

# Fire Extinguisher Requirements and References in the International Fire Code® (IFC®)

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## Introduction:

The *International Fire Code (IFC)* has become the most adopted model fire code in the United States. It is used in over 35 States at the time of this writing in various forms and editions. Anyone working in the fire protection industry should obtain a copy of the *IFC*, preferably a version that includes the Commentary. This publication is merely a guide using excerpts from the *IFC and Commentary (2015) Edition* along with notes and cross-references. The *2015 edition of the IFC* is being used as it most closely represents what has been adopted by most states at the time of this writing.

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Many people involved with the selection, purchasing, installation, maintenance and recharge of fire extinguishers may be familiar with NFPA 10 – Standard for Portable Fire Extinguishers. While NFPA 10 is a referenced document in the *IFC*, there are **additional** requirements for placement, installation, servicing and training with portable fire extinguishers beyond the requirements of NFPA 10 to be found in the *IFC*. It is clear in the model code what action is to be taken when there is a conflict between the referenced standard and the Code. As an example, paragraph 102.10 of the *IFC* states:

**“102.10 Conflicting provisions.** Where there is a conflict between a general requirement and a specific requirement, the specific requirement shall be applicable. Where, in a specific case, different sections of this code specify different methods of construction or other requirements, the most restrictive shall govern.”

Great effort has been made to include every reference and requirement for portable fire extinguishers contained in the *IFC* within this guide. However, it should not be assumed that this guide is complete, nor should it be assumed that there are no omissions or mistakes. The official *International Fire Code and Commentary – 2015 Edition*, as published by the *International Code Council* is the only document for accurate and complete information.

## How to use this guide:

**Code and Commentary.** The excerpts in this guide will contain both the Code language (which is enforceable) and the *Commentary* (which immediately follows the Code language and is not enforceable). While the Code language is enforceable and often considered the most important, the *Commentary* gives guidance, background, education and invaluable insight as to the reason for the Code requirement. To avoid confusion, the *Commentary* will be printed in italics following an asterisk (\*) to distinguish the verbiage from the enforceable language. If you have, or plan to obtain a copy of the *IFC with Commentary*, as you should, this is not the exact format that is found in the *IFC*.

The excerpts will be given by Chapter in order as they would appear in the complete *IFC* with the Chapter title and Section heading preceding the paragraph. For those readers who are familiar with NFPA Standards and the Standards process, the *IFC* is different in some terms, definitions and who was involved in the process. You will not find the term “Authority Having Jurisdiction”, commonly referred to

as “AHJ”. Instead, the term “*Fire Code Official*” is used. The process for writing and changing the *IFC* involves individuals from the fire service and building inspectors. There are no “end-users”, manufacturers, insurance companies or industry associations involved in the final decisions. Therefore, the Commentary language is composed primarily by representatives of the fire service, who have a vested interest in proper fire protection. The reader may find some inconsistency in the *presentation* of terms such as UL ratings – this should not be considered an issue as the meaning and intent remain the same. The *IFC* was created by a large body of individuals using legacy codes and working in groups, so some inconsistency is to be expected – as with any large body of work. Every attempt has been made to present the language as accurately as possible, however, in some cases information has been left out as being extraneous to the task at hand. Such occurrences are noted with an “Editor’s note”.

When using this guide with a *fire code official*, it would be best to look up the reference in this guide, but then use the complete *International Fire Code and Commentary* when discussing the requirements, options or “intent” with the official.

In addition to requirements for a specific sized or rated extinguisher for a unique situation or hazard, this guide includes extinguisher training requirements, and more general information, including statements in the *IFC commentary* regarding the role of fire extinguishers in fire protection.

**PLEASE NOTE** – this is a Model Code and as such may not mirror exactly what has been adopted in your state or locality. The adoption of a Model Code often includes changes – deletions, additions and other forms of amendments. Before making any assumptions that excerpts in this guide are the same as in your state because your state adopted a version of the *IFC*, you should check your specific fire code to confirm the language. As an example, in previous Editions of the *IFC*, in paragraph 906.1, where extinguisher replacement requirements are stated, there is an exception where A, B and E occupancies, equipped throughout quick response sprinklers are only required to have fire extinguishers in hazardous locations. Many states deleted this exception when they adopted the *IFC*. The only way to confirm if the exception is deleted is to look at the specific wording in your code **as it is adopted**.

Table 906.1 lists all of the specific additional extinguisher requirements, in order as shown below. As stated before, while each of these are listed, along with the commentary, they are not the only items in this guide.

**ADDITIONAL REQUIRED PORTABLE FIRE EXTINGUISHERS**

<b>SECTION</b>	<b>SUBJECT</b>
303.5	Asphalt kettles
307.5	Open burning
308.1.3	Open flames—torches
309.4	Powered industrial trucks
2005.2	Aircraft towing vehicles
2005.3	Aircraft welding apparatus
2005.4	Aircraft fuel-servicing tank vehicles
2005.5	Aircraft hydrant fuel-servicing vehicles
2005.6	Aircraft fuel-dispensing stations

2007.7	Heliports and helistops
2108.4	Dry cleaning plants
2305.5	Motor fuel-dispensing facilities
2310.6.4	Marine motor fuel-dispensing facilities
2311.6	Repair Garages
2404.4.1	Spray-finishing operations
2405.4.2	Dip tank operations
2406.4.2	Powder-coating areas
2804.3	Lumberyards/woodworking facilities
2808.8	Recycling facilities

*(continued)*

**TABLE 906.1—continued**  
**ADDITIONAL REQUIRED PORTABLE FIRE EXTINGUISHERS**

SECTION	SUBJECT
2809.5	Exterior lumber storage
2903.5	Organic-coating areas
3006.3	Industrial ovens
3104.12	Tents and membrane structures
3206.10	High-piled storage
3315.1	Buildings under construction or demolition
3317.3	Roofing operations
3408.2	Tire rebuilding/storage
3504.2.6	Welding and other hot work
3604.4	Marinas
3703.6	Combustible fibers
5703.2.1	Flammable and combustible liquids, general
5704.3.3.1	Indoor storage of flammable and combustible liquids
5704.3.7.5.2	Liquid storage rooms for flammable and combustible
5705.4.9	Solvent distillation units
5706.2.7	Farms and construction sites – flammable and combustible liquids storage
5706.10.1	Bulk plants and terminals for flammable and combustible liquids
5706.5.4.5	Commercial, industrial, governmental or
5706.6.4	Tank vehicles for flammable and combustible liquids
5906.5.7	Flammable solids
6108.2	LP-gas

## **CHAPTER 2: DEFINITIONS**

**LABELED.** Equipment, materials or products to which have been fixed a label, seal, symbol or other identifying mark of a nationally recognized laboratory, *approved* agency or other organization concerned with product evaluation that maintains periodic inspection of the production of the labeled items and whose labeling indicates either the equipment, material or product meets identified standards or has been tested and found suitable for a specific purpose.

*\*The term labeled is not to be confused with the term “listed”. A label is a marking or other identifying mark that indicates approval from a nationally recognized testing laboratory, approved agency or other organization that evaluates products. A label is used to identify materials and assemblies that must bear the identification of the manufacturer, as well as a third-party control agency. The quality control agency allows the use of its label based on the results of periodic audits and inspections of the manufacturer’s plant. This is one form of quality control. The code often requires labeled equipment and systems (see definition for “Listed”).*

**LISTED.** Equipment, materials, products or services included in a list published by an organization acceptable to the *fire code official* and concerned with evaluation of products or services that maintains periodic inspection of production of listed equipment or materials or periodic evaluation of services and whose listing states either that the equipment, material, product or service meets identified standards or has been tested and found suitable for a specific purpose.

*\*The term “listed,” which is not to be confused with “labeled,” is a form of quality control. Essentially, a particular product, piece of equipment or system is evaluated or tested and the results are published in a list by agencies such as approved testing laboratories and inspection agencies. Listed products and equipment are periodically inspected to maintain the listing. The code often requires listed equipment or systems (see the definition for “Labeled”).*

## **CHAPTER 3: GENERAL REQUIREMENTS**

### **SECTION 303 ASPHALT KETTLES**

**303.5 Fire Extinguishers.** There shall be a portable fire extinguisher complying with Section 906 and with a minimum 40-B;C rating within 25 feet (7620 mm) of each asphalt (tar) kettle during the period such kettle is being utilized. Additionally, there shall be one portable extinguisher with a minimum 3-A:40-B:C rating on the roof being covered.

*\*This section defines the type and size of extinguisher that must be available for use, both on the ground near the kettle and on the roof level to which the asphalt is being applied. In the event of a kettle fire, water should not be used as an extinguishing agent because it could cause the molten asphalt to froth and possibly overflow the kettle or spatter over anything or anyone in the surrounding area. See also the commentary to Section 1417.3 for roofing operations during construction.*

### **SECTION 307 OPEN BURNING, RECREATIONAL FIRES AND PORTABLE OUTDOOR FIREPLACES**

**307.5 Attendance.** *Open burning, bonfires, recreational fires* and use of outdoor fireplaces shall be constantly attended until the fire is extinguished. A minimum of one portable fire extinguisher complying with Section 906 with a minimum 4-A rating or other *approved* on-site fire extinguishing equipment, such as dirt, sand, water barrel, garden hose or water truck, shall be available for immediate utilization.

*\*This section reiterates common sense, but tends to be ignored quite often. Having one or more individuals responsible for keeping watch on a fire, even one of small size, is the first line of fire prevention. All too often news articles tell of wooden decks burning because hot embers from a charcoal grill fell unobserved onto the unprotected wooden surface or of a huge brush or forest fire being caused by careless individuals who did not watch their campfires.*

*For practical purposes as well as fire safety, some means of extinguishing a kindled fire should be kept close at hand. For small fires, a shovelful of dirt may be sufficient. For large fires, such as bonfires, large volumes of water may be necessary; however, no matter how much extinguishing equipment is available, it may prove worthless unless someone is tending the fire and can sound an alarm.*

## **SECTION 308 OPEN FLAMES**

**308.1.3 Torches for removing paint.** A person utilizing a torch or other flame-producing device for removing paint from a structure shall provide a minimum of one portable fire extinguisher complying with Section 906 and a minimum of 4-A rating, two portable fire extinguishers, each with a minimum of 2-A rating, or a water hose connected to the water supply on the premises where such burning is being done. The person doing the burning shall remain on the premises 1 hour after the torch or flame-producing device is utilized.

*\*Any time an open flame is used to soften old paint in preparation for removal, there is a risk of fire that must be covered by having approved fire extinguishers or a water source readily available. The requirement for a 1 – hour fire watch after discontinuing the use of the open flame covers the possibility that paint fragments could still be hot enough to ignite flammable or combustible materials that might be lying around. It also considers the possibility that the flame used to remove paint from a combustible base material could heat that material to its ignition temperature and leave an almost undetectable smolder that might burst into flames later. Safe and effective means for removing the paint at lower temperatures, such as warm-air heat devices capable of generating high-temperature convection air, are readily available for sale or rent and far less likely to result in ignition of combustible materials.*

## **SECTION 309 POWERED INDUSTRIAL TRUCKS AND EQUIPMENT**

**309.4 Fire extinguishers.** Battery-charging areas shall be provided with a fire extinguisher complying with Section 906 having a minimum 4-A:20-B:C rating within 20 feet (6096 mm) of the battery charger.

*\*Because of the electrical hazards associated with the battery charging operation; the fuel load presented by the plastic battery cases and other area contents and the potential for the presence of gases in the room, an appropriately sized portable fire extinguisher must be located within the battery charging area. The extinguisher must be accessible with minimum travel.*

## **CHAPTER 9: FIRE PROTECTION SYSTEMS**

### **Section 901 General**

**901.4.4 Additional fire protection systems.** In occupancies of a hazardous nature, where special hazards exist in addition to the normal hazards of the occupancy, or where the *fire code official* determines that access for fire apparatus is unduly difficult, the *fire code official* shall have the authority to require additional safeguards. Such safeguards include, but shall not be limited to, the following: automatic fire detection systems, fire alarm systems, automatic fire-extinguishing systems, standpipe systems, or portable or fixed fire extinguishers. Fire protection equipment required under this section shall be installed in accordance with this code and the applicable referenced standards.

