

# 2018 APA STANDARD 87-1C

## STANDARD FOR THE CONSTRUCTION, CLASSIFICATION, APPROVAL, AND TRANSPORTATION OF ENTERTAINMENT INDUSTRY AND TECHNICAL (EI&T) PYROTECHNICS

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## PART 1: Introduction and Applicability

### 1.1 Introduction

This document describes requirements related to Entertainment Industry and Technical Pyrotechnics (EI&T pyrotechnics) classed as UN0431, Articles, pyrotechnic for technical purposes, Division 1.4G or UN0336, Fireworks [for professional use only] Division 1.4G and is not intended to supersede the transportation requirements in accordance with Title 49 Code of Federal Regulations (CFR) Parts 100-185.

The American Pyrotechnic Association (APA) is a primary national industry association for manufacturers, importers, wholesalers, distributors, and retailers of consumer fireworks, display fireworks, and entertainment industry and technical pyrotechnic devices. The U.S. Department of Transportation (DOT) Pipeline and Hazardous Materials Safety Administration (PHMSA) has jurisdiction over the packaging and transportation of hazardous materials in commerce, pursuant to *Title 49 CFR, Parts 100-185*.

This document is subject to review and every effort is made to keep the standard consistent with Federal regulations. The APA will periodically review and amend this standard every five years or more frequently as appropriate. Proposed changes to this standard may be submitted to the APA in writing. Submitters should provide the proposed language, substantiation, and request that the change be considered for incorporation by reference. Users are cautioned to obtain the latest edition of this document and all applicable regulations before making any decisions based on the material noted in this standard.

This document should not be confused with Federal, state or municipal specifications or regulations, insurance requirements, or national safety codes. However, when incorporated by reference (IBR) in Title 49 CFR, those portions of this document that apply to the manufacturing and transportation of pyrotechnic devices have the force of a Federal regulation, and the manufacturers, importers, wholesalers, distributors, retailers and shippers of pyrotechnic devices are subject to penalties pertaining thereto.

This document describes a standard in which classifications are assigned based on the weight and type of chemical composition contained in each specific device. When a specific Approval is sought for a device that does not comply with the requirements of this standard, this standard may not be used and the Approval procedures specified in 49 CFR § 173.56(b) or (f) must be followed.

Pursuant to the procedure described in 5 U.S.C. 552(a) and 1 CFR Part 51, Parts 1 through 5 of this document have been incorporated by reference into 49 CFR § 171.7. The Appendices to this document are not incorporated by reference and are provided solely as guidance materials. Unless otherwise noted, all CFR references cited in this standard refer to sections in effect on October 1, 2017.

Requests for classification approvals under the procedures described in this document can be sent to the U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration, Office of Hazardous Materials Safety, Approvals & Permits Division, East Building, 1200 New Jersey

Avenue, SE, Washington, DC 20590-0001 or by using the e-mail address: [fireworks@dot.gov](mailto:fireworks@dot.gov) or submitted on line through the PHMSA website.

The information contained in this document was obtained from sources believed to be reliable and is based on technical information and experience currently available from members of the APA and others. However, the Association, and its members, make no guarantee of the results and assume no liability or responsibility in connection with the information or suggestions contained within, or that abnormal or unusual circumstance may not warrant or suggest further requirements or additional procedures.

## 1.2 Applicability

This document applies to devices meeting the requirements of EI&T pyrotechnics. Pursuant to the procedure described in 5 U.S.C. 552(a) and 1 CFR Part 51, Parts 1 through 5 of this document has been incorporated by reference into 49 CFR § 171.7. Specifically, this document details the requirements for obtaining approvals for the transportation of EI&T pyrotechnics classed as UN0431, Articles, pyrotechnic for technical purposes, Division 1.4G or UN0336, Fireworks [for professional use only] Division 1.4G. The Appendices to this document are not incorporated by reference and are provided solely as guidance materials.

## PART 2: EI&T Pyrotechnics – Definitions and General Requirements

### 2.1 Introduction

This standard is limited in scope to the classification requirements for the transportation of EI&T pyrotechnic devices.

This standard provides EI&T pyrotechnic device manufacturers with requirements and information on how to submit an application request for classification of a UN0431, Articles, pyrotechnic for technical purposes, Division 1.4G or UN0336, Fireworks [for professional use only] Division 1.4G . Under 49 CFR § 173.64 EI&T pyrotechnic devices are permitted to be approved by PHMSA for transportation, if the EI&T pyrotechnic device is compliant with the APA Standard 87-1C incorporated by reference.

### 2.2 Classification

Only EI&T pyrotechnic devices, which comply with this standard, may be approved by PHMSA. For devices not listed in this standard see 49 CFR § 173.56.

### 2.3 Definitions of Some Common EI&T Pyrotechnic Device Terms

<b>Term</b>	<b>Definition</b>
<b>Aerial Device</b>	A device designed to produce its effect(s) in the air
<b>Applicant</b>	The manufacturer of the EI&T pyrotechnic device
<b>Approval (also known as a competent authority approval)</b>	Written authorization from the Associate Administrator of the Office of Hazardous Materials Safety, Pipeline and Hazardous Materials Safety Administration, of the U.S. DOT or other designated Department official, to perform a function that requires prior authorization under subchapter C of 49 CFR Parts 100-185
<b>Assembled Device</b>	A display piece made (assembled together) from other devices with valid approval and/or certification transported by private carriage
<b>Attachments</b>	Attachments are external components of an aerial device
<b>Base</b>	The bottom surface or an attachment that is affixed to the bottom of a device, which provides stability to maintain the device in a vertical position upon functioning
<b>Black Match, Fuse</b>	Uncovered fuse made from thread impregnated with black powder
<b>Black Powder</b>	A chemical composition used in EI&T pyrotechnic devices
<b>Break/Burst Charge</b>	A chemical composition used to open an aerial device
<b>Multi- Shot/ Cake</b>	A multiple tube device that is fused and assembled together to form one device
<b>Chemical Composition</b>	Chemical formulations contained in a EI&T pyrotechnic device
<b>Combination Device</b>	Multiple devices that are fused and assembled together to form one device
<b>Driver</b>	An EI&T pyrotechnic component (tube) that contains a propellant charge
<b>Effect</b>	A chemical composition, other than lift charge or burst charge, which upon functioning will burn or explode to produce a visual and/or audible result

<b>Term</b>	<b>Definition</b>
<b>Entertainment Industry and Technical (EI&amp;T) Pyrotechnic Device</b>	A device containing compositions, which produce a visual and or audible effect primarily used in the entertainment (visual arts) and technical training/development industries and complies with the limits and requirements of this standard and intended only for professional use and may not be offered for sale to the general public
<b>Electric Igniter (E-Match)</b>	A device used for the electrical ignition of pyrotechnic devices
<b>EX Number</b>	An explosive classification approval number preceded by the prefix "EX", assigned by the Associate Administrator of PHMSA, to a device that has been reviewed and classed under the provisions of 49 CFR §§ 173.56 or 173.64
<b>Pyrotechnic Device</b>	A device containing chemical compositions, which upon functioning produces a desired effect that is intended for public or professional use
<b>Flash Powder</b>	A term for a chemical composition used to produce a report
<b>Fuse</b>	A core of fine grained powder surrounded by a flexible material
<b>Fuse, Connecting</b>	A fuse used to connect tubes and/or components in a device
<b>Fuse, Ignition</b>	A fuse used to initiate the functioning of a EI&T pyrotechnic device
<b>Fuse, Quickmatch instantaneous, non-detonating</b>	A piece of black match that is encased in a paper and/or plastic sheath designed to burn fast
<b>Ground Device</b>	A device that is designed to produce its effects at or near ground level
<b>Handle</b>	A part of the device intended to be held in the hand while the device functions
<b>Ignition Powder</b>	A chemical composition used to ensure ignition transfer between components in a device
<b>Insert</b>	A cylindrical or spherical receptacle containing pyrotechnic and/or non-pyrotechnic effects
<b>Lift or Lifting Charge</b>	A chemical composition intended to expel internal components from a device
<b>Manufacturer of EI&amp;T Pyrotechnic device</b>	An entity that produces the EI&T pyrotechnic device
<b>Particle Size</b>	A measurement, expressed in microns, of a chemical component (typically used for metal powders)
<b>Propellant Charge</b>	A chemical composition that burns at a controlled rate to produce thrust, which causes movement of a device
<b>Pyrotechnic composition</b>	A chemical mixture, which upon burning, and without explosion, produces a visual display, whistle, and/or motion.
<b>Report</b>	A concussive effect and flash of light produced by the ignition of a chemical composition
<b>Safety fuse</b>	A fuse that can be used to ignite a pyrotechnic device
<b>Spike</b>	A part of the firework device used to keep the device upright and secure in the ground while it functions
<b>Tail</b>	A chemical composition that burns during the flight of an aerial device to produce a visual effect

## 2.4 General Requirements

These requirements, where applicable, must be met for all EI&T pyrotechnic devices constructed under this standard.

<b>General Requirements for EI&amp;T Pyrotechnic Devices</b>	
<b>Aerial device</b>	Must be designed to produce its effect(s) in the air
<b>Aerial Shell Attachments</b>	Aerial shells can be approved with or without attachments. The attachments must: <ol style="list-style-type: none"> <li>1. remain attached to the aerial shell during transportation;</li> <li>2. must not leak chemical composition during transportation; and</li> <li>3. must be constructed of sturdy materials, such as (but not limited to) plastic, Kraft paper, or cardboard (excluding tails)</li> </ol>
<b>Applicant</b>	Must be the manufacturer. In addition, foreign applicants must have a U.S. Designated Agent who may submit an application to PHMSA on their behalf (See 49 CFR § 105.40)
<b>Assembled Device</b>	Must comply with requirements in Part 5
<b>Base</b>	Must remain attached during transportation and handling
<b>Binary Kits</b>	Must be non-breakable bottles (e.g., LDPE) with screw on caps. The closure device of the bottles must provide double protection against leakage. For example, the screw cap must be secured in place with tape. The binary bottles may be packaged together as a set
<b>Black Match</b>	Must be made with black powder
<b>Black Powder</b>	Must consist of a mixture of charcoal or carbon and either potassium or sodium nitrate, potassium perchlorate, with or without sulfur and may contain a binder
<b>Break/Burst Charge</b>	<ol style="list-style-type: none"> <li>1. Must not exceed 25 percent of the total chemical composition weight per tube including the lift charge (exclude airburst devices).</li> <li>2. Secondary burst charges are only permitted in inserts</li> </ol>
<b>Multi-shot Device (Cake)</b>	Must be a multiple tube device: <ol style="list-style-type: none"> <li>1. Must contain items marked "yes" on line 81 of the requirement tables.</li> <li>2. Must comply with the individual device requirement tables for specific weight limits, chemical restrictions and special conditions, and</li> <li>3. Must be fused and assembled together to form one device. (Sequential fusing not required)</li> </ol>
<b>Chemical Composition</b>	Must be the formulation(s) used to produce the pyrotechnic effects that are listed on the application request and must be formulated from the chemicals in the Permitted and Restricted Chemical Table for EI&T pyrotechnic devices (available on the PHMSA website)
<b>Chemical Restrictions</b>	Must be adhered to when using restricted chemicals in any chemical composition available on the PHMSA website).
<b>Combination</b>	Must contain more than one device fused together to form a new device (other than just tube devices): <ol style="list-style-type: none"> <li>1. Must contain items marked "yes" on line 82 of the requirement tables,</li> <li>2. Must comply with the individual device requirement tables for specific weight limits, chemical restrictions and special conditions, and</li> <li>3. Must be fused and assembled together to form one device. (Sequential fusing not required)</li> </ol>
<b>Construction</b>	<ol style="list-style-type: none"> <li>1. Materials must be suitable for the intended purpose and the integrity of the device must be maintained during transportation and handling; and</li> <li>2. Product must not leak pyrotechnic composition during transportation and handling</li> </ol>

<b>General Requirements for EI&amp;T Pyrotechnic Devices</b>	
<b>Dimensional Series</b>	Only devices that are marked “yes” on line 83 of the requirements table are permitted to be approved as a series. See Series Application for additional requirements.
<b>Driver</b>	<ol style="list-style-type: none"> <li>1. Contains the propellant charge;</li> <li>2. Must be constructed of sturdy materials such as (but not limited to) plastic, Kraft paper, or cardboard; and</li> <li>3. Must be securely attached to the device so as not to separate or come loose during transportation</li> </ol>
<b>Effects</b>	Must be formulated from the chemicals listed in the Permitted and Restricted Chemicals table. Lift charge, burst charge, and fuses are not considered effects
<b>Effect Series</b>	Only devices that are marked “yes” on line 83 of the requirements table are permitted to be approved as a series. See Series Application for additional requirements.
<b>Electric Igniter (E-Match)</b>	<ol style="list-style-type: none"> <li>1. When an electrical igniter is used, a statement must be included in the application indicating that the igniter has been approved by PHMSA</li> <li>2. Can be used to initiate device incorporated under this standard that are marked “yes” on line 65 of the requirements table,</li> <li>3. If line 65 is marked yes in the requirement table, multiple igniters are permitted, and Permitted in assembled devices defined in Part 5</li> </ol>
<b>Finished EI&amp;T Pyrotechnic device:</b>	<p>An EI&amp;T pyrotechnic device that:</p> <ol style="list-style-type: none"> <li>1. Meets the General Requirements for that specific device;</li> <li>2. Meets all the requirements in the requirement tables in Part 3;</li> <li>3. Passes the Thermal Stability Test in Part 4;</li> <li>4. Has no loose chemical composition in the packaging; and</li> <li>5. Marked with the EX Number on the device, or packaging if the device is too small; and</li> <li>6. Any device manufactured, prior to October 1, 2018 is not required to be marked with the EX Number.</li> <li>7. Device label may be placed on the device or electric igniter wire or on the smallest inner packaging containing the device</li> </ol>
<b>Fuse</b>	Connecting, Delay, Ignition and Quickmatch Fuse are not required to be listed on the chemical composition sheet but must be formulations of nitrate and perchlorate salts mixed with or without charcoal, sulfur, benzoates, and binders
<b>Ground Device</b>	Must be designed to produce its effect(s) at or near the ground level
<b>Handle</b>	May be cardboard, paper tube, plastic, wire or wood
<b>Labeling</b>	Device must be marked with the words ‘For Professional Use Only’
<b>Lift or Lifting Charge</b>	<ol style="list-style-type: none"> <li>1. Is not restricted to black powder; however, the use of report composition is prohibited as lift or lifting charge</li> <li>2. The individual or the combined use of metal powders greater than 53 microns, benzoates, phthalates, salicylates and terephthalates must not exceed 10 percent of the total lift charge formulation weight</li> </ol>
<b>Manufacturer of EI&amp;T Pyrotechnic devices</b>	Must be the entity that produces the device
<b>Particle Size</b>	Must be provided in microns when aluminum, magnalium, magnesium, and/or titanium are used in a chemical formulation. The smallest particle size is all that is required, but a range can be provided
<b>Propellant Charge</b>	<ol style="list-style-type: none"> <li>1. Formulations are not limited to black powder; and</li> <li>2. Individual or combined use of metal powders greater than 53 microns, benzoates, phthalates, salicylates and terephthalates must not exceed 30 percent of the total propellant charge formulation weight (excludes whistles)</li> </ol>



