7.6.4.4 Flame Breaks. Temporary CFRS stands where the interior is not accessible to the public shall not be required to comply with 7.3.15.3.

7.6.4.5 Covered Fuses. Individual consumer fireworks items displayed for sale in temporary CFRS stands where the interior is not accessible to the public shall not be required to have covered fuses.

7.6.4.6 Sales Display. The following shall apply to the sales display of consumer fireworks in temporary CFRS stands that do not allow access to the interior of the stand by the public:

(1) Consumer fireworks shall be displayed in a manner that prevents the fireworks from being handled by persons other than those operating, supervising, or working in the temporary CFRS stand.
(2) The handling requirements of 7.6.4.6(1) shall not apply to packaged assortments, boxes, or similarly packaged containers of one or more items, regardless of type.

Chapter 8 Transportation on Public Highways of Fireworks, Pyrotechnic Articles, and Any Component(s) Containing Pyrotechnic or Explosive Materials

8.1 General Requirements. Transportation on public highways of fireworks, pyrotechnic articles, and any component(s) containing pyrotechnic or explosive materials shall meet all applicable requirements of the U.S. Department of Transportation (U.S. DOT), 49 CFR 170 to end, and any applicable local, state, or international requirements.

Annex A Explanatory Material

Annex A is not a part of the requirements of this NFPA document but is included for informational purposes only. This annex contains explanatory material, numbered to correspond with the applicable text paragraphs.

A.1.3.11 Novelties are not classified as fireworks. See Annex C.

A.3.2.1 Approved. The National Fire Protection Association does not approve, inspect, or certify any installations, procedures, equipment, or materials; nor does it approve or evaluate testing laboratories. In determining the acceptability of installations, procedures, equipment, or materials, the authority having jurisdiction may base acceptance on compliance with NFPA or other appropriate standards. In the absence of such standards, said authority may require evidence of proper installation, procedure, or use. The authority having jurisdiction may also refer to the listings or labeling practices of an organization that is concerned with product evaluations and is thus in a position to determine compliance with appropriate standards for the current production of listed items.

A.3.2.2 Authority Having Jurisdiction (AHJ). The phrase "authority having jurisdiction," or its acronym AHJ, is used in NFPA documents in a broad manner, since jurisdictions and approval agencies vary, as do their responsibilities. Where public safety is primary, the authority having jurisdiction may be a federal, state, local, or other regional department or individual such as a fire chief; fire marshal; chief of a fire prevention bureau, labor department, or health department; building official; electrical inspector; or others having statutory authority. For insurance purposes, an insurance inspection department, rating bureau, or other insurance company representative may be the authority having jurisdiction. In many circumstances, the property owner or his or her designated agent assumes the role of the authority having jurisdiction; at government installations, the commanding officer or departmental official may be the authority having jurisdiction.

A.3.2.3 Code. The decision to designate a standard as a "code" is based on such factors as the size and scope of the document, its intended use and form of adoption, and whether it contains substantial enforcement and administrative provisions.

A.3.2.5 Listed. The means for identifying listed equipment may vary for each organization concerned with product evaluation; some organizations do not recognize equipment as listed unless it is also labeled. The authority having jurisdiction should utilize the system employed by the listing organization to identify a listed product.

A.3.3.1 Aerial Shell. Comets and mines are not aerial shells. The shells are most commonly 3 in. to 6 in. (76 mm to 152 mm) outside diameter and are fired from mortars. Upon firing of the shell, the fuse and lift charge are consumed. [**1123**, 2006]

A.3.3.5.3 Screen Barricade. Such barricades can be constructed of metal roofing, ¼ in. to ½ in. (6 mm to 13 mm) mesh screen, or equivalent material.

A.3.3.7 Binary System. The ingredients for such a system are shipped separately as an oxidizer and a fuel. The ingredients do not become a pyrotechnic material until they are mixed.

A.3.3.9.1 Consumer Fireworks Storage Building. Consumer fireworks storage buildings are typically found at manufacturing or distribution facilities and are not considered to be process buildings, rooms, or areas.

A.3.3.9.2 Consumer Fireworks Work Building, Room, or Area. Work buildings, rooms, or areas are typically found at manufacturing or distribution facilities and are considered nonprocess buildings, rooms, or areas.

A.3.3.9.3 Inhabited Building. The term includes any church, school, store, railway passenger station, airport passenger terminal, and any other building or structure where people are accustomed to congregate or assemble. This term does not include any building or structure occupied in connection with the manufacture, transportation, storage, distribution, packing, packaging, shipping, or use of explosive materials or fireworks at a manufacturing or distribution facility.

A.3.3.9.4 Mechanical Building. A mechanical building is intended to be an unoccupied building.

A.3.3.9.5 Mixing Building. This definition does not apply to wet sparkler mix preparation.

A.3.3.9.6 Nonprocess Building. A pyrotechnic laboratory is considered to be a nonprocess building, but it is subject to the required separation distances for a consumer fireworks process building.

A.3.3.9.7 Process Building. Examples of operations performed in a process building include, but are not limited to, the following:

(1) Assembling internal component parts or exposed pyrotechnic compositions into finished fireworks
(2) Mixing pyrotechnic or explosive compositions

(3) Pressing pyrotechnic or explosive compositions
(4) Drying of newly manufactured fireworks or pyrotechnic articles or their compositions
(5) Packing of finished fireworks or pyrotechnic articles
(6) Any combination of these operations

A.3.3.9.10 Unoccupied Building. An unoccupied building can be used for long-term storage of materials acceptable to the AHJ, provided that no fireworks or pyrotechnic composition is stored within the building.

A.3.3.13 Comet. A comet is not a shell or mine. Comets frequently leave a trail of sparks as they rise in the air, and they sometimes burst into smaller fragments at their zenith. [**1123**, 2006]

A.3.3.19 Consumer Fireworks Retail Sales (CFRS) Stand. Stands can include, but are not limited to, small buildings, plywood or sheet metal structures, manufactured buildings, semitrailers, trailers, shipping containers, or similar structures or facilities.

A.3.3.22 Covered Fuse. The purpose of the covered fuse is to minimize the accidental ignition of fireworks in a retail display by a lighted cigarette or a match, a cigarette lighter, or similar small open flame, as well as to reduce the potential for the rapid involvement of fireworks in, and the subsequent acceleration of, a fire originating within a retail display of consumer fireworks.