*\* This section allows the fire code official to require fire protection safeguards beyond the minimum requirement of Chapter 9 when warranted by potential unsafe conditions. The provisions of the code cannot anticipate every occupancy condition. Hazardous material occupancies or buildings with limited fire department access are potentially a greater hazard to both building occupants and fire fighters. Any additional safeguards should be those needed to abate potential hazards. This section does not give the fire code official the right to require additional systems without cause. If the condition is adequately addressed by the code, then additional safeguards are not warranted. Should additional safeguards be deemed necessary, then the fire protection components regulated by this section must be considered required systems.*

**901.6 Inspection, testing and maintenance.**

**901.6.1 Standards.** Fire protection systems shall be inspected, tested and maintained in accordance with the referenced standards listed in Table 901.6.1

*\* Specific requirements related to inspection practices, testing schedules and maintenance procedures are dependent on the type of fire protection system and its corresponding NFPA standard as indicated in Table 901.6.1*

**TABLE 901.6.1  
FIRE PROTECTION SYSTEM MAINTENANCE STANDARDS**

<b>SYSTEM</b>	<b>STANDARD</b>
Portable fire extinguishers	NFPA 10
Carbon dioxide fire-extinguishing system	NFPA 12
Halon 1301 fire-extinguishing systems	NFPA 12A
Dry-chemical extinguishing systems	NFPA 17
Wet-chemical extinguishing systems	NFPA 17A
Water-based fire protection systems	NFPA 25
Fire alarm systems	NFPA 72
Water-mist systems	NFPA 750
Clean-agent extinguishing systems	NFPA 2001

**904.12.5 Portable fire extinguishers for commercial cooking equipment.** Portable fire extinguishers shall be provided within a 30 – foot (9144 mm) travel distance of commercial-type cooking equipment. Cooking equipment involving solid fuels or vegetable or animal oils and fats shall be protected by a Class K rated portable extinguisher in accordance with Sections 904.12.5.1 or 904.12.5.2 as applicable.

*\*To combat a fire in its incipient stage, access to a manual means of extinguishment is critical. Although a 30-foot (9144 mm) maximum travel distance is specified, the location of the extinguisher should be a safe distance from the cooking equipment so that it will not become involved in the fire. Only Class K-rated extinguishers that have been tested on commercial cooking appliances can be used.*

**904.12.5.1 Portable fire extinguishers for solid fuel cooking appliances.** All solid fuel cooking appliances, whether or not under a hood, with fireboxes 5 cubic feet (0.14 m<sup>3</sup>) or less shall have a minimum 2.5-gallon (9L) or two 1.5 gallon (6L) Class K wet-chemical portable fire extinguishers located in accordance with section 904.11.5.

*\*The fuels used in solid fuel-fired cooking appliances present significantly more potential burning surface area than the flat surface of a grill or deep fat fryer. This surface area is also often shielded by other solid fuel elements. As a result, a large extinguisher or two moderate-sized extinguishers are required. The 2 ½ gallon (9L) extinguisher roughly equates to a 2A rating. The K rating is necessary rather than using a water-based agent because the discharge from the water-based extinguishers is usually in the form of a straight stream rather than a less concentrated, flooding type of coverage. A straight stream can dislodge the burning solid fuel material and possibly spread the burning coals to other areas where they could pose both a secondary fire risk as well as a life safety hazard. The same travel distance to an extinguisher is required for solid fuel extinguishers as for deep fat fryer extinguishers so that manual suppression can be provided if necessary in a reasonable time. See the commentary to Section 904.11.5.2 for further discussion of Class K extinguishers.*

**904.12.5.2 Class K portable fire extinguishers for deep fat fryers.** When hazard areas include deep fat fryers, listed Class K portable fire extinguishers shall be provided as follows:

1. For up to four fryers having a maximum capacity of 80 pounds (36.3kg) each: One Class K portable fire extinguisher with a minimum 1.5 gallon (6 L) capacity.
2. For every additional group of four fryers having a maximum capacity of 80 pounds (36.3 kg) each: One additional Class K portable fire extinguisher of a minimum 1.5 gallon (6 L) capacity shall be provided.
3. For individual fryers exceeding 6 square feet (0.55 m<sup>2</sup>) in surface area: Class K portable fire extinguishers shall be installed in accordance with the manufacturer's recommendations

*\*In recent years, commercial cooking operations have begun to use improved, more efficient deep fat fryer-type cooking appliances and more healthful, unsaturated cooking oils that require a much higher cooking temperature than the former saturated oils. The Class K extinguishing agent and extinguishers were developed to deal with this new hazard. Class K extinguishers use a wet-chemical, potassium acetate-based agent that has proven to be more effective in fighting these fires and provides a cooling effect for the deep fat fryer hazard. Though primarily intended for cooking fires, many Class K extinguishers can also be effectively used on Class A, B and C hazards.*

*Class K extinguishers do not have letter ratings similar to other types of extinguishers. The capacity of the Class K extinguisher becomes the effective rating. Based on the extinguishing capability of a moderate sized Class K extinguisher the maximum quantity of typical fat frying can be determined. This quantity is determined by weight based on the typical deep fat fryer. A fryer capacity of 80 pounds (36 kg) can provide a surface area between 4 ½ and 6 square feet (0.42 to 0.56 m<sup>2</sup>), depending on the manufacturer. When surface area exceeds 6 square feet (0.56 m<sup>2</sup>), guidelines for Class K extinguishers are no longer applicable. Consequently, for the larger surface area fryers the size of Class K extinguisher should be based on the manufacturer's recommendations. Although not specifically indicated in the code text, the understanding is that if the weight capacity of the fryer*

*exceeds 80 pounds (36 kg) but the surface area is less than 6 square feet (0.56 m<sup>2</sup>), the manufacturer's recommendation should be applied for those conditions as well.*

**904.13.2 Portable fire extinguishers for domestic cooking equipment in Group I-2 Condition 1.** A portable fire extinguisher complying with Section 906 shall be installed within a 30 foot (9144 mm) distance of travel from domestic cooking appliances.

*\*This requirement for a portable fire extinguisher relates to the added safety of allowing a residential-type kitchen in nursing homes. This provides another line of defense and the location is focused on the distance from the cooking appliances*

## **SECTION 906 PORTABLE FIRE EXTINGUISHERS**

**906.1 Where required. Portable fire extinguishers shall be installed in the following locations.**

1. In new and existing Group A, B, E, F, H, I, M, R-1, R-2, R-4 and S occupancies  
Exception: In Group R-2 occupancies, portable fire extinguishers shall be required only in locations specified in Items 2 through 6 where each dwelling unit is provided with a portable fire extinguisher having a minimum rating of 1-A:10-B:C
2. Within 30 feet (9144 mm) of commercial cooking equipment.
3. In areas where flammable or *combustible liquids* are stored, used or dispensed.
4. On each floor of structures under construction, except Group R-3 occupancies, in accordance with Section 1415.1
5. Where required by the sections indicated in Table 906.1
6. Special hazard areas, including but not limited to laboratories, computer rooms and generator rooms, where required by the *fire code official*.

*\*Portable fire extinguishers (PFEs) are required in certain instances to give the occupants the means to suppress a fire in its incipient stage. The capability for manual fire suppression can contribute to the protection of the occupants, especially if there are evacuation difficulties associated with the occupancy or the specific hazard in the area. To be effective, personnel must be properly trained in the use of portable fire extinguishers.*

*Because of the high hazard nature of building contents, portable fire extinguishers are required in occupancies in Group H.*

*Portable fire extinguishers are required in occupancies in Groups A, B, E, F, I, M, R-1, R-2, R-4 and S because of the need to control the fire in its early stages and because evacuation can be slowed by the density of the occupancy load, the capability of the occupants to evacuate or the overall fuel load in the building. Because the IBC references the code for fire extinguishers in new buildings the code is applicable to new buildings.*

*Portable fire extinguishers are required in areas containing special hazards such as commercial cooking equipment and specific hazardous operations as indicated in Table 906.1. Because of the potential extreme fire hazard associated with such areas and occupancy conditions, prompt extinguishment of the fire is critical.*

*Portable fire extinguishers are required in all buildings under construction, except in occupancies in Group R-3. The extinguishers are intended for use by construction personnel to suppress a fire in its incipient stages.*

*Portable fire extinguishers are also required in laboratories, computer rooms and other work spaces in which fire hazards may exist based on the use of the space. Many of these will be addressed by the required occupancy group criteria or by the specific hazard provisions of Table 906.1. Laboratories, for example, may not be considered Group H, but still use limited amounts of hazardous materials that would make manual means of fire extinguishment desirable.*

*The exception to Item 1 permits smaller PFEs in dwelling units of Group R-2 occupancies instead of larger PFEs in the common areas. Under the revised exception, the installation of 1-A:10-B:C PFEs within individual dwelling units that allow apartment owners to eliminate their installation in common areas such as corridors, laundry rooms and swimming pool areas. PFEs in these areas are susceptible to vandalism and theft. Another issue is that the larger PFEs are more difficult for the infirm or the elderly to safely deploy and operate. Note that the exception does not waive the ongoing maintenance requirement for PFEs within the dwelling units.*

*For the period of 2003 through 2007, NFPA reported that approximately 38,000 fires occurred in apartment buildings. Sixty percent of these fires occurred inside of dwelling units versus 14 percent that occurred in common areas covered by Items 3 and 6 of Section 906.1. It is more logical to place PFEs inside of the dwelling units versus common areas because it locates the extinguisher in an area where statistically most fires occur. If the occupant cannot control the fire using the PFE, he or she can escape and allow the automatic sprinkler system to operate and control the fire. This exception improves the safety of Group R-2 residents because it does not require them to leave a dwelling involved in a fire, find a PFE and then return to the fire-involved dwelling unit to attempt incipient fire attack.*

*Including this requirement in the code alerts designers and building officials that the extinguishers are required. This will allow designers to plan for thicker walls where recessed cabinets may be used or to design locations where the extinguishers will not project or obstruct the egress or circulation path.*

Table 906.1 see below

*\*Table 906.1 lists those sections of the code that represent specific occupancy conditions requiring portable fire extinguishers for incipient fire control. Wherever the code requires a fire extinguisher because of one of the listed occupancy conditions, it may identify the required rating of the extinguisher that is compatible with the hazard involved in addition to referencing Section 906.*

**TABLE 906.1  
ADDITIONAL REQUIRED PORTABLE FIRE EXTINGUISHERS**

<b>SECTION</b>	<b>SUBJECT</b>
303.5	Asphalt kettles
307.5	Open burning
308.1.3	Open flames—torches

309.4	Powered industrial trucks
2005.2	Aircraft towing vehicles
2005.3	Aircraft welding apparatus
2005.4	Aircraft fuel-servicing tank vehicles
2005.5	Aircraft hydrant fuel-servicing vehicles
2005.6	Aircraft fuel-dispensing stations
2007.7	Heliports and helistops
2108.4	Dry cleaning plants
2305.5	Motor fuel-dispensing facilities
2310.6.4	Marine motor fuel-dispensing facilities
2311.6	Repair garages
2404.4.1	Spray-finishing operations
2405.4.2	Dip-tank operations
2406.4.2	Powder-coating areas
2804.3	Lumber yards/woodworking facilities
2808.8	Recycling facilities

(continued)

**TABLE 906.1—continued  
ADDITIONAL REQUIRED PORTABLE FIRE EXTINGUISHERS**

<b>SECTION</b>	<b>SUBJECT</b>
2809.5	Exterior lumber storage
2903.5	Organic coating areas
3006.3	Industrial ovens
3104.12	Tents and membrane structures
3206.10	High-piled storage
3315.1	Buildings under construction or demolition
3317.3	Roofing operations
3408.2	Tire rebuilding/storage
3504.2.6	Welding and other hot work
3604.4	Marinas
3703.6	Combustible fibers
5703.2.1	Flammable and combustible liquids, general
5704.3.3.1	Indoor storage of flammable and combustible liquids
5704.3.7.5.2	Liquid storage rooms for flammable and combustible

5705.4.9	Solvent distillation units
5706.2.7	Farms and construction sites-flammable and combustible liquids storage
5706.4.10.1	Bulk plants and terminals for flammable and combustible liquids
5706.5.4.5	Commercial, industrial, governmental or
5706.6.4	Tank vehicles for flammable and combustible liquids
5906.5.7	Flammable solids
6108.2	LP-gas

**906.2 General requirements.** Portable fire extinguishers shall be selected, installed and maintained in accordance with this section and NFPA 10.

