

NFPA® 1124

Code for the Manufacture, Transportation, Storage, and Retail Sales of Fireworks and Pyrotechnic Articles

The 2013 edition of NFPA 1124, *Code for the Manufacture, Transportation, Storage, and Retail Sales of Fireworks and Pyrotechnic Articles*, is provided for historical reference only. This edition of NFPA 1124 was temporarily withdrawn by Standards Council Decision #14-1. In Decision #14-1, the Standards Council directed that NFPA cease all standards development activity regarding the retail sale and storage of consumer fireworks and that the Technical Committee on Pyrotechnics revise NFPA 1124 in accordance with the newly revised committee and document scopes. The Standards Council will consider the reissuance of NFPA 1124 once the Technical Committee has completed this work.

2013 Edition



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NFPA® 1124

Code for the

Manufacture, Transportation, Storage, and Retail Sales of Fireworks and Pyrotechnic Articles

2013 Edition

Special Note from the NFPA on Consumer Fireworks. Because the sale and use of consumer fireworks is permitted in many jurisdictions throughout the United States and elsewhere, this code, in the interest of public safety, includes provisions on the storage and retail sale of such fireworks. The NFPA, however, is opposed to consumer fireworks. Every year thousands of people, most often children and teens, are injured while using consumer fireworks, and the NFPA urges the public to avoid the use of consumer fireworks and, instead, to enjoy displays of fireworks conducted by trained professionals. For more information about the dangers of consumer fireworks, please visit: www.nfpa.org/fireworks

This edition of NFPA 1124, *Code for the Manufacture, Transportation, Storage, and the Retail Sales of Fireworks and Pyrotechnic Articles*, was prepared by the Technical Committee on Pyrotechnics, and acted on by NFPA at its June Association Technical Meeting held June 11–14, 2012, in Las Vegas, NV. It was issued by the Standards Council on August 9, 2012, with an effective date of August 29, 2012, and supersedes all previous editions.

This edition of NFPA 1124 was approved as an American National Standard on August 29, 2012.

A tentative interim amendment (TIA) to 7.3.18.1 and 7.4.9.2 was issued on August 9, 2012. For further information on tentative interim amendments, see Section 5 of the NFPA Regulations Governing Committee Projects available at: <http://www.nfpa.org/assets/files/PDF/CodesStandards/TIAErrataFI/TIAREgs.pdf>

Origin and Development of NFPA 1124

The precursor to NFPA 1124 was NFPA 44A, *Code for the Manufacture, Transportation, and Storage of Fireworks*, which was developed by the Technical Committee on Explosives of the NFPA Committee on Chemicals and Explosives and adopted as a Tentative Code at the 1972 NFPA Annual Meeting. It was further revised and officially adopted at the 1973 NFPA Annual Meeting. A revised edition was adopted in 1974.

In 1980, the Technical Committee on Explosives and the Committee on Pyrotechnics voted to transfer responsibility for NFPA 44A to the Committee on Pyrotechnics. The Correlating Committee on Chemicals and Explosives concurred and petitioned the NFPA Standards Council to effect the change. The Standards Council approved the change in June 1981.

The 1984 edition of NFPA 1124, *Code for the Manufacture, Transportation, and Storage of Fireworks*, was the result of a complete review of the 1974 edition of NFPA 44A by the Committee on Pyrotechnics, including the redesignation of the document as NFPA 1124 for consistency with the designations for other documents relating to pyrotechnics.

The 1988 edition of NFPA 1124 was the result of a thorough review of and partial revision to the 1984 edition of NFPA 1124 by the Technical Committee on Pyrotechnics, including reference updating and incorporation of the latest separation distances as approved by the Institute of Makers of Explosives in May 1983. It included new provisions for salute manufacturing and storage of salute powder.

The 1995 edition of NFPA 1124 included partial amendments to the document and editorial revisions, improving its ability to be used, adopted, and enforced and making it conform with the NFPA *Manual of Style*. The Committee incorporated the latest separation distances as approved by the Institute of Makers of Explosives in June 1991. The Committee also updated the definitions of fireworks to be consistent with the new terminology used in the U.S. Department of Transportation regulations that incorporated the United Nations shipping designations for fireworks (explosives).

For the 1998 edition, the requirements for fireworks laboratories were clarified by the addition of a definition and clarification of the storage and separation distances that are appropriate for them. The Committee added an appendix that extracts language from the American Pyrotechnics Association Standard 87-1 to provide users of this document with the approved definitions used in the Federal Regulations for fireworks, novelties, and theatrical pyrotechnics. The 1998 edition also incorporated amendments to the separation distances for fireworks manufacturing plants based upon gross weight. Amendments to Chapter 4 clarified the storage requirements for manufacturing facilities and provided requirements for storage at nonmanufacturing facilities such as warehouses and distribution facilities.

In 1999, the NFPA Board of Directors revised its policy in order to permit the Technical Committee on Pyrotechnics to develop provisions for the retail sales and storage of consumer fireworks, subject to Standards Council oversight. At the same time, the Board reaffirmed its support of the Model Fireworks Law, which, since 1938, prohibits use of consumer fireworks.

Although NFPA's Public Education position has continued to advocate against any use of consumer fireworks, it is believed that in the interest of public safety, NFPA standards for the retail sales and storage of consumer fireworks should be available in those jurisdictions where such sales are permitted.

As a result of the Board of Directors' decision, the 2003 edition incorporated new provisions dealing with the distribution and retail sales of consumer fireworks and the title was revised to reflect those additions. The code then addressed the fire and life safety requirements for construction, siting and separation distances, and storage and display layout for both permanent and temporary consumer fireworks retail sales facilities. It contained a completely revised Chapter 6 on distribution facilities and a new Chapter 7 on consumer fireworks retail sales facilities. The code was also revised to reflect the *Manual of Style for NFPA Technical Committee Documents*.

The 2006 edition featured a reorganization of Chapter 7 that brought the requirements for consumer fireworks retail sales (CFRS) facilities, stores, tents, and stands into separate, comprehensive sections. The code also added a requirement that all consumer fireworks undergo third-party testing and certification. The Committee also revised definitions to make them consistent with NFPA 1123, *Code for Fireworks Display*.

The 2013 edition includes updated definitions that correlate with updates to extracted text and conform to the *Manual of Style for NFPA Technical Committee Documents* guidelines. As a result of a 2008 research project conducted by the Fire Protection Research Foundation, the committee incorporated several changes to both consumer fireworks storage and retail sales facility requirements (Chapters 6 and 7, respectively). The research results provided a more technically sound basis for requirements on threshold quantities of pyrotechnic composition within venues covered by the code and threshold facility sizes establishing requirements for automatic sprinkler protection. Coordinating with several other committees, the Pyrotechnics Committee established egress capacity requirements for both storage and retail sales facilities. The code also contains improved requirements for protective features — flame breaks and covered fuses — by referencing newly developed fire test standards.

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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.

Committee Scope: This Committee shall have primary responsibility for documents on the manufacture, transportation, and storage of consumer and display fireworks, pyrotechnic special effects, and model and high power rocket motors. This Committee shall have primary responsibility for the use of display fireworks and for model and high power rocketry, and the construction, launching, and other operations that involve model and high power rocket motors. The Committee shall have primary responsibility for documents on the wholesale and retail sale and storage of consumer fireworks. The Committee shall have responsibility for the development of fire test standards applicable to the packaging, covered fuses, and flame breaks used in retail sales display of consumer fireworks. The Committee shall coordinate the fire test documents with the Fire Tests Committee. The Committee does not have responsibility for documents on the use of consumer fireworks by the general public; on the use of pyrotechnic special effects before a proximate audience; on the manufacture, transportation, storage for use of military, automotive, agricultural, and industrial pyrotechnics.



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A reference in brackets [] following a section or paragraph indicates material that has been extracted from another NFPA document. As an aid to the user, the complete title and edition of the source documents for extracts in mandatory sections of the document are given in Chapter 2 and those for extracts in informational sections are given in Annex G. Extracted text may be edited for consistency and style and may include the revision of internal paragraph references and other references as appropriate. Requests for interpretations or revisions of extracted text shall be sent to the technical committee responsible for the source document.

Information on referenced publications can be found in Chapter 2 and Annex G.

Chapter 1 Administration

1.1 Scope. This code shall provide regulations for the construction, use, and maintenance of buildings and facilities for the following:

- (1) The manufacture and storage of fireworks, novelties, and pyrotechnic articles at manufacturing facilities
- (2) The storage of display fireworks, pyrotechnic articles, salute powder, pyrotechnic and explosive compositions, and Black Powder at other than display sites
- (3) The storage of consumer fireworks at distribution facilities
- (4) The retail sales and related storage of consumer fireworks in consumer fireworks retail sales (CFRS) facilities and stores
- (5) The transportation on public highways of fireworks, pyrotechnic articles, and components thereof containing pyrotechnic or explosive materials

1.2 Purpose. The purpose of this code shall be to establish reasonable minimum fire and life safety requirements for the manufacture, transportation, and storage of fireworks, pyrotechnic articles, and any component(s) thereof con-

taining pyrotechnic or explosive compositions, and in the distribution and retail sales of consumer fireworks.

1.3 Application. This code shall apply to the manufacture, transportation, and storage of fireworks, pyrotechnic articles, and any component(s) thereof containing pyrotechnic or explosive compositions, and to the distribution and retail sales of consumer fireworks.

