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CODE CORNER

ABOUT CODE CORNER

CCFS would like to remind you to check with your local "Authority Having Jurisdiction (AHJ)" for questions and opinions concerning your local Fire and Building Codes. The information contained in this article is supplied as a courtesy by the International Code Council (ICC) and is based on the International Fire and Building Codes and their respective commentaries. Your local codes or ordinances may vary.

CHAPTER 33: EXPLOSIVES AND FIREWORKS

General Comments

Fireworks regulation is one of the most controversial and hotly debated topics in American fire protection. The National Fire Protection Association (NFPA) and U.S. Consumer Product Safety Commission (CPSC) have called for stricter rules to govern the sale and use of common fireworks and trick and novelty items. To understand the tenor of the debate, it is helpful to appreciate the scope of the problem and look back at the origins of this chapter and other standards that were drafted in response to fireworks misuse and injuries.

According to statistics quoted by NFPA and gathered by the CPSC, more than 10,000 citizens are injured each year by the misuse of common and illegally manufactured fireworks. These injuries result in millions of dollars in medical and legal expenses, and untold suffering. The injuries include burns and the loss of fingers, limbs, vision or hearing; most injuries leave permanent scarring.

The overwhelming majority of persons injured are younger than 20 years old. Public displays of fireworks have also resulted in several serious acci-

dents. Many of these accidents have involved local fire departments and untrained operators performing public fireworks displays.

Parts of Chapter 33 had their origin in former NFPA 1121L, *Model Fireworks Law*, which was first published in 1938. According to NFPA, this is the most widely adopted fireworks regulation in the United States. Many states have enacted this model as part of state law and prohibit all fireworks except toy paper or plastic caps and authorized public displays. Other states have adopted modified versions that prohibit all but trick and novelty items, toy paper or plastic caps and permitted public displays.

The NFPA Standards Council withdrew NFPA 1121L as an NFPA standard and in 1988 transferred control of the document to the Fire Marshal's Association of North America (FMANA) [now the International Fire Marshals Association (IFMA)], a membership section of NFPA. Copies of the document may be obtainable from IFMA or from various internet sources.

This chapter requires the display of fireworks to comply with NFPA 1123. The standard includes criteria for the firing and on-site storage of fireworks, display site location, fallout area and operator qualifications. This chapter also references NFPA 1124 for the regulation of fireworks

manufacture and storage of fireworks at manufacturing plants. Federal regulations also provide useful guidance.

Purpose

Chapter 33 prescribes minimum requirements for the safe manufacture, storage, handling and use of explosives, ammunition and blasting agents for commercial and industrial occupancies. These provisions are intended to protect the general public, emergency responders and individuals who handle explosives. This chapter regulates the manufacturing, retail sale, display and wholesale distribution of fireworks, establishing the requirements for obtaining approval to manufacture, store, sell, discharge or conduct a public display, and references national standards for regulations governing manufacture, storage and public displays.

SECTION 3301 GENERAL

3301.1 Scope. The provisions of this chapter shall govern the possession, manufacture, storage, handling, sale and use of *explosives, explosive materials, fireworks* and small arms ammunition.

Exceptions:

1. The Armed Forces of the United States, Coast Guard or National Guard.
2. *Explosives* in forms prescribed by the official United States Pharmacopoeia.
3. The possession, storage and use of small arms ammunition when packaged in accordance with DOTn packaging requirements.
4. The possession, storage and use of not more than 1 pound (0.454 kg) of commercially manufactured sporting black powder, 20 pounds (9 kg) of smokeless powder and 10,000 small arms primers for hand loading of small arms ammunition for personal consumption.
5. The use of *explosive materials* by federal, state and local regulatory, law enforcement and fire agencies acting in their official capacities.
6. Special industrial *explosive* devices which in the aggregate contain less than 50 pounds (23 kg) of *explosive materials*.
7. The possession, storage and use of blank industrial-

power load cartridges when packaged in accordance with DOTn packaging regulations.

