent of the ceiling height ($0.1 H$), spacing shall be in accordance with 13.7.4.3.3.4.2(2)(b).

- (4) *For corridors 15 ft (4.6 m) in width or less having ceiling beams or solid joists perpendicular to the corridor length, the following shall apply:
 - (a) Smooth ceiling spacing shall be permitted.
 - (b) Location of spot-type smoke detectors shall be permitted on ceilings, sidewalls, or the bottom of beams or solid joists.
- (5) For rooms of 900 ft² (84 m²) or less, the following shall apply:
 - (a) Use of smooth ceiling spacing shall be permitted.
 - (b) Location of spot-type smoke detectors shall be permitted on ceilings or on the bottom of beams

[72:17.7.3.2.4.2]17.7.4.2.4.2]

A.13.7.4.3.3.4.2(3)

The geometry and reservoir effect is a significant factor that contributes to the development of velocity, temperature, and smoke obscuration conditions at smoke detectors located on the ceiling in beam pocket areas or at the bottom of beams as smoke collected in the reservoir volume spills into adjacent pockets. The waffle- or pan-type ceiling created by beams or solid joists, although retarding the initial flow of smoke, results in increased optical density, temperature rise, and gas velocities comparable to unconfined smooth ceilings. [72:A.17.7.3.2.4.2(3)]A.17.7.4.2.4.2(3)]

For waffle- or pan-type ceilings with beams or solid joists, an alternative smoke detector grid arrangement (such as a shifted grid), with detectors located to take advantage of the channeling effect due to the reservoirs created by the beam pockets, will improve detector response and might allow greater spacing. See Figure A.13.7.4.3.3.4.2(3)(a) and Figure A.13.7.4.3.3.4.2(3)(b) for an example of shifted grids. The alternative smoke detector grid arrangement and spacing should be justified by an engineering analysis comparing the alternative smoke detector grid arrangement with the performance of smoke detectors on a level ceiling of equal height using 30 ft (9.1 m) smoke detector spacing.

[72:A.17.7.3.2.4.2(3)]A.17.7.4.2.4.2(3)]

Figure A.13.7.4.3.3.4.2(3)(a) illustrates the reservoir and channeling effect that results from the deep beam configuration. The strongest gas flows occur in a direction perpendicular to the beam opposite the fire location. The weaker flow occurs in a directional 45 degrees off the beam grid; however, the reservoir effect accounts for higher concentrations of smoke eventually flowing from the strong area reservoirs into the weak area reservoirs. [72:A.17.7.3.2.4.2(3)]A.17.7.4.2.4.2(3)]

Figure A.13.7.4.3.3.4.2(3)(a) Reservoir and Channeling Effect of Deep Beams. [72: Figure A.17.7.3.2.4.2(3)(a)]A.17.7.4.2.4.2(3)(a)]

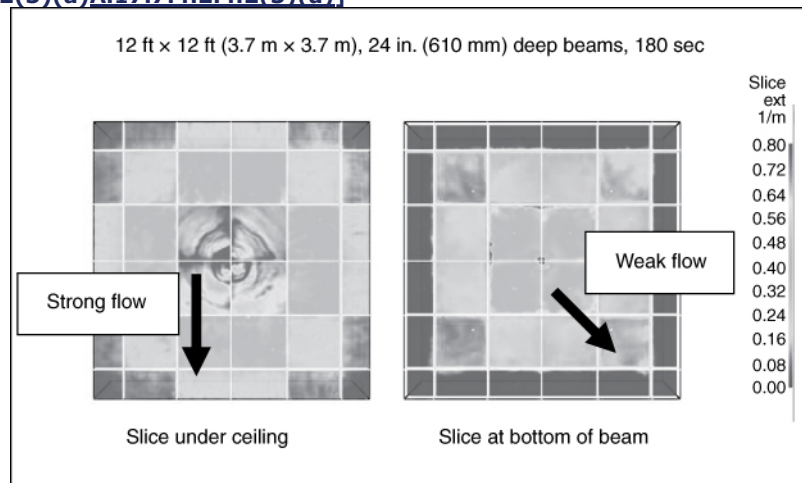
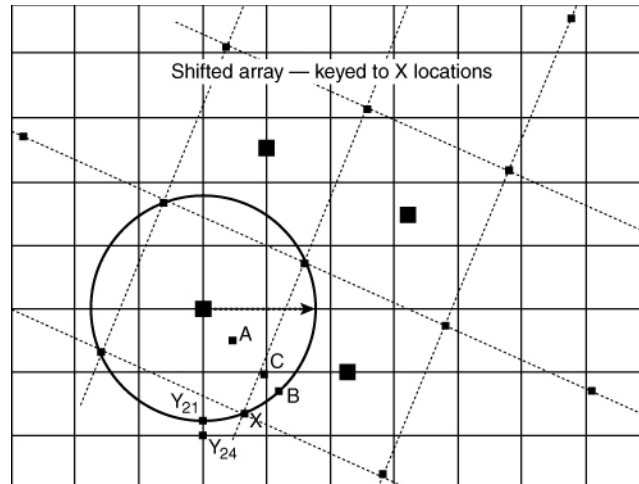


Figure A.13.7.4.3.3.4.2(3)(b) is a generic example illustrating how a smoke detection grid using 30 ft (9.1 m) spacing can be shifted to take advantage of the channeling and reservoir effect to optimize detection response. In the circle, the fire is split into four beam bays that must fill with smoke before appreciable flows occur into the next adjoining eight beam bays. This represents the worst case scenario for smoke to reach the detectors on the circle. The three other fire locations shown require the fire to initially fill only one or two bays before spilling to adjacent bays. [72:A.17.7.3.2.4.2(3)]A.17.7.4.2.4.2(3)]

Figure A.13.7.4.3.3.4.2(3)(b) Shifted Smoke Detection Grid to Optimize Detection for Deep Beam Effects. [72: Figure A.17.7.3.2.4.2(3)(b)]A.17.7.4.2.4.2(3)(b)]



A.13.7.4.3.3.4.2(4)

Corridor geometry is a significant factor that contributes to the development of velocity, temperature, and smoke obscuration conditions at smoke detectors located along a corridor. This is based on the fact that the ceiling jet is confined or constrained by the nearby walls without opportunity for entrainment of air. For corridors of approximately 15 ft (4.6 m) in width and for fires of approximately 100 kW or greater, modeling has demonstrated that the performance of smoke detectors in corridors with beams has been shown to be comparable to spot smoke detector spacing on an unconfined smooth ceiling surface.

[72:A.17.7.3.2.4.2(4)A.17.7.4.2.4.2(4)]

13.7.4.3.3.4.3*

For sloping ceilings with beams running parallel up slope, the following shall apply:

- (1) Spot-type detector(s) shall be located on the ceiling within beam pocket(s).
- (2) The ceiling height shall be taken as the average height over slope.
- (3) Spacing shall be measured along a horizontal projection of the ceiling.
- (4) Smooth ceiling spacing shall be permitted within beam pocket(s) parallel to the beams.
- (5) For beam depths less than or equal to 10 percent of the ceiling height ($0.1 H$), spot-type detectors shall be located with smooth ceiling spacing perpendicular to the beams.
- (6) For beam depths greater than 10 percent of the ceiling height ($0.1 H$), the following shall apply for spacing perpendicular to the beams:
 - (a) For beam spacing greater than or equal to 40 percent of the ceiling height ($0.4 H$), spot-type detectors shall be located in each beam pocket.
 - (b) For beam spacing less than 40 percent of the ceiling height ($0.4 H$), spot-type detectors shall not be required in every beam pocket but shall be spaced not greater than 50 percent of smooth ceiling spacing.

[72:17.7.3.2.4.317.7.4.2.4.3]

A.13.7.4.3.3.4.3

A smoke detector should be placed within each beam channel. Computer modeling has shown that parallel beams (upslope) are very effective at channeling smoke, and smoke spillover is rarely detectable in adjacent parallel pockets. [72:A.17.7.3.2.4.3A.17.7.4.2.4.3]

13.7.4.3.3.4.4*

For sloping ceilings with beams running perpendicular across slope, the following shall apply:

- (1) Spot-type detector(s) shall be located at the bottom of the beams.
- (2) The ceiling height shall be taken as the average height over slope.

- (3) Spacing shall be measured along a horizontal projection of the ceiling.
- (4) Smooth ceiling spacing shall be permitted within beam pocket(s).
- (5) For beam depths less than or equal to 10 percent of the ceiling height ($0.1 H$), spot-type detectors shall be located with smooth ceiling spacing.
- (6) For beam depths greater than 10 percent of the ceiling height ($0.1 H$), spot-type detectors shall not be required to be located closer than ($0.4 H$) and shall not exceed 50 percent of smooth ceiling spacing.

[72:17.7.3.2.4.417.7.4.2.4.4]

A.13.7.4.3.3.4.4

Irregular area spacing guidance for level beam ceilings can be used. Computer modeling has shown that spot-type detectors should be located on the bottom of perpendicular beams.

[72:A.17.7.3.2.4.4A.17.7.4.2.4.4]

13.7.4.3.3.4.5*

For sloped ceilings with beam pockets formed by intersecting beams, the following shall apply:

- (1) Spot-type detector(s) shall be located at the bottom of the beams.
- (2) The ceiling height shall be taken as the average height over slope.
- (3) Spacing shall be measured along a horizontal projection of the ceiling.
- (4) For beam depths less than or equal to 10 percent of the ceiling height ($0.1 H$), spot-type detectors shall be spaced with not more than three beams between detectors and shall not exceed smooth ceiling spacing.
- (5) For beam depths greater than 10 percent of the ceiling height ($0.1 H$), spot-type detectors shall be spaced with not more than two beams between detectors, but shall not be required to be spaced closer than ($0.4 H$), and shall not exceed 50 percent of smooth ceiling spacing.

[72:17.7.3.2.4.517.7.4.2.4.5]

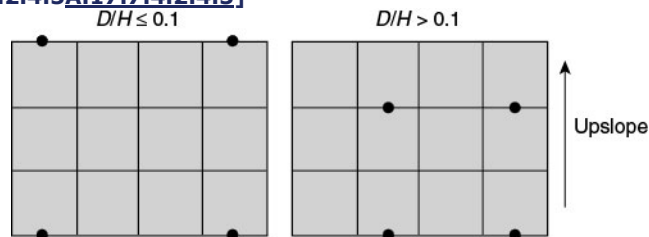
A.13.7.4.3.3.4.5

Computer modeling has shown that spot-type detectors should be located on the bottom of perpendicular beams and should be aligned with the center of pocket, as shown, in Figure A.13.7.4.3.3.4.5.

[72:A.17.7.3.2.4.5A.17.7.4.2.4.5]

Figure A.13.7.4.3.3.4.5 Spot-Type Detector Spacing for Sloping Ceilings with Beam Pockets.

[72: Figure A.17.7.3.2.4.5A.17.7.4.2.4.5]



13.7.4.3.3.4.6

For sloped ceilings with solid joists, the detectors shall be located on the bottom of the joist.

[72:17.7.3.2.4.617.7.4.2.4.6]

13.7.4.3.4.1.1

In the absence of specific performance-based design criteria, each sampling port of an air sampling-type smoke detector shall be treated as a spot-type detector for the purpose of location and spacing in accordance with 17.7.3.17.7.4 of NFPA 72. [72:17.7.3.6.1.117.7.4.6.1.1]

13.7.4.3.4.1.2

Air sampling-type smoke detectors shall produce trouble signals if the airflow is outside the manufacturer's specified range. [72:17.7.3.6.1.217.7.4.6.1.2]

13.7.4.3.4.1.3

If provided, atmospheric contaminant filtration shall be listed for use with the detector and installed and maintained in accordance with the air sampling-type smoke detector manufacturer's published instructions. [~~72:17.7.3.6.1.3~~17.7.4.6.1.3]

13.7.4.3.4.2.1

Maximum air sample transport time from the farthest sampling port to the detector shall not exceed 120 seconds. [~~72:17.7.3.6.2.1~~17.7.4.6.2.1]

13.7.4.3.4.2.2

Sampling pipe networks shall be designed on the basis of, and shall be supported by, computer-based fluid dynamics design calculations to ensure required performance. [~~72:17.7.3.6.2.2~~17.7.4.6.2.2]

13.7.4.3.4.2.3

The sampling pipe network design calculations shall include pressure, volumetric flow, and alarm sensitivity at each sampling port. [~~72:17.7.3.6.2.3~~17.7.4.6.2.3]

13.7.4.3.4.2.4

Software applications for the design of pipe networks shall be listed for use with the manufacturer's equipment. [~~72:17.7.3.6.2.4~~17.7.4.6.2.4]

13.7.4.3.4.2.5

Sampling system piping shall be conspicuously identified as "SMOKE DETECTOR SAMPLING TUBE — DO NOT DISTURB," as follows:

- (1) At changes in direction or branches of piping
- (2) At each side of penetrations of walls, floors, or other barriers
- (3) At intervals on piping that provide visibility within the space, but no greater than 20 ft (6.1 m)

[~~72:17.7.3.6.2.5~~17.7.4.6.2.5]

13.7.4.3.4.2.6*

Sampling ports shall be identified as such. [~~72:17.7.3.6.2.6~~17.7.4.6.2.6]

A.13.7.4.3.4.2.6

Identification can include means such as marking or use of a configuration management program that identifies locations. [~~72:A.17.7.3.6.2.6~~A.17.7.4.6.2.6]

13.7.4.3.4.2.7*

If provided, test ports at the end (most remote location) of a pipe run installed in the pipe network solely for the purpose of validating consistency in performance (also referred to as benchmark test points) shall be included in the design calculations and allowed, but not required, to comply with the requirements of 13.7.4.3.4.2. [~~72:17.7.3.6.2.7~~17.7.4.6.2.7]

A.13.7.4.3.4.2.7

A benchmark test point should be provided at the furthest end of each pipe run, opposite the end of the air sampling-type smoke detector apparatus. This remote test point is intended to benchmark system performance at the time of initial commissioning and during routine test and inspection. The test point should be labeled to document benchmark system performance at the time of commissioning, using manufacturer-supplied labels intended for this purpose. Benchmark labels should be placed just above test points and be positioned so that they are visible without obstruction. [~~72:A.17.7.3.4.6.2.7~~]

13.7.4.3.4.2.8

If the piping and fittings are painted, the painting shall be performed in accordance with the air sampling-type smoke detector manufacturer's published instructions. [~~72:17.7.3.6.2.8~~17.7.4.6.2.8]

13.7.4.3.4.2.9*

Pipe network materials, sizing, and installation shall be in accordance with the manufacturer's published requirements and suitable for use in the environment in which they are installed. [~~72:17.7.3.6.2.9~~17.7.4.6.2.9]

A.13.7.4.3.4.2.9

Where installed in areas having environmental conditions such as high temperature or humidity, radiation or corrosive atmospheres, all pipe network materials should be suitable for the specific environmental conditions anticipated. [~~72:A.17.7.3.6.2.9~~A.17.7.4.6.2.9]

13.7.4.3.4.2.10

Where used, capillary tubing shall be sized and affixed in accordance with the manufacturer's published instructions and computer-based design calculations. [~~72:17.7.3.6.2.10~~17.7.4.6.2.10]

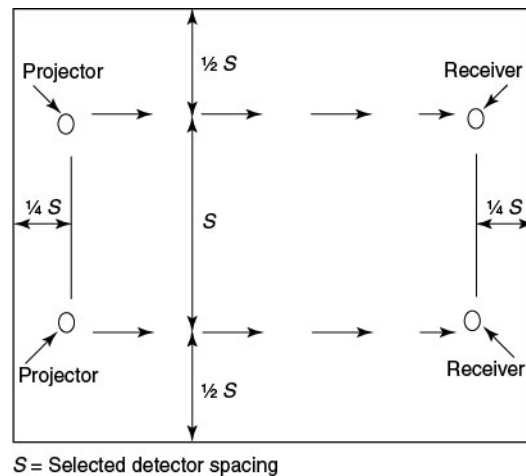
13.7.4.3.5* Projected Beam-Type Smoke Detectors.

A.13.7.4.3.5

On smooth ceilings, a spacing of not more than 60 ft (18.3 m) between projected beams and not more than one-half that spacing between a projected beam and a sidewall (i.e., wall parallel to the beam travel) should be used as a guide. Other spacing should be determined based on ceiling height, airflow characteristics, and response requirements. [~~72:A.17.7.3.7A.17.7.4.7~~]

In some cases, the light beam projector is mounted on one end wall, with the light beam receiver or reflector mounted on the opposite wall. However, it is also permitted to suspend the projector and receiver/reflector from the ceiling at a distance from the end walls not exceeding one-quarter the selected spacing (S). (See Figure A.13.7.4.3.5.) [~~72:A.17.7.3.7A.17.7.4.7~~]

Figure A.13.7.4.3.5 Maximum Distance at Which Ceiling-Suspended Light Projector and Receiver Can Be Positioned from End Wall Is One-Quarter Selected Spacing (S). [~~72:Figure A.17.7.3.7A.17.7.4.7~~]



13.7.4.3.5.1

Projected beam-type smoke detectors shall be located in accordance with the manufacturer's published instructions. [~~72:17.7.3.7.1~~17.7.4.7.1]

13.7.4.3.5.2

The effects of stratification shall be evaluated when locating the detectors. [~~72:17.7.3.7.2~~17.7.4.7.2]

13.7.4.3.5.3

The beam length shall not exceed the maximum permitted by the equipment listing. [~~72:17.7.3.7.3~~17.7.4.7.3]

13.7.4.3.5.4

If ~~mirrors~~reflectors are used with projected beams, the ~~mirrors~~reflectors shall be installed in accordance with the manufacturer's published instructions. [~~72:17.7.3.7.4~~17.7.4.7.4]

13.7.4.3.5.5

A projected beam-type smoke detector shall be considered equivalent to a row of spot-type smoke detectors for level and sloping ceiling applications. [~~72:17.7.3.7.5~~17.7.4.7.5]

13.7.4.3.5.6

Projected beam-type detectors and ~~mirrors~~reflectors shall be mounted on stable surfaces to prevent false or erratic operation due to movement. [~~72:17.7.3.7.6~~17.7.4.7.6]

13.7.4.3.5.7

The beam shall be designed so that small angular movements of the light source or receiver do not prevent operation due to smoke and do not cause nuisance or unintentional alarms.

