NFPA

123

NSI / NFPA 1123
An American
National
Standard
June 7, 1982

PUBLIC DISPLAY OF FIREWORKS 1982

NATIONAL FIRE PROTECTION ASSOCIATION, INC.
Batterymarch Park, Quincy, MA 02269

M-3-83-FP(.75M)
Printed in U.S.A.

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Standard for
Public Display of Fireworks

NFPA 1123-1982

1982 Edition of NFPA 1123

This edition of NFPA 1123, *Standard for Public Display of Fireworks*, was prepared by the Committee on Pyrotechnics and acted on by the National Fire Protection Association, Inc. on November 18, 1981 at its Fall Meeting in Toronto, Ontario, Canada. It was issued by the Standards Council on December 9, 1981, with an effective date of December 29, 1981, and supersedes all previous editions.

Origin and Development of NFPA 1123

The development of NFPA 1123 began in 1975 with the submittal to the Committee on Pyrotechnics of a proposed standard drafted by the American Pyrotechnics Association. The proposed standard was redrafted and was officially adopted by the National Fire Protection Association at its 1978 Fall Meeting. The 1978 edition was amended in 1980 and the amended version was adopted by the Association at its 1981 Fall Meeting.

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NOTE: Membership on a Committee shall not in and of itself constitute an endorsement of the Association or any document developed by the Committee on which the member serves.

Contents

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Public Display of Fireworks

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NOTICE: An asterisk (*) following the number or letter designating a subsection indicates explanatory material on that section in Appendix A. Information on referenced publications can be found in Appendix D.

Chapter 1 General

1-1 Scope.

1-1.1 This standard shall apply to the construction, handling, and use of fireworks intended solely for public display. It shall also apply to the general conduct and operation of the display. (*See definition of Public Display.*)

1-1.2 This standard shall not apply to the manufacture, transportation, or storage of fireworks. (*See NFPA 44A, Code for the Manufacture, Transportation, and Storage of Fireworks.*)

1-1.3 This standard shall not apply to the use of Class C (common) fireworks by the general public.

1-1.4 This standard shall not apply to the transportation, handling, or use of fireworks by the Armed Forces of the United States.

1-1.5 This standard shall not apply to the transportation, handling, or use of industrial pyrotechnic devices or fireworks, such as railroad torpedoes, fusees, and automotive, aeronautical, and marine flares and smoke signals.

1-2 Purpose.

1-2.1 The purpose of this standard is to provide reasonable protection, as detailed in this standard, to the general public when viewing a public fireworks display.

1-2.2 The purpose of this standard is also to provide reasonable safety, as detailed in this standard, to the operator of a public fireworks display.

1-2.3 The purpose of this standard is also to provide a suggested local permit regulation. (*See Appendix C.*)

1-3 Definitions. For the purpose of this standard, the following terms shall have the meanings shown below:

Approved. Acceptable to the "authority having jurisdiction."

NOTE: 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 or 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 concerned with product evaluations which is in a position to determine compliance with appropriate standards for the current production of listed items.

Authority Having Jurisdiction. The "authority having jurisdiction" is the organization, office or individual responsible for "approving" equipment, an installation or a procedure.

NOTE: The phrase "authority having jurisdiction" 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, 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 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."

Black Match. A fuse made from thread impregnated with black powder and used for igniting pyrotechnic devices.

Boxed Finale. A number of mortars grouped closely together and contained by a suitable frame. The mortars are loaded prior to the display and fused for rapid sequence firing.

Break. An individual effect from an aerial shall; generally either color (stars) or noise (salute). Aerial shells can be single-break (having only one effect) or multiple-break (having two or more effects).

Colored Pot. A paper tube containing pyrotechnic composition that produces a colored flame on ignition. Colored pots are used in the construction of ground display pieces.

Discharge Site. The area immediately surrounding the mortars used to fire the aerial shells.

Finale Rack. A row of closely spaced 2-in. (51-mm) or 3-in. (76-mm) (inside diameter) mortars held in a wooden frame. It is similar to a boxed finale.

