### **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: <a href="mailto:fireworks@dot.gov">fireworks@dot.gov</a> 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

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

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

General Requirements for EI&T Pyrotechnic Devices		
Aerial device	erial device Must be designed to produce its effect(s) in the air	
Aerial Shell Attachments	Aerial shells can be approved with or without attachments.  The attachments must:  1. remain attached to the aerial shell during transportation;  2. must not leak chemical composition during transportation; and  3. must be constructed of sturdy materials, such as (but not limited to) plastic, Kraft paper, or cardboard (excluding tails)	
Applicant	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)	
Assembled Device	Must comply with requirements in Part 5	
Base	Must remain attached during transportation and handling	
Binary Kits	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	
Black Match	Must be made with black powder	
Black Powder  Must consist of a mixture of charcoal or carbon and either potassium or sodion nitrate, potassium perchlorate, with or without sulfur and may contain a binder		
Break/Burst Charge	<ol> <li>Must not exceed 25 percent of the total chemical composition weight per tube including the lift charge (exclude airburst devices).</li> <li>Secondary burst charges are only permitted in inserts</li> </ol>	
Multi-shot Device (Cake)	<ol> <li>Must be a multiple tube device:         <ol> <li>Must contain items marked "yes" on line 81 of the requirement tables.</li> <li>Must comply with the individual device requirement tables for specific weight limits, chemical restrictions and special conditions, and</li> </ol> </li> <li>Must be fused and assembled together to form one device. (Sequential fusing not required)</li> </ol>	
Chemical Composition	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)	
Chemical Must be adhered to when using restricted chemicals in any chemical composition		
Restrictions Combination	<ul> <li>avaiblable on the PHMSA website).</li> <li>Must contain more than one device fused together to form a new device (other than just tube devices):</li> <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> </ul>	
Construction	Materials must be suitable for the intended purpose and the integrity of the device must be maintained during transportation and handling; and     Product must not leak pyrotechnic composition during transportation and handling	

General Requirements for EI&T Pyrotechnic Devices		
Dimensional Series	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.	
Driver	<ol> <li>Contains the propellant charge;</li> <li>Must be constructed of sturdy materials such as (but not limited to) plastic, Kraft paper, or cardboard; and</li> <li>Must be securely attached to the device so as not to separate or come loose during transportation</li> </ol>	
Effects	Must be formulated from the chemicals listed in the Permitted and Restricted Chemicals table. Lift charge, burst charge, and fuses are not considered effects	
Effect Series	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.	
Electric Igniter (E-Match)	<ol> <li>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>Can be used to initiate device incorporated under this standard that are marked "yes" on line 65 of the requirements table,</li> <li>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>	
Finished EI&T Pyrotechnic device:	An El&T pyrotechnic device that:  1. Meets the General Requirements for that specific device;	
Fuse	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	
Ground Device	Must be designed to produce its effect(s) at or near the ground level	
Handle	May be cardboard, paper tube, plastic, wire or wood	
Labeling	Device must be marked with the words 'For Professional Use Only'	
Lift or Lifting Charge	<ol> <li>Is not restricted to black powder; however, the use of report composition is prohibited as lift or lifting charge</li> <li>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>	
Manufacturer of EI&T Pyrotechnic devices	Must be the entity that produces the device	
Particle Size	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	
Propellant Charge	<ol> <li>Formulations are not limited to black powder; and</li> <li>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>	

General Requireme	General Requirements for EI&T Pyrotechnic Devices		
Reports	<ol> <li>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>Multiple reports are permitted when line 23 is marked yes and are limited to 1 gram each and 25 grams total</li> </ol>		
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.  Series approvals are limited to one category of device;  Dimensional series:  a. Must contain the same chemical composition; and b. Only vary in size, weight, and/or numbers of tubes in the devices.  3. Effect series:  a. Must be the same size, maximum weight and numbers of tubes b. Only vary in the effects produced (chemical formulations vary).  4. Dimensional and Effect Series:  a. Can combine dimensional and effect series in one application.			
Shells (aerial)	<ol> <li>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>EI&amp;T pyrotechnic shells may be shipped without a tube</li> </ol>		
Smoke Compositions	Formulations that incorporate chlorates must contain two (2) percent or greater of an acid neutralizer (bicarbonates or carbonates)		
Tails	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		
Thermal Stability test	Stability Must be conducted in accordance with the requirements outlined in Part 4 of this standard or 49 CFR § 173.64(a)(2)		
Tubes	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**

3.2.2

Miscellaneous 3.2.2.1 - Blank Requirements Table

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3.2.1
          EI&T Pyrotechnic Devices
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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)
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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
```

## **3.2.1 EI&T Pyrotechnic Devices** 3.2.1.1 - Airburst Colored

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 out	
	Attribute	Requirements
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
20	Reports	
21	Reports permitted	No
23	Multiple reports permitted	No
30	Tubes	
31	Tube required	No
32	Multiple tubes permitted	No
35	Driver required	No
36	Multiple drivers permitted	No
<b>40</b>	Inserts and Shells	L_
<del>40</del> 41	Inserts and offens Inserts permitted	No
42	Shell required	No No
	· · · · · · · · · · · · · · · · · · ·	No
44 <b>50</b>	Inner shells permitted	INO
	Base, Spike and Handle Requirements	 N.I
51	Attached base required	No
52	Spikes, handles, or sticks required	No
53	Spikes, handles, or sticks permitted	No
60	Ignition Requirements	
62	Ignition fuse permitted	No
65	Electric igniter permitted	Yes
70	Chemical Restrictions	
71	Chemical restrictions	Yes
72	Restrictions	See General Requirements for burst charge
		restrictions.