[72:17.7.3.7.717.7.4.7.7]

13.7.4.3.5.8*

~~The light path of projected beam-type detectors shall be kept clear of opaque obstacles at all times. Unless otherwise permitted by 13.7.4.1.2.2, the design and installation of projected beam-type detectors shall address the potential for the obstruction of the light path.~~ [72:17.7.3.7.817.7.4.7.8]

A.13.7.4.3.5.8

Where the light path of a projected beam-type detector is abruptly interrupted or obscured, the unit should not initiate an alarm. It should give a trouble signal after verification of blockage.

[72:A.17.7.3.7.8A.17.7.4.7.8]

13.7.4.3.6* Protection During Construction.

A.13.7.4.3.6

Construction debris, dust (especially gypsum dust and the fines resulting from the sanding of drywall joint compounds), and aerosols can affect the sensitivity of smoke detectors and, in some instances, cause deleterious effects to the detector, thereby significantly reducing the expected life of the detector.

[72:A.17.7.1.12A.17.7.2]

13.7.4.3.6.1

Where detectors are installed for signal initiation during construction, they shall be cleaned and verified to be operating in accordance with the listed sensitivity, or they shall be replaced prior to the final acceptance test of the system. [72:17.7.1.12.117.7.2.1]

13.7.4.3.6.2

Where detectors are installed but not operational during construction, they shall be protected from construction debris, dust, dirt, and damage in accordance with the manufacturer's recommendations and verified to be operating in accordance with the listed sensitivity, or they shall be replaced prior to the final acceptance test of the system. [72:17.7.1.12.217.7.2.2]

13.7.4.3.6.3

Where detection is not required during construction, detectors shall not be installed until after all other construction trades have completed cleanup. [72:17.7.1.12.317.7.2.3]

13.7.4.3.7 Ceiling Tiles and Ceiling Assemblies.

Where automatic detectors are installed in accordance with *NFPA 72*, ceilings necessary for the proper actuation of the fire protection device shall be maintained.

13.7.4.3.8 High Air Movement Areas.

13.7.4.3.8.1 Location.

Smoke detectors shall not be located directly in the airstream of supply registers.

[72:17.7.6.3.217.7.3.2]

13.7.4.3.8.2* Spacing.

A.13.7.4.3.8.2

Smoke detector spacing depends on the movement of air within the room. [72:A.17.7.6.3.3A.17.7.3.3]

13.7.4.3.8.2.1

Smoke detector spacing shall be reduced where the airflow in a defined space exceeds 8 minutes per air change (total space volume) (equal to 7.5 air changes per hour). [72:17.7.6.3.3.117.7.3.3.1]

13.7.4.3.8.2.2

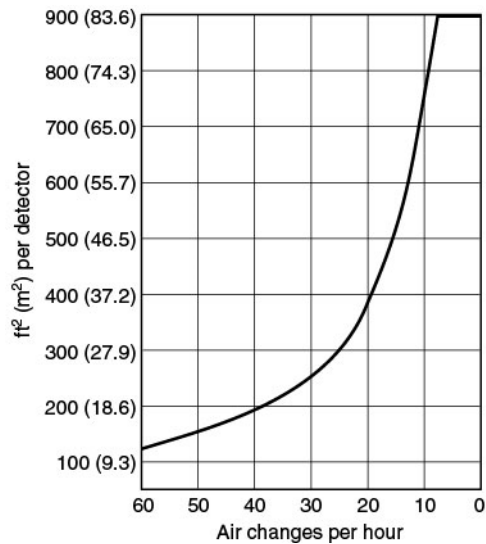
Where spacing must be adjusted for airflow, spot-type smoke detector spacing shall be adjusted in accordance with Table 13.7.4.3.8.2.2 or Figure 13.7.4.3.8.2.2 before making any other spacing adjustments required by this *Code*. [72:17.7.6.3.3.217.7.3.3.2]

Table 13.7.4.3.8.2.2 Smoke Detector Spacing Based on Air Movement (Not to Be Used for Under-Floor or Above-Ceiling Spaces)

Minutes per Air Change	Air Changes per Hour	Spacing per Detector	
		ft ²	m ²
1	60	125	12
2	30	250	23
3	20	375	35
4	15	500	46
5	12	625	58
6	10	750	70
7	8.6	875	81
8	7.5	900	84
9	6.7	900	84
10	6	900	84

[72:Table 17.7.6.3.3-217.7.7.3.3.2]

Figure 13.7.4.3.8.2.2 High Air Movement Areas (Not to Be Used for Under-Floor or Above-Ceiling Spaces). [72:Figure 17.7.6.3.3-217.7.7.3.3.2]



13.7.4.3.8.2.3

Air-sampling or projected beam smoke detectors shall be installed in accordance with the manufacturer's published instructions. [72:17.7.6.3.3-317.7.7.3.3.3]



Second Revision No. 6-NFPA 1-2022 [Global Comment]

See attached word document for updates to NFPA 14 extracts.

Supplemental Information

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
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Request to FCC-AAC: Update the reference in section 2.4 to NFPA 14, 2023 edition.

Response Message: SR-6-NFPA 1-2022

[14-19 extract updates for NFPA 1-24 (14-23)]

3.3.221 Pressure-Regulating Device.

A device designed for the purpose of reducing, regulating, controlling, or restricting water pressure. [14, 20~~23~~19] (FCC-OCP)

3.3.221.1 Pressure-Reducing Valve.

A valve designed for the purpose of reducing the downstream water pressure under both flowing (residual) and nonflowing (static) conditions. [14, 20~~23~~19] (FCC-OCP)

3.3.221.2 Pressure-Restricting Device.

A valve designed for the purpose of reducing the downstream water pressure under flowing (residual) conditions only. [14, 20~~23~~19] (FCC-OCP)

3.3.278.13 *Standpipe System.

An arrangement of piping, valves, hose connections, and associated equipment in-stalled in a building or structure, with the hose connections located in such a manner that water can be discharged in streams or spray patterns through attached hose and nozzles, for the purpose of extinguishing a fire, thereby protecting a building or structure and its contents in addition to protecting the occupants. [14, 20~~23~~19] (FCC-OCP)

A.3.3.278.13 Standpipe System.

This arrangement is accomplished by means of connections to water supply systems or by means of pumps, tanks, and other equipment necessary to provide an adequate supply of water to the hose connections. A building can have multiple horizontal standpipes, vertical standpipe system zones, and/or multiple types of standpipe systems. [14, 20~~23~~19]

13.2 Standpipe Systems.

13.2.3 Inspection, Testing, and Maintenance.

13.2.3.4 Existing Systems.

13.2.3.4.1

Where an existing standpipe system, including yard piping and fire department connection, is modified,

the new piping shall be independently tested in accordance with ~~121.4.1~~ of NFPA 14. [~~14:14.2.111.4.7.1~~]

13.2.3.4.2

Modifications that cannot be isolated, such as new valves or the point of connection for new piping, shall not require testing in excess of system static pressure. [~~14:14.2.211.4.7.2~~]

14.8 Capacity of Means of Egress.

14.8.3 *Egress Capacity.

14.8.3.2 *

For stairways wider than 44 in. (1120 mm) and subject to the 0.3 in. (7.6 mm) width per person capacity factor, the capacity shall be permitted to be increased using the following equation: ~~[14.8.3.2]~~

$$C = 146.7 + \left(\frac{W_n - 44}{0.218} \right)$$

where:

C = capacity, in persons, rounded to the nearest integer

W_n = nominal width of the stair as permitted by **14.8.3.2** (in.) [~~101:7.3.3.2~~]



Second Revision No. 7-NFPA 1-2022 [Global Comment]

See attached word document for updates to NFPA 914 extracts.

Supplemental Information

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Request to FCC-AAC: Update the reference in section 2.4 to NFPA 914, 2023 edition.

Response Message: SR-7-NFPA 1-2022

[914-19 extract updates for NFPA 1-24 (914-23)]

3.3.82 *Cultural Resource Properties.

Buildings, structures, or sites, or portions thereof, that are culturally significant, or that house culturally significant collections for museums, libraries, and places of worship. [914,20~~23~~19] (FCC-OCP)

A.3.3.82 Cultural Resource Properties.

Such properties include, but are not limited to, museums, libraries, historic structures, and places of worship. [914,20~~23~~19]



Second Revision No. 8-NFPA 1-2022 [Global Comment]

See attached word document for updates to NFPA 1140 extracts.

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Response Message: SR-8-NFPA 1-2022

NFPA 1140 (new) extracts to update in NFPA 1 (OCP)

(was 1141, 1142, 1144)

3.3.278.11 Fire Protection System.

Any fire alarm device or system or fire-extinguishing device or system, or combination thereof, that is designed and installed for detecting, controlling, or extinguishing a fire or otherwise alerting occupants, or the fire department, or both, that a fire has occurred. [~~1141~~1140, ~~2017~~2022]

3.3.303* Wildland/Urban Interface.

~~An area where wildland fuels abut structures, with a clear line of demarcation between residential, business, and public structures and wildland fuels. A geographical area where structures and other human development meet or intermingle with wildland or vegetative fuels, resulting in the potential for ignition of the structures within the area from flames or firebrands of a wildland fire.~~ [~~1144~~1140, ~~2018~~2022]

A.3.3.303 Wildland/Urban Interface.

The term *wildland/urban interface* can distort the perception of the primary issue. It can direct attention to “where” structures are located (e.g., at the edge of communities near the wildland) rather than if they structures are highly ignitable. This can cause emergency planners to focus on things that will not make a significant impact on reducing structure loss And if so, the focus on “where” can result in a concern about things that will not make a big difference in reducing structure loss (e.g., i.e., how fire fighters and equipment get there, what type of fire equipment is needed, and the location of fire hydrants and water sources). ~~How wide the roads are and where the fire hydrants are located become of little value~~ if there are more structures at risk than equipment to protect them, or if it is becomes too dangerous ~~to safely be there with~~ for fire-fighting forces to be present. [~~1144~~1140, ~~2018~~2022]

The essence of this issue is not where structures and domestic landscapes adjoin wildland, but the location, density, and availability of ignitable structures. Which structures are at the greatest risk, ~~is~~ ignition-resistant homes bordering the wildland or a dense subdivision with wood shingle roofs several miles away from wildland fuels? The wildland/urban interface is not a geographic location, but rather a set of conditions that can exist in many communities. [~~1144~~1140, ~~2018~~2022]

Chapter 17 Wildland Urban Interface

17.1.2*

The structure assessment shall, at a minimum, include the following:

- (1) Identification and documentation of the wildland fire hazards in the ignition zone(s) for each structure within wildland fire hazard areas, according to the elements and conditions in 17.1.4
- (2) Determination of mitigation measures for vegetation, other combustibles, and the structure, including the periodic maintenance associated with such measures
- (3) Establishment of priorities relative to mitigating the risks from wildland fire
- (4) Evaluation of the site for conflagration hazards associated with the property to provide information for fire operations strategies should the site or surrounding properties become involved with fire.

[~~11441140:24.2.24.1.2~~]

A.17.1.2

Figure A.17.1.2 and Table A.17.1.2 are examples of two different approaches to hazard assessment. [~~11441140:A.24.2.24.1.2~~]

Figure A.17.1.2 is an example of an assessment guide with assessment information based on observation of the areas around the structure. This form, intended to be given to the resident, can be very useful by indicating the most serious hazards and the mitigation recommendation(s) that can be taken to reduce the ignition hazard. In this example, samples of the kind of information noted in an assessment are given as observations and suggestions for mitigation. [~~11441140:A.24.2.24.1.2~~]

This example of an assessment guide is designed to help determine how vulnerable the structure will be during a wildland fire and to convey to the resident those items that should be corrected (mitigated) so that their home will have a better chance to survive a wildland fire. This form is offered as an example of the kind of tool that might be useful during a site visit as a guide for assessing the structure ignition zone. Remember, the following assessment items are for *prevention/mitigation* measures to be done *well in advance* of wildland fire season. [~~11441140:A.24.2.24.1.2~~]

Figure A.17.1.2 is a form used to document observations, collect data, provide a hazard assessment, and give mitigation recommendations for the resident. From the mitigation recommendations, a mitigation plan and schedule is developed in accordance with 17.1.10. ~~For more information on the use of this assessment form, refer to the course *Assessing Wildfire Hazards in the Home Ignition Zone*, available from the national Firewise Communities Program (www.firewise.org).~~ [~~11441140:A.24.2.24.1.2~~]

Table A.17.1.2 is a modified rating form based on the previous edition of NFPA 1144. Infrastructure elements of water supply, signage, and other fire suppression resources have been deleted, since the presence or absence of such resources does not modify the existing hazards of the structure. The table is presented only as an example of a rating system and should be modified to meet the environmental conditions of the area under consideration. ~~For more information on creating an assessment system, consult *Wildland/Urban Interface Fire Hazards: A New Look at Understanding Assessment Methodologies Pamphlet*, produced by the national Firewise Communities Program (www.firewise.org).~~ [1144:1140:A.24.2.24.1.2]

A numeric rating form that will yield a hazard rating number can have a variety of uses, for example, determining relative hazards among several properties and mapping overall hazard ratings on a map. However, residents and homeowners often accept the rating number as finite and undertake mitigation measures that will merely reduce the rating rather than actually reduce the ignition potential of the structure. [1144:1140:A.24.2.24.1.2]

Figure A.17.1.2 Structure Assessment—Guide — Example with Notations. [1144:Figure A.4.1.224.2.2]

****INSERT FIGURE****

1Table A.17.1.2 Example of Structure Assessment Rating Form

Rating Values by Areas Assessed	Overview of Surrounding Environment (4.2.1 24.3.1)	From Chimney to Eaves (4.2.2 24.3.2)	From Top of the Exterior Wall to Foundation (4.2.3 24.3.3)	From Foundation to Immediate Landscaped Area (4.2.4 24.3.4)	From Immediate Landscaped Area to Extent of Structure Ignition Zone (4.2.5 24.3.5)
Topographical Features					
(1) Topographical features that adversely affect wildland fire behavior (4.2.1 24.3.1)	0–5				

(2) Areas with history of high fire occurrence (4.3.4 <u>24.4.4</u>)	0–5				
(3) Areas exposed to unusually severe fire weather and strong, dry winds (4.2.1.3 <u>24.3.1.3</u>)	0–5				
(4) Local weather conditions and prevailing winds (4.2.1.2 <u>24.3.1.2</u>)	0–5				
(5) Separation of structure on adjacent property that can contribute to fire spread/behavior (4.2.1.3 <u>24.3.1.3</u>)	0–5			0–5	0–5
Vegetation — Characteristics of predominant vegetation					
(1) Light (e.g., grasses, forbs, sawgrasses, and tundra) NFDRS Fuel Models A, C, L, N, S, and T	5			15	5
(2) Medium (e.g., light brush and small trees) NFDRS Fuel Models D, E, F, H, P, Q, and U	10			20	5
(3) Heavy (e.g., dense brush, timber, and hardwoods) NFDRS Fuel Models B, G, and O	15			25	15
(4) Slash (e.g., timber harvesting residue) NFDRS Fuel Models J, K, and L	15			30	20

Topography (24.3.1.1 , 24.3.4 , 24.3.5) 4.2.1.1 , 4.2.4 , 4.2.5)					
(1) Slope 5–9%				1	1
(2) Slope 10–20%				4	2
(3) Slope 21–30%				7	3
(4) Slope 31–40%				10	6
(5) Slope >41%				15	10
Building Setback , relative to slopes of 30% or more (24.3.1.5 , 25.1.3.2) 4.2.1.5 , 5.1.3.2)					
(1) 30 ft (9.14 m) to slope	1				
(2) 30 ft (9.14 m) to slope	5				
Roofing Materials and Assembly , nonrated (24.3.2.1 , 24.3.2.3) 4.2.2.1 , 4.2.2.3)		50*			
Ventilation Soffits , without metal mesh or screening (24.3.3.4) 4.2.3.4)		20			
Gutters , combustible (24.3.2.4 , 24.3.2.5) 4.2.2.4 , 4.2.2.5)		5			
Building Construction (predominant) [†] (24.3.4) 4.2.4)					
(1) Noncombustible/fire-resistive/ignition-resistant siding and deck			Low		
(2) Noncombustible/fire-resistive/ignition-			Medium		

resistant siding and combustible deck					
(3) Combustible siding and deck			High		
Fences and Attachments, combustible (24.3.4.3)4.2.4.3)				15	
Placement of Gas and Electric Utilities					
(1) One underground, one aboveground	3				
(2) Both aboveground	5				
Fuel Modification within the structure ignition zone (24.3.4, 24.3.5)4.2.4, 4.2.5)					
(1) 71–100 ft (21–30 m) of vegetation treatment from the structure(s)					5
(2) 30–70 ft (9–21 m) of vegetation treatment from the structure(s)				7	
(3) <30 ft (9 m) of vegetation treatment from the structure(s)				15	
No Fixed Fire Protection (NFPA 13, 13R, 13D sprinkler system)			5		
TOTALS (if numerical ranking is desired)					
Hazard Rating Scale (Compare with above totals)					
Slight Structure Ignition Hazards from Wildland Fire	0–14	0–14	0–14	0–14	0–14

Moderate Structure Ignition Hazards from Wildland Fire	15–29	15–29	15–29	15–29	15–29
Significant Structure Ignition Hazards from Wildland Fire	30–49	30–49	30–49	30–49	30–49
Severe Structure Ignition Hazards from Wildland Fire	50+	50+	50+	50+	50+

*Nonrated and combustible roof assemblies are predominantly structural exposures and severely increase the ignition hazard from wildland fire.