Fireworks. Any composition or device for the purpose of producing a visible or an audible effect by combustion, deflagration or detonation, and which meets the definition of "common" or "special" fireworks as set forth in the U.S. Department of Transportation's (DOT) *Hazardous Materials Regulations*, Title 49, Code of Federal Regulations, Parts 173.88 and 173.100.

Exception No. 1: Toy pistols, toy canes, toy guns, or other devices in which paper and/or plastic caps, manufactured in accordance with DOT regulations, 49 CFR 173.100 (p)[1]*, and packed and shipped according to said regulations, are not considered to be fireworks and shall be allowed to be used and sold at all times.*

Exception No. 2: Model rockets and model rocket motors designed, sold, and used for the purpose of propelling recoverable aero models are not considered to be fireworks. (See NFPA 1122, Code for Unmanned Rockets.)

Exception No. 3: Propelling or expelling charges consisting of a mixture of sulfur, charcoal, and saltpeter are not considered as being designed for producing audible effects.

Exception No. 4: Items described in Part E of the definition of Common Fireworks.

Common Fireworks. Any small firework device designed primarily to produce visible effects by combustion and which must

[1]The regulations referred to limit the explosive content of each cap to not more than an average of 0.25 grains (16.25 mg). Also, each package containing such caps must be labeled to indicate the maximum explosive content per cap.

comply with the construction, chemical composition, and labeling regulations of the U.S. Consumer Product Safety Commission, as set forth in Title 16, Code of Federal Regulations, Part 1507. Some small devices designed to produce audible effects are included, such as whistling devices, ground devices containing 50 mg or less of explosive composition, and aerial devices containing 130 mg or less of explosive composition. Common fireworks are classified as Class C explosives by the U.S. Department of Transportation and include the following:

A. Ground and Hand-held Sparkling Devices.

(1) Dipped Stick; Sparkler. Stick or wire coated with pyrotechnic composition that produces a shower of sparks upon ignition. Total pyrotechnic composition may not exceed 100 g per item. Those devices containing any perchlorate or chlorate salts may not exceed 5 g of pyrotechnic composition per item. Wire sparklers which contain no magnesium and which contain less than 100 g of composition per item are not included in this category, in accordance with DOT regulations.

(2) Cylindrical Fountain. Cylindrical tube not more than ¾ in. (19 mm) inside diameter, containing up to 75 g of pyrotechnic composition. Upon ignition, a shower of colored sparks, and sometimes a whistling effect, is produced. This device may be provided with a spike for insertion into the ground (spike fountain), a wood or plastic base for placing on the ground (base fountain), or a wood or cardboard handle, if intended to be hand-held (handle fountain).

(3) Cone Fountain. Cardboard or heavy paper cone containing up to 50 g of pyrotechnic composition. The effect is the same as that of a cylindrical fountain.

(4) Illuminating Torch. Cylindrical tube containing up to 100 g of pyrotechnic composition. Upon ignition, colored fire is produced. May be spike, base, or hand-held.

(5) Wheel. Pyrotechnic device attached to a post or tree by means of a nail or string. Each wheel may contain up to 6 "driver" units: tubes not exceeding ½ in. (12.5 mm) inside diameter and containing up to 60 g of pyrotechnic composition. Upon ignition, the wheel revolves, producing a shower of color and sparks and, sometimes, a whistling effect.

(6) Ground Spinner. Small device similar to a wheel in design and effect and placed on the ground and ignited. A shower of sparks and color is produced by the rapidly spinning device.

(7) Flitter Sparkler. Narrow paper tube filled with pyrotechnic composition that produces color and sparks upon ignition. This device does not have a fuse for ignition. The paper at one end of the tube is ignited to make the device function.

B. Aerial Devices.

(1) Sky Rocket. Tube not exceeding ½ in. (12.5 mm) inside diameter that may contain up to 20 g of pyrotechnic composition. Sky rockets contain a wooden stick for guidance and stability and rise into the air upon ignition. A burst of color or noise or both is produced at the height of flight.

(2) Missile-type Rocket. A device similar to a sky rocket in size, composition, and effect that uses fins rather than a stick for guidance and stability.