80	Multi-Shot and Series	
81	Device permitted in a multi-shot (Cake)	No
82	Device permitted in a multi-shot (Combination)	No
83	Series applications permitted	Yes
90	Special Conditions	
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.
100	Packaging	-
101	Packaging limits	Yes
103	Composition weight per inner packaging	32.5 grams
	1 1	i 9

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# **3.2.1 El&T Pyrotechnic Devices** 3.2.1.2 - Airburst Inert Material

J.Z. I	.T.Z - Airburst mert material		
	Airburst Inert Material – a device that bursts and propels inert material such as confetti or		
	streamers that is typically suspended from ove		
4		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	
20	Reports		
21	Reports permitted	No	
23	Multiple reports permitted	No	
30	Tubes	-	
31	Tube required	No	
32	Multiple tubes permitted	No	
35	Driver required	No	
36	Multiple drivers permitted	No	
40	Inserts and Shells	-	
41	Inserts permitted	No	
42	Shell required	No	
44	Inner shells permitted	No	
50	Base, Spike and Handle Requirements		
51	Attached base required	No	
52	Spikes, handles, or sticks required	No	
53	Spikes, handles, or sticks permitted	No	
60	Ignition Requirements		
62	Ignition fuse permitted	No	
65	Electric igniter permitted	Yes	
70	Chemical Restrictions	<b></b>	
71	Chemical restrictions	Yes	
72	Restrictions	See General Requirements for burst charge restrictions.	
80	Multi-Shot and Series		
81	Device permitted in a multi-shot (Cake)	No	
82	Device permitted in a multi-shot (Combination)	No	
83	Series applications permitted	Yes	
90	Special Conditions		
91	Are there any special conditions	No	
100	Packaging	-	
101	Packaging limits	No	
		1	

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## **3.2.1 EI&T Pyrotechnic Devices** 3.2.1.3 - Airburst Report

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.	
	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
20	Reports	
21	Reports permitted	Yes
22	Weight per report	6 grams
23	Multiple reports permitted	No
30	Tubes	
31	Tube required	No
32	Multiple tubes permitted	No
35	Driver required	No
36	Multiple drivers permitted	No
40	Inserts and Shells	
41	Inserts permitted	No
42	Shell required	No
44	Inner shells permitted	No
50	Base, Spike and Handle Requirements	
51	Attached base required	No
52	Spikes, handles, or sticks required	No
53	Spikes, handles, or sticks permitted	No
60	Ignition Requirements	
62	Ignition fuse permitted	No
65	Electric igniter permitted	Yes
70	Chemical Restrictions	
71	Chemical restrictions	No
80	Multi-Shot and Series	
81	Device permitted in a multi-shot (Cake)	No
82		No
83	Series applications permitted	Yes
90	Special Conditions	
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.
100	Packaging	
101	Packaging limits	Yes
103	Composition weight per inner packaging	6 grams

# 3.2.1 El&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.		
		Requirements	
1	Composition weight in the finished device	30 grams	
6		No	
11	Propellant charge permitted	No	
14	Burst charge permitted	No	
15	Secondary burst charge permitted	No	
20	Reports	-	
21	Reports permitted	No	
23	Multiple reports permitted	No	
30	Tubes	-	
31	Tube required	No	
32		No	
35		No	
36	Multiple drivers permitted	No	
40	Inserts and Shells	-	
41	Inserts permitted	No	
42	Shell required	No	
44	Inner shells permitted	No	
50	Base, Spike and Handle Requirements		
51	Attached base required	No	
52	Spikes, handles, or sticks required	No	
53	Spikes, handles, or sticks permitted	No	
60	Ignition Requirements		
62	Ignition fuse permitted	No	
65	Electric igniter permitted	No	
70	Chemical Restrictions		
71	Chemical restrictions	No	
80	Multi-Shot and Series		
81	Device permitted in a multi-shot (Cake)	No	
82	Device permitted in a multi-shot (Combination)	No	
83	Series applications permitted	Yes	
90	Special Conditions		
91		Yes	
92		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.	
100	Packaging	-	
101	Packaging limits	No	

# **3.2.1 EI&T Pyrotechnic Devices** 3.2.1.5 - Binary Powder Kit

	.5 - Billary Fowder Kit	1114 1 4 6 WANT (III 1 WANT (III	
	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).  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	
20		INO	
	Reports	N.o.	