Protection of the fuse can be provided by means of tape covering the exposed (ignitable) end of a safety fuse or by covering the fuse or the entire fireworks device or group of fireworks devices with paper, plastic, cardboard, paperboard, or similar or equivalent materials.

Examples of covered fuses of fireworks devices include those contained within packaged assortments, multi-item packages, and similar retail merchandise arrangements that are displayed within unopened and unperforated containers so that they are not exposed to view, or they are covered with, or are contained within, plastic wrap, paper, paperboard, cardboard, or other types of wrapping or packaging materials designed to prevent the fuses from coming into direct contact with an ignition source.

A.3.3.25 DOT-Approved Packaging. DOT-approved packaging for consumer fireworks typically consists of sealed fiberboard cartons that have been tested and certified to meet the performance requirements specified in Part 178 of 49 CFR. Cartons are required to be marked and labeled in compliance with DOT regulations to indicate that fireworks are contained in the packagings.

A.3.3.27 Explosive. This term includes but is not limited to dynamite, Black Powder, pellet powder, initiating explosives, detonators, safety fuses, squibs, detonating cord, igniter cord, and igniters. The term *explosive* includes any materials determined to be within the scope of 18 USC Chapter 40, "Importation, Manufacture, Distribution, and Storage of Explosive Materials," and also includes any materials classified as an explosive by the Hazardous Materials Regulations of the U.S. Department of Transportation (U.S. DOT). See Annex E.

A.3.3.29.3 Manufacturing Facility. The following operations are not considered to be manufacturing where performed in a separate building or area:

(1) Assembly of display pieces from finished pyrotechnic articles classified as Explosive 1.4
(2) Minor repairs or modification of consumer fireworks not involving exposed pyrotechnic material
(3) Packing of finished consumer fireworks into consumer fireworks assortments
(4) Attachment of electric matches and minor repairs to display fireworks and pyrotechnic articles

A.3.3.30 Fireworks. Toy caps for use in toy pistols, toy canes, toy guns, and novelties and trick noisemakers are not considered to be fireworks *(see Annex C)*. The regulations referred to limit the explosive content of each toy cap to not more than an average of 0.25 gr (16.2 mg). Also, each package containing such caps has to be labeled to indicate the maximum explosive content per cap. For information on the use of model rockets and model rocket motors, see NFPA 1122, *Code for Model Rocketry*. For information on the use of high power rockets and high power rocket motors, see NFPA 1127, *Code for High Power Rocketry*. Model rockets, model rocket motors, high power rockets, and high power rocket motors designed, sold, and used for the purpose of propelling recoverable aero models are not considered to be fireworks.

A.3.3.30.1 Consumer Fireworks. Consumer fireworks are normally classified as Explosives, 1.4G and described as Fireworks, UN 0336 by the U.S. Department of Transportation (U.S. DOT) *(see Annex C)*. Some small devices designed to produce audible effects are included, such as whistling devices, ground devices containing 0.8 gr (50 mg) or less of explosive composition (salute powder), and aerial devices containing 2 gr (130 mg) or less of explosive composition (salute powder) per explosive unit. Consumer fireworks that comply with the construction, chemical composition, and labeling regulations of the U.S. DOT for fireworks, 49 CFR 172, and the U.S. Consumer Product Safety Commission (CPSC) as set forth in CPSC 16 CFR 1500 and 1507, are not considered to be explosive materials for purposes of this code.

A.3.3.30.2 Display Fireworks. Display fireworks are described as Fireworks, UN0335 and are classified as Explosives, 1.3G by the U.S. Department of Transportation (U.S. DOT) *(see Annex C)*.

Display fireworks include, but are not limited to, the following:

(1) Salutes or firecrackers containing more than 2 gr (130 mg) of explosive composition (salute powder)
(2) Aerial shells containing more than 2.1 oz (60 g) of total pyrotechnic and explosive composition
(3) Other display pieces that exceed the limits for classification as consumer fireworks

Such fireworks are also described as fireworks, 49 CFR 172 by the U.S. DOT.

A.3.3.37 Manufacturing. The following operations are not considered to be manufacturing where performed in a separate building or area:

(1) Assembly of display pieces from finished pyrotechnic articles classified as Explosive 1.4
(2) Minor repairs or modification of consumer fireworks not involving exposed pyrotechnic material
(3) Packing of finished consumer fireworks into consumer fireworks assortments
(4) Attachment of electric matches and minor repairs to display fireworks and pyrotechnic articles

A.3.3.39.2 Bullet-Sensitive Explosive Material. The test material is at a temperature of 70°F to 75°F (21°C to 24°C) and is placed against a ½ in. (12.7 mm) steel plate.

A.3.3.39.5 Pyrotechnic Material (Pyrotechnic Special Effects Material). Such a chemical mixture consists predominantly of solids capable of producing a controlled, self-sustaining, self-contained exothermic chemical reaction that results in heat, gas, sound, or light, or a combination of these effects. The chemical reaction functions without external oxygen.

A.3.3.41 Mercantile Occupancy. Mercantile occupancies include the following:

(1) Auction rooms
(2) Department stores
(3) Drugstores
(4) Restaurants with fewer than 50 persons
(5) Shopping centers
(6) Supermarkets

Office, storage, and service facilities incidental to the sale of merchandise and located in the same building should be considered part of the mercantile occupancy classification. [*5000*, 2006]

A.3.3.42 Mine. A mine is not an aerial shell or a comet. [**1123**, 2006]

A.3.3.48 Novelties. For further information, see Annex C.

A.3.3.49 Oxidizer. Where such a chemical decomposes, it releases oxygen. In addition to ionic solids, an oxidizer can be a material having covalent molecules containing halogen atoms. An oxidizer is an ingredient of pyrotechnic materials.

A.3.3.50 Packaged Fireworks Merchandise. Packaged fireworks merchandise is generally fireworks items or groups of fireworks items that have been packaged by the manufacturer or distributor before they are offered for sale to the consumer. The packaging arrangement completely encapsulates the fireworks item or items within paperboard, cardboard, plastic wrap, or similar materials or combinations of materials. Such encapsulation ensures that a person must puncture, tear, unseal, or break open the package or otherwise damage or destroy the packaging materials in order to gain access to, and directly handle, each individual fireworks item to expose its fuse.