**Exceptions:**

1. The travel distance to reach an extinguisher shall not apply to spectator seating portions of Group A-5 occupancies.
2. Thirty-day inspections shall not be required and maintenance shall be allowed to be once every three years for dry-chemical or halogenated agent portable fire extinguishers that are supervised by a *listed* and *approved* electronic monitoring device, provided that all of the following conditions are met:
  - 2.1 Electronic monitoring shall confirm that extinguishers are properly positioned, properly charged and unobstructed.
  - 2.2 Loss of power or circuit continuity to the electronic device shall initiate a trouble signal.
  - 2.3 The extinguishers shall be installed inside of a building or cabinet in a noncorrosive environment.
  - 2.4 Electronic monitoring devices and supervisory circuits shall be tested every three years when extinguisher maintenance is performed.
  - 2.5 A written log of required hydrostatic test dates for extinguishers shall be maintained by the *owner* to verify that hydrostatic tests are conducted at frequency required by NFPA 10.
3. In Group I-3, portable fire extinguishers shall be permitted to be located at staff locations

*\*NFPA 10 contains minimum requirements for the selection, installation and maintenance of portable fire extinguishers. Portable fire extinguishers are investigated and rated in conformance to NFPA 10 and listed under a variety of standards. Portable*

*fire extinguishers must be labeled and rated for use on fires of the type, severity and hazard class protected.*

*NFPA 10 notes that more frequent inspections may be necessary where conditions warrant. For existing installations, a history of recent fires, vandalism, physical abuse and theft should be considered in determining if more frequent inspections are needed. For both existing and new facilities, determining the frequency of inspections should consider the environmental conditions in which the extinguisher will be located, including corrosiveness and temperature variations; and, the possibility of obstructions that may place the extinguisher out of reach in case of an emergency.*

*Exception 1 recognizes the openness to the atmosphere associated with Group A-5 occupancies. A fire in open areas is more obvious to all spectators. Group A-5 occupancies also do not accumulate smoke and hot gases because they are not enclosed spaces. These reasons, in addition to the large and expansive layout within seating areas, make it reasonable and practical not to apply the distance of travel to a PFE criteria in Group A-5. Revised distance of travel allowance would need to be approved by the fire code official. Group A-5 occupancies also tend to be more subject to the corrosive conditions of an outdoor environment, and may include freeze/thaw cycles that are detrimental to fire extinguishers.*

*Exception 2 acknowledges a 30 day inspection interval similar to NFPA 10. An electronic monitoring device can determine whether or not the fire extinguisher is still present and whether or not its contents are still at proper charge. The use of such devices, being relatively new, is allowed if it is limited to dry-chemical and halogenated agents with the additional safeguards noted on the list. Where inspection intervals may be at more frequent intervals, as discussed above, the use of electronic monitoring may have even greater benefits and is acknowledged as such in NFPA 10. The log, noted in the exception, can be a written log or a printout of the electronic log maintained by the electronic monitoring device. This exception provides the building owner with an alternative to the contract inspections popularly used.*

*Exception 3 recognizes that portable fire extinguishers located throughout the facility are at times tampered with, removed and/or used for weapons by inmates in a detention or correctional setting. This exception would protect the extinguishers from damage or removal by inmates while still making them available to staff and employees for use in an emergency situation.*

**906.2.1 Certification of service personnel for portable fire extinguishers.** Service personnel providing or conducting maintenance on portable fire extinguishers shall possess a valid certificate issued by an *approved* government agency, or other *approved* organization for the type of work being performed.

*\*Maintenance of fire protection systems and devices are minimum Chapter 9 requirements. Fire protection systems, like other technologies, have advanced new designs which*

require a clear understanding of their construction and maintenance. To ensure that systems and devices are properly maintained, the code now requires individuals performing these activities be certified. Certification must be issued by an approved organization or governmental agency. These provisions align the code with NFPA standards governing the inspection and maintenance of portable extinguishers.

Qualifications for individuals who service portable fire extinguishers are established in the 2010 Edition of NFPA 10. Section 7.1.2.1 of NFPA 10 requires individuals inspecting and servicing portable fire extinguishers be trained and certified to reliably perform these activities.

**906.3 Size and distribution.** The size and distribution of portable fire extinguishers shall be in accordance with Sections 906.3.1 through 906.3.4.

*\*Proper selection and distribution of portable fire extinguishers is essential to having adequate protection for the building structure and the occupancy conditions within. This section introduces the sections that provide those requirements. Determination of the desired type of portable fire extinguisher depends on the character of the fire anticipated, building occupancy, specific hazards and ambient temperature conditions (see commentary Tables 906.3(1) and 906.3(2)).*

**906.3.1 Class A fire hazards.** Portable fire extinguishers for occupancies that involve Class A hazards, the minimum sizes and distribution shall comply with Table 906.3(1)

*\*Class A fires generally involve materials considered to be “ordinary combustibles”, such as wood, cloth, paper, rubber and most plastics {see commentary, Table 906.3(1)}.*

**TABLE 906.3(1)  
FIRE EXTINGUISHERS FOR CLASS A FIRE HAZARDS**

	<b>LIGHT (Low) HAZARD OCCUPANCY</b>	<b>ORDINARY (Moderate) HAZARD</b>	<b>EXTRA (High) HAZARD OCCUPANCY</b>
Minimum Rated	2-A <sup>c</sup>	2-A	4-A <sup>a</sup>
Maximum Floor Area	3,000 square feet	1,500 square feet	1,000 square feet
Maximum Floor Area	11,250 square feet	11,250 square feet	11,250 square feet
Maximum Travel Distance to Extinguisher	75 feet	75 feet	75 feet

For SI: 1 foot = 304.8 mm, 1 square foot = 0.0929 m<sup>2</sup>, 1 gallon = 3.785 L.

- a. Two 2½ gallon water-type extinguishers shall be deemed the equivalent of one 4-A rated extinguisher.
- b. Annex E.3.3 of NFPA 10 provides more details concerning application of the maximum floor area criteria.
- c. Two water-type extinguishers each with a 1-A rating shall be deemed the equivalent of one 2-A rated extinguisher for Light (Low) Hazard Occupancies

*\*Table 906.3(1), which parallels Table 6.2.1.1 of NFPA 10, establishes the minimum number and rating of fire extinguishers for Class A fires in any particular occupancy. The occupancy classifications are further defined in NFPA 10. The maximum area that a single fire extinguisher can protect is determined based upon the rating of the fire extinguisher. The travel distance limitation of 75 feet (22 860 mm) is intended to be the actual walking distance along a normal path of travel to the extinguisher. For this reason, it is necessary to select fire extinguishers that comply with both the distribution criteria and travel distance limitation for a specific occupancy classification.*

**906.3.2 Class B fire hazards.** Portable fire extinguishers for occupancies involving flammable or combustible liquids with depths of less than or equal to 0.25-inch (6.356 mm) shall be selected and placed in accordance with Table 906.3(2).

Portable fire extinguishers for occupancies involving flammable or combustible liquids with a depth greater than 0.25-inc (6.35 mm) shall be selected and placed in accordance with NFPA 10.

*\*Class B fires involve flammable and combustible liquids, oil-based paints, alcohols, solvents, flammable gases and similar materials. Selection of these extinguishers is made based on the depth of the liquid that could become involved in a fire. If the depth is ¼-inch or less, selection is made using Table 906.3(2). Class B extinguishers for greater liquid depth, characterized in NFPA as “appreciable depth”, must be selected and installed in accordance with Section 6.3.2 of NFPA 10 {see commentary, Table 906.3(2)}.*

**TABLE 906.3(2)  
FLAMMABLE OR COMBUSTIBLE LIQUIDS WITH  
DEPTHS OF LESS THAN OR EQUAL TO 0.25-INCH**

<b>TYPE OF HAZARD</b>	<b>BASIC MINIMUM EXTINGUISHER RATING</b>	<b>MAXIMUM TRAVEL DISTANCE TO EXTINGUISHERS (feet)</b>
Light (Low)	5-B	30
	10-B	50
Ordinary (Moderate)	10-B	30
	20-B	50
Extra (High)	40-B	30
	80-B	50

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

**NOTE.** For requirements on water-soluble flammable liquids and alternative sizing criteria, see Section 5.5 of NFPA 10.

*\*Fires involving flammable or combustible liquids present a severe hazard challenge regardless of occupancy. Table 906.3(2), which parallels Table 6.3.1.1 of NFPA 10, prescribes the minimum portable fire extinguisher requirements where flammable or combustible liquids are limited in depth {0.25 inch (6 mm) or less}. As can be seen in the table, the size of the extinguisher is directly related to the travel distance to the extinguisher for each given occupancy classification. These fire extinguisher provisions are independent of whether other fixed automatic fire-extinguishing systems are installed. For occupancy conditions involving flammable or combustible liquids in potential depths greater than 0.25 inch (6 mm), the selection and spacing criteria of NFPA 10 must be used in addition to any applicable requirements in Chapter 57 and NFPA 30.*

**906.3.3 Class C fire hazards.** Portable fire extinguishers for Class C fire hazards shall be selected and placed on the basis of the anticipated Class A or B hazard.

*\*Class C fires involve energized electrical equipment where the electrical nonconductivity of the extinguishing agent is critical. The need for this class of extinguisher is simply based on the presence of the hazard in an occupancy and no numerical rating is required.*

**906.3.4 Class D fire hazards.** Portable fire extinguishers for occupancies involving combustible metals shall be selected and placed in accordance with NFPA 10.

*\*Class D fires involving flammable solids, the bulk of which are combustible metals, including, but not limited to magnesium, potassium, sodium and titanium. Most Class D extinguishers will have a special low velocity nozzle or discharge wand to gently apply the agent in large volumes to avoid disrupting any finely divided burning materials. Extinguishing agents are also available in bulk and can be applied with a scoop or shovel. While Class D extinguishers are often referred to as “dry chemical” fire extinguishers, they are more properly called “dry powder” fire extinguishers because their mechanism of extinguishment is by a smothering action rather than by chemical reaction with the combustion process.*

*There are several Class D fire extinguisher agents available, some will handle multiple types of metal fires, others will not. Sodium carbonate-based extinguishers are used to control sodium, potassium, and sodium-potassium alloy fires but have limited use on other metals. This material smothers and forms a crust. Sodium chloride-based extinguishers contain sodium chloride salt and a thermoplastic additive. The plastic melts to form an oxygen-excluding crust over the metal, and the salt dissipates the heat. This powder is useful on most alkali metals including magnesium, titanium, aluminum, sodium, potassium, and zirconium. Graphite based-extinguishers contain dry graphite powder that smothers burning metals. Unlike sodium chloride powder extinguishers, the*

*graphite powder fire extinguishers can be used on very hot burning metal fires, such as lithium, but the powder will not stick to and extinguish flowing or vertical lithium fires. The graphite powder acts as a heat sink as well as smothering the metal fire. See the commentary to Section 5906.5.7 for a discussion on extinguishing flammable solid fires.*

**906.4 Cooking grease fires.** Fire extinguishers provided for the protection of cooking grease fires shall be of an *approved* type compatible with the automatic fire-extinguishing system agent and in accordance with Section 904.12.5.