(3) Helicopter, Aerial Spinner. A tube not more than ½ in. (12.5 mm) inside diameter and containing up to 20 g of pyrotechnic composition. A propeller or blade is attached, which, upon ignition, lifts the rapidly spinning device into the air. A visible or audible effect is produced at the height of flight.

(4) Roman Candles. Heavy paper or cardboard tube not exceeding ⅜ in. (9.5 mm) inside diameter and containing up to 20 g of pyrotechnic composition. Upon ignition, up to 10 "stars" (pellets of pressed pyrotechnic composition that burn with bright color) are individually expelled at several-second intervals.

(5) Mine, Shell. Heavy cardboard or paper tube up to 2½ in. (63.5 mm) inside diameter attached to a wood or plastic base and containing up to 40 g of pyrotechnic composition. Upon ignition, "stars" [*see B.(4)*], firecrackers [*see C.(1)*], or other devices are propelled into the air. The tube remains on the ground.

C. Audible Ground Devices.

(1) Firecracker, Salute. Small paper-wrapped or cardboard tube containing not more than 50 mg of pyrotechnic composition. Upon ignition, noise and a flash of light is produced.

(2) Chaser. Small paper or cardboard tube that travels along the ground upon ignition. A whistling effect, or other noise, is often produced. The explosive composition used to create the noise may not exceed 50 mg.

D. Combination Items. Fireworks devices containing combinations of two or more of the effects described in Categories A, B and C.

E. Novelties and Trick Noisemakers.

NOTE: Items listed in this section are not classified as common fireworks by the U.S. Department of Transportation.

(1) Snake, Glow Worm. Pressed pellet of pyrotechnic composition that produces a large, snakelike ash upon burning. The ash expands in length as the pellet burns. These devices may not contain mercuric thiocyanate.

(2) **Smoke Device.** Tube or sphere containing pyrotechnic composition that, upon ignition, produces white or colored smoke as the primary effect.

(3) **Wire Sparkler.** Wire coated with pyrotechnic composition that produces a shower of sparks upon ignition. These items may *not* contain magnesium and must not exceed 100 g of composition per item. Devices containing any chlorate or perchlorate salts may not exceed 5 g of composition per item.

(4) **Trick Noisemaker.** Item that produces a small report intended to surprise the user. These devices include:

a. Party Popper. Small plastic or paper item containing not more than 16 mg of explosive composition that is friction sensitive. A string protruding from the device is pulled to ignite it, expelling paper streams and producing a small report.

b. Booby Trap. Small tube with string protruding from both ends, similar to a party popper in design. The ends of the string are pulled to ignite the friction-sensitive composition, producing a small report.

c. Snapper. Small, paper-wrapped item containing a minute quantity of explosive composition coated on small bits of sand. When dropped, the device explodes, producing a small report.

d. Trick Match. Kitchen or book match that has been coated with a small quantity of explosive or pyrotechnic composition. Upon ignition of the match, a small report or a shower of sparks is produced.

e. Cigarette Load. Small wooden peg that has been coated with a small quantity of explosive composition. Upon ignition of a cigarette containing one of the pegs, a small report is produced.

f. Auto Burglar Alarm. Tube which contains pyrotechnic composition that produces a loud whistle and/or smoke when ignited. A small quantity of explosive, not exceeding 50 mg, may also be used to produce a small report. A squib is used to ignite the device.

Special Fireworks. Large fireworks designed primarily to produce visible or audible effects by combustion, deflagration, or detonation. This term includes, but is not limited to, firecrackers containing more than 2 grains (130 mg) of explosive composition, aerial shells containing more than 40 g of pyrotechnic composition, and other display pieces which exceed the limits for classification as "common fireworks." Special fireworks are classified as Class B explosives by the U.S. Department of Transportation.

Ground Display Piece. A pyrotechnic device that functions on the ground (as opposed to an aerial shell which functions in the air). Typical ground display pieces include fountains, roman candles, wheels, and "set pieces."