8. Transportation in accordance with DOTn 49 CFR Parts 100-185.
9. Items preempted by federal regulations.

⚡ *This chapter contains specific requirements for the manufacture, transportation, handling, storage and use of explosives, ammunition and blasting agents by nonmilitary and nongovernmental agencies and individuals. Exceptions in this section detail situations in which compliance with the requirements of this chapter is not required. Generally, these situations are governed by more stringent federal requirements or another chapter of the code or they may represent a low hazard.*

Exception 1 recognizes that the U.S. military promulgates its own regulations governing the manufacture and storage of explosives, ammunition and blasting agents. These regulations are similar to those that apply to civilian explosives with a few exceptions for identifying and marking them in transportation and storage.

An example of Exception 2 is nitroglycerin in tablet and transdermal patch form used for the treatment of angina pectoris and other pharmaceuticals containing explosive materials which are not dangerous in the form dispensed and thus are exempt from these requirements.

Exception 4 exempts small amounts of materials for making small arms ammunition for personal use based on the limited potential hazard due to the quantity.

Exception 5 is a limited exception that exempts certain federal, state and local agencies from the application of Article 33 when using explosive materials while acting in the course of their official capacities. All other applicable provisions contained in the chapter would apply, i.e., possession, storage and handling regulations.

Exception 6 exempts from the provisions of this chapter special industrial explosive devices in an aggregate quantity of 50 pounds of explosive materials. See the commentary to Section 3302 definitions of Special Industrial Explosive Device and Explosive Material.

Exception 7 exempts from the provisions of this chapter the possession, storage, and use of blank industrial power load cartridges. Sometimes called propellant-actuated power devices, these articles include devices such as rivets, nail guns, bolt or stud drivers, punches and cutting tools which use explosive cartridges to perform their function. Devices employing explosive mixtures to produce a flame or jet for cutting, propelling or directing work would not be included.

3301.1.1 Explosive material standard. In addition to the requirements of this chapter, NFPA495 shall govern the manufacture, transportation, storage, sale, handling and use of explosive materials.

⚡ *The requirements in NFPA 495 apply to situations not specifically addressed by this chapter.*

3301.1.2 Explosive material terminals. In addition to the requirements of this chapter, the operation of explosive material terminals shall conform to the provisions of NFPA 498.

⚡ *The requirements of NFPA 498 apply to situations not specifically addressed by this chapter.*

3301.1.3 Fireworks. The possession, manufacture, storage, sale, handling and use of fireworks are prohibited.

Exceptions:

1. Storage and handling of fireworks as allowed in Section 3304.
2. Manufacture, assembly and testing of fireworks as allowed in Section 3305.
3. The use of fireworks for fireworks displays as allowed in Section 3308.

4. The possession, storage, sale, handling and use of specific types of Division 1.4G fireworks where allowed by applicable laws, ordinances and regulations, provided such fireworks comply with CPSC 16 CFR, Parts 1500 and 1507, and DOTn 49 CFR, Parts 100-185, for consumer fireworks.

⚡ *The possession, manufacture, storage, sale and unauthorized use of fireworks are prohibited by this section. The prohibition of retail sales allows communities to have direct control over the hazards associated with small amounts of storage typical of retail sales. Exception 1 allows storage and handling of fireworks within the limitations of Section 3304. Exception 2 allows the manufacture, assembly and testing of fireworks within the limitations of Section 3305. Exception 3 allows those displays to be specifically approved by the fire code official in accordance with Section 3308. Exception 4 recognizes that, in some instances, the possession, storage, sale, handling and use of certain types of fireworks may be allowed by provisions of the preemptive laws of superior jurisdictions, most typically the state. Even if such laws preempt the local jurisdiction, the exception stipulates that the fireworks allowed by such laws must still meet the minimum requirements of the referenced standards.*

3301.1.4 Rocketry. The storage, handling and use of model and high-power rockets shall comply with the requirements of NFPA 1122, NFPA 1125 and NFPA 1127.

⚡ *NFPA 1122 contains instructional guidelines and specific standards for the design, construction, limitation of charge and power, and reliability of rocket motors manufactured for sale to the general public; for the design and construction of rockets propelled by these motors and for tests, launchings and other operations involving such rockets in order to minimize hazards. NFPA1125 applies to the manufacture of model rocket motors designed, sold and used for the purpose of propelling recoverable aero models. NFPA 1127 contains instructional guidelines and specific standards for the design, construction, limitation of charge and power and reliability of high-power rocket motors manufactured for sale to users; for the qualification and certification of users; for the design and construction of high-power rockets propelled by these motors and for tests, launchings and other operations*

involving rockets so that hazards are minimized.