*\*The combination of high-efficiency cooking appliances and hotter burning cooking media creates a potentially severe fire hazard. Although commercial cooking systems must have an approved exhaust hood and be protected by an approved automatic fire-extinguishing system, a manual means of extinguishment is desirable to attack a fire in its incipient stage.*

*As indicated in Section 904.12.5, a Class K-rated portable fire extinguisher must be located within 30 feet (9144 mm) of travel distance of commercial-type cooking equipment. Class K-rated extinguishers have been specifically tested on commercial cooking appliances using vegetable or animal oils or fats. These portable fire extinguishers are usually of sodium bicarbonate or potassium bicarbonate dry chemical type.*

**906.5 Conspicuous location.** Portable fire extinguishers shall be located in conspicuous locations where they will be readily accessible and immediately available for use. These locations shall be along normal paths of travel, unless the *fire code official* determines that the hazard posed indicates the need for placement away from normal paths of travel.

*\*Fire extinguishers must be located in readily accessible locations along normal egress paths. This increases the occupants familiarity with the location of the fire extinguishers. When considering location, the most frequent occupants should be considered. These are the occupants who would become most familiar with the fire-extinguisher placement. For most buildings, it is the employees who are most familiar with their surroundings; therefore, a good understanding of employee operations is important for proper extinguisher placement.*

**906.6 Unobstructed and unobscured.** Portable fire extinguishers shall not be obstructed or obscured from view. In rooms or areas in which visual obstruction cannot be completely avoided, means shall be provided to indicate the location of extinguishers.

*\*Portable fire extinguishers must be located where they are readily visible at all times. If visual obstruction cannot be avoided, the location of the extinguishers must be marked by an approved means of identification. This could include additional signage, lights, arrows or other means approved by the fire code official. Unobstructed does not*

*necessarily mean visible from all angles within the space. Often, columns or furnishing may obscure the extinguisher from one direction or another. These are not by themselves obstructions. The intent is that the extinguisher is not hidden but rather can readily be found. If the extinguisher is placed in the wall behind the door, it is clearly obstructed since it cannot be easily viewed. An extinguisher on a wall that is visible from most of the space would be considered unobstructed.*

**906.7 Hangers and brackets.** Hand-held portable fire extinguishers, not housed in cabinets, shall be installed on the hangers or brackets supplied. Hangers or brackets shall be securely anchored to the mounting surface in accordance with the manufacturer's instructions.

*\*Portable extinguishers not housed in cabinets are usually mounted on walls or columns using securely fastened hangers. Brackets must be used where the fire extinguishers need to be protected from impact or other potential physical damage.*

**906.8 Cabinets.** Cabinets used to house portable fire extinguishers shall not be locked.

**Exceptions:**

1. Where portable fire extinguishers subject to malicious use or damage are provided with a means of ready access.
2. In Group I-3 occupancies and in mental health areas in Group I-2 occupancies, access to portable fire extinguishers shall be permitted to be locked or to be located in staff locations provided the staff has keys.

*\*Cabinets housing fire extinguishers must not be locked in order to provide quick access in an emergency. Exception 1, however, allows the cabinets to be locked in occupancies where vandalism, theft or other malicious behavior is possible. Exception 2 also permits cabinets housing fire extinguishers to be locked or located in staff locations in Group I-3 occupancies and mental health areas in Group I-2 occupancies. Occupants in Group I-3 areas of jails, prisons or similar restrained occupancies should not have access to fire extinguishers because they could possibly be used as a weapon or be subject to vandalism. Staff adequately trained in the use of fire extinguishers are assumed to have ready access to the keys for the cabinets at all times.*

**906.9 Extinguisher installation.** The installation of portable fire extinguishers shall be in accordance with Sections 906.9.1 through 906.9.3

*\*This section introduces the installation criteria for portable fire extinguishers based on the weight of the unit.*

**906.9.1 Extinguishers weighing 40 pounds or less.** Portable fire extinguishers having a gross weight not exceeding 40 pounds (18 kg) shall be installed so that their tops are not more than 5 feet (1524 mm) above the floor.

*\*Due to the varying height and physical strength levels of persons who might be called upon to operate a portable fire extinguisher, the mounting height of the extinguisher must be commensurate with its weight so that it may be easily retrieved by anyone from its mounting location and placed into use.*

**906.9.2 Extinguishers weighing more than 40 pounds.** Hand-held portable fire extinguishers having a gross weight exceeding 40 pounds (18 kg) shall be installed so that their tops are not more than 3.5 feet (1067 mm) above the floor.

*\*See the commentary to Section 906.9.1*

**906.9.3 Floor clearance.** The clearance between the floor and the bottom of installed hand-held portable fire extinguishers shall not be less than 4 inches (102 mm).

*\* The clearance between the floor and the bottom of installed hand-held extinguishers must not be less than 4 inches (102 mm) to facilitate cleaning beneath the unit and reduce the likelihood of the extinguisher becoming dislodged during cleaning operations (floor mopping, sweeping, etc.).*

**906.10 Wheeled units.** Wheeled fire extinguishers shall be conspicuously located in a designated location.

*\*Wheeled fire extinguishers consist of a large-capacity (up to several hundred pounds of agent) fire extinguisher assembly (either stored-pressure or pressure transfer type) equipped with a carriage and wheels and discharge hose. They are constructed so that one able-bodied person could move the unit to the fire area and begin extinguishment unassisted. Wheeled fire extinguishers are capable of delivering greater flow rates and stream range for various extinguishing agents than hand-held portable fire extinguishers. Wheeled fire extinguishers are generally more effective in high-hazard areas and, as with any extinguisher, must be readily available and stored in an approved location. The wheeled fire extinguisher should be located a safe distance from the hazard area so that it will not become involved in the fire or access to it compromised by a fire. These units are typically found at airport fueling ramps, refineries, bulk plants and similar locations where high-challenge fires may be encountered. The extinguishing Agents available in wheeled units include carbon dioxide, dry chemical, dry powder and foam*

## **CHAPTER 10 MEANS OF EGRESS**

## SECTION 1003 GENERAL MEANS OF EGRESS

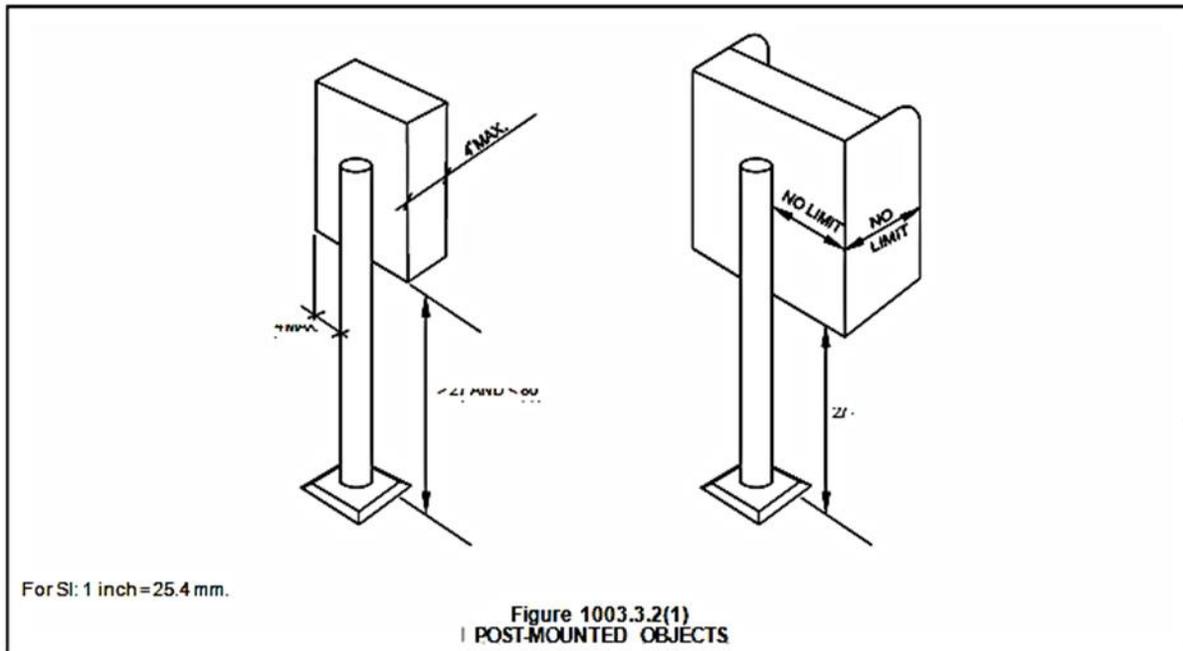
**1003.3.2 Post-mounted objects.** A free-standing object mounted on a post or pylon shall not overhang that post or pylon more than 4 inches (102 mm) where the lowest point of the leading edge is more than 27 inches (686 mm) and less than 80 inches (2032 mm) above the walking surface. Where a sign or other obstruction is mounted between posts or pylons and the clear distance between the posts or pylons is greater than 12 inches (305 mm), the lowest edge of such sign or obstruction shall be 27 inches (686 mm) maximum or 80 inches (2032 mm) minimum above the finished floor or ground.

**Exception:** The requirements shall not apply to sloping portions of *handrails* between the top and bottom riser of *stairs* and above the *ramp* run.

*\*Post-mounted objects such as signs or some types of drinking fountains or phone boxes, are not permitted to overhang more than 4 inches (102 mm) past the post where the bottom edge is located higher than 27 inches (686 mm) above the walking surface {see Figure 1003.2(1)}. Since the minimum required height of doorways, stairways and ramps in the means of egress is 80 inches (2032 mm), protruding objects located higher than 80 inches (2032 mm) above the walking surface are not regulated. Protrusions that are lower than 27 inches (686 mm) above the walking surface are also permitted since they are more readily detected by a person using a long cane, provided that the minimum width of the egress element is maintained. This is consistent with the post-mounted objects requirements in Section 307.3 of ICC A117.1, Accessible and Usable Buildings and Facilities. The intent is to reduce the potential for accidental impact for a person who is visually impaired.*

*When signs are provided on multiple posts, the posts must be located closer than 12 inches (305 mm) apart, or the bottom edge of the sign must be lower than 27 inches (686 mm) so it is within detectable cane range or above 80 inches (2032 mm) so that it is above headroom clearances {see Figure 1003.3.2(2)}.*

*The exception is for handrails that are located along a stairway or ramp. The extensions at top and bottom of stairways and ramps must meet the requirements for protruding objects.*