Labeled. Equipment or materials to which has been attached a label, symbol or other identifying mark of an organization acceptable to the "authority having jurisdiction" and concerned with product evaluation, that maintains periodic inspection of production of labeled equipment or materials and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner.

Lance. A thin cardboard tube packed with color-producing pyrotechnic composition used to construct ground display pieces. Lances are mounted on a wooden frame and fused so that ignition of all tubes is simultaneous.

Lift Charge. That part of an aerial shell which actually lifts the shell into the air. It usually consists of a black powder charge ignited by a quick match fuse. (A delay fuse then ignites the main part of the shell, producing the desired effect.)

Listed. Equipment or materials included in a list published by an organization acceptable to the "authority having jurisdiction" and concerned with product evaluation, that maintains periodic inspection of production of listed equipment or materials and whose listing states either that the equipment or material meets appropriate standards or has been tested and found suitable for use in a specified manner.

NOTE: The means for identifying listed equipment may vary for each organization concerned with product evaluation, some of which 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.

Monitor. A person designated by the sponsors of the display to keep the audience in the intended viewing area and out of the discharge site and potential landing area.

Mortar. A metal or heavy cardboard tube from which aerial shells are fired.

Movable Ground Piece. A ground display piece having movable parts, such as a revolving wheel.

Operator. The person responsible for setting up and firing a public fireworks display.

Potential Landing Area. The area over which aerial shells are fired. The shells will normally burst over this area, but debris and malfunctions will fall into this area; therefore, it must be kept clear of spectators.

Public Display. An outdoor display of aerial pyrotechnic shells [*see Shell (Aerial)*] and/or ground display pieces (*see Ground Display Piece*).

Quick Match. Black match that is encased in a loose-fitting paper sheath. While exposed black match burns slowly, quick match propagates flame extremely rapidly, almost instantaneously. Quick match is used in fuses for aerial shells and for simultaneous ignition of a number of pyrotechnic devices, such as lances in a ground display piece.

Safety Cap. A paper tube, closed at one end, that is placed over the end of the fuse of an aerial shell to protect it from accidental ignition. The cap is not removed until just before firing of the shell.

Shell (Aerial). A cylindrical or spherical cartridge containing pyrotechnic composition, a long fuse, and a black powder lift charge. The shells are most commonly 3 in. (76 mm) to 6 in. (152 mm) outside diameter and are fired from mortars. Upon firing, the fuse and lift charge are consumed.

Shooter. (*See Operator.*)

Chapter 2 Requirements for Shells and Mortars

2-1 Construction of Shells.

2-1.1 Shells shall be classified and described only in terms of the inside diameter of the mortar in which they can be safely used [e.g., 3-in. (76-mm) shells are only for use in 3-in. (76-mm) mortars].

2-1.2* Shells shall be constructed so that the difference between the inside diameter of the mortar and the outside diameter of the shell is no less than ⅛ in. (3.2 mm) and no more than ¼ in. (6.4 mm) for 2-in. (51-mm) and 3-in. (76-mm) shells or ½ in. (12.7 mm) for shells larger than 3 in. (76 mm).

2-1.3 Shells shall be labeled with the type of shell, the diameter measurement, and the name of the manufacturer or distributor. Shells shall also carry a warning label, as described in Figure B-2-1.3, Appendix B.

2-1.4 The length of the internal delay fuse and the amount of lift charge shall be sized to ensure proper functioning of the shells in their mortars. Quick match fuse shall be long enough to allow not less than 6 in. (152 mm) of fuse to protrude from the mortar after the shell has been properly inserted.

2-1.5 The length of exposed black match on a shell shall not be less than 3 in. (76 mm) and the fuse shall not be folded or doubled back under the safety cap. Also, the time delay between ignition of the tip of the exposed black match and ignition of the lift charge shall not be less than 4 seconds to allow the operator to retreat safely.

2-1.6 A safety cap shall be installed over the exposed end of the fuse. The safety cap shall be of a different color than that used for the paper of the fuse.

2-2 Storage of Shells.