3301.1.5 Ammonium nitrate. The storage and handling of ammonium nitrate shall comply with the requirements of NFPA 490 and Chapter 40.

Exception: Storage of ammonium nitrate in magazines with blasting agents shall comply with the requirements of NFPA 495.

⚡ *NFPA 490 addresses storage and Chapter 40 addresses oxidizers and separation distances for ammonium nitrate. Ammonium nitrate can be sensitized by both heat and contaminants, causing it to become a greater explosive danger (commercial blasting agents are made from a mixture of diesel oil and ammonium nitrate). It cannot be determined when or if contamination will occur. No matter how many times it has failed to explode in fires, the important point is that ammonium nitrate might explode and has the potential to explode in any fire.*

3301.2 Permit required. Permits shall be required as set forth in Section 105.6 and regulated in accordance with this section.

⚡ *The process of issuing permits gives the fire code official an opportunity to carefully evaluate and regulate hazardous operations. Permit applicants should be required to demonstrate that their operations comply with the intent of the code before the permit is issued. See the commentary to Section 105.6 for a general discussion of operations requiring an operational permit and Section 105.6.14 for a discussion of specific quantity-based operational permits for the materials regulated in this chapter. The permit process also notifies the fire department of the need for prefire planning for the hazardous property.*

3301.2.1 Residential uses. No person shall keep or store, nor shall any permit be issued to keep or store, any explosives at any place of habitation, or within 100 feet (30 480 mm) thereof.

Exception: Storage of smokeless propellant, black powder and small arms primers for personal use and

not for resale in accordance with Section 3306.

⚡ *Small amounts of materials for making small arms ammunition for personal use are exempt based on the limited potential hazard of the small quantities.*

3301.2.2 Sale and retail display. No person shall construct a retail display nor offer for sale explosives, explosive materials or fireworks upon highways, sidewalks, public property or in Group A or E occupancies.

⚡ *When retail sales are allowed by Section 3301.1.3, Exception 4, the intent of this section is to prohibit the retail display and sale of explosives, including fireworks 1.3G and 1.4G, in public rights-of-way, on public property and in assembly (Group A) and educational (Group E) buildings. This reduces the likelihood of theft and personal injury if a fire or explosion occurs. See also the commentary to Section 3301.1.3 for further discussion of retail sales of fireworks.*

3301.2.3 Permit restrictions. The fire code official is authorized to limit the quantity of explosives, explosive materials or fireworks permitted at a given location. No person, possessing a permit for storage of explosives at any place, shall keep or store an amount greater than authorized in such permit. Only the kind of explosive specified in such a permit shall be kept or stored.

⚡ *The fire code official may set limits on the quantity of explosive materials or blasting agents stored at any site as a means of maintaining control over the degree of hazard posed by explosive storage. Limits should be based on the severity of the exposure if an explosion or fire occurs in the magazine. This section is not intended to give the fire code official authority to prohibit the storage of explosives or blasting agents on any site.*

3301.2.4 Financial responsibility. Before a permit is issued, as required by Section 3301.2, the applicant shall file with the jurisdiction a corporate surety bond

in the principal sum of \$100,000 or a public liability insurance policy for the same amount, for the purpose of the payment of all damages to *persons* or property which arise from, or are caused by, the conduct of any act authorized by the permit upon which any judicial judgment results. The *fire code official* is authorized to specify a greater or lesser amount when, in his or her opinion, conditions at the location of use indicate a greater or lesser amount is required. Government entities shall be exempt from this bond requirement.

⚡ *The fire code official should understand that some insurance coverages are invalidated by violations of federal, state and local regulations. Insurance coverages obtained by an owner or operator provide no protection from liability for the fire code official who is responsible for issuing approvals or conducting inspections. Moreover, third-party insurance may conflict with other coverages obtained by the jurisdiction, as well as governmental immunity or tort claims protections under state or local statutes.*

3301.2.4.1 Blasting. Before approval to do blasting is issued, the applicant for approval shall file a bond or submit a certificate of insurance in such form, amount and coverage as determined by the legal department of the jurisdiction to be adequate in each case to indemnify the jurisdiction against any and all damages arising from permitted blasting.