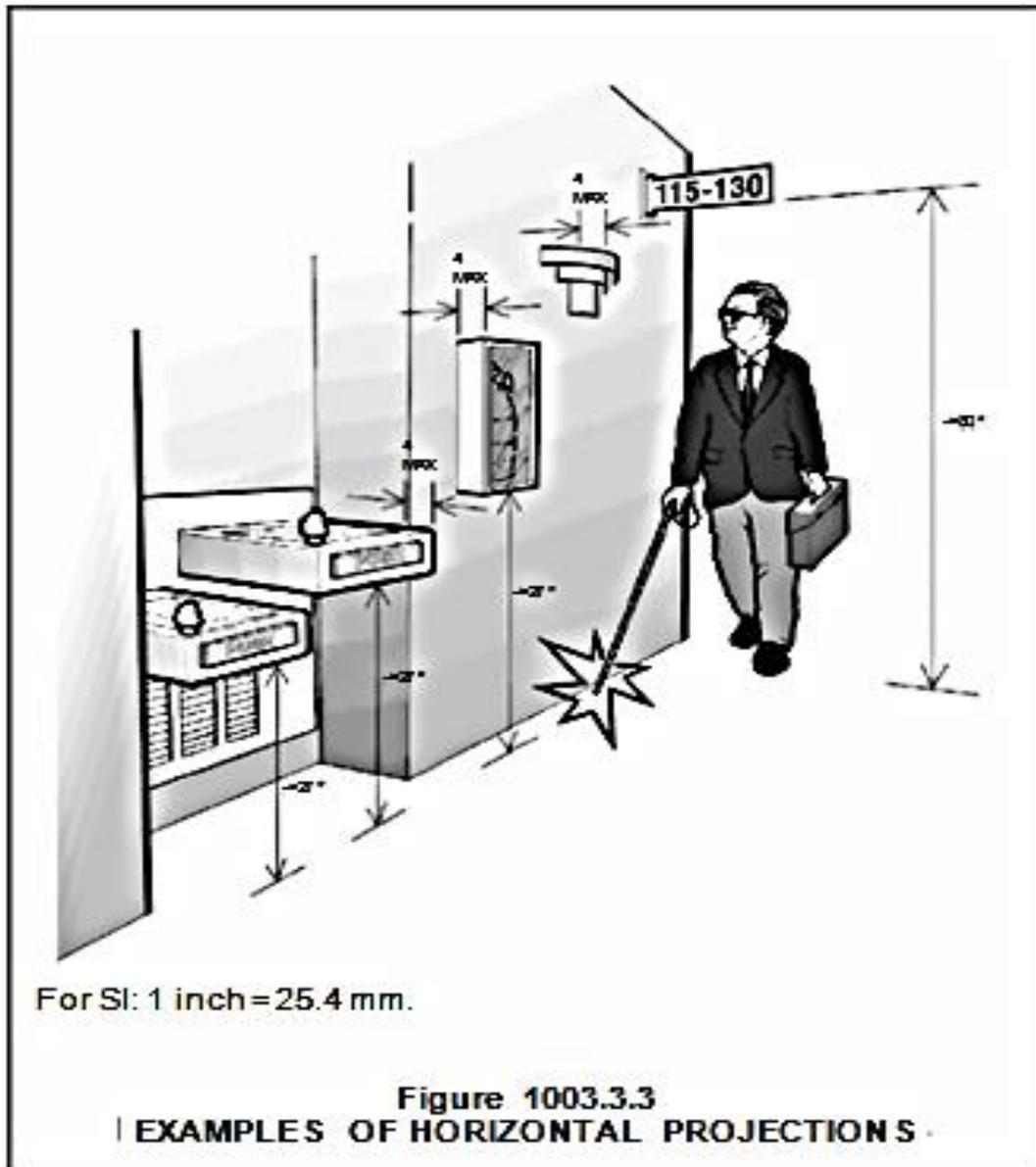
**1003.3.3 Horizontal projections.** Structural elements, fixtures or furnishings shall not project horizontally more than 4 inches (102 mm) over any walking surface between the heights of 27 inches (686 mm) and 80 inches (2032 mm) above the walking surface.

**Exception:** Handrails are permitted to protrude 4 - 1/2 inches (114 mm) from the wall

*\* Protruding objects could slow down the egress flow through passageway and injure someone hurriedly passing by or someone with a visual impairment, who use a long cane for guidance, must have sufficient warning of a protruding object. Where protrusions are located higher than 27 inches (686 mm) above the walking surface, the cane will most likely not encounter the protrusion before the person collides with the object.*

*Additionally, people with poor visual acuity or poor depth perception may have difficulty identifying protruding objects higher than 27 inches (686 mm). Therefore, objects such as lights, signs and door hardware, located between 27 inches (686 mm) and 80 inches (2032 mm) above the walking surface, are not permitted to extend more than 4 inches (102 mm) from each wall (see Figure 1003.3.3). The requirement for protrusions into the door clear width in Section 1008.1.1 is different because it deals with allowances for panic hardware on a door. It is not the intent of this section to prohibit column, pilasters or wing walls to project into a corridor as long as adequate egress width is maintained. These types of structural elements are detectable by persons using a long cane.*

The exception is an allowance for handrails when they are provided along a wall, such as in some hospitals or nursing homes. The 4 - 1/2 inches (114 mm) is intended to be consistent with projections by handrails into the required width of stairways and ramps in Section 1014.8. There are additional requirements when talking about the required width (see Section 1005.2).



**1003.3.4 Clear width.** Protruding objects shall not reduce the minimum clearance of *accessible routes*.

*\* The intent of this section is to limit the projections into an accessible route so that a minimum clear width of 36 inches (914 mm) is maintained along the route. ICC A117.1 is referenced by Chapter 11 for technical requirements for accessibility. ICC A117.1 Section 403.5 allows the accessible route to be reduced to a minimum of 32 inches (914 mm) for segments not to exceed 24 inches (635 mm) in length and spaced a minimum of 48 inches (1219 mm) apart. This allows for movement through a doorway or through a gap in planters or counters.*

## **CHAPTER 20: AVIATION FACILITIES**

### **GENERAL COMMENTS**

#### **Purpose**

Chapter 20 specifies minimum requirements for the fire-safe operation of airports, heliports and helistops. Safe use of flammable and combustible liquids during fueling and maintenance operations is emphasized. Availability of portable B:C rated fire extinguishers for prompt control or suppression of incipient fires is required.

### **SECTION 2005 FIRE EXTINGUISHERS**

**2005.1 General.** Portable fire extinguishers suitable for flammable or *combustible liquid* and electrical-type fires shall be provided as specified in Sections 2005.2 through 2005.6 and Section 906. Extinguishers required by this section shall be inspected and maintained in accordance with Section 906.

*\*Portable fire extinguishers (PFEs) must be approved for Class B and C fires. Placement and distribution of PFEs should conform to NFPA 10, and 407 and Section 906 of the code. Generally, PFEs are required in the immediate vicinity of all flammable and combustible liquid storage; use and dispensing; welding and cutting; spray finishing and other maintenance operations, as well as on aircraft fueler and service vehicles..*

*It should be noted that Sections 2005.2, 2005.4, 2005.5 and 2005.6 specifically require B:C rated PFEs on vehicles and in locations that are in close proximity to aircraft. This is because it has been reported by the National Safety Council that A:B:C-rated PFE chemicals pose a severe aircraft damage problem. While A:B:C-rated PFEs generally have an excellent fire-fighting capability and track record, the monoammonium-phosphate chemical extinguishing agent is highly corrosive to aluminum. This agent will melt and flow when it comes into contact with heated surfaces and, once it comes into contact with hot aluminum and works its way into the structural joints and crevices, it cannot be flushed out as the B:C-dry chemical agents can. Clean-up following use of an A:B:C-rated PFE on an aircraft could require disassembly of the aircraft to remove any remnant of the chemical to prevent hidden corrosion damage that could lead to structural failure.*

**2005.2 On towing vehicles.** Vehicles used for towing aircraft shall be equipped with a minimum of one *listed* portable fire extinguisher complying with Section 906 and having a minimum rating of 20-B:C.

*\*Tow motors and other vehicles must be equipped with a PFE that is readily available if a fire occurs away from a service, maintenance or boarding area.*

**2005.3 On welding apparatus.** Welding apparatus shall be equipped with a minimum of one *listed* portable fire extinguisher complying with Section 906 and having a minimum rating of 2-A:20-B:C.

*\*Consistent with section 3504.2.6, a PFE is required on all welding apparatus so that it is readily available during welding or cutting operations outside a welding or cutting shop area.*

**2005.4 On aircraft fuel-servicing tank vehicles.** Aircraft fuel-servicing tank vehicles shall be equipped with a minimum of two *listed* portable fire extinguishers complying with Section 906, each having a minimum rating of 20-B:C. A portable fire extinguisher shall be readily accessible from either side of the vehicle.

*\*Fuel-servicing tank vehicles for aircraft must have a PFE on each side of the vehicle. Both extinguishers must be readily accessible and not be obstructed. Each PFE must be effective for the extinguishment of flammable liquid fire and also be effective for energized electrical components (see Commentary Figure 2006.3 – note the PFE on each side of the rear bumper).*

**2005.5 On hydrant fuel-servicing vehicles.** Hydrant fuel-servicing vehicles shall be equipped with a not less than one *listed* portable fire extinguisher complying with Section 906 and having a minimum rating of 20-B:C.

*\*Hydrant fuel-servicing vehicles must be equipped with one PFE that is effective for the extinguishment of a flammable liquid fire and is also effective for energized electrical components.*

**2005.6 At fuel-dispensing stations.** Portable extinguishers at fuel-dispensing stations shall be located such that pumps or dispensers are not more than 75 feet (22,860 mm) from one extinguisher. Fire Extinguishers shall be provided as follows:

1. Where the open-hose discharge capacity of the fueling system is not more than 200 gallons per minute (13 L/s), a minimum of two *listed* portable fire extinguishers complying with Section 906 and having a minimum rating of 20-B;C shall be provided.
2. Where the open-hose discharge capacity of the fueling system is more than 200 gallons per minute (13 L/s) but not more than 350 gallons per minute (22 L/s), a minimum of one *listed* wheeled extinguisher complying with Section 906 and having a minimum rating of 80-B:C, and a minimum agent capacity of 125 pounds (57 kg), shall be provided.
3. Where the open-hose discharge capacity of the fueling system is more than 350 gallons per minute (22 L/s), a minimum of two *listed* wheeled extinguishers complying with Section 906 and having a minimum rating of 80-B:C each, and a minimum agent capacity of 125 pounds (57 kg) of each, shall be provided.

*\*This section requires PFEs with ratings based on the anticipated discharge rate of a broken or ruptured fuel hose. NFPA 407 contains requirements for the inspection and maintenance of an aircraft refueling hose, including daily pre-use inspection and removal from service of obviously defective hoses. Despite these inspections, however, hoses and fittings can and do fail for a variety of reasons (e.g., unnoticed physical damage, coupling and fitting failure, overpressure rupture, etc.), resulting in a flailing hose, "open butt" discharge of fuel under full pressure of the fueling system. Such uncontrolled fuel discharge could flow under the aircraft; fueling vehicles; passenger stairs or ramps; baggage-handling equipment or in close proximity to building openings. If a hose were to rupture on top of an aircraft wing or a flailing hose were to spray fuel on vehicles, baggage carts, etc., the resulting hazard would increase beyond a simple spill fire. The large amount of property damage and the potential loss of life requires that sufficient PFEs of an adequate size be located in the fueling area. (Note: The PFEs required by this section are in addition to others required on vehicles that may be present in the fuel area).*

*Considerations in locating PFEs during fueling operations include placing them out and upwind of the fuel-dispensing site and potential spill area, as well as within the access travel distance specified in NFPA 120 for extra-hazard locations. When two PFEs are required, they should be located close enough to each other so NFPA 10 access travel distances are not exceeded and a spill does not prevent access to or use of both appliances.*

*FAA regulations and NFPA 407 require fueling personnel to receive PFE and fire safety training. Appendix A of NFPA 407 recommends that such training include live-fire exercises. Training should be adequately detailed so that supervisors are capable of properly indoctrinating their subordinates in fire safety essentials. Topics covered in the training program should include electrical bonding and*

*grounding; maintenance of aircraft egress; emergency shutdown of fuel-servicing equipment; notification of emergency forces and supporting emergency operations.*

*The flow rate in Item 1 requires that at least two 20-B:C hand-held PFEs are provided. It also assumes that the trained personnel available will be able to handle the relatively small anticipated spill. Such PFEs typically discharge for up to +/- 25 seconds for distances up to +/- 20 feet (+/- 6096 mm).*

*Item 2 states that a ruptured hose discharging up to 350 gallons per minute (gpm) (1325 L/m) creates a potentially larger spill area and a more challenging fire for first-aid appliances. The higher required "B" rating requires a quantity of extinguishing agent, usually dry chemical, that likely exceeds 50 pounds (28 kg), depending on the agent. Accordingly, a wheeled PFE will enable a single operator more mobility in moving the PFE for fire attack. The size of the wheeled unit, in addition to its longer hose, allows the operator a greater discharge time, a higher agent flow rate, a greater discharge distance and more mobility in the hazardous area. For the same reasons discussed under Item 2, a minimum of two wheeled units are required for a more aggressive attack.*

**2005.7 Fire extinguisher access.** Portable fire extinguishers required by this chapter shall be accessible at all times. Where necessary, provisions shall be made to clear accumulations of snow, ice and other forms of weather-induced obstructions.