21	Reports permitted	No No	
23	Multiple reports permitted	No	
30	Tubes		
31	Tube required	No	
32	Multiple tubes permitted	No	
35	Driver required	No	
36	Multiple drivers permitted	No	
40	Inserts and Shells		
41	Inserts permitted	No	
42	Shell required	No	
44	Inner shells permitted	No	
50	Base, Spike and Handle Requirements		
51	Attached base required	No	
52	Spikes, handles, or sticks required	No	
53	Spikes, handles, or sticks permitted	No	
60	Ignition Requirements		
62	Ignition fuse permitted	No	
65	Electric igniter permitted	No	
70	Chemical Restrictions		
71	Chemical restrictions	No	
80	Multi-Shot and Series		
81	Device permitted in a multi-shot (Cake)	No	
82	Device permitted in a multi-shot (Combination	on) No	
83	Series applications permitted	Yes	
90	Special Conditions		
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	
100	Packaging		
101	Packaging limits	No	

## **3.2.1 EI&T Pyrotechnic Devices** 3.2.1.6 - Cannon Simulator

Multiple reports permitted  Tubes  Tubes  Tube required  No  Multiple tubes permitted  No  Multiple drivers permitted  No  Multiple drivers permitted  No  Multiple drivers permitted  No  Multiple drivers permitted  No  Inserts and Shells   Shell required  No  Shell required  No  Mo  Base, Spike and Handle Requirements  Spikes, handles, or sticks required  No  Spikes, handles, or sticks permitted  No  Spikes, landles, or sticks permitted  No  Spikes, landles, or sticks permitted  No  Chemical Requirements   Chemical Restrictions  No  Multi-Shot and Series   Device permitted in a multi-shot (Cake)  No  Spices applications permitted  Yes  Device permitted in a multi-shot (Combination)  Series applications permitted  Yes  Special Conditions   Are there any special conditions  Yes  Special conditions  When the device has an easily penetrable membrane, it must be protected during transportation with a removable cap or cover.  Packaging imits  Yes	3.Z.T	1.6 - Cannon Simulator		
1 Composition weight in the finished device 6 grams 6 Lift charge permitted No 14 Propellant charge permitted No 15 Secondary burst charge permitted No 16 Secondary burst charge permitted No 17 Reports 20 Reports 21 Reports permitted Yes 22 Weight per report 6 grams 23 Multiple reports permitted No 30 Tubes 31 Tuber required No 32 Multiple tubes permitted No 35 Driver required No 36 Multiple drivers permitted No 37 Driver required No 38 Multiple drivers permitted No 39 Driver required No 30 No 30 Driver required No 31 Inserts and Shells 41 Inserts permitted No 42 Shell required No 44 Inserts and Shells 45 Attached base required No 46 Shell required No 47 Dispersion No 48 Dispersion No 49 Dispersion No 40 Dispersion No 40 Dispersion No 41 Inserts permitted No 42 Spikes, handles, or sticks required No 43 Dispersion No 44 Dispersion No 45 Dispersion No 46 Dispersion No 47 Dispersion No 48 Dispersion No 49 Dispersion No 40 Dispersion No 40 Dispersion No 40 Dispersion No 41 Dispersion No 42 Dispersion No 43 Dispersion No 44 Dispersion No 45 Dispersion No 46 Dispersion No 47 Dispersion No 48 Dispersion No 49 Dispersion No 40 Dispe				
6 Lift charge permitted No 11 Propellant charge permitted No 12 Burst charge permitted No 15 Secondary burst charge permitted No 16 Secondary burst charge permitted No 17 Reports 18 Reports 19 Reports 10 Reports 11 Reports permitted Yes 12 Weight per report 6 grams 13 Multiple reports permitted No 15 Tubes 16 Tubes 17 Tube required No 18 Multiple tubes permitted No 18 Multiple tubes permitted No 18 Multiple trivers permitted No 18 Multiple drivers permitted No 18 Multiple drivers permitted No 19 Inserts and Shells 10 Inserts and Shells 10 Inserts permitted No 10 Insert shells			•	
Propellant charge permitted   No				
Burst charge permitted No Secondary burst charge permitted No Reports Reports Reports permitted Yes Weight per report 6 grams Multiple reports permitted No Multiple reports permitted No Multiple tubes permitted No Multiple tubes permitted No Multiple drivers permitted No Multiple drivers permitted No Multiple drivers permitted No Multiple drivers permitted No Senier spermitted No Multiple drivers permitted No Multiple drivers permitted No Multiple drivers permitted No Shell required No Inner shells permitted No Shell required No Spikes, handles, or sticks required No Spikes, handles, or sticks permitted No Spikes, handles, or sticks pe			-	
Secondary burst charge permitted   No				
### Reports Permitted Perm				
Reports permitted			No	
Multiple reports permitted No Tubes  11 Tube required No Multiple trubes permitted No Driver required No Multiple drivers permitted No Multiple drivers permitted No Multiple drivers permitted No Multiple drivers permitted No Inserts and Shells Inserts permitted No Shell required No Inner shells permitted No Shell required No Shell required No Shell required No Spikes, handles, or sticks required No Spikes, handles, or sticks required No Spikes, handles, or sticks permitted No				
Multiple reports permitted  Tubes  Tubes  Tube required  No  Multiple tubes permitted  No  Multiple drivers permitted  No  Multiple drivers permitted  No  Multiple drivers permitted  No  Multiple drivers permitted  No  Inserts and Shells   Shell required  No  Shell required  No  Mo  Base, Spike and Handle Requirements  Spikes, handles, or sticks required  No  Spikes, handles, or sticks permitted  No  Spikes, landles, or sticks permitted  No  Spikes, landles, or sticks permitted  No  Chemical Requirements   Chemical Restrictions  No  Multi-Shot and Series   Device permitted in a multi-shot (Cake)  No  Spices applications permitted  Yes  Device permitted in a multi-shot (Combination)  Series applications permitted  Yes  Special Conditions   Are there any special conditions  Yes  Special conditions  When the device has an easily penetrable membrane, it must be protected during transportation with a removable cap or cover.  Packaging imits  Yes				
Tube required Tube required No Multiple tubes permitted No Multiple drivers permitted No Multipl	22			
Tube required No Multiple tubes permitted No Driver required No Multiple drivers permitted No Mo Shell required No Shell required No Mo Sase, Spike and Handle Requirements Multichard base required No Spikes, handles, or sticks required No Spikes, handles, or sticks permitted No Go Ignition Requirements Ignition fuse permitted Yes Chemical Restrictions No Multi-Shot and Series Device permitted in a multi-shot (Cake) No Series applications permitted Yes Device permitted in a multi-shot (Combination) No Series applications permitted Yes Special Conditions Are there any special conditions Yes Special conditions When the device has an easily penetrable membrane, it must be protected during transportation with a removable cap or cover.  100 Packaging Packaging limits Yes			No	
Multiple tubes permitted No Driver required No Multiple drivers permitted No Multiple drivers permitted No Inserts and Shells Inserts permitted No Shell required No Mo Multiple drivers permitted No Shell required No Mo Multiple drivers permitted No Mo Multiple drivers permitted No Mo Mase, Spike and Handle Requirements Attached base required No Mo Multiple drivers permitted No Mo Multiple drivers permitted No Mo Multiple drivers Mo Multiple drivers permitted No Mo Multiple drivers Mo Multiple drivers permitted No Mo Multiple drivers Mo Multiple drivers permitted No Multiple drivers Mo Multiple drive	30			