1.3.1 This code shall also apply to the following:

- (1) Testing of fireworks at a manufacturing facility
- (2) Testing of pyrotechnic devices used in the entertainment industry
- (3) Testing of any component(s) of fireworks or pyrotechnic devices used in the entertainment industry that contain pyrotechnic or explosive compositions

1.3.2 Use of This Code. This code is structured in a logical sequence of Chapters 4 through 8 containing specific requirements that are intended to be mutually exclusive unless specifically indicated within a chapter.

1.3.2.1 Chapter 4. Chapter 4 shall apply to the manufacturing of all types of fireworks and pyrotechnic articles at manufacturing facilities.

1.3.2.1.1 For the storage of salute powder, pyrotechnic and explosive compositions, and Black Powder used in the manufacturing of fireworks and for the storage of finished display fireworks and pyrotechnic articles, see Chapter 5.

1.3.2.1.2 For the storage of finished consumer fireworks and pyrotechnic articles classified as explosives, 1.4G (UN0336, UN0337, UN0431, and UN0432), see Chapter 6.

1.3.2.2 Chapter 5. Chapter 5 shall apply to the storage of salute powder, pyrotechnic and explosive compositions, and Black Powder used in the manufacturing of fireworks and to finished display fireworks and pyrotechnic articles not classified as explosives, 1.4G (UN0336, UN0337, UN0431, and UN0432).

1.3.2.3 Chapter 6. Chapter 6 shall apply to the storage of finished consumer fireworks at manufacturing and distribution facilities.

1.3.2.3.1 Chapter 6 shall not apply to the storage of consumer fireworks at CFRS facilities and stores.

1.3.2.3.2 For the storage of consumer fireworks related to the retail sales of consumer fireworks at CFRS facilities or stores, see Chapter 7.

1.3.2.4 Chapter 7. Chapter 7 shall apply to the retail sales of consumer fireworks to the public at CFRS facilities and stores and to the related storage of consumer fireworks at such facilities.

1.3.2.5 Chapter 8. Chapter 8 shall apply to the transportation on public highways of fireworks, pyrotechnic articles, and any component(s) containing pyrotechnic or explosive compositions or explosive materials.

1.3.3 This code shall not apply to the use of consumer fireworks by the general public.

1.3.4 This code shall not apply to the display site storage and use of fireworks and pyrotechnic articles conducted in accordance with NFPA 1123, *Code for Fireworks Display*.

1.3.5 This code shall not apply to the transportation of fireworks, pyrotechnic devices used in the entertainment industry, or any component(s) thereof containing pyrotechnic or

explosive compositions, where such transportation is under the jurisdiction of the U.S. Department of Transportation (U.S. DOT) or any other national transportation authority.

1.3.6 This code shall not apply to the manufacture, transportation, or storage of model rockets or high power rockets, model rocket motors or high power rocket motors, model rocket motor reloading kits or modules, or high power motor reloading kits or modules, as covered by one of the following codes:

- (1) NFPA 1122, *Code for Model Rocketry*
- (2) NFPA 1125, *Code for the Manufacture of Model Rocket and High Power Rocket Motors*
- (3) NFPA 1127, *Code for High Power Rocketry*

1.3.7 This code shall not apply to the manufacture, transportation, and storage of fireworks by federal and state military agencies.

1.3.8 This code shall not apply to the storage of pyrotechnic devices at the site of use and the use of pyrotechnic special effects in the entertainment industry conducted in accordance with NFPA 1126, *Standard for the Use of Pyrotechnics Before a Proximate Audience*.

1.3.9 This code shall not apply to laboratories covered by NFPA 45, *Standard on Fire Protection for Laboratories Using Chemicals*.

1.3.10 This code shall not apply to fireworks or pyrotechnic articles used in conjunction with flammable gas or flammable liquid special effects conducted in accordance with NFPA 1123, *Code for Fireworks Display*, and NFPA 1126, *Standard for the Use of Pyrotechnics Before a Proximate Audience*.

1.3.11* This code shall not apply to novelties for other than their manufacture.

1.4 Retroactivity. The provisions of this code reflect a consensus of what is necessary to provide an acceptable degree of protection from the hazards addressed in this code at the time the code was issued.

1.4.1 Unless otherwise specified, the provisions of this code shall not apply to facilities, equipment, structures, or installations that existed or were approved for construction or installation prior to the effective date of the code. Where specified, the provisions of this code shall be retroactive.

1.4.2 In those cases where the authority having jurisdiction determines that the existing situation presents an unacceptable degree of risk, the authority having jurisdiction shall be permitted to apply retroactively any portions of this code deemed appropriate.

1.4.3 The retroactive requirements of this code shall be permitted to be modified if their application clearly would be impractical in the judgment of the authority having jurisdiction, and only where it is clearly evident that a reasonable degree of safety is provided.

1.5 Equivalency. Nothing in this code is intended to prevent the use of systems, methods, or devices of equivalent or superior quality, strength, fire resistance, effectiveness, durability, and safety over those prescribed by this code.

1.5.1 Technical documentation shall be submitted to the authority having jurisdiction to demonstrate equivalency.

1.5.2 The system, method, or device shall be approved for the intended purpose by the authority having jurisdiction.

1.6 Enforcement. This code shall be administered and enforced by the authority having jurisdiction designated by the governing authority. (*See Annex F for sample wording for enabling legislation.*)

Chapter 2 Referenced Publications

2.1 General. The documents or portions thereof listed in this chapter are referenced within this code and shall be considered part of the requirements of this document.

2.2 NFPA Publications. National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.

NFPA 10, *Standard for Portable Fire Extinguishers*, 2010 edition.

NFPA 13, *Standard for the Installation of Sprinkler Systems*, 2013 edition.

NFPA 45, *Standard on Fire Protection for Laboratories Using Chemicals*, 2011 edition.

NFPA 70®, *National Electrical Code*®, 2011 edition.

NFPA 72®, *National Fire Alarm and Signaling Code*, 2013 edition.

NFPA 80, *Standard for Fire Doors and Other Opening Protectives*, 2013 edition.

NFPA 101®, *Life Safety Code*®, 2012 edition.

NFPA 102, *Standard for Grandstands, Folding and Telescopic Seating, Tents, and Membrane Structures*, 2011 edition.

• NFPA 259, *Standard Test Method for Potential Heat of Building Materials*, 2008 edition.

NFPA 400, *Hazardous Materials Code*, 2013 edition.

NFPA 1122, *Code for Model Rocketry*, 2013 edition.

NFPA 1123, *Code for Fireworks Display*, 2010 edition.

NFPA 1125, *Code for the Manufacture of Model Rocket and High Power Rocket Motors*, 2012 edition.

NFPA 1126, *Standard for the Use of Pyrotechnics Before a Proximate Audience*, 2011 edition.

NFPA 1127, *Code for High Power Rocketry*, 2013 edition.

PYR 1128, *Standard Method of Fire Test for Flame Breaks*, 2013 edition.

PYR 1129, *Standard Method of Fire Test for Covered Fuse on Consumer Fireworks*, 2013 edition.

2.3 Other Publications.

2.3.1 APA Publication. American Pyrotechnics Association, P.O. Box 30438, Bethesda, MD 20824.

APA 87-1, *Standard for the Construction and Approval for Transportation of Fireworks, Novelties, and Theatrical Pyrotechnics*, 2004 edition.

2.3.2 ASTM Publication. ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959.

ASTM E 84, *Standard Test Method for Surface Burning Characteristics of Building Materials*, 2012.

ASTM E 108, *Standard Test Methods for Fire Tests of Roof Coverings*, 2011.

ASTM E 136, *Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C*, 2011.

ASTM E 2652, *Standard Test Method for Behavior of Materials in a Tube Furnace with a Cone-shaped Airflow Stabilizer, at 750 Degrees C*, 2009a.

2.3.3 Institute of Makers of Explosives Publication. Institute of Makers of Explosives, 1120 19th St., NW, Suite 310, Washington, DC 20036-3605.

American Table of Distances, *American Table of Distances for Storage of Explosives*, June, 1991.

2.3.4 UL Publications. Underwriters Laboratories Inc., 333 Pfingsten Road, Northbrook, IL 60062-2096.

ANSI/UL 723, *Standard for Test for Surface Burning Characteristics of Building Materials*, 2008.

ANSI/UL 790, *Standard for Standard Test Methods for Fire Tests of Roof Coverings*, 2004.

2.3.5 U.S. Government Publications. U.S. Government Printing Office, Washington, DC 20402.

Child Safety Act of 1966.

Title XI, "Regulation of Explosives, of the Crime Control Act of 1970," 1970.

Title 16, Code of Federal Regulations, Part 1500 and Part 1507, U.S. Consumer Product Safety Commission.

Title 18, United States Code, Chapter 40, "Importation, Manufacture, Distribution, and Storage of Explosive Materials," 1970.

Title 27, Code of Federal Regulations, Part 555, Bureau of Alcohol, Tobacco, Firearms, and Explosives, U.S. Department of Justice.

Title 29, Code of Federal Regulations, Part 1910.1200, "Hazard Communication," U.S. Department of Labor.

Title 49, Code of Federal Regulations, Part 100 to end, U.S. Department of Transportation.

2.3.6 Other Publication.

Merriam-Webster's Collegiate Dictionary, 11th edition, Merriam-Webster, Inc., Springfield, MA, 2003.