†The table provides both numerical and value rankings (low, medium, high). The user is urged to assign the value ranking of low, medium, or high based on the other ignition factors prevalent at the assessment site. For example, a deck made of combustible materials might rank low if it is small in size and the rest of the site is in a low fuel loading area that will not promote a large amount of firebrands. That same deck might rate high if it is in an area of high fuel loading that will promote numerous firebrands. Numeric values can be substituted as a local option. [[11441140:Table -A.24.2.24.1.2](#)]

17.1.3

The wildland fire hazard assessment shall be the basis for recommended mitigation measures relative to the vegetation, other combustibles, and structures on the site.

[[11441140:4.1.324.2.3](#)]

17.1.4* Structure Assessment Elements and Conditions.

As a minimum, the structure assessment shall cover elements and conditions indicated in 17.1.5 through 17.1.9. [[11441140:4.224.3](#)]

A.17.1.4

It is critical to keep in mind that the ignition of the structure might occur from one or more of the following sources:

- (1) Big flames (crown fire or intense surface fire). One objective of observation of the conditions and elements and subsequent mitigation recommendations is to keep crown fire and high intensity surface fire at a distance of 100–200 ft (30–60 m) or more from home and other potential hazards (combustibles, buildings, etc.).
- (2) Small flames (surface fire). Another objective is to keep small flames at a distance of 30 ft (9 m) or more from home(s) and combustible attachments (decks).
- (3) Firebrands (embers). A final and essential objective is to eliminate beds of fine fuel and entry points for firebrands on and near home(s).

[~~11441140~~:A.4.2.24.3]

17.1.5 Overview of the Surrounding Environment.

The structure assessment shall document the conditions of 17.1.5.1 through 17.1.5.5 in the assessment of the surrounding environment, as they will place the structure in the most risk from ignition by a wildland fire. [~~11441140~~:4.2.1.24.3.1]

17.1.5.1*

The structure assessment shall document the location of the structure in relation to predominant topographical features, such as flat open areas, ridges, saddles, steep slopes, natural chimneys like steep narrow draws, or small canyons, that will increase the ignition potential of the structure. [~~11441140~~:4.2.1.124.3.1.1]

A.17.1.5.1

Wildland fire dangers exist in flat land areas, as well as in mountainous terrain. In addition, property line limitations often preclude effective vegetation mitigation, and alternatives for mitigation are needed. [~~11441140~~:A.4.2.1.124.3.1.1]

17.1.5.2*

The structure assessment shall document local weather conditions, including wind, relative humidity, temperature, and fine fuel moisture content. [~~11441140~~:4.2.1.224.3.1.2]

A.17.1.5.2

Local weather conditions or prevailing winds play a role in fire behavior (e.g., from which direction a fire is most likely to come, to the intensity and speed of fire travel, depending on the degree of slope), and the direction from which a wildland fire is most likely to approach the structure is an important exposure consideration. Sources of local weather records and fire weather history from the National Weather Service, National Oceanic and Atmospheric Administration (NOAA), local weather bureaus, or wildland fire agencies can be a valuable resource in assessing existing structures or in planning for new construction. [~~11441140~~:A.4.2.1.224.3.1.2]

17.1.5.3*

The structure assessment shall document nearby structures using the same criteria as the primary structure. [~~11441140~~:4.2.1.324.3.1.3]

A.17.1.5.3

Adjacent ignitable structures (garages, carports, sheds, gazebos, utility cabinets) can contribute to heat intensity, flame contact, and fire spread from firebrands.

[~~11441140~~:A.4.2.1.3~~24.3.1.3~~]

17.1.5.4*

The structure assessment shall document any neighboring properties that could impact the ignition zone of the property being assessed. [~~11441140~~:4.2.1.4~~24.3.1.4~~]

A.17.1.5.4

Overlapping zones could have a positive result in that the outermost extent of a structure ignition zone might be a neighboring parking lot or already treated vegetation area, such as a fuel modification. On the other hand, the overlap might include other private or public lands, which could make mitigation more difficult because it could involve state or federal agencies or absentee landowners who do little or no vegetation management or hazard mitigation. [~~11441140~~:A.4.2.1.4~~24.3.1.4~~]

17.1.5.5*

The structure assessment shall document the structure's location on the slope relative to the structure's potential exposure to heat from a wildland fire. [~~11441140~~:4.2.1.5~~24.3.1.5~~]

A.17.1.5.5

Structure location on a slope increases the structure's exposure to heat (e.g., structure setback from the slope is sufficient to reduce its radiant heat exposure). Setback distances of the structure can be measured in accordance with A.25.1.3.25.1.3.2 of NFPA ~~11441140~~. [~~11441140~~:A.4.2.1.5~~24.3.1.5~~]

17.1.6 From Chimney to Eaves.

The structure assessment shall document the conditions of 17.1.6.1 through 17.1.6.6 to observe construction and vegetation as they place the structure in the most risk from ignition by a wildland fire. [~~11441140~~:24.3.24.2.2]

17.1.6.1*

The structure assessment shall document the type and construction of roofing materials. [~~11441140~~:24.3.2.14.2.2.1]

A.17.1.6.1

All common coverings (composition shingles, tile, and, in many cases, metal) typically have a fire-resistive roofing classification adequate for interface fire protection if the

covering material is tightly assembled to resist firebrand intrusion.

[~~11441140~~:A.~~24.3.2.14.2.2.1~~]

Untreated wood roofing is easily ignited and a major hazard. The only wood roof coverings that can be considered acceptable are wood shakes or shingles that have been treated at the factory by a pressure-impregnation fire-retardant process, tested for fire resistance, and certified with a fire-resistant roofing classification of Class A, Class B, or Class C. ~~Pressure-Pressure~~-treated wood roofing looks very similar to the hazardous untreated wood roofing, and currently there is no permanent identification method. If in doubt, assume wood roofing is untreated unless documentation is provided. [~~11441140~~:A.~~24.3.2.14.2.2.1~~]

17.1.6.2*

The structure assessment shall document the condition of roofing materials and assemblies.

[~~11441140~~:~~24.3.2.24.2.2.2~~]

A.17.1.6.2

Look for gaps in the roof covering that might allow small wind-blown firebrands to penetrate under the covering and ignite material below. [~~11441140~~:A.~~24.3.2.24.2.2.2~~]

Some fire-resistive roof coverings are designed or installed with gaps that allow firebrand intrusion under the covering and have resulted in firebrand intrusion and ignition of the building under the roof covering. The worst example is roof coverings that allow combustible debris to blow under the covering or that allow rodents and birds to bring nesting material in under the roof covering. Clay (Spanish or straight barrel mission) tile roof covering can have this problem unless eave closures or “bird stops” are used to close the convex opening created by the shape of the tile at the eave. Metal tile roofing installed on top of old wood roofing left in place has been a problem. If you can see wood through gaps in metal tile roof covering, firebrands can penetrate and ignite the building. [~~11441140~~:A.~~24.3.2.24.2.2.2~~]

17.1.6.3*

The structure assessment shall document all skylights in roof assemblies.

[~~11441140~~:~~24.3.2.34.2.2.3~~]

A.17.1.6.3

Plastic skylights can melt from radiant heat or flaming embers or both. Deformation can result in large openings that can allow the entry of embers and other flaming materials. Skylights constructed of multilayered glazed panels or tempered glass provide increased protection from heat and embers. [~~11441140~~:A.~~24.3.2.34.2.2.3~~]

17.1.6.4*

The structure assessment shall document the potential of roof gutters and areas where exterior walls meet roof or deck surfaces to collect litter on surfaces or in crevices.

[[11441140:24.3.2.44.2.2.4](#)]

A.17.1.6.4

The roof is the most vulnerable part of the structure and is subject to the collection of combustible vegetative litter (e.g., leaves, pine needles) or other debris and buildup that can be ignited by firebrands. Can litter build up and accumulate on surfaces next to combustible, perpendicular walls? Will combustible decking or roofing provide ember beds next to combustible, perpendicular walls? [[11441140:A.24.3.2.44.2.2.4](#)]

17.1.6.5*

The structure assessment shall document the construction materials of gutters, downspouts, and connectors. [[11441140:24.3.2.54.2.2.5](#)]

A.17.1.6.5

Gutters and downspouts collect leaves and pine needles. Gutters and eave troughs made from combustible materials (e.g., wood, vinyl) are as vulnerable to firebrand collection as the roof and other parts of the structure. If leaf litter is allowed to gather in gutters, firebrands or embers can ignite the leaf litter, which in turn could ignite combustible eave materials or overhangs. If gutters are attached to combustible fascia boards, the fascia board should be considered as a possible fuel that can be ignited by fine fuels burning in the gutters. [[11441140:A.24.3.2.54.2.2.5](#)]

Gutters that pose a fire threat from an approaching wildland fire are often pulled down by attending fire-fighters. For the resident, an alternative might be to remove the gutters along the side(s) of the house most prone to the collection of leaves and needles and install a noncombustible drip line shown in Figure A.17.1.6.5. Removing gutters eliminates the collection of dry leaves and needles along the roof line and fascia board. Also reduced is the possibility of ice damage to the roof in the winter. The use of a gravel bed for drip lines along the leeward side(s) of the house provides reduced ignition potential and reduced wind hazard, since the gravel would be less likely to be blown by high winds on the leeward elevations. The windward sides of the house can be landscaped with mulch (less impact damage in case of wind events) if protected with low volume sprinklers to raise the fine fuel moisture levels in times of high fire danger. [[11441140:A.24.3.2.54.2.2.5](#)]

Figure A.17.1.6.5 Mitigating Risk of Leaf- and Needle-Filled Gutters. [~~11441140~~:Figure A.~~24.3.2.54.2.2.5~~]

****INSERT FIGURE****

17.1.6.6*

The structure assessment shall document the materials and construction used in eaves of roof overhangs. [~~11441140~~:~~24.3.2.64.2.2.6~~]

A.17.1.6.6

Eaves should be boxed to prevent flying embers from entering small spaces.
[~~11441140~~:A.~~24.3.2.64.2.2.6~~]

17.1.7 From Top of Exterior Wall to Foundation.

The structure assessment shall document the conditions of 17.1.7.1 through 17.1.7.6 to observe construction and vegetation as they place the structure in the most risk from ignition by a wildland fire. [~~11441140~~:~~24.3.34.2.3~~]

17.1.7.1*

The structure assessment shall document the materials and construction used in exterior walls and exterior siding. [~~11441140~~:~~24.3.3.14.2.3.1~~]

A.17.1.7.1

Identify the wall covering or siding (e.g., wood, vinyl, brick, stucco) and determine the possibility of litter buildup and accumulation on surfaces next to walls. Under low radiant heat levels, vinyl siding is damaged and falls off a wall, which can leave openings for firebrands exposing the interior of the home to ignition through eave vents and other possible openings. Vinyl is difficult to ignite by firebrands or radiant heat, but will sustain combustion when directly contacted by flames. [~~11441140~~:A.~~24.3.3.14.2.3.1~~]

Hanging 1/2 in. (12.5 mm) or thicker drywall on the exterior wall studs prior to adding stucco, siding, and so forth can increase the fire rating. [~~11441140~~:A.~~24.3.3.14.2.3.1~~]

17.1.7.2

The structure assessment shall document the materials used for gutter downspouts and connectors on exterior walls. [~~11441140~~:~~24.3.3.24.2.3.2~~]

17.1.7.3*

The structure assessment shall document the materials used in windows and other openings in vertical surfaces. [~~11441140~~:~~24.3.3.34.2.3.3~~]

A.17.1.7.3

Windows should be constructed of multi-paned or tempered glass that will resist fracture from intense heat in accordance with 25.7.1 of NFPA 11441140, and window screens made from a material that will not allow hot firebrands to enter the home's interior in accordance with 25.7.2 of NFPA 11441140. [11441140:A.24.3.3.34.2.3.3]

17.1.7.4*

The structure assessment shall document the location, size, and screening of ventilation openings. [11441140:24.3.3.44.2.3.4]

A.17.1.7.4

Check attic, crawl space, eave, and soffit vents for appropriate protection (e.g., metal screening, noncombustible skirting) to prevent entry of firebrands. Roof turbine vents should be screened to prevent the entry of firebrands into attic spaces.

[11441140:A.24.3.3.44.2.3.4]

17.1.7.5*

The structure assessment shall document all attached accessory structures as part of the primary structure. [11441140:24.3.3.54.2.3.5]

A.17.1.7.5

Examples of attached structures include decks, lean-to overhangs, patio covers, carports, balconies, fences, and similar structures that could be ignited by convection or firebrands. [11441140:A.24.3.3.54.2.3.5]

17.1.7.6*

The structure assessment shall document areas next to or under a structure where combustible materials that present a source of flame exposure to the structure might collect.

[11441140:24.3.3.64.2.3.6]

A.17.1.7.6

Areas on, next to, or under a structure should be kept free of combustible fuel such as debris, vegetation, wooden furniture, brooms, welcome mats, furniture cushions, gasoline cans, firewood stacks, or piled construction materials. Look for combustible walkways, fencing, or decking attached to the structure, highly combustible fuels adjacent to the structure (e.g., junipers near decks and walkways), combustible materials (e.g., building materials, firewood) stored under decks or adjacent to the structure, animal nests among combustible structural fuels, and landscaping materials

(e.g., bark mulch, ground cover plants) near the structure and surrounding plants that might support flaming combustion or that could easily be ignited by firebrands.

[11441140:A.24.3.3.64.2.3.6]

17.1.8* _From Foundation to the Immediate Landscaped Area.

The structure assessment shall document the conditions of 17.1.8.1 through 17.1.8.5 to observe construction and vegetation, as they place the structure in the most risk from ignition by a wildland fire. [11441140:24.3.44.2.4]

A.17.1.8

The structure ignition zone includes the spatially arranged traditional landscaping zones, but can exceed the extent of the property line. Figure A.17.1.8 illustrates the relationship of the structure and immediate landscaped area to the larger structure ignition zone. Within the immediate landscaped area [from the structure to approximately 30 ft (9 m)], often referred to as the defensible space, special consideration should be given that any combustible materials (e.g., plants, lawn furniture, litter, construction materials) should be removed in the 0 ft to 5 ft (0 m to 1.5 m) zone immediately adjacent to the structure and reduced in the zone from 5 ft to 30 ft (1.5 m to 9 m) to minimize the chance for ignition of the structure. The total structure ignition zone includes any spatially arranged landscaping area and can exceed the extent of the property line. The level of risk of ignition within the total area of the ignition zone depends on the type of construction and is further influenced by slope, soils, and other site-specific conditions. [11441140:A.24.3.44.2.4]

The AHJ should require the development of a landscape plan for the property. Such plans should address four zones around the property as follows:

- (1) The most immediate landscaped area is the closest to the house and includes the area encircling the structure for at least 30 ft (9 m) on all sides. The landscaped vegetation within 30 ft (9 m) of structures should be irrigated as needed, cleared of dead vegetation, and/or planted with succulents and other plants (where appropriate) that are low in combustibility potential. Plantings should be limited to carefully spaced, low-growing, low-combustibility species, grasses, and lawns. Shrubs planted next to the structure should be of low combustibility, no more than 18 in. (45 cm) in height, and not planted against the home. The planting bed should be noncombustible (e.g., stone, gravel, bare ground) or irrigated if combustible materials (e.g., bark mulch) are used. All highly combustible plants, such as junipers and ornamental conifers, should be removed or trimmed and maintained to be ignition-resistant. Vegetation deposits (dry leaf and pine litter) that can support surface fire and flames should be removed regularly. Areas of vegetation (natural areas, undeveloped areas, landscaped areas, fields, etc.) that exist

near the structure should be evaluated for the possibility of causing ignition of the structure.

- (2) Progressing outward from the structure, the types and densities of vegetation should change to reduce the continuity of vegetation fuels. For example, plantings can be done in islands. Trees can be introduced into this zone with careful consideration of their combustibility and continued maintenance to separate crowns and avoid ladder fuels. Tree placement should be planned so that the edge of the canopy of the tree when fully mature is no closer than 10 ft (3 m) to the edge of the structure.
- (3) Progressing even farther from the structure, more medium-sized plants and well-spaced trees can be planted in well-spaced groupings to reduce exposure to wildland fire and help maintain privacy. The volume of vegetation (i.e., fuel) should be kept as low as possible or practical.
- (4) The most distant area [100 ft to 200 ft (30 m to 60 m)] from the structure determines the extent of the structure ignition zone. Plants in this furthest area should be carefully pruned and thinned, and highly combustible vegetation removed. Particular attention should be paid to the types and densities of the vegetation in this area. For example, some vegetation and trees generate more firebrands than others and require additional thinning, removal, or replacement.