⚡ *Insurance coverage is required in an amount specified by a jurisdiction's legal department. This coverage is intended to indemnify the operator or individual who is responsible for blasting operations involving explosives or blasting agents from damages arising from accidents involving these operations.*

3301.2.4.2 Fireworks display. The permit holder shall furnish a bond or certificate of insurance in an amount deemed adequate by the *fire code official* for the payment of all potential damages to a *person* or *persons* or to property by reason of the permitted display, and arising from any acts of the permit holder, the agent, employees or subcontractors.

⚡ *The bonding requirement is intended to indemnify*

the display operator and, if required by the fire code official, the jurisdiction in the event of an accident. Jurisdictions desiring coverage under the display operator's policy should require that the jurisdiction be named on the policy as an additional insured or a named insured. (Before making this requirement, check with legal counsel to determine the fire code official's and the jurisdiction's liability. Many tort claims acts exempt the government from certain claims, while others limit the amount of liability. The standard of care that must be exercised by the fire code official when reviewing conditions for a permit varies widely.) The fire code official must exercise great care when establishing bonding requirements. Insurance companies underwriting fireworks displays often issue a large number of policies at the same time of year. Often the face value of these policies far exceeds the total of the companies' assets and reserves. Insurance evaluation services should be consulted to evaluate the companies' ratings. (Like credit bureaus, these evaluation services rate the companies' financial health on a letter scale—AAA being the highest rating, B and C the lowest.) Most policies include some coverage restrictions. Losses within 150 feet (45 720 mm) of the discharge site are often excluded from coverage, and claims within 600 feet (182 m) of the discharge site are frequently severely limited. When included in the policy, these separation distances usually conform to the separation requirements of NFPA 1123. This is done purposely to encourage display operators to follow nationally recognized standards. The fire code official may require the approval holder to submit an original copy of the certificate of insurance verifying indemnification of the display. When an original copy cannot be obtained, a facsimile of the original from the issuing broker is a good alternative. Most insurance companies authorize only highly trusted, specially trained, bonded employees to issue these certificates. The fire code official should examine the certificate carefully and never accept a photocopy of this document unless it can be thoroughly authenticated. Unscrupulous operators have been known to alter old certificates or produce and submit counterfeit certificates. The fire code official may contact the broker, underwriter or other insurance company representative to verify coverage, although these agents may be reluctant to confirm coverage if the jurisdiction is not named as an additional insured on the policy.

3301.3 Prohibited explosives. Permits shall not be issued or renewed for possession, manufacture, storage, handling, sale or use of the following materials and such materials currently in storage or use shall be disposed of in an *approved* manner.

1. Liquid nitroglycerin.
2. Dynamite containing more than 60-percent liquid explosive ingredient.
3. Dynamite having an unsatisfactory absorbent or one that permits leakage of a liquid *explosive* ingredient under any conditions liable to exist during storage.
4. Nitrocellulose in a dry and uncompressed condition in a quantity greater than 10 pounds (4.54 kg) of net weight in one package.
5. Fulminate of mercury in a dry condition and fulminate of all other metals in any condition except as a component of manufactured articles not hereinafter forbidden.
6. *Explosive* compositions that ignite spontaneously or undergo marked decomposition, rendering the products of their use more hazardous, when subjected for 48 consecutive hours or less to a temperature of 167° F (75° C).
7. New *explosive materials* until *approved* by DOTn except that permits are allowed to be issued to educational, governmental or industrial laboratories for instructional or research purposes.
8. *Explosive materials* condemned by DOTn.
9. *Explosive materials* containing an ammonium salt and a chlorate.
10. *Explosives* not packed or marked as required by DOTn49 CFR, Parts 100-185.

Exception: Gelatin dynamite.

⚡ *The fire code official is not authorized to issue approval for manufacture, transportation, storage, sale or use because of extreme or unusual hazards presented by the listed materials.*

3301.4 Qualifications. Persons in charge of magazines, blasting, fireworks display or pyrotechnic special effect operations shall not be under the influence of alcohol

or drugs which impair sensory or motor skills, shall be at least 21 years of age and shall demonstrate knowledge of all safety precautions related to the storage, handling or use of *explosives, explosive materials* or fireworks.