2.4 References for Extracts in Mandatory Sections.

NFPA 101®, *Life Safety Code*®, 2012 edition.

NFPA 400, *Hazardous Materials Code*, 2013 edition.

NFPA 495, *Explosive Materials Code*, 2010 edition.

NFPA 1123, *Code for Fireworks Display*, 2010 edition.

NFPA 1125, *Code for the Manufacture of Model Rocket and High Power Rocket Motors*, 2012 edition.

NFPA 1126, *Standard for the Use of Pyrotechnics Before a Proximate Audience*, 2011 edition.

NFPA 5000®, *Building Construction and Safety Code*®, 2012 edition.

Chapter 3 Definitions

3.1 General. The definitions contained in this chapter shall apply to the terms used in this code. Where terms are not defined in this chapter or within another chapter, they shall be defined using their ordinarily accepted meanings within the context in which they are used. *Merriam-Webster's Collegiate Dictionary*, 11th edition, shall be the source for the ordinarily accepted meaning.

3.2 NFPA Official Definitions.

3.2.1* Approved. Acceptable to the authority having jurisdiction.

3.2.2* Authority Having Jurisdiction (AHJ). An organization, office, or individual responsible for enforcing the requirements of a code or standard, or for approving equipment, materials, an installation, or a procedure.

3.2.3* Code. A standard that is an extensive compilation of provisions covering broad subject matter or that is suitable for adoption into law independently of other codes and standards.

3.2.4 Labeled. Equipment or materials to which has been attached a label, symbol, or other identifying mark of an organization that is 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.

3.2.5* Listed. Equipment, materials, or services included in a list published by an organization that is acceptable to the authority having jurisdiction and concerned with evaluation of products or services, that maintains periodic inspection of production of listed equipment or materials or periodic evaluation of services, and whose listing states that either the equipment, material, or service meets appropriate designated standards or has been tested and found suitable for a specified purpose.

3.2.6 Shall. Indicates a mandatory requirement.

3.2.7 Should. Indicates a recommendation or that which is advised but not required.

3.3 General Definitions.

3.3.1* Aerial Shell. A cartridge containing pyrotechnic composition, a burst charge, and an internal time fuse or module, that is propelled into the air from a mortar and that is intended to burst at or near apogee. [1123, 2010]

3.3.2 Airburst. A pyrotechnic device that is suspended in the air to simulate outdoor aerial fireworks shells without producing hazardous debris. [1126, 2011]

3.3.3 Area.

3.3.3.1 Consumer Fireworks Retail Sales (CFRS) Area. The portion of a consumer fireworks retail sales facility or store, including the immediately adjacent aisles, where consumer fireworks are located for the purpose of retail display and sale to the public.

3.3.3.2 Process Area. An outside area complying with the applicable provisions of this code for a process building that is used for the manufacture of fireworks and pyrotechnic articles.

3.3.4 Artificial Barricade. See 3.3.5.1.

3.3.5 Barricade. A natural or artificial barrier that effectively screens a magazine, building, railway, or highway from the effects of an explosion in a magazine or building containing explosives.

3.3.5.1 Artificial Barricade. An artificial mound or revetted wall of earth of a minimum thickness of 3 ft (0.9 m).

3.3.5.2 Natural Barricade. A natural outdoor feature(s), such as hills or trees, with a density sufficient to prevent surrounding exposures that require protection from being seen from a magazine or building containing explosives when the trees are bare of leaves.



3.3.5.3* Screen Barricade. Any barrier that contains the embers and debris from a fire or deflagration in a process building, thus preventing propagation of fire to other buildings or areas. [1125, 2012]

3.3.6 Binary Material. See 3.3.7, *Binary System*.

3.3.7* Binary System. A two-component pyrotechnic system. [1126, 2011]

3.3.8 Black Powder. See 3.3.55.1.

3.3.9 Building.

3.3.9.1* Consumer Fireworks Storage Building. A building in which finished consumer fireworks are received, stored, and shipped but in which no manufacturing is performed.

3.3.9.2* Consumer Fireworks Work Building, Room, or Area. A building, room, or area where finished consumer fireworks are picked and packaged into retail packages, including assortments and those picked and packed into DOT-approved packaging, and where related operations are performed.

3.3.9.3* Inhabited Building. Any building or structure regularly used in whole or part as a place of human habitation.

3.3.9.4* Mechanical Building. A building that contains mechanical, electrical, air-conditioning, or other equipment and that usually is connected to a process or non-process building.

3.3.9.5* Mixing Building. Any building used primarily for mixing and blending of pyrotechnic compositions.

3.3.9.6* Nonprocess Building. An office building, a warehouse, or other building or area located in a manufacturing facility in which no fireworks, pyrotechnic or explosive composition, pyrotechnic articles, or components containing pyrotechnic or explosive materials are processed or stored.

3.3.9.7* Process Building. Any building or any room at a manufacturing facility where fireworks, pyrotechnic articles, or component(s) containing explosive or pyrotechnic compositions are manufactured.

3.3.9.8 Shipping Building. A building used for the packing of assorted display fireworks or for the loading of display fireworks onto vehicles for shipment to purchasers.

3.3.9.9 Storage Building. A building, structure, or facility in which consumer fireworks in any state of processing are stored, but in which no processing or manufacturing is performed.

3.3.9.10* Unoccupied Building. A building that is normally unoccupied during its entire period of daily operations.

3.3.10 Bulk Salute. See 3.3.68.2.

3.3.11 Bulk Salute Powder. See 3.3.55.3.1.

3.3.12 Bullet-Sensitive Explosive Material. See 3.3.39.2.

3.3.13* Comet. A single pellet of pyrotechnic composition that is ignited and simultaneously propelled into the air from a mortar or tube; a comet is self-consuming as it rises into the air and can be designed to split apart. [1123, 2010]

3.3.14 Common Fireworks. See 3.3.30.1, *Consumer Fireworks*.

3.3.15 Composition.

3.3.15.1 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.

3.3.15.2 Pyrotechnic Composition. A chemical mixture that, upon burning, produces visible, brilliant displays, bright lights, or sounds.

3.3.15.3 Whistle Composition. A pyrotechnic composition that when pressed into a tube with an open end burns in an oscillatory manner to produce an audible effect.

3.3.16 Consumer Fireworks. See 3.3.30.1.

3.3.17 Consumer Fireworks Retail Sales (CFRS) Area. See 3.3.3.1.

3.3.18 Consumer Fireworks Retail Sales (CFRS) Facility. See 3.3.29.1.

3.3.19* Consumer Fireworks Retail Sales (CFRS) Stand. A temporary or permanent building or structure that has a floor area not greater than 800 ft² (74 m²), other than tents, canopies, or membrane structures, that is used primarily for the retail display and sale of consumer fireworks to the public.

3.3.20 Consumer Fireworks Storage Building. See 3.3.9.1.

3.3.21 Consumer Fireworks Work Building, Room, or Area. See 3.3.9.2.

3.3.22* Covered Fuse. A fuse or designed point of ignition that is protected against accidental ignition by contact with a spark, smoldering items, or small open flame.

3.3.23 Display Fireworks. See 3.3.30.2.

3.3.24 Distribution Facility. See 3.3.29.2.

3.3.25* DOT-Approved Packaging. Packaging for fireworks complying with the regulations of the U.S. Department of Transportation (DOT), Title 49, Part 178.

3.3.26 Electric Match. An electric device that contains a small amount of pyrotechnic material that ignites when current flows through the device. [1123, 2010]

3.3.27* Explosive. Any chemical compound, mixture, or device, the primary or common purpose of which is to function by explosion. [495, 2010]

3.3.28 Explosive Composition. See 3.3.15.1.

3.3.29 Facility.

3.3.29.1 Consumer Fireworks Retail Sales Facility (CFRS Facility). A permanent or temporary building or structure, CFRS stand, tent, canopy, or membrane structure that is used primarily for the retail display and sale of consumer fireworks to the public.

3.3.29.2 Distribution Facility. A place where consumer fireworks are received, stored, picked, packaged and packed into shipping cartons, and shipped to other distribution facilities, manufacturing facilities, or CFRS facilities or stores.

3.3.29.3* Manufacturing Facility. A place where manufacturing of fireworks, novelties, pyrotechnic articles, or components for these devices is conducted.

3.3.30* Fireworks. Any composition or device for the purpose of producing a visible or an audible effect for entertainment purposes by combustion, deflagration, or detonation, that meets the definition of *Consumer Fireworks* or *Display Fireworks* as set forth in this code.

3.3.30.1* Consumer Fireworks. Small fireworks devices containing restricted amounts of pyrotechnic composition, designed primarily to produce visible or audible effects by combustion, that comply with the construction, chemical composition, and labeling regulations of the U.S. Consumer Product Safety Commission (CPSC), as set forth in CPSC 16 CFR 1500 and 1507, 49 CFR 172, and APA Standard 87-1, *Standard for the Construction and Approval for Transportation of Fireworks, Novelties, and Theatrical Pyrotechnics*.

3.3.30.2* Display Fireworks. Large fireworks devices that are explosive materials intended for use in fireworks displays and designed to produce visible or audible effects by combustion, deflagration, or detonation, as set forth in Title 27 CFR Part 555, Title 49 CFR 172, and APA Standard 87-1, *Standard for the Construction and Approval for Transportation of Fireworks, Novelties, and Theatrical Pyrotechnics*.