Driver required   No   No   No   No   No   No   No   N	31		No	
Multiple drivers permitted No Inserts and Shells Inserts permitted No Shell required No Inner shells permitted No Sase, Spike and Handle Requirements Spikes, handles, or sticks required No Spikes, handles, or sticks permitted No Spikes, handles, or sticks permitted No Ignition Requirements Spikes, handles, or sticks permitted No Combination Requirements Spikes, handles, or sticks permitted No Multi-Shot and Series Device permitted in a multi-shot (Cake) Spikes, handles, or sticks permitted No So So Spikes, handles, or sticks permitted No Spikes, handles, or st	32	Multiple tubes permitted	No	
Inserts and Shells	35		No	
Inserts permitted	36	Multiple drivers permitted	No	
Shell required   No	40	Inserts and Shells		
Inner shells permitted  Base, Spike and Handle Requirements  Attached base required  No  Spikes, handles, or sticks required  No  Spikes, handles, or sticks permitted  No  Ignition Requirements  Cleding permitted  No  Electric igniter permitted  Chemical Restrictions  No  Multi-Shot and Series  Device permitted in a multi-shot (Cake)  Device permitted in a multi-shot (Combination)  Series applications permitted  Series applications permitted  Yes  Special Conditions  Are there any special conditions  Packaging  Packaging limits  No  No  No  No  No  No  When the device has an easily penetrable membrane, it must be protected during transportation with a removable cap or cover.	41	Inserts permitted	No	
Base, Spike and Handle Requirements	42	Shell required	No	
Attached base required No Spikes, handles, or sticks required No Spikes, handles, or sticks permitted No Ignition Requirements Ignition fuse permitted No Electric igniter permitted Yes Chemical Restrictions Chemical restrictions No Multi-Shot and Series Device permitted in a multi-shot (Cake) No Escries applications permitted Yes Special Conditions Special Conditions Packaging The Actached base required No No No No No Spikes, handles, or sticks permitted No No No No No Selectric igniter permitted Yes No	44	Inner shells permitted	No	
Spikes, handles, or sticks required No Spikes, handles, or sticks permitted No Ignition Requirements Ignition fuse permitted No Electric igniter permitted Yes Chemical Restrictions Chemical restrictions No Multi-Shot and Series Device permitted in a multi-shot (Cake) No Series applications permitted Yes Special Conditions Special Conditions Are there any special conditions Special Condition	50	Base, Spike and Handle Requirements		
Spikes, handles, or sticks permitted  No  Ignition Requirements  Ignition fuse permitted  No  Electric igniter permitted  Yes  Chemical Restrictions  Chemical restrictions  No  Multi-Shot and Series  Device permitted in a multi-shot (Cake)  Series applications permitted  Yes  Special Conditions  Are there any special conditions  Special conditions  Packaging  Packaging  Yes  No  No  When the device has an easily penetrable membrane, it must be protected during transportation with a removable cap or cover.	51		No	
Ignition Requirements	52	Spikes, handles, or sticks required	No	
Ignition Requirements	53	Spikes, handles, or sticks permitted	No	
65 Electric igniter permitted Yes  70 Chemical Restrictions  71 Chemical restrictions No  80 Multi-Shot and Series  81 Device permitted in a multi-shot (Cake) No  82 Device permitted in a multi-shot (Combination) No  83 Series applications permitted Yes  90 Special Conditions  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.  100 Packaging  101 Packaging limits Yes	60			
70 Chemical Restrictions 71 Chemical restrictions No  80 Multi-Shot and Series 81 Device permitted in a multi-shot (Cake) No 82 Device permitted in a multi-shot (Combination) No 83 Series applications permitted Yes  90 Special Conditions 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.  100 Packaging 101 Packaging limits Yes	62	Ignition fuse permitted	No	
70 Chemical Restrictions 71 Chemical restrictions No  80 Multi-Shot and Series 81 Device permitted in a multi-shot (Cake) No 82 Device permitted in a multi-shot (Combination) No 83 Series applications permitted Yes  90 Special Conditions 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.  100 Packaging 101 Packaging limits Yes	65	Electric igniter permitted	Yes	
Multi-Shot and Series Device permitted in a multi-shot (Cake) Device permitted in a multi-shot (Combination) No Series applications permitted Yes Special Conditions Test there any special conditions Special conditions When the device has an easily penetrable membrane, it must be protected during transportation with a removable cap or cover.  Packaging Packaging Imits Yes	70			
Device permitted in a multi-shot (Cake)  Device permitted in a multi-shot (Combination)  Series applications permitted  Special Conditions  1	71	Chemical restrictions	No	
Device permitted in a multi-shot (Combination) No Series applications permitted Yes  90 Special Conditions 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.  100 Packaging 101 Packaging limits Yes	80	Multi-Shot and Series		
Device permitted in a multi-shot (Combination) No Series applications permitted Yes  90 Special Conditions 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.  100 Packaging 101 Packaging limits Yes	81	Device permitted in a multi-shot (Cake)	No	
Series applications permitted  90 Special Conditions 91 Are there any special conditions 92 Special conditions 93 When the device has an easily penetrable membrane, it must be protected during transportation with a removable cap or cover.  100 Packaging 101 Packaging limits  Yes	82		No	
90 Special Conditions 91 Are there any special conditions 92 Special conditions 93 When the device has an easily penetrable membrane, it must be protected during transportation with a removable cap or cover.  100 Packaging 101 Packaging limits 94 Yes	83			
Are there any special conditions  Special conditions  When the device has an easily penetrable membrane, it must be protected during transportation with a removable cap or cover.  Packaging  Packaging limits  Yes	90			
92 Special conditions  When the device has an easily penetrable membrane, it must be protected during transportation with a removable cap or cover.  100 Packaging  101 Packaging limits  Yes	91		Yes	
membrane, it must be protected during transportation with a removable cap or cover.  100 Packaging 101 Packaging limits Yes	92			
transportation with a removable cap or cover.  100 Packaging 101 Packaging limits Yes				
101 Packaging limits Yes				
101 Packaging limits Yes	100	Packaging	-	
	101		Yes	
	103	Composition weight per inner packaging	6 grams	

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# **3.2.1 EI&T Pyrotechnic Devices** 3.2.1.7 - Comet Crossette, (Split Comet)

J.Z. I.	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.	