<b>General Requirements for EI&amp;T Pyrotechnic Devices</b>	
<b>Reports</b>	<ol style="list-style-type: none"> <li>1. A single report is permitted when line 21 is marked yes and is limited to 6 grams per individual tube or shell; and</li> <li>2. Multiple reports are permitted when line 23 is marked yes and are limited to 1 gram each and 25 grams total</li> </ol>
<b>Series Application</b>	<p>A series is a group of closely related devices that are categorized as a dimensional series or an effect series and meet the following requirements:</p> <ol style="list-style-type: none"> <li>1. Series approvals are limited to one category of device;</li> <li>2. Dimensional series:           <ol style="list-style-type: none"> <li>a. Must contain the same chemical composition; and</li> <li>b. Only vary in size, weight, and/or numbers of tubes in the device</li> </ol> </li> <li>3. Effect series:           <ol style="list-style-type: none"> <li>a. Must be the same size, maximum weight and numbers of tubes; and</li> <li>b. Only vary in the effects produced (chemical formulations vary)</li> </ol> </li> <li>4. Dimensional and Effect Series:           <ol style="list-style-type: none"> <li>a. Can combine dimensional and effect series in one application</li> </ol> </li> </ol>
<b>Shells (aerial)</b>	<ol style="list-style-type: none"> <li>1. Single or stacked cylindrical or spherical receptacles constructed of sturdy materials such as (but not limited to) plastic, Kraft paper, or cardboard; and</li> <li>2. EI&amp;T pyrotechnic shells may be shipped without a tube</li> </ol>
<b>Smoke Compositions</b>	Formulations that incorporate chlorates must contain two (2) percent or greater of an acid neutralizer (bicarbonates or carbonates)
<b>Tails</b>	May be either an external or an internal component of an aerial shell, a mine or comet device. External tails must remain securely attached to the device during handling and transportation
<b>Thermal Stability test</b>	Must be conducted in accordance with the requirements outlined in Part 4 of this standard or 49 CFR § 173.64(a)(2)
<b>Tubes</b>	Must be constructed of sturdy materials such as (but not limited to) plastic, fiberglass, Kraft paper, or cardboard

## PART 3: Specific Requirements for EI&T Pyrotechnics

### 3.1 Introduction

In addition to the general requirements in section 2.4, this part contains the specific requirements for EI&T pyrotechnics that can be approved under this standard. The chemical composition weights listed in this standard are the maximum weight limits permitted for the components and the finished device. The requirements for ground devices, aerial devices, and multi-shot devices are provided in the following tables. When a requirement is not applicable, it was omitted from the requirements table. The units of measure for the following tables are grams for weights and millimeters for dimensions, abbreviations I.D. = inner diameter, O.D. = outer diameter. Devices in APA Standard 87-1C are for professional use only.

### 3.2 Index of Devices

#### 3.2.1 EI&T Pyrotechnic Devices

- 3.2.1.1 - Airburst Colored
- 3.2.1.2 - Airburst Inert Material
- 3.2.1.3 - Airburst Report
- 3.2.1.4 - Binary Flash Powder (Binary Flash, Report Kit)
- 3.2.1.5 - Binary Powder Kit
- 3.2.1.6 - Cannon Simulator
- 3.2.1.7 - Comet Crossette (Split Comet)
- 3.2.1.8 - Flame Projector (Flame Mortar, Flame Column, Flame Ball)
- 3.2.1.9 - Flare (Torch, Lance)
- 3.2.1.10 - Flash Tray / Flash Curtain / Split Mine
- 3.2.1.11 - Flash Tube / Flash Pot
- 3.2.1.12 - Fountain (Cascade, Falls, Gerb)
- 3.2.1.13 - Fountain Nitrocellulose
- 3.2.1.14 - Line Rocket
- 3.2.1.15 - Mine
- 3.2.1.16 - Mine Inert Material (Streamer Mine, Confetti Mine)
- 3.2.1.17 - Mortar Hit Mine (Fireball Effect)
- 3.2.1.18 - Multi-Shot (Cake)
- 3.2.1.19 - Multi-Shot (Combination)
- 3.2.1.20 - Saxon
- 3.2.1.21 - Shell
- 3.2.1.22 - Shot Tube Preloaded
- 3.2.1.23 - Smoke (Cartridge, Gerb, Flare)
- 3.2.1.24 - Spark Effect Devices (Bullet Hits, Spark Producing Devices (SPD))
- 3.2.1.25 - Wheel

#### 3.2.2 Miscellaneous

- 3.2.2.1 - Blank Requirements Table

### 3.2.1 EI&T Pyrotechnic Devices

#### 3.2.1.1 - Airburst Colored

	Airburst Colored - a device that produces a burst of color that is typically suspended from overhead rigging, producing an effect that mimics an outdoor aerial firework without burning fallout.	
	<b>Attribute</b>	<b>Requirements</b>
1	Composition weight in the finished device	32.5 grams
6	Lift charge permitted	No
11	Propellant charge permitted	No
14	Burst charge permitted	Yes
15	Secondary burst charge permitted	No
16	Burst charge weight per device	2.5 grams
<b>20</b>	<b>Reports</b>	--
21	Reports permitted	No
23	Multiple reports permitted	No
<b>30</b>	<b>Tubes</b>	--
31	Tube required	No
32	Multiple tubes permitted	No
35	Driver required	No
36	Multiple drivers permitted	No
<b>40</b>	<b>Inserts and Shells</b>	--
41	Inserts permitted	No
42	Shell required	No
44	Inner shells permitted	No
<b>50</b>	<b>Base, Spike and Handle Requirements</b>	--
51	Attached base required	No
52	Spikes, handles, or sticks required	No
53	Spikes, handles, or sticks permitted	No
<b>60</b>	<b>Ignition Requirements</b>	--
62	Ignition fuse permitted	No
65	Electric igniter permitted	Yes
<b>70</b>	<b>Chemical Restrictions</b>	--
71	Chemical restrictions	Yes
72	Restrictions	See General Requirements for burst charge restrictions.
<b>80</b>	<b>Multi-Shot and Series</b>	--
81	Device permitted in a multi-shot (Cake)	No
82	Device permitted in a multi-shot (Combination)	No
83	Series applications permitted	Yes
<b>90</b>	<b>Special Conditions</b>	--
91	Are there any special conditions	Yes
92	Special conditions	Devices must be packed in securely closed inner packages that include, but are not limited to fiber boxes, and fiber or plastic tubes. Inner packaging must have a minimum wall thickness of 1.5 millimeters.
<b>100</b>	<b>Packaging</b>	--
101	Packaging limits	Yes
103	Composition weight per inner packaging	32.5 grams

### 3.2.1 EI&T Pyrotechnic Devices

#### 3.2.1.2 - Airburst Inert Material

Airburst Inert Material – a device that bursts and propels inert material such as confetti or streamers that is typically suspended from overhead rigging		
Attribute	Requirements	
1	Composition weight in the finished device	2.5 grams
6	Lift charge permitted	No
11	Propellant charge permitted	No
14	Burst charge permitted	Yes
15	Secondary burst charge permitted	No
16	Burst charge weight per device	2.5 grams
<b>20</b>	<b>Reports</b>	--
21	Reports permitted	No
23	Multiple reports permitted	No
<b>30</b>	<b>Tubes</b>	--
31	Tube required	No
32	Multiple tubes permitted	No
35	Driver required	No
36	Multiple drivers permitted	No
<b>40</b>	<b>Inserts and Shells</b>	--
41	Inserts permitted	No
42	Shell required	No
44	Inner shells permitted	No
<b>50</b>	<b>Base, Spike and Handle Requirements</b>	--
51	Attached base required	No
52	Spikes, handles, or sticks required	No
53	Spikes, handles, or sticks permitted	No
<b>60</b>	<b>Ignition Requirements</b>	--
62	Ignition fuse permitted	No
65	Electric igniter permitted	Yes
<b>70</b>	<b>Chemical Restrictions</b>	--
71	Chemical restrictions	Yes
72	Restrictions	See General Requirements for burst charge restrictions.
<b>80</b>	<b>Multi-Shot and Series</b>	--
81	Device permitted in a multi-shot (Cake)	No
82	Device permitted in a multi-shot (Combination)	No
83	Series applications permitted	Yes
<b>90</b>	<b>Special Conditions</b>	--
91	Are there any special conditions	No
<b>100</b>	<b>Packaging</b>	--
101	Packaging limits	No

### 3.2.1 EI&T Pyrotechnic Devices

#### 3.2.1.3 - Airburst Report

	Airburst Report – a device that produces a flash of light and report that is typically suspended from overhead rigging without producing burning fallout.	
	<b>Attribute</b>	<b>Requirements</b>
1	Composition weight in the finished device	6 grams
6	Lift charge permitted	No
11	Propellant charge permitted	No
14	Burst charge permitted	No
15	Secondary burst charge permitted	No
<b>20</b>	<b>Reports</b>	--
21	Reports permitted	Yes
22	Weight per report	6 grams
23	Multiple reports permitted	No
<b>30</b>	<b>Tubes</b>	--
31	Tube required	No
32	Multiple tubes permitted	No
35	Driver required	No
36	Multiple drivers permitted	No
<b>40</b>	<b>Inserts and Shells</b>	--
41	Inserts permitted	No
42	Shell required	No
44	Inner shells permitted	No
<b>50</b>	<b>Base, Spike and Handle Requirements</b>	--
51	Attached base required	No
52	Spikes, handles, or sticks required	No
53	Spikes, handles, or sticks permitted	No
<b>60</b>	<b>Ignition Requirements</b>	--
62	Ignition fuse permitted	No
65	Electric igniter permitted	Yes
<b>70</b>	<b>Chemical Restrictions</b>	--
71	Chemical restrictions	No
<b>80</b>	<b>Multi-Shot and Series</b>	--
81	Device permitted in a multi-shot (Cake)	No
82	Device permitted in a multi-shot (Combination)	No
83	Series applications permitted	Yes
<b>90</b>	<b>Special Conditions</b>	--
91	Are there any special conditions	Yes
92	Special condition	Devices must be packed in securely closed inner packages that include, but are not limited to fiber boxes, and fiber or plastic tubes. Inner packaging must have a minimum wall thickness of 1.5 millimeters.
<b>100</b>	<b>Packaging</b>	--
101	Packaging limits	Yes
103	Composition weight per inner packaging	6 grams

### 3.2.1 EI&T Pyrotechnic Devices

#### 3.2.1.4 - Binary Flash Powder, (Binary Flash, Report Kit)

	Binary Flash Powder – a two-component bottled kit consisting of an “A” bottle and a “B” bottle wherein one bottle contains an oxidizer and the other a fuel. When mixed together, the AB mixture becomes a pyrotechnic composition that produces various effects such as airburst, concussion, flash, and spark effects.	
	<b>Attribute</b>	<b>Requirements</b>
1	Composition weight in the finished device	30 grams
6	Lift charge permitted	No
11	Propellant charge permitted	No
14	Burst charge permitted	No
15	Secondary burst charge permitted	No
<b>20</b>	<b>Reports</b>	--
21	Reports permitted	No
23	Multiple reports permitted	No
<b>30</b>	<b>Tubes</b>	--
31	Tube required	No
32	Multiple tubes permitted	No
35	Driver required	No
36	Multiple drivers permitted	No
<b>40</b>	<b>Inserts and Shells</b>	--
41	Inserts permitted	No
42	Shell required	No
44	Inner shells permitted	No
<b>50</b>	<b>Base, Spike and Handle Requirements</b>	--
51	Attached base required	No
52	Spikes, handles, or sticks required	No
53	Spikes, handles, or sticks permitted	No
<b>60</b>	<b>Ignition Requirements</b>	--
62	Ignition fuse permitted	No
65	Electric igniter permitted	No
<b>70</b>	<b>Chemical Restrictions</b>	--
71	Chemical restrictions	No
<b>80</b>	<b>Multi-Shot and Series</b>	--
81	Device permitted in a multi-shot (Cake)	No
82	Device permitted in a multi-shot (Combination)	No
83	Series applications permitted	Yes
<b>90</b>	<b>Special Conditions</b>	--
91	Are there any special conditions	Yes
92	Special conditions	The label on each of the containers “A” and “B” must state that the EX number does not apply to the mixed (A + B) composition.
<b>100</b>	<b>Packaging</b>	--
101	Packaging limits	No