A.3.3.60 Pyrotechnic Laboratory. A pyrotechnic laboratory typically processes small batches of chemicals and compositions, manufactures prototypes, or conducts a variety of tests and analyses. See 3.3.9.7, *Process Building*, and 4.6.9.

A.3.3.72 Stars. Stars burn while in the air, producing color or streamer effects.

A.3.3.74 Store. Stores are subclassified as Class A, Class B, or Class C in accordance with NFPA *101, Life Safety Code*. For informational purposes, 36.1.4.2, *Subclassification of Occupancy*, is reprinted from NFPA *101* in Figure A.3.3.74.

A.4.5.2 For information on the use of conductive surfaces to minimize the hazard of static electricity, see 20.3.6 of NFPA 99, *Standard for Health Care Facilities*.

A.4.5.5.1 In general, the wall having the largest area should be chosen to provide explosion relief. The entire area of the wall should be utilized. The term *weakwall* is used to describe the relative strength of the explosion-relieving wall as compared to the rest of the building.

A.4.6.3.1 The use of barricades is highly recommended.

A.4.7 The maximum quantity of salute powder that is permitted in any process building or area is 10 lb (4.5 kg).

36.1.4.2 Subclassification of Occupancy.

36.1.4.2.1 Mercantile occupancies shall be subclassified as follows:

(1) Class A, all mercantile occupancies having an aggregate gross area of more than 30,000 ft² (2800 m²) or occupying more than three stories for sales purposes
(2) Class B, all mercantile occupancies of more than 3000 ft² (280 m²), but not more than 30,000 ft² (2800 m²), aggregate gross area and occupying not more than three stories for sales purposes
(3) Class C, all mercantile occupancies of not more than 3000 ft² (280 m²) gross area and used for sales purposes occupying one story only

36.1.4.2.2 For the purpose of the classification required in 36.1.4.2.1, the requirements of 36.1.4.2.2.1, 36.1.4.2.2.2, and 36.1.4.2.2.3 shall be met.

36.1.4.2.2.1 The aggregate gross area shall be the total gross area of all floors used for mercantile purposes.

36.1.4.2.2.2 Where a mercantile occupancy is divided into sections, regardless of fire separation, the aggregate gross area shall include the area of all sections used for sales purposes.

36.1.4.2.2.3 Areas of floors not used for sales purposes, such as an area used only for storage and not open to the public, shall not be counted for the purposes of the classifications in 36.1.4.2.1(1), (2), and (3), but means of egress shall be provided for such nonsales areas in accordance with their occupancy, as specified by other chapters of this *Code*.

FIGURE A.3.3.74 Subclassification of Occupancy. [*101*:36.1.4.2]

A.4.8.2 Where sufficient separation distances exist, the Regional Director of the Bureau of Alcohol, Tobacco and Firearms can grant a variance from this requirement upon written request.

A.4.9.2.3 Smoking materials include matches, lighters, cigarettes, cigars, and pipes.

A.4.9.5 Care should be exercised because some oxidizers are mutually incompatible. The NFPA *Fire Protection Guide to Hazardous Materials*, which contains the former NFPA 491, *Guide to Hazardous Chemical Reactions*, lists many oxidizers and other materials that result in hazardous interactions. Oxidizers commonly include nitrates, chlorates, and perchlorates.

A.4.9.6 Where practicable, nonsparking machinery and tooling should be used. To the extent practical, ferrous metals should be covered with nonsparking coatings such as epoxy paint.

A.4.11 For information on fireworks classification testing, contact the following agencies:

(1) U.S. Bureau of Mines, Columbia Plaza, 2401 E Street, NW, Washington, DC 20241.
(2) Bureau of Explosives, c/o Association of American Railroads, 50 F Street, NW, Washington, DC 20001.

A.4.12.1 This requirement minimizes personnel exposure and is distinct from any requirement on maximum building occupancy that might exist in local ordinances. One method for assessing the number of people necessary to conduct production operations is to perform a process hazard analysis as required by OSHA's *Process Safety Management Standard*, Title 29 CFR 1910.119.

A.4.14.5.2 Markings should be on the device, unless it is too small to do so conspicuously. If too small, a tag or label on the package with the information should be marked conspicuously.

Aerial shells, comets, or mines should be marked with the size according to A.4.14.5.2(3). Roman candles and multiple tube devices should be described by the inside diameter of their tubes.

The warnings should be in bold letters that are easily discernable from the rest of the markings.

A.4.14.5.2(3) As a minimum, each shell should bear a label containing the following information:

(1) Description of the size of the shell [e.g., 3 in. (76 mm) shell]
(2) Description of the type of shell (e.g., 2-break with report)
(3) Warning statement that reads as shown in Figure A.4.14.5.2(3)(a).
(4) Name and location of the business of the manufacturer, importer, or distributor, with conspicuous labeling as follows:
   (a) The statement should be printed in capital letters at least ⅛ in. (3 mm) high and be underlined as shown in Figure A.4.14.5.2(3)(b).
   (b) The remaining printed matter does not need to be printed in capital letters, but the letters should be at least ⅛ in. (3 mm) high.
   (c) The required statements should be printed in a color that contrasts sharply with the background and should be printed within a borderline.
   (d) The label should be at least 9 in.^{2} (58 cm^2), unless the size of the shell is too small to accommodate a label of such size, in which case the label should be reduced to a size no smaller than necessary.

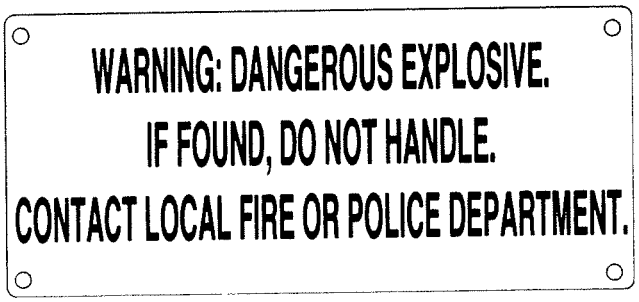

FIGURE A.4.14.5.2(3)(a) Warning Statement on Shell.