*\*Unobstructed access to PFEs is essential. In colder climates, snow and ice may block access and must be removed because fire can occur at any time.*

**2005.7.1 Cabinets.** Cabinets and enclosed compartments used to house portable fire extinguishers shall be clearly marked with the words FIRE EXTINGUISHER in letters at least 2 inches (51 mm) high. Cabinets and compartments shall be readily accessible at all times.

*\*In an emergency people can panic and become confused. Labeling cabinets where PFEs are housed with letters 2 inches high (51 mm) (often in red) makes the PFEs easier to locate.*

**2005.8 Reporting use.** Use of a fire extinguisher under any circumstances shall be reported to the manager of the airport and the *fire code official* immediately after use.

*\*The fire code official is responsible for the investigation of fires within the jurisdiction and for maintaining records thereof. Likewise, the airport manager is responsible for all activities and*

*events within the airport. Both persons must be notified of extinguisher use so the circumstances of the event can be investigated and appropriate follow-up procedures initiated to mitigate the hazard that resulted in the incident. Discharged PFEs must be promptly replaced with serviceable units.*

## **SECTION 2006 AIRCRAFT FUELING**

**2006.5.3.2.1 Fire extinguisher training.** Fuel-servicing personnel shall receive *approved* training in the operation of fire-extinguishing equipment.

*\*Employees involved in fuel servicing must have adequate training with extinguishers to use them effectively in the event of an emergency (see commentary, Section 2005.6 for further information.*

## **SECTION 2007 HELISTOPS AND HELIPORTS**

**2007.7 Fire extinguishers.** Not less than one portable fire extinguisher having a minimum 80-B:C rating shall be provided for each permanent takeoff and landing area and for the aircraft parking areas. Installation, inspection and maintenance of these extinguishers shall be in accordance with Section 906.

*\* The portable fire extinguisher for the takeoff/landing area must be effective for the extinguishment of a flammable liquid fire and for energized electrical components.*

## **CHAPTER 21: DRY CLEANING**

### **SECTION 2108 FIRE PROTECTION**

**2108.4 Portable fire extinguishers.** Portable fire extinguishers shall be selected, installed and maintained in accordance with this section and Section 906. A minimum two of 2-A:10-B:C portable fire extinguishers shall be provided near the door inside dry cleaning rooms containing Type II, Type II-A and Type III-B dry cleaning systems.

*\*Portable fire extinguishers are intended only for fighting incipient fires. Employees should be trained in the proper selection and use of portable fire extinguishers. Both the fire extinguisher rating and the travel distance must be consistent with Section 906 and NFPA 10 for the moderate hazards expected in dry cleaning plants. Placing the extinguishers at the doors leading out of rooms containing Type II, III-A and III-B dry cleaning systems will enhance personnel safety by requiring them to travel toward the means of egress door to gain access to an extinguisher in case of a fire. The required size of the extinguisher(s) should give the operator sufficient agent capacity and discharge time to handle the magnitude of incipient fires expected.*

## **CHAPTER 23: MOTOR FUEL-DISPENSING FACILITIES AND REPAIR GARAGES**

### **SECTION 2305 OPERATIONAL REQUIREMENTS**

**2305.5 Fire extinguishers.** *Approved* portable fire extinguishers complying with Section 906 with a minimum rating of 2-A:20-B:C shall be provided and located such that an extinguisher is not more than 75 feet (22 860mm) from pumps, dispensers or tank fill-pipe openings.

*\*A person should not have to travel more than 75 feet (22 860 mm) from a fuel dispenser, pump or fill opening to reach an extinguisher. If the dispenser, pump and fill opening are in close proximity to each other, one extinguisher may satisfy the requirements.*

### **SECTION 2310 MARINE MOTOR FUEL-DISPENSING FACILITIES**

**2310.6.4 Portable fire extinguishers.** Portable fire extinguishers in accordance with Section 906, each having a minimum rating of 20-B:C shall be provided as follows:

1. One on each float.
2. One on the pier or wharf within 25 feet (7620 mm) of the head of the gangway to the float, unless the office is within 25 feet (7620 mm) of the gangway or is on the float and an extinguisher is provided thereon.

*\*Section 906 lists the requirements for where and how to mount portable extinguishers. They should be conspicuous and unobstructed.*

### **SECTION 2311 REPAIR GARAGES**

**2311.6. Fire extinguishers.** Fire extinguishers shall be provided in accordance with Section 906

*\*A motor vehicle garage is classified as a moderate-hazard storage facility. See Table 906.3(1) for the size and placement of portable fire extinguishers.*

## **CHAPTER 24: FLAMMABLE FINISHES**

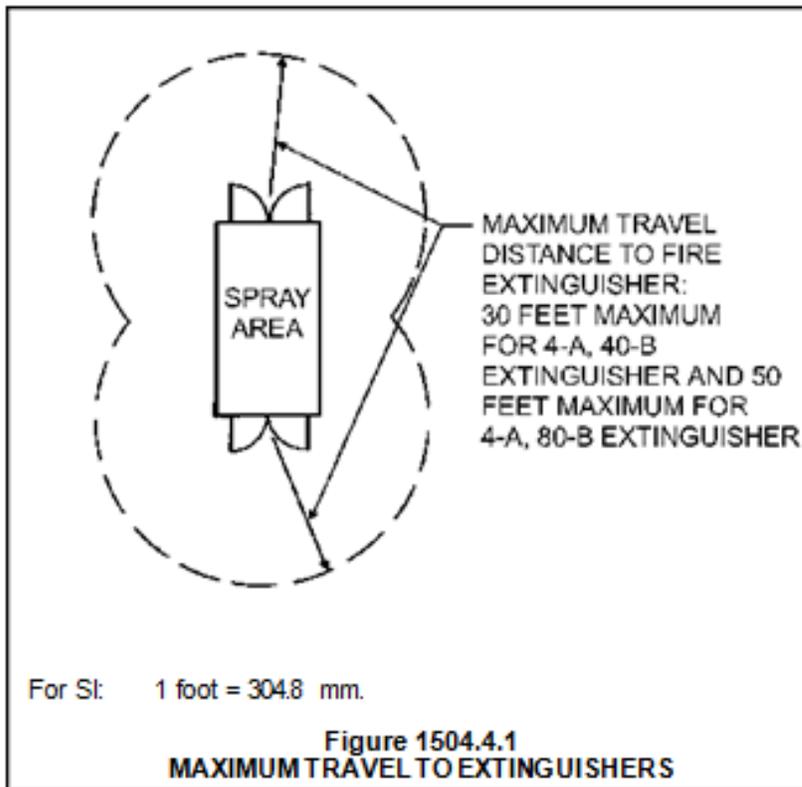
### **SECTION 2404 SPRAY FINISHING**

**2404.4.1 Fire Extinguishers.** Portable fire extinguishers complying with Section 906 shall be provided for spraying areas in accordance with the requirements for an extra (high) hazard occupancy.

*\*Portable fire extinguishers for fighting incipient fires must be installed for ready access by the spray booth, spray room or spraying space operator. Additionally, they should be selected on the*

basis of extra-hazard criteria contained in NFPA 10 to provide sufficient extinguishing agents and discharge time for the hazard to be protected. Because a spraying space fire would involve ordinary combustibles, as well as flammable/combustible liquids and dusts, the selection of an extinguisher will include Class A and B ratings.

Section 906 and NFPA 10 require no less than a 4A, 40B extinguisher when the maximum travel distance to the extinguisher does not exceed 30 feet (9144 mm). A 4A, 80B extinguisher is also acceptable when the maximum travel distance does not exceed 50 feet (15 240 mm) (see Figure 1504.4.1). Employees who are expected to fight incipient fires should receive instruction in the operation of the installed fire protection equipment.



## SECTION 2405 DIPPING OPERATIONS

**2405.4.2 Portable fire extinguishers.** Areas in the vicinity of dip tanks shall be provided with portable fire extinguishers complying with Section 906 and suitable for flammable and combustible liquid fires as specified for extra (high) hazard occupancies.

*\*Readily accessible portable fire extinguishers for incipient fire fighting must be installed for use by employees working around dipping and coating processing equipment. Both the size and distribution of portable fire extinguishers must conform to this section, Section 906.1 and the applicable sections of NFPA 10 for extra (high) hazards. Two units of Class B extinguishing capabilities are required for each square foot of dip tank area if either dry-chemical or carbon dioxide portable extinguishers are installed. Only one unit of Class B rating is required per square foot if aqueous film-forming foam (AFFF) portable extinguishers are provided. For example, a 40-square-foot (4 m<sup>2</sup>) dip tank would require an 80-B rated dry-chemical or carbon dioxide extinguisher or a 40-B rated AFFF extinguisher. The maximum travel distance to the nearest required portable extinguisher is 30 feet (9144 mm). Employees who are expected to fight incipient fires should receive instructions in the operation of installed fire protection equipment. Fire protection systems, equipment and devices must be maintained in accordance with Section 901.6.*

## **SECTION 2406 POWDER COATING**

**2406.4.2 Fire extinguishers.** Portable fire extinguishers complying with Section 906.1 shall be provided for areas used for powder coating in accordance with the requirements for an extra hazard occupancy.

*\*Section 906 gives the requirements for portable fire extinguishers. Areas may be classified as an extra-hazard occupancy in accordance with NFPA 10 because of the higher hazard of powder-coating operations.*

## **CHAPTER 28: LUMBER YARDS AND AGRO-INDUSTRIAL, SOLID BIOMASS AND WOODWORKING FACILITIES**

### **SECTION 2804 FIRE PROTECTION**

**2804.3 Portable fire extinguishers or standpipes and hose.** Portable fire extinguishers or standpipes and hose supplied from an *approved* water system shall be provided within 50 feet (15240 mm) of travel distance to any machine producing shavings or sawdust. Portable fire extinguishers shall be provided in accordance with Section 906 for extra-high hazards.

*\*The degree of protection will vary from facility to facility, but the basic recommendation is for a water system of mains and hydrants capable of supplying at least 1,000 gallons per minute (gpm) (60 L/s). Standpipes will provide a hose within 50 feet (1540 mm) of shavings and sanding machines. Portable fire extinguishers are good initial fire knockdown equipment. Section 906 gives these requirements.*

## **SECTION 2808 STORAGE AND PROCESSING OF WOOD CHIPS, HOGGED MATERIAL, FINES, COMPOST, SOLID BIOMASS FEEDSTOCK AND RAW PRODUCT ASSOCIATED WITH YARD WASTE, AGRO-INDUSTRIAL AND RECYCLING FACILITIES**

**2808.8 Fire extinguishers.** Portable fire extinguishers complying with Section 906 and with a minimum rating of 4-A:60-B:C shall be provided on all vehicles and equipment operating on piles and at all processing equipment.

*\*Each vehicle operating in the area must be equipped with a portable fire extinguisher that provides the fire extinguishing equivalent of 5 gallons (19 L) of water for use on a substantial Class A fire and is also effective for flammable liquids and energized electrical components.*

## **SECTION 2809 EXTERIOR STORAGE OF FINISHED LUMBER AND SOLID BIOFUEL PRODUCTS**

**2809.5 Fire protection.** An *approved* hydrant and hose system or portable fire extinguishing equipment suitable for the fire hazard involved shall be provided for open storage yards. Hydrant and hose systems shall be installed in accordance with NFPA 24. Portable fire extinguishers complying with Section 906 shall be located so that the travel distance to the nearest unit does not exceed 75 feet (22 860 mm).