3.3.31 Flame Break. A solid material without holes or other openings, used to retard the spread of flame.

3.3.32 Flashpowder. See 3.3.55.3, *Salute Powder*.

3.3.33 Highway. Any public street, public alley, or public road, including a privately financed, constructed, or maintained road, that is regularly and openly traveled by the general public.

3.3.34 Inhabited Building. See 3.3.9.3.

3.3.35 Limited-Combustible Material. See 3.3.39.3.

3.3.36 Magazine. A building or structure, other than an explosives manufacturing building, approved for the storage of explosive materials.

3.3.37* Manufacturing. The mixing, pressing, and loading of explosive or pyrotechnic compositions for the purpose of producing fireworks or pyrotechnic articles.

3.3.38 Manufacturing Facility. See 3.3.29.3.

3.3.39 Material.

3.3.39.1 Binary Material. See 3.3.7, *Binary System*. [1126, 2011]

3.3.39.2* Bullet-Sensitive Explosive Material. Explosive material that can be detonated by 150 gr (9.8 g) M2 ball ammunition having a nominal muzzle velocity of 2700 ft/sec (824 m/sec) where fired from a 0.30 caliber rifle at a distance of 100 ft (30 m), measured perpendicularly. [495, 2010]

3.3.39.3 Limited-Combustible Material. A material that meets the conditions found in 6.4.2.2.

3.3.39.4 Noncombustible Material. A material that meets the conditions found in 6.4.2.1.

3.3.39.5* Pyrotechnic Material (Pyrotechnic Special Effects Material). A chemical mixture used in the entertainment industry to produce visible or audible effects by combustion, deflagration, or detonation.

3.3.40 Mechanical Building. See 3.3.9.4.

3.3.41* Mercantile Occupancy. An occupancy used for the display and sale of merchandise. [5000, 2012]

3.3.42* Mine. A device containing multiple pyrotechnic effects that are simultaneously ignited and dispersed into the air from mortar or tube. [1123, 2010]

3.3.43 Mixing Building. See 3.3.9.5.

3.3.44 Mobile Storage Unit. A movable structure such as a box, semi-trailer, or other movable container.

3.3.45 Motor Vehicle. Any self-propelled vehicle, truck, tractor, semitrailer, or truck-trailer combination used for the transportation of freight over public highways. [495, 2010]

3.3.46 Natural Barricade. See 3.3.5.2.

3.3.47 Noncombustible or Limited-Combustible Material. See 3.3.39.4.

3.3.48 Nonprocess Building. See 3.3.9.6.

3.3.49* Novelties. Small devices containing limited amounts of pyrotechnic or explosive composition that produce a visible or an audible effect and that are not classified as consumer fireworks.

3.3.50* Oxidizer. Any solid or liquid material that readily yields oxygen or other oxidizing gas or that readily reacts to promote or initiate combustion of combustible materials and that can, under some circumstances, undergo a vigorous self-sustained decomposition due to contamination or heat exposure. [400, 2013]

3.3.51* Packaged Fireworks Merchandise. A consumer fireworks device or group of consumer fireworks devices that has been packaged within an unperforated container or packaging material by the manufacturer, distributor, or seller for retail display and sale as a unit.

3.3.52 Permanent. As applied to buildings or structures: a building or structure affixed to a foundation on a site and having fixed utility connections, that is intended to remain on the site for more than 180 consecutive calendar days.

3.3.53 Person. An individual, a firm, a copartnership, a corporation, a company, an association, or a joint-stock association, including any trustee, receiver, assignee, or personal representative thereof.

3.3.54 Pest Control Device. An explosive device used to control animal pests.

3.3.55 Powder.

3.3.55.1 Black Powder. A low explosive consisting of an intimate mixture of potassium or sodium nitrate, charcoal, and sulfur. [1126, 2011]

3.3.55.2 Flashpowder. See 3.3.55.3, *Salute Powder*.

3.3.55.3 Salute Powder. An explosive composition that makes a loud report when ignited and constitutes the sole pyrotechnic mixture in a salute.

3.3.55.3.1 Bulk Salute Powder. A quantity of salute powder in an amount exceeding 1 lb (0.45 kg).

3.3.56 Process Area. See 3.3.3.2.

3.3.57 Process Building. See 3.3.9.7.

3.3.58 Public Conveyance. Any railroad car, streetcar, ferry, cab, bus, airplane, or other vehicle that carries passengers for hire. [495, 2010]



3.3.59 Pyrotechnic Article. A pyrotechnic device, other than a device classed as fireworks, for use in the entertainment industry.

3.3.60 Pyrotechnic Composition. See 3.3.15.2.

3.3.61* Pyrotechnic Laboratory. A building or room used for research, development, or testing of chemicals, fireworks, pyrotechnic articles, or components containing explosive or pyrotechnic compositions.

3.3.62 Pyrotechnic Material. See 3.3.39.5.

3.3.63 Pyrotechnic Special Effect. A special effect created through the use of pyrotechnic materials and devices. (See also D.1.42, *Special Effect*.) [1126, 2011]

3.3.64 Pyrotechnics. Controlled exothermic chemical reactions that are timed to create the effects of heat, gas, sound, dispersion of aerosols, emission of visible electromagnetic radiation, or a combination of these effects to provide the maximum effect from the least volume.

3.3.65 Railway. Any steam, electric, diesel-electric, or other railroad or railway that carries passengers for hire on the particular line or branch in the vicinity of a pyrotechnics manufacturing or storage facility.

3.3.66 Retail Sales. The retail display and sale of merchandise to the public within a mercantile occupancy.

3.3.67 Rocket (Fireworks Rocket). A pyrotechnic device that is designed to move by the ejection of matter produced by the internal combustion of propellants.

3.3.68 Salute. A display firework that is designed to produce a loud report.

3.3.68.1 Aerial Salute. A salute that functions as an aerial shell.

3.3.68.2 Bulk Salute. A collection of salutes or salute components containing more than 2 lb (0.9 kg) of salute powder, unless the salutes are mixed with other types of aerial shells so that the total quantity of salutes to other types of shells is less than 50 percent in a single magazine.

3.3.68.3 Ground Salute. A salute that functions from a stationary or secured position.

3.3.69 Salute Powder. See 3.3.55.3.

3.3.70 Screen Barricade. See 3.3.5.3.

3.3.71 Shipping Building. See 3.3.9.8.

3.3.72 Special Fireworks. See 3.3.30.2, *Display Fireworks*.

3.3.73* Stars. Small masses of pyrotechnic compounds that are projected from aerial shells, mines, or roman candles.

3.3.74 Storage Building. See 3.3.9.9.

3.3.75* Store. A building classified as a mercantile occupancy that contains a variety of merchandise and that is not used primarily for the retail sales of consumer fireworks.

3.3.76 Temporary. As applied to buildings or structures: a building or structure not meeting the definition for permanent structure. As applied to electrical power and wiring: electrical service in use or in place for a period of 90 consecutive calendar days or less.

3.3.77 Unoccupied Building. See 3.3.9.10.

3.3.78 Whistle Composition. See 3.3.15.3.

Chapter 4 Manufacturing Operations

4.1 Applicability.

4.1.1 All manufacturing facilities shall comply with the requirements of this chapter.

4.1.2 Manufacturing facilities shall not be required to comply with Sections 4.4, 4.6, 4.7, and 5.3, provided that they meet all of the following conditions:

- (1) Manufacturing is restricted to production of custom fireworks, pyrotechnic articles, and any component(s) containing pyrotechnic or explosive materials that are not for general sale.
- (2) The facility contains not more than 5 lb (2.3 kg) of pyrotechnic composition, of which not more than 0.5 lb (0.23 kg) is of explosive composition.
- (3) All explosive and pyrotechnic compositions are removed to a storage magazine at the end of each workday.

4.1.3 This chapter shall not apply to the following operations performed in a separate building or area, which are not considered fireworks manufacturing:

- (1) Assembly of display pieces from finished fireworks, pyrotechnic articles, and fuse classified as UN0336, UN0337, UN0431, and UN0432
- (2) Minor repairs or modification of finished fireworks not involving exposed pyrotechnic material
- (3) Picking and packaging finished fireworks into packages including assortments
- (4) Packing packages and assortments into DOT-approved packaging
- (5) The attachment of a match or fuse and minor repairs to display fireworks and pyrotechnic articles

4.2 Permit Requirements. The manufacture of any fireworks shall be prohibited unless authorized by federal license, where required, and conducted in accordance with this code.

4.2.1 Persons engaged in the business of importing, manufacturing, or dealing in fireworks shall meet both of the following requirements:

- (1) They shall possess a valid federal license or permit, where required by Title XI, "Regulation of Explosives, of the Crime Control Act of 1970" (18 USC Chapter 40, "Importation, Manufacture, Distribution, and Storage of Explosive Materials").
- (2) They shall comply with all applicable state and local laws and regulations.

4.2.1.1 Copies of all required licenses and permits shall be posted at each manufacturing facility.

4.2.1.1.1 License and permit holders shall protect licenses and permits from loss, theft, defacement, destruction, or unauthorized duplication.

4.2.1.1.2 Any loss, theft, defacement, destruction, or unauthorized duplication of a license or permit shall be reported immediately to the issuing authority.

4.2.1.2 Licenses or permits shall not be assigned or transferred.

4.2.2 The issuing authority shall be notified immediately of any change of business name, controlling ownership, or address.

