First Revision No. 4-NFPA 1123-2023 [Global Input]

Correct the term "discharge area" in 8.1.9.2, 8.2.10.3.3, and A. 8.3. 1.1 t 1 to the defined term "discharge site".

Submitter Information Verification

Committee: PYR-AAA
Submittal Date: Wed Oct 25 16:47:41 EDT 2023

Committee Statement

Committee Statement: The term discharge site is defined and the revision changes discharge area to discharge site where it is relevant.

Response Message: FR-4-NFPA 1123-2023

Public Input No. 35-NFPA 1123-2023 [Global Input]

First Revision No. 15-NFPA 1123-2023 [Detail]

A.3.3.15 Fireworks.

Toy caps for use in toy pistols, toy canes, toy guns, and novelties and trick noisemakers are not considered to be fireworks ~~*(see Annex D)*~~ . The regulations referred to limit the explosive content of each toy cap to not more than an average of 0.25 gr (16.2 mg). Also, each package containing such caps has to be labeled to indicate the maximum explosive content per cap. For information on the use of model rockets and model rocket motors, see NFPA 1122. For information on the use of high power rockets and high power rocket motors, see NFPA 1127. Model rockets, model rocket motors, high power rockets, and high power rocket motors designed, sold, and used for the purpose of propelling recoverable aero models are not considered to be fireworks. [1124, 2022]

A.3.3.15.1 Consumer Fireworks.

Consumer fireworks are normally classed as Explosives, 1.4G and described as UN 0336, " Fireworks," ~~UN 0336~~ by the ~~U.S.~~ US Department of Transportation (~~U.S.~~ US DOT) ~~*(see Annex D).*~~ . Some small devices designed to produce audible effects are included, such as whistling devices, ground devices containing 0.8 gr (50 mg) or less of explosive composition (salute powder), and aerial devices containing 2 gr (130 mg) or less of explosive composition (salute powder) per explosive unit. Consumer fireworks contain limited quantities of pyrotechnic composition per unit and do not pose a mass explosion hazard where stored. Therefore, they are not required to be stored in a magazine.

A.3.3.15.2 Display Fireworks.

Display fireworks are described as UN 0335, " Fireworks, ~~UN 0335~~ " and are classified as Explosives, 1.3G by the ~~U.S.~~ US Department of Transportation (~~U.S.~~ US DOT) ~~*(see Annex D)*~~ .

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

(1) Salutes or firecrackers containing more than 2 gr (130 mg) of explosive composition (salute powder)

(2) Aerial shells containing more than 2.1 oz (60 g) of total pyrotechnic and explosive composition

(3) Other display pieces that exceed the limits for classification as consumer fireworks

Such fireworks are also described as fireworks, 49 CFR 172 by the ~~U.S.~~ US DOT. [1124, 2022]

Submitter Information Verification

Committee: PYR-AAA

Submittal Date: Mon Nov 20 11:31:41 EST 2023

Committee Statement

Committee Statement: This revision was developed by NFPA staff for editorial purposes, in accordance with 4.3.9.3.2 and 4.3.9.3.3 of the Regulations Governing the Development of NFPA Standards (www.nfpa.org/regs).

Response Message:	Annex D is being deleted and the cross references are being updated here. FR-15-NFPA 1123-2023

First Revision No. 1-NFPA 1123-2023 [Section No. 5.1.3.7.1]

5.1.3.7.1

For effects using black powder or a black powder equivalent as a propellant and those using gasoline~~/~~ , alcohols ~~, /~~ or other flammable liquids for fireball effects, whether discharged from mortars or from other devices, the separation distances provided in Table 5.1.3.7.1 shall apply.

Table 5.1.3.7.1 Distances for Flammable Effects: Minimum Separation Distances from Mortars to Spectators for Land or Water Displays

Device Capacity ~~in Gallons~~ (gal)	Device Capacity (L)	Audience Separation Distance (ft)	Audience Separation Distance (m)
≤5	≤19	75	23
~~5.01–25~~		~~150~~	
~~25–50~~		~~200~~	
~~50–100~~		~~250~~	
~~100–200~~		~~300~~	
~~200–400~~		~~350~~	
~~>400~~		~~600~~	
>5–25	>19–95	150	46
>25–50	>95–189	200	61
>50–100	>189–379	250	76
>100–200	>379–757	300	91
>200–400	>757–1514	350	107
>400	>1514	600	183

Submitter Information Verification

Committee: PYR-AAA

Submittal Date: Wed Oct 25 14:32:26 EDT 2023

Committee Statement

Committee Statement: Metric equivalents have been added and overlapping values have been corrected. Additionally the unit for separation distance has been added.

Response Message: FR-1-NFPA 1123-2023

Public Input No. 2-NFPA 1123-2023 [Section No. 5.1.3.7.1]

Public Input No. 41-NFPA 1123-2023 [Section No. 5.1.3.7]

First Revision No. 13-NFPA 1123-2023 [New Section after 5.1.3.7.4]

5.1.3.8 Solid Fuel Fireball Effects.

5.1.3.8.1*

For effects using black powder or a black powder equivalent as a propellant and those using powdered solids for fireball effects, whether discharged from mortars or other devices, the separation distance to the audience shall be the lesser of the distance required for the device as calculated by the volume of the device per 5.1.3.8.1.1 or either of the following:

(1) For round devices, the separation distance shall be 12.5 ft (3.81 m) per 1 in. (25 mm) of the internal diameter of the largest device to be fired.

(2) For rectangular devices, the separation distance shall be 12.5 ft (3.81 m) per 1 in. (25 mm) of the largest dimension (width or length) of the largest device to be fired.

A.5.1.3.8.1

Examples of powdered solids that are typically used for fireball effects are sawdust, lycopodium, powdered milk, walnut husks, etc. Solid fuel fireball effects should not utilize flash powder or similar combinations of metal powder and oxidizer mixes as the fuel element of a fireball. The calculated volume or device size can be used to determine the required separation distance.

The volume of a cylinder can be calculated using the following formula:

$$V = \pi \times r^2 \times h$$ **[A.5.1.3.8.1]**

where:

V = volume of the cylinder in in^3

r = radius

h = height

To obtain that volume in gallons, multiply the number of in.^{3} by 0.0043 to convert it into US gallons or 0.0036 for Imperial gallons.

5.1.3.8.1.1

Volume-based audience separation distances shall be calculated per Table 5.1.3.8.1.1 .

Table 5.1.3.8.1.1 Volume-Based Audience Separation Distances

Volume (gal)	Volume (L)	Separation Distance (ft)	Separation Distance (m)
<1	<4	50	15
1–4	4–15	75	23
>4–10	>15–38	150	46
>10–25	>38–95	200	61
>25–100	>95–379	250	76
>100–200	>379–757	300	91
>200–400	>757–1514	350	107

Volume (gal)	Volume (L)	Separation Distance (ft)	Separation Distance (m)
>400	>1514	600	183

5.1.3.8.1.2

If multiple devices are separated by less than 10 ft (3 m) to create a single fireball effect, the combined volume of all devices and not device size or diameter shall determine the audience separation distance.

5.1.3.8.2

If a solid fuel fireball effect contains any type of insert, such as stars or other effects that split, burst, or provide additional effects other than simple combustion, the audience separation distances shall be increased by 50 percent.

5.1.3.8.3

Devices for firing solid fuel fireball effects shall be one of the following:

(1) Display fireworks mortars.

(2) Plastic containers, provided all the metal parts and attachments are removed

(3) Cardboard containers

(4) Metal containers with a minimum wall thickness of $\frac{1}{8}$ in. (3.18 mm) for all containers with a volume over 5 gal (19 L)

5.1.3.8.4

When prevailing winds are oriented toward the audience, a 20 percent increase in audience separation distance shall be required.

5.1.3.8.5

Solid fuel fireball effects shall be assembled in their respective firing locations and not moved or transported after assembly.

5.1.3.8.6*

Solid fuel fireball effect devices using black powder or equivalent propellants that are used in a display with projectile or other firework devices shall be protected from premature ignition caused by debris or other components of the projectile fireworks by means of a plastic, foil, or similar covering.

A.5.1.3.8.6

If utilizing metal bowls to contain the black powder or other lift charge and the solid fuel is not to be immediately loaded, an opaque covering such as foil or a similar cover should be used to prevent premature ignition of the e-match or another igniter.