### 3.2.1 EI&T Pyrotechnic Devices

#### 3.2.1.5 - Binary Powder Kit

	Binary Powder Kit – a two-component bottled kit consisting of an “A” bottle and a “B” bottle wherein one bottle contains an oxidizer and the other a fuel. When mixed together, the AB mixture becomes a pyrotechnic composition that produces various effects other than airburst, concussion and flash (ex. colored flames).	
	<b>Attribute</b>	<b>Requirements</b>
1	Composition weight in the finished device	1000 grams
6	Lift charge permitted	No
11	Propellant charge permitted	No
14	Burst charge permitted	No
15	Secondary burst charge permitted	No
<b>20</b>	<b>Reports</b>	--
21	Reports permitted	No
23	Multiple reports permitted	No
<b>30</b>	<b>Tubes</b>	--
31	Tube required	No
32	Multiple tubes permitted	No
35	Driver required	No
36	Multiple drivers permitted	No
<b>40</b>	<b>Inserts and Shells</b>	--
41	Inserts permitted	No
42	Shell required	No
44	Inner shells permitted	No
<b>50</b>	<b>Base, Spike and Handle Requirements</b>	--
51	Attached base required	No
52	Spikes, handles, or sticks required	No
53	Spikes, handles, or sticks permitted	No
<b>60</b>	<b>Ignition Requirements</b>	--
62	Ignition fuse permitted	No
65	Electric igniter permitted	No
<b>70</b>	<b>Chemical Restrictions</b>	--
71	Chemical restrictions	No
<b>80</b>	<b>Multi-Shot and Series</b>	--
81	Device permitted in a multi-shot (Cake)	No
82	Device permitted in a multi-shot (Combination)	No
83	Series applications permitted	Yes
<b>90</b>	<b>Special Conditions</b>	--
91	Are there any special conditions	No
92	Special conditions	The label on each of the containers “A” and “B” must state that the EX number does not apply to the mixed (A + B) composition
<b>100</b>	<b>Packaging</b>	--
101	Packaging limits	No

### 3.2.1 EI&T Pyrotechnic Devices

#### 3.2.1.6 - Cannon Simulator

Cannon Simulator – a device that produces a report with or without a flash of light and smoke.		
Attribute	Requirements	
1	Composition weight in the finished device	6 grams
6	Lift charge permitted	No
11	Propellant charge permitted	No
14	Burst charge permitted	No
15	Secondary burst charge permitted	No
<b>20</b>	<b>Reports</b>	--
21	Reports permitted	Yes
22	Weight per report	6 grams
23	Multiple reports permitted	No
<b>30</b>	<b>Tubes</b>	--
31	Tube required	No
32	Multiple tubes permitted	No
35	Driver required	No
36	Multiple drivers permitted	No
<b>40</b>	<b>Inserts and Shells</b>	--
41	Inserts permitted	No
42	Shell required	No
44	Inner shells permitted	No
<b>50</b>	<b>Base, Spike and Handle Requirements</b>	--
51	Attached base required	No
52	Spikes, handles, or sticks required	No
53	Spikes, handles, or sticks permitted	No
<b>60</b>	<b>Ignition Requirements</b>	--
62	Ignition fuse permitted	No
65	Electric igniter permitted	Yes
<b>70</b>	<b>Chemical Restrictions</b>	--
71	Chemical restrictions	No
<b>80</b>	<b>Multi-Shot and Series</b>	--
81	Device permitted in a multi-shot (Cake)	No
82	Device permitted in a multi-shot (Combination)	No
83	Series applications permitted	Yes
<b>90</b>	<b>Special Conditions</b>	--
91	Are there any special conditions	Yes
92	Special conditions	When the device has an easily penetrable membrane, it must be protected during transportation with a removable cap or cover.
<b>100</b>	<b>Packaging</b>	--
101	Packaging limits	Yes
103	Composition weight per inner packaging	6 grams



### 3.2.1 EI&T Pyrotechnic Devices

#### 3.2.1.7 - Comet Crossette, (Split Comet)

	Comet Crossette – a device that propels a pellet of pyrotechnic composition into the air that breaks into several smaller pieces forming a cross pattern.	
	<b>Attribute</b>	<b>Requirements</b>
1	Composition weight in the finished device	150 grams
6	Lift charge permitted	Yes
7	Lift charge weight per device	20 grams
11	Propellant charge permitted	No
14	Burst charge permitted	Yes
15	Secondary burst charge permitted	No
<b>20</b>	<b>Reports</b>	--
21	Reports permitted	Yes
22	Weight per report	1 gram
23	Multiple reports permitted	Yes
27	Multiple report weight (individual)	1 gram
<b>30</b>	<b>Tubes</b>	--
31	Tube required	Yes
32	Multiple tubes permitted	No
35	Driver required	No
36	Multiple drivers permitted	No
<b>40</b>	<b>Inserts and Shells</b>	--
41	Inserts permitted	No
42	Shell required	No
44	Inner shells permitted	No
<b>50</b>	<b>Base, Spike and Handle Requirements</b>	--
51	Attached base required	No
52	Spikes, handles, or sticks required	No
53	Spikes, handles, or sticks permitted	Yes
<b>60</b>	<b>Ignition Requirements</b>	--
62	Ignition fuse permitted	Yes
65	Electric igniter permitted	Yes
<b>70</b>	<b>Chemical Restrictions</b>	--
71	Chemical restrictions	Yes
72	Restrictions	See General Requirements for lift and burst charge restrictions.
<b>80</b>	<b>Multi-Shot and Series</b>	--
81	Device permitted in a multi-shot (Cake)	Yes
82	Device permitted in a multi-shot (Combination)	Yes
83	Series applications permitted	Yes
<b>90</b>	<b>Special Conditions</b>	--
91	Are there any special conditions	No
<b>100</b>	<b>Packaging</b>	--
101	Packaging limits	No

### 3.2.1 EI&T Pyrotechnic Devices

#### 3.2.1.8 - Flame Projector (Flame Mortar, Flame Column, Flame Ball)

Flame Projector – a device that produces a column or ball of fire in various colors.		
Attribute	Requirements	
1	Composition weight in the finished device	200 grams
6	Lift charge permitted	No
11	Propellant charge permitted	No
14	Burst charge permitted	No
15	Secondary burst charge permitted	No
<b>20</b>	<b>Reports</b>	--
21	Reports permitted	No
23	Multiple reports permitted	No
<b>30</b>	<b>Tubes</b>	--
31	Tube required	Yes
32	Multiple tubes permitted	No
35	Driver required	No
36	Multiple drivers permitted	No
<b>40</b>	<b>Inserts and Shells</b>	--
41	Inserts permitted	No
42	Shell required	No
44	Inner shells permitted	No
<b>50</b>	<b>Base, Spike and Handle Requirements</b>	--
51	Attached base required	No
52	Spikes, handles, or sticks required	No
53	Spikes, handles, or sticks permitted	Yes
<b>60</b>	<b>Ignition Requirements</b>	--
62	Ignition fuse permitted	Yes
65	Electric igniter permitted	Yes
<b>70</b>	<b>Chemical Restrictions</b>	--
71	Chemical restrictions	Yes
72	Restrictions	Device may contain up to 200 grams of smokeless powder.
<b>80</b>	<b>Multi-Shot and Series</b>	--
81	Device permitted in a multi-shot (Cake)	Yes
82	Device permitted in a multi-shot (Combination)	Yes
83	Series applications permitted	Yes
<b>90</b>	<b>Special Conditions</b>	--
91	Are there any special conditions	Yes
92	Special conditions	When the device has an easily penetrable membrane, it must be protected during transportation with a removable cap or cover. Only UN0161, Powder, smokeless, 1.3C and UN0509 Powder, smokeless, 1.4C may be used.
<b>100</b>	<b>Packaging</b>	--
101	Packaging limits	No

### 3.2.1 EI&T Pyrotechnic Devices

#### 3.2.1.9 - Flare (Torch, Lance)

	Flare – a device that produces a constant flame and/or a strobing effect in various colors with or without sparks.	
	<b>Attribute</b>	<b>Requirements</b>
1	Composition weight in the finished device	1000 grams
6	Lift charge permitted	No
11	Propellant charge permitted	No
14	Burst charge permitted	No
15	Secondary burst charge permitted	No
<b>20</b>	<b>Reports</b>	--
21	Reports permitted	No
23	Multiple reports permitted	No
<b>30</b>	<b>Tubes</b>	--
31	Tube required	Yes
32	Multiple tubes permitted	No
35	Driver required	No
36	Multiple drivers permitted	No
<b>40</b>	<b>Inserts and Shells</b>	--
41	Inserts permitted	No
42	Shell required	No
44	Inner shells permitted	No
<b>50</b>	<b>Base, Spike and Handle Requirements</b>	--
51	Attached base required	No
52	Spikes, handles, or sticks required	No
53	Spikes, handles, or sticks permitted	Yes
<b>60</b>	<b>Ignition Requirements</b>	--
62	Ignition fuse permitted	Yes
65	Electric igniter permitted	Yes
<b>70</b>	<b>Chemical Restrictions</b>	--
71	Chemical restrictions	No
<b>80</b>	<b>Multi-Shot and Series</b>	--
81	Device permitted in a multi-shot (Cake)	Yes
82	Device permitted in a multi-shot (Combination)	Yes
83	Series applications permitted	Yes
<b>90</b>	<b>Special Conditions</b>	--
91	Are there any special conditions	No
<b>100</b>	<b>Packaging</b>	--
101	Packaging limits	No

### 3.2.1 EI&T Pyrotechnic Devices

#### 3.2.1.10 - Flash Tray (Flash Curtain, Split Mine)

	Flash Tray – a device with a longitudinal slit cut from end to end that produces a fan shaped pattern.	
	<b>Attribute</b>	<b>Requirements</b>
1	Composition weight in the finished device	100 grams
6	Lift charge permitted	No
11	Propellant charge permitted	No
14	Burst charge permitted	No
15	Secondary burst charge permitted	No
<b>20</b>	<b>Reports</b>	--
21	Reports permitted	No
23	Multiple reports permitted	No
<b>30</b>	<b>Tubes</b>	--
31	Tube required	Yes
32	Multiple tubes permitted	No
35	Driver required	No
36	Multiple drivers permitted	No
<b>40</b>	<b>Inserts and Shells</b>	--
41	Inserts permitted	No
42	Shell required	No
44	Inner shells permitted	No
<b>50</b>	<b>Base, Spike and Handle Requirements</b>	--
51	Attached base required	No
52	Spikes, handles, or sticks required	No
53	Spikes, handles, or sticks permitted	Yes
<b>60</b>	<b>Ignition Requirements</b>	--
62	Ignition fuse permitted	Yes
65	Electric igniter permitted	Yes
<b>70</b>	<b>Chemical Restrictions</b>	--
71	Chemical restrictions	No
<b>80</b>	<b>Multi-Shot and Series</b>	--
81	Device permitted in a multi-shot (Cake)	No
82	Device permitted in a multi-shot (Combination)	Yes
83	Series applications permitted	Yes
<b>90</b>	<b>Special Conditions</b>	--
91	Are there any special conditions	Yes
92	Special conditions	The longitudinal slit must be sealed with a removable cap or cover to prevent leakage during transportation.
<b>100</b>	<b>Packaging</b>	--
101	Packaging limits	No

### 3.2.1 EI&T Pyrotechnic Devices

#### 3.2.1.11 - Flash Tubes (Flash Pot)

Flash Tubes – a device with a thin membrane top that emits a bright flash and smoke, sometimes with a report and/or spray of sparks.		
	Attribute	Requirements
1	Composition weight in the finished device	30 grams
6	Lift charge permitted	No
11	Propellant charge permitted	No
14	Burst charge permitted	No
15	Secondary burst charge permitted	No
<b>20</b>	<b>Reports</b>	--
21	Reports permitted	Yes
22	Weight per report	6 grams
23	Multiple reports permitted	No
<b>30</b>	<b>Tubes</b>	--
31	Tube required	Yes
32	Multiple tubes permitted	No
35	Driver required	No
36	Multiple drivers permitted	No
<b>40</b>	<b>Inserts and Shells</b>	--
41	Inserts permitted	No
42	Shell required	No
44	Inner shells permitted	No
<b>50</b>	<b>Base, Spike and Handle Requirements</b>	--
51	Attached base required	No
52	Spikes, handles, or sticks required	No
53	Spikes, handles, or sticks permitted	Yes
<b>60</b>	<b>Ignition Requirements</b>	--
62	Ignition fuse permitted	Yes
65	Electric igniter permitted	Yes
<b>70</b>	<b>Chemical Restrictions</b>	--
71	Chemical restrictions	No
<b>80</b>	<b>Multi-Shot and Series</b>	--
81	Device permitted in a multi-shot (Cake)	No
82	Device permitted in a multi-shot (Combination)	Yes
83	Series applications permitted	Yes
<b>90</b>	<b>Special Conditions</b>	--
91	Are there any special conditions	Yes
92	Special conditions	When the device has an easily penetrable membrane, it must be protected during transportation with a removable cap or cover.
<b>100</b>	<b>Packaging</b>	--
101	Packaging limits	No

### 3.2.1 EI&T Pyrotechnic Devices

#### 3.2.1.12 - Fountain (Casade, Falls, Gerb)

	Fountain – a device that produces a shower of any combination of colored sparks, color flame, crackle, smoke, whistle and/or micro star effects.	
	<b>Attribute</b>	<b>Requirements</b>
1	Composition weight in the finished device	1000 grams
6	Lift charge permitted	No
11	Propellant charge permitted	No
14	Burst charge permitted	No
15	Secondary burst charge permitted	No
<b>20</b>	<b>Reports</b>	--
21	Reports permitted	No
23	Multiple reports permitted	No
<b>30</b>	<b>Tubes</b>	--
31	Tube required	Yes
32	Multiple tubes permitted	No
35	Driver required	No
36	Multiple drivers permitted	No
<b>40</b>	<b>Inserts and Shells</b>	--
41	Inserts permitted	No
42	Shell required	No
44	Inner shells permitted	No
<b>50</b>	<b>Base, Spike and Handle Requirements</b>	--
51	Attached base required	No
52	Spikes, handles, or sticks required	No
53	Spikes, handles, or sticks permitted	Yes
<b>60</b>	<b>Ignition Requirements</b>	--
62	Ignition fuse permitted	Yes
65	Electric igniter permitted	Yes
<b>70</b>	<b>Chemical Restrictions</b>	--
71	Chemical restrictions	No
<b>80</b>	<b>Multi-Shot and Series</b>	--
81	Device permitted in a multi-shot (Cake)	Yes
82	Device permitted in a multi-shot (Combination)	Yes
83	Series applications permitted	Yes
<b>90</b>	<b>Special Conditions</b>	--
91	Are there any special conditions	No
<b>100</b>	<b>Packaging</b>	--
101	Packaging limits	No