⚡ *The only discharge of fireworks permissible under the code is a public display conducted by competent pyrotechnicians in accordance with the requirements of NFPA1123 and authorized by the fire code official. The competence of the display operator is first among the important safeguards that must be observed for a safe and enjoyable public display. Chapter 6 of NFPA1123 details the qualifications of competent fireworks display operators. Many jurisdictions also require display operators to possess a license or certificate of fitness. To obtain such a certificate, the operator must be bonded or indemnified, pass a written examination and serve an apprenticeship under another licensed or certified pyrotechnician. The best sites are free of overhead obstructions and are well isolated, with clear viewing paths and landing areas. Fallout areas should be large, open areas, clear of spectators, vehicles and combustible materials. Generally, the discharge site must have a minimum radius of 70 feet (21 336 mm) for each inch of aerial shell diameter. Table 31.3 of NFPA 1123 specifies the separation distances.*

Fireworks discharge sites must be separated from institutional and high-hazard occupancies by at least twice the distance specified in the table [140 feet (42672 mm) per inch of shell diameter]. When mortars are positioned vertically (zero degrees), they must be located at the center of the display area. When mortars or shells stored at the discharge site are angled, they must be aimed away from principal spectator viewing and shell storage areas. When angled, mortars may be placed up to one-third the distance from the center of the display area to the principal spectator viewing area. Aerial shell trajectories must not come within 25 feet (7,620 mm) of overhead obstructions, such as power lines and trees. Tents and canvas structures must be at least 100 feet (30 480 mm) from the discharge site. High winds, precipitation or extremely hot, dry conditions should be avoided. Moisture-damaged shells must not be fired. If, in the opinion of

the fire code official or the display operator, weather conditions present a danger, the display must be postponed or canceled.

3301.5 Supervision. The *fire code official* is authorized to require operations permitted under the provisions of Section 3301.2 to be supervised at any time by the *fire code official* in order to determine compliance with all safety and fire regulations.

⌘ *Only supervised public displays of fireworks, approved in advance by the fire code official, and wholesale sales in accordance with Section 3301.1.3, Exception 4, are permitted under the requirements of this chapter. Written application for approval of public displays must be made at least 15 days prior to the display. Before approval can be issued, the fire code official must review the qualifications and determine the competence of the display operator, verify the operator's proof of insurance or indemnification, inspect the proposed discharge site and viewing area and review the operator's fire protection and crowd control plans.*

3301.6 Notification. Whenever a new *explosive material* storage or manufacturing site is established, including a temporary job site, the local law enforcement agency, fire department and local emergency planning committee shall be notified 48 hours in advance, not including Saturdays, Sundays and holidays, of the type, quantity and location of *explosive materials* at the site.

⌘ *Local law enforcement, fire department and emergency planning officials must be notified of all new explosive materials storage and handling sites at least 48 hours, excluding weekends and holidays, prior to operations beginning. This period is intended to give officials time to prepare response plans for the new site, communicate the hazards incident to the operations to first responders and train site personnel and emergency responders on the management of emergencies at the new site. In practice, this notice should be submitted well in advance of the required 48 hours. Approval should not be granted or should be suspended if local law enforcement, fire department or emer-*

gency planning officials believe that adequate and proper preparations cannot be made to safeguard the public and emergency responders prior to the planned start of such operations.

3301.7 Seizure. The *fire code official* is authorized to remove or cause to be removed or disposed of in an *approved manner*, at the expense of the owner, *explosives, explosive materials* or fireworks offered or exposed for sale, stored, possessed or used in violation of this chapter.

⌘ *The seizure and disposal of controlled articles, in this case fireworks, at the owner's expense is usually considered a lawful taking of private property under the U.S. Constitution. However, before taking such measures, fire code officials should consult with legal counsel regarding due process requirements. Seizure requires probable cause that the article or device being seized is unlawful itself, is being used in an unlawful manner, has been used in conjunction with an unlawful activity or poses an imminent danger to life and property. Recovery of expenses may require the filing of civil or criminal charges against the owner or his or her agents. Before taking possession of fireworks, it is also prudent for the jurisdiction to verify that it has adequate facilities for safely handling, transporting, storing and disposing of the articles. The jurisdiction may require assistance to dispose of large quantities of special fireworks. Transportation of special fireworks is governed by DOTn 49 CFR. A commercial driver's license with a hazardous materials endorsement is required, as well as a vehicle with special equipment and inspections.*

SECTION 3308

FIREWORKS DISPLAY

3308.1 General. Outdoor fireworks displays, use of pyrotechnics before a *proximate audience* and pyrotechnic special effects in motion picture, television, theatrical and group entertainment productions shall comply with Sections 3308.2 through 3308.10 and NFPA 1123 or NFPA 1126.