4.3 Recordkeeping and Reporting.

4.3.1 Record Maintenance.

4.3.1.1 Manufacturers shall maintain records in compliance with federal regulations.

4.3.1.2 Manufacturers shall maintain records for all chemicals and chemical mixtures in compliance with the requirements of 29 CFR 1910.1200, "Hazard Communication."

4.3.2 Record Availability. Records shall be made available to the authority having jurisdiction (AHJ).

4.3.2.1 Where consumer fireworks are handled exclusively, records shall be maintained for 3 years.

4.3.2.2 Records other than consumer fireworks shall be maintained for 5 years.

4.3.3 Loss, Theft, or Unlawful Removal of Explosive Materials.

4.3.3.1 The loss, theft, or unlawful removal of explosive materials shall be reported immediately to the nearest office of the Bureau of Alcohol, Tobacco and Firearms, U.S. Department of the Treasury, and to local law enforcement authorities.

4.3.3.2 The loss, theft or removal of consumer fireworks shall not be required to be reported.

4.4 Site Security.

4.4.1 General. All plant buildings containing pyrotechnic composition, explosive composition, or fireworks shall be locked at the end of the workday and whenever plant personnel are not present, to provide security.

4.4.2 Plant Access.

4.4.2.1 All roads leading into the plant shall be provided with gates that shall be kept closed and locked at all times when not used for entry or exit.

4.4.2.2 Vehicle access to the plant shall be restricted to roadways by means of a fence, natural barriers such as trees, and culverts, or by other means.

4.4.2.3 If the main plant entrance is in full view of and under the observation of an authorized responsible employee or guard, the main plant entrance shall be permitted to be left open during regular plant operating hours.

4.4.2.4 Only authorized employees or representatives of federal, state, or local agencies having jurisdiction over the plant shall be permitted inside the plant without special permission of the person in charge.

4.4.3 Signage. Conspicuous signs that read as follows shall be posted at the entrance and along the fence or barrier:

WARNING:

NO SMOKING — NO TRESPASSING

4.5 Construction.

4.5.1 Process Building.

4.5.1.1 Process buildings shall be single-story buildings and shall not have basements.

4.5.1.2 Wall joints and openings for wiring, plumbing, and other utilities shall be sealed to prevent the entry of dusts.

4.5.1.3 Horizontal ledges and surfaces upon which dust can settle and accumulate shall be minimized.

4.5.2* Floors and Work Surfaces.

4.5.2.1 Floors and work surfaces shall not have cracks or crevices in which explosives or pyrotechnic compositions can lodge.

4.5.2.2 Floors and work surfaces in mixing and loading buildings for salute powder shall be of conductive materials.

4.5.2.3 Conductive footwear or other grounding techniques for personnel shall be used wherever exposed salute powder is present.

4.5.3 Heating, Lighting, and Electrical Equipment.

4.5.3.1 Stoves, exposed flames, and portable electric heaters shall be prohibited in any building where fireworks, fireworks components, or flammable liquids are or can be present.

4.5.3.2 Heating shall be provided by steam, hot water, indirect hot air radiators, or any other means acceptable to the AHJ.

4.5.3.3 Unit heaters located in buildings that contain exposed explosive or pyrotechnic composition shall be equipped with motors and electrical devices for use in hazardous locations in accordance with Article 502 of *NFPA 70, National Electrical Code*.

4.5.3.4 All wiring, switches, and electrical fixtures in process buildings shall meet the requirements for hazardous locations in accordance with Article 502 of *NFPA 70, National Electrical Code*.

4.5.3.4.1 Portable lighting equipment shall not be used, unless under both of the following conditions:

- (1) Listed portable lighting equipment shall be permitted to be used during repair operations.
- (2) The repair operations area shall be cleared of all pyrotechnic or explosive material, and all dust or residue shall be removed before portable lighting equipment is used.

4.5.3.4.2 All presses and other such mechanical devices used in the vicinity of exposed explosive or pyrotechnic composition shall be electrically bonded and grounded.

4.5.3.5 All artificial lighting shall be electrically powered.

4.5.4 Static Discharge.

4.5.4.1 A means for discharging static shall be provided at the entrance to all mixing, pressing, and loading buildings where exposed salute powder is present.

4.5.4.2 All personnel entering the buildings described in 4.5.4.1 shall utilize the means required by 4.5.4.1.

4.5.5 Explosion Relief.

4.5.5.1* Provision of explosion relief, by means of pressure-relieving construction or explosion vents, shall be considered for each process building in which an explosion hazard exists.



4.5.5.2 Where climatic conditions (or local building code requirements) prevent the use of pressure-relieving construction or explosion vents, alternate methods of protecting nearby buildings such as, but not limited to, screen-type barricades and differences in elevation of trees shall be provided for buildings in which an explosion hazard exists.

4.5.6 Means of Egress.

4.5.6.1 Means of egress in all buildings shall comply with applicable requirements of NFPA 101, *Life Safety Code*.

4.5.6.2 Means of egress in process buildings also shall comply with the following requirements:

- (1) At least two remotely located means of egress shall be provided from every point in every undivided floor area of more than 100 ft² (9 m²).
- (2) Where process buildings are divided into rooms, means of egress shall be as follows:
 - (a) At least two means of escape shall be provided from each room of more than 100 ft² (9 m²).
 - (b) Toilet rooms shall be permitted to have only one means of egress, provided that they are located away from or shielded from process areas.
- (3) An unobstructed means of egress shall be located so that every point within the room or undivided floor area is within 25 ft (7.6 m) of a means of egress.
- (4) Exit doors shall open outward and shall be capable of being pressure actuated from the inside.

4.6 Separation Distances and Quantity Tables.

4.6.1 General.

4.6.1.1 Barricades. To be effective, a barricade shall be of such height that one of the following passes through the barricade:

- (1) A straight line measured from the top of any sidewall of a magazine or building containing explosives to the eave line of any magazine or building
- (2) A straight line measured from the top of any sidewall of a magazine or building containing explosives to a point 12 ft (3.7 m) above the center of a railway or highway

4.6.1.2 Screen Barricades.

4.6.1.2.1 Screen barricades shall be permitted to be constructed of one of the following:

- (1) Metal roofing
- (2) 0.25 in. to 0.5 in. (6 mm to 13 mm) mesh screen
- (3) Other equivalent material

4.6.1.2.2 The screen barrier shall extend from floor level to a height such that a straight line measured from the top of any sidewall of the donor building to the eave line of any exposed building intercepts the screen at a point not less than 5 ft (1.5 m) from the top of the screen.

4.6.1.2.3 The top 5 ft (1.5 m) of the screen barrier shall incline toward the donor building at an angle of 30 degrees to 45 degrees.

4.6.2 Separation Distances and Quantity Tables for Process Buildings and Areas.

4.6.2.1 Process buildings and areas shall be separated from other process buildings and areas and from nonprocess buildings in accordance with the distances specified in Table 4.6.2.1.

4.6.2.2 A maximum of 500 lb (227 kg) of in-process composition, in loose form or in partially assembled display fireworks, shall be permitted in any process building or area.

4.6.2.3 Finished display fireworks shall not be stored in a process building. (See Section 4.7.)

4.6.2.4 A maximum of 10 lb (4.5 kg) of salute powder, in loose form or in assembled units, shall be permitted in any process building or area.

4.6.2.5 Quantities of loose salute powder in excess of 10 lb (4.5 kg) shall be kept in an approved magazine.

4.6.2.6 The minimum separation distance for in-process consumer fireworks or pyrotechnic articles shall be as follows:

- (1) The minimum separation distance of 37 ft (11 m) for in-process consumer fireworks or pyrotechnic articles shall apply only to 100 lb (45 kg) of loose powder or stars.
- (2) If a quantity of loose powder or stars greater than 100 lb (45 kg) is present, the minimum separation distances in Table 4.6.2.1 for in-process display fireworks shall be used.

Table 4.6.2.1 Minimum Separation Distances of Process Buildings and Areas from Process and Nonprocess Buildings and Areas

Net Weight of Fireworks ^a		In-Process Display Fireworks Without Barricades		In-Process Display Fireworks with Barricades		In-Process Consumer Fireworks or Pyrotechnic Articles ^{b,c}	
lb	kg	ft	m	ft	m	ft	m
>0 to ≤100	>0 to ≤45	114	35	57	17	37	11
>100 to ≤200	>45 to ≤91	138	42	69	21	37	11
>200 to ≤300	>91 to ≤136	154	47	77	23	37	11
>300 to ≤400	>136 to ≤181	170	52	85	26	37	11
>400 to ≤500	>181 to ≤227	182	55	91	28	37	11
>500	>227	NP	NP	NP	NP	NP	NP

NP: Not permitted.

^aNet weight equals the weight of all pyrotechnic and explosive composition and fuse only.

^bFor maximum quantity of pyrotechnic composition permitted in a pyrotechnics laboratory, see 4.6.9.3.

^cSee 4.6.2.6(1).

4.6.3 Separation Distances for Process Buildings and Areas from Inhabited Buildings, Passenger Railways, Public Highways, Magazines, and Shipping and Storage Buildings. Process buildings and areas shall be separated from the following in accordance with the distances specified in Table 4.6.3:

- (1) Inhabited buildings
- (2) Passenger railways
- (3) Public highways
- (4) Magazines
- (5) Display fireworks shipping buildings
- (6) Consumer fireworks storage buildings

4.6.3.1* The distances in Table 4.6.3 shall apply to process buildings and areas with or without barricades or screen-type barricades.