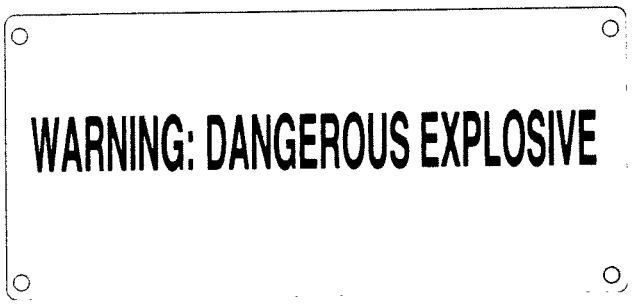

FIGURE A.4.14.5.2(3)(b) Warning Statement Following Manufacturer, Importer, or Distributor Data.

A.5.3.1(3) A bullet-resistant roof should be constructed according to any of the specifications in Annex B. A bullet-resistant ceiling should be constructed at the eave line, covering the entire area of the magazine, except for the necessary ventilation space. Examples of bullet-resistant ceiling construction include the following:

(1) Any construction meeting the specifications in Annex B
(2) A sand tray having a sand depth of at least 4 in. (101.6 mm)

A.5.4.2 Corresponding grades and brands of explosive materials should be stored together so that brand and grade markings are readily visible. All stock should be stored so it can be easily counted and checked.

A.5.4.3 Where explosive materials are removed from the magazine for use, the oldest stock should be used first.

A.5.4.5 Open containers of explosive materials should be closed securely before they are returned to a magazine. No container without a closed lid should be stored in a magazine.

A.5.6.3 Net weight equals the net weight of all pyrotechnic and explosive compositions and fuse only. For display fireworks, approximately 50 percent of the gross weight of the fireworks equals the net weight of composition and fuse.

A.5.7.9 Tools, equipment, supplies, and documents can include, but not be limited to, empty cartons, packing materials, labels, marking pens, tape and other shipping and receiving supplies, scales, carts, pallet jacks, pallets, crates, conveyors and stands, box cutters or knives, dispensers, brooms, dustpans, bills of lading, shipping papers and documents, packing slips, orders, invoices, and inventory records.

A.6.1.1 Requirements for consumer fireworks stored in conjunction with the retail sales of consumer fireworks at a CFRS facility or store should be in accordance with Chapter 7, Retail Sales of Consumer Fireworks.

A.6.1.6 Devices that are lacking labeling, ornamentation, or bases are considered to be finished for the purposes of Chapter 6.

A.6.2.7 The American Fireworks Safety Laboratory (AFSL) is an independent third-party testing agency recognized by the Consumer Product Safety Commission (CPSC) as an acceptable testing agency for consumer fireworks.

A.6.5.1 Where consumer fireworks storage buildings are subdivided with fire walls meeting the requirements of *NFPA 5000, Building Construction and Safety Code*, so that no area exceeds 12,000 ft^2 (1114 m^2), an automatic sprinkler system is not required because each area is considered a separate building.

A.6.6 An approved fire apparatus access is generally considered to be a paved road or other suitable all-weather surface, such as gravel or compacted earth, that can accommodate a typical fire department vehicle such as a pumper. Such access is not required to be a public street or alley, but it is to be laid out and designed so that it can be readily used by the responding fire department under all weather conditions without unduly impeding the fire department's access to the building or facility.

A.6.7.1 In jurisdictions where a local building code is adopted and enforced, separation distances are usually measured to property lines, except where there are two or more buildings located on the same property. In that case, an imaginary or assumed property line is generally assumed to be located somewhere between the buildings for the purpose of determining the required separation distance between the

buildings. Otherwise, the buildings can be treated as one building for the purpose of applying building code requirements or the requirements in Chapter 6. However, it is the intent of this section to specify the minimum separation distance necessary to minimize the propagation of fire by transmission of ejected burning materials. This distance is required between buildings, not between buildings and property lines whether real, imagined, or assumed.

A.6.10 Extension cords should be approved and listed, minimum 14 gauge.

A.6.11.4 Where pile heights exceed 12 ft (3.7 m), aisle widths should be increased proportionally so as to maintain the 4:1 ratio between pile height and aisle width.

A.6.11.7 The operator of each consumer fireworks storage or work building or area should train employees at least once a year using the written emergency response plan.

A.7.1 The content of Chapter 7 has been extensively reorganized in this edition in order to provide all the requirements for a specific facility or store type to appear in one section of the chapter. To facilitate use of this chapter for those familiar with the 2003 code, a guide to this reorganization has been provided in Annex H.

A.7.1.1 To assist the user of this code in determining whether a CFRS facility or store is new or existing for the purpose of applying this code, Table A.7.1.1 has been provided.

A.7.2.2 This requirement is not intended to preclude the retail sales of consumer fireworks in occupancies that might be classified as Group H High Hazard (Hazardous) by a building code.

A.7.3.2 Specific information and requirements for permits can be found in Section 1.12, NFPA 1, *Uniform Fire Code*, for those jurisdictions that have not adopted a building code or fire code.

A.7.3.4 See A.6.6.

A.7.3.13 Fire safety and evacuation plans should be prepared by the owner or operator of the consumer fireworks retail sales facility or store in consultation with the AHJ.

A.7.3.14.3.2 The purpose of 7.3.14.3.2 is to ensure that a readily available path of travel is provided to reach the required exits and that such travel can occur under emergency conditions without significant impedance by the aisle arrangement. In fact, cross-aisles are required to facilitate access to alternate aisles and paths of travel in case an aisle or a path of travel is blocked by an incident. An example of how the requirements of 7.3.14.3.2 would be implemented for the design of an exit access aisle system in a CFRS facility is shown in Figure A.7.3.14.3.2.

A.7.3.15 Consumer fireworks sealed in packaging meeting U.S. DOT standards for shipping would not be considered to be on display.