∩ *The only discharge of fireworks permissible under the code is a public display conducted by competent pyrotechnicians in accordance with the requirements of NFPA 1123 and NFPA 1126 and authorized by the fire code official. The use of pyrotechnic special effects in theatrical performances has become a topic of some concern. In December 1990, a pyrotechnic effect exploded during a band concert in a Florida hotel lounge, injuring seven people, one critically. NFPA 1126 was published in response to this event.*

3308.2 Permit application. Prior to issuing permits for a fireworks display, plans for the fireworks display, inspections of the display site and demonstrations of the display operations shall be *approved*. A plan establishing procedures to follow and actions to be taken in the event that a shell fails to ignite in, or discharge from, a mortar or fails to function over the fallout area or other malfunctions shall be provided to the *fire code official*.

∩ *This section addresses approval and permit issuance for fireworks displays. A 15-day time limitation is suggested to give the fire code official reasonable time to thoroughly verify the completeness and accuracy of the information in the application and to allow a thorough inspection of the display site. Customarily, only the display operator or pyrotechnician may apply for approval and a permit. Issuing approvals and permits to corporations, associations, boards or other corporate entities may hamper accountability. Because only a single individual can be assigned overall control of the discharge of fireworks, only the individual responsible for operating the display should be issued an approval, and ultimately a permit. However, all other organizations, institutions or individuals acting together or alone to contract the display should also be named in the permit application and, if considered appropriate by the fire code official, named as additional insureds in the bond indemnifying the jurisdiction for the display. Strict prohibitions against transfers and extensions are needed for the continuing supervision of fireworks operations. This section also requires the applicant for approval and permit to provide an action plan for those occasions during the conduct of a fireworks display when a shell fails in some manner, often referred to as a “misfire,” a term which*

is often misinterpreted since it is not defined in either the code or NFPA1123. The terminology used in this section makes it clear that the concerns are specifically with malfunctions of shells that either fail to discharge from a mortar or fail to function properly within the fallout area of the display venue, which could jeopardize safety of the audience or display operators. The fireworks display industry has established procedures for responding to various types and degrees of incidents that may occur as a result of a malfunction. This section enables the fire code official to be aware of the proposed procedures in order to evaluate their appropriateness to the particular event. The terminology used is consistent with that found in NFPA 1123.

3308.2.1 Outdoor fireworks displays. In addition to the requirements of Section 403, permit applications for outdoor fireworks displays using Division 1.3G fireworks shall include a diagram of the location at which the fireworks display will be conducted, including the site from which fireworks will be discharged; the location of buildings, highways, overhead obstructions and utilities; and the lines behind which the audience will be restrained.

∩ *The best sites are free of overhead obstructions and are well isolated, with clear viewing paths and landing areas. Fallout areas should be large, open areas, clear of spectators, vehicles and combustible materials. Generally, the discharge site must have a minimum radius of 70 feet (21 336 mm) for each inch of aerial shell diameter.*

3308.2.2 Use of pyrotechnics before a proximate audience.

Where the separation distances required in Section 3308.4 and NFPA 1123 are unavailable or cannot be secured, fireworks displays shall be conducted in accordance with NFPA 1126 for *proximate audiences*. Applications for use of pyrotechnics before a *proximate audience* shall include plans indicating the required clearances for spectators and combustibles, crowd control measures, smoke control measures and requirements for standby personnel and equipment when provision of such personnel or equipment is required by

the fire code official.