Supplemental Information

File Name	Description	Approved
Table_5.1.3.8_3_.docx		

Submitter Information Verification

Committee: PYR-AAA

Submittal Date: Mon Oct 30 14:26:18 EDT 2023

Committee Statement

Committee Statement:	The committee is adding solid fireball effects to the code as the use of solid fireball effects in a display is a permitted activity. The distances proposed are based on field data from PGI and industry operators. The increases for splitting and bursting effects are based on similar requirements for display fireworks. Wind will disperse these types of effects, however a 20% safety factor is proposed to accommodate a reasonable margin of safety.
Response Message:	FR-13-NFPA 1123-2023

First Revision No. 7-NFPA 1123-2023 [New Section after 5.1.3.7.4]

5.1.3.7.5

Flammable liquid fireball effects shall be separated from fireworks and other devices as follows:

(1) By a distance of at least 10 ft (3 m) for single flammable liquid fireball effects

(2) By a distance of at least 25 ft (7.6 m) for clusters of multiple flammable liquid fireball effects

5.1.3.7.6

The requirements of 5.1.3.7.5 shall not apply to fireworks and devices fired in conjunction with flammable liquid fireball effects.

Submitter Information Verification

Committee: PYR-AAA

Submittal Date: Thu Oct 26 09:19:29 EDT 2023

Committee Statement

Committee Statement: This revision provides clarification on the placement of flammable liquid fireball effects in relation to other devices or fireworks at the display site.

Response Message: FR-7-NFPA 1123-2023

First Revision No. 9-NFPA 1123-2023 [Section No. 5.3]

5.3 Tents.

5.3.1

Tents shall ~~not~~ be ~~located within~~ permitted in the ~~discharge~~ display site during the display as approved by the owner, operator, and AHJ .

5.3.2

~~Where tents are permitted in the fallout area by the operator and AHJ, such tents~~ Tents within the display site shall not be occupied during the display.

Submitter Information Verification

Committee: PYR-AAA

Submittal Date: Thu Oct 26 15:52:41 EDT 2023

Committee Statement

Committee Statement: The two previous requirements were contradictory and the text as been revised to permit tents in the display site, and then specify they need to be unoccupied during the display.

Response Message: FR-9-NFPA 1123-2023

First Revision No. 2-NFPA 1123-2023 [New Section after 6.3.2.3]

6.3.2.4* Temporary Structures and Barriers.

Other than the shelter required by 6.2.3 or 6.4.1 , temporary structures and barriers that impede egress or access to the barge or floating platform that have not been determined by the display operator to be necessary for the safe setup and operation of the display shall not be placed or constructed on or near the barge or floating platform used for the display.

A.6.3.2.4

Temporary structures and barriers can interfere with overboard activities or procedures and the ability to monitor for, see, and quickly recover personnel who go overboard voluntarily or otherwise.

In addition, temporary structures and barriers placed near a barge or floating platform present a hazard to navigation for vessels and personnel attempting to access or depart from the site. Such temporary structures and barriers might also require placement or control measures that could impact safety.

Submitter Information Verification

Committee: PYR-AAA

Submittal Date: Wed Oct 25 15:02:32 EDT 2023

Committee Statement

Committee Statement: These requirements are not intended to restrict gunwales and other features of a barge or floating platform designed into the vessel as a primary containment, fall protection measure such as railings and walls for the transportation of bulk materials, strengthening reinforcement measures, or attachment and securement features.

Temporary structures and barriers that are placed or constructed on or near a barge or floating platform to contain debris can greatly inhibit the safe and prompt egress from and access to the barge or floating platform. This can occur at any time that the crew is present on the barge, including set up and strike. This can delay or prevent the crew from escaping and emergency personnel from accessing the barge or floating platform in the event of an emergency.

Access is also necessary for the crews of controlling vessels and other authorized vessels and personnel. Examples include tug crews to secure lines and other vessel operations as well as AHJ and USCG personnel inspecting the vessel for compliance with safety regulations and permitting conditions.

Response Message: FR-2-NFPA 1123-2023

Public Input No. 24-NFPA 1123-2023 [New Section after 6.3.2.3]

First Revision No. 3-NFPA 1123-2023 [New Section after 6.4.8]

6.4.9*

Fireworks crew members on barges and floating platforms shall not, without the direction of the operator, engage in activities that distract from or interfere with the safe set up, firing, clearing, and striking of the fireworks display, or the continuous monitoring for potential hazards.

A.6.4.9

The primary duty of the fireworks crew and crews on other safety-related vessels is ensuring safety. Duties that are not safety related, such as placing or operating cameras or recording systems, distract from those primary duties and should not be permitted unless the operator is directing them. This requirement is not intended to restrict common crew and vessel support functions.

Submitter Information Verification

Committee: PYR-AAA

Submittal Date: Wed Oct 25 15:26:03 EDT 2023

Committee Statement

Committee Statement: The operator of the display is the only one who can assign other duties to the display crew.

Response Message: FR-3-NFPA 1123-2023

Public Input No. 25-NFPA 1123-2023 [New Section after 6.4.8]

First Revision No. 5-NFPA 1123-2023 [Section No. 8.3.1.1]

8.3.1.1

Unless the requirements of 8.3.1.2 or 8.3.1.3 are met to the extent that it is practical, all ground display pieces shall be positioned ~~outside~~ so that they will not be prematurely ignited by the discharge ~~area~~ of aerial displays.

Submitter Information Verification

Committee: PYR-AAA

Submittal Date: Wed Oct 25 16:59:45 EDT 2023

Committee Statement

Committee Statement: An undefined term is being removed and the change clarifies the intended hazard mitigation.

Response Message: FR-5-NFPA 1123-2023

First Revision No. 16-NFPA 1123-2023 [Section No. A.4.1.3.1]

A.4.1.3.1

Examples of labeling information are as follows:

(1) The description of the size of the shell, comet, or mine [e.g., 2 in. (50 mm), 3 in. (76 mm), etc.]

(2) The description of the type of shell, comet, or mine (e.g., color shell, salute shell, silver comet, color mine, two-break with report, etc.)

Submitter Information Verification

Committee: PYR-AAA

Submittal Date: Mon Nov 20 11:37:08 EST 2023

Committee Statement

Committee Statement: This revision was developed by NFPA staff for editorial purposes, in accordance with 4.3.9.3.2 and 4.3.9.3.3 of the Regulations governing the development of NFPA Standards (www.nfpa.org/regs).

A lead in sentence is needed for a list and is being added in.

Response Message: FR-16-NFPA 1123-2023

First Revision No. 17-NFPA 1123-2023 [Section No. A.4.5.7]

A.4.5.7

The materials used in rack construction vary widely in the industry. There is no single material or construction method that is uniquely acceptable for fireworks display racks. This performance-based requirement addresses the concern about mortar rack construction and provides direction ~~in order~~ to ensure operator and audience safety during fireworks displays.

Many accidents characterized as rack-related accidents might actually be related to violations of current code such as mortar stabilization, shell type, or chain fusing. Mortar rack construction might be neither a cause of these accidents nor a means by which such accidents might be best prevented in the future.

Examples of the ~~employed~~ systems and methods ~~related to the use of~~ used to ensure safety with racks include the following:

(1) ~~How racks are secured and stabilized~~ Different methods for securing and stabilizing the racks

(2) ~~Use of~~ Constructing additional containment and/or framework ~~construction~~ structures

(3) ~~Types~~ Utilizing different types of shells ~~utilized~~

(4) ~~Placement~~ Strategic placement of the devices in the field

(5) ~~Use of~~ Using natural barriers and/or berms

(6) ~~Use of~~ Using other barriers (e.g., metal dumpsters)

(7) ~~Audience location~~ Strategic placement of the audience

(8) ~~Use of~~ Using other, smaller caliber shell mortar racks to surround and contain the larger 5 in. and 6 in. (127 mm and 152 mm) shell mortars

(9) ~~Chain~~ Utilizing chain fusing alternatives

(10) ~~Use of additional separation distances~~ Increasing the separation distance as prescribed by the code related to the use of chain fusing and other actions

(11) Consideration for mortar rack construction and the materials used for construction

Submitter Information Verification

Committee: PYR-AAA

Submittal Date: Mon Nov 20 11:46:34 EST 2023

Committee Statement

Committee Statement: This revision was developed by NFPA Staff for editorial purposes, in accordance with 4.3.9.3.2 and 4.3.9.3.3 of the Regulations Governing the Development of NFPA Standards (www.nfpa.org/regs).