2-2.1 All fireworks shall be stored and transported according to the requirements of NFPA 44A, *Code for the Manufacture, Transportation, and Storage of Fireworks*, prior to reaching the display site.[1]

[1]See also Code of Federal Regulations, Title 27, Part 18, Subparts J and JJ.

2-2.2 As soon as the fireworks have been delivered to the display site, they shall not be left unattended nor shall they be allowed to become wet.

2-2.3 All shells shall be inspected upon delivery to the display site by the display operators. Any shells having tears, leaks, broken fuses, or showing signs of having been wet shall be set aside and shall not be fired. After the display, any such shells shall either be returned to the supplier or be destroyed according to the supplier's instructions.

2-2.4 All shells shall be separated according to diameter and stored in tightly covered containers of metal, wood, or plastic or in fiber drums or corrugated cardboard cartons meeting U.S. Department of Transportation specifications for transportation of fireworks. A flame-resistant tarpaulin meeting the requirements of NFPA 701, *Standard Methods of Fire Tests for Flame-Resistant Textiles and Films*, shall be permitted to be used as a covering over the containers, if additional protection is desired.

2-2.5* The shell storage area shall be located at a minimum distance of not less than 25 ft (7.6 m) from the discharge site.

Exception: Where acceptable to the authority having jurisdiction, alternate protective measures may be used in lieu of the above requirement.

2-2.6 During the display, shells shall be stored upwind from the discharge site. If the wind should shift during the display, the shell storage area shall be relocated so as again to be upwind from the discharge site.

Exception: Where conditions do not permit locating the shell storage area upwind from the discharge site.

2-3 Installation of Mortars.

2-3.1 Mortars shall be inspected for dents, bent ends, and cracked or broken plugs prior to ground placement. Mortars found to be defective in any way shall not be used. Any scale on the inside surface of the mortars shall be removed.

2-3.2 Mortars shall be positioned so that the shells are carried away from spectators and into a clear area acceptable to the authority having jurisdiction. (*See Section 3-2.*)

2-3.3* Mortars shall be either buried securely into the ground to a depth of ⅔ to ¾ of their length or fastened securely in mortar boxes

or drums. In soft ground, heavy timber [e.g., 4 in. (102 mm) thick] or rock slabs shall be placed beneath the mortars to prevent their sinking or being driven into the ground during firing.

Exception: Boxed finales and finale racks.

2-3.3.1 In damp ground, a weather-resistant bag shall be placed under the bottom of the mortar prior to placement in the ground to protect the mortar against moisture.

2-3.3.2 Weather-resistant bags shall be placed over the open end of the mortar in damp weather to keep moisture from accumulating on the inside surface of the mortar.

2-3.4* Sand bags, dirt boxes, or other suitable protection shall be placed around the mortars to protect the operator from ground bursts. This requirement shall not apply to the down-range side of the discharge site.

2-3.5 Mortars shall be inspected before the first shells are loaded to be certain that no water or debris has accumulated in the bottom of the mortar.

2-3.6 Metal mortars shall be deemed acceptable for use with all shells. Paper mortars shall only be used for discharge of single- and double-break shells. A 30-second cooling period shall be allowed between firing and reloading of paper mortars.

2-3.6.1 Paper mortars shall be constructed of convolute wound paper, except that spiral wound paper shall be permitted for 3-in. (76-mm) diameter mortars only. Wall thickness of paper mortars shall conform to Table 2-3.6.

Table 2-3.6 Wall Thickness of Paper Mortars

Mortar Type	Mortar Diameter, in.	(mm)	Wall Thickness, in.	(mm)
Convolute	2 in.	(51)	¼ in.	(6.4)
Convolute or Spiral	3 in.	(76)	⅜ in.	(9.5)
Convolute	4 in.	(102)	½ in.	(12.7)
Convolute	5 in.	(127)	¾ in.	(19.0)
Convolute	6 in.	(152)	¾ in.	(19.0)

Exception: For 3-in. (76-mm) single-fire mortars, such as used in finales, a wall thickness of ¼ in. (6.4 mm) shall be permitted.