[11441140:A.24.3.44.2.4]

Figure A.17.1.8 The Structure Ignition Zone. *(Source: Firewise Communities Program.)*

[11441140:Figure A.24.3.44.2.4]

INSERT FIGURE

17.1.8.1*

The structure assessment shall document all vegetative fuels and other combustible materials adjacent to and within 30 ft (9 m) of the structure for their potential to contribute to the intensity and spread of wildland fire. [11441140:24.3.4.14.2.4.1]

A.17.1.8.1

Vegetative fuels include live vegetation, mulch and landscaping materials, slash piles, composting piles, and firewood storage. [11441140:A.24.3.4.14.2.4.1]

Combustible vegetation close enough to windows to provide intense radiant heat or flame contact should be pruned, moved, or substituted with smaller, lower combustibility plants. Figure A.17.1.8.1(a) illustrates the use of low combustibility plants separated by a gravel area next to the foundation. [11441140:A.24.3.4.14.2.4.1]

Mulch is an alternative to noncombustible landscaping materials such as gravel and rock. The size and texture of mulching materials affects its ignition and fire spread

potential. Larger organic materials are preferable to smaller materials.

[11441140:A.24.3.4.14.2.4.1]

Landscaping with mulch can be acceptable if the mulch is protected with low volume sprinklers to raise the fine fuel moisture levels and offset its combustibility in times of high fire danger. The installation of sprinklers for areas using mulch for landscaping is shown in Figure A.17.1.8.1(b). [11441140:A.24.3.4.14.2.4.1]

Figure A.17.1.8.1(c) describes the physical similarities of the NFDRS fuel models with fire behavior fuel models. See Annex B-I of NFPA 11441140 for fuel model classifications. [11441140:A.24.3.4.14.2.4.1]

Figure A.17.1.8.1(a) Foundation Planting and Landscaping. (*Courtesy of Firewise Communities Program. Photo by K. Clineff.*) [11441140:Figure A.24.3.4.1.2.4.1(a)]

****INSERT FIGURE****

Figure A.17.1.8.1(b) Use of Low Volume Sprinklers in Organic Material. (*Courtesy of Firewise Communities Program. Photo by G. Johnston.*) [11441140:Figure A.24.3.4.14.2.4.1(b)]

****INSERT FIGURE****

Figure A.17.1.8.1(c) Sample of a Physical Description Similarity Chart of NFDRS and FBO Fuel Models. [11441140:Figure A.24.3.4.14.2.4.1(c)]

****INSERT FIGURE****

17.1.8.2*

The structure assessment shall document the presence and location of all heat and flame sources within 30 ft (9 m) of the primary structure. [11441140:24.3.4.24.2.4.2]

A.17.1.8.2

Typical heat and flame sources include, but are not limited to, propane heaters, barbecue cookers, and grills. [11441140:A.24.3.4.24.2.4.2]

17.1.8.3*

The structure assessment shall document all projections attached to the primary structure. [11441140:24.3.4.34.2.4.3]

A.17.1.8.3

Attachments include, but are not limited to, permanent and temporary construction such as decks, fences, awnings, lean-to buildings; and combustible walkways, fencing, or decking attached to the home. [11441140:A.24.3.4.34.2.4.3]

Figure A.17.1.8.3(a) shows a typical deck where combustible decking materials could result in the gathering of embers next to combustible walls and where the construction and design of decks, balconies, and porches with open spaces underneath could allow leaf and needle debris and embers to collect. [11441140:A.24.3.4.34.2.4.3]

Figure A.17.1.8.3(b) illustrates one method of separating a combustible fence from the structure by the installation of a transitional section of noncombustible (iron) fencing. Similar use of masonry or stone can provide the same fire-resistant separation. [11441140:A.24.3.4.34.2.4.3]

Figure A.17.1.8.3(a) Leaf Litter and Needles Collect in Small Spaces. (Courtesy of Firewise Communities Program.) [11441140:Figure A.24.3.4.34.2.4.3(a)]

****INSERT FIGURE****

Figure A.17.1.8.3(b) Transition Fence Separates Combustible Fence from Structure. (Courtesy of Firewise Communities Program. Photo by G. Johnston.) [11441140:Figure A.24.3.4.34.2.4.3(b)]

****INSERT FIGURE****

17.1.8.4*

The structure assessment shall document detached structures within 30 ft (9 m) of the primary structure that might be ignited by flames, radiant heat, or firebrands from wildland fires. [11441140:24.3.4.44.2.4.4]

A.17.1.8.4

Examples of such structures include, but are not limited to, hot tubs, utility sheds, outbuildings, detached garages and carports, gazebos, trellises, auxiliary structures, stables, barns and other structures within 30 ft (9 m) of the primary structure, outdoor furniture, and recreational structures (e.g., children's playhouses, swing sets). In some cases, separation distances from lot lines might require the inclusion of neighboring residential structures in the assessment. [11441140:A.24.3.4.44.2.4.4]

17.1.8.5*

The structure assessment shall document vehicle parking areas within 30 ft (9 m) of any surface of the structure. [11441140:24.3.4.54.2.4.5]

A.17.1.8.5

Parking vehicles on areas of dry grasses and fine fuels could result in ignition by hot exhaust systems or firebrands. Also, a fire that originates from a parked vehicle could present an exposure hazard to the primary structure or nearby vegetation. Any dry vegetation beneath the vehicle could cause ignition of the vehicle, which in turn could cause structure ignition; conversely, the ignition of the structure could cause ignition of the vehicle, which could present additional dangers to responding fire fighters.

[~~11441140~~:A.~~24.3.4.54.2.4.5~~]

17.1.9 From the Immediate Landscaped Area to the Extent of the Structure Ignition Zone.

The structure assessment shall document the conditions of 17.1.9.1 through 17.1.9.8 to observe construction and vegetation, as they place the structure in the most risk from ignition by a wildland fire. [~~11441140~~:~~24.3.54.2.5~~]

17.1.9.1*

The structure assessment shall document vegetation within the area between the outer edge of the immediate landscaped area and the extent of the structure ignition zone as potential fuel that can convey the fire to the structure. [~~11441140~~:~~24.3.5.14.2.5.1~~]

A.17.1.9.1

Evaluation of the vegetative fuels should include the following:

- (1) Can vegetative fuels lead surface fire and flames to the structure?
- (2) Have ladder fuels been eliminated within the structure ignition zone?
- (3) Are tree crowns separated enough to prevent big flames from coming within 30 ft (9 m) of the structure?

[~~11441140~~:A.~~24.3.5.14.2.5.1~~]

17.1.9.2*

The structure assessment shall document the species and location of trees and the separation of tree crowns within the area between the outer edge of the immediate landscaped area and the extent of the structure ignition zone. [~~11441140~~:~~24.3.5.24.2.5.2~~]

A.17.1.9.2

The location (placement) of trees and the separation between them is important to prevent ignition of the structure from radiant heat and to reduce the concentration of leaf fall and needle drop near the structure. Adequate separation and control of ignition potential are factors that affect fire intensity and are dependent on the size, density, and species of trees and vegetation. [~~11441140~~:A.~~24.3.5.24.2.5.2~~]

Consider using islands of trees that offer separation of trees from the structure and other combustibles. Figure A.17.1.9.2(a) illustrates the use of such planting islands that preserve key trees for aesthetics while providing shade and exposure separation from structures. Figure A.17.1.9.2(b) shows that small planting islands within an expanse of maintained lawn provides both separation and low combustibility protection from ignition close the structure. [[11441140:A.24.3.5.24.2.5.2](#)]

Figure A.17.1.9.2(a) Planting Islands Offer Exposure Protection, Preserve Aesthetics.
(Courtesy of Firewise Communities Program. Photo by G. Johnston.) [[11441140:Figure A.24.3.5.24.2.5.2\(a\)](#)]

****INSERT FIGURE****

Figure A.17.1.9.2(b) Small Planting Islands Within an Expanse of Maintained Lawn.
(Courtesy of Firewise Communities Program. Photo by D. Frazier.) [[11441140:Figure A.24.3.5.24.2.5.2\(b\)](#)]

****INSERT FIGURE****

17.1.9.3*

The structure assessment shall document the presence and location of all heat and flame sources within the area between the outer edge of the immediate landscaped area and the extent of the structure ignition zone. [[11441140:24.3.5.34.2.5.3](#)]

A.17.1.9.3

Typical heat and flame sources include, but are not limited to, propane- and charcoal-fired barbecue cookers, heaters, and grills. [[11441140:A.24.3.5.34.2.5.3](#)]

17.1.9.4*

The structure assessment shall document detached structures within the area between the outer edge of the immediate landscaped area and the extent of the structure ignition zone that might be ignited by flames, radiant heat, or firebrands from wildland fires.

[[11441140:24.3.5.44.2.5.4](#)]

A.17.1.9.4

Examples of such structures include, but are not limited to, hot tubs, utility sheds, outbuildings, detached garages and carports, gazebos, trellises, auxiliary structures, stables, barns and other structures between the immediate landscaped area and the extent of structure ignition zone, outdoor furniture, recreational structures (children's playhouses, swing sets). In some cases, separation distances from lot lines might require

the inclusion of neighboring residential structures in the assessment.

[~~11441140~~:A.~~24.3.5.44.2.5.4~~]

17.1.9.5*

The structure assessment shall document vehicle parking areas within the area between the outer edges of the immediate landscaped area and the extent of the structure ignition zone.

[~~11441140~~:~~24.3.5.54.2.5.5~~]

A.17.1.9.5

See A.17.1.8.5. [~~11441140~~:A.~~24.3.5.54.2.5.5~~]

17.1.9.6*

The structure assessment shall document all projections attached to the primary structure that extend beyond the immediate landscaped area. [~~11441140~~:~~24.3.5.64.2.5.6~~]

A.17.1.9.6

Attachments include, but are not limited to, permanent and temporary construction such as decks, fences, awnings, and lean-to buildings. [~~11441140~~:A.~~24.3.5.64.2.5.6~~]

17.1.9.7

The structure assessment shall document all other factors that can affect the risk of ignition or the spread of wildland fire on improved property within the structure ignition zone, including the risk of structure fires spreading to vegetation. [~~11441140~~:~~24.3.5.74.2.5.7~~]

17.1.9.8

Any structure that fails to comply with the requirements of Chapter 25 of NFPA ~~11441140~~ shall be deemed to increase the risk of the spread of wildland fire to improved property and the risk of fires on improved property spreading to wildland fuels. [~~11441140~~:~~24.3.5.84.2.5.8~~]

17.1.10 Development of Wildland Fire Hazard Mitigation Plan.

17.1.10.1

From the information gathered in each structure assessment, the AHJ shall require or cause to be developed a wildland fire hazard mitigation plan and schedule to address the wildland fire hazards identified in the specific structure ignition zone assessment. [~~11441140~~:~~24.4.14.3.1~~]

17.1.10.2

The AHJ shall work with applicable agencies and organizations to resolve any conflicts between recommended wildland fire hazard mitigation measures and mitigation measures or objectives of other hazards. [~~11441140:24.4.24.3.2~~]

17.1.10.3*

This plan shall include, but not be limited to, the following:

- (1) Specific mitigation recommendations based on the hazard assessment to reduce the ignition potential around and including the structure
- (2) Construction modification or retrofit necessary to reduce the identified hazards as a minimum or to comply with the provisions of Chapter 25 of NFPA ~~11441140~~
- (3) Fuel modification recommendations as specified in Chapter 26 of NFPA ~~11441140~~
- (4) A hazard mitigation implementation and maintenance schedule approved by the AHJ [~~11441140:24.4.34.3.3~~]

A.17.1.10.3

Access and evacuation concerns along with fire suppression capabilities (such as fire station location, water supply, road widths, and grades) are important to overall fire protection and safety. Likewise, vegetation clearance and maintenance along private roadways, driveways, and water supplies are important elements in fire suppression and emergency evacuation. Since these elements do not relate specifically to reducing the ignition potential of the structure, these are covered in NFPA 1140 ~~1141~~; ~~NFPA 1142~~; and 17.3.5.3. [~~11441140:A.24.4.34.3.3~~]

17.1.10.4*

The history of wildland fire in the area under assessment shall be considered in determining required hazard mitigation plan. [~~11441140:24.4.44.3.4~~]

A.17.1.10.4

The frequency of wildland fire occurrence will affect the priorities of the mitigation measures and the periodic maintenance schedule of the property being assessed. [~~11441140:A.4.3.424.4.4~~]

17.1.10.5*

The AHJ shall approve the mitigating measures relative to access, water supply, and construction based upon the structure assessment established in 17.1.2. [~~11441140:24.4.54.3.5~~]

A.17.1.10.5

Chapters 10 through 18 in NFPA 1140~~1141~~ provides guidance on planning and installing fire protection infrastructure. [~~11441140~~:A.4.3.5~~24.4.5~~]

17.1.10.6

From the information gathered in each structure assessment, the AHJ shall require or cause to be developed a wildland fire hazard severity map of each residential development area addressed. [~~11441140~~:~~24.4.6~~~~4.3.6~~]

17.1.10.7

The map shall include, but not be limited to, the following data elements:

- (1) Lot designations
- (2) Structure locations on each lot
- (3) Locations of wildland fire evacuation centers or safety zones
- (4) Hazard severity for each lot
- (5) Overlapping ignition zones
- (6) Location of fire hydrants, cisterns, or other water sources for fire-fighting

[~~11441140~~:~~24.4.7~~~~4.3.7~~]

17.1.11 Mitigation Implementation and Enforcement.

17.1.11.1

The AHJ shall require the property owner to develop and comply with the approved wildland fire hazard mitigation plan and schedule according to 17.1.10.1. [~~11441140~~:~~24.5.14~~~~4.1~~]

17.1.11.2

No permit associated with construction shall be issued if the provisions of this *Code* are not addressed. [~~11441140~~:~~24.5.24~~~~4.2~~]

17.1.11.3

No permit associated with occupancy shall be issued until the provisions of this *Code* are satisfied. [~~11441140~~:~~24.5.34~~~~4.3~~]

17.3 Wildland Fire-Prone Areas.

17.3.5 Clearance of Brush and Vegetative Growth.

17.3.5.2 Structures.

17.3.5.2.1.1*

Ground-Surface fuels, including native vegetation and plants used for landscaping within the defined landscaping zones, shall be treated or removed. [~~11441140~~:~~26.2.1~~]

A.17.3.5.2.1.1

Acceptable methods of fuel treatment include, but are not limited to, prescribed burning by qualified personnel, mowing, pruning, removing, substitution, mulching, converting to compost, and grazing. [[11441140:A.26.2.1](#)]

Vegetation. Fire resistance in plants depends on many variables, including location, growing conditions, and maintenance. Plants should be chosen that are suitable for the geographic region and the location in the landscape, and plants with similar needs should be grouped to minimize care. Plant characteristics that reduce maintenance needs include the following:

- (1) Drought-resistant
- (2) Pest-resistant
- (3) Native
- (4) Noninvasive
- (5) Slow-growing
- (6) Wind-resistant
- (7) Thriving without supplemental fertilizing

[[11441140:A.26.2.1](#)]

High Combustibility (fire-prone, fire-tolerant) Plants. Some plants burn readily because they are adapted to survive in fire-dependent ecosystems and can contain volatile compounds that support fire. Fire-prone plants have traits (i.e., adaptations) that help them to survive fire, such as thick bark or extensive roots. They often contain resins, oils, or waxes that ignite easily and burn intensely. Fire-prone plants will flame, not smolder, when preheated and ignited with a match. They should be removed from Zone 1 of the landscape, as illustrated in Figure A.17.1.8, Figure A.17.1.9.2(a), and Figure A.17.1.9.2(b). Where it is not practical or desirable to remove a fire-prone plant, surrounding it with open space or fire-resistant plants can reduce the hazard. Typical characteristics of fire-prone plants include the following:

- (1) Volatile resins, oils, or waxes, indicated by leaves that are aromatic when crushed
- (2) Narrow leaves or needles (often evergreen)
- (3) Waxy or fuzzy leaves
- (4) Accumulation of fine, twiggy, dry, or dead material on the plant or on the ground under the plant
- (5) Loose, papery, or thick bark

[[11441140:A.26.2.1](#)]

Low Combustibility Plants. In place of fire-prone plants, landscapers and homeowners should use low combustibility plants, often referred to as fire-resistant plants. Although all plants will burn at some point, wildland fire researchers have shown that some types

of plants, including many native plants, resist burning more than others. Additionally, some ornamental plants, when properly irrigated and maintained, are more resistant to fire than others. Low combustibility plants are typically low fuel volume, non-oily, nonresinous plants that are also drought-resistant, have small thick leathery leaves, and produce very little dead plant material. Typical characteristics of fire-resistant plants include the following:

- (1) High moisture content in leaves
- (2) Low oil or resin content (not aromatic)
- (3) Drought tolerance or drought resistance
- (4) Minimal seasonal accumulation of dead vegetation, or accumulation of dead leaves that are somewhat resistant to fire because they hold moisture in the soil (large, flat leaves)
- (5) Limited foliage and few dead branches
- (6) Open or loose branching habit
- (7) Easy maintenance and pruning

[~~11441140~~:A.26.2.1]

17.3.5.2.1.2

Live vegetation within the fuel modification area shall have dead material removed and shall be thinned and pruned in conformance with the wildland fire mitigation plan, as approved by the AHJ. [~~11441140~~:26.2.2]

17.3.5.2.1.3

Dead and downed fuels within 30 ft (9 m) of all buildings shall be removed or treated to maintain the fuel modification area in conformance with the wildland fire mitigation plan, as approved by the AHJ. [~~11441140~~:26.2.3]

17.3.5.2.1.4

Vegetation under trees within the fuel modification area shall be maintained at a height that will preclude ground fire from spreading in the tree crown. [~~11441140~~:26.2.4]

17.3.5.2.1.5*

Tree crowns within the structure ignition zone shall be spaced to prevent structure ignition from radiant heat. [~~11441140~~:26.2.5]

A.17.3.5.2.1.5

Studies of structural ignition from radiant heat indicate that ignitions are unlikely to occur from burning vegetation beyond 120 ft (36.6 m) from a structure. Therefore, clearing of vegetation and thinning of trees to a distance of 120 ft (36.6 m) from a dwelling — as in a zoned Firewise landscape — will prevent ignition of a structure from

the radiant heat from a flame front in a high-risk ecosystem (Cohen and Butler, 1996).