	Attribute	Requirements
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
20	Reports	
21	Reports permitted	Yes
22	Weight per report	1 gram
23	Multiple reports permitted	Yes
27	Multiple report weight (individual)	1 gram
30	Tubes	
31	Tube required	Yes
32	Multiple tubes permitted	No
35	Driver required	No
36	Multiple drivers permitted	No
40	Inserts and Shells	
41	Inserts permitted	No
42	Shell required	No
44	Inner shells permitted	No
50	Base, Spike and Handle Requirements	
51	Attached base required	No
52	Spikes, handles, or sticks required	No
53	Spikes, handles, or sticks permitted	Yes
60	Ignition Requirements	
62	Ignition fuse permitted	Yes
65	Electric igniter permitted	Yes
70	Chemical Restrictions	
71	Chemical restrictions	Yes
72	Restrictions	See General Requirements for lift and burst charge restrictions.
80	Multi-Shot and Series	
81	Device permitted in a multi-shot (Cake)	Yes
82	Device permitted in a multi-shot (Combination)	Yes
83	Series applications permitted	Yes
90	Special Conditions	
91	Are there any special conditions	No
100	Packaging	
101	Packaging limits	No

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3.2.1 El&T Pyrotechnic Devices
3.2.1.8 - Flame Projector (Flame Mortar, Flame Column, Flame Ball)

	8 - Flame Projector (Flame Mortar, Flame Colul Flame Projector – a device that produces a col	
		Requirements
1		200 grams
6		No
11		No
14	· • • •	No
15	5 1	No
20	Reports	
21	•	No
23		No
30	Tubes	
31	Tube required	Yes
32		No
35		No
36		No
40	Inserts and Shells	-
41		No
42		No
44		No
50	Base, Spike and Handle Requirements	
51		No
52	· · · · · · · · · · · · · · · · · · ·	No
53	Spikes, handles, or sticks permitted	Yes
60	Ignition Requirements	_
62	Ignition fuse permitted	Yes
65	Electric igniter permitted	Yes
70	Chemical Restrictions	
71	Chemical restrictions	Yes
72	Restrictions	Device may contain up to 200 grams of smokeless
		powder.
80	Multi-Shot and Series	- <del>-</del>
81	Device permitted in a multi-shot (Cake)	Yes
82	Device permitted in a multi-shot (Combination)	Yes
83	Series applications permitted	Yes
90	Special Conditions	
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> 101	Packaging	Powder, smokeless, 1.4C may be used No

### 3.2.1 EI&T Pyrotechnic Devices

### 3.2.1.9 - Flare (Torch, Lance)

3.2.1	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.		
		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	
20	Reports	-	
21	Reports permitted	No	
23	Multiple reports permitted	No	
30	Tubes		
31	Tube required	Yes	
32	Multiple tubes permitted	No	
35	Driver required	No	
36	Multiple drivers permitted	No	
40	Inserts and Shells		
41	Inserts permitted	No	
42	Shell required	No	
44	Inner shells permitted	No	
50	Base, Spike and Handle Requirements		
51	Attached base required	No	
52	Spikes, handles, or sticks required	No	
53	Spikes, handles, or sticks permitted	Yes	
60	Ignition Requirements		
62	Ignition fuse permitted	Yes	
65	Electric igniter permitted	Yes	
70	Chemical Restrictions		
71	Chemical restrictions	No	
80	Multi-Shot and Series		
81	Device permitted in a multi-shot (Cake)	Yes	
82		Yes	
83	Series applications permitted	Yes	
90	Special Conditions		
91	Are there any special conditions	No	
100	Packaging		
101	Packaging limits	No	

**3.2.1 El&T Pyrotechnic Devices** 3.2.1.10 - Flash Tray (Flash Curtain, Split Mine)

	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.	
		Requirements
	Composition weight in the finished device	100 grams
	Lift charge permitted	No
	Propellant charge permitted	No
	Burst charge permitted	No
	Secondary burst charge permitted	No
	Reports	
		No
	Multiple reports permitted	No
	Tubes	
	Tube required	Yes
	Multiple tubes permitted	No
		No
	Multiple drivers permitted	No
	Inserts and Shells	-
41	Inserts permitted	No
		No
		No
	Base, Spike and Handle Requirements	
51	Attached base required	No
52	Spikes, handles, or sticks required	No
53	Spikes, handles, or sticks permitted	Yes
	Ignition Requirements	
62	Ignition fuse permitted	Yes
65	Electric igniter permitted	Yes
	Chemical Restrictions	
71	Chemical restrictions	No
80	Multi-Shot and Series	
81	Device permitted in a multi-shot (Cake)	No
	Device permitted in a multi-shot (Combination)	Yes
	Series applications permitted	Yes
	Special Conditions	
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.