Table 4.6.3 Minimum Separation Distances of Process Buildings and Areas at Manufacturing Facilities from Inhabited Buildings, Passenger Railways, Public Highways, Magazines, Shipping Buildings, and Storage Buildings

Net Weight of Fireworks*		In-Process Display Fireworks [†]		In-Process Consumer Fireworks or Pyrotechnic Articles	
lb	kg	ft	m	ft	m
>0 to ≤100	>0 to ≤45	200	61	25	7.6
>100 to ≤500	>45 to ≤227	200	61	50	15
>500	>227	NP	NP	NP	NP

NP: Not permitted.

*Net weight equals the weight of all pyrotechnic and explosive composition and fuse only.

[†]For information on the separation distances between process buildings, see Table 4.6.2.1; between magazines, see Table 4.6.4.1 and Table 4.6.4.4; and between storage buildings, see Table 4.6.6.

4.6.3.2 Table 4.6.3 shall not apply to the separation distances between process buildings or areas (see Table 4.6.2.1), between magazines (see Table 4.6.4.1 and Table 4.6.4.4), and between storage buildings (see Table 4.6.6 and Table 6.7.1).

4.6.3.3 A maximum of 500 lb (227 kg) of in-process composition, in loose form or in partially assembled display fireworks, shall be permitted in any process building or area.

4.6.3.4 Finished display fireworks shall not be stored in a process building. (See Section 4.7.)

4.6.3.5 A maximum of 10 lb (4.5 kg) of salute powder, either in loose form or in assembled units, shall be permitted in any process building or area at one time.

4.6.3.6 Quantities of salute powder in excess of 10 lb (4.5 kg) shall be kept in an approved magazine.

4.6.4 Separation Distances and Quantity Tables for Magazines for the Storage of Display Fireworks and Components for Display Fireworks, Loose Pyrotechnic Composition, and Stars.

4.6.4.1 Magazines for the storage of display fireworks and components for display fireworks, loose pyrotechnic composition, and stars shall be separated from inhabited buildings, passenger railways, public highways, and other magazines in accordance with the distances specified in Table 4.6.4.1.

4.6.4.2 For the purposes of applying Table 4.6.4.1, the following criteria shall be met:

- (1) Display fireworks shipping buildings shall meet the same distance requirements as magazines.
- (2) All compositions not in current use shall be kept in covered, nonferrous containers, unless such composition has been loaded or pressed into tubes or other containers as consumer fireworks.

4.6.4.3 At a fireworks plant, up to 50 lb (22.7 kg) of pyrotechnic composition or display fireworks shall be permitted to be stored in a Type 2 or a Type 4 indoor magazine in any process building.

4.6.4.4 Magazines for the storage of bulk salute powder and bulk salutes shall comply with Table 4.6.4.4.

Table 4.6.4.1 Minimum Separation Distances for the Storage of Display Fireworks (Except Bulk Salutes) from Inhabited Buildings, Passenger Railways, Public Highways, Magazines, Shipping Buildings, and Storage Buildings

Net Weight of Fireworks*		Distance Between Magazine or Shipping Building and Inhabited Building, Passenger Railway, or Public Highway		Distance Between Magazines, Shipping Buildings, and Storage Buildings [†]	
lb	kg	ft	m	ft	m
>0 to ≤1000	>0 to ≤454	150	46	100	30
>1,000 to ≤5,000	>454 to ≤2,268	230	70	150	46
>5,000 to ≤10,000	>2,268 to ≤4,536	300	91	200	61
>10,000	>4,536	See Table 4.6.4.4		See Table 4.6.4.4	

*Net weight equals the weight of all pyrotechnic and explosive compositions and fuse only.

[†]For distances between storage buildings to storage buildings, see Table 4.6.4.4.



Table 4.6.4.4 The American Table of Distances for Storage of Explosives

Quantity of Explosive Materials ^{1,2,3,4,5}		Distances (ft)							
		Inhabited Buildings ¹⁰		Public Highways Class A to D ¹²		Passenger Railways — Public Highways with Traffic Volume of More than 3,000 Vehicles/Day ^{11,12}		Separation of Magazines ^{6,13}	
Pounds Over	Pounds Not Over	Barri-caded ^{7,8,9}	Unbarri-caded	Barri-caded ^{7,8,9}	Unbarri-caded	Barri-caded ^{6,7,8}	Unbarri-caded	Barri-caded ^{6,7,8}	Unbarri-caded
0	5	70	140	30	60	51	102	6	12
5	10	90	180	35	70	64	128	8	16
10	20	110	220	45	90	81	162	10	20
20	30	125	250	50	100	93	186	11	22
30	40	140	280	55	110	103	206	12	24
40	50	150	300	60	120	110	220	14	28
50	75	170	340	70	140	127	254	15	30
75	100	190	380	75	150	139	278	16	32
100	125	200	400	80	160	150	300	18	36
125	150	215	430	85	170	159	318	19	38
150	200	235	470	95	190	175	350	21	42
200	250	255	510	105	210	189	378	23	46
250	300	270	540	110	220	201	402	24	48
300	400	295	590	120	240	221	442	27	54
400	500	320	640	130	260	238	476	29	58
500	600	340	680	135	270	253	506	31	62
600	700	355	710	145	290	266	532	32	64
700	800	375	750	150	300	278	556	33	66
800	900	390	780	155	310	289	578	35	70
900	1,000	400	800	160	320	300	600	36	72
1,000	1,200	425	850	165	330	318	636	39	78
1,200	1,400	450	900	170	340	336	672	41	82
1,400	1,600	470	940	175	350	351	702	43	86
1,600	1,800	490	980	180	360	366	732	44	88
1,800	2,000	505	1,010	185	370	378	756	45	90
2,000	2,500	545	1,090	190	380	408	816	49	98
2,500	3,000	580	1,160	195	390	432	864	52	104
3,000	4,000	635	1,270	210	420	474	948	58	116
4,000	5,000	685	1,370	225	450	513	1,026	61	122
5,000	6,000	730	1,460	235	470	546	1,092	65	130
6,000	7,000	770	1,540	245	490	573	1,146	68	136
7,000	8,000	800	1,600	250	500	600	1,200	72	144
8,000	9,000	835	1,670	255	510	624	1,248	75	150
9,000	10,000	865	1,730	260	520	645	1,290	78	156
10,000	12,000	875	1,750	270	540	687	1,374	82	164
12,000	14,000	885	1,770	275	550	723	1,446	87	174
14,000	16,000	900	1,800	280	560	756	1,512	90	180
16,000	18,000	940	1,880	285	570	786	1,572	94	188
18,000	20,000	975	1,950	290	580	813	1,626	98	196
20,000	25,000	1,055	2,000	315	630	876	1,752	105	210
25,000	30,000	1,130	2,000	340	680	933	1,866	112	224
30,000	35,000	1,205	2,000	360	720	981	1,962	119	238
35,000	40,000	1,275	2,000	380	760	1,026	2,000	124	248
40,000	45,000	1,340	2,000	400	800	1,068	2,000	129	258
45,000	50,000	1,400	2,000	420	840	1,104	2,000	135	270
50,000	55,000	1,460	2,000	440	880	1,140	2,000	140	280
55,000	60,000	1,515	2,000	455	910	1,173	2,000	145	290
60,000	65,000	1,565	2,000	470	940	1,206	2,000	150	300
65,000	70,000	1,610	2,000	485	970	1,236	2,000	155	310
70,000	75,000	1,655	2,000	500	1,000	1,263	2,000	160	320
75,000	80,000	1,695	2,000	510	1,020	1,293	2,000	165	330
80,000	85,000	1,730	2,000	520	1,040	1,317	2,000	170	340
85,000	90,000	1,760	2,000	530	1,060	1,344	2,000	175	350
90,000	95,000	1,790	2,000	540	1,080	1,368	2,000	180	360
95,000	100,000	1,815	2,000	545	1,090	1,392	2,000	185	370

(continues)



Table 4.6.4.4 *Continued*

Quantity of Explosive Materials ^{1,2,3,4,5}		Distances (ft)							
		Inhabited Buildings ¹⁰		Public Highways Class A to D ¹²		Passenger Railways — Public Highways with Traffic Volume of More than 3,000 Vehicles/Day ^{11,12}		Separation of Magazines ^{6,13}	
Pounds Over	Pounds Not Over	Barri-caded ^{7,8,9}	Unbarri-caded	Barri-caded ^{7,8,9}	Unbarri-caded	Barri-caded ^{6,7,8}	Unbarri-caded	Barri-caded ^{6,7,8}	Unbarri-caded
100,000	110,000	1,835	2,000	550	1,100	1,437	2,000	195	390
110,000	120,000	1,855	2,000	555	1,110	1,479	2,000	205	410
120,000	130,000	1,875	2,000	560	1,120	1,521	2,000	215	430
130,000	140,000	1,890	2,000	565	1,130	1,557	2,000	225	450
140,000	150,000	1,900	2,000	570	1,140	1,593	2,000	235	470
150,000	160,000	1,935	2,000	580	1,160	1,629	2,000	245	490
160,000	170,000	1,965	2,000	590	1,180	1,662	2,000	255	510
170,000	180,000	1,990	2,000	600	1,200	1,695	2,000	265	530
180,000	190,000	2,010	2,010	605	1,210	1,725	2,000	275	550
190,000	200,000	2,030	2,030	610	1,220	1,755	2,000	285	570
200,000	210,000	2,055	2,055	620	1,240	1,782	2,000	295	590
210,000	230,000	2,100	2,100	635	1,270	1,836	2,000	315	630
230,000	250,000	2,155	2,155	650	1,300	1,890	2,000	335	670
250,000	275,000	2,215	2,215	670	1,340	1,950	2,000	360	720
275,000	300,000	2,275	2,275	690	1,380	2,000	2,000	385	770

Explanatory Notes Essential to the Application of the American Table of Distances for Storage of Explosives

¹ "Explosive materials" means explosives, blasting agents, and detonators.