[11441140:A.26.2.5]

A tree crown spacing of 18 ft (5.5 m) for trees within the Zone 1 defensible space [within 30 ft (9 m) of a structure] will reduce radiant heat to at or below the level where ignition of wood occurs, with closer spacing of trees allowed in the zones further from the structure, as described in Table A.17.3.5.2.1.5. These tree-spacing recommendations apply equally to thinning of mature trees or planting of new trees in high- or extreme-risk areas. Tree spacing is measured between the outer edges of the crowns of mature trees, so new trees must be planted with spacing equivalent to the estimated diameter of the mature crown. [11441140:A.26.2.5]

Table A.17.3.5.2.1.5 illustrates general clearance distances for tree crowns. However, these distances can be adjusted by the AHJ in consideration of species of trees and understory vegetation, slope of the property, the proximity to other neighboring structures, overlapping ignition zones, and other site-specific factors.

[11441140:A.26.2.5]

2Table A.17.3.5.2.1.5 Recommended Tree Crown Spacing to Prevent Structural Ignition from Wildland Fire Radiant Heat

Zone	Distance from Structure	Recommended Tree Crown Spacing
1	0–30 ft (0–9 m)	18 ft (5.5 m)
2	30–60 ft (9–18 m)	12 ft (3.7 m)
3	60–100 ft (18–30 m)	6 ft (1.8 m)
4	Beyond 100 ft (30 m)	No restrictions

[11441140:Table A.26.2.5]

17.3.5.2.1.6

The fuel modification plan shall include a maintenance element identifying and defining the responsibility for continued and periodic maintenance. [11441140:26.2.6]

17.3.5.2.1.7 Chimneys and Flues.

17.3.5.2.1.7.1

Every fireplace and wood stove chimney and flue shall be provided with an approved spark arrester constructed of a minimum 12-gauge welded wire or woven wire mesh, with openings not exceeding $\frac{1}{2}$ in. (12.7 mm). [11441140:25.8.1]

17.3.5.2.1.7.2

Vegetation shall not be allowed within 10 ft (3 m) of a chimney outlet. [~~11441140~~:25.8.2]

17.3.5.2.1.8*Accessory Structure(s).

Accessory structures shall be constructed to meet the requirements of Chapter ~~25~~ of NFPA ~~11441140~~ or shall be separated from the main structure by a minimum of 30 ft (9 m). [~~11441140~~:25.9]

A.17.3.5.2.1.8

Accessory structures include, but are not limited to, outbuildings, patio covers, gazebos, palapas, and similar outdoor structures. [~~11441140~~:A.25.9]

17.3.5.2.1.9 Mobile and Manufactured Homes.

17.3.5.2.1.9.1

Permanently located mobile and manufactured homes with an open space beneath shall have a skirt of noncombustible materials, exterior fire-retardant-treated wood, or other ignition-resistant material. [~~11441140~~:25.10.1]

17.3.5.2.1.9.2

Any enclosed space beneath the mobile or manufactured home shall be vented according to ~~25.3.35.2.2~~ of NFPA ~~11441140~~. [~~11441140~~:25.10.2]

17.3.5.2.1.10 Vehicle Parking Areas.

Vehicle parking areas within the immediate landscaped zone shall be maintained free of dry grasses and fine fuels that could be ignited by hot exhaust systems or firebrands. [~~11441140~~:25.11]

17.3.5.2.1.11 Exterior Exposure Hazards.

17.3.5.2.1.11.1*

Heat and flame sources that are unprotected or unsupervised shall not be permitted within 30 ft (9 m) of the primary structure. [~~11441140~~:25.12.1]

A.17.3.5.2.1.11.1

Unprotected heat and flame sources include, but are not limited to, open burning without spark protection, barbecue pits, clay or stone fireplaces, and fire pits. Supervision of burning includes the presence of a source of water or other extinguishing equipment. [~~11441140~~:A.25.12.1]

17.3.5.2.1.11.2

Incinerators, outdoor fireplaces, permanent barbecues, and grills shall not be built, installed, or maintained in hazardous fire areas without prior approval of the AHJ. [~~11441140~~:25.12.2]

17.3.5.2.1.11.3

Openings in incinerators, outdoor fireplaces, permanent barbecues, and grills shall be provided with an approved spark arrester, screen, or door. [~~11441140~~:25.12.3]

17.3.5.2.1.11.4

Propane tanks and other combustible liquids storage shall conform to NFPA 58 and the wildland fire hazard mitigation plan required in 17.1.10. [~~11441140~~:25.12.4]

17.3.5.2.1.11.5

Other combustible materials within 30 ft (9 m) of any structure shall be removed or stored in conformance with the wildland fire hazard mitigation plan as approved by the AHJ. [~~11441140~~:25.12.5]



Second Revision No. 62-NFPA 1-2022 [Detail]

16.10.2.1 Permits shall be required for lead removal operations in accordance with Table 1.13.8(a).

Submitter Information Verification

Committee: FCC-OCP

Submittal Date: Fri Mar 25 09:21:47 EDT 2022

Committee Statement

Committee Statement: This revision is intended as a placeholder for the FCC-AAC correlating committee to revise the language in Table 1.13.8(a) as follows:

Add "Lead Removal"- "For lead removal operations" - "16.10" to the table as a new line item.

This section should be removed after the FCC-AAC makes the change to the table.

Response Message: SR-62-NFPA 1-2022



Second Revision No. 66-NFPA 1-2022 [Detail]

16.8.3.2.3 [16.5.3.2.3]

Permits shall be required for operation of rubberized asphalt melters in accordance with Table 1.13.8(a).

Submitter Information Verification

Committee: FCC-OCP

Submittal Date: Fri Mar 25 09:43:10 EDT 2022

Committee Statement

Committee Statement: This revision is intended as a placeholder for the FCC-AAC correlating committee to revise the language in Table 1.13.8(a) as follows:

Add new item to table "Rubberized asphalt melters"-"For operation"-16.8.3.2

This section should be removed after the FCC-AAC makes the change to the table.

Response Message: SR-66-NFPA 1-2022



Second Revision No. 49-NFPA 1-2022 [New Section after 3.3.13]

3.3.22 Automatic Sprinkler.

A fire suppression or control device that operates automatically when its heat-activated element is heated to its thermal rating or above, allowing water to discharge over a specified area. [13, 2022] (FCC-OCP).

Submitter Information Verification

Committee: FCC-OCP

Submittal Date: Thu Mar 24 13:04:47 EDT 2022

Committee Statement

Committee Statement: NFPA 13/13D/13R have similar definitions for automatic sprinkler. This is a new extract from 13 related to CI4.

Response Message: SR-49-NFPA 1-2022



Second Revision No. 68-NFPA 1-2022 [Section No. 3.3.198]

3.3.202* Nuisance Alarm.

An unwanted activation of a signaling system or an alarm initiating device in response to a stimulus or condition that is not the result of a potentially hazardous condition. [72, 2022] (FCC-OCP)

A.3.3.202 Nuisance Alarm.

Nuisance alarms are unwanted alarms. Sometimes nuisance alarms might be called false alarms. In this Code, any unwanted alarm is considered false because they are not indicative of real hazards. Because the term false has been used by many people to mean many different things, this Code is instead using the terms unwanted, nuisance, and malicious to categorize the different types of alarms. They occur when some condition simulates a fire or other hazardous condition. For example, cigarette smoke can activate smoke detectors and smoke alarms. In that case, there might not be anything wrong with the smoke detector or smoke alarm — it is doing its job responding to the condition or stimulus that it was designed to detect. Another example would be a heat detector or heat alarm that activates when someone inadvertently points a hair dryer towards it. A malicious alarm occurs when someone intentionally activates the detector or alarm when there is no fire hazard. See the definitions of malicious, unintentional, unknown, and unwanted alarms. [72, 2022]

Submitter Information Verification

Committee: FCC-OCP

Submittal Date: Fri Mar 25 10:10:23 EDT 2022

Committee Statement

Committee Statement: Additional annex text from NFPA 72 is helpful for the code users.

Response Message: SR-68-NFPA 1-2022



Second Revision No. 48-NFPA 1-2022 [New Section after 3.3.267]

3.3.272 Sprinkler System.

3.3.272.1 Sprinkler System (NFPA 13/13R).

A system, commonly activated by heat from a fire and discharges water over the fire area, that consists of an integrated network of piping designed in accordance with fire protection engineering standards that includes a water supply source, a control valve, a waterflow alarm, and a drain. The portion of the sprinkler system above ground is a network of specifically sized or hydraulically designed piping installed in a building, structure, or area, generally overhead, and to which sprinklers are attached in a systematic pattern. [13, 2022] (FCC-OCP)

3.3.272.2 Sprinkler System (NFPA 13D)

A system that consists of an integrated network of piping designed in accordance with fire protection engineering standards that includes a water supply source, a water control valve, and a drain. The portion of the sprinkler system above ground is a network of specifically sized or hydraulically designed piping installed in a building, structure, or area, generally overhead, and to which sprinklers are attached in a systematic pattern. The system is commonly activated by heat from a fire and discharges water over the fire area. [13D, 2022] (FCC-OCP)

Submitter Information Verification

Committee: FCC-OCP

Submittal Date: Thu Mar 24 13:00:41 EDT 2022

Committee Statement

Committee Statement: This addresses the concerns raised by the FCC-AAC in CN-11. The two new extracted definitions address both definitions used by NFPA 13, 13R and 13D. NFPA 13R extracts the definition from 13.

Response Message: SR-48-NFPA 1-2022

[Public Comment No. 19-NFPA 1-2022 \[Global Input\]](#)



Second Revision No. 41-NFPA 1-2022 [Section No. 13.1.6]

13.1.6 Records.

~~Detailed records documenting all systems and equipment inspection, testing, and maintenance shall be both of the following:~~

~~Kept by the property owner~~

~~Made available upon request for review by the AHJ~~

13.1.6.1

Records shall be made for all inspections, tests, and maintenance of the system and its components. [25: 4.3.1]

13.1.6.1.1

Records shall be maintained by the property owner. [25: 4.3.1.1]

13.1.6.1.2

Records shall be permitted to be stored and accessed electronically. [25: 4.3.1.2]

13.1.6.2

Records shall include the following:

- (1) The procedure/activity performed (e.g., inspection, test, or maintenance)
- (2) The organization that performed the activity
- (3) The required frequency of the activity
- (4) The results and date of the activity
- (5) The name and contact information of the qualified contractor or owner, including lead person for activity

[25: 4.3.2]

13.1.6.3

Records shall be made available to the authority having jurisdiction upon request. [25: 4.3.3]

13.1.6.4

As-built system installation drawings, hydraulic calculations, original acceptance test records, and device manufacturer's data sheets shall be retained for the life of the system. [25: 4.3.4]

13.1.6.5

Subsequent records shall be retained for a period of 1 year after the next inspection, test, or maintenance of that type required by the standard. [**25:** 4.3.5]

Submitter Information Verification

Committee: FCC-OCP

Submittal Date: Wed Mar 23 14:32:00 EDT 2022

Committee Statement

Committee Statement: The record keeping requirements found in NFPA 25 would be appropriate to be extracted in this section. As NFPA 25 is the owner's document, having these requirements contained within NFPA 1 makes them enforceable by the fire code official. Additionally, it will provide needed guidance on the information required to be included in ITM records as well as how long those records should be maintained.

Response Message: SR-41-NFPA 1-2022

Public Comment No. 30-NFPA 1-2022 [Section No. 13.1.6]



Second Revision No. 67-NFPA 1-2022 [Section No. 13.3.2.5]

13.3.2.5

~~Stand-alone open parking structures that are detached from other occupancies shall not be required to be protected by an automatic sprinkler system.~~

Submitter Information Verification

Committee: FCC-OCP

Submittal Date: Fri Mar 25 10:08:02 EDT 2022

Committee Statement

Committee Statement: CI 7 was dependent on the current NFPA 88a cycle, which by (NFPA 88a) SR 1 put automatic sprinkler systems in all parking garages. This removes the exception for stand alone, detached parking structures, eliminating the conflict between the two documents. NFPA 88a is referenced in Chapter 29.

Response Message: SR-67-NFPA 1-2022



Second Revision No. 50-NFPA 1-2022 [Section No. 13.7.1.5.5]

13.7.1.5.5*

Fire alarm systems classified as chronic-nuisance-alarm-prone systems shall comply with the following:

- (1) The system shall be inspected by qualified inspection, testing, and service personnel, in accordance with *NFPA 72*, ~~from an approved fire alarm service company~~ for the cause of the nuisance alarms.
- (2) Corrective action shall be taken ~~by the approved fire alarm service company~~ to address the cause of the nuisance alarms.
- (3) A report indicating the cause and corrective action taken to mitigate future nuisance alarms from the fire alarm system shall be provided to the AHJ by the owner. ~~report, completed by the fire alarm service company, shall be provided to the AHJ by the owner of the fire alarm system as to the cause and corrective action taken to mitigate future nuisance alarms from the fire alarm system.~~

Submitter Information Verification

Committee: FCC-OCP

Submittal Date: Thu Mar 24 13:08:07 EDT 2022

Committee Statement

Committee Statement: The proposed changes broaden who can diagnose the cause of chronic-nuisance-alarms and get them corrected. NFPA 72 is still referenced and does require qualified personnel. The current language limits who can correct issues not related to the fire alarm system, such as building a wall or working on HVAC systems. Item 3 clarifies who the report goes to and who is responsible for providing it.

The proposed changes broadens who can diagnose the issue and get it corrected.

Response Message: SR-50-NFPA 1-2022

[Public Comment No. 22-NFPA 1-2022 \[Section No. 13.7.1.5.5\]](#)



Second Revision No. 53-NFPA 1-2022 [Chapter 16]

Chapter 16 Safeguarding Construction, Alteration, and Demolition Operations

16.1 General Requirements.

16.1.1

Structures undergoing construction, alteration, or demolition operations, including those in underground locations, shall comply with NFPA 241 and this chapter.

16.1.2

A fire protection plan shall be established where required by the AHJ.

16.1.3*

In buildings under construction, adequate escape facilities shall be maintained at all times for the use of construction workers. Escape facilities shall consist of doors, walkways, stairs, ramps, fire escapes, ladders, or other approved means or devices arranged in accordance with the general principles of Chapter 14 and NFPA 101 insofar as they can reasonably be applied to buildings under construction. [101:4.6.10.3]

16.1.4

Fire apparatus access roads provided in accordance with 18.2.3 shall be ~~provided at the start of a project and shall be maintained throughout construction~~ both of the following: -

- (1) ~~provided~~ Provided at the start of a project and shall be
- (2) ~~maintained~~ Maintained throughout construction

16.1.5

Permanent fire apparatus access road markings shall not be required until the building is complete or occupied for use.

~~16.2 Processes and Hazards.~~

~~16.2.1 Temporary Heating Equipment.~~

~~16.2.1.1~~

~~Temporary heating equipment shall be listed. [241: 5.2.1]~~

A.16.2.1.1

Examples of relevant test standards include, but are not limited to, UL 647, *Unvented Kerosene-Fired Room Heaters and Portable Heaters*, and UL 1278, *Moveable and Wall- or Ceiling-Hung Electric Room Heaters*. [241: A.5.2.1]

16.2.1.2

Temporary heating equipment shall be installed in accordance with its listing, including clearance to combustible material, equipment, or construction. [241: 5.2.2]

16.2.1.3

Temporary heating equipment shall be installed, used, and maintained in accordance with the manufacturer's instructions, except as otherwise provided in 16.2.1.4. [241: 5.2.3]

16.2.1.4

Where instructions, as addressed in 16.2.1.2, are not available, temporary heating equipment shall be used in accordance with recognized safe practices. [241: 5.2.4]

16.2.1.5

Temporary heating equipment shall be placed and used in such a manner so that it is secured against overturning or displacement. [241: 5.2.5]

16.2.1.6

Only personnel familiar with the operation of the temporary heating equipment shall be allowed to operate such devices. [241: 5.2.6]

16.2.1.7

Temporary heating equipment, where utilized, shall be monitored for safe operation and maintained by properly trained personnel. [241: 5.2.7]

A.16.2.1.7

Misuse of temporary heating devices has resulted in numerous fires and millions of dollars in property loss. Temporary heating equipment, while operating, should be visually inspected every hour to ensure that combustibles have not blown or fallen near the temporary heating device. During windy periods, it might be necessary to reduce the interval between inspections. Any object near the temporary heating device that is hot to the touch should be moved, or the temporary heating device should be relocated. The visual inspection also should ensure that the appliance is operating properly. Any appliance that is not operating properly should be turned off until repairs have been made. [241: A.5.2.7]

16.2.1.8

~~Temporary heating equipment and devices noted to be damaged or considered to be a potential safety hazard shall not be used. [241: 5.2.8]~~

16.2.1.9

~~Temporary heating equipment using exposed radiant heating wires shall not be used. [241: 5.2.9]~~

16.2.1.10

~~Temporary electrical heating equipment shall be equipped with tip-over protection and overheat cutoffs. [241: 5.2.10]~~

16.2.1.11

~~Chimney or vent connectors, where required from direct-fired heaters, shall be maintained at least 18 in. (460 mm) from combustibles and shall be installed in accordance with NFPA 211. [241: 5.2.11]~~

16.2.1.12

~~Oil-fired heaters shall comply in design and installation features with Section 11.5. [241: 5.2.12]~~

16.2.1.13

~~Fuel supplies for liquefied petroleum gas-fired heaters shall comply with NFPA 54 and Chapter 69. [241: 5.2.13]~~