### 3.2.1 EI&T Pyrotechnic Devices

#### 3.2.1.13 - Fountain Nitrocellulose

	Fountain Nitrocellulose –a device that produces a shower of sparks, color and/or flame as its primary effect using nitrocellulose as the major chemical component.	
	<b>Attribute</b>	<b>Requirements</b>
1	Composition weight in the finished device	75 grams
6	Lift charge permitted	No
11	Propellant charge permitted	No
14	Burst charge permitted	No
15	Secondary burst charge permitted	No
<b>20</b>	<b>Reports</b>	--
21	Reports permitted	No
23	Multiple reports permitted	No
<b>30</b>	<b>Tubes</b>	--
31	Tube required	Yes
32	Multiple tubes permitted	No
35	Driver required	No
36	Multiple drivers permitted	No
<b>40</b>	<b>Inserts and Shells</b>	--
41	Inserts permitted	No
42	Shell required	No
44	Inner shells permitted	No
<b>50</b>	<b>Base, Spike and Handle Requirements</b>	--
51	Attached base required	No
52	Spikes, handles, or sticks required	No
53	Spikes, handles, or sticks permitted	Yes
<b>60</b>	<b>Ignition Requirements</b>	--
62	Ignition fuse permitted	Yes
65	Electric igniter permitted	Yes
<b>70</b>	<b>Chemical Restrictions</b>	--
71	Chemical restrictions	No
<b>80</b>	<b>Multi-Shot and Series</b>	--
81	Device permitted in a multi-shot (Cake)	Yes
82	Device permitted in a multi-shot (Combination)	Yes
83	Series applications permitted	Yes
<b>90</b>	<b>Special Conditions</b>	--
91	Are there any special conditions	No
<b>100</b>	<b>Packaging</b>	--
101	Packaging limits	No

### 3.2.1 EI&T Pyrotechnic Devices

#### 3.2.1.14 - Line Rocket

Line Rocket – a device that travels along a wire producing effects.		
	Attribute	Requirements
1	Composition weight in the finished device	20 grams
6	Lift charge permitted	No
11	Propellant charge permitted	Yes
12	Propellant charge weight per tube	20 grams
14	Burst charge permitted	No
15	Secondary burst charge permitted	No
<b>20</b>	<b>Reports</b>	--
21	Reports permitted	No
23	Multiple reports permitted	No
<b>30</b>	<b>Tubes</b>	--
31	Tube required	Yes
32	Multiple tubes permitted	No
35	Driver required	No
36	Multiple drivers permitted	No
<b>40</b>	<b>Inserts and Shells</b>	--
41	Inserts permitted	No
42	Shell required	No
44	Inner shells permitted	No
<b>50</b>	<b>Base, Spike and Handle Requirements</b>	--
51	Attached base required	No
52	Spikes, handles, or sticks required	No
53	Spikes, handles, or sticks permitted	Yes
<b>60</b>	<b>Ignition Requirements</b>	--
62	Ignition fuse permitted	Yes
65	Electric igniter permitted	Yes
<b>70</b>	<b>Chemical Restrictions</b>	--
71	Chemical restrictions	Yes
72	Restrictions	See General Requirements for propellant charge restrictions.
<b>80</b>	<b>Multi-Shot and Series</b>	--
81	Device permitted in a multi-shot (Cake)	No
82	Device permitted in a multi-shot (Combination)	No
83	Series applications permitted	Yes
<b>90</b>	<b>Special Conditions</b>	--
91	Are there any special conditions	No
<b>100</b>	<b>Packaging</b>	--
101	Packaging limits	No



### 3.2.1 EI&T Pyrotechnic Devices

#### 3.2.1.15 - Mine

	Mine – a device that ignites and projects its effect directly out of the launch tube. Effects may be pyrotechnic and/or non-pyrotechnic.	
	<b>Attribute</b>	<b>Requirements</b>
1	Composition weight in the finished device	150 grams
6	Lift charge permitted	Yes
7	Lift charge weight per device	25 grams
11	Propellant charge permitted	No
14	Burst charge permitted	Yes
15	Secondary burst charge permitted	Yes
<b>20</b>	<b>Reports</b>	--
21	Reports permitted	Yes
22	Weight per report	1 gram
23	Multiple reports permitted	Yes
27	Multiple report weight (individual)	1 gram
<b>30</b>	<b>Tubes</b>	--
31	Tube required	Yes
32	Multiple tubes permitted	No
35	Driver required	No
36	Multiple drivers permitted	No
<b>40</b>	<b>Inserts and Shells</b>	--
41	Inserts permitted	Yes
42	Shell required	No
44	Inner shells permitted	Yes
<b>50</b>	<b>Base, Spike and Handle Requirements</b>	--
51	Attached base required	No
52	Spikes, handles, or sticks required	No
53	Spikes, handles, or sticks permitted	Yes
<b>60</b>	<b>Ignition Requirements</b>	--
62	Ignition fuse permitted	Yes
65	Electric igniter permitted	Yes
<b>70</b>	<b>Chemical Restrictions</b>	--
71	Chemical restrictions	Yes
72	Restrictions	See General Requirements for lift and burst charge restrictions.
<b>80</b>	<b>Multi-Shot and Series</b>	--
81	Device permitted in a multi-shot (Cake)	Yes
82	Device permitted in a multi-shot (Combination)	Yes
83	Series applications permitted	Yes
<b>90</b>	<b>Special Conditions</b>	--
91	Are there any special conditions	Yes
92	Special conditions	Burst charges are limited to Secondary effects only (e.g., crossettes and inserts).
<b>100</b>	<b>Packaging</b>	--
101	Packaging limits	No

### 3.2.1 EI&T Pyrotechnic Devices

#### 3.2.1.16 - Mine Inert Material (Streamer Mine, Confetti Mine)

	Mine Inert Material - a device that projects inert materials such as streamers, confetti, money, etc. directly out of the launch tube.	
	<b>Attribute</b>	<b>Requirements</b>
1	Composition weight in the finished device	25 grams
6	Lift charge permitted	Yes
11	Propellant charge permitted	No
14	Burst charge permitted	No
15	Secondary burst charge permitted	No
<b>20</b>	<b>Reports</b>	--
21	Reports permitted	No
23	Multiple reports permitted	No
<b>30</b>	<b>Tubes</b>	--
31	Tube required	Yes
32	Multiple tubes permitted	No
35	Driver required	No
36	Multiple drivers permitted	No
<b>40</b>	<b>Inserts and Shells</b>	--
41	Inserts permitted	No
42	Shell required	No
44	Inner shells permitted	No
<b>50</b>	<b>Base, Spike and Handle Requirements</b>	--
51	Attached base required	No
52	Spikes, handles, or sticks required	No
53	Spikes, handles, or sticks permitted	Yes
<b>60</b>	<b>Ignition Requirements</b>	--
62	Ignition fuse permitted	Yes
65	Electric igniter permitted	Yes
<b>70</b>	<b>Chemical Restrictions</b>	--
71	Chemical restrictions	Yes
72	Restrictions	See General Requirements for lift charge restrictions.
<b>80</b>	<b>Multi-Shot and Series</b>	--
81	Device permitted in a multi-shot (Cake)	Yes
82	Device permitted in a multi-shot (Combination)	Yes
83	Series applications permitted	Yes
<b>90</b>	<b>Special Conditions</b>	--
91	Are there any special conditions	No
<b>100</b>	<b>Packaging</b>	--
101	Packaging limits	No

### 3.2.1 EI&T Pyrotechnic Devices

#### 3.2.1.17 - Mortar Hit Mine (Fireball Effect)

	Mortar Hit Mine – a device that projects effects such as a bright flash, heavy smoke and / or a ball of fire.	
	<b>Attribute</b>	<b>Requirements</b>
1	Composition weight in the finished device	150 grams
6	Lift charge permitted	Yes
7	Lift charge weight per device	50 grams
11	Propellant charge permitted	No
14	Burst charge permitted	No
15	Secondary burst charge permitted	No
<b>20</b>	<b>Reports</b>	--
21	Reports permitted	No
23	Multiple reports permitted	No
<b>30</b>	<b>Tubes</b>	--
31	Tube required	Yes
32	Multiple tubes permitted	No
35	Driver required	No
36	Multiple drivers permitted	No
<b>40</b>	<b>Inserts and Shells</b>	--
41	Inserts permitted	No
42	Shell required	No
44	Inner shells permitted	No
<b>50</b>	<b>Base, Spike and Handle Requirements</b>	--
51	Attached base required	No
52	Spikes, handles, or sticks required	No
53	Spikes, handles, or sticks permitted	Yes
<b>60</b>	<b>Ignition Requirements</b>	--
62	Ignition fuse permitted	Yes
65	Electric igniter permitted	Yes
<b>70</b>	<b>Chemical Restrictions</b>	--
71	Chemical restrictions	Yes
72	Restrictions	See General Requirements for lift charge restrictions.
<b>80</b>	<b>Multi-Shot and Series</b>	--
81	Device permitted in a multi-shot (Cake)	No
82	Device permitted in a multi-shot (Combination)	Yes
83	Series applications permitted	Yes
<b>90</b>	<b>Special Conditions</b>	--
91	Are there any special conditions	Yes
92	Special conditions	When the device has a penetrable membrane it must be protected during transportation with a cap or cover that can be removed prior to use.
<b>100</b>	<b>Packaging</b>	--
101	Packaging limits	No

### 3.2.1 EI&T Pyrotechnic Devices

#### 3.2.1.18 - Multi-Shot Device (Cake)

	Multi-Shot Device (Cake) – a multiple tube device that is fused and assembled together to form one device wherein the ignition causes the tubes to fire in a designed sequence producing a succession of various effects	
	<b>Attribute</b>	<b>Requirements</b>
1	Composition weight in the finished device	1000 grams
3	Composition weight per tube	See individual device requirements
6	Lift charge permitted	See individual device requirements
7	Lift charge weight per device	See individual device requirements
8	Lift charge weight per tube	See individual device requirements
11	Propellant charge permitted	See individual device requirements
12	Propellant charge weight per tube	See individual device requirements
14	Burst charge permitted	See individual device requirements
15	Secondary burst charge permitted	See individual device requirements
16	Burst charge weight per device	See individual device requirements
<b>20</b>	<b>Reports</b>	--
21	Reports permitted	See individual device requirements
22	Weight per report	See individual device requirements
23	Multiple reports permitted	See individual device requirements
27	Multiple report weight (individual)	See individual device requirements
<b>30</b>	<b>Tubes</b>	--
31	Tube required	Yes
32	Multiple tubes permitted	Yes
35	Driver required	No
36	Multiple drivers permitted	No
<b>40</b>	<b>Inserts and Shells</b>	--
41	Inserts permitted	See individual device requirements
42	Shell required	See individual device requirements
43	Shell diameter (O.D.)	See individual device requirements
44	Inner shells permitted	See individual device requirements
<b>50</b>	<b>Base, Spike and Handle Requirements</b>	--
51	Attached base required	No
52	Spikes, handles, or sticks required	No
53	Spikes, handles, or sticks permitted	Yes
<b>60</b>	<b>Ignition Requirements</b>	--
62	Ignition fuse permitted	Yes
65	Electric igniter permitted	Yes
<b>70</b>	<b>Chemical Restrictions</b>	--
71	Chemical restrictions	See individual device requirements
72	Restrictions	See individual device requirements
<b>80</b>	<b>Multi-Shot and Series</b>	--
81	Device permitted in a multi-shot (Cake)	No
82	Device permitted in a multi-shot (Combination)	Yes
83	Series applications permitted	Yes
<b>90</b>	<b>Special Conditions</b>	--
91	Are there any special conditions	See individual device requirements
92	Special conditions	See individual device requirements, if nitrocellulose fountains are used the total weight of nitrocellulose in the device must not exceed 500 grams.
<b>100</b>	<b>Packaging</b>	--
101	Packaging limits	No

### 3.2.1 EI&T Pyrotechnic Devices

#### 3.2.1.19 - Multi-Shot Device (Combination)

	Multi-Shot Device (Combination) – a combination of devices that are fused and assembled together to form one device, wherein the ignition causes the devices to fire in a designed sequence producing a succession of various effects.	
	<b>Attribute</b>	<b>Requirements</b>
1	Composition weight in the finished device	1000 grams
3	Composition weight per tube	See individual device requirements
6	Lift charge permitted	See individual device requirements
7	Lift charge weight per device	See individual device requirements
8	Lift charge weight per tube	See individual device requirements
11	Propellant charge permitted	See individual device requirements
12	Propellant charge weight per tube	See individual device requirements
14	Burst charge permitted	See individual device requirements
15	Secondary burst charge permitted	See individual device requirements
16	Burst charge weight per device	See individual device requirements
<b>20</b>	<b>Reports</b>	--
21	Reports permitted	See individual device requirements
22	Weight per report	See individual device requirements
23	Multiple reports permitted	See individual device requirements
27	Multiple report weight (individual)	See individual device requirements
<b>30</b>	<b>Tubes</b>	--
31	Tube required	See individual device requirements
32	Multiple tubes permitted	Yes
35	Driver required	See individual device requirements
36	Multiple drivers permitted	See individual device requirements
<b>40</b>	<b>Inserts and Shells</b>	--
41	Inserts permitted	See individual device requirements
42	Shell required	See individual device requirements
43	Shell diameter (O.D.)	See individual device requirements
44	Inner shells permitted	See individual device requirements
<b>50</b>	<b>Base, Spike and Handle Requirements</b>	--
51	Attached base required	No
52	Spikes, handles, or sticks required	No
53	Spikes, handles, or sticks permitted	Yes
<b>60</b>	<b>Ignition Requirements</b>	--
62	Ignition fuse permitted	Yes
65	Electric igniter permitted	Yes
<b>70</b>	<b>Chemical Restrictions</b>	--
71	Chemical restrictions	See individual device requirements
72	Restrictions	See individual device requirements
<b>80</b>	<b>Multi-Shot and Series</b>	--
81	Device permitted in a multi-shot (Cake)	No
82	Device permitted in a multi-shot (Combination)	No
83	Series applications permitted	Yes
<b>90</b>	<b>Special Conditions</b>	--
91	Are there any special conditions	See individual device requirements
92	Special conditions	See individual device requirements, if nitrocellulose fountains are used the total weight of nitrocellulose in the device must not exceed 500 grams.
<b>100</b>	<b>Packaging</b>	--
101	Packaging limits	No