² "Explosives" means any chemical compound, mixture, or device, the primary or common purpose of which is to function by explosion. A list of explosives determined to be within the coverage of 18 USC Chapter 40, "Importation, Manufacture, Distribution, and Storage of Explosive Materials," is issued at least annually by the Director of the Bureau of Alcohol, Tobacco, and Firearms of the Department of the Treasury. For quantity and distance purposes, detonating cord of 50 grains per foot should be calculated as equivalent to 8 lb (3.7 kg) of high explosives per 1,000 ft (305 m). Heavier or lighter core loads should be rated proportionately.

³ "Blasting agents" means any material or mixture consisting of fuel and oxidizer, intended for blasting, not otherwise defined as an explosive, provided that the finished product, as mixed for use or shipment, cannot be detonated by means of a No. 8 test blasting cap where unconfined.

⁴ "Detonator" means any device containing any initiating or primary explosive that is used for initiating detonation. A detonator shall not be permitted to contain more than 10 g of total explosives by weight, excluding ignition or delay charges. The term includes, but is not limited to, electric blasting caps of instantaneous and delay types, blasting caps for use with safety fuses, detonating cord delay connectors, and nonelectric instantaneous and delay blasting caps that use detonating cord, shock tube, or any other replacement for electric leg wires. All types of detonators in strengths through No. 8 cap should be rated at 1 lb (0.7 kg) of explosives per 1,000 caps.

⁵ For strengths higher than No. 8 cap, consult the manufacturer.

⁶ "Magazine" means any building, structure, or container, other than an explosives manufacturing building, approved for the storage of explosive materials.

⁷ "Natural barricade" means natural features of the ground, such as hills, or timber of sufficient density that the surrounding exposures that require protection cannot be seen from the magazine when the trees are bare of leaves.

⁸ "Artificial barricade" means an artificial mound or revetted wall of earth of a minimum thickness of 3 ft (0.9 m).

⁹ "Barricaded" means the effective screening of a building containing explosive materials from the magazine or other building, railway, or highway by a natural or an artificial barrier. A straight line from the top of any sidewall of the building containing explosive materials to the eave line of any magazine or other building or to a point 12 ft (3.7 m) above the center of a railway or highway shall pass through such barrier.

¹⁰ "Inhabited building" means a building regularly occupied in whole or part as a habitation for human beings, or any church, schoolhouse, railroad station, store, or other structure where people are accustomed to assemble, except any building or structure occupied in connection with the manufacture, transportation, storage, or use of explosive materials.

¹¹ "Railway" means any steam, electric, or other railroad or railway that carries passengers for hire.

¹² "Highway" means any public street, public alley, or public road.

¹³ Where two or more storage magazines are located on the same property, each magazine must comply with the minimum distances specified from inhabited buildings, railways, and highways, and, in addition, the magazine should be separated from each other by not less than the distances shown for "separation of magazines," except that the quantity of explosive materials contained in detonator magazines shall govern with regard to the spacing of the detonator magazines from magazines containing other explosive materials. If any two or more magazines are separated from each other by less than the specified "separation of magazines" distances, then those two or more magazines, as a group, must be considered as one magazine, and the total quantity of explosive materials stored in such group must be treated as if stored in a single magazine located on the site of any magazine of the group, and must comply with the minimum distances specified from other magazines, inhabited buildings, railways, and highways.

¹⁴ Storage in excess of 300,000 lb (136,200 kg) of explosive materials in one magazine is generally not required for commercial enterprises.

¹⁵ This table applies only to the manufacture and permanent storage of commercial explosive materials. It is not applicable to transportation of explosives or any handling or temporary storage necessary or incident thereto. It is not intended to apply to bombs, projectiles, or other heavily encased explosives.

¹⁶ Where a manufacturing building on an explosive materials plant site is designed to contain explosive materials, such building shall be located from inhabited buildings, public highways, and passenger railways in accordance with the American Table of Distances based on the maximum quantity of explosive materials permitted to be in the building at one time.

Source: Reprinted from IME Library Publication No. 2, with permission of the Institute of Makers of Explosives, revised in June 1991.



4.6.4.5 For fireworks storage magazines in active use prior to March 7, 1990, the distances in Table 4.6.4.1 shall be permitted to be halved, provided that earthen barricades are used between the magazine and potential receptor sites.

4.6.4.6 Table 4.6.4.1 shall not apply to the storage of bulk salute powder or to the storage of shipping cartons or storage containers that primarily contain salutes or salute components. (See Table 4.6.4.4 for bulk salute powder and bulk salute storage requirements.)

4.6.4.7 Magazines for the storage of Black Powder shall comply with Table 4.6.4.7.

4.6.5 Magazines Containing Salute Powder and Salutes. Magazines containing salute powder and salutes shall be separated from each other and from inhabited buildings, public

Table 4.6.4.7 Minimum Separation Distances for the Storage of Black Powder

Pounds		From Inhabited Building Distance (ft)	From Public Railroad and Highway Distance (ft)	From Aboveground Magazine (ft)
Over	Not Over			
0	1,000	75	75	50
1,000	5,000	115	115	75
5,000	10,000	150	150	100
10,000	20,000	190	190	125
20,000	30,000	215	215	145
30,000	40,000	235	235	155
40,000	50,000	250	250	165
50,000	60,000	260	260	175
60,000	70,000	270	270	185
70,000	80,000	280	280	190
80,000	90,000	295	295	195
90,000	100,000	300	300	200
100,000	200,000	375	375	250
200,000	300,000	450	450	300

Source: ATF Table 555.219, Table of Distances for Storage of Low Explosives.

Table 4.6.6 Minimum Separation Distances of Consumer Fireworks Storage Buildings at Manufacturing Facilities from Passenger Railways, Public Highways, Other Storage Buildings, and Inhabited Buildings

Gross Weight of Consumer Fireworks		Distance from Passenger Railways, Public Highways, and Other Storage Buildings		Distance from Inhabited Buildings	
lb	kg	ft	m	ft	m
0-1,000	0-454	35	11	70	21
1,000-5,000	454-2,268	55	17	110	34
5,000-10,000	2,268-4,536	60	18	120	37
10,000-20,000	4,536-9,072	65	20	135	41
20,000-50,000	9,072-22,680	80	24	160	49
50,000-100,000	22,680-45,360	90	27	180	55
≥100,000	≥45,360	100	30	200	61

highways, and passenger railways in accordance with the distances specified in Table 4.6.4.4.

4.6.6 Separation Distances and Quantity Tables for Storage Buildings for Consumer Fireworks. Storage buildings for consumer fireworks located at fireworks manufacturing facilities shall be separated from inhabited buildings, passenger railways, public highways, and other storage buildings in accordance with the distances specified in Table 4.6.6.

4.6.7 Groups of Buildings.

4.6.7.1 If any process building is separated from any other process or nonprocess building by less than the distance specified in Table 4.6.2.1, two or more such buildings, as a group, shall be considered to be one building.

4.6.7.2 The total quantity of explosive and pyrotechnic composition in the group of buildings specified in 4.6.7.1 shall not exceed 500 lb (227 kg) or shall not exceed 10 lb (4.5 kg) of salute powder.

4.6.7.3 Each building in the group shall otherwise comply with the separation distances specified in Table 4.6.2.1 and Table 4.6.3.

4.6.7.4 Unoccupied buildings at manufacturing facilities shall not be subject to the separation distance requirements of Section 4.6.

4.6.8 Magazine Groups.

4.6.8.1 If any two or more magazines or storage buildings are separated by less than the distances specified in Table 4.6.4.1, Table 4.6.4.4, or Table 4.6.6, two or more such structures shall be considered to be one magazine or storage building.

4.6.8.2 The total quantity of explosive and pyrotechnic composition stored in the group of buildings shall be used to determine the minimum separation distances of each building in the group from inhabited buildings, passenger railways, public highways, and other magazines and storage buildings.

4.6.8.3 No minimum separation distance shall be required for process buildings, magazines, or storage buildings within a group.

4.6.9 Pyrotechnics Laboratories.

4.6.9.1 Pyrotechnics laboratories shall be considered process buildings for consumer fireworks for the purpose of separation distances.

4.6.9.2 Pyrotechnics laboratories shall be considered to be nonprocess buildings with respect to the other requirements of this code.

4.6.9.3 Pyrotechnics laboratories shall not contain more than 10 lb (4.5 kg) of pyrotechnic composition and not more than 0.5 lb (0.23 kg) of salute powder, provided that all fireworks and pyrotechnic composition are stored properly when not in use.

4.7* Maximum Number of Occupants and Maximum Quantity Limitations. Not more than 500 lb (227 kg) of pyrotechnic or explosive composition shall be permitted at one time in any process building or area.