A.7.3.15.2 The ability to view the entire retail sales area is important for several reasons. For employees, such visibility allows easier supervision of the customers and helps to minimize the possibility of malicious mischief, such as the willful setting of fires in the fireworks merchandise displays. It also allows employees to quickly observe and respond to an incipient fire condition. Response might include the following:

(1) Evacuation of the occupants
(2) Notification of the local fire department
(3) Initiation of a fire attack using the fire extinguishers in the facility, provided that the fire is still small enough

Table A.7.1.1 Applicability of Chapter 7 to New and Existing CFRS Facilities and Stores

Venue Type	Application
Temporary stand – seasonal	New
Temporary tent – seasonal	New
Temporary facility – seasonal	New
Temporary stores (including bulk retail) – seasonal	New
Permanent stand*	
– Year round	Existing
– Seasonal	Existing
Permanent stand†	
– Year round	New
– Seasonal	New
Permanent tent*	
– Year round	Existing
– Seasonal	Existing
Permanent tent†	
– Year round	New
– Seasonal	New
Permanent CFRS facility*	
– Year round	Existing
– Seasonal	Existing
Permanent CFRS facility†	
– Year round	New
– Seasonal	New
Permanent store*	
– Year round	Existing
– Seasonal	Existing
Permanent store†	
– Year round	New
– Seasonal	New

Note: Change in display or exit layout can require new permit based on local requirements.
* Sales conducted within 1 year prior to the effective date.
† Sales not conducted within 1 year prior to the effective date.
CFRS facility – consumer fireworks retail sales facility

For the customers, such visibility allows them also to quickly see a developing fire condition and react accordingly. Exits and their corresponding paths of travel are more easily observed, thus minimizing panic and facilitating evacuation in a timely manner. Full visibility can be easily achieved by keeping the height of displays and displayed merchandise within the retail sales area below adult eye level. Where displays located around the perimeter of the retail sales area do not impact the ability to view the area, it is not necessary to limit their height. However, if it is desirable to have higher displays of merchandise within the retail sales area, equivalent means of achieving full visibility should be employed, such as the use of unobstructed surveillance mirrors strategically located throughout the sales area or the addition of more employees who can walk the sales floor and monitor the customers.

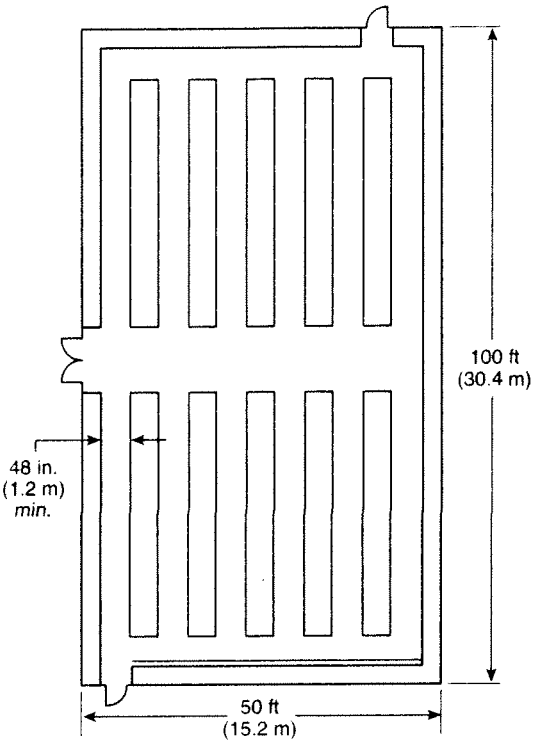

FIGURE A.7.3.14.3.2 Typical Design for Exit Access Aisle System in CFRS Facility.

A.7.3.15.3 Flame breaks can be constructed of any of the following:

(1) Sheet steel
(2) Sheet aluminum not less than 0.010 in. (0.25 mm) thick
(3) Hardboard not less than ⅛ in. (3 mm) thick
(4) Gypsum board not less than ⅜ in. (10 mm) thick
(5) Wood panels not less than ⅛ in. (3 mm) thick
(6) Plywood not less than ¼ in. (6 mm) thick
(7) Particleboard not less than ¼ in. (6 mm) thick
(8) Cement fiberboard
(9) Plastic laminate not less than ⅛ in. (3 mm) thick
(10) Safety glass not less than ⅛ in. (3 mm) thick
(11) Other approved material

Where installed within a retail display fixture containing consumer fireworks, the flame break should impede or retard the rapid spread of an incipient fire involving the fireworks and their packaging materials as any of the following occurs:

(1) The fire progresses along a display level or shelf.
(2) The fire attacks another display level or shelf above.
(3) The fire attacks another display fixture abutting the display fixture of origin.

As a result of installing flame breaks to impede fire spread, the quantity and rate of smoke production can be retarded as well. Thus, flame breaks can provide the building occupants with additional time to react to an incipient fire and safely evacuate the building. See Figure A.7.3.15.3.

A.7.3.15.3.3 The purpose of specifying packaged fireworks merchandise is to permit such merchandise to be used in longer lengths of displays of consumer fireworks without the installation of a flame break. It is presumed that packaged fireworks merchandise does not readily ignite when exposed to a fire developing within the retail display area merchandise and does not readily contribute to or accelerate a fire that might spread along the surface of a display. See Figure A.7.3.15.3.3. Since the purpose of a flame break is to slow down the rapid spread of a fire involving a retail display of consumer fireworks to allow occupants time to react and evacuate the immediate area, properly packaged fireworks merchandise can also serve the purpose of a flame break. For a description of packaged fireworks merchandise, see A.3.3.22, Covered Fuse.

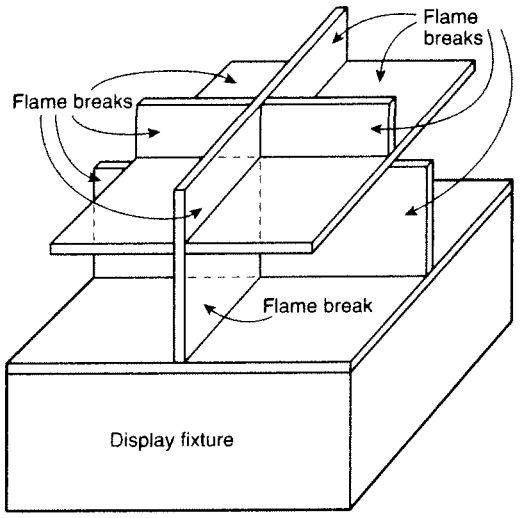

FIGURE A.7.3.15.3 Flame Break Design.