### 3.2.1 EI&T Pyrotechnic Devices

#### 3.2.1.20 - Saxon

Saxon – a device that rotates around a fixed axis producing a shower of sparks.		
	Attribute	Requirements
1	Composition weight in the finished device	1000 grams
6	Lift charge permitted	No
11	Propellant charge permitted	Yes
12	Propellant charge weight per tube	1000 grams
14	Burst charge permitted	No
15	Secondary burst charge permitted	No
<b>20</b>	<b>Reports</b>	--
21	Reports permitted	No
23	Multiple reports permitted	No
<b>30</b>	<b>Tubes</b>	--
31	Tube required	Yes
32	Multiple tubes permitted	No
35	Driver required	No
36	Multiple drivers permitted	Yes
<b>40</b>	<b>Inserts and Shells</b>	--
41	Inserts permitted	No
42	Shell required	No
44	Inner shells permitted	No
<b>50</b>	<b>Base, Spike and Handle Requirements</b>	--
51	Attached base required	No
52	Spikes, handles, or sticks required	No
53	Spikes, handles, or sticks permitted	Yes
<b>60</b>	<b>Ignition Requirements</b>	--
62	Ignition fuse permitted	Yes
65	Electric igniter permitted	Yes
<b>70</b>	<b>Chemical Restrictions</b>	--
71	Chemical restrictions	Yes
72	Restrictions	See General Requirements for propellant charge restrictions.
<b>80</b>	<b>Multi-Shot and Series</b>	--
81	Device permitted in a multi-shot (Cake)	No
82	Device permitted in a multi-shot (Combination)	Yes
83	Series applications permitted	Yes
<b>90</b>	<b>Special Conditions</b>	--
91	Are there any special conditions	No
<b>100</b>	<b>Packaging</b>	--
101	Packaging limits	No

### 3.2.1 EI&T Pyrotechnic Devices

#### 3.2.1.21 - Shell

	Shell – a device designed to be launched from a tube (mortar) and containing pyrotechnic and/or non-pyrotechnic components.	
	<b>Attribute</b>	<b>Requirements</b>
1	Composition weight in the finished device	60 grams
6	Lift charge permitted	Yes
7	Lift charge weight per device	20 grams
11	Propellant charge permitted	No
14	Burst charge permitted	Yes
15	Secondary burst charge permitted	Yes
16	Burst charge weight per device	15 grams
<b>20</b>	<b>Reports</b>	--
21	Reports permitted	Yes
22	Weight per report	0.130 grams
23	Multiple reports permitted	Yes
27	Multiple report weight (individual)	0.130 grams
<b>30</b>	<b>Tubes</b>	--
31	Tube required	No
32	Multiple tubes permitted	No
35	Driver required	No
36	Multiple drivers permitted	No
<b>40</b>	<b>Inserts and Shells</b>	--
41	Inserts permitted	Yes
42	Shell required	Yes
43	Shell diameter (O.D.)	44.75millimeters
44	Inner shells permitted	Yes
<b>50</b>	<b>Base, Spike and Handle Requirements</b>	--
51	Attached base required	No
52	Spikes, handles, or sticks required	No
53	Spikes, handles, or sticks permitted	No
<b>60</b>	<b>Ignition Requirements</b>	--
62	Ignition fuse permitted	Yes
65	Electric igniter permitted	No
<b>70</b>	<b>Chemical Restrictions</b>	--
71	Chemical restrictions	No
72	Restrictions	See General Requirements for lift and burst charge restrictions.
<b>80</b>	<b>Multi-Shot and Series</b>	--
81	Device permitted in a multi-shot (Cake)	No
82	Device permitted in a multi-shot (Combination)	No
83	Series applications permitted	Yes
<b>90</b>	<b>Special Conditions</b>	--
91	Are there any special conditions	Yes
92	Special conditions	Shells can be <ul style="list-style-type: none"> <li>• cylindrical or spherical in shape,</li> <li>• with or without external attachments,</li> <li>• can be made with or without a lift charge, and</li> <li>• burst charge cannot exceed 25 percent of the composition.</li> </ul>
<b>100</b>	<b>Packaging</b>	--
101	Packaging limits	Yes
103	Composition weight per inner packaging	400 grams

### 3.2.1 EI&T Pyrotechnic Devices

#### 3.2.1.22 - Shot Tube Preloaded

Shot Tube Preloaded – a device that launches and ignites a preloaded shell into the air that bursts open and produces an effect. Effects may be pyrotechnic and/or non-pyrotechnic.		
	Attribute	Requirements
1	Composition weight in the finished device	60 grams
6	Lift charge permitted	Yes
7	Lift charge weight per device	20 grams
11	Propellant charge permitted	No
14	Burst charge permitted	Yes
15	Secondary burst charge permitted	Yes
16	Burst charge weight per device	15 grams
<b>20</b>	<b>Reports</b>	--
21	Reports permitted	Yes
22	Weight per report	6 grams
23	Multiple reports permitted	Yes
27	Multiple report weight (individual)	1 gram
<b>30</b>	<b>Tubes</b>	--
31	Tube required	Yes
32	Multiple tubes permitted	No
35	Driver required	No
36	Multiple drivers permitted	No
<b>40</b>	<b>Inserts and Shells</b>	--
41	Inserts permitted	Yes
42	Shell required	Yes
44	Inner shells permitted	Yes
<b>50</b>	<b>Base, Spike and Handle Requirements</b>	--
51	Attached base required	No
52	Spikes, handles, or sticks required	No
53	Spikes, handles, or sticks permitted	Yes
<b>60</b>	<b>Ignition Requirements</b>	--
62	Ignition fuse permitted	Yes
65	Electric igniter permitted	Yes
<b>70</b>	<b>Chemical Restrictions</b>	--
71	Chemical restrictions	Yes
72	Restrictions	See General Requirements for lift and burst charge restrictions.
<b>80</b>	<b>Multi-Shot and Series</b>	--
81	Device permitted in a multi-shot (Cake)	Yes
82	Device permitted in a multi-shot (Combination)	Yes
83	Series applications permitted	Yes
<b>90</b>	<b>Special Conditions</b>	--
91	Are there any special conditions	Yes
92	Special conditions	Shells can be <ul style="list-style-type: none"> <li>• cylindrical or spherical in shape,</li> <li>• with or without external attachments,</li> <li>• burst charge cannot exceed 25 percent of the composition.</li> </ul>
<b>100</b>	<b>Packaging</b>	--
101	Packaging limits	No



### 3.2.1 EI&T Pyrotechnic Devices

#### 3.2.1.23 – Smoke (Cartridge, Gerb, Flare)

Smoke Cartridge – a device that produces smoke as the primary effect.		
Attribute	Requirements	
1	Composition weight in the finished device	1000 grams
6	Lift charge permitted	No
11	Propellant charge permitted	No
14	Burst charge permitted	No
15	Secondary burst charge permitted	No
<b>20</b>	<b>Reports</b>	--
21	Reports permitted	No
23	Multiple reports permitted	No
<b>30</b>	<b>Tubes</b>	--
31	Tube required	No
32	Multiple tubes permitted	No
35	Driver required	No
36	Multiple drivers permitted	No
<b>40</b>	<b>Inserts and Shells</b>	--
41	Inserts permitted	No
42	Shell required	No
44	Inner shells permitted	No
<b>50</b>	<b>Base, Spike and Handle Requirements</b>	--
51	Attached base required	No
52	Spikes, handles, or sticks required	No
53	Spikes, handles, or sticks permitted	Yes
<b>60</b>	<b>Ignition Requirements</b>	--
62	Ignition fuse permitted	Yes
65	Electric igniter permitted	Yes
<b>70</b>	<b>Chemical Restrictions</b>	--
71	Chemical restrictions	Yes
72	Restrictions	Compositions that incorporate chlorates in their formulations must contain two (2) percent or greater of an acid neutralizer (bicarbonates or carbonates).
<b>80</b>	<b>Multi-Shot and Series</b>	--
81	Device permitted in a multi-shot (Cake)	Yes
82	Device permitted in a multi-shot (Combination)	Yes
83	Series applications permitted	Yes
<b>90</b>	<b>Special Conditions</b>	--
91	Are there any special conditions	No
<b>100</b>	<b>Packaging</b>	--
101	Packaging limits	No

### 3.2.1 EI&T Pyrotechnic Devices

#### 3.2.1.24 - Spark Effect Devices / Bullet Hits / Spark Producing Devices (SPD)

Spark Effect Devices – a ‘micro-mine’ device that projects a spray effects composition.		
	Attribute	Requirements
1	Composition weight in the finished device	6 grams
6	Lift charge permitted	No
11	Propellant charge permitted	No
14	Burst charge permitted	No
15	Secondary burst charge permitted	No
<b>20</b>	<b>Reports</b>	--
21	Reports permitted	Yes
22	Weight per report	1 gram
23	Multiple reports permitted	Yes
27	Multiple report weight (individual)	1 gram
<b>30</b>	<b>Tubes</b>	--
31	Tube required	No
32	Multiple tubes permitted	No
35	Driver required	No
36	Multiple drivers permitted	No
<b>40</b>	<b>Inserts and Shells</b>	--
41	Inserts permitted	No
42	Shell required	No
44	Inner shells permitted	No
<b>50</b>	<b>Base, Spike and Handle Requirements</b>	--
51	Attached base required	No
52	Spikes, handles, or sticks required	No
53	Spikes, handles, or sticks permitted	Yes
<b>60</b>	<b>Ignition Requirements</b>	--
62	Ignition fuse permitted	No
65	Electric igniter permitted	Yes
<b>70</b>	<b>Chemical Restrictions</b>	--
71	Chemical restrictions	No
<b>80</b>	<b>Multi-Shot and Series</b>	--
81	Device permitted in a multi-shot (Cake)	No
82	Device permitted in a multi-shot (Combination)	No
83	Series applications permitted	Yes
<b>90</b>	<b>Special Conditions</b>	--
91	Are there any special conditions	Yes
92	Special condition	When the device has an easily penetrable membrane, it must be protected during transportation with a removable cap or cover.
<b>100</b>	<b>Packaging</b>	--
101	Packaging limits	Yes
103	Composition weight per inner packaging	6 grams

### 3.2.1 EI&T Pyrotechnic Devices

#### 3.2.1.25 - Wheel

	Wheel – a multi-tube device intended to be attached to a support so it can rotate and produce a shower of sparks, whistle or other effects.	
	<b>Attribute</b>	<b>Requirements</b>
1	Composition weight in the finished device	1000 grams
6	Lift charge permitted	No
11	Propellant charge permitted	Yes
12	Propellant charge weight per tube	60 grams
14	Burst charge permitted	No
15	Secondary burst charge permitted	No
<b>20</b>	<b>Reports</b>	--
21	Reports permitted	No
23	Multiple reports permitted	No
<b>30</b>	<b>Tubes</b>	--
31	Tube required	Yes
32	Multiple tubes permitted	Yes
35	Driver required	No
36	Multiple drivers permitted	Yes
<b>40</b>	<b>Inserts and Shells</b>	--
41	Inserts permitted	No
42	Shell required	No
44	Inner shells permitted	No
<b>50</b>	<b>Base, Spike and Handle Requirements</b>	--
51	Attached base required	No
52	Spikes, handles, or sticks required	No
53	Spikes, handles, or sticks permitted	Yes
<b>60</b>	<b>Ignition Requirements</b>	--
62	Ignition fuse permitted	Yes
65	Electric igniter permitted	Yes
<b>70</b>	<b>Chemical Restrictions</b>	--
71	Chemical restrictions	Yes
72	Restrictions	See General Requirements for propellant charge restrictions.
<b>80</b>	<b>Multi-Shot and Series</b>	--
81	Device permitted in a multi-shot (Cake)	No
82	Device permitted in a multi-shot (Combination)	Yes
83	Series applications permitted	Yes
<b>90</b>	<b>Special Conditions</b>	--
91	Are there any special conditions	No
<b>100</b>	<b>Packaging</b>	--
101	Packaging limits	No

### 3.2.2 Miscellaneous

#### 3.2.2.1 - Blank Requirements Table

Device Definition		
	Attribute	Requirements
1	Composition weight in the finished device	[Number] (grams)
3	Composition weight per tube	[Number] (grams)
6	Lift charge permitted	Yes or No
7	Lift charge weight per device	[Number] (grams)
8	Lift charge weight per tube	[Number] (grams)
11	Propellant charge permitted	Yes or No
12	Propellant charge weight per tube	[Number] (grams)
14	Burst charge permitted	Yes or No
15	Secondary burst charge permitted	Yes or No
16	Burst charge weight per device	[Number] (grams)
<b>20</b>	<b>Reports</b>	--
21	Reports permitted	Yes or No
22	Weight per report	[Number] (grams)
23	Multiple reports permitted	[Number] (grams)
27	Multiple report weight (individual)	[Number] (grams)
<b>30</b>	<b>Tubes</b>	--
31	Tube required	Yes or No
32	Multiple tubes permitted	Yes or No
35	Driver required	Yes or No
36	Multiple drivers permitted	Yes or No
<b>40</b>	<b>Inserts and Shells</b>	--
41	Inserts permitted	Yes or No
42	Shell required	Yes or No
43	Shell diameter (O.D.)	[Number] (millimeters)
44	Inner shells permitted	Yes or No
<b>50</b>	<b>Base, Spike and Handle Requirements</b>	--
51	Attached base required	Yes or No
52	Spikes, handles, or sticks required	Yes or No
53	Spikes, handles, or sticks permitted	Yes or No
<b>60</b>	<b>Ignition Requirements</b>	--
62	Ignition fuse permitted	Yes or No
65	Electric igniter permitted	Yes or No
<b>70</b>	<b>Chemical Restrictions</b>	--
71	Chemical restrictions	Yes or No
72	Restrictions	[Text]
<b>80</b>	<b>Multi-Shot and Series</b>	--
81	Device permitted in a multi-shot (Cake)	Yes or No
82	Device permitted in a multi-shot (Combination)	Yes or No
83	Series applications permitted	Yes or No
<b>90</b>	<b>Special Conditions</b>	--
91	Are there any special conditions	Yes or No
92	Special conditions	[Text]
<b>100</b>	<b>Packaging</b>	--
101	Packaging limits	Yes or No
102	Number of devices per inner package	[Number] (count)
103	Composition weight per inner packaging	[Number] (grams)

## Part 4: Thermal Stability Test Requirements for EI&T Pyrotechnic Devices

### 4.1 Introduction

All devices offered for transportation must be thermally stable. Thermal stability is assessed by subjecting a finished device or the chemical compositions as they will appear in the finished devices to a constant temperature of 75 degree C (167 degree F) for 48 consecutive hours with no ignition or marked decomposition occurring.