100	Packaging	

## **3.2.1 EI&T Pyrotechnic Devices** 3.2.1.11 - Flash Tubes (Flash Pot)

3.2.1.	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.		
		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	
20	Reports		
21	Reports permitted	Yes	
22	Weight per report	6 grams	
23	Multiple reports permitted	No	
30	Tubes	<b></b>	
31	Tube required	Yes	
32	Multiple tubes permitted	No	
35	Driver required	No	
36	Multiple drivers permitted	No	
40	Inserts and Shells		
41	Inserts permitted	No	
42	Shell required	No	
44	Inner shells permitted	No	
50	Base, Spike and Handle Requirements		
51	Attached base required	No	
52	Spikes, handles, or sticks required	No	
53	Spikes, handles, or sticks permitted	Yes	
60	Ignition Requirements		
62	Ignition fuse permitted	Yes	
65	Electric igniter permitted	Yes	
70	Chemical Restrictions		
71	Chemical restrictions	No	
80	Multi-Shot and Series	<b></b>	
81	Device permitted in a multi-shot (Cake)	No	
82	Device permitted in a multi-shot (Combination)	Yes	
83	Series applications permitted	Yes	
90	Special Conditions	<b></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.	
100	Packaging		
101	Packaging limits	No	

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# **3.2.1 El&T Pyrotechnic Devices** 3.2.1.12 - Fountain (Casade, Falls, Gerb)

5.2.1.	12 - Fountain (Casade, Fails, Gerb)		
	Fountain – a device that produces a shower of any combination of colored sparks, color flame,		
	crackle, smoke, whistle and/or micro star effects.		
•		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	
20	Reports	-	
21	Reports permitted	No	
23	Multiple reports permitted	No	
30	Tubes		
31	Tube required	Yes	
32	Multiple tubes permitted	No	
35	Driver required	No	
36	Multiple drivers permitted	No	
40	Inserts and Shells		
41	Inserts permitted	No	
42	Shell required	No	
44	Inner shells permitted	No	
50	Base, Spike and Handle Requirements		
51	Attached base required	No	
52	Spikes, handles, or sticks required	No	
53	Spikes, handles, or sticks permitted	Yes	
60	Ignition Requirements		
62	Ignition fuse permitted	Yes	
65	Electric igniter permitted	Yes	
70	Chemical Restrictions		
71	Chemical restrictions	No	
80	Multi-Shot and Series		
81	Device permitted in a multi-shot (Cake)	Yes	
82	Device permitted in a multi-shot (Combination)	Yes	
83	Series applications permitted	Yes	
90	Special Conditions		
91	Are there any special conditions	No	
100	Packaging		
101	Packaging limits	No	
	r worksgring minio	r · ·	

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# **3.2.1 El&T Pyrotechnic Devices** 3.2.1.13 - Fountain Nitrocellulose

5.2.1	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.  Attribute  Requirements		
4		Requirements	
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	
20	Reports		
21	Reports permitted	No	
23	Multiple reports permitted	No	
30	Tubes	-	
31	Tube required	Yes	
32	Multiple tubes permitted	No	
35	Driver required	No	
36	Multiple drivers permitted	No	
40	Inserts and Shells		
41	Inserts permitted	No	
42	Shell required	No	
44	Inner shells permitted	No	
50	Base, Spike and Handle Requirements		
51	Attached base required	No	
52	Spikes, handles, or sticks required	No	
53	Spikes, handles, or sticks permitted	Yes	
60	Ignition Requirements		
62	Ignition fuse permitted	Yes	
65	Electric igniter permitted	Yes	
70	Chemical Restrictions		
71	Chemical restrictions	No	
80	Multi-Shot and Series		
81	Device permitted in a multi-shot (Cake)	Yes	
82	Device permitted in a multi-shot (Combination)		
83	Series applications permitted	Yes	
90	Special Conditions		
91	Are there any special conditions	No	
100	Packaging		
101	Packaging limits	No	
101	r ackaying illillis	Į VO	

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# **3.2.1 EI&T Pyrotechnic Devices** 3.2.1.14 - Line Rocket