*\* Open storage yards can involve significant land areas and are often situated a substantial distance from public rights-of-way and public fire mains. Yard hydrant and private fire service main systems facilitate ready access to water for fire fighting by public or private fire-fighting forces. The yard system must be supplied by a water supply of a sufficient volume and duration to provide adequate protection where the public water supply provides inadequate volume or pressure to protect the facility. The fire flows required will, of necessity, be substantial because of the large land areas that can be included within the boundaries of a lumber yard. Water may need to be delivered by tankers in rural areas where there is no significant water supply. Further information and guidance on water supplies may be obtained from NFPA 1142 and the International Fire Service Training Association (IFSTA) Pumping Apparatus Driver/Operator Handbook. Installation of private fire protection systems must conform to the appropriate NFPA standards, including: yard hydrants and private fire mains (NFPA 24); water tanks for private fire protection (NFPA 22) and stationary fire pumps (NFPA 20).*

*Portable fire extinguishers must be provided for incipient fire fighting and be protected from freezing. Additionally, approved hose houses, properly equipped as described in NFPA 24, may be connected to the yard hydrant system. Travel distance to an extinguisher is limited to 75 feet (22 860 mm) so that manual efforts can be undertaken while the fire is still small enough to respond to first-aid fire-fighting efforts.*

## **CHAPTER 29: MANUFACTURE OF ORGANIC COATINGS**

## **SECTION 2903 GENERAL PRECAUTIONS**

**2903.3 Fire-fighting access.** Organic coating manufacturing operations shall be accessible from at least one side for the purpose of fire control. *Approved* aisles shall be maintained for the unobstructed movement of personnel and fire suppression equipment.

*\*Access from at least one side conforming to Sections 503 and 504 is required. Fire department connections, fire protection valves, yard hydrants and related fire-fighting equipment should be sited with respect to the provided access and hazards present (see commentary, Chapter 5). Fire department preincident plans should consider operational alternatives if the access is unusable when only one means of access is provided. Design and layout of equipment and processes must facilitate access for fire control. If provided, standpipes and hose reels should be located at intersections between aisles to facilitate movement of hose lines. Portable fire extinguishers must be located in the path of egress travel.*

**2903.5 Portable fire extinguishers.** A minimum of one portable fire extinguisher complying with Section 906 for extra hazard shall be provided in organic coating areas.

*\*At least one fire extinguisher is required, sized and located for the extra hazardous nature of organic coatings operations. The addition of wheeled fire extinguishers could provide more extinguishing agent, longer discharge time and greater stream reach for the higher hazard in large area operations.*

## **CHAPTER 30: INDUSTRIAL OVENS**

### **SECTION 3006 FIRE PROTECTION**

**3006.3 Fire extinguishers.** Portable fire extinguishers complying with Section 906 shall be provided not closer than 15 feet (4572 mm) or a maximum of 50 feet (15 240 mm) or in accordance with NFPA 10. This shall apply to the oven and related equipment.

*\*Portable fire extinguishers of the proper size and type, and using the specified agent, must be installed near the furnace and related equipment. The distances mentioned in this section should be used unless requirements in NFPA 10 are more stringent. See the commentary to 906 for additional discussion on portable extinguishers.*

## **CHAPTER 31: TENTS AND OTHER MEMBRANE STRUCTURES**

### **SECTION 3104 TEMPORARY AND PERMANENT TENTS AND MEMBRANE STRUCTURES**

**3104.12 Portable fire extinguishers.** Portable fire extinguishers shall be provided as required by Section 906.

*\*Section 906 states that portable extinguishers are required in Group A occupancies and in special hazards areas as designated by the fire code official. This section also refers to NFPA 10 for guidance on selection and placement of the extinguishers. Employees and staff who will be manning the membrane structure must be trained to use the extinguishers because they are likely to become the first line of emergency response in case of a fire*

**3104.13 Fire protection equipment.** Fire hose lines, water supplies and other auxiliary equipment shall be maintained at the site in such numbers and sizes as required by *the fire code official*.

*\*This section gives the fire code official the authority to establish reasonable equipment requirements for membrane structures. Because the size, construction and intended use of membrane structures vary so widely, each installation must be evaluated individually.*

## **CHAPTER 32: HIGH-PILED COMBUSTIBLE STORAGE**

### **SECTION 3206 GENERAL FIRE PROTECTION AND LIFE SAFETY FEATURES**

**3206.10 Portable fire extinguishers.** Portable fire extinguishers shall be provided in accordance with Section 906.

*\*Portable fire extinguishers provide building occupants with an opportunity to suppress a fire in its incipient stage. In storage facilities, the fire extinguisher can contribute to the protection of occupants when there are evacuation difficulties or a specific hazard within that occupancy. For portable extinguishers to be effective, personnel must be properly trained in their use and maintenance (see Sections 3201.3 and 3201.4). Section 906 provides criteria for the location, installation, inspection and testing and maintenance of portable fire extinguishers. Section 906 also contains criteria for cabinets in which portable fire extinguishers may be stored, as well as the designated locations for wheeled portable fire extinguishers.*

## **CHAPTER 33: FIRE SAFETY DURING CONSTRUCTION AND DEMOLITION**

### **SECTION 3308 OWNER'S RESPONSIBILITY FOR FIRE PROTECTION**

**3308.3 Training.** Training of responsible personnel in the use of fire protection equipment shall be the responsibility of the fire prevention program superintendent.

*\* A fire responder is expected to know what fire-fighting and fire protection equipment is on site and how to operate it. The fire prevention program superintendent is responsible for training the job-site personnel in the proper use of hand-held fire extinguishers, hose lines, fire alarms and sprinkler systems.*

### **SECTION 3315 PORTABLE FIRE EXTINGUISHERS**

**3315.1 Where required.** Structures under construction, *alteration* or demolition shall be provided with not less than one *approved* portable extinguishers in accordance with Section 906 and sized for not less than ordinary hazard as follows:

1. At each stairway on all floor levels where combustible materials have accumulated
2. In every storage and construction shed
3. Additional portable fire extinguishers shall be provided where hazards exist, including but not limited to, the storage and use of flammable and combustible liquids.

*\*Portable extinguishers must be rated for the hazards protected. Section 906 and NFPA 10, the applicable standard for portable extinguishers, contain information on extinguisher ratings. Other circumstances under which the fire code official may require additional extinguishers include: workers using open-flame devices; flammable or combustible liquids; welding or cutting equipment or painting equipment for applying flammable or combustible finishes during both construction and demolition.*

## **SECTION 3317 SAFEGUARDING ROOFING OPERATIONS**

**3317.3 Fire extinguishers for roofing operations.** Fire extinguishers shall comply with Section 906. There shall be not less than one multipurpose portable extinguisher with a 3-A 40-B:C rating on the roof being covered or repaired.

*\*Section 906 generally covers the location and requirement of portable fire extinguishers with a particular reference to asphalt kettles in Table 906.1. Section 303 also has requirements for extinguishers on the kettle, in the proximity of the kettle and on the roof. Fire extinguishers are to be fully charged and ready for service. Many construction sites are littered with building materials and debris. The kettle operator is responsible for maintaining an appropriate distance between the hot kettle and combustible materials.*

## **CHAPTER 34: TIRE REBUILDING AND TIRE STORAGE**

### **SECTION 3408 FIRE PROTECTION**

**3408.2. Fire extinguishers.** Buildings or structures shall be provided with fire extinguishers in accordance with Section 906. Fuel-fired vehicles operating in the storage yard shall be equipped with a minimum 2-A:20-B:C rated fire extinguisher.

*\*This section, as well as section 906, requires that fire extinguishers be available. Portable fire extinguishers are provided for incipient fire control. These appliances should be located where they are readily available. They are also required on fuel-fired vehicles operating in the yard*

## **CHAPTER 35: WELDING AND OTHER HOT WORK**

## SECTION 3504 FIRE SAFETY REQUIREMENTS

**3504.2.3 Duties.** Individuals designated to fire watch duty shall have fire-extinguishing equipment readily available and shall be trained in the use of such equipment. Individuals assigned to fire watch duty shall be responsible for extinguishing spot fires and communicating an alarm.

*\*The individuals who undertake a fire watch have specific duties. They not only need to watch for and notify of an ignition of combustibles, they also need to be prepared to extinguish spot fires with portable extinguishers. Intervention when fires are small is the best line of defense in extinguishing and controlling fires. Waiting until the fire department or fire brigade arrives will allow a fire to increase dramatically in size and intensity.*

**3504.2.4 Fire training.** The individuals responsible for performing the hot work and individuals responsible for providing the fire watch shall be trained in the use of portable fire extinguishers.

*\*A person conducting a fire watch must be trained to operate extinguishers located in the watch area. As noted previously, intervention in the incipient stages of a fire is extremely effective.*

**3504.2.6 Fire extinguisher.** A minimum of one portable fire extinguisher complying with Section 906 and with a minimum 2-A:20-B:C rating shall be readily accessible within 30 feet (9144 mm) of the location where the hot work is performed.

*\*This section specifies that the fire extinguishers required for a fire watch must be an all-purpose extinguisher for all fire types; the potential fire type will vary with the type of hot work and the surrounding combustibles. The 30 foot (9144 mm) travel distance specified here is more restrictive than what is required for similar ratings of extinguishers in Section 906. Table 906.3(2) would allow a maximum travel distance of 50 feet (15 240 mm) for other applications of the same extinguisher.*

**3504.3.1. Pre-hot-work check.** A pre-hot-work check shall be conducted prior to work to ensure that all equipment is safe and hazards are recognized and protected. A report of the check shall be kept at the work site during the work and available upon request. The pre-hot-work check shall determine all of the following:

1. Hot work equipment to be used shall be in satisfactory operating condition and in good repair.
2. Hot work site is clear of combustibles or combustibles are protected.
3. Exposed construction is of noncombustible materials or, if combustible, then protected.
4. Openings are protected.
5. Floors are kept clean.
6. No exposed combustibles are located on the opposite side of partitions, walls, ceilings or floors.
7. Fire watches, where required, are assigned.

8. *Approved* actions have been taken to prevent accidental activation of suppression and detection equipment in accordance with Sections 3504.1.8 and 3504.1.9.
9. Fire extinguishers and fire hoses (where provided) are operable and available.

*\*As noted in Section 2604.3, this section includes a list of items to be reviewed in hot work areas. These checks confirm that the requirements in Sections 3504.1 and 3504.2 are actually being met.*

## **CHAPTER 36: MARINAS**

### **SECTION 3604 FIRE PROTECTION EQUIPMENT**

**3604.4 Portable fire extinguishers.** One portable fire extinguisher of the ordinary (moderate) hazard type shall be provided at each required standpipe hose connection. Additional fire extinguishers, suitable for the hazards involved, shall be provided and maintained in accordance with Section 906.

*\*A 2-A:10-B-C rated portable fire extinguisher placed adjacent to each standpipe hose connection would meet the general requirement for this section. In addition, to meet the requirements of Table 906.3(1), a sufficient number of extinguishers must be provided throughout the marina with a maximum travel distance of 75 feet (22 860 mm) from any point along the piers, wharves or floats to an extinguisher.*

## **CHAPTER 37: COMBUSTIBLE FIBERS**

### **SECTION 3703 GENERAL PRECAUTIONS**

**3703.6. Portable fire extinguishers.** Portable fire extinguishers shall be provided in accordance with Section 906 as required for extra-hazard occupancy protection as indicated in Table 906.3(1)

*\*Section 906 gives the requirements for portable fire extinguishers. Areas must be classified as an extra-hazard occupancy because of the high possibility of ignition of combustible fibers or dust.*

## **CHAPTER 57: FLAMMABLE AND COMBUSTIBLE LIQUIDS**

### **SECTION 5703 GENERAL REQUIREMENTS**

**5703.2.1. Portable fire extinguishers and hose lines.** Portable fire extinguishers shall be provided in accordance with Section 906. Hose lines shall be provided in accordance with Section 905.

*\*Portable fire extinguishers and hose lines are to be installed where flammable and combustible liquids are stored, used or dispensed. These fire protection devices, operated by trained personnel, are to handle small emergencies. They are not an alternative to fire protection systems mandated by this section, Chapter 9 or the IBC.*

### **SECTION 5704 STORAGE**

**5704.3.3.1 Portable fire extinguishers.** *Approved* portable fire extinguishers shall be provided in accordance with specific sections of this chapter and Section 906.