#### Safety Notes-

- When testing quantities of pyrotechnic composition in excess of several grams, the thermal stability test must be conducted in an isolated facility. Personnel must not be working in the vicinity. Barricading of the ovens must be considered.
- It is strongly recommended that the thermal stability testing not be conducted on large, intact devices, which could produce devastating consequences. The components used in such large devices should be tested rather than a completed device.
- Samples should be placed in a pan or aluminum foil to prevent/minimize oven contamination.
- The oven should be wiped cleaned after each test and fully cleaned on a regular basis.

### 4.2 General Requirements for Thermal stability Testing

Testing Requirement	<ul style="list-style-type: none"><li>• Any device approved for transportation by DOT must be thermally stable. The explosive material must not ignite spontaneously or undergo marked decomposition when subjected to a temperature of 75 degree C (167 degree F) for 48 consecutive hours.</li><li>• When the thermal stability test is conducted on components rather than the finished device, the components that would be in contact with each other in the finished device must be placed in contact with each other for thermal stability testing.</li></ul>
Recommended Equipment	A commercial laboratory-type oven is best for conducting the thermal stability test with explosion-proof wiring. The oven must be capable of controlling temperature to $\pm 2$ degrees C.
Safety Factors	<ul style="list-style-type: none"><li>• Safety is critical in the performance of thermal stability tests.</li><li>• It must be assumed that there is distinct possibility that the sample will ignite/explode during the test, and precautions must be taken to minimize the consequences of ignition and the resultant fire or explosion.</li></ul>
Recording Requirements	<ul style="list-style-type: none"><li>• Test Date</li><li>• Test Location / Company</li><li>• Name of Person performing the test and job Title</li><li>• Test Results – did the device ignite, explode or undergo any significant decomposition.</li></ul>

## **Part 5: Special Provisions for Transportation**

### **5.1 Misfired Fireworks and Pyrotechnic Devices**

Misfired undamaged devices that are to be returned from the display site to the supplier shall be permitted to be transported under the EX approval of the original device and shall be packed separately from unused, unfired devices, and transported only by private motor carrier.

Shall not contain loose pyrotechnic composition. Electric Matches must be shunted if present.

### **5.2 Assembled Devices and Set Pieces**

Assembled devices and Set pieces made exclusively from devices with valid EX approval and/or FCA Certification shall not require a new approval provided:

- a. The device is transported by private motor carrier
- b. The device is transported using the EX numbers and/or FC Certification for the individual components. A minimum of five EX numbers and/or FC Numbers are required unless the device contains less.

Devices that are too large to be placed in non-bulk packaging, shall be permitted to be transported by private motor carrier without external packaging to a display site. The devices must be secured against movement inside the vehicle and all pyrotechnic material must be protected against unintentional/inadvertent ignition.

### **5.3 Transportation of Fireworks with Fusees (highway flares) and Electric Igniters**

Fusees (highway flares) and/or electric igniters for use in a firework display are permitted to be transported in a motor vehicle with fireworks, provided the flares and/or electric igniters are packaged in a separate specification package, in accordance with Title 49 CFR.

## **APPENDICES**

APPENDIX I	Permitted and Restricted Chemicals
APPENDIX II	Applying for an Approval
APPENDIX III	Designation of a U.S. Agent of Service
APPENDIX IV	Process to Amend the Standard

NOTE: While these appendices are included in this standard, they will not be incorporated by reference into Title 49 CFR. This material is for reference use only, current versions of Appendix I and II, and III can be found on the PHMSA website.

## APPENDIX I: Permitted and Restricted Chemical Table for EI&T Pyrotechnic Devices

1. Permitted and Restricted Chemical Table for EI&T Pyrotechnic is controlled by PHMSA (available on the PHMSA website). Any requests for modifications must be submitted to PHMSA for review at [fireworks@dot.gov](mailto:fireworks@dot.gov).
2. Under the provisions of this standard, only chemicals listed in the Permitted and Restricted Chemical Table for EI&T Pyrotechnic Devices may be used in the manufacturing of EI&T Pyrotechnic Devices.
3. Devices may not contain any chemical not listed in the Permitted and Restricted Chemical Table for EI&T Pyrotechnic Devices, except in amounts less than 0.25 percent by weight as impurities.
4. A manufacturing tolerance of up to one (1) percent is permitted for individual chemicals used in EI&T Pyrotechnic Device formulations.
5. Specific restrictions for individual chemicals are provided in the Permitted and Restricted Chemical Table for EI&T Pyrotechnic Devices.

### Permitted and Restricted Chemical Table for EI&T Pyrotechnic Devices

Only chemicals in the table below are permitted to be used in devices manufactured under this standard. Using any combination of these chemicals to produce an effect in a device must comply with the total chemical composition limits in columns 1, 3, 7, 8, 12,16, 22 and 23, 27 and 103 respectively of the requirement tables in PART 3.

<b>Permitted and Restricted Chemicals for EI&amp;T Pyrotechnics (APA 87-1C)</b>			
<b>Chemical</b>	<b>Formula</b>	<b>Typical Use</b>	<b>Restrictions</b>
Alloprene (Chlorinated Rubber)	Not Required	Color Intensifier	
Aluminum > 53 microns	Al	Fuel	Not to exceed 10 percent by weight in a lift and burst, or 30 percent in a propellant formulation (Excluding whistles)
Aluminum ≤ 53 microns	Al	Fuel	Permitted only in reports
Ammonium Perchlorate	NH <sub>4</sub> ClO <sub>4</sub>	Oxygen Donor	Prohibited if mixed with a chlorate
Antimony	Sb	Fuel	
Antimony Sulfide	Sb <sub>2</sub> S <sub>3</sub>	Fuel	
Antimony Trioxide	Sb <sub>2</sub> O <sub>3</sub>	Oxygen Donor	
Barium Carbonate	BaCO <sub>3</sub>	Color Agent	
Barium Chlorate	Ba(ClO <sub>3</sub> ) <sub>2</sub>	Oxygen Donor / Color Agent	Smoke formulations must contain a minimum of 2 percent of bicarbonates or carbonates
Barium Nitrate	Ba(NO <sub>3</sub> ) <sub>2</sub>	Oxygen Donor / Color Agent	



<b>Permitted and Restricted Chemicals for EI&amp;T Pyrotechnics (APA 87-1C)</b>			
Barium Oxalate	BaC <sub>2</sub> O <sub>4</sub>	Color Agent	
Barium Phthalate	Ba(C <sub>8</sub> H <sub>5</sub> O <sub>4</sub> ) <sub>2</sub>	Whistle / Color Agent	Not to exceed 10 percent by weight in a lift and burst, or 30 percent in a propellant formulation (Excluding whistles)
Barium Sulfate	BaSO <sub>4</sub>	Oxygen Donor / Color Agent	
Benzoic Acid	C <sub>6</sub> H <sub>5</sub> COOH	Whistle	Not to exceed 10 percent by weight in a lift and burst, or 30 percent in a propellant formulation (Excluding whistles)
Bismuth Trioxide (Bismuth Oxide)	Bi <sub>2</sub> O <sub>3</sub>	Oxygen Donor	
Boric Acid (Boracic Acid)	H <sub>3</sub> BO <sub>3</sub>	Neutralizer	
Calcium Carbonate	CaCO <sub>3</sub>	Neutralizer	
Calcium Sulfate	CaSO <sub>4</sub>	Oxygen Donor	
Calcium Sulfate (Gypsum)	CaSO <sub>4</sub> ×2H <sub>2</sub> O	Oxygen Donor	
Charcoal (Carbon)	C	Fuel	
Chlorinated Rubber	Not Required	Color Intensifier	
Chlorinated Wax (Chlorinated Paraffin)	Not Required	Color Intensifier	
Copper Benzoate	Cu(C <sub>6</sub> H <sub>5</sub> CO <sub>2</sub> ) <sub>2</sub>	Whistle / Color Agent	Not to exceed 10 percent by weight in a lift and burst, or 30 percent in a propellant formulation (Excluding whistles)
Copper (II) Salts (Cupric Salts) Acetates, Carbonates, Chlorides, Oxides, and Sulfates, etc		Color Agent	Prohibited if mixed with a chlorate
Copper Metal	Cu	Color Agent	Particle size is not required
Cryolite (Sodium Hexafluoroaluminate)	Na <sub>3</sub> AlF <sub>6</sub>	Color Agent	
Cuprous Chloride (Copper Chloride)	Cu <sub>2</sub> Cl <sub>2</sub>	Color Agent	
Cuprous Oxide (Copper Oxide)	Cu <sub>2</sub> O	Color Agent	
Dextrin or Dextrine	Not Required	Binder/Fuel	
Dicopper chloride trihydroxide	Cu <sub>2</sub> (OH) <sub>3</sub> Cl	Color Agent	Prohibited if mixed with a chlorate
Diphenylamine	(C <sub>6</sub> H <sub>5</sub> ) <sub>2</sub> NH	Stabilizer	
Epoxy (Thermosetting polymer)	Not Required	Binder	
Flour (Wheat, Corn or Rice)	Not Required	Binder	

<b>Permitted and Restricted Chemicals for EI&amp;T Pyrotechnics (APA 87-1C)</b>			
Glucose	$C_6H_{12}O_5$	Binder	
Hexachlorophene (Nabac)	$C_{13}H_6Cl_6O_2$	Fuel	
Hexamethylenetetramine (Hexamine)	$C_6H_{12}N_4$	Fuel	
Iron	Fe	Fuel / Sparks	Particle size is not required
Iron (II, III) Oxide (Black)	$Fe_3O_4$ or $FeO$ / $Fe_2O_3$	Oxygen Donor	
Iron (III) Oxide (Red)	$Fe_2O_3$	Oxygen Donor	
Iron/Titanium Alloy (Ferro/Titanium)	Fe/Ti	Fuel / Sparks	Particle size is not required
Isophthalic Acid (Meta-Phthalic Acid)	$C_6H_4(COOH)_2$	Whistle	Not to exceed 10 percent by weight in a lift and burst, or 30 percent in a propellant formulation (Excluding whistles)
Lactose	$C_{12}H_{22}O_{11}$	Binder/Fuel	
Lampblack	C	Fuel	
Linseed Oil	Not Required	Fuel	
Magnalium > 53 microns	Mg/Al	Fuel	Not to exceed 10 percent by weight in a lift and burst, or 30 percent in a propellant formulation (Excluding whistles)
Magnalium ≤ 53 microns	Mg/Al	Fuel	Permitted only in reports
Magnesium > 53 microns	Mg	Fuel	1) Not to exceed 10 percent by weight in a lift and/or burst charge, or 30 percent in a propellant formulation (Excluding whistles) 2) Magnesium is Prohibited in 3.2.1.21 (Shells)
Magnesium ≤ 53 microns	Mg	Fuel	1) Permitted only in reports 2) Magnesium is Prohibited in 3.2.1.21 (Shells)
Magnesium Carbonate	$MgCO_3$	Neutralizer	
Magnesium Stearate	Not Required	Binder	
Magnesium Sulfate	$MgSO_4$	Oxygen Donor	
Nitrocellulose ≤ 12.6 percent nitrogen by mass	Not Required	Fuel	1) Limited to 75 grams per tube; 2) Limited to 500 grams per device.
Nitrocellulose Lacquer ≤ 12.6 percent nitrogen by mass	Not Required	Binder	Limited to 5 percent of formulation
Par Oil (Chlorinated Wax)	Not Required	Color intensifier	
Parlon (Chlorinated rubber)	Not Required	Color intensifier	
Phthalic Acid (Ortho-Phthalic Acid)	$C_6H_4(COOH)_2$	Whistle	Not to exceed 10 percent by weight in a lift and burst, or 30 percent in a propellant formulation (Excluding whistles)
Polyvinyl Alcohol (PVA)	$[CH_2CH(OH)]_n$	Binder	