16.2.1.14

~~Refueling operations shall be conducted in an approved manner. [241: 5.2.14]~~

A.16.2.1.14

~~This might necessitate the removal of the heater prior to refueling. The appliance also should be allowed to cool prior to refueling. [241: A.5.2.14]~~

16.2.2 Smoking.**16.2.2.1**

~~Smoking shall be prohibited at or in the vicinity of hazardous operations or combustible/flammable materials, and "No Smoking" signs shall be posted in these areas. [241: 5.3.1]~~

A.16.2.2.1

~~Areas where smoking should be prohibited include, but are not limited to, temporary holding areas for combustible construction materials, storage areas, and areas where oil, gasoline, propane, or flammable materials are stored or used. [241: A.5.3.1]~~

16.2.2.2

~~Smoking shall be permitted only in designated areas. [241: 5.3.2]~~

16.2.2.3

~~Where smoking is permitted, safe receptacles for smoking materials shall be provided. [241: 5.3.3]~~

16.2.3 Waste Disposal.**16.2.3.1**

~~Accumulations of combustible waste material, dust, and debris shall be removed from the structure and its immediate vicinity at the end of each work shift or more frequently as necessary for safe operations. [241: 5.4.1]~~

A.16.2.3.1

~~Failure to remove scrap and trash accumulations provides fuel for the rapid expansion of a fire that might otherwise be confined to a small area. These accumulations also provide a convenient fuel source for malicious fires. Open-topped dumpsters containing combustible materials should be emptied or moved to at least 35 ft (11 m) from combustible structures at the end of each work shift. [241: A.5.4.1]~~

16.2.3.2

~~Rubbish shall not be burned on the premises without first obtaining a permit from the AHJ. (See Section 10.10 .) [241: 5.4.2]~~

16.2.3.3

~~Materials susceptible to spontaneous ignition, such as oily rags, shall be stored in a listed disposal container. [241: 5.4.3]~~

16.2.3.4

~~Trash chutes, where provided, shall comply with 16.2.3.4.1 through 16.2.3.4.6 .[241: 5.4.4]~~

16.2.3.4.1

~~A trash chute safety plan shall be submitted to and approved by the AHJ. [241: 5.4.4.1]~~

16.2.3.4.2

~~Trash chutes used on the exterior of a building shall be of noncombustible construction, or protected in accordance with 16.2.3.4.3 through 16.2.3.4.6 if of combustible construction. [241: 5.4.4.2]~~

16.2.3.4.3

~~The interior of combustible trash chutes shall be provided with not less than one temporary automatic sprinkler within a recess near the top of the chute. [241: 5.4.4.3]~~

A.16.2.3.4.3

The temporary sprinkler or sprinklers are not required to comply with NFPA 13. Where trash chutes have a length exceeding 36 ft (11 m), intermittent levels of sprinkler protection should be provided at intervals not exceeding 36 ft (11 m). The use of fire retardant coatings can be substituted for sprinkler protection provided that the coating is compatible with the substrate, abrasion resistant, and approved by the AHJ. [241: A.5.4.4.3]

16.2.3.4.4

The temporary sprinkler required by 16.2.3.4.3 shall be protected by the recess as well as a listed sprinkler guard. [241: 5.4.4.4]

16.2.3.4.5

The temporary sprinkler required by 16.2.3.4.3 shall be connected to any available water supply with a listed fire hose, or a flexible, commercial rubber hose, with a diameter of not less than $\frac{3}{4}$ in. (19 mm) and a listed flexible connector. [241: 5.4.4.5]

16.2.3.4.6

The temporary sprinkler required by 16.2.3.4.3 shall be protected against freezing where required by the AHJ. [241: 5.4.4.6]

16.2.4 Flammable and Combustible Liquids and Flammable Gases.**16.2.4.1 Storage.****16.2.4.1.1**

Storage of flammable and combustible liquids shall be in accordance with Chapter 66 unless otherwise modified by 16.2.4. [241: 5.5.1.1]

16.2.4.1.2

Storage of Class I and Class II liquids shall not exceed 60 gal (227 L) within 50 ft (15 m) of the structure. [241: 5.5.1.2]

A.16.2.4.1.2

The reference to "structure" is intended to apply to those structures under construction, alteration, or demolition and not to temporary structures on the construction site. Additionally, existing properly protected storage within 50 ft (15 m) of the structure or inside an existing structure under alteration is not intended to be regulated by this provision. [241: A.5.5.1.2]

16.2.4.1.3

Storage areas shall be kept free of weeds, debris, and combustible materials not necessary to the storage. [241: 5.5.1.3]

16.2.4.1.4

Open flames and smoking shall not be permitted in flammable and combustible liquids storage areas. [241: 5.5.1.4]

16.2.4.1.5

Such storage areas shall be appropriately posted as “No Smoking” areas. [241: 5.5.1.5]

16.2.4.1.6

Storage areas shall be appropriately posted with markings in accordance with NFPA 704. [241: 5.5.1.6]

16.2.4.2 Handling of Flammable and Combustible Liquids at Point of Final Use.**16.2.4.2.1**

Handling of flammable and combustible liquids shall be in accordance with Chapter 66 except as modified by 16.2.4.2.2 through 16.2.4.2.4. [241: 5.5.2.1]

16.2.4.2.2

Class I and Class II liquids shall be kept in approved safety containers. [241: 5.5.2.2]

16.2.4.2.3

Means shall be provided to contain and dispose of leakage and spills promptly and safely. [241: 5.5.2.3]

16.2.4.2.4

Class I liquids shall be dispensed only where there are no open flames or other sources of ignition within the possible path of vapor travel. [241: 5.5.2.4]

A.16.2.4.2.4

The vapors given off by flammable liquids generally have vapor densities greater than those of air. Therefore, these vapors tend to collect in low spots and travel at floor level. Being invisible, these vapors are difficult to detect without the aid of proper instruments designed specifically for the purpose. [241: A.5.5.2.4]

Proper ventilation is, therefore, important in the prevention of accidental ignition of these vapors. Proper ventilation can be accomplished by either natural or mechanical means. [241: A.5.5.2.4]

16.2.4.3 Storage and Handling of Combustible and Flammable Gases.**16.2.4.3.1**

Storage and handling of combustible and flammable gases shall be in accordance with NFPA 54 and Chapter 69. [241: 5.5.3.1]

16.2.4.3.2

Open flames and smoking shall not be permitted in flammable gas storage areas. [241: 5.5.3.2]

16.2.5 Explosive Materials.**16.2.5.1**

The storage, handling, and use of explosive materials shall be in accordance with NFPA 495. [241: 5.6.1]

16.2.5.2

~~All blasting operations shall be under the direct supervision of an individual who is legally licensed to use explosives and who possesses the required permits. [241: 5.6.2]~~

16.2.6 Cooking.**16.2.6.1**

~~Cooking equipment shall be placed and used in such a manner so that it is secured against overturning or displacement. [241: 5.7.1]~~

16.2.6.2

~~Cooking shall only be located in approved cooking areas that are designated by approved signs, which state the following:~~

~~-WARNING! DESIGNATED COOKING AREA — COOKING OUTSIDE OF A DESIGNATED COOKING AREA IS PROHIBITED~~

~~[241: 5.7.2]~~

16.2.6.3

~~Cooking outside of approved cooking areas shall be prohibited. [241: 5.7.3]~~

16.3 Utilities.

~~Utilities shall comply with the requirements of Chapter 6 of NFPA 241 .~~

16.4 Fire Protection.**16.4.1** Fire Safety Program.**16.4.1.1**

~~An overall construction or demolition fire safety program shall be developed. [241: 7.1.1]~~

16.4.1.2

~~All of the following items shall be addressed in the fire safety program:~~

~~Good housekeeping~~

~~On-site security~~

~~Fire protection systems, as follows:~~

~~For construction operations, installation of new fire protection systems as construction progresses~~

~~For demolition operations, preservation of existing fire protection systems during demolition~~

~~Organization and training of an on-site fire brigade, where applicable~~

~~Development of a prefire plan with the local fire department~~

~~Rapid communication~~

~~Consideration of special hazards resulting from previous occupancies~~

~~Protection of existing structures and equipment from exposure fires resulting from construction, alteration, and demolition operations~~

[~~241: 7.1.2~~]

16.4.2 ~~Owner's Responsibility for Fire Protection.~~

16.4.2.1

~~The owner shall designate a person who shall be responsible for the fire prevention program and who shall ensure that it is carried out to completion. [241: 7.2.1]~~

A.16.4.2.1

~~One person should be made responsible for the protection of property from fire. This person should ensure that the proper procedures for controlling fire hazards are established and should have full authority to enforce them. [241: A.7.2.1]~~

~~The responsible person should be appointed by the owner. Where an entirely new structure is being constructed, the owner should ensure that specifications for new buildings contain a clause stating that the "contractor will take all reasonable precautions against fire in accordance with good fire protection engineering practice." [241: A.7.2.1]~~

~~The responsibility for loss prevention is the owner's. However, loss prevention recommendations normally are accomplished by the contractor. To ensure that recommendations are carried out promptly, the owner's assistance might be needed. [241: A.7.2.1]~~

~~Fire prevention education should be a topic at contractor safety meetings ("tailgate talks") at least once a month. Topics that could be discussed include maintaining clear access to fire-fighting equipment, reinforcing cutting and welding procedures, flammable liquids use and storage, use of first aid fire-fighting equipment, roofing operations, and precautions for the use of temporary heating equipment. [241: A.7.2.1]~~

~~All fires should be investigated by the program manager, and necessary fire prevention improvements that are identified by the investigation should be communicated to all employees as soon as possible. [241: A.7.2.1]~~

16.4.2.1.1

~~The fire prevention program manager shall have the authority to enforce the provisions of NFPA 241 and other applicable fire protection standards. [241: 7.2.1.1]~~

16.4.2.1.2

~~The fire prevention program manager shall have knowledge of the applicable fire protection standards, available fire protection systems, and fire inspection procedures. [241: 7.2.1.2]~~

16.4.2.1.3

~~Inspection records shall be available for review by the AHJ. [241: 7.2.1.3]~~

16.4.2.2

~~Where guard service is provided, the fire prevention program manager shall be responsible for the guard service. [241: 7.2.2]~~

16.4.2.3 Prefire Plans.

A.16.4.2.3

~~Large-scale construction sites change rapidly as construction progresses. The prefire plan should be flexible to allow for different stages of construction. Critical stages that should be considered include access, installation of water mains and fire hydrants, framing/exterior shell, roofing, covering of interior partitions, installation of fixed fire protection, concrete form work, installation of building systems, and construction safety hazards. [241: A.7.2.3]~~

~~Since construction projects do change, the local fire department should be encouraged to visit the site on a regular basis. Prefire plan visits should be scheduled by the manager at least semiannually and when there have been major revisions to the fire prevention plan. Since municipal fire departments work rotating shifts, a series of prefire plan visits might be necessary to allow all responding fire fighters an opportunity to visit the site. In rural areas and smaller cities, the local fire department might be a volunteer organization or might have only a small career fire fighter crew on duty during the day. It might be necessary for the manager to schedule the prefire plan visit during the evening hours to meet the needs of the local fire department. [241: A.7.2.3]~~

16.4.2.3.1

~~Where there is public fire protection or a private fire brigade, the manager shall be responsible for the development of prefire plans in conjunction with the fire agencies. [241: 7.2.3.1]~~

16.4.2.3.2

~~Prefire plans shall be updated as necessary. [241: 7.2.3.2]~~

16.4.2.3.3

~~The prefire plan shall include provisions for on-site visits by the fire agency. [241: 7.2.3.3]~~

16.4.2.4 Program Manager Responsibilities.**16.4.2.4.1**

~~The manager shall be responsible for ensuring that proper training in the use of protection equipment has been provided.~~
~~[241: 7.2.4.1]~~

16.4.2.4.2

~~The manager shall be responsible for the presence of adequate numbers and types of fire protection devices and appliances and for their proper maintenance.~~ [241: 7.2.4.2]

16.4.2.4.3

~~The manager shall be responsible for supervising the permit system for hot work operations. (See Section 5.1 of NFPA 241.)~~ [241: 7.2.4.3]

16.4.2.4.4

~~A weekly self-inspection program shall be implemented, with records maintained and made available.~~ [241: 7.2.4.4]

16.4.2.4.5

~~Impairments to the fire protection systems or fire alarm, detection, or communications systems shall be authorized only by the fire prevention program manager. [241: 7.2.4.5]~~

A.16.4.2.4.5

~~See NFPA 101 for impairments to fire protection systems or fire alarm, detection, or communication systems where required by that code. In addition, see NFPA 72 for impairments resulting to fire alarm equipment, and NFPA 25 for impairments resulting to water-based fire protection equipment. [241: A.7.2.4.5]~~

16.4.2.4.6

~~Temporary protective coverings used on fire protection devices during renovations, such as painting, shall be removed promptly when work has been completed in the area. [241: 7.2.4.6]~~

16.4.2.5 Site Security.

16.4.2.5.1

~~Guard service shall be provided where required by the AHJ. Where required, buildings with combustible construction exposed during construction more than 40 ft (12.19 m) above grade plane shall be provided with guard service when there are no crews on-site. [241: 7.2.5.1]~~

A.16.4.2.5.1

~~Due to the growing threat of arson, guard service should be provided on major projects even where not required by the AHJ. The requirements for guard service also should be based on, but should not be limited to, the hazards at the site, the size of the risk, the difficulty of the fire-fighting situation, the exposure risk, and the physical security of the site. [241: A.7.2.5.1]~~

16.4.2.5.2

~~Where guard service is provided, the guard(s) shall be trained in all of the following:~~

~~Notification procedures that include calling the fire department and management personnel~~

~~Function and operation of fire protection equipment~~

~~Familiarization with fire hazards~~

~~Use of construction elevators, where provided~~

[241: 7.2.5.2]

A.16.4.2.5.2

~~It is recommended that areas in buildings should be patrolled at all times when construction, alteration, and demolition operations are not in progress by a competent guard registered on an approved security tour supervision system (watch clock) with stations covering all parts of the building in accordance with NFPA 601. Guard rounds should include all parts of the buildings and outside areas where hazardous equipment or materials are located. Rounds should be conducted every $\frac{1}{2}$ hour for 2 hours after suspension of work for the day and every hour thereafter during the night and nonworking days and should include tours of all accessible work areas.~~

[241: A.7.2.5.2]

16.4.2.5.3

~~Guards shall be informed of any special status of emergency equipment or hazards. [241: 7.2.5.3]~~

16.4.2.5.4

~~Security fences shall be provided where required by the AHJ. [241: 7.2.5.4]~~

A.16.4.2.5.4

~~The requirements for security fencing should be based on, but should not be limited to, the hazards at the site, the size of the risk, the difficulty of the fire-fighting situation, the exposure risk, and the presence of guard service.
[241: A.7.2.5.4]~~

16.4.2.5.5

~~Entrances (e.g., doors and windows) to the structure under construction, alteration, or demolition shall be secured where required by the AHJ. [241: 7.2.5.5]~~

A.16.4.2.5.5

~~Securing the openings (doors and windows) to the structure, where possible, reduces the chance of entry by unauthorized persons. This, in turn, reduces the chance of arson or accidental fires. It could, in some instances, eliminate the need for guard service or security fencing. It also helps prevent freezing or wind damage to fire protection equipment and prevents combustible material from being blown against heating devices and igniting. [241: A.7.2.5.5]~~

16.4.3 Fire Alarm Reporting.

A.16.4.3

In large projects or tall structures, or both, the use of an audible device for an evacuation signal in case of fire or other emergency is recommended. [**241:** A.7.4]

16.4.3.1

There shall be a readily available public fire alarm box near the premises, telephone service to the responding fire department, or equivalent facilities. [**241:** 7.4.1]

16.4.3.2

Instructions shall be issued for the immediate notification of the fire department in the case of a fire. Where telephone service is employed, the local fire department number and site address shall be conspicuously posted near each telephone. [**241:** 7.4.2]

16.4.4 Access for Fire Fighting.

16.4.4.1 Command Post.

16.4.4.1.1

~~A suitable location at the site shall be designated as a command post and provided with plans, emergency information, keys, communications, and equipment, as needed. [241: 7.5.1.1]~~

16.4.4.1.2

~~The person in charge of fire protection shall respond to the location command post whenever fire occurs. [241: 7.5.1.2]~~

16.4.4.2 Key Box.

16.4.4.2.1

~~Where access to or within a structure or an area is unduly difficult because of secured openings or where immediate access is necessary for life-saving or fire-fighting purposes, the AHJ shall be permitted to require a key box to be installed in an accessible location. [241: 7.5.2.1]~~

16.4.4.2.2

~~The key box shall be an approved type and shall contain keys to gain access as required by the AHJ. (See Section 18.2.) [241: 7.5.2.2]~~

16.4.4.3 Stairs.

16.4.4.3.1

~~In all buildings over one story in height, at least one stairway shall be provided that is in usable condition at all times and that meets the requirements of NFPA 101. [241: 7.5.4.1]~~

16.4.4.3.2

~~This stairway shall be extended upward as each floor is installed in new construction and maintained for each floor still remaining during demolition. [241: 7.5.4.2]~~

16.4.4.3.3

~~The stairway shall be lighted. [241: 7.5.4.3]~~

16.4.4.3.4

~~During construction, the stairway shall be enclosed where the building exterior walls are in place. [241: 7.5.4.4]~~

16.4.4.3.5

~~All exit stairs shall be provided with stair identification signs to include the floor level, stair designation, and exit path direction as required to provide for safe egress. [241: 7.5.4.5]~~

16.4.5 Standpipes.

~~In all new buildings in which standpipes are required or where standpipes exist in buildings being altered or demolished, such standpipes shall be maintained in conformity with the progress of building construction in such a manner that they are always ready for use. [241: 7.6]~~