*\*Portable fire extinguishers are useful for controlling small fires. Section 906 contains the size and spacing for portable extinguishers to be used on a fire involving flammable or combustible liquids that have a liquid depth of 0.25 inch (6.4 mm) or less.*

**5704.3.7.5.2 Portable fire extinguishers.** A minimum of one *approved* portable fire extinguisher complying with Section 906 and having a rating of not less than 20-B shall be located not less than 10 feet (3048 mm) or more than 50 feet (15 240 mm) from any Class I or II liquid storage area located outside of a liquid storage room.

Not less than one portable fire extinguisher having a rating of not less than 20-B shall be located outside of, but not more than 10 feet (3048 mm) from, the door opening into a liquid storage room.

*\*Portable fire extinguishers are to be available outside of the liquid storage room because a fire in the liquid storage room could prevent personnel from getting to portable fire extinguishers in the room. The 20B portable fire extinguisher is for the control of small flammable liquid fires.*

## **SECTION 5705 DISPENSING, USE, MIXING AND HANDLING**

**5705.4.9 Portable fire extinguishers.** *Approved* portable fire extinguishers shall be provided in accordance with Section 906. Not less than one portable fire extinguisher having a rating not less than 40-B shall be located not less than 10 feet (3048 mm) or more than 30 feet (9144 mm) from any solvent distillation unit.

*\*Portable fire extinguishers must be located in clear view and within 30 feet (9144 mm) of the distillation unit. The 40B portable extinguisher is for the control of small liquid fires.*

## **SECTION 5706 SECIAL OPERATIONS**

### **5706.2 Storage and dispensing of flammable and combustible liquids on farms and construction sites.**

Permanent and temporary storage and dispensing of Class I and Class II liquids for private use on farms and rural areas and at construction sites, earth moving projects, gravel pits or borrow pits shall be in accordance with Sections 3406.2.1 through 3406.2.8.1.

**5706.2.7 Portable fire extinguishers.** Portable fire extinguishers with a minimum rating of 20-B:C and complying with section 906 shall be provided where required by the fire official.

*\*Portable fire extinguishers must be in clear view and within 50 feet (15 240mm) of the storage tank. The 20BC portable fire extinguisher is for control of small flammable liquid fires and electrical fires.*

**5706.4 Bulk plants or terminals.** Portions of properties where flammable and *combustible liquids* are received by tank vessels, pipelines, tank cars or tank vehicles and which are stored or blended in bulk for

the purpose of distributing such liquids by tank vessels, pipelines, tank cars, tank vehicles or containers shall be in accordance with Sections 3406.4.1 through 3406.4.10.4

**5706.4.10.1 Portable fire extinguishers.** Portable fire extinguishers with a rating of not less than 20-B and complying with Section 906 shall be located within 75 feet (22 860 mm) of hose connections, pumps and separator tanks.

*\*Portable fire extinguishers must be located within 75 feet (22 860 mm) of hose connections, pumps and separator tanks. These locations are where a possible leak can occur and a portable fire extinguisher may be adequate in preventing a fire or controlling a small flammable liquid fire. The 20B portable extinguisher is for the control of small fires.*

**5706.5.4.5 Commercial, industrial, governmental or manufacturing.** Dispensing of Class II and Class III motor vehicle fuel from tank vehicles into the fuel tanks of motor vehicles located at commercial, industrial, governmental or manufacturing establishments is allowed where permitted, provided such dispensing operations are conducted in accordance with the following:

1. Dispensing shall occur only at sites that have been issued a permit to conduct mobile fueling.....
9. A portable fire extinguisher with a minimum rating of 40:BC shall be provided on the vehicle with signage clearly indicating its location.

(Editor's note – there are 25 requirements and 2 exceptions listed under 5706.5.4.5 detailing permitting, environmental protection, clearance to property, dispensing equipment, training and reporting. For the entire list and entire commentary consult the complete International Fire Code and Commentary)

*\*This section codifies minimum safety requirements for the regulation of certain mobile fueling operations and provides administrative controls over fueling sites, specifies the types of tank vehicles required in such operations and specifies training and licensing requirements for persons engaged in mobile fueling operations.....*

**5706.6 Tank vehicles and vehicle operation.** Tank vehicles shall be designed, constructed, equipped and maintained in accordance with NFPA 385 and sections 5706.6.1 through 5706.6.4

**5706.6.4 Portable fire extinguishers.** Tank vehicles shall be equipped with a portable fire extinguisher complying with Section 906 and having a minimum rating of 2-A:20-B:C.

During unloading of the tank vehicle, the portable fire extinguisher shall be out of the carrying device on the vehicle and shall be 15 feet (4572 mm) or more from the unloading valve.

*\*A fire extinguisher (\*2A:20BC) must be available to control a small fire. The fire extinguisher is designed for use on ordinary combustible fires, flammable liquid fires and electrical fires. The extinguisher is to be at least 15 feet (4572 mm) from the unloading valve. This location is*

*convenient for the attendant to close the valve, control the flow of the flammable or combustible liquid and have access to the extinguisher to control a fire.*

## **CHAPTER 59: FLAMMABLE SOLIDS**

### **GENERAL COMMENTS**

*This chapter addresses magnesium almost to the exclusion of all other flammable solids; however, it is important to know that several other solid materials, primarily metals, are also flammable and under the right conditions can be explosion hazards. It should also be noted that, although the definition of "Flammable solid" could literally be interpreted as being applicable to a much wider variety of common materials having an ignition temperature below 212 deg F (100 deg C), it is not the intent of this chapter to regulate such materials. See the commentary to Section 3602.1, definition of "Flammable solid."*

*The list of other metals that can become fire hazards consist of titanium, zirconium, hafnium, calcium, zinc, sodium, lithium, potassium, sodium/potassium alloys, aluminum, iron and steel, uranium, thorium, and plutonium. Some of these metals have few highly specialized commercial uses; they are almost exclusively laboratory materials. But because of where they are used, both plant and fire service personnel must be trained to handle emergency situations. Because uranium, thorium and plutonium are also radioactive materials, they present still more specialized problems for plant fire brigades and local fire service personnel.*

*The form of the material being used (powder, sheets, castings or billets) also is critical to the way fire services respond to an incident. Fine powders of any of the materials listed can ignite or even explode under various atmospheres, including nitrogen. Some molten metals can ignite or explode under certain conditions. Castings of some of these metals can ignite or detonate if they are not handled properly. Even bulky billets can be ignited if there is sufficient heat to bring the metal to its ignition temperature, resulting in self-sustaining burning.*

*Conventional fire-extinguishing agents may only increase the intensity of the fire being fought. Magnesium, for example, burns fiercely in a steam atmosphere. Likewise, carbon dioxide, foam and dry chemical extinguishers are not effective on titanium fires. Additionally, water, foam and vaporizing liquids should never be used on lithium, sodium and potassium fires. Each material is different and requires different extinguishing treatment.*

*The National Fire Protection Association (NFPA) has developed standards for handling several of the listed materials, which are included in the bibliography at the end of this chapter. Most industry associations and companies manufacturing primary metals and alloys also have available recommended practices for storage, handling, use and scrap disposal that are based on extensive testing and history. The fire code official should require any person or business storing,*

*handling or processing any of these materials to demonstrate a thorough knowledge of safe practices in both facility design and operating procedures.*

**5906.5.7 Fire extinguishing materials.** Fire extinguishing materials shall be provided for every operator performing machining, grinding or other processing operation on magnesium as follows:

1. Within 30 feet (9144 mm), a supply of extinguishing materials in an *approved* container with a hand scoop or shovel for applying the material; or
2. Within 75 feet (22 860 mm), a portable fire extinguisher complying with Section 906.

All extinguishing materials shall be *approved* for use on magnesium fires. Where extinguishing materials are stored in cabinets or other enclosed areas, the enclosures shall be openable without the use of a key or special knowledge.

*\*Magnesium fires present unusual fire suppression challenges because none of the common extinguishing materials can be used safely. The problem of using water has already been mentioned, but it must be emphasized again. Water sprayed on a magnesium fire will do two things. First, if the fire involves small pieces such as chips, fines or dust, the reaction of the burning metal with water can be explosive, causing burning brands to fly into surrounding materials and equipment. Second, the extraordinary heat generated by burning magnesium can break the chemical bonds between hydrogen and oxygen atoms in the water molecule. Once this occurs, the hydrogen will be burned and the oxygen will support continued combustion, making the fire that much more intense; however, the danger of a hydrogen explosion under fire conditions is generally slight. If magnesium burns in the open, an excess of oxygen will be available to burn any hydrogen as rapidly as it is generated, thus preventing formation of an explosive accumulation of gas. Despite the noted dangers however, magnesium fires can be extinguished by cooling the metal below its melting point using relatively large amounts of water carefully applied from a safe distance.*

*The use of sand can produce a similar reaction to the use of water. Sand is composed of silicon dioxide (SiO<sub>2</sub>) molecules that will breakdown, allowing the oxygen to support the combustion of the magnesium.*

*Carbon dioxide cannot be used on magnesium fires for the same reason. Magnesium reacts so strongly with oxygen that the carbon dioxide will decompose, giving the fire additional oxygen and making it burn more intensely.*

*In extreme cases, magnesium will even burn in a nitrogen atmosphere, forming magnesium nitride.*

*Halon cannot be used because magnesium reacts violently with the chlorine molecules in the gas to form magnesium chloride.*

*Consequently, special fire-fighting agents are required for fighting magnesium and other flammable metal fires. Because flammable metal fires are considered Class D fires, it is*

*important to verify that portable fire extinguishers provided in accordance with this section are labeled as being effective on such fires. Similarly, any installed fire-extinguishing system must be chosen carefully with the focus on compatibility with the protected content.*

*The form of the material involved in the fire will dictate what can be used to extinguish it. The most difficult fire is one involving fines. Normally, a dry extinguishing agent is manually spread over the fire to smother the burning material. Care must be taken, however, to make sure the application does not raise a dust cloud that could cause an explosion.*

*The long history of magnesium use has resulted in a well-documented fire-fighting strategy for each form of magnesium that could be involved in a fire. The fire code official must verify that the user is equipped to fight potential fires and that emergency response personnel are trained in the hazards they may face as well as in the use of the available extinguishers.*

*Prompt control of magnesium fires requires ready access to fire-extinguishing materials and equipment by every operator at every workstation processing the metal. The fire extinguisher access travel distance of 75 feet (22 860 mm) correlates with Section 906. The 30 foot (9144 mm) travel distance to a stockpile of dry extinguishing agent correlates with the travel distance for an extra-hazard occupancy and recognizes the potential need to make repeated trips to the stockpile to bring a sufficient amount of agent to accomplish extinguishment.*

## **CHAPTER 61: LIQUIFIED PETROLEUM GASES**

### **SECTION 6108 FIRE PROTECTION**

**6108.2 Portable fire extinguishers.** Portable fire extinguishers complying with Section 906 shall be provided as specified in NFPA 58.

*\*Refer to NFPA 58 to determine where fire extinguishers must be provided.*

## **APPENDIX I: FIRE PROTECTION SYSTEMS – NONCOMPLIANT CONDITIONS**

### **SECTION I101 NONCOMPLIANT CONDITIONS**

**I1101.3 Noncompliant conditions requiring component repair or replacement.** The following shall be deemed noncompliant conditions and shall cause the related component(s) to be repaired or replaced to comply with the provisions of this code:

4. Portable fire extinguishers having any of the following conditions:
  - 5.1. Broken seal or tamper indicator;

- 5.2. Expired maintenance tag;
- 5.3. Pressure gauge indicator in “red”;
- 5.4. Signs of leakage or corrosion;
- 5.5. Mechanical damage, denting or abrasion of tank;
- 5.6. Presence of repairs such as welding, soldering or brazing;
- 5.7. Damaged threads; or
- 5.8. Damaged hose assembly, couplings or swivel joints.

*\*This section provides inspection items for the components of different types of fire protection systems. All of these are visual and manipulative items that can easily be verified during an inspection.*