<b>Permitted and Restricted Chemicals for EI&amp;T Pyrotechnics (APA 87-1C)</b>			
Polyvinyl Butyral (PVB)	$(C_8H_{14}O_2)_n$	Binder	
Polyvinyl Chloride (PVC)	$(C_2H_3Cl)_n$	Color Intensifier	
Polyvinylidene chloride (Saran Resin)	$(C_2H_2Cl_2)_n$	Color Intensifier	
Potassium Benzoate	$KC_6H_5CO_4$	Whistle	Not to exceed 10 percent by weight in a lift and burst, or 30 percent in a propellant formulation (Excluding whistles)
Potassium Chlorate	$KClO_3$	Oxygen Donor	Smoke formulations must contain a minimum of 2 percent of bicarbonates or carbonates
Potassium Dichromate (Potassium Bichromate)	$K_2Cr_2O_7$	Oxygen Donor	Not to exceed 5 percent of the formulation
Potassium Fluorosilicate	$K_2SiF_6$	Color Intensifier	
Potassium hexafluoroaluminate (Cryolite)	$K_3AlF_6$	Color Agent	
Potassium Hydrogen Phthalate (KHP)	$KC_8H_5O_4$	Whistle	Not to exceed 10 percent by weight in a lift and burst, or 30 percent in a propellant formulation (Excluding whistles)
Potassium Nitrate	$KNO_3$	Oxygen Donor	
Potassium Oxalate	$K_2C_2O_4$	Color Agent	
Potassium Perchlorate	$KClO_4$	Oxygen Donor	
Potassium Silicofluoride	$K_2SiF_6$	Color Intensifier	
Potassium Sulfate	$K_2SO_4$	Oxygen Donor	
Red Gum (Accaroid Resin)	Not Required	Binder	
Resinox (Phenolic Resin)	Not Required	Binder	
Rice Flour (Rice Starch)	Not Required	Binder	
Rice Hull	Not Required	Density Control	
Rice Hull (Coated)	Not Required	Fuel	Specify chemical formulation of the coating
Salicylic Acid	$C_6H_4(OH)COOH$	Whistle	Not to exceed 10 percent by weight in a lift and burst, or 30 percent in a propellant formulation (Excluding whistles)
Shellac	Not Required	Binder	
Silica	$SiO_2 \cdot nH_2O$	Moisture Absorber	
Silicon	Si	Fuel	
Silver	Ag	Fuel	Particle size is not required
Smoke Dye (Blue) Lysine	$C_6H_{14}N_2O_2$	Smoke Dye	

<b>Permitted and Restricted Chemicals for EI&amp;T Pyrotechnics (APA 87-1C)</b>			
Smoke Dye (Blue) Methylene Blue	$C_{16}H_{18}ClN_3S$	Smoke Dye	
Smoke Dye (Blue) Phthalocyanine (Blue)	$C_{32}H_{16}CuN_8$	Smoke Dye	
Smoke Dye (Blue) Ultramarine	$Na_2S_2 \ddot{Y}$ $3NaAlSiO_4$	Smoke Dye	
Smoke Dye (Green) 1,4-di- p-toluidino-anthraquinone (Solvent Green 3)	$C_{26}H_{20}O_2(NH)_2$ $(CH_3)_2$	Smoke Dye	
Smoke Dye (Green) Lysine – 2, 6-diaminohexanoic acid	$C_6H_{14}N_2O_2$	Smoke Dye	
Smoke Dye (Orange) a-xylene-azo-b-naphthol (Orange 7)	$C_{16}H_{11}N_2NaO_4S$	Smoke Dye	
Smoke Dye (Orange) Oil Orange Pigment	$C_{26}H_{28}N_2O_2$	Smoke Dye	
Smoke Dye (Red) 1-methylamino- anthraquinone (Disperse Red 9)	$C_{15}H_{11}NO_2$	Smoke Dye	
Smoke Dye (Red) 1-Naphthalenol, 4-[(4- ethoxyphenyl)azo] (Solvent Red 3)	$C_{18}H_{16}N_2O_2$	Smoke Dye	
Smoke Dye (Red) Para Red (Pigment Red1 ) (p-nitroaniline red)	$C_{16}H_{11}N_3O_3$	Smoke Dye	
Smoke Dye (Violet) 1,4-diamino-2,3- dihydroanthraquinone	$C_{14}H_{12}N_2O_2$	Smoke Dye	
Smoke Dye (Violet) Rhodamine B (Basic Violet 10)	$C_{28}H_{31}ClN_2O_3$	Smoke Dye	
Smoke Dye (Yellow) 2-(2-quinolyl)-1, 3- indandione (Chinoline Yellow) (Solvent Yellow 33)	$C_{18}H_{11}O_2N$	Smoke Dye	
Smoke Dye (Yellow) Auramine (Basic Yellow 2)	$C_{17}H_{22}ClN_3$	Smoke Dye	

<b>Permitted and Restricted Chemicals for EI&amp;T Pyrotechnics (APA 87-1C)</b>			
Smoke Dye (Yellow) Dibenzo(a,h)pyrene-7,14- dione (Dibenzochrysenedione) (Dibenzpyrenequinone) (Golden Yellow GK) (Tyrian Yellow I-GOK) (Vat Yellow 4)	$C_{24}H_{12}O_2$	Smoke Dye	
Smoke Dye (Yellow) Methyl Yellow (Butter Yellow); Dimethyl Yellow; 4- Dimethylaminoazobenzene (N, N-Dimethyl-4- phenylazoaniline) (Solvent Yellow 2) (Oil Yellow)	$C_{14}H_{15}N_3$	Smoke Dye	
Smokeless Powder	Not Required	Expelling Agent	Must be UN0161 and have a valid US EX Approval
Sodium Benzoate	$NaC_6H_5CO_2$	Whistle	Not to exceed 10 percent by weight in a lift and burst, or 30 percent in a propellant formulation (Excluding whistles)
Sodium Bicarbonate (Sodium Hydrogen Carbonate)	$NaHCO_3$	Neutralizer	
Sodium Carbonate	$Na_2CO_3$	Neutralizer	
Sodium Chlorate	$NaClO_3$	Oxygen Donor	Smoke formulations must contain a minimum of 2 percent of bicarbonates or carbonates
Sodium Fluorosilicate	$Na_2SiF_6$	Color Intensifier	
Sodium hexafluoroaluminate (Cryolite)	$Na_3AlF_6$	Color Agent	
Sodium Nitrate	$NaNO_3$	Oxygen Donor	
Sodium Oxalate	$Na_2C_2O_4$	Color Agent	
Sodium Salicylate	$C_7H_5NaO_3$	Whistle	Not to exceed 10 percent by weight in a lift and burst, or 30 percent in a propellant formulation (Excluding whistles)
Sodium Silicofluoride	$Na_2SiF_6$	Color Intensifier	
Sodium Sulfate	$Na_2SO_4$	Oxygen Donor	
Starch (Amylum) (Wheat, Corn, Rice)	Not Required	Binder	
Stearic Acid (Octadecanoic Acid)	Not Required	Fuel	
Strontium Carbonate	$SrCO_3$	Color Agent	
Strontium Chloride	$SrCl_2$	Color Agent	

<b>Permitted and Restricted Chemicals            for EI&amp;T Pyrotechnics (APA 87-1C)</b>			
Strontium Nitrate	$\text{Sr}(\text{NO}_3)_2$	Oxygen Donor / Color Agent	
Strontium Oxalate	$\text{SrC}_2\text{O}_4$	Color Agent	
Strontium Phthalate	$\text{Sr}(\text{C}_8\text{H}_5\text{O}_4)_2$	Whistle / Color Agent	Not to exceed 10 percent by weight in a lift and burst, or 30 percent in a propellant formulation (Excluding whistles)
Strontium Sulfate	$\text{SrSO}_4$	Color Agent	
Sucrose	$\text{C}_{12}\text{H}_{22}\text{O}_{11}$	Fuel	
Sulfur	S	Fuel	
Terphthalic Acid ( <i>Para</i> -Phthalic Acid)	$\text{C}_6\text{H}_4(\text{COOH})_2$	Whistle	Not to exceed 10 percent by weight in a lift and burst, or 30 percent in a propellant formulation (Excluding whistles)
Titanium > 149 microns	Ti	Fuel	
Wood Powder (Cellulose)	Not Required	Fuel	
Zirconium $\geq$ 250 microns	Zr	Fuel	

## APPENDIX II Applying for an Approval

### 1. Introduction

There are two options a manufacturer may use to obtain authorization to transport an entertainment industry and technical pyrotechnics device, UN0431, Articles, pyrotechnics for technical purposes, 1.4G or UN0336, Fireworks [for professional use only] Division 1. 4G:

1. Submit an application to U.S. DOT/PHMSA Approvals for an EX Number for devices manufactured in accordance with the applicable requirements in 49 CFR § 173.64 [fireworks@dot.gov](mailto:fireworks@dot.gov) .
2. Submit an application to U.S. DOT/PHMSA Approvals for an explosive in accordance with 49 CFR § 173.56. Additional information can be found on the PHMSA website.

### 2. Procedures for obtaining an approval in accordance with 49 CFR § 173.64

Complete a EI&T Pyrotechnic devices approval application	See Sample Application in Part 5.
Applications must contain seven key elements	<ol style="list-style-type: none"> <li>a. Identification of the applicant;</li> <li>b. Selection of the device category;</li> <li>c. Description of the device, dimensions and composition limits;</li> <li>d. Chemical Formulation Sheet (list of all effects and chemicals used to produce the effects);</li> <li>e. Diagram of device (with labels identifying the major components of the device);</li> <li>f. Thermal Stability Test results (must be certified with test date); and</li> <li>g. Signed Certification with compliance with the APA Standard 87-1C.</li> </ol>
Application cover letter should contain the following elements	<ol style="list-style-type: none"> <li>a. Identification of the applicant; and</li> <li>b. Summary of request.</li> </ol>
U.S. Designated Agent Letter	All foreign applicants must have and submit a copy of their U.S. Designated Agent Letter with each application.
Submit an application package to DOT/PHMSA	<p>The package should include a cover letter, an application (includes description of the device, diagram(s) and chemical formulation sheet(s)) and U.S. Agent letter. The application package can be submitted three ways:</p> <ol style="list-style-type: none"> <li>1. <u>Mail</u>: U.S. Department of Transportation Office of Hazardous Materials Transportation Approvals and Permits PHH-32 1200 New Jersey Avenue, SE East Building, 2<sup>nd</sup> Floor, Washington, DC 20590-0001 Email: <a href="mailto:fireworks@dot.gov">fireworks@dot.gov</a></li> <li>3. <u>Online</u>: PHMSA online application PHMSA.DOT.GOV</li> </ol>
Contact	APA:

Information	Ms. Julie L. Heckman American Pyrotechnics Association 301-907-8181 or <a href="mailto:jheckman@americanpyro.com">jheckman@americanpyro.com</a>  PHMSA: Chief of Energetic Materials U.S. Department of Transportation 202-366-4512 or <a href="mailto:fireworks@dot.gov">fireworks@dot.gov</a>
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### 3. Example of EX Application Cover Letter

<p style="text-align: center;">Your Corporate Letterhead</p> <p>(Date of Letter)</p> <p>U.S. Department of Transportation Office of Hazardous Materials Transportation Approvals and Permits PHH-32 1200 New Jersey Avenue, SE East Building, 2nd Floor, Washington, DC 20590-0001</p> <p>Chief of Energetic Materials:</p> <p>We wish to request an approval for the device described in the enclosed firework application, submitted under the provisions of 49 CFR § 173.64.</p> <p>Classification is requested for this device as UN0431 Articles, pyrotechnic for technical purposes, 1.4G or UN0336, Fireworks [for professional use only], 1.4G.</p> <p>The approval letter, or any questions regarding this application, should be sent to the address listed on the enclosed application or you may send questions via email to: _____.</p> <p>Thank you for your attention to our request.</p> <p>Sincerely,</p> <p>Signature, Title</p>
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**4. Application Sheet Criteria** - the following table provides the criteria and information required to complete an EX application. The application must be in English.

Criteria	Description
Item Name	a. Item Name, item name of the series (if applicable) and/or an Item Number/Code should be provided to identify the product. b. The identifier (i.e.: Item Name or Item Code) must be constant throughout the application.
Name and Address of Manufacturer Applicant	a. Must be the manufacturer of the device. b. Name of a responsible person (and their job title) at the applicant company c. Provide telephone number, fax number and email address.
Designated US Agent	a. Include a designated U.S. Agent of Service in accordance with 49 CFR §105.40. b. Provide the name of designated agent, telephone number, fax number and email address.
Manufacturer's information	a. Provide company name b. Physical address of the facility c. Name and title of applicant d. Phone number e. Email address.
DOT Class	DOT classification on application clearly identified
Device Category	a. The Category of the device must be identified in the application. b. If not listed in APA 87-1C, the application can be submitted in accordance with 49 CFR 173.56.
Description of Device	A clear description of the device, explaining the effects produced must be included.
Packaging Requirements	Where specific packaging requirements are critical to the classification of the product, the applicant must comply with the packaging requirements.
Thermal Stability Test	a. Tester name and title b. Testing location c. Tested item: finished product or component chemical mixtures d. Test date and results.
Signed and Dated	Application must be signed and dated by the person identified in Section ii above.