⚡ *This section applies to any outdoor use of pyrotechnics at distances less than those required by NFPA 1123. The use of pyrotechnics before a proximate audience is not a display of fireworks as regulated by NFPA 1123 but is regulated by NFPA 1126. The separation distance between the audience and where the pyrotechnic device is fired during a performance must be at least 15 feet (4572 mm) but not less than twice the fallout radius of the device. The audience must be separated from concussion mortars by a minimum of 25 feet (7620 mm) and there must be no glowing or flaming particles within 10 feet (3048 mm) of the audience.*

3308.3 Approved fireworks displays. Approved fireworks displays shall include only the approved fireworks 1.3G, fireworks 1.4G, fireworks 1.4S and pyrotechnic articles, 1.4G, which shall be handled by an approved, competent operator. The approved fireworks shall be arranged, located, discharged and fired in a manner that will not pose a hazard to property or endanger any person.

⚡ *The competence of the display operator is foremost among the important safeguards that must be observed for a safe and enjoyable public display. NFPA 1123 details the qualifications of competent fireworks display operators. Many jurisdictions require display operators to possess a license or certificate of fitness. To obtain such a certificate, the operator must be bonded or indemnified, pass a written examination and serve an apprenticeship under another licensed or certified pyrotechnician.*

3308.4 Clearance. Spectators, spectator parking areas, and dwellings, buildings or structures shall not be located within the display site.

Exceptions:

1. This provision shall not apply to pyrotechnic special effects and fireworks displays using Division 1.4G materials before a proximate audience in accordance with NFPA 1126.
- 2.

2. This provision shall not apply to unoccupied dwellings, buildings and structures with the approval of the building owner and the fire code official.

⚡ *Aerial displays must meet the requirements of NFPA 1123. The site for the outdoor display should have at least a 70-foot (21 336 mm) radius per inch of the internal mortar diameter of the largest aerial shell being fired, except as noted in NFPA 1123. Some jurisdictions require 100 feet (30 480 mm) of radius per inch of diameter of aerial shell. No spectators, dwellings or spectator parking areas can be located within the display site.*

3308.5 Storage of fireworks at display site. The storage of fireworks at the display site shall comply with the requirements of this section and NFPA 1123 or NFPA 1126.

⚡ *NFPA 1123 addresses weather protection, inspection, sorting and ready boxes for fireworks. The standard also addresses construction of display fireworks aerial shells.*

3308.5.1 Supervision and weather protection. Beginning as soon as fireworks have been delivered to the display site, they shall not be left unattended.

⚡ *Never leave fireworks unattended. Too many events can cause serious problems during the show. For example, someone could replace good fireworks with faulty ones. Constant supervision is necessary both after and before inspection of the fireworks.*

3308.5.2 Weather protection. Fireworks shall be kept dry after delivery to the display site.

⚡ *Protecting the fireworks from inclement weather is the responsibility of everyone involved in the display. If the fireworks get wet from rain, they will not fire properly, thus possibly causing harm to personnel and spectators. A tarpaulin will serve nicely for protection from rain.*

3308.5.3 Inspection. Shells shall be inspected by the operator or assistants after delivery to the display site. Shells having tears, leaks, broken fuses or signs of having been wet shall be set aside and shall not be fired. Aerial shells shall be checked for proper fit in mortars prior to discharge. Aerial shells that do not fit properly shall not be fired. After the fireworks display, damaged, deteriorated or dud shells shall either be returned to the supplier or destroyed in accordance with the supplier's instructions and Section 3304.10.

Exception: Minor repairs to fuses shall be allowed. For electrically ignited displays, attachment of electric matches and similar tasks shall be allowed.

☞ *Prior to acceptance of display fireworks from a wholesaler, the permit holder or designated agent must confirm that the outside of all cartons, containers or cases is in good condition and all documentation is in order. Shells can be damaged during transport from the factory. It is good safety practice to examine all shells before placing them into the mortars for firing. If there is any sign of damage, the shells should be set aside and not fired, reducing the risk of injury to personnel. The exception does allow minor repairs that are safe in the judgment of the pyrotechnician.*

3308.5.4 Sorting and separation. After delivery to the display site and prior to the fireworks display, all shells shall be separated according to size and their designation as salutes.

Exception: For electrically fired displays, or displays where all shells are loaded into mortars prior to the show, there is no requirement for separation of shells according to size or their designation as salutes.

☞ *Where aerial shells are to be stored at the discharge site for subsequent loading into mortars during the display, the mortars must be placed usually at one-sixteenth, but not more than one-third, the distance from the center of the display site toward the main spectator area.*

3308.5.5 Ready boxes. Display fireworks, 1.3G, that will be temporarily stored at the site during the fireworks display shall be stored in ready boxes located

upwind and at least 25 feet (7620 mm) from the mortar placement and separated according to size and their designation as salutes.