Editorial corrections are being made to the section, to match the editorial corrections made to A.4.6.4.

Response Message: FR-17-NFPA 1123-2023

First Revision No. 6-NFPA 1123-2023 [Section No. A.4.6.4]

A.4.6.4

~~The materials used in rack construction vary widely in the industry. There is no single material or construction method that is uniquely acceptable for fireworks display racks.~~ This performance-based requirement addresses the concern about ~~mortar rack construction~~ chain-fused aerial fireworks devices and provides direction ~~in order~~ to ensure operator and audience safety during fireworks displays.

~~Many accidents characterized as rack-related accidents might actually be related to violations of current code such as mortar stabilization, shell type, or chain fusing. Mortar rack construction might be neither a cause of these accidents nor a means by which such accidents might be best prevented in the future.~~

Examples of the ~~employed~~ systems and methods ~~related to the use of racks~~ used to ensure safety with chain-fused devices include the following:

(1) ~~How racks are secured and stabilized~~ Different methods for securing and stabilizing the devices

(2) ~~Use of~~ Constructing additional containment and/or framework ~~construction~~ structures

(3) ~~Types~~ Utilizing different types of shells ~~utilized~~

(4) ~~Placement~~ Strategic placement of the devices in the field

(5) ~~Use of~~ Using natural barriers and/or berms

(6) ~~Use of~~ Using other barriers (e.g., metal dumpsters)

(7) ~~Audience location~~ Strategic placement of the audience

(8) ~~Use of~~ Using other, smaller caliber shell mortar racks to surround and contain the larger 5 in. and 6 in. (127 mm ~~to~~ and 152 mm) shell mortars

(9) ~~Chain~~ Utilizing chain fusing alternatives

(10) ~~Use of additional separation distances~~ Increasing the separation distance as prescribed by the code related to the use of chain fusing

~~Consideration for mortar rack construction and the materials used for construction~~

Submitter Information Verification

Committee: PYR-AAA

Submittal Date: Thu Oct 26 09:02:07 EDT 2023

Committee Statement

Committee Statement: The revision changes the annex to be more specific to chain fusing rather than mortar construction.

Response Message: FR-6-NFPA 1123-2023

Public Input No. 1-NFPA 1123-2022 [Section No. A.4.6.4]

First Revision No. 12-NFPA 1123-2023 [Chapter D]

D-deleted ~~Extract from American Pyrotechnics Association 87-1,~~ ***~~Standard for Construction and Approval for Transportation of Fireworks, Novelties, and Theatrical Pyrotechnics~~*** **-** ~~DELETED~~

~~*This annex is not a part of the requirements of this NFPA document but is included for informational purposes only. This annex is extracted from the 2001 edition of APA 87-1.*~~

~~D.1~~ ~~Introduction.~~

~~D.1.1~~

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

~~D.1.2~~

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

~~D.1.3~~

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

~~D.1.4~~

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

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

~~D.1.5~~

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

~~D.1.6~~

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

~~D.2~~ ~~Definitions.~~

~~D.2.1~~ ~~Approval.~~

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

D.2.2 Black Match (Instantaneous Fuse).

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

D.2.3 Blowout.

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

D.2.4 Burnout.

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

D.2.5 Burst Charge.

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

D.2.6 Chemical Composition.

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

D.2.6.1 Explosive Composition.

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

D.2.6.2 Pyrotechnic Composition.

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

D.2.7 Fireworks.

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

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

D.2.7.1 Consumer Fireworks (Formerly Common Fireworks).

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

D.2.7.2 Display Fireworks (Formerly Special Fireworks).

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

D.2.8 Electric Match (Igniter).

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

D.2.9 Labeling.

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

D.2.10 Lift Charge.

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

D.2.11 Marking.

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

D.2.12 Novelty.

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

D.2.13 Placard.

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

D.2.14 Quick Match (Instantaneous Fuse).

Black match that is encased in a loose-fitting paper or plastic sheath to make it burn extremely rapidly. Quick match is used for aerial shells and for simultaneous ignition of a number of pyrotechnic devices, such as lances in a ground display piece. Quick match may be approved under the provisions of this Standard and classed as 1.3G, described as Fuse, non-detonating, and assigned identification number UN0101. A different classification may be recommended based on testing and examination as specified in Title 49, CFR, 173.56. [††]

D.2.15 Safety Fuse.

A fuse consisting of a thread-wrapped Black Powder train that has been coated with a water resistant material. Such fuse is typically 3⁄32 in. (2.4 mm) in outside diameter and frequently green in color. Safety Fuse is described as Fuse, Safety UN0105 and classed as 1.4S. [††]

D.2.16 Star.

A pressed or consolidated pellet of pyrotechnic composition that is usually cylindrical, spherical, or rectangular in shape. Stars are fired from a launch tube by means of a propelling charge of Black Powder in roman candles and mines, or they are a component of an insert that is fired into the air in an aerial shell. Stars produce a visible display of color and light as they burn in the air, and sometimes a crackling or similar audible effect is also produced. Stars are typically 0.375-1.0 in. in diameter. Larger cylindrical stars are known as comets. A star is not considered a finished firework, and stars cannot be approved for transportation under the provisions of this Standard. [†]

D.2.17 Theatrical Pyrotechnics.

Pyrotechnic devices for professional use in the entertainment industry similar to consumer fireworks in chemical composition and construction but not intended for consumer use. Such articles, meeting the lift and effect powder weight limits for similar consumer fireworks but not labeled as such, and containing only chemicals listed in Table D.3.7.1 may be approved under the provisions of this Standard and classified as Articles, Pyrotechnic, 1.4G, UN0431. [†]

Note: Theatrical pyrotechnics devices may be classed by DOT as Articles, Pyrotechnic, 1.4S, UN0432 or as Articles, Pyrotechnic, 1.3G, UN0430 on the basis of examination and testing as specified in Title 49, CFR, 173.56.

D.3 Requirements for Consumer Fireworks, Novelties, and Theatrical Pyrotechnics.

Note 1: Devices in this category, formerly classed as Class C Explosive, Common Fireworks, are now classed as Fireworks 1.4G under the UN System, and referred to in this Standard as Consumer Fireworks.

Note 2: Devices intended for non-consumer use in the entertainment industry, termed Theatrical Pyrotechnics in this Standard, that meet the chemical composition weight requirements of Section D.3 may be classed as 1.4G and described as Articles, Pyrotechnic UN0431 under the provisions of this Standard, but are not required to comply with the fuse, construction, and labeling requirements of CPSC for consumer fireworks. Theatrical Pyrotechnics may or may not have an ignition device attached.

D.3.1 Types of Consumer Fireworks.

The following fireworks devices are subject to the requirements of Section D.3 of this annex. *(See Appendix A of APA Standard 87-1 for diagrams.)* [†]

D.3.1.1 Ground and Hand-Held Sparkling Devices ("Sparklers").

These devices are ground-based or hand-held devices that produce a shower of white, gold, or colored sparks as their primary pyrotechnic effect. Additional effects may include a colored flame, an audible crackling effect, an audible whistle effect, and smoke. These devices do not rise into the air, do not fire inserts or projectiles into the air, and do not explode or produce a report (a mild audible crackling-type effect is not considered to be a report). Ground-based or hand-held devices that produce a cloud of smoke as their sole pyrotechnic effect are also included in this category. Types of devices in this category include those in D.3.1.1.1 through D.3.1.1.8 . [†]

D.3.1.1.1 Cylindrical Fountain.

Cylindrical tube containing not more than 75 g of pyrotechnic composition. Upon ignition, a shower of colored sparks, and sometimes a whistling effect or smoke, 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 to be hand held (Handle Fountain). When more than 1 tube is mounted on a common base, total pyrotechnic composition may not exceed 200 g. *(See D.3.5 for exceptions.)* [†]

D.3.1.1.2 Cone Fountain.

Cardboard or heavy paper cone containing not more than 50 g of pyrotechnic composition. The effect is the same as that of a cylindrical fountain. When more than 1 cone is mounted on a common base, total pyrotechnic composition may not exceed 200 g. *(See D.3.5 for exceptions.)* [†]

D.3.1.1.3 Illuminating Torch.