## 5. Sample EX Application:

1. Item Name [Product Code]: 8 Shot 10 Second Red & White Comet [8S10RDWHTCOM]
2. This is a series application (Y/N): N
3. Manufacturer: (Manufacturer located outside the U.S must complete item # 4)

Name/Title: Joseph Smith, Manager  
Company Name: Smith Liling Fireworks Mfg. Co.  
Address: P.O. Box 5000, Liuyang City, Hunan, China 410317  
Phone: 86-707-234-XXXX  
Fax: 86-707-234-XXXX  
Email: smithfireworks@smithchina.com

Physical Manufacturing Location (if different from address above):

Company Name: Smith Liling Fireworks Mfg. Co.  
Address: Huanglai Town, Liuyang City, Hunan, China 410317  
Phone: 86-707-234-XXXX  
Fax: 86-707-234-XXXX  
Email: smithfireworks@smithchina.com

4. Designated U.S. Agent of Service (attached)

Name/Title: Margie Smith/Vice-President  
Company Name: Smith Fireworks, Inc.  
Address: 236 Fireworks Lane, Sunset, KS 63456  
Phone: (718) 555-XXXX  
Fax: (718) 555-XXXX  
Email: msmith@smithfireworks.com

5. DOT UN Number, Proper Shipping Name, Hazard Division:  
 UN0431, Articles, pyrotechnic for technical purposes, 1.4G  UN0336, Fireworks [for professional use only], 1.4G
6. Category of Device: (under APA 87-1C)

### **3.2.1 El&T Pyrotechnic Devices**

- |   |  |
|---|--|
| <input type="checkbox"/> 3.2.1.1 - Airburst Colored         | <input type="checkbox"/> 3.2.1.17 - Mortar Hit Mine              |
| <input type="checkbox"/> 3.2.1.2 - Airburst Inert Material  | <input checked="" type="checkbox"/> 3.2.1.18 - Multi-Shot (Cake) |
| <input type="checkbox"/> 3.2.1.3 - Airburst Report          | <input type="checkbox"/> 3.2.1.19 - Multi-Shot (Combination)     |
| <input type="checkbox"/> 3.2.1.4 - Binary Flash Powder      | <input type="checkbox"/> 3.2.1.20 - Saxon                        |
| <input type="checkbox"/> 3.2.1.5 - Binary Powder Kit        | <input type="checkbox"/> 3.2.1.21 - Shell                        |
| <input type="checkbox"/> 3.2.1.6 - Cannon Simulator         | <input type="checkbox"/> 3.2.1.22 - Shot Tube Preloaded          |
| <input type="checkbox"/> 3.2.1.7 - Comet Crossette          | <input type="checkbox"/> 3.2.1.23 - Smoke Cartridge              |
| <input type="checkbox"/> 3.2.1.8 - Flame Projector          | <input type="checkbox"/> 3.2.1.24 - Spark Effect Devices         |
| <input type="checkbox"/> 3.2.1.9 - Flare                    | <input type="checkbox"/> 3.2.1.25 - Wheel                        |
| <input type="checkbox"/> 3.2.1.10 - Flash Tray              |  |
| <input type="checkbox"/> 3.2.1.11 - Flash Tube              |  |
| <input type="checkbox"/> 3.2.1.12 - Fountain                |  |
| <input type="checkbox"/> 3.2.1.13 - Fountain Nitrocellulose |  |
| <input type="checkbox"/> 3.2.1.14 - Line Rocket             |  |
| <input type="checkbox"/> 3.2.1.15 - Mine                    |  |
| <input type="checkbox"/> 3.2.1.16 - Mine Inert Material     |  |



### Chemical Composition Sheet

**Item Name [Product Code]:** 8 Shot 10 Second Red & White Comet [8S10RDWHTCOM]

**Total composition in device (grams):** 272

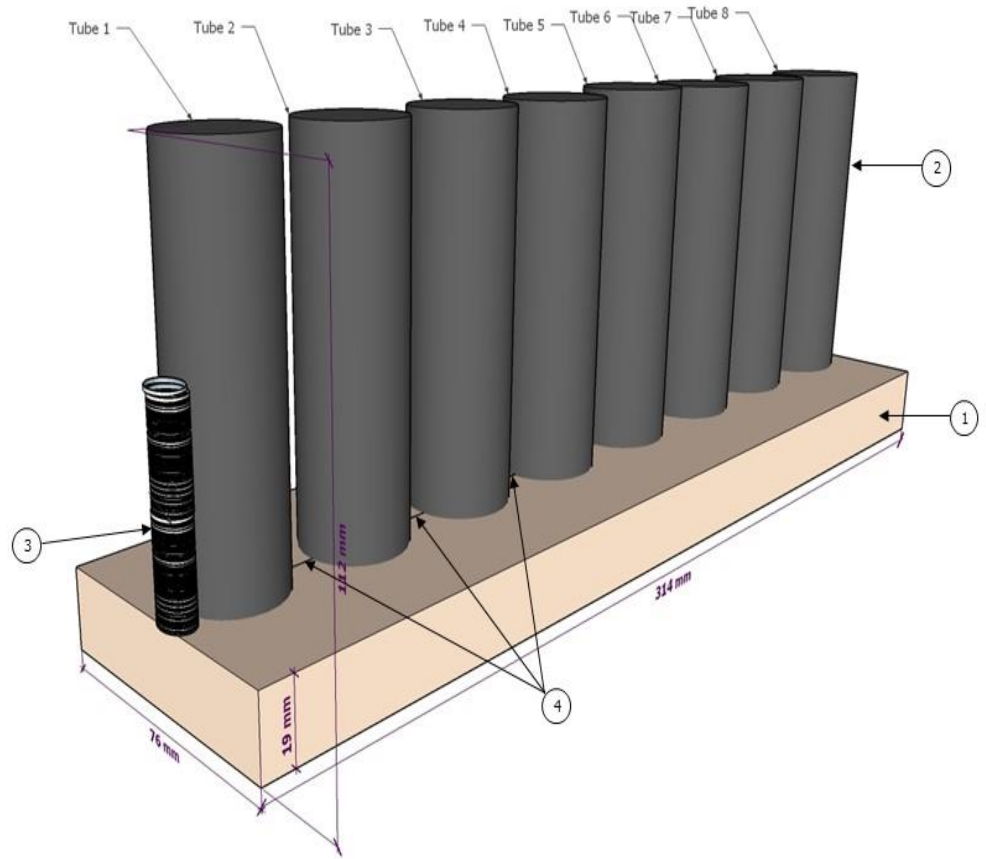
**Name and Weight for each composition in device (grams):**

1. Lift Charge 48    2. White Comet 112    3. Red Comet

<b>Chemicals</b>	<b>Formulas</b>	1	2	3	4	5	6
Potassium Nitrate	KNO <sub>3</sub>	75	5				
Potassium Perchlorate	KClO <sub>4</sub>			28			
Barium Nitrate	Ba(NO <sub>3</sub> ) <sub>2</sub>		47				
Strontium Nitrate	SrNO <sub>3</sub>		9	36			
Sulfur	S	10	8				
Charcoal	C	15	1	5			
Boric Acid	H <sub>3</sub> BO <sub>3</sub>		2				
Dextrin	C <sub>6</sub> H <sub>10</sub> O <sub>5</sub>		5	4			
Saran Resin	(CHClCHCl) <sub>n</sub>			15			
Red Gum				3			
<b>Restricted Chemicals</b>	<b>Formulas</b>						
Aluminum (140 microns)	Al		23				
Magnalium (180 microns)	Al-Mg			9			
<b>Total Weight Percent</b>		100	100	100			

### Diagram of Device

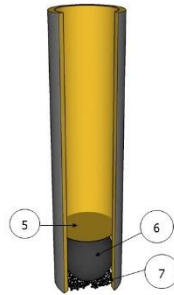
Item Name [Product Code]: 8 Shot 10 Second Red & White Comet [8S10RDWHTCOM]



## Diagram of Device

**Item Name [Product Code]:** 8 Shot 10 Second Red & White Comet [8S10RDWHTCOM]

### Tube Diagram



### Diagram Component Table

No.	Description	Dimension(s) (mm)	Inner Diameter (mm)	Outer Diameter (mm)	Total Composition Weight (g)
1	Wood Base	314 x 76 x 19			
2	Kraft Paper Tube	105	25	30	
3	Electric Igniter				
4	Delay Fuse (Between each tube)				
5	Paper Cap				
6	Effect Composition(s)				224
7	Lift Charge				48
8	Finished device	314x76x12			
	TOTAL COMPOSITION				272

For a blank application, see the PHMSA website.

## APPENDIX III Designation of a U.S. Agent of Service

Instructions for Designating a U.S. Agent of Service as required by 49 CFR § 105.40. If the manufacturer is a non-resident of the United States, the manufacturer is required to designate a permanent resident (individual, firm, or a domestic corporation) of the United States to act as their U.S. Designated Agent and receive documents on their behalf. The non-resident manufacturer may have more than one U.S. Designated Agent and a copy of the designation must be submitted with each application.

### 3.1 Designated Agent(s):

- May be an individual, firm, or a domestic corporation,
- May represent any number of principals,
- May not reassign responsibilities under a designation to another person.

### 3.2 A designation must:

- Be written, signed and dated,
- Identify the section in the Hazardous Materials Regulations that requires you to file a designation,
- Description of the activity the designation will provide,
- Certify that the designation is in the correct legal form required to make it legal and binding under the laws, corporate bylaws, and other requirements that apply to designations at the time and place you are making the designation,
- Provide the applicant's full legal name, the principal name of the business, and mailing address. Although not required the inclusion of electronic contact information (i.e., email, fax and phone number) allows for a more expedited processing of the approvals,
- Statement the designation will remain in effect until you withdraw or replace it,
- Provide the full legal name and mailing address of the U.S. Designated Agent. Although not required the inclusion of electronic contact information (i.e., email, fax and phone number) allows for a more expedited processing of the approvals.
- A declaration of acceptance signed by both the non-resident company and the designated agent, and
- Any additional information if required.

### 3.3 Additional Information;

- Refer to §§ 105.40 and 107.705 for any additional information or requirements.

### 3.4 Sample Letter:

Suggested Sample Letter – Designation of U.S. Agent of Service in accordance with 49 CFR § 105.40.

Submit on Company Letterhead

Note: The “Letter of Designation” needs to be signed and dated by both parties

(date of letter)

To:  
U.S. Department of Transportation  
Pipeline and Hazardous Materials Safety  
Administration, Approvals and Permits (PHH-30)  
1200 New Jersey Avenue, SE  
East Building, 2<sup>nd</sup> Floor  
Washington, DC 20590-0001

From:  
ABC China, Inc.  
2222 Beijing Road  
Beihai, Guangxi, China 536000  
E-mail address  
Phone number  
Fax number

Director, Approvals and Permits

ABC China, Inc. is filing this designation of agent for service, in accordance with 49 CFR §105.40. The US based agent of service listed below will represent us on matters concerning firework applications submitted to U.S. Department of Transportation.

Joe Round Manager  
Global Drive  
2000 N. Pacific Blvd., Suite 1  
Portland, OR 12345  
EMAIL: [xyz@globaldrive.com](mailto:xyz@globaldrive.com)  
TEL: (212) yyy-yyyy  
FAX: (212) xxx-xxxx

This designation is legal and binding in accordance with 49 CFR §105.40(b)(2) and will remain in effect until it is withdrawn or replaced by us. By the dated signatures below ABC China, Inc. accepts this designation of agent and Global Drive accepts the agent's responsibilities.

**PRINCIPAL**

Name/Title: John Smith / Manager  
Company: ABC China, Inc.

Signed: \_\_\_\_\_  
Date: \_\_\_\_\_

**AGENT**

Name/Title: Joe Round/ Manager  
Company: Global Drive

Signed: \_\_\_\_\_  
Date: \_\_\_\_\_



## APPENDIX IV: Process to Amend the APA Standard 87-1C

1.1 Scope - The purpose of this Appendix is to illustrate the procedures to be utilized in correcting any errors in the material presented in this standard, and to address any new regulation changes that may appear before the next scheduled review cycle.

1.2 Frequency of new editions of APA Standard 87-1C - The document shall be reviewed during the end of the third year following publication of a new edition of the standard. The APA Standards Committee shall be responsible for initiating each review of the document, with the goal of finalizing the next edition of the standard within five years from date of incorporation of the previous edition into Title 49 CFR.

### 1.3 Procedure for Revising the Standard

a. A notice shall appear in an APA Bulletin advising the Association membership that a review of the document is about to commence, and inviting comments and suggestions from interested parties.

b. Trade publications shall be notified that a review of APA 87-1C is underway, and that comments regarding possible changes to the standard should be sent by regular mail, express delivery, or by email to the APA office.

c. The APA office will formally notify Federal agencies that are involved in the regulation of EI&T pyrotechnic devices that revisions to the standard are underway, and that comments from the agencies will be considered by the APA Standards Committee for inclusion in the new edition. These agencies will include the U.S. Consumer Product Safety Commission; the U.S. Department of Justice's Bureau of Alcohol, Tobacco, Firearms & Explosives; U.S. Department of Transportation's Pipeline and Hazardous Materials Safety Administration; the U.S. Department of Labor's Occupational Safety & Health Administration; and the U.S. Environmental Protection Agency.

d. A minimum of a 30-day notice shall be provided to all interested parties that the revision is underway and comments on the new edition will be accepted until a specified date.

e. Following this comment period, the APA Standards Committee shall meet to review all comments that have been received. The timing of the meeting shall coincide with regularly scheduled meetings of the APA.

f. The Committee shall meet and discuss the comments that have been received regarding changes to the standard. The Committee shall decide by majority vote to accept, reject, or modify the recommended changes. If necessary, the Committee shall develop additional changes to the standard based on input from Committee members.

g. The approved changes shall be incorporated into a revised version of the standard, and a copy of the draft document shall be forwarded to the APA Board of Directors for their review and approval. Any changes requested by the Board shall become part of the final draft version.

h. The final draft version of the new edition of the standard shall then be formally submitted to the Pipeline and Hazardous Materials Safety Administration (PHMSA) of the U.S. Department of Transportation for their review and comments. Any comments from PHMSA shall then be circulated among the members of the APA Standards Committee, and the comments will either be accepted or held for further study and discussion with PHMSA.

- i. Once both parties (APA and PHMSA) are satisfied with the content of the document, the standard shall be returned to the APA Board of Directors for formal adoption, and then officially submitted to PHMSA for incorporation by reference into 49 CFR § 171.7(f)(1).
- j. The date of incorporation of the new edition of the standard into 49 CFR § 171.7 shall serve as the effective date for the new edition of the standard.