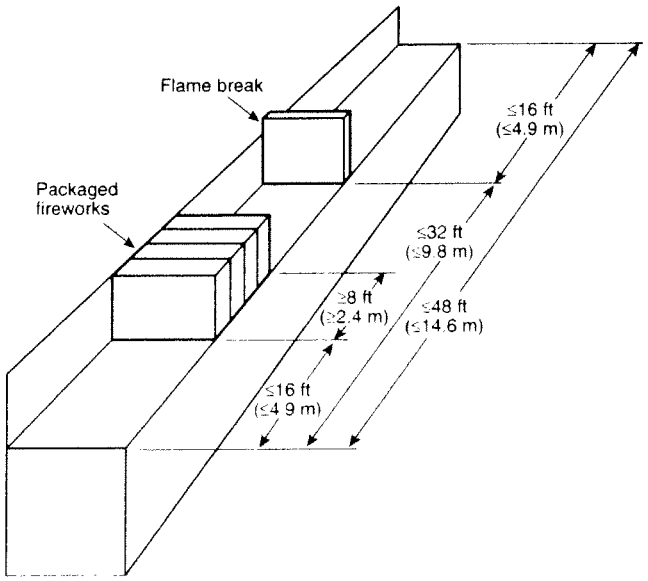

FIGURE A.7.3.15.3.3 Packaged Fireworks Merchandise and Flame Break Requirements.

A.7.3.15.6 This section describes performance criteria for how aerial devices, which are described in C.3.1.2, are to be packaged, displayed, and restrained as needed, depending upon the device and the manner in which it is packaged and displayed. Thus, upon ignition by a fire in the retail sales display area containing devices, the resultant effect of the ejection of pyrotechnic components will be reasonably limited so as not to pose an undue threat to evacuating occupants or to cause rapid spread of the fire to areas remote from the immediate area of the fire.

The method and manner of packaging and displaying aerial devices have been demonstrated to be effective in accomplishing the intent of this section. This performance criterion could also be met by enclosing consumer fireworks within bins. The packaging material itself can be designed to contain the consumer fireworks. The placement and arrangement of the aerial devices within the packages or within bins or on shelves are also important factors. Other containment methods include fastening aerial devices together, restraining their movement with packaging materials, or placing aerial devices or packages of aerial devices within racks, containers, holders, or other structures.

A.7.3.15.7 Arrangement of horizontal plywood barriers should be as shown in Figure A.7.3.15.7.

A.7.3.21 Refer to Material Safety Data Sheet (MSDS) for additional information.

A.7.3.22 Training might be required by the U.S. Department of Transportation or the Occupational Safety and Health Administration as applicable for the purpose of being employed in the operation of a CFRS or storage facility.

A.7.4.8.1.2 NFPA 102, *Standard for Grandstands, Folding and Telescopic Seating, Tents, and Membrane Structures*, has been referenced for the purpose of determining the requirements for the means of egress in tents and membrane structures except as modified by 7.3.14 of this code for special requirements for the retail sales of consumer fireworks. It should be noted that although 9-2.5 of NFPA 102 prohibits fireworks in any tent or temporary membrane structure, the intent is to prohibit the use, discharge, or ignition of fireworks within the tent or temporary membrane structure because unauthorized open flames are also prohibited in the same section. Consumer fireworks in and of themselves do not pose an unusual fire hazard when they are stored or placed on display for retail sales within a tent or temporary membrane structure unless they are actually ignited or discharged. Chapter 7 in this code contains several provisions that specifically deal with how fireworks can be safely displayed or stored in tents or temporary membrane structures for the purpose of selling them at retail. Those requirements are an effort to minimize the fire hazard associated with such fireworks.

A.7.4.9.2.4 See NFPA 30, *Flammable and Combustible Liquids Code*, for the separation distances.

A.7.5.1.1 Preliminary results of recent full scale fire tests indicate that automatic sprinkler systems designed for an Ordinary Hazard, Group 2 occupancy in accordance with NFPA 13, *Standard for the Installation of Sprinkler Systems*, might be suitable for protecting retail displays of consumer fireworks where the ceiling height does not exceed 10 ft (3.1 m) and might also be adequate for ceiling heights up to 16 ft (4.9 m). This implies that there may be a need to design the sprinkler system in new buildings for an Extra Hazard, Group 1 occupancy for ceiling

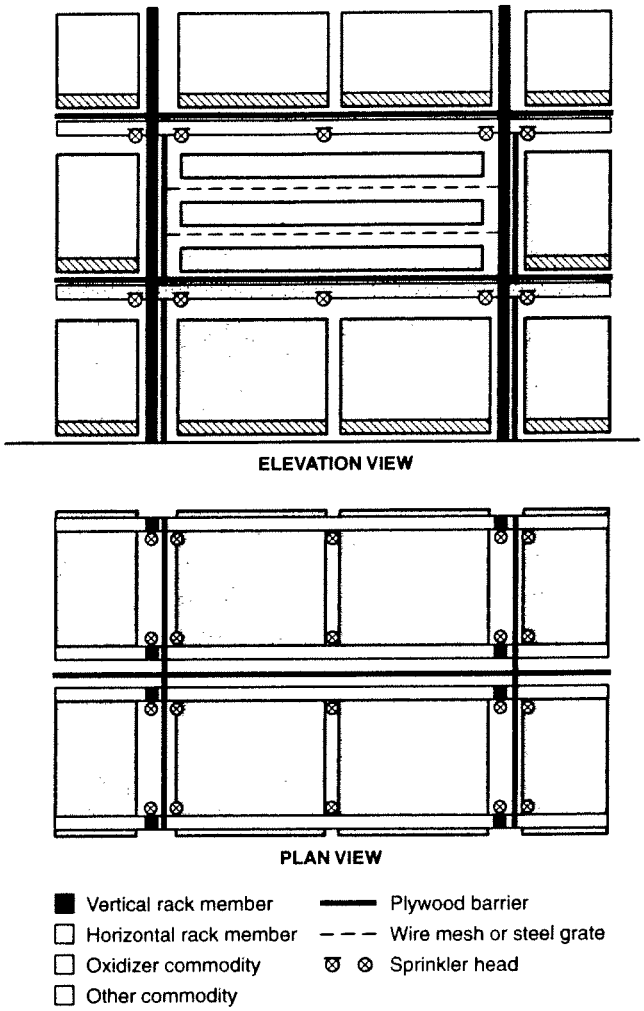

FIGURE A.7.3.15.7 Arrangement of Horizontal Barrier Separating Combustible Materials and Consumer Fireworks.

heights greater than 16 ft (4.9 m). For existing buildings, existing sprinkler systems designed for an Ordinary Hazard, Group 2 occupancy should suffice. Until such time as additional fire testing is completed and more conclusive design criteria can be verified, designers of automatic sprinkler systems for areas where retail sales of consumer fireworks are located may want to consider these design criteria. For additional information contact the American Pyrotechnics Association (APA), PO Box 30438, Bethesda, MD 20824.