Cylindrical tube containing not more than 100 g of pyrotechnic composition that produces a colored flame upon ignition. May be spike, base, or hand held. When more than 1 tube is mounted on a common base, total pyrotechnic composition may not exceed 200 g. *(See D.3.5 for exceptions.)* [†]

D.3.1.1.4 Wheel.

Pyrotechnic device intended to be attached to a post or tree by means of a nail or string. May have one or more drivers, each of which may contain not more than 60 g of pyrotechnic composition. No wheel may contain more than 200 g total pyrotechnic composition. Upon ignition, the wheel revolves, producing a shower of color and sparks and, sometimes, a whistling effect. [†]

D.3.1.1.5 Ground Spinner.

Small device containing not more than 20 g of pyrotechnic composition, venting out an orifice usually on the side of the tube. Similar in operation to a wheel but intended to be placed flat on the ground and ignited. A shower of sparks and color is produced by the rapidly spinning device. [†]

D.3.1.1.6 Flitter Sparkler.

Narrow paper tube attached to a stick or wire and filled with not more than 5 g of pyrotechnic composition that produces color and sparks upon ignition. The paper at one end of the tube is ignited to make the device function. [†]

D.3.1.1.7 Toy Smoke Device.

Small plastic or paper item containing not more than 100 g of pyrotechnic composition that, upon ignition, produces white or colored smoke as the primary effect. *(For devices containing less than 5 g of pyrotechnic composition, see D.3.2 , Novelties.)* Toy smoke devices, when complying with the provisions of this section, are classed as Fireworks, 1.4G unless classed as 1.4S or not regulated as an explosive on the basis of examination and testing as specified in Title 49, CFR, 173.56. [†]

D.3.1.1.8 Wire Sparkler/Dipped Stick.

These devices consist of a metal wire or wood dowel that has been coated with pyrotechnic composition. Upon ignition of the tip of the device, a shower of sparks is produced. Sparklers may contain up to 100 g of pyrotechnic composition per item. Certain wire sparklers and dipped sticks are considered as novelties under this Standard. *(See D.3.2 .)* [†]

D.3.1.2 Aerial Devices.

D.3.1.2.1 Sky Rockets and Bottle Rockets.

Cylindrical tube containing not more than 20 g of chemical composition with a wooden stick attached for guidance and stability. Rockets rise into the air upon ignition. A burst of color and/or sound may be produced at or near the height of flight. [†]

D.3.1.2.2 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. Missiles shall contain not more than 20 g of total chemical composition. [†]

D.3.1.2.3 Helicopter, Aerial Spinner.

A tube containing not more than 20 g of chemical composition, with a propeller or blade attached. Upon ignition the rapidly spinning device rises into the air. A visible or audible effect may be produced at or near the height of flight. [†]

D.3.1.2.4 Roman Candle.

Heavy paper or cardboard tube containing not more than 20 g of chemical composition. Upon ignition, stars *(see D.2.14)* are individually expelled. [†]

D.3.1.2.5 Mine and Shell Devices.

Heavy cardboard or paper tube usually attached to a wooden or plastic base and containing not more than 60 g of total chemical composition (lift charge, burst charge, and visible/audible effect composition.) Upon ignition stars, components producing reports containing up to 130 mg of explosive composition per report, or other devices are propelled into the air. The term *mine* refers to a device with no internal components containing a bursting charge, and the term *shell* refers to a device that propels a component that subsequently bursts open in the air. A mine or shell device may contain more than 1 tube provided the tubes fire in sequence upon ignition of 1 external fuse. The term *cake* refers to a dense-packed collection of mine/shell tubes. Total chemical composition including lift charges of any multiple-tube devices may not exceed 200 g. The maximum quantity of lift charge in any one tube of a mine or shell device shall not exceed 20 g, and the maximum quantity of break or bursting charge in any component shall not exceed 25 percent of the total weight of chemical composition in the component. [†]

Note: Shells that are offered for transportation without a launching tube may not be approved as Fireworks, 1.4G, UN0336 under the provisions of this Standard, except as provided in D.3.1.2.6 for kits. Aerial shells without launching tubes may be approved for transportation as Fireworks, 1.3G, UN0335. *(See D.4.1.1 .)*

D.3.1.2.6 Aerial Shell Kit, Reloadable Tube.

A package (kit) containing a cardboard, high-density polyethylene (HDPE), or equivalent launching tube and not more than 12 small aerial shells. *(See D.4.1.1 .)* Each aerial shell is limited to a maximum of 60 g of total chemical composition (lift charge, burst charge, and visible/audible effect composition), and the maximum diameter of each shell shall not exceed 1.75 inches. In addition, the maximum quantity of lift charge in any shell shall not exceed 20 g, and the maximum quantity of break or bursting charge in any shell shall not exceed 25 percent of the total weight of chemical composition in the shell. The total chemical composition of all the shells in a kit, including lift charge, shall not exceed 400 g for approval under the provisions of this standard. The user lowers a shell into the launching tube, at the time of firing, with the fuse extending out of the top of the tube. After firing, the tube is then reloaded with another shell for the next firing. All launching tubes must be capable of firing twice the number of shells in the kit without failure of the tube. Each package of 12 shells must comply with all warning label requirements of CPSC. [†]

D.3.1.3 Audible Ground Devices.

D.3.1.3.1 Firecracker.

Small, paper-wrapped or cardboard tube containing not more than 50 mg of explosive composition, those used in aerial devices may contain not more than 130 mg of explosive composition per report. Upon ignition, noise and a flash of light are produced. [†]

Note: Firecrackers are not subject to the requirements of fuse in D.3.5.1 and chemicals in D.3.6.1 of this annex.

D.3.1.3.2 Chaser.

Paper or cardboard tube venting out the fuse end of the tube containing not more than 20 g of chemical composition. The device travels along the ground upon ignition. A whistling effect, or other noise, is often produced. Explosive composition may be included to produce a report but may not exceed 50 mg. [†]

D.3.2 Novelties.

The following devices do not require approval from DOT and are not regulated as explosives under the provisions of this Standard, provided that they are manufactured and packaged as described below. Any devices not complying with the requirements set forth in this section require approval from DOT, and are classed as Fireworks 1.4G and described as Fireworks, UN0336, unless they are classed as 1.4S or not regulated as hazardous materials based on examination and testing as specified in Title 49, CFR, 173.56. Devices described in this section which are not regulated as explosives are not considered to be consumer fireworks; however, these devices must still comply with all labeling requirements of CPSC applicable to consumer fireworks devices. Novelties must be packaged in strong outer packagings that are sealed to prevent leakage of the contents. Each package, and overpack if used, offered for surface transportation must be plainly marked NOVELTIES, NOT REGULATED, EXCEPT WHEN TRANSPORTED BY AIR, IN CONFORMANCE WITH APA STANDARD 87-1. If novelties are transported by aircraft, they must be classed, labeled, and described as Flammable Solid, Inorganic, n.o.s (Novelties), UN3178. [†]

D.3.2.1 Party Popper.

Small devices with paper or plastic exteriors that are actuated by means of friction (a string or trigger is typically pulled to actuate the device.) They frequently resemble champagne bottles or toy pistols in shape. Upon activation, the device expels flame-resistant paper streamers, confetti, or other novelties and produces a small report. Devices may contain not more than 16 mg (0.25 grains) of explosive composition, which is limited to potassium chlorate and red phosphorus. These devices must be packaged in an inner packaging which contains a maximum of 72 devices. [†]

D.3.2.2 Snapper.

Small, paper-wrapped devices containing not more than 1.0 mg of silver fulminate coated on small bits of sand or gravel. When dropped, the device explodes, producing a small report. Snappers must be in inner packages not to exceed 50 devices each, and the inner packages must contain sawdust or a similar, impact-absorbing material. [†]

D.3.2.3 Toy Smoke Devices.

Small devices consisting of cork-like spheres, or cardboard or plastic tubes, containing not more than 5 g of pyrotechnic composition that produces a small cloud of smoke after activation. The devices are typically ignited by means of safety fuse. The outer configuration is usually a sphere (smoke ball), cylindrical tube, or paper cone. The chemical composition for white smoke consists of potassium nitrate and sulfur, while colored smokes are produced by mixtures consisting of potassium chlorate, sulfur or sugar, and a sublimable organic dye. Mixtures containing potassium chlorate must also contain a neutralizer/coolant such as sodium bicarbonate. To be eligible for not regulated status, these devices must produce smoke as their sole pyrotechnic effect following ignition, and must be packaged in inner units containing a maximum of 72 devices. [†]

D.3.2.4 Snakes, Glow Worms.