Exception: For electrically fired fireworks displays, or fireworks displays where all shells are loaded into mortars prior to the show, there is no requirement for separation of shells according to size, their designation as salutes or for the use of ready boxes.

☞ *A ready box should be a weather-resistant container that protects contents from burning debris with a self-closing cover or equivalent means of closure required. If the wind shifts during a display, the ready boxes must be relocated to again be upwind from the discharge site. Tarpaulins can be used as weather protection for ready boxes but not considered as ready boxes.*

3308.6 Installation of mortars. Mortars for firing fireworks shells shall be installed in accordance with NFPA 1123 and shall be positioned so that shells are propelled away from spectators and over the fallout area. Under no circumstances shall mortars be angled toward the spectator viewing area. Prior to placement, mortars shall be inspected for defects, such as dents, bent ends, damaged interiors and damaged plugs. Defective mortars shall not be used.

☞ *Mortars can be buried to a depth of at least two-thirds to three-quarters of their length, either in the ground or in above-ground troughs or drums or however the local fire code official considers necessary. Eliminating as much of a risk as possible from spectator injury is a good reason for angling away from the viewing area.*

See also the commentary to the definition of "Fallout area" for further information.

3308.7 Handling. Aerial shells shall be carried to mortars by the shell body. For the purpose of loading mortars, aerial shells shall be held by the thick portion of the fuse and carefully loaded into mortars.

⚡ *During the firing of the display, personnel in the discharge site should wear head protection, eye protection, hearing protection, foot protection and cotton, wool or similarly flame-resistant, long-sleeved, long-legged clothing. Personal-protective equipment, as necessary, should be worn by the operator and assistants during the setup and cleanup of the display. Shells must be carried from the storage area to the discharge site only by their bodies and shall never be carried by their fuses.*

3308.8 Fireworks display supervision. Whenever in the opinion of the *fire code official* or the operator a hazardous condition exists, the fireworks display shall be discontinued immediately until such time as the dangerous situation is corrected.

⚡ *All displays must be set up using methods that allow an interruption in firing in case an unforeseen danger becomes evident. The judgment of the display operator and the fire code official will determine whether an ongoing display or one that has been set up and is ready to begin must be stopped or delayed because of hazardous conditions.*

3308.9 Post-fireworks display inspection. After the fireworks display, the firing crew shall conduct an inspection of the fallout area for the purpose of locating unexploded aerial shells or live components. This inspection shall be conducted before public access to the site shall be allowed. Where fireworks are displayed at night and it is not possible to inspect the site thoroughly, the operator or designated assistant shall inspect the entire site at first light.

A report identifying any shells that fail to ignite in, or discharge from, a mortar or fail to function over the fallout area or otherwise malfunction, shall be filed with the *fire code official*.

⚡ *The intent of this section is to identify those display fireworks shells that fail to discharge or function properly over the fallout area of the fireworks display site, and provide a means of notification to the fire code official of the disposition of malfunctioning or*

misfired fireworks within the jurisdiction.

The firing crew will consist of the operator and assistants. For the public's own safety, no one should be allowed entry into the fallout area of the display site until inspection is completed. Mortar inspection and removal should be conducted within 10 minutes after show completion. When fireworks are displayed at night and it is impossible to thoroughly inspect the site, the crew must re-inspect the entire site early the following morning. Preparation of an inspection report will enhance the level of safety provided for displays and is consistent with the requirements of Section 3308.2. See the commentary to that section for a further discussion of fireworks malfunctions.

3308.10 Disposal. Any shells found during the inspection required in Section 3308.9 shall not be handled until at least 15 minutes have elapsed from the time the shells were fired. The fireworks shall then be doused with water and allowed to remain for at least 5 additional minutes before being placed in a plastic bucket or fiberboard box. The disposal instructions of the manufacturer as provided by the fireworks supplier shall then be followed in disposing of the fireworks in accordance with Section 3304.10.

⚡ *In addition to the above requirements, any aerial shell that misfires in a mortar should be left alone for a minimum of 30 minutes, carefully loaded into a bucket of water and left for a minimum of 15 minutes and then properly disposed of.*