2-3.7 A cleaning tool shall be provided for cleaning debris out of the mortars between firings. An acceptable tool is shown in Figure 2-3.7.

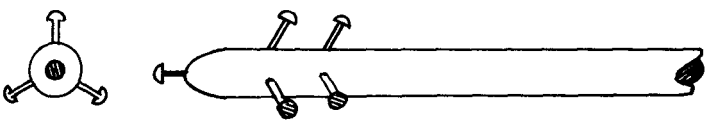

Figure 2-3.7 A Mortar Cleaning Tool Made from a Broom Handle.

Chapter 3 Site Selection

3-1 General.

3-1.1 The intent of this chapter is to provide minimum clearances upon which the authority having jurisdiction may base his approval of the display site. Where unusual conditions exist, the authority having jurisdiction may increase the minimum clearances as he deems necessary.

3-1.2 The areas selected for the discharge site, spectator viewing area, parking areas, and the potential landing area shall be inspected and approved by the authority having jurisdiction.

3-2 Discharge Site.

3-2.1 The area selected for the discharge of aerial shells shall be located so that the trajectory of the shells will not come within 25 ft (7.6 m) of any overhead object.

3-2.2 Ground display pieces shall be located at a minimum distance of 75 ft (22.9 m) from spectator viewing areas and parking areas.

Exception: For movable ground pieces, such as wheels, this minimum distance shall be increased to 150 ft (45.7 m).

3-2.3 Mortars shall be separated from spectator viewing areas and parking areas, from health care and penal facilities, from storage of hazardous materials, and from residential occupancies by the minimum distances specified in Table 3-2.3.

Table 3-2.3 Mortar Separation Distances

Mortar Sizes	Spectator Viewing Areas Parking Areas 1 & 2-family Dwellings[1]	Health Care & Penal Facilities[1]	Storage of Hazardous Materials[2]	Clear Landing Area
2 in. (51 mm)	50 ft (15.2 m)	500 ft (152.4 m)	500 ft (152.4 m)	150 ft (45.7 m)
3 in. (76 mm)	75 ft (22.9 m)	500 ft (152.4 m)	500 ft (152.4 m)	150 ft (45.7 m)
4 in. (102 mm)	75 ft (22.9 m)	500 ft (152.4 m)	500 ft (152.4 m)	150 ft (45.7 m)
5 in. (127 mm)	100 ft (30.5 m)	500 ft (152.4 m)	500 ft (152.4 m)	150 ft (45.7 m)
6 in. (152 mm) & larger	150 ft (45.7 m)	500 ft (152.4 m)	500 ft (152.4 m)	150 ft (45.7 m)

NOTE 1: As defined in NFPA *101®, Life Safety Code®*.
NOTE 2: See the following for aid in determining whether materials are to be considered hazardous.

NFPA 325M, *Fire Hazard Properties of Flammable Liquids, Gases and Volatile Solids.*
NFPA 49, *Hazardous Chemicals Data.*

3-2.4 Fireworks shall not be discharged within 100 ft (30.5 m) of any tent or canvas shelter.

3-3 Potential Landing Area.

3-3.1 The potential landing area shall be a large, clear, open area acceptable to the authority having jurisdiction.

3-3.2 Spectators, vehicles, or any readily combustible materials shall not be located within the potential landing area during the display.

3-3.3 The potential landing area shall be located according to the distances specified in Table 3-2.3 and shall also comply with the requirements of 3-2.4.

Chapter 4 Operation of the Display

4-1 General Requirements.

4-1.1* The sponsor of the display shall provide adequate fire protection for the display, as required by the authority having jurisdiction.

4-1.1.1 The sponsor shall consult with the authority having jurisdiction to determine the level of fire protection required.

4-1.2* Monitors whose sole duty shall be the enforcement of crowd control shall be located around the display area by the sponsor. The authority having jurisdiction shall determine the number of monitors needed and their placement.

4-1.2.1 Monitors shall be located around the discharge site to prevent spectators or any other unauthorized persons from entering the discharge site. The discharge site shall be so restricted throughout the display and until the discharge site has been inspected after the display. Where practical, fences and rope barriers shall be used to aid in crowd control.