Pressed pellets of pyrotechnic composition that contain 2 g or less of composition per article. Upon burning, they produce a snake-like ash that expands in length as the pellet burns. Chemical compositions vary, but typically contain ammonium perchlorate, nitrated pitch, asphaltum, and similar carbonaceous materials. These devices are limited to a maximum of 25 pellets per inner package in order to be transported as not regulated devices. [††]

D.3.2.5 Wire Sparklers, Dipped Sticks.

These devices consist of a metal wire or wood dowel that has been coated with pyrotechnic composition. Upon ignition of the tip of the device, a shower of sparks is produced. Sparklers may contain up to 100 g of composition per item. Sparklers typically use barium nitrate as the oxidizer, with aluminum and dextrine as fuels. Iron filings produce the spark effect. Color-producing sparklers use potassium perchlorate as an oxidizer. Any sparkler containing a chlorate or perchlorate oxidizer is limited to a maximum of 5 g of composition per article. Sparklers must be packaged in inner packagings that contain 8 devices or less to be transported as not regulated devices. [††]

D.3.3 Toy Caps.

Toy plastic or paper caps for toy pistols in sheets, strips, rolls, or individual caps, containing not more than an average of 0.25 grains (16 mg) of explosive composition per cap. Toy caps are described as Toy Caps NA0337 and classed as 1.4S. Toy caps shall only be approved for transportation using the procedure specified in Title 49, CFR, § 173.56(b). [††]

D.3.4 Other Devices.

The Approvals Branch at DOT should be contacted regarding the requirements and procedures for approval of any device that is a unique shape or design, or any device that produces unique pyrotechnic or explosive effects, or combinations of effects not enumerated in Section D.3 of this Standard. [††]

D.3.5 Multiple-Tube Fireworks Devices and Pyrotechnic Articles.

D.3.5.1 –

Multiple-tube devices contain more than one cardboard tube. The ignition of one external fuse causes all of the tubes to function in sequence. The tubes are either individually attached to a wood or plastic base, or are dense-packed and are held together by glue, wire, string, or other means that securely holds the tubes together during operation. [††]

D.3.5.2 –

Multiple-tube devices are normally limited to a maximum of 200 g of total pyrotechnic composition for approval as Fireworks, UN0336, 1.4G or Article, Pyrotechnic, UN0431, 1.4G under this Standard. *(See D.3.5.4 for exceptions.)* The weight of chemical composition per tube is limited to the weight limit for the specific type of device in the tube. *(See D.3.1 for the weight limits per tube, based on type of effect.)* [††]

D.3.5.3 –

The connecting fuses on multiple-tube devices must be fused in sequence so that the tubes fire sequentially rather than all at once. [††]

D.3.5.4 –

When the tubes are securely attached to a wood or plastic base, and the tubes are separated from each other on the base by a distance of at least 0.50 in. (12.7 mm), a maximum total weight of 500 g of pyrotechnic composition shall be permitted for approval as 1.4G. [††]

D.3.6 Specific Requirements for Consumer Fireworks.

D.3.6.1 Fuse.

D.3.6.1.1 –

Only safety fuse or other fuse that has been protected to resist side ignition may be used in consumer fireworks devices subject to the requirements of this Standard. [††]

Note: See APA 87-1, Appendix B, for method of measuring resistance to side ignition. Devices, such as ground spinners, that require a restricted orifice for proper functioning and that contain less than 6 g of pyrotechnic composition, are not subject to the requirements of D.3.6.1.1 .

D.3.6.1.2 –

The fuse must be of sufficient length to burn at least 3 seconds but not more than 9 seconds before ignition of the device. The fuse for roman candles or similar devices requiring a longer fuse for safe functioning may burn up to 12 seconds before ignition of the device. [††]

D.3.6.1.3 –

The fuse must be securely attached so that it will support either the weight of the device plus 8 ounces (227 g) of dead weight or double the weight of the device, whichever is less, without separation from the fireworks device. [††]

D.3.6.1.4 –

The fuse on multiple tube devices must be fused in sequence between individual tubes. [††]

D.3.6.2 Construction.

D.3.6.2.1 Bases.

Each fireworks device that requires a base shall utilize a base of wood or plastic (preferably non-brittle, medium impact polystyrene). The minimum horizontal dimension or the diameter of the base must be equal to at least the height of the device (excluding any protruding fuse), unless the device remains upright when subjected to a tilt of 12 degrees from the horizontal. Bases shall remain firmly attached to the item during transportation, handling, and normal operation. *(See APA 87-1, Appendix B, for method of measuring.)* [††]

Note: Multiple tube mine and shell devices which contain at least one launching tube with an inner diameter of 1.5 inches or greater must be stable when placed on a test fixture that holds the device at a 60° angle. This is a static test, the fireworks device is not ignited while at a 60° angle.

D.3.6.2.2 Sticks.

The stick on a rocket (sky rockets and bottle rockets), and on other fireworks devices that utilize a stick, shall be firmly attached to the body of the device by means of glue, staples, or wire. Sticks must be secure enough to remain firmly attached during transportation, handling, and normal operation. Sticks shall be rigid and of such length so as to assure stable flight. The maximum curvature of such stick(s) may not exceed 1 in. (25 mm). *(See APA 87-1, Appendix B, for method of testing rigidity.)* [††]

D.3.6.2.3 Handles.

Each fireworks device which is intended to be hand-held, and is so labeled, must incorporate a handle at least 4 in. (101 mm) in length. Handles must remain firmly attached during transportation, handling, and normal operation of the device. Or must consist of an integral section of the device which extends at least 4 in. (101 mm) below the pyrotechnic chamber. Sparklers 10 in. (253 mm) or less in length shall have handles at least 3 in. (76 mm) in length. [††]

D.3.6.2.4 Spikes.

Spikes which constitute an integral part of a fireworks device shall protrude at least 2 in. (51 mm) from the base of the device and shall have a blunt tip not less than ⅛ in. (3.2 mm) in diameter or ⅛ in. (3.2 mm) square. [††]

D.3.6.2.5 Pyrotechnic Chamber.

The pyrotechnic chamber in a fireworks device that functions other than by exploding must be of sufficient thickness and rigidity to allow normal functioning of the device without burnout or blowout. The chamber must also be constructed and sealed to prevent leakage of the pyrotechnic composition during transportation, handling, and normal operation. [††]

D.3.6.2.6 Wings.

Wings on helicopter-type rockets and similar devices must be securely attached to the body by means of gluing, wiring, or other appropriate means so that they will remain firmly attached during transportation, handling, and normal operation. [††]

D.3.6.2.7 Wheel Devices.

Each wheel device must be constructed so that the driver(s), motor(s), and axle(s), when needed (i.e., on wheel devices intended to operate in a fixed location) remain securely attached to the device during transportation, handling, and normal operation. [††]

D.3.6.2.8 Aerial Devices.

Each device intended to produce a visible or audible effect high in the air must be designed to produce the effect at or near the apex of its flight. [††]

D.3.6.2.9 Smoke Devices.

Each smoke device must be constructed so that it will neither burst nor produce excessive flame (excluding fuse and small but brief bursts of flame accompanying normal smoke production). Smoke devices may not contain plastic in direct contact with the pyrotechnic composition, nor may smoke devices resemble, in color and configuration, banned fireworks devices, such as M-80 salutes, cherry bombs, or silver salutes. [††]

D.3.7 Prohibited Chemicals and Components.

D.3.7.1 Prohibited Chemicals.

Consumer fireworks devices offered or intended for sale to the public may not contain a chemical enumerated in Table D.3.7.1 , except for small amounts (less than 0.25% by weight) as impurities, and except as specified therein. [††]

Note: Display fireworks and theatrical pyrotechnics *(see D.2.15)* are not subject to the provisions of this section.