0.2	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
20	Reports	
21	Reports permitted	No
23	Multiple reports permitted	No
30	Tubes	
31	Tube required	Yes
32	Multiple tubes permitted	No
35	Driver required	No
36	Multiple drivers permitted	No
40	Inserts and Shells	
41	Inserts permitted	No
42	Shell required	No
44	Inner shells permitted	No
50	Base, Spike and Handle Requirements	
51	Attached base required	No
52	Spikes, handles, or sticks required	No
53	Spikes, handles, or sticks permitted	Yes
60	Ignition Requirements	
62	Ignition fuse permitted	Yes
65	Electric igniter permitted	Yes
70	Chemical Restrictions	
71	Chemical restrictions	Yes
72	Restrictions	See General Requirements for propellant charge restrictions.
80	Multi-Shot and Series	
81	Device permitted in a multi-shot (Cake)	No
82	Device permitted in a multi-shot (Combination	
83	Series applications permitted	Yes
90	Special Conditions	
91	Are there any special conditions	No
100	Packaging	-
101	Packaging limits	No

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# **3.2.1 EI&T Pyrotechnic Devices** 3.2.1.15 - Mine

restrictions.  Multi-Shot and Series  Device permitted in a multi-shot (Cake)  Device permitted in a multi-shot (Combination) Yes  Series applications permitted  Special Conditions  1 Are there any special conditions  Special conditions  Pes  Burst charges are limited to Secondary effects (e.g., crossettes and inserts).	ა.∠. I	.15 - Mine	
Attribute 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 16 Reports			ect directly out of the launch tube. Effects may be
1 Composition weight in the finished device 15 Grams 1 Lift charge permitted 1 Propellant charge permitted 1 Propellant charge permitted 1 Propellant charge permitted 1 Propellant charge permitted 2 Secondary burst charge permitted 2 Reports 2 Reports 2 Reports 2 Reports 2 Reports 2 Reports permitted 2 Weight per report 3 Multiple reports permitted 4 Yes 2 Weight per report 3 Multiple report sepremitted 5 Yes 2 Multiple report weight (individual) 5 Libus 3 Tubes 7 Multiple report weight (individual) 8 Libus 8 Libu			Requirements
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 20 Reports	1		
7 Lift charge weight per device 25 grams 11 Propellant charge permitted No 12 Burst charge permitted Yes 15 Secondary burst charge permitted Yes 16 Reports	6		
11 Propellant charge permitted Yes 15 Secondary burst charge permitted Yes 20 Reports 21 Reports permitted Yes 22 Weight per report 1 gram 23 Multiple reports permitted Yes 26 Would be report Yes 27 Multiple report weight (individual) 1 gram 28 Unutiple report weight (individual) 1 gram 30 Tubes 31 Tube Yes 32 Multiple tubes permitted No 35 Driver required No 36 Multiple drivers permitted No 36 Multiple drivers permitted No 37 Unutiple drivers permitted No 38 Driver required No 39 No 30 Multiple drivers permitted No 30 Multiple drivers permitted No 31 Inserts and Shells 41 Inserts permitted Yes 42 Shell required No 44 Inserts handle permitted Yes 45 Shell required No 46 Inserts handle, or sticks required No 47 Spikes, handles, or sticks required No 48 Spikes, handles, or sticks required Yes 49 Ignition Requirements 40 Ignition Requirements 40 Ignition Requirements 41 Report No 42 Spikes, handles, or sticks required No 43 Spikes, handles, or sticks required Yes 44 Ignition fuse permitted Yes 45 Ignition Requirements 46 Ignition Requirements 47 Chemical restrictions Yes 48 Restrictions Yes 49 Device permitted in a multi-shot (Cake) Yes 49 Device permitted in a multi-shot (Cake) Yes 40 Spikes applications permitted Yes 41 Spikes Special Conditions Yes 42 Spicial conditions Hunti-shot (Combination) Yes 43 Spicial conditions Hunti-shot (Combination) Yes 44 Spicial conditions Hunti-shot (Combination) Yes 45 Special Conditions Hunti-shot (Combination) Yes 46 Spicial conditions Hunti-shot (Combination) Yes 47 Spicial conditions Hunti-shot (Combination) Yes 48 Special Conditions Hunti-shot (Combination) Yes 49 Special Conditions Hunti-shot (Combination) Yes 40 Spicial conditions Hunti-shot (Combination) Yes 41 Spicial conditions Hunti-shot (Combination) Yes 42 Spicial conditions Hunti-shot (Combination) Yes 43 Spicial conditions Hunti-shot (Combination) Yes	7	0 1	
14 Burst charge permitted Yes 20 Reports 21 Reports 22 Weight per report	11		
15 Secondary burst charge permitted Yes 20 Reports			
20 Reports Permitted Yes 21 Reports permitted Yes 22 Weight per report 1 gram 23 Multiple reports permitted Yes 26 Multiple report weight (individual) 1 gram 27 Multiple report weight (individual) 1 gram 38 Tubes 39 Multiple tubes permitted No 30 Driver required No 31 Driver required No 32 Multiple drivers permitted No 33 Multiple drivers permitted No 34 No 35 Driver required No 36 Multiple drivers permitted No 37 No 38 Multiple drivers permitted No 39 No 30 Multiple drivers permitted No 30 Multiple drivers permitted Yes 31 Tuber spermitted Yes 42 Shell required No 43 Shell required No 44 Inner shells permitted Yes 45 Spikes, handles, or sticks required No 46 Spikes, handles, or sticks required No 47 Spikes, handles, or sticks permitted Yes 48 Ignition fuse permitted Yes 49 Ignition fuse permitted Yes 40 Chemical Restrictions Yes 41 Restrictions Yes 42 See General Requirements For lift and burst che restrictions 45 Electric igniter permitted Yes 46 Electric igniter permitted Yes 47 Restrictions Yes 48 Device permitted in a multi-shot (Cake) Yes 48 Device permitted in a multi-shot (Combination) Yes 48 Series applications permitted Yes 49 Special Conditions 40 Spical Conditions Yes 40 Spical conditions Yes 41 Permitted Yes 42 Spical conditions Permitted Yes 43 Spical conditions Permitted Yes 44 Spical conditions Permitted Yes 45 Spical conditions Permitted Yes 46 Spical conditions Permitted Yes 47 Spical conditions Permitted Yes 48 Spical conditions Permitted Yes 49 Spical conditions Permitted Yes 49 Spical conditions Permitted Yes 40 Spical conditions Permitted Yes 41 Spical Conditions Permitted Yes 42 Spical conditions Permitted Yes 43 Spical conditions Permitted Yes 44 Spical Conditions Permitted Yes 45 Spical Conditions Permitted Yes 46 Spical Conditions Permitted Yes 47 Spical Conditions Permitted Yes 48 Spical Conditions Permitted Yes 49 Spical Conditions Permitted Yes 40 Spical Conditions Permitted Yes 40 Spical Conditions Permitted Yes 40 Spical Conditions Permitted Yes 41 Spical Conditions Permitted Y			