4-1.3 If, in the opinion of the authority having jurisdiction or the display operator, lack of crowd control should pose a danger, the display shall be immediately discontinued until such time as the situation is corrected.

4-1.4 If, at any time, high winds or unusually wet weather prevail, such that in the opinion of either the authority having jurisdiction or the display operator a definite danger exists, the public display shall be postponed until weather conditions improve to an acceptable level.

4-1.4.1 Light snow or mist need not cause cancellation of the display; however, all materials used in the display shall be protected from the weather by suitable means until immediately prior to use.

4-1.5 Display operators and assistants shall use only flashlights or electric lighting for artificial illumination.

4-1.6 No smoking or open flames shall be allowed in the shell storage area as long as shells are present. Signs to this effect shall be conspicuously posted.

4-2 Firing of Shells.

4-2.1 Shells shall be carried from the storage area to the discharge site only by their bodies; *never* by their fuses.

Exception: As specified in 4-2.3.

4-2.2 Shells shall be checked for proper fit in their mortars prior to the display.

4-2.3* When loaded into the mortars, shells shall be held by the thick portion of their fuses and carefully lowered into the mortar. At no time shall the operator place any part of his body over the throat of the mortar.

4-2.4* The operator shall be certain that the shell is properly seated in the mortar.

4-2.5 Shells shall not, under any circumstances, be forced into a mortar too small to accept them. Shells that do not fit properly into the mortars shall not be fired; they shall be disposed of according to the procedure described in 4-2.8.

4-2.6 Shells shall be ignited by lighting the tip of the fuse with a fusee, torch, portfire, or similar device. The operator shall never place any part of his body over the mortar at any time. As soon as the fuse is ignited, the operator shall retreat from the mortar area.

Exception: Alternatively, electrical ignition may be used.

4-2.6.1 The safety cap protecting the fuse shall not be removed by the operator responsible for igniting the fuse until immediately before the shell is to be fired.

Exception: Where electrical ignition is used.

4-2.7 The first shell fired shall be carefully observed to determine that its trajectory will carry it into the intended firing range and that the shell functions over, and any debris falls into, the potential landing area.

4-2.7.1 The mortars shall be re-angled or reset if necessary at any time during the display.

4-2.8* In the event of a shell failing to ignite in the mortar, the mortar shall be left alone for a minimum of 5 minutes, then carefully flooded with water. Immediately following the display, the mortar shall be emptied into a bucket of water. The supplier shall be contacted as soon as possible for proper disposal instructions.

4-2.9 Operators shall never attempt to repair a damaged shell nor shall they attempt to dismantle a dry shell. In all such cases, the supplier shall be contacted as soon as possible for proper disposal instructions.

4-2.10 Operators shall never dry a wet shell, lance, or pot for reuse. In such cases, the shell, lance, or pot shall be handled according to the procedure in 4-2.8.

4-2.11 The entire firing range shall be inspected immediately following the display for the purpose of locating any defective shells. Any shells found shall be immediately doused with water before handling. The shells shall then be placed in a bucket of water. The supplier shall then be contacted as soon as possible for proper disposal instructions.

4-2.11.1 When fireworks are displayed at night, the sponsor shall ensure that the firing range is inspected early the following morning.

4-2.11.2 The operator of the display shall keep a record, on a form provided by the supplier, of all shells that fail to ignite or fail to function. The form shall be completed and returned to the supplier. (*See Appendix B.*)

4-3 Ground Pieces.

4-3.1 All ground pieces shall be positioned out of the firing range of aerial displays. Mortars shall be positioned so that they do not fire towards any ground pieces.

4-3.2 No dry grass or combustible material shall be located beneath ground pieces. If dry, the area shall be thoroughly wet down before the display.

4-3.3 Poles for ground pieces shall be securely placed and firmly braced so that they will not fall over when they function.

4-3.4 Specific instructions from the supplier shall accompany all ground pieces. A list of required accessories shall also be supplied.

Chapter 5 Operator Qualifications

5-1 Public display operators shall be licensed or approved in accordance with any and all applicable state, county, or municipal laws.