Table D.3.7.1 Prohibited Chemicals for Consumer Fireworks

1. Arsenic sulfide, arsenates, or arsenites
2. Boron
3. Chlorates, except:
   - a. In colored smoke mixtures in which an equal or greater weight of sodium bicarbonate is included
   - b. In party poppers
   - c. In those small items (such as ground spinners) wherein the total powder content does not exceed 4 g of which not greater than 15% (or 600 mg) is potassium, sodium, or barium chlorate
   - d. In firecrackers
   - e. In toy caps
4. Gallates or gallic acid
5. Magnesium (magnesium/aluminum alloys, called magnalium, are permitted)
6. Mercury salts
7. Phosphorus (red or white) (red phosphorus is permissible in caps and party poppers)
8. Picrates or picric acid
9. Thiocyanates
10. Titanium, except in particle size that does not pass through a 100-mesh sieve
11. Zirconium
12. Lead tetroxide (red lead oxide) and other lead compounds

D.3.7.2 Prohibited Components.

No component of any consumer fireworks device or novelty may, upon functioning, project or disperse any metal, glass, or brittle plastic fragments. [††]

D.3.7.3 Forbidden Devices.

Any device intended for sale to the public that produces an audible effect (other than a whistle) by a charge of more than 130 mg (2 grains) of explosive composition per report. Devices obtained for bonafide pest control purposes in accordance with regulations promulgated by CPSC in Title 16, CFR are not forbidden if approved in accordance with Title 49, CFR, 173.56. [††]

Note: For transportation purposes, the term, *forbidden devices,* may also include mixtures or devices that contain a chlorate and an ammonium salt, or an acidic metal, salt. Or, devices that contain yellow or white phosphorus, devices that combine an explosive and a detonator or blasting cap. And, any device that has not been approved by the DOT.

D.3.8 Specific Requirements for Theatrical Pyrotechnics.

D.3.8.1 –

Theatrical pyrotechnics that are approved as UN0431, Articles, Pyrotechnic, 1.4G shall not bear a warning label that resembles the required wording on a consumer fireworks device. A warning label providing instructions to a trained operator is permitted, but alternative wording must be used. [††]

D.3.8.2 –

Theatrical pyrotechnics may or may not have an ignition device attached. [††]

D.3.8.3 –

All requests for approval of a device as Articles, Pyrotechnic shall be accompanied by a signed certification stating that the article is intended for professional use in the entertainment industry and will not be offered for sale to the general public. [††]

D.3.8.4 –

Approvals for classification as Articles, Pyrotechnic shall be evaluated based on the weight of pyrotechnic composition in the individual article, and compared to the allowable weights for the corresponding category of 1.4G consumer fireworks. If a 1.4G classification is desired for an article containing more pyrotechnic composition than is permitted for a comparable consumer firework, the DOT approval procedure in Title 49, CFR, 173.56(b)(1) shall be followed. [††]

D.3.9 Approval.

All consumer fireworks (Fireworks, UN0336), novelties, and theatrical pyrotechnics offered for transportation in the United States shall be classified and approved for transportation purposes by the DOT, in accordance with the following procedure. [††]

D.3.9.1 –

Fireworks and novelties containing mixtures of chemicals specified in Table D.4.3.1 , but none of the chemicals prohibited by D.3.7 . For each item for which approval is sought, manufacturers shall submit a copy of an approval application *(see APA 87-1, Appendix D)* to DOT. DOT may issue an approval for the device as 1.4G based on the information contained in the form or, at its option, may require laboratory examination by a person approved by DOT to examine explosives. [††]

D.3.9.2 –

Fireworks and novelties containing any chemical not specified in Table D.4.3.1 , but none of the chemicals prohibited by D.3.7 . For each item in which approval is sought, the manufacturer shall obtain a report from a person approved by DOT to examine explosives or, obtain a test report from a recognized competent authority (for fireworks manufactured abroad). The manufacturer shall then submit an approval application *(see APA 87-1, Appendix D)* together with the appropriate examination reports to DOT. DOT may then issue approval based on the information contained in the application and accompanying laboratory reports, or may require additional information. [††]

D.3.9.3 –

Theatrical pyrotechnics containing only mixtures of chemicals specified in Table D.4.3.1 . For each item in which approval is sought, manufacturers shall submit a copy of an approval application *(see APA 87-1, Appendix D)* to DOT. DOT may issue an approval for the device as 1.4G based on the information contained in the form. Or, at DOT's discretion, may require a report from a person approved by DOT to examine explosives or may require a test report from a recognized competent authority (for articles manufactured abroad). [††]

D.3.9.4 –

Theatrical pyrotechnics containing any chemical not specified in Table D.4.3.1 . For each item in which approval is sought, the manufacturer shall obtain a report from a person approved by DOT to examine explosives or obtain a test report from a recognized competent authority (for articles manufactured abroad). The manufacturer shall then submit an approval application *(see Appendix D of this Standard)* together with the appropriate laboratory reports to DOT. DOT may then issue an approval based on the information contained in the application and accompanying laboratory reports. [††]

D.3.9.5 –

If classification other than 1.4G is sought, the DOT approval procedure in Title 49, CFR, 173.56(b)(1) must be followed. This includes obtaining a laboratory report from a person approved by DOT to examine explosives. [††]

D.3.10 Marking and Labeling.

Fireworks intended for consumer sale and use shall be labeled in conformance with the requirements of the Federal Hazardous Substances Act and regulations promulgated thereunder in Title 16, CFR, 1500. All outside packaging containing fireworks must be marked and labeled in conformance with Title 49, CFR, 172. *(See APA 87-1, Appendix C, and Section D.5 of this annex for details and examples.)* [†]

D.4 Requirements for Display Fireworks Devices.

Note: Devices in this category, formerly classed as Class B Explosives, Special Fireworks, are now classed as 1.3G, under the UN system and referred to as display fireworks. [†]

D.4.1 Types of Display Fireworks Devices.

The following fireworks devices are subject to the requirements of Section D.4 of this annex. [†]

D.4.1.1 Aerial Shell.

A cylindrical or spherical cartridge containing lift charge, burst charge and effect composition. Shells are most commonly 2 inches (50 mm) to 6 inches (152 mm) in diameter, and are fired from metal, high-density polyethylene (HDPE), fiberglass, or heavy cardboard tubes. Upon firing, the lift charge is consumed and the cartridge is expelled into the air. A pyrotechnic effect is produced near the apex of flight. Aerial shells are typically ignited by means of a quick match fuse or electric match. Burst charge used in aerial shells is limited to Black Powder (potassium nitrate, sulfur, and charcoal) or similar pyrotechnic composition may not be approved under the provisions of this Standard as 1.3G articles. Aerial shells exceeding 10 inches (250 mm) in diameter or containing a burst charge that has metallic fuel may be approved under this Standard as Fireworks, UN0333, 1.1G. [†]

Note: All aerial shells that are not contained in a launch tube (D.3.1.2.5) or sold as part of a reloadable shell kit (D.3.1.2.6) may only be approved under the provisions of this Standard as Fireworks, UN0335, 1.3G.

D.4.1.2 Salute.

Paper-wrapped, cardboard tube, or sphere containing explosive composition in excess of 130 mg (2 grains.) Upon ignition, noise and a flash of light are produced. The maximum quantity of explosive composition in a salute shell, or in a salute component of a multi-effect shell, shall not exceed 2.5 oz (71 g) for approval under this Standard as a 1.3G article. Salutes or articles with salute components containing more than 2.5 oz (71 g) of explosive composition per salute or per component may be approved under this Standard as Fireworks, UN0333 1.1G. [†]

D.4.1.3 Other Fireworks Devices.

D.4.1.3.1 –

When the quantity of explosive and/or pyrotechnic composition exceeds the limit for inclusion in the Fireworks, UN0336 category, devices enumerated in D.3.1 are classed as 1.3G and described as Fireworks, UN0335 (formerly described as Fireworks, Special and classed as Class B Explosives). This includes multiple tube devices containing more than 200 g of total chemical composition, except as otherwise specified in D.3.5 . [†]

D.4.1.3.2 –

Certain devices intended for signaling, illuminating, and incendiary purposes such as: railway torpedoes; airplane flares; illuminating projectiles; incendiary and smoke projectiles, as well as flash cartridges (formerly classed as special fireworks), no longer fall into the fireworks category under DOT regulations effective on 10/1/91, and are not part of this Standard. [†]

D.4.2 Construction of Aerial Shells.