16.4.6 First-Aid Fire-Fighting Equipment.

A.16.4.6

~~Portable fire extinguishers, water pails, small hose lines, and 1.5 in. (38 mm) standpipe hose are considered first-aid fire-fighting equipment. To be effective, first-aid fire-fighting equipment should be used in the incipient stage of a fire. [241: A.7.7]~~

A.16.4.6

~~Portable fire extinguishers, water pails, small hose lines, and 1.5 in. (38 mm) standpipe hose are considered first-aid fire-fighting equipment. To be effective, first-aid fire-fighting equipment should be used in the incipient stage of a fire. [241: A.7.7]~~

16.4.6.1

~~The suitability, distribution, and maintenance of extinguishers shall be in accordance with Section 13.6 . [241: 7.7.1]~~

A.16.4.6.1

~~A suitable number and type of spare fire extinguishers should be provided on-site for immediate replacement of discharged fire extinguishers. [241: A.7.7.1]~~

A.16.4.6

~~Portable fire extinguishers, water pails, small hose lines, and 1.5 in. (38 mm) standpipe hose are considered first-aid fire-fighting equipment. To be effective, first-aid fire-fighting equipment should be used in the incipient stage of a fire. [241: A.7.7]~~

16.4.6.2

~~Wherever a toolhouse, storeroom, or other shanty is located in or adjacent to the building under construction or demolition, or where a room or space within that building is used for storage, a dressing room, or a workshop, at least one approved extinguisher shall be provided and maintained in an accessible location, unless otherwise permitted by 16.4.6.3. [241: 7.7.2]~~

16.4.6.3

~~The requirement of 16.4.6.2 shall be permitted to be waived where the structure does not exceed 150 ft ² (14 m ²) in floor area or is equipped with automatic sprinklers or other approved protection. [241: 7.7.3]~~

16.4.6.4

~~At least one approved fire extinguisher also shall be provided in plain sight on each floor at each usable stairway as soon as significant combustible material is present. [241: 7.7.4]~~

16.4.6.5

~~Suitable fire extinguishers shall be provided on self-propelled equipment. [241: 7.7.5]~~

A.16.4.6

~~Portable fire extinguishers, water pails, small hose lines, and 1.5 in. (38 mm) standpipe hose are considered first-aid fire-fighting equipment. To be effective, first-aid fire-fighting equipment should be used in the incipient stage of a fire. [241: A.7.7]~~

16.4.6.6

~~Free access to permanent, temporary, or portable first-aid fire equipment shall be maintained at all times. [241: 7.7.6]~~

A.16.4.6.6

~~Clear and unobstructed access to all first-aid fire-fighting equipment should be maintained. Fire-fighting equipment also should be clearly visible from surrounding areas. If visibility to first-aid fire-fighting equipment is obstructed, signs in accordance with NFPA 170 should be installed to indicate the position of the fire-fighting equipment. [241: A.7.7.6]~~

A.16.4.6

~~Portable fire extinguishers, water pails, small hose lines, and 1.5 in. (38 mm) standpipe hose are considered first-aid fire-fighting equipment. To be effective, first-aid fire-fighting equipment should be used in the incipient stage of a fire. [241: A.7.7]~~

16.4.7 Temporary Protection During Construction, Alteration, or Demolition.

During construction, alteration, or demolition, the use of temporary fire sprinkler protection approved by the AHJ shall be permitted as supplemental protection. [**241:** 7.9]

A.16.4.7

During construction, alternation, and demolition, there are many hazardous conditions, such as cutting, welding, grinding, and combustible or hazardous product storage that can be made safer by installing a temporary fire sprinkler system. Given that such protection will be supplemental to any other protection that would be required, there is no harm in allowing this additional safety feature on a temporary basis if the design and installation is considered acceptable by the AHJ. [**241:** A.7.9]

~~16.5~~ Safeguarding Construction and Alteration Operations.

~~16.5.1*~~ Scaffolding, Shoring, and Forms.

~~16.5.1.1~~

~~Accumulations of unnecessary combustible forms or form lumber shall be prohibited. [241: 8.2.1]~~

~~16.5.1.2~~

~~Combustible forms or form lumber shall be brought into the structure only when needed. [241: 8.2.2]~~

~~16.5.1.3~~

~~Combustible forms or form lumber shall be removed from the structure as soon as stripping is complete. [241: 8.2.3]~~

~~16.5.1.4~~

~~Those portions of the structure where combustible forms are present shall not be used for the storage of other combustible building materials. [241: 8.2.4]~~

~~16.5.1.5*~~

~~During forming and stripping operations, portable fire extinguishers or charged hose lines shall be provided to protect the additional combustible loading adequately. [241: 8.2.5]~~

~~16.5.2~~ Temporary Separation Walls.

~~16.5.2.1~~

~~Protection shall be provided to separate an occupied portion of the structure from a portion of the structure undergoing alteration, construction, or demolition operations when such operations are considered as having a higher level of hazard than the occupied portion of the building. [241: 8.6.2.1]~~

~~16.5.2.1.1~~

~~Walls shall have at least a 1-hour fire resistance rating. [241: 8.6.2.1.1]~~

~~16.5.2.1.2~~

~~Opening protectives shall have at least a 45-minute fire protection rating. [241: 8.6.2.1.2]~~

~~16.5.2.2*~~

~~Walls in 16.5.2.1.1 and opening protectives in 16.5.2.1.2 shall be permitted to be nonrated when an approved automatic sprinkler system is installed and operational. [241: 8.6.2.2]~~

~~16.5.3~~ Fire Protection During Construction.

~~16.5.3.1~~ Water Supply.

~~16.5.3.1.1*~~

~~A water supply for fire protection, either temporary or permanent, shall be made available as soon as significant combustible material is present. [241: 8.7.2.1]~~

16.5.3.1.2

~~There shall be no delay in the installation of fire protection equipment. (See 4.16.5.1.5 -) [241: 8.7.2.2]~~

16.5.3.1.3*

~~Where underground water mains and hydrants are to be provided, they shall be installed, completed, and in service prior to commencing construction work on any structure. [241: 8.7.2.3]~~

16.5.3.2 Sprinkler Protection.**16.5.3.2.1***

~~If automatic sprinkler protection is to be provided, the installation shall be placed in service as soon as practicable. [241: 8.7.3.1]~~

16.5.3.2.2

~~The details of installation shall be in accordance with NFPA 13 - [241: 8.7.3.2]~~

16.5.3.2.3

~~Where sprinklers are required for safety to life, the building shall not be occupied until the sprinkler installation has been entirely completed and tested so that the protection is not susceptible to frequent impairment caused by testing and correction, unless otherwise permitted by 16.5.3.2.4 - [241: 8.7.3.3]~~

16.5.3.2.4

~~The provision of 16.5.3.2.3 shall not prohibit occupancy of completed floors of a building, even where other floors are in various stages of construction or protection, provided that both of the following conditions are satisfied:~~

~~The sprinkler protection of the occupied floors has been completed and tested in accordance with 16.5.3.2.3 -~~

~~The sprinkler protection of the floors remaining under construction is supplied by entirely separate systems and separate control valves so that the absence or incompleteness of protection in no way impairs the sprinkler protection of the occupied floors.~~

~~[241: 8.7.3.4]~~

16.5.3.2.5

~~The operation of sprinkler control valves shall be permitted only by properly authorized personnel and shall be accompanied by the notification of duly designated parties. [241: 8.7.3.5]~~

16.5.3.2.6

~~Where the sprinkler protection is regularly turned off and on to facilitate connection of newly completed segments, the sprinkler control valves shall be checked at the end of each work shift to ascertain that protection is in service. [241: 8.7.3.6]~~

16.5.3.3 Standpipes.**16.5.3.3.1 General.**

16.5.3.3.1.1*

~~The pipe size, hose valves, hose, water supply, and other details for new construction shall be in accordance with Section 13.2. [241: 8.7.4.1.1]~~

16.5.3.3.1.2

~~On permanent Type II and Type III standpipes, hose and nozzles shall be provided and made ready for use as soon as the water supply is available to the standpipe, unless otherwise permitted by 16.5.3.3.1.3. [241: 8.7.4.1.2]~~

16.5.3.3.1.3*

~~In combined systems where occupant hose is not required, temporary hose and nozzles shall be provided during construction. [241: 8.7.4.1.3]~~

16.5.3.3.2 Standpipe Installations in Buildings Under Construction.

~~Where required by the AHJ, in buildings under construction, a standpipe system, either temporary or permanent in nature, shall be installed in accordance with 16.5.3.3.2.1 through 16.5.3.3.2.10. [241: 8.7.4.2]~~

16.5.3.3.2.1

~~The standpipes shall be provided with conspicuously marked and readily accessible fire department connections on the outside of the building at the street level and shall have at least one standard hose outlet at each floor. [241: 8.7.4.2.1]~~

16.5.3.3.2.2

~~The pipe sizes, hose valves, hose, water supply, and other details for new construction shall be in accordance with NFPA 241. [241: 8.7.4.2.2]~~

16.5.3.3.2.3

~~The standpipes shall be securely supported and restrained at each alternate floor. [241: 8.7.4.2.3]~~

16.5.3.3.2.4*

~~At least one approved hose valve for attaching fire department hose shall be provided at each intermediate landing or floor level in the exit stairway, as determined by the AHJ. [241: 8.7.4.2.4]~~

16.5.3.3.2.5

~~Hose valves shall be kept closed at all times and guarded against mechanical injury. [241: 8.7.4.2.5]~~

16.5.3.3.2.6

~~Hose valves shall have NH standard external threads for the valve size specified in accordance with NFPA 1963 unless modified by 16.5.3.3.2.7. [241: 8.7.4.2.6]~~

16.5.3.3.2.7

~~Where local fire department connections do not conform to NFPA 1963 the AHJ shall designate the connection to be used. [241: 8.7.4.2.7]~~

16.5.3.3.2.8*

~~The standpipes shall be extended up with each floor and shall be securely capped at the top.~~
~~[241: 8.7.4.2.8]~~

16.5.3.3.2.9

~~Top hose outlets shall be not more than one floor below the highest forms, staging, and similar combustibles at all times.~~ [241: 8.7.4.2.9]

16.5.3.3.2.10

~~Temporary standpipes shall remain in service until the permanent standpipe installation is complete.~~
~~[241: 8.7.4.2.10]~~

16.5.4 Alteration of Buildings.**16.5.4.1**

~~Where the building is protected by fire protection systems, such systems shall be maintained operational at all times during alteration.~~

16.5.4.2

~~Where alteration requires modification of a portion of the fire protection system, the remainder of the system shall be kept in service and the fire department shall be notified.~~

16.5.4.3

~~When it is necessary to shut down the system, the AHJ shall have the authority to require alternate measures of protection until the system is returned to service.~~

16.5.4.4

~~The fire department shall be notified when the system is shut down and when the system is returned to service.~~

16.5.4.5

~~All required exit components shall be maintained in accordance with this Code as deemed necessary by the AHJ.~~

16.5.4.6

~~Fire-resistive assemblies and construction shall be maintained.~~

16.2 Alteration of Buildings.**16.2.1**

Where the building is protected by fire protection systems, such systems shall be maintained operational at all times during alteration.

16.2.2

Where alteration requires modification of a portion of the fire protection system, both of the following shall apply: ~~the remainder of the system shall be kept in service and the fire department shall be notified.~~

- (1) The remainder of the system shall be kept in service.
- (2) The fire department shall be notified.

16.2.3

When it is necessary to shut down the system, the AHJ shall have the authority to require alternate measures of protection until the system is returned to service.

16.2.4

The fire department shall be notified when the system is shut down and when the system is returned to service.

16.2.5

All required exit components shall be maintained in accordance with this *Code* as deemed necessary by the AHJ.

16.2.6

Fire-resistive assemblies and construction shall be maintained.

16.3 Fire Safety During Demolition.**16.3.1**

If a building intended to be demolished contains a sprinkler system, such system shall not be rendered inoperative without approval of the AHJ.

16.3.2

Demolition operations involving the use of cutting and welding shall be done in accordance with Chapter 41.

16.3.3

Combustible waste material shall not be burned at the demolition site unless approved by the AHJ. ~~Combustible materials shall be removed from the site as often as necessary to minimize the hazards therefrom. (See 16.2.3 and Section 10.10.)~~

16.3.4

Combustible materials shall be removed from the site as often as necessary to minimize the hazards therefrom. (See 16.2.3 and Section 10.10.)

16.3.5

Where in the opinion of the AHJ the demolition site is of a hazardous nature, qualified personnel shall serve as an on-site fire watch.

16.4 Torch-Applied Roofing Systems.

16.4.1 Permits.

Permits, where required, shall comply with Section 1.13.

16.4.2

Torch-applied roofing systems shall be installed in accordance with Chapter 9 of NFPA 241.

16.5 Tar Kettles and Rubberized Asphalt Melters.**16.5.1** General.**16.5.1.1**

The provisions of Section ~~16.8~~ 16.5 shall apply to any type of equipment including, but not limited to, chassis-mounted equipment used for preheating or heating tar, asphalt, rubberized asphalt, pitch, or similar substances for roofs, floors, pipes, or similar objects.

16.5.1.2 Permits.

Permits, where required, shall comply with Section 1.13.

16.5.2 Tar Kettles.**16.5.2.1**

Operating kettles shall not be located inside of or on the roof of any building.

16.5.2.2 Tar Kettle Location.

~~The kettle shall be operated in a controlled area. The area shall be identified by the use of traffic cones, barriers, and other suitable means as approved by the AHJ.~~

16.5.2.2.1

The kettle shall be operated in a controlled area.

16.5.2.2.2

The controlled area shall be identified by the use of traffic cones, barriers, and other suitable means as approved by the AHJ.

16.5.2.3 Kettle Supervision.**16.5.2.3.1**

An operating kettle shall be attended by a minimum of one employee who is knowledgeable of the operations and hazards.

16.5.2.3.2

The employee shall comply with both of the following: ~~be within 25 ft (7.6 m) of the kettle and shall have the kettle within sight.~~

- (1) Be within 25 ft (7.6 m) of the kettle
- (2) Have the kettle within sight.

16.5.2.4 Fire Extinguishers.**16.5.2.4.1**

Two approved 4-A:40-B:C fire extinguishers shall be provided and maintained within 25 ft (7.6 m) of the operating kettle.

16.5.2.4.2*

A minimum of one approved 4-A:40-B:C fire extinguisher shall be provided and maintained on the roof in close proximity to the roofing operations while the roofing material is being applied.

16.5.2.4.3

Fire extinguishers shall be mounted in an accessible and visible or identified location.

16.5.2.5 Exits.**16.5.2.5.1**

Roofing kettles shall not block exits, means of egress, gates, roadways, or entrances.

16.5.2.5.2

Kettles shall not be closer than 10 ft (3 m) from exits or means of egress.

16.5.2.6 Fuel System.**16.5.2.6.1**

Fuel containers shall be constructed and approved for the use for which they were designed.

16.5.2.6.2

Liquefied petroleum gas (LP-Gas) containers, hose, regulators, and burners shall conform to the requirements in Chapter 69.

16.5.2.6.3

LP-Gas cylinders shall be secured to prevent accidental tipover.

16.5.2.7

Regulators shall be required on any cylinders.

16.5.2.8

Where, in the opinion of the AHJ, physical damage to the container is a danger, protection shall be provided to prevent such physical damage.

16.5.2.9

LP-Gas containers for roofing kettles shall not be used in any building.

16.5.2.10 Maintenance.

16.5.2.10.1

Roofing kettles and all integral working parts shall be both of the following: ~~in good working condition and shall be maintained free of excessive residue.~~

- (1) In good working condition
- (2) Maintained free of excessive residue.

16.5.2.10.2

All piping used for pumping heated material to the roof shall be installed in a manner to prevent loss of heated material.

16.5.2.10.3

Flexible steel piping shall not be used on the vertical extension of piping systems.

16.5.2.10.4

Flexible steel piping shall be limited to those connections that are immediately adjacent to the pump kettle or discharge outlet.

16.5.2.10.5

No single length of flexible piping shall exceed 6 ft (1.8 m) in length, ~~and all piping shall be able to withstand a pressure of at least four times the working pressure of the pump.~~

16.5.2.10.6

All piping shall be able to withstand a pressure of at least four times the working pressure of the pump.

16.5.2.11 Roofing Kettle Doors.**16.5.2.11.1**

All roofing kettles shall have doors permanently attached.

16.5.2.11.2

Roofing kettle doors shall be both of the following: ~~installed in a workmanlike manner and shall be provided with handles that allow them to be opened without the operator having to stand in front of same.~~

- (1) Installed in a workmanlike manner
- (2) Provided with handles that allow them to be opened without the operator having to stand in front of same.

16.5.2.11.3

All kettles shall have an approved, working visible temperature gauge that indicates the temperature of the material being heated.

16.5.2.12

All kettle doors shall be tightly closed and latched when in transit.

16.5.2.13 Construction.**16.5.2.13.1**

The materials and methods of construction of roofing kettles shall be acceptable to the AHJ.

16.5.2.13.2 Minimum Requirements.**16.5.2.13.2.1**

Paragraph ~~16.8.2.13.2~~ 16.5.2.13.2 shall apply to all roofing kettles or tar pots in excess of 1 gal (3.8 L) capacity.

16.5.2.13.2.2

No roofing kettle shall have a capacity in excess of 5 barrels (bbl).