4.8 Operations.

4.8.1 The requirements of 27 CFR 555 for transfer of the following from process buildings to magazines at the conclusion of daily operation shall be met:

- (1) Dry explosive powders and mixtures
- (2) Partially assembled display fireworks
- (3) Finished display fireworks

4.8.2* Unless a variance from the requirement of 4.8.1 has been issued in writing to a manufacturer by the Bureau of Alcohol, Tobacco and Firearms, all dry explosive powders and mixtures, partially assembled display fireworks, and finished display fireworks shall be transferred from process buildings to magazines at the conclusion of daily operation.

4.9 Fire and Explosion Prevention.

4.9.1 Rubbish, Spills, and Waste Disposal.

4.9.1.1 All buildings shall be kept clean and orderly, and dust or rubbish shall be kept to a minimum.

4.9.1.2 Spills of explosive or pyrotechnic composition shall be cleaned up, and materials used for cleanup shall be removed immediately from the building.

4.9.1.3 The spilled material shall be destroyed by immersion in water or by burning in a manner acceptable to the AHJ.

4.9.1.4 Rags, combustible scrap, and paper shall be kept separate from waste explosive or pyrotechnic materials.

4.9.1.5 Rags, combustible scrap, and paper shall be kept in approved, marked containers until removed from the building.

4.9.1.6 Disposal containers shall be removed from buildings on a daily basis and removed from the plant at regular intervals.

4.9.1.7 Waste explosive or pyrotechnic materials shall be destroyed as described in 4.9.1.3.

4.9.2 Smoking Materials.

4.9.2.1 Smoking materials shall not be carried into or in the vicinity of process buildings.

4.9.2.2 Personnel shall deposit all smoking materials at a designated location in a nonprocess building before entering a processing plant.

4.9.2.3* Smoking shall be permitted only in office buildings or in buildings used exclusively as lunchrooms or rest rooms and in which the presence of explosive or pyrotechnic materials is prohibited.

4.9.2.4 Authorized smoking locations shall comply with the following:

- (1) They shall be marked as smoking areas.
- (2) They shall contain designated receptacles for disposal of smoking materials.
- (3) They shall be provided with at least one approved portable fire extinguisher for use on Class A fires.

4.9.2.5 Personnel whose clothing is contaminated with explosive or pyrotechnic composition to a degree that endangers personnel safety shall not be permitted in smoking areas.

4.9.3 Substance Abuse. No employee or other person shall be permitted to enter the plant while in possession of or under the influence of alcohol, drugs, or narcotics.

4.9.4 Clothing.

4.9.4.1 Personnel working at or supervising mixing, pressing, and loading operations shall be provided with and shall wear cotton or other similarly protective clothing.

4.9.4.2 Other protective clothing, eye protection, and respiratory protection shall be worn as needed.

4.9.4.3 Washing and changing facilities shall be provided for personnel.

4.9.4.4 Work clothing shall be washed frequently to prevent the accumulation of explosive or pyrotechnic composition and shall not be worn outside the plant.

4.9.5* Oxidizers.

4.9.5.1 Oxidizers shall be stored to avoid contact with incompatible materials such as ordinary combustibles, flammable or combustible liquids, greases, and materials that could react with the oxidizer or promote or initiate its decomposition.

4.9.5.2 Incompatible materials shall not include approved packaging materials, pallets, or other dunnage.

4.9.5.3 Oxidizer storage shall comply with NFPA 400, *Hazardous Materials Code*.

4.9.6* Machinery and Tooling. Machinery and tooling shall be permitted to be made of ferrous metal. (*See also 4.5.3.4.2.*)

4.10 Fire Protection and Emergency Plans.

4.10.1 Fire Extinguishers.

4.10.1.1 Portable fire extinguishers shall be provided in all nonprocess buildings in accordance with the requirements of NFPA 10, *Standard for Portable Fire Extinguishers*.

4.10.1.2 Fire extinguishers shall not be located in process buildings, shipping buildings, or magazines.

4.10.2 Automatic sprinklers or deluge systems shall not be required for mixing buildings, process buildings, magazines, or shipping buildings.

4.10.3 Emergency Plan.

4.10.3.1 Each plant shall have a formal emergency plan.

4.10.3.2 An emergency warning signal shall be established.

4.10.3.3 The emergency plan shall include employee instruction and training and shall be applicable to all anticipated emergencies.



4.10.3.4 The emergency plan shall include instruction in the use of portable fire extinguishers and the identification of fires on which they can be used.

4.10.3.5 Employees shall be instructed to abandon fire-fighting efforts if the fire involves or appears likely to spread to explosive or pyrotechnic composition or devices, in which case employees shall evacuate the building immediately and alert other plant personnel.

• **4.11* Testing of Fireworks and Pyrotechnic Articles.**

4.11.1 Testing of fireworks, pyrotechnic materials, and pyrotechnic and explosive compositions shall be performed only in a building or area specifically designated for the purpose.

4.11.2 Testing shall be conducted at a safe distance from other plant buildings or structures and process areas.

4.11.3 Testing of fireworks, pyrotechnic articles, and any component(s) containing pyrotechnic or explosive materials shall be performed only in an area specifically designated by the manufacturer and approved by the AHJ.

4.12 Occupancies.

4.12.1* The number of occupants in each process building and in each magazine shall not exceed the number necessary to conduct production operations.

4.12.2 The maximum number of occupants and maximum weight of pyrotechnic and explosive composition permitted in each process building and in each magazine shall be posted in a conspicuous location in each process building or magazine.

4.13 Training.

4.13.1 Each plant shall designate an employee as safety officer who shall be responsible for general safety, fire prevention and protection, and employee safety training.

4.13.2 The safety officer shall provide formal instruction to all employees upon their commencing employment and at least annually thereafter, regarding safety methods, procedures, and requirements and procedures for handling explosive and pyrotechnic compositions and devices.

4.14 Item Construction.

4.14.1 Aerial Shells. Aerial shells shall be constructed so that they fit easily into the correctly sized mortar, and so that the correct lift charge and internal delay fuse are used to propel the shell to a safe altitude before it functions.

4.14.2 Safety Caps. Safety caps shall comply with the following requirements:

- (1) A safety cap shall be installed over the exposed end of the internal delay fuse.
- (2) The safety cap shall be of a different color than that of the fuse and shall be installed in such a manner that the fuse remains undamaged when removed.
- (3) Electrically fired displays shall not require a safety cap, provided that no pyrotechnic composition is exposed.

4.14.3 Display Fireworks—Ground Salutes.

4.14.3.1 Display fireworks—ground salutes shall not exceed 3 in. (76 mm) in diameter × 3 in. (76 mm) in length.

4.14.3.2 The maximum quantity of salute powder in display fireworks—ground salutes shall not exceed 2.5 oz (71 g).

4.14.3.3 Display fireworks—ground salutes shall not be constructed using brittle plastic.

4.14.3.4 To allow the person igniting the aerial shells to retreat safely, the time delay between igniting the tip of the shell's fuse and the firing of the shell shall be not less than 3 seconds or more than 6 seconds.

4.14.3.5 Electrically ignited displays shall not require the delay period specified in 4.14.3.4.

4.14.4 Labeling.

4.14.4.1 Pyrotechnic articles intended for indoor use shall be so marked, and labels shall include the following information:

- (1) Accurate performance characteristics of the device
- (2) For fountains, gerbs, and other preloads, duration, height, and diameter of the effect, as applicable

4.14.4.2 Pyrotechnic articles marked for indoor use shall be permitted to be used outdoors.

4.14.4.3 Pyrotechnic articles marked by the manufacturer for indoor use shall be used indoors only.

4.14.4.4 All binary systems shall be labeled with the following information in addition to the general requirements:

- (1) Type of contents and general use of the material
- (2) Description of conditions of use, potential hazards, and required equipment with instructions for use
- (3) Manufacturer's statement regarding whether the material is permitted for indoor use and the conditions under which the material is to be used

4.14.4.5 All binary materials intended for indoor use shall be preweighed, premeasured, prepackaged, and identified by the manufacturer as permitted for indoor use.

4.14.5 Requirements for Display Fireworks Aerial Devices. In addition to the general requirements, the requirements of 4.14.5.1 through 4.14.5.6 shall apply to aerial devices for display fireworks.

4.14.5.1 Aerial shells, mines, and comets shall be classified and described only in terms of the inside diameter of the mortar from which they are to be fired.

4.14.5.2* As a minimum, display fireworks manufactured on or after September 30, 2007, shall be conspicuously marked with the following information:

- (1) The size of the display fireworks device, if applicable
- (2) A description of the type of device and the effect(s)
- (3)*A warning statement that reads as shown in Figure 4.14.5.2

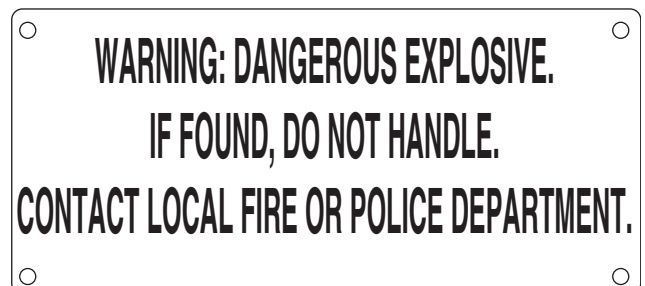


FIGURE 4.14.5.2 Warning Statement on Fireworks Aerial Devices.