D.4.2.1 –

Each shell shall be identified only in terms of the inside diameter (not the circumference) of the mortar in which it can be safely used [e.g., 3 in. (76 mm) shells are only for use in 3 in. (76 mm) mortars]. [†]

D.4.2.2 –

Each shell shall be constructed so that the difference between the inside diameter of the mortar in which it can be safely used and the outside diameter of the shell is no less than 4⁄8 in. (3.2 mm) and not more than 4⁄4 in. (6.4 mm) for shells not exceeding 3 in. (76 mm) or 4⁄2 in. (12.7 mm) for shells larger than 3 in. (76 mm). [††]

D.4.2.3 –

Each shell needs to be marked with the type of shell, the diameter measurement, and the name of the manufacturer or distributor. [††]

D.4.2.4 –

The length of the internal delay fuse and the amount of lift charge must be sized to insure proper functioning of the shell in its mortar. Quick match fuse, if required, must be long enough to allow not less than 6 in. (152 mm) of fuse to protrude from the mortar after the shell is properly inserted. [††]

D.4.2.5 –

The length of exposed black match on a shell, if required, may 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 may not be less than 3 seconds to allow the operator to retreat safely. [††]

D.4.2.6 –

A safety cap shall be installed over the exposed end of the fuse, if ignition fuse is present. The safety cap must be of a different color than that used for the paper of the fuse. [††]

D.4.2.7 –

If an electric match is attached to an aerial shell or other display firework prior to transportation, the requirements in D.5.8 must be complied with. [††]

D.4.3 Approval.

Prior to being offered for transportation in the United States all display fireworks (Fireworks, 1.3G) must be classified and approved by DOT in accordance with the following procedures. [††]

~~**D.4.3.1** Devices Containing Only Mixtures of Chemicals Specified in Table D.4.3.1.~~

~~The manufacturer shall submit a copy of an approval application *(see APA 87-1, Appendix D)* to DOT for any item that has not previously been approved by DOT. DOT may issue an approval for the device based on the information contained in the form. Or, at its discretion, may require examination by a person approved by DOT to examine explosives, or may accept a test report from a recognized competent authority (for fireworks manufactured abroad). [†]~~

~~Table D.4.3.1 Standard Fireworks Chemicals~~

~~Chemical~~	~~Typical Use~~
~~Aluminum~~	~~Fuel~~
~~Ammonium Perchlorate~~	~~Oxygen Donor~~
~~Antimony~~	~~Fuel~~
~~Antimony Sulfide~~	~~Fuel~~
~~Barium Carbonate~~	~~Neutralizer~~
~~Barium Nitrate~~	~~Oxygen Donor~~
~~Barium Sulfate~~	~~Oxygen Donor~~
~~Bismuth Oxide~~	~~Oxygen Donor~~
~~Boric Acid~~	~~Neutralizer~~
~~Calcium Carbonate~~	~~Neutralizer~~
~~Calcium Sulfate~~	~~Oxygen Donor~~
~~Carbon or Charcoal~~	~~Fuel~~
~~Copper Metal~~	~~Color Agent~~
~~Copper Oxide~~	~~Oxygen Donor/Color Agent~~
~~Copper Salts (except Copper Chlorate)~~	~~Color Agent~~
~~Dextrine~~	~~Fuel/Binder~~
~~Hexamethylenenetetramine (Hexamine)~~	~~Fuel~~
~~Iron and Iron Alloys (e.g., ferro/titanium)~~	~~Fuel~~
~~Iron Oxide~~	~~Oxygen Donor~~
~~Magnalium (Magnesium/Aluminum)~~	~~Fuel~~
~~Magnesium (in display fireworks and theatrical pyrotechnics only)~~	~~Fuel~~
~~Magnesium Carbonate~~	~~Neutralizer~~
~~Magnesium Sulfate~~	~~Oxygen Donor~~
~~Nitrocellulose (see Miscellaneous Compounds)~~	~~-~~
~~Nitrocellulose Based Lacquers~~	~~Binder~~
~~Phosphorus, Red (only as provided in Table D.4.3.1)~~	~~Fuel~~
~~Potassium or Sodium Benzoate~~	~~Whistle~~
~~Potassium Bichromate (Potassium Dichromate) (not to exceed 5% of formulation)~~	~~Oxygen Donor~~
~~Potassium Chlorate (only as provided in Table D.4.3.1)~~	~~Oxygen Donor~~
~~Potassium Hydrogen Phthalate~~	~~Whistle~~
~~Potassium Nitrate~~	~~Oxygen Donor~~
~~Potassium Perchlorate~~	~~Oxygen Donor~~
~~Potassium Sulfate~~	~~Oxygen Donor~~
~~Silicon~~	~~Fuel~~
~~Sodium Bicarbonate (Sodium Hydrogen Carbonate)~~	~~Neutralizer~~
~~Sodium Nitrate~~	~~Oxygen Donor~~
~~Sodium Salicylate~~	~~Whistle~~

Chemical	Typical Use
Sodium Salts (except Sodium Chlorate)	Color Agent
Sodium Sulphate	Oxygen Donor
Strontium Carbonate	Color Agent
Strontium Nitrate	Oxygen Donor
Strontium Salts (except Strontium Chlorate)	Color Agent
Strontium Sulfate	Oxygen Donor
Sulfur	Fuel
Titanium (particle size must not pass through 100 mesh sieve if 1.4G or 1.4S Fireworks)	Fuel

D.4.3.2 Devices Containing any Chemical Not Specified in Table D.4.3.1.

For each item in which approval is sought, the manufacturer shall submit a sample of each pyrotechnic mixture that contains any chemical not specified in Table D.4.3.1 to a person approved by DOT to examine explosives. Or, the applicant may obtain a test report from a recognized competent authority (for fireworks manufactured abroad). The manufacturer shall then submit an approval application *(see APA 87-1, Appendix D)* , together with the appropriate laboratory reports to DOT. DOT may then issue approval based on the information contained in the application and accompanying laboratory report(s). [††]

Miscellaneous Compounds: Organic compounds may be compounds such as: lactose; shellac; red gum; chlorinated paraffin; and polyvinyl chloride that consist of some combination of carbon with hydrogen, oxygen and/or chlorine. Nitrogen may be present if it accounts for less than 10% (by weight) of the compound. [††]

Nitrocellulose with not more than 12.6% nitrogen by mass, that meets the criteria for classification as a 4.1 flammable solid, is permitted as a propelling or expelling charge provided there is less than 15 g of nitrocellulose per article. [††]

Note: Exact chemical identity of each organic compound must be included when submitting an approval application *(See APA 87-1, Appendix D)* to DOT. [††]

D.4.4 Approval for Combination Devices for Display Purposes.

When two or more articles of consumer or display fireworks, or theatrical pyrotechnics (already approved by DOT) are combined to form one unit, a separate approval for the combination device is not required if all of the following conditions are met. [††]

D.4.4.1 –

The combination device is to be used for display or entertainment purposes, but is not intended for consumer use. [††]

D.4.4.2 –

The combination device is constructed from approved fireworks, novelties, and theatrical pyrotechnics. [††]

D.4.4.3 –

The combination device is transported by private carrier. [††]

D.4.4.4 –

The assembled unit is transported using the EX numbers for the individual components. [††]

D.4.4.5 –

If all components of the combination device have been approved as 1.4G articles, the combination item is classed as a 1.4G article provided that the total weight of pyrotechnic composition (including lift and effect charges) in the article does not exceed 200 g. *(See D.3.5 for exception.)* The combination device shall be described as UN0431, Articles, Pyrotechnic, 1.4G if all of the components are approved as UN0431. Otherwise, the device shall be described as UN0336, Fireworks, 1.4G. [††]

D.4.4.6 –

If one or more of the components has been classed as a 1.3G Article, or if the total weight of pyrotechnic composition (including lift and effect charges) is more than 200 g *(see D.3.5 for exception)* , then the assembled unit is classed as a 1.3G Article. The combination device shall be described as UN0430, Articles, Pyrotechnic, 1.3G if all of the components are classed as either UN0430 or UN0431. Otherwise, the device shall be described as UN0335, Fireworks, 1.3G. [††]

D.5 Shipping Requirements.

D.5.1 Transportation Regulating Authorities.

Transportation of fireworks is regulated by DOT. Some states and municipalities also regulate transportation of fireworks through their jurisdiction, often by incorporation of federal regulations. [††]

D.5.2 Approval.