5-1.1 All operators shall be at least 21 years old. Assistants shall be at least 18 years old.

5-1.2 Applicants for licensing as operators and assistants shall successfully complete a written examination of laws, regulations, and safety practices administered by the state fire marshal's office or other authority, or otherwise demonstrate proficiency.

5-2* An adequate number of operators, assistants, and monitors shall be on hand to conduct the display.

5-3 No person shall handle or be involved in the firing of fireworks while under the influence of alcohol, narcotics, or drugs which could adversely affect judgment, movements, or stability.

Appendix A

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

A-2-1.2 These dimensions ensure proper operation of and optimum lift for the shell. If the fit is too loose, the shell may not lift into the intended firing range or may not lift off at all. If the fit is too tight, the shell may bind in the mortar.

A-2-2.5 An example of additional protection would be the use of a flame-resistant tarpaulin meeting the requirements of NFPA 701, *Standard Methods of Fire Tests for Flame-Resistant Textiles and Films*.

A-2-3.3 All mortars of the same diameter should be grouped together to minimize the possibility of shells being placed in the wrong mortars. Mortars should be spaced apart by at least twice their diameters.

A-2-3.4 Care should be taken to remove loose gravel, rocks, and other loose solid objects from the area, to prevent such items from being thrown from ground bursts during firing.

A-4-1.1 The authority having jurisdiction should be consulted well enough in advance so that the required fire protection may be arranged for. Fire protection may include portable fire extingushers for the discharge area and standby fire apparatus for protection down range.

A-4-1.2 Monitors should wear some distinctive identification, e.g., badges, brightly colored vests, etc.

A-4-2.3 The operator should crouch alongside the mortar when loading the shell into the mortar.

A-4-2.4 A *gentle* tug on the fuse will usually determine this.

A-4-2.8 The operator should use extreme caution in destroying the shell.

A-5-2 Normally, only one operator is required. Assistants may be used to aid in loading mortars, operating ground pieces, and performing other duties.

Appendix B

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

B-2-1.3 Labeling of Shells.

B-2-1.3.1 Each shell should bear a label containing the following information:

a description of the size of the shell (e.g., "3-in. shell");

a description of the type of shell (e.g., "2-break with report");

a warning statement reading:

WARNING: DANGEROUS EXPLOSIVE
If found, do not handle —
Contact local fire or
police department

the name and place of business of the manufacturer, importer or distributor.

B-2-1.3.2 Conspicuousness.

(a) The statement "WARNING — DANGEROUS EXPLOSIVE" should be printed in capital letters having a printed image of at least ⅛ in. (0.32 cm) and should be underlined.

(b) The remaining printed matter need not be printed in capital letters but should be in the same size type as the foregoing statment.

(c) The required statements should be printed in a color contrasting sharply with the background and should be printed within a borderline.

(d) The label should be at least 3 in. × 3 in. (7.6 cm × 7.6 cm), unless the size of the shell is too small to accommodate such size, in which case the size may be reduced, but to a size no smaller than necessary.

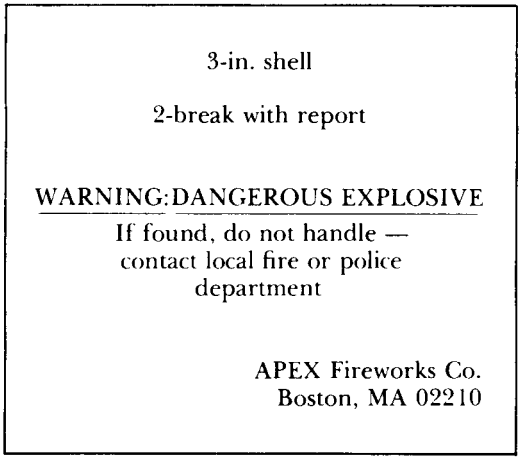

Figure B-2-1.3 Sample Shell Label.

(The information above is based on the Labeling Regulations of the Federal Hazardous Substances Act, 16 CFR 1500.121.)