A.7.5.1.2(3) This item describes performance criteria for how consumer fireworks displayed for sale in stores are to be packaged and displayed and restrained as needed, depending upon the device and the manner in which it is packaged and displayed. Thus, upon ignition by a fire in the retail sales display area containing consumer fireworks, the resultant effect of the ejection of pyrotechnic components will be reasonably limited so as not to pose an undue threat to evacuating occupants or to cause rapid spread of the fire to areas remote from the immediate area of the fire. The method and manner of packaging and displaying consumer fireworks have been demonstrated to be effective in accomplishing the intent of this section. The performance criteria might also be met by enclosing consumer fireworks within bins.

The packaging material itself can be designed to contain the consumer fireworks. The placement and arrangement of the consumer fireworks within the packages or within bins or on shelves are also important factors. Other containment methods include fastening consumer fireworks together, restraining their movement with packaging materials, or placing consumer fireworks or packages of consumer fireworks within racks, containers, holders, or other structures.

Annex B Magazine Construction

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

B.1 General. Magazines constructed in accordance with the following minimum specifications are approved as bullet resistant. All steel and wood dimensions are actual thickness; concrete block and brick dimensions are nominal.

B.2 Steel Exterior. The steel exterior of a magazine should be constructed of one of the following:

(1) ⅜ in. (16 mm) steel with an interior lining of nonsparking material
(2) ½ in. (13 mm) steel with an interior lining of at least ⅜ in. (9.5 mm) plywood
(3) ⅜ in. (9.5 mm) steel lined with one of the following materials:
  (a) 2 in. (51 mm) hardwood
  (b) 3 in. (76.2 mm) softwood
  (c) 2 in. (51 mm) plywood
(4) ¼ in. (6.4 mm) steel lined with one of the following materials:
  (a) 3 in. (76.2 mm) hardwood
  (b) 5 in. (127 mm) softwood
  (c) 5¼ in. (133.4 mm) plywood
  (d) 1½ in. (38.1 mm) plywood with an intermediate layer of 2 in. (51 mm) of hardwood
(5) 3/16 in. (4.8 mm) steel lined with one of the following materials:
  (a) 4 in. (101.6 mm) hardwood
  (b) 7 in. (177.8 mm) softwood
  (c) 6¾ in. (171.5 mm) plywood
  (d) ¾ in. (19.1 mm) plywood with an intermediate layer of 3 in. (76.2 mm) of hardwood
(6) ⅛ in. (3.2 mm) steel lined with one of the following materials:
  (a) 5 in. (127 mm) hardwood
  (b) 9 in. (228.6 mm) softwood
  (c) ¾ in. (19.1 mm) plywood with an intermediate layer of 4 in. (101.6 mm) of hardwood
  (d) Two layers of ¾ in. (19.1 mm) plywood with an intermediate layer of 3⅝ in. (92.1 mm), well-tamped, dry sand or sand/cement mixture

B.3 Fire-Resistant Exterior. The exterior of any type of fire-resistant material in a magazine should include one of the following to be considered structurally sound:

(1) Interior lining of ½ in. (13 mm) plywood placed securely against an intermediate 4 in. (101.6 mm) thick layer of solid concrete block, solid brick, or solid concrete
(2) Interior lining of ¾ in. (19.1 mm) plywood and all of the following:
  (a) A first intermediate layer of ¾ in. (19.1 mm) plywood
  (b) A second intermediate layer of 3⅝ in. (92.1 mm), well-tamped, dry sand or sand/cement mixture
  (c) A third intermediate layer of ¾ in. (19.1 mm) plywood
  (d) A fourth intermediate layer of 2 in. (51 mm) hardwood or 14 gauge steel
(3) Intermediate 6 in. (152.4 mm) space filled with well-tamped, dry sand or sand/cement mixture

B.4 Masonry Exterior. The masonry exterior of a magazine should be constructed of one of the following:

(1) Standard 8 in. (203.2 mm) concrete block with voids filled with well-tamped, dry sand or sand/cement mixture
(2) Standard 8 in. (203.2 mm) solid brick
(3) Solid concrete of 8 in. (203.2 mm)
(4) Two layers of 4 in. (101.6 mm) concrete block

Annex C Extract from American Pyrotechnics Association Standard 87-1, Standard for Construction and Approval for Transportation of Fireworks, Novelties, and Theatrical Pyrotechnics

This annex is not a part of the requirements of this NFPA document but is included for informational purposes only. The annex is an extract of the 2001 edition of APA 87-1.

C.1 Introduction.

C.1.1 This Standard provides manufacturers, importers, and distributors of fireworks and novelties with information to assist them in manufacturing, testing, shipping, and labeling the products of the fireworks industry in accordance with applicable federal laws and current good manufacturing practices. (GMPs). Paragraphs in this Standard which apply to the approval by the U.S. Department of Transportation (DOT) for transportation of fireworks are indicated by a dagger [†] at the end of the appropriate paragraphs. [†]

C.1.2 The information in this Standard should enable manufacturers, importers, and distributors of fireworks and novelties to provide their customers with products that can be transported and used safely and without unreasonable risk. [†]

C.1.3 Fireworks, pyrotechnic articles for theatrical purposes, and novelties are not acceptable for transportation within the jurisdiction of the United States unless they are classed, packaged, labeled, and marked and are in proper condition for shipment in accordance with DOT regulations in Title 49, CFR. *(See Section C.5 of this annex for further discussion.)* [†]

C.1.4 Consumer fireworks (fireworks classed as 1.4G and 1.4S) (formerly Fireworks, Common) and novelties are not acceptable for sale to the public unless they are manufactured, labeled, and sold in conformance with the regulations of the U.S. Consumer Product Safety Commission (CPSC) published in Title 16, CFR. *(See Section C.3 of this annex for further discussion.)* [†]

Note: Consumer Fireworks are normally classed as 1.4G but may be classed by DOT as 1.4S on the basis of examination and testing in accordance with Title 49, CFR, 173.56.