Except for samples prepared in accordance with DOT regulations, or unless specifically permitted by this Standard, no fireworks device or novelty may be offered for transportation or transported until it is classed and approved by DOT, and an approval number (EX number) is issued (Title 49, CFR, 173.86). *(See Sections D.3 and D.4 of this annex and APA 87-1, Appendix D.)* [††]

D.5.2.1 –

EX numbers for fireworks contained in a shipping carton must be marked on the shipping carton or on the shipping paper. [††]

D.5.2.2 –

Cartons containing 5 or more different fireworks devices must be marked with at least 5 of the EX numbers covering items in the carton, or the EX numbers must appear on the shipping paper [Title 49, CFR, 172.320(c) and (d)]. [††]

D.5.3 Packaging.

With certain exceptions, Consumer Fireworks UN0336, Display Fireworks UN0335, Articles Pyrotechnic UN0431 and Novelties, must be securely packaged in containers complying with DOT regulations Title 49, CFR, 178. Gross weight limitation per package is now dictated by the weight marked on the certified packaging. Articles with match or friction tip ignition must be packed so that each individual tip is protected against accidental contact or friction. Loose chemical composition may not be present in packages in transportation [Title 49, CFR, 172.102(c), Special Provision (108)]. [††]

D.5.4 Placards.

Unless otherwise provided, each motor vehicle, freight container and rail car must bear appropriate placards on each end and each side [Title 49, CFR, 172.504(a)]. Vehicles containing packages of consumer fireworks or novelties which are labeled 1.4G require a 1.4G or Explosive 1.4G placard (Title 49, CFR, 172.523), and use of the word *explosive* is optional [Title 49, CFR, 172.519(b)(3)], except highway and rail shipments of less than 1000 lb gross weight of such fireworks need not bear a placard [Title 49, CFR, 172.504(c)]. Vehicles containing display fireworks in any quantity require a 1.3G or Explosive 1.3G placard (Title 49, CFR, 172.522) and use of the word explosive is optional [Title 49, CFR, 173.519(b)(3)]. If both 1.4G and 1.3G are present in a shipment, the 1.3G placard is required, and the 1.4G placard is not needed. [††]

D.5.5 Package Marking and Labeling.

Each person who offers fireworks for transportation shall ensure that the package displays the appropriate square-on-point label [Title 49, CFR, 172.400(a) and 172.411]. Use of the word *explosive* on the 1.3G, and the 1.4G labels is not required [Title 49, CFR, 172.405(a)]. Consumer fireworks, toy smoke devices, and trick noisemakers are either classed as 1.4G, 1.4S, or not regulated for transportation purposes. Display fireworks are classed as 1.3G (Title 49, CFR, 172.101). The label must be printed or affixed to the surface of the package near the proper shipping name and identification number, which are also required to appear on the package [Title 49, CFR, Part 172.301(a)]. [††]

D.5.6 Shipping Papers.

Each person who offers a fireworks device or novelty for transportation shall describe the item on a shipping paper. The description must include the proper shipping name (Title 49, CFR, 172.101 hazardous materials table, col. 2), the hazard class of the material (col. 3), the identification number (col. 4), the packing group (col. 5), and the total quantity covered by the description [Title 49, CFR, 172.202(a)]. Consumer fireworks should be described as follows: Fireworks, 1.4G, UN 0336, PG II x lb or kg. Display fireworks should be described as Fireworks, 1.3G, UN 0335, PG II x lb or kg. In addition, the shipper shall certify that the shipment is properly classified, marked and labeled [Title 49, CFR, 172.204(a)]. [†]

Note: EX numbers shall also appear on shipping papers unless they are marked on each shipping carton.

D.5.7 Special Packaging Provisions for Transportation in a Motor Vehicle by Private Carrier.

D.5.7.1 –

Fireworks articles such as large set pieces, that are too large to be readily placed into fiberboard cartons, shall be permitted to be transported without external packaging to a display site provided that the articles are securely attached to the inside walls of the vehicle by means of wire, wood, or rope and provided that all fuse is protected against accidental ignition by means of a paper covering or paper end cap. All other packages in the vehicle shall be secured to prevent accidental movement and contact with the unpackaged articles. [†]

D.5.7.2 –

Fusees (highway flares) for use in a fireworks display shall be permitted to be transported in a motor vehicle with fireworks, provided that the flares are properly packaged in accordance with Title 49, CFR. [†]

D.5.7.3 –

Display fireworks remaining unfired at the conclusion of a display shall be permitted to be repacked in the certified packaging used to bring the fireworks to the display site. The maximum gross weight (printed as part of the box certification marking) authorized for a fiberboard carton shall not be exceeded. The fireworks shall be removed to authorized storage, by means of motor vehicle, as soon as possible following the display. [†]

D.5.7.4 –

Misfired devices that are to be returned from the display site to the supplier shall be packed separately from unused, unfired devices, and shall be transported only by private motor carrier. [†]

D.5.8 Requirements for an Electric Match (Igniter) Attached to a Display Firework Prior to Transportation.

D.5.8.1 –

Fireworks with electric matches attached shall only be transported from a fireworks manufacturer's or display operator's facility to a fireworks display site, or to an approved storage for subsequent shipment to a display site. [†]

D.5.8.2 –

The fireworks and the electric matches must be separately approved and assigned EX numbers in accordance with Title 49, CFR, 173.56. [†]

D.5.8.3 –

Report shells (salutes) that exceed 3 in. in diameter or contain more than 70 g (2.5 oz) of salute powder shall not be transported with electric matches attached. [†]

D.5.8.4 –

All electric matches that are pre-attached to fireworks for transportation must be certified by the manufacturer to be thermally stable at 150°C for 24 hours. [†]

~~**D.5.8.5** –~~

~~All electric matches that are pre-attached to fireworks for transportation shall be rated by the manufacturer to have a no fire current of not less than 0.20 amperes (i.e., the match does not ignite when tested with a current of less than 0.20 amperes). [††]~~

~~**D.5.8.6** –~~

~~The electric match shall be securely attached to the fuse or to the lift charge so as to prevent significant movement of the igniter. [††]~~

~~**D.5.8.7** –~~

~~When the electric match is placed directly into the lift charge of a firework, the electric match shall have a covering (shroud) placed over the match head itself. [††]~~

~~**D.5.8.8** –~~

~~The leg wires of the electric match shall be shorted (shunted) at all times during transportation. [††]~~

~~**D.5.8.9** –~~

~~The transportation of any UN0335, Fireworks, 1.3G with attached electric matches by aircraft is prohibited. [††]~~

~~**D.6** References.~~

~~**D.6.1** Title 49, CFR, 171-180, DOT.~~

~~This document can be found online at:~~

~~*www.access.gpo.gov/nara/cfr/waisidx_99/49cfrv2_99.html* .~~

~~A hard copy may be purchased from: Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402, or as republished by Bureau of Explosives as Hazardous Materials Regulations of the Department of Transportation, Association of American Railroads, 50 F Street, NW, Washington DC 20001.[††]~~

~~**D.6.2** Title 16, CFR, 1000 to End, CPSC.~~

~~This document can be found online at:~~

~~*www.access.gpo.gov/nara/cfr/waisidx_00/16cfrv2_00.html* .~~

~~A hard copy may be purchased from the US GPO *(see D.6.1 for address)* . Extracts of these regulations pertaining to fireworks only may be purchased from the American Pyrotechnics Association.[††]~~

Submitter Information Verification

Committee: PYR-AAA

Submittal Date: Thu Oct 26 16:50:53 EDT 2023

Committee Statement

Committee Statement: APA 87-1 has been revised to create 3 separate APA documents and the text in Annex D is no longer necessary.

Response Message: FR-12-NFPA 1123-2023

First Revision No. 14-NFPA 1123-2023 [Section No. G.3]

F.3 References for Extracts in Informational Sections.

NFPA 1124, *Code for the Manufacture, Transportation, and Storage of Fireworks and Pyrotechnic Articles*, 2022 edition.

NFPA 1126, *Standard for the Use of Pyrotechnics Before a Proximate Audience* , 2021 edition.

Submitter Information Verification

Committee: PYR-AAA

Submittal Date: Tue Nov 07 17:08:12 EST 2023

Committee Statement

Committee Statement: This revision was developed by NFPA staff for editorial purposes, in accordance with 4.3.9.3.2 and 4.3.9.3.3 of the Regulations Governing the Development of NFPA Standards (www.nfpa.org/regs).

NFPA 1126 has been added in an FR and is being added here.

Response Message: FR-14-NFPA 1123-2023