16.5.2.13.2.3

Roofing kettles of 2 bbl capacity or less shall be constructed of steel sheet having a thickness of not less than 0.105 in. (No. 12 Manufacturers' Standard Gauge). ~~Kettles of more than 2 bbl capacity shall be constructed of steel sheet having a thickness of not less than 0.135 in. (No. 10 Manufacturers' Standard Gauge). All supports, corners, and the top and bottom of the fire box shall be bound with angle iron or other reinforcements approved by the AHJ. All doors shall be hinged, closely fitted, and adequately latched. Fire boxes shall be of sufficient height from the ground or shall be provided with a system of shields or insulation to prevent heat damage to the street surface.~~

16.5.2.13.2.4

Kettles of more than 2 bbl capacity shall be constructed of steel sheet having a thickness of not less than 0.135 in. (No. 10 Manufacturers' Standard Gauge).

16.5.2.13.2.5

All supports, corners, and the top and bottom of the fire box shall be bound with angle iron or other reinforcements approved by the AHJ.

16.5.2.13.2.6

All doors shall be hinged, closely fitted, and adequately latched.

16.5.2.13.2.7

Fire boxes shall be either of sufficient height from the ground or ~~shall be~~ provided with a system of shields or insulation to prevent heat damage to the street surface.

16.5.2.13.2.8

Lids that can be gravity operated shall be provided on all roofing kettles. ~~The tops and covers of all kettles shall be constructed of steel sheet having a thickness of not less than 0.075 in. (1.90 mm) (No. 14 Manufacturers' Standard Gauge) that is close fitting and attached to the kettle with hinges that allow gravity to close the lid.~~

16.5.2.13.2.9

The tops and covers of all kettles shall be constructed of steel sheet having a thickness of not less than 0.075 in. (1.90 mm) (No. 14 Manufacturers' Standard Gauge) that is close fitting and attached to the kettle with hinges that allow gravity to close the lid.

16.5.2.13.2.10

The chassis shall be substantially constructed and capable of carrying the load imposed upon it whether it is standing still or being transported.

16.5.2.13.2.11

Fuel containers, burners, and related appurtenances of roofing kettles in which LP-Gas is used for heating shall comply with all the requirements of Chapter 69.

16.5.2.13.2.12

Fuel containers that operate under air pressure shall comply with both of the following: ~~not exceed 20 gal (76 L) in capacity and shall be subject to the approval of the AHJ.~~

- (1) Not exceed 20 gal (76 L) in capacity
- (2) Be subject to the approval of the AHJ.

16.5.2.13.2.13

All fuel containers shall be ~~maintained in accordance with applicable NFPA codes and standards or shall be at least 10 ft (3 m) from the burner flame or at least 2 ft (0.6 m) therefrom when properly insulated from heat or flame.~~

- (1) Maintained in accordance with applicable NFPA codes and standards
- (2) Be at least 10 ft (3 m) from the burner flame or at least 2 ft (0.6 m) therefrom when properly insulated from heat or flame.

16.5.3 Rubberized Asphalt Melters for Roof Deck Systems.**16.5.3.1 General.****16.5.3.1.1**

Fully enclosed chassis-mounted and portable rubberized asphalt melters shall comply with ~~16.8.3~~ 16.5.3.

16.5.3.1.2

Fully enclosed chassis-mounted and portable rubberized asphalt melters for heating a mix of asphalt and inert material for application on roof decks shall use an indirect method of heating that complies with all of the following:

- (1) The heating system shall use a fully enclosed oil or air system that transfers heat from a burner to the oil or air around the outside of a material vat which then heats the rubberized material.
- (2) The material vat shall not be subject to direct burner or flame impingement.
- (3) The temperature rise in the material vat shall be gradual and controlled.

16.5.3.2 Permits.**16.5.3.2.1**

Permits, where required, shall comply with Section 1.13.

16.5.3.2.2*

Permits for the operation of a rubberized asphalt melter on a roof deck shall not be deemed a permit for torches or burners. ~~Any use of torches or burners will require a separate permit.~~

A.16.5.3.2.2

Any use of torches or burners will require a separate permit.

[Detail SR-66](#)

16.5.3.2.3

Permits shall be required for operation of rubberized asphalt melters in accordance with Table 1.13.8(a).

16.5.3.3 Rubberized Asphalt Melter Location.

The melter shall be located and operated in a controlled area identified by the use of traffic cones, barriers, and other suitable means as designated by the AHJ.

16.5.3.3.1

Melters shall not be located or operated on combustible roof decks.

16.5.3.3.2

The design load of the roof deck shall be both of the following: ~~capable of supporting the weight of the melter when loaded to capacity with rubberized asphalt material. The design load of the roof deck shall be as determined on building drawings or by a design professional acceptable to the AHJ.~~

- (1) Capable of supporting the weight of the melter when loaded to capacity with rubberized asphalt material.
- (2) ~~The design load of the roof deck shall be as~~ As determined on building drawings or by a design professional acceptable to the AHJ.

16.5.3.3.3

Melters shall be chocked in place on the roof deck at locations identified by the design professional and acceptable to the AHJ.

16.5.3.3.4

Rubberized asphalt cakes for use in melters shall be located on the roof at a location agreed upon by the design professional and the AHJ.

16.5.3.3.5

Rubberized asphalt melters shall not be located inside of any building.

16.5.3.4 Exits.**16.5.3.4.1**

Melters shall not block exits or a means of egress or escape to an exit.

16.5.3.4.2

Melters shall not be closer than 10 ft from exits.

16.5.3.5 Fire Extinguishers.**16.5.3.5.1**

Two approved 4-A:40-B:C fire extinguishers shall be provided and maintained within 25 ft of the melter.

16.5.3.5.2

A minimum of one approved 4-A:40-B:C fire extinguisher shall be provided in close proximity to the roofing material application.

16.5.3.5.3

Each worker shall be instructed on the proper use of fire extinguishers and in the event of a fire to turn off all ~~Melter~~ melter engines and burners and notify the fire department.

16.5.3.6 Melter Operation.

16.5.3.6.1

Melters shall be operated according to manufacturer instructions. ~~Melters shall operate using integral control systems that include shut off controls for the diesel fired burner and temperature controls for the oil system and the material vat.~~

16.5.3.6.2

Melters shall operate using integral control systems that include shut off controls for the diesel fired burner and temperature controls for the oil system and the material vat.

16.5.3.6.3

The diesel burner shall fire into an oil or air jacketed tank for uniform transfer.

16.5.3.6.4

Melters shall have melter lids permanently attached and closed at all times during operation.

16.5.3.7 Melter Supervision.**16.5.3.7.1**

An operating melter shall be constantly attended by an employee who is knowledgeable and solely dedicated to the operation of the equipment and associated hazards.

16.5.3.7.2

The employee shall comply with both of the following: ~~be within 25 ft of the melter and shall have the melter within sight.~~

- (1) Be within 25 ft of the melter
- (2) Have the melter within sight.

16.5.3.7.3

The employee shall remain in the area of the melter for a minimum of one-hour after the device is shut down.

16.5.3.7.4

The roofing contractor shall have the capability to immediately notify the fire department of an emergency on the site.

16.5.3.8 Fuel System.**16.5.3.8.1**

Fuel containers shall be constructed and approved for the use for which they were designed. ~~Melter fuel tanks shall be attached to the frame of the melter.~~

16.5.3.8.2

Melter fuel tanks shall be attached to the frame of the melter.

16.5.3.8.3

Melters shall be diesel fuel or electrically powered.

16.5.3.8.4

Portable fuel tanks shall not be utilized to power melters.

16.5.3.8.5

Diesel tanks and engines integral to melters shall be maintained in accordance with manufacturer instructions.

16.5.3.8.6

Refueling of diesel tanks shall be performed when the melter is off.

16.5.3.8.6.1

A refueling and spill prevention plan acceptable to the AHJ shall be utilized.

16.5.3.8.6.2

Refueling shall be conducted using approved safety cans.

16.5.3.8.6.3

No open flames shall be present within 20 ft of the refueling operation.

16.5.3.9 Maintenance.

Melters and all integral working parts shall be both in good working condition and ~~shall be~~ maintained free of excessive residue.

16.5.3.10 Minimum Requirements.**16.5.3.10.1**

Melters shall be operated as a complete unit as designed and built by the manufacturer. ~~Field changes that override controls or safety features shall not be permitted.~~

16.5.3.10.2

Field changes that override controls or safety features shall not be permitted.

16.5.3.10.3

Material vats on melters shall have a capacity of 230 gal or less. ~~Material vats shall be a permanent integral part of the melter unit.~~

16.5.3.10.4

Material vats shall be a permanent integral part of the melter unit.

16.5.3.10.5

The melter chassis shall be substantially constructed and capable of carrying the load imposed upon it whether it is standing still or being transported.

16.6 Asbestos Removal.**16.6.1 Notification.**

The AHJ and the fire department shall be notified 24 hours prior to the commencement and closure of asbestos removal operations.

16.6.2 Permits.

Permits, where required, shall comply with Section 1.13.

16.6.3 Signs.

Approved signs shall be posted at the entrance, exit and exit access door, decontamination areas, and waste disposal areas for asbestos removal operations.

16.6.3.1

The signs shall state that asbestos is being removed from the area, that asbestos is a suspected carcinogen, and that proper respiratory protection is required.

16.6.3.2

Signs shall have a reflective surface, ~~and lettering shall be a minimum of 2 in. (51 mm) high.~~

16.6.3.3

Sign lettering shall be a minimum of 2 in. (51 mm) high.

16.7 Lead Removal.**16.7.1 Notification.**

The AHJ and the fire department shall be notified 24 hours prior to the commencement and closure of lead removal operations.

16.7.2 Permits.

Permits, where required, shall comply with Section 1.42 13.

Detail SR-62

16.7.2.1

Permits shall be required for lead removal operations in accordance with Table 1.13.8(a).

16.7.3 Signs.

Approved signs shall be posted at the entrance, exit and exit access door, decontamination areas, and waste disposal areas for lead removal operations.

16.7.3.1

The signs shall state that lead is being removed from the area.

16.7.3.2

Signs shall have a reflective surface.

16.7.3.3

Sign lettering shall be a minimum of 2 in. (51 mm) high.

Submitter Information Verification

Committee: FCC-OCP

Submittal Date: Thu Mar 24 14:13:31 EDT 2022

Committee Statement

Committee Statement: NFPA 241 recently undertook a major revision, adding many new requirements. Rather than trying to capture all of the changes and incorporate large new extracted chapters, the TC has removed all extracts and will retain the reference to NFPA 241 in 16.1. Language not extracted from 241 will remain in Ch 16 in addition to the NFPA 101 extract in 16.1.3.

Response Message: SR-53-NFPA 1-2022



Second Revision No. 51-NFPA 1-2022 [New Section after 22.9.5.2]

22.9.6 Other Battery Technologies.

Other battery technologies shall be handled and stored in accordance with NFPA 855.

Submitter Information Verification

Committee: FCC-OCP

Submittal Date: Thu Mar 24 13:12:22 EDT 2022

Committee Statement

Committee Statement: Wrecking and salvage yards are dealing with electric and hybrid vehicles and the code should have provisions on how to deal with them safely.

Response Message: SR-51-NFPA 1-2022

Public Comment No. 24-NFPA 1-2022 [New Section after 22.9.5.2]



Second Revision No. 61-NFPA 1-2022 [Section No. 26.2]

26.2 Permits.

~~Permits, where required, shall comply with Section 1.13 .~~

26.2.1

Permits, where required, shall comply with Section 1.13.

26.2.2

Permits shall be required for laboratories using chemicals undergoing construction, alteration, or operation per Table 1.13.8(a) .

Submitter Information Verification

Committee: FCC-OCP

Submittal Date: Fri Mar 25 09:16:23 EDT 2022

Committee Statement

Committee Statement: This revision is intended as a placeholder for the FCC-AAC correlating committee to revise the language in Table 1.13.8(a) as follows:

Change "laboratories" to "Laboratories Using Chemicals" in column 1.

This section should be removed after the FCC-AAC makes the change to the table.

Response Message: SR-61-NFPA 1-2022



Second Revision No. 65-NFPA 1-2022 [Section No. 30.1.1.3]

30.1.1.3 Permits.

~~Permits, where required, shall comply with Section 1.13 .~~

30.1.1.3.1

Permits, where required, shall comply with Section 1.13.

30.1.1.3.2

Permits shall be required for repair garages in accordance with Table 1.13.8(a) .

Submitter Information Verification

Committee: FCC-OCP

Submittal Date: Fri Mar 25 09:41:41 EDT 2022

Committee Statement

Committee Statement: This revision is intended as a placeholder for the FCC-AAC correlating committee to revise the language in Table 1.13.8(a) as follows:

Revise "Repair garages and service stations " to "Repair garages". Remove "service stations and" from second column.

This section should be removed after the FCC-AAC makes the change to the table.

Response Message: SR-65-NFPA 1-2022



Second Revision No. 52-NFPA 1-2022 [Section No. 31.2]

31.2 Permits.

~~Permits, where required, shall comply with Section 1.13 .~~

31.2.1

Permits, where required, shall comply with Section 1.13.

31.2.2

Permits shall be required when storing more than 250,000 ft ³ (7080 m ³).

Submitter Information Verification

Committee: FCC-OCP

Submittal Date: Thu Mar 24 13:21:33 EDT 2022

Committee Statement

Committee Statement: This revision is a placeholder for FCC-AAC to make a revision in Table 1.13. The language that should be added is "Biomass Feed Stock Storage"-To store more than 250,000 cu ft - 31.2". Once added to the table, this section should be removed.

Response Message: SR-52-NFPA 1-2022



Second Revision No. 60-NFPA 1-2022 [Section No. 31.3.2.1.12]

31.3.2.1.12

Cutting, welding, or other use of open flames or spark-producing equipment shall not be permitted in the storage area unless by an approved permit system.

31.3.2.1.13

Permits shall be in accordance with Table 1.13.8(a) .

Submitter Information Verification

Committee: FCC-OCP

Submittal Date: Fri Mar 25 09:15:04 EDT 2022

Committee Statement

Committee Statement: This revision is intended as a placeholder for the FCC-AAC correlating committee to revise Table 1.13.8(a) as follows:

Under the existing "Cutting and welding operation" section, add a referenced in the current list (3rd column) to "31.3.2.1.12".

This section should be removed once the FCC-AAC makes the change to the table.

Response Message: SR-60-NFPA 1-2022



Second Revision No. 64-NFPA 1-2022 [Section No. 32.2]

32.2 Permits.

32.2.1

Permits, where required, shall comply with Section 1.13.

32.2.2

Where required by the AHJ, a permit shall be obtained for any of the following activities:

- (1) Use of pyrotechnic special effects
- (2) Use of open flames
- (3) Welding
- (4) Use of flammable or combustible liquids or gases
- (5) Use of aircraft
- (6) Presence of motor vehicles within a building
- (7) Productions with live audiences
- (8) Change of use or change of occupancy classification
[140:4.2]
- (9) Use of the site as a production location [~~140:5.2~~ 5.2(1)]

32.2.3

Permits shall be in accordance with Table 1.13.8(a) .

Submitter Information Verification

Committee: FCC-OCP

Submittal Date: Fri Mar 25 09:38:59 EDT 2022

Committee Statement

Committee Statement: This revision is intended as a placeholder for the FCC-AAC correlating committee to revise the language in Table 1.13.8(a) as follows:

Add an item under "motion picture and television production studio soundstages and approved production facilities" as follows:

"3. For additional permit requirements for operations, see 32.2.2"

This section should be removed after the FCC-AAC makes the change to the table.

Response Message: SR-64-NFPA 1-2022



Second Revision No. 69-NFPA 1-2022 [Section No. 32.9.2.8]

32.9.2.8

Portable feeder cables shall be permitted to temporarily penetrate fire-rated walls, floors, or ceilings provided that all of the following apply:

- (1) The opening is of noncombustible material.
- (2) When in use, the penetration is sealed with a temporary seal of a listed firestop material.
- (3) When not in use, the opening shall be capped with a material of equivalent fire rating.

[~~70 140~~ :530.18(C 4.8.8)]

Submitter Information Verification

Committee: FCC-OCP

Submittal Date: Fri Mar 25 12:25:46 EDT 2022

Committee Statement

Committee Statement: This section is extracted from NFPA 140 which extracts from NFPA 70. The best practice is to maintain the extract from NFPA 140.

Response Message: SR-69-NFPA 1-2022



Second Revision No. 63-NFPA 1-2022 [Section No. 32.10.1.1]

32.10.1.1

Electrical power connections made to the site electrical service shall be made by an approved electrician under permit from the AHJ. [140:5.8.1]

32.10.1.2

Permits for electrical power connections shall be in accordance with Table 1.13.8(a) .

Submitter Information Verification

Committee: FCC-OCP

Submittal Date: Fri Mar 25 09:24:38 EDT 2022

Committee Statement

Committee Statement: This revision is intended as a placeholder for the FCC-AAC correlating committee to revise the language in Table 1.13.8(a) as follows:

Under the existing "Motion picture and television production studio soundstages and approved production facilities", add "Electrical power connections" in the second column and a reference to 32.10.1.1.

This section should be removed after the FCC-AAC makes the change to the table.

Response Message: SR-63-NFPA 1-2022



Second Revision No. 59-NFPA 1-2022 [Section No. 35.2]

35.2 Permits.

~~Permits, where required, shall comply with Section 1.13 .~~

35.2.1

Permits, where required, shall comply with Section 1.13.

35.2.2

Permits shall be required for operation in Table 1.13.8(a) .

Submitter Information Verification

Committee: FCC-OCP

Submittal Date: Fri Mar 25 09:12:34 EDT 2022

Committee Statement

Committee Statement: This revision is intended as a placeholder for the FCC-AAC correlating committee to revise Table 1.13.8(a) as follows:

Add "Animal Housing Facilities- For operation-Chapter 35" to the table as a new item.

This section should be removed once the FCC-AAC makes the change to the table.

Response Message: SR-59-NFPA 1-2022