C.1.5 United States laws and regulations prescribe mandatory requirements that a person must follow in order to market certain products. In these instances, failure to comply may be regarded by courts as negligence *per se* in product liability litigation. [†]

C.1.6 This Standard applies to fireworks devices, pyrotechnic articles, and novelties for entertainment purposes. [†]

C.2 Definitions.

C.2.1 Approval. For purposes of this Standard, approval means the assignment of proper hazard class, EX (explosives approval) number, proper shipping name, and UN (United Nations) identification number by DOT so that fireworks and novelties may be transported under conditions specified in Title 49, CFR. *(See Section C.5 of this annex for details.)* [†]

C.2.2 Black Match (Instantaneous Fuse). An uncovered fuse made from thread impregnated with Black Powder and used for igniting pyrotechnic devices. Black match may be classed as 1.3G and described as Fuse, non-detonating, UN0101, under the provisions of this Standard. For any other classification, examination and testing as specified in Title 49, CFR, 173.56, CFR is required. *(See also Quick Match.)* [†]

C.2.3 Blowout. The unintended release of a pressure effect from other than the intended orifice of a fireworks device. Examples include expulsion of the bottom plug of a roman candle, expulsion of the clay choke of a fountain, or the rupturing of the wall of a mine or shell. [†]

C.2.4 Burnout. The unintended escape of flame through the wall of a pyrotechnic chamber during functioning of a fireworks device. [†]

C.2.5 Burst Charge. Chemical composition used to break open a fireworks device after it has been propelled into the air, producing a secondary effect such as a shower of stars. Burst charge is also sometimes referred to as expelling charge or break charge. Any burst charge containing metallic powder (such as magnalium or aluminum) less than 100 mesh in particle size, is considered to be intended to produce an audible effect, and is limited to 130 mg in 1.4G fireworks devices. Burst charge consisting of Black Powder or equivalent non-metallic composition is not considered to be intended to produce an audible effect when it is used to expel and ignite a secondary effect in a fireworks device. Burst charge for use in 1.3G fireworks is limited to Black Powder (potassium nitrate, sulfur, and charcoal) or similar pyrotechnic composition without metallic fuel for approval under the provisions of this Standard. [†]

C.2.6 Chemical Composition. All pyrotechnic and explosive composition contained in a fireworks device. Inert materials such as clay used for plugs, or organic matter such as rice hulls used for density control are not considered to be chemical composition. [†]

C.2.6.1 Explosive Composition. Any chemical compound or mixture, the primary purpose of which is to function by explosion, producing an audible effect (report) in a fireworks device. [†]

C.2.6.2 Pyrotechnic Composition. A chemical mixture which on burning, and without explosion, produces visible or brilliant displays or bright lights, or whistles or motion. [†]

C.2.7 Fireworks. Any device, other than a novelty or theatrical pyrotechnic article, intended to produce visible and/or audible effects, by combustion, deflagration, or detonation. Fireworks are further described as Fireworks UN0336 (formerly Common Fireworks and now referred to in this Standard as Consumer Fireworks) or Fireworks UN0335 (formerly Special Fireworks and now referred to in this Standard as Display Fireworks). Fireworks may also be described as Fireworks UN0337 if examination and testing in accordance with Title 49, CFR, 173.56 is performed that warrants that classification. [†]

Note: Propelling and expelling charges consisting of a mixture of sulfur, charcoal, and potassium nitrate (saltpeter or similar pyrotechnic compositions not containing metal powders) are not considered as designed to produce audible effects.

C.2.7.1 Consumer Fireworks (formerly Common Fireworks). Any fireworks device in a finished state, exclusive of mere ornamentation, suitable for use by the public that complies with the construction, performance, composition, and labeling requirements promulgated by CPSC in Title 16, CFR, in addition to any limits and other requirements of this Standard. *(See Section C.3 of this annex for details.)* [†]

C.2.7.2 Display Fireworks (formerly Special Fireworks). Fireworks devices in a finished state, exclusive of mere ornamentation, primarily intended for commercial displays which are designed to produce visible and/or audible effects, by combustion, deflagration or detonation, including, but not limited to: salutes containing more than 130 mg (2 grains) of explosive composition; aerial shells containing more than 40 g of chemical composition exclusive of lift charge; and other exhibition display items that exceed the limits contained in this Standard for consumer fireworks. Certain devices intended for signaling, illuminating, and incendiary purposes and formerly classed as Special Fireworks no longer fall into this fireworks category. *(See Section C.4 of this annex for details.)* [†]

C.2.8 Electric Match (Igniter). A device used for the electrical ignition of fireworks and pyrotechnic articles that contains a small amount of pyrotechnic material that ignites when a specified electric current flows through the leads. [†]

C.2.9 Labeling. A display of written, printed, or graphic matter upon a fireworks device and/or upon the immediate package of any such device(s). Included are diamond-shaped labels required by DOT to be displayed on outside packaging for transportation purposes. The term also includes any identification, cautions, and other information required by this Standard or by any federal government agency. [†]

C.2.10 Lift Charge. Pyrotechnic composition used to propel a component of a mine or shell device into the air. Lift charge is limited to Black Powder (potassium nitrate, sulfur, and charcoal) or similar pyrotechnic composition without metallic fuel. [†]

C.2.11 Marking. The application of the proper shipping name, identification number (UN number), instructions, cautions, weight, or specification mark or combination thereof to a package of hazardous material. Marking also includes any required specification mark on a shipping package. [†]

C.2.12 Novelty. A device containing small amounts of pyrotechnic and/or explosive composition. Such devices produce limited visible or audible effects. These items must be approved by DOT and are normally classed as 1.4G. A different classification may be assigned based on testing and examination as specified in Title 49, CFR, 173.56. Certain novelties which meet the criteria specified in C.3.2 are not regulated as explosives, and approval by DOT is not required for those specific items. [†]

C.2.13 Placard. A warning symbol of a square-on-point configuration mounted on each side and each end of a truck, rail car or freight container which informs the public and emergency personnel of the hazardous nature of the cargo, as specified in Title 49, CFR, 172. [†]