21 Reports permitted 22 Weight per report 23 Multiple reports permitted 24 Weight per report 25 Multiple reports permitted 26 Yes 27 Multiple report weight (individual) 28 1 gram 29 Tubes 30 Tubes 30 Tubes 31 Tube required 32 Multiple tubes permitted 33 Multiple tubes permitted 34 No 35 Driver required 36 Multiple drivers permitted 37 No 38 Multiple drivers permitted 39 No 30 Multiple tubes permitted 30 No 31 No 32 No 33 Spile required 34 No 35 No 36 No 37 No 38 No 39 No 39 No 30 N			-
Multiple reports permitted   1 gram		•	Yes
Multiple reports permitted  7 Multiple report weight (individual)  7 Tubes  7 Tubes  7 Tube required  8 Multiple tubes permitted  8 No  8 Multiple tubes permitted  8 No  9 Multiple drivers permitted  9 No  1 Inserts and Shells  1 Inserts and Shells  1 Inserts permitted  9 No  1 Inner shells permitted  9 No  1 Inner shells permitted  9 Shell required  9 No  1 Attached base required  1 Attached base required  1 Spikes, handles, or sticks required  1 Spikes, handles, or sticks permitted  2 Spikes, handles, or sticks permitted  3 Spikes, handles, or sticks permitted  4 Yes  6 Ignition Requirements  6 Ignition Requirements  7 Chemical Restrictions  7 Chemical Restrictions  7 Restrictions  8 Restrictions  9 Restrictions  1 Device permitted in a multi-shot (Cake)  8 Device permitted in a multi-shot (Cake)  8 Device permitted in a multi-shot (Combination)  9 Special Conditions  9 Special Conditions  9 Special conditions  8 Burst charges are limited to Secondary effects (e.g., crossettes and inserts).			1 gram
Tubes Tubes Tube required Multiple tubes permitted No Multiple tubes permitted No Multiple tubes permitted No Multiple drivers permitted No Multiple drivers permitted No Inserts and Shells Inserts permitted Yes Shell required No Multiple drivers permitted Yes Shell required No Multiple drivers permitted Yes Shell required No Multiple drivers permitted Yes Shell required No Spikes, handles, or sticks required No Spikes, handles, or sticks required Spikes, handles, or sticks permitted Yes Gold Ignition Requirements Gold Ignition fuse permitted Yes Chemical Restrictions Restrictions Restrictions Restrictions Pes Restrictions Restrictions Restrictions Device permitted in a multi-shot (Cake) Pes Special Conditions Pes Special Conditions Pes Special conditions Burst charges are limited to Secondary effects (e.g., crossettes and inserts).			
Tubes Tube required Yes Multiple tubes permitted No Multiple drivers permitted No Inserts and Shells Inserts permitted Yes Shell required No Inner shells permitted Yes Shell required No Multiple drivers permitted Yes Spikes, handles, or sticks required No Spikes, handles, or sticks required No Spikes, handles, or sticks permitted Yes Go Ignition Requirements Ugnition Requirements Spikes, handles, or sticks permitted Yes Chemical Restrictions Restrictions Fee Wulti-Shot and Series Restrictions See General Requirements for lift and burst chrestrictions.  Multi-Shot and Series Burst charges are limited to Secondary effects Special Conditions Yes Special conditions Burst charges are limited to Secondary effects (e.g., crossettes and inserts).			1 gram
Multiple tubes permitted No Driver required No Multiple drivers permitted No Inserts and Shells Inserts permitted Yes Shell required No Inner shells permitted Yes Shell required No Multiple drivers permitted Yes Shell required No Inner shells permitted Yes Spike and Handle Requirements Attached base required No Spikes, handles, or sticks required No Spikes, handles, or sticks permitted Yes Gount or spikes, part of the stick of the			<b></b>
Multiple tubes permitted No Driver required No Multiple drivers permitted No Inserts and Shells Inserts permitted Yes Shell required No Inner shells permitted Yes Shell required No Multiple drivers permitted Yes Shell required No Inner shells permitted Yes Spike and Handle Requirements Attached base required No Spikes, handles, or sticks required No Spikes, handles, or sticks permitted Yes Gount or spikes, part of the stick of the	31	Tube required	Yes
Driver required   No			
Multiple drivers permitted No Inserts and Shells Inserts permitted Yes Shell required No Inner shells permitted Yes Base, Spike and Handle Requirements Intercept and Spikes, handles, or sticks required Spikes, handles, or sticks permitted Yes Ignition Requirements Ignition fuse permitted Yes Electric igniter permitted Yes Chemical Restrictions Restrictions See General Requirements for lift and burst chrestrictions.  Multi-Shot and Series Device permitted in a multi-shot (Cake) Device permitted in a multi-shot (Combination) Special Conditions Are there any special conditions Puss Burst charges are limited to Secondary effects (e.g., crossettes and inserts).			No
40 Inserts and Shells 41 Inserts permitted 42 Shell required 44 Inner shells permitted 45 Spike and Handle Requirements 46 Attached base required 47 No 48 Spikes, handles, or sticks required 49 Spikes, handles, or sticks permitted 40 Ignition Requirements 41 Restrictions 42 Ignition Requirements 43 Spikes, handles, or sticks permitted 44 Inner shells permitted 45 Spikes, handles, or sticks permitted 46 Ignition Requirements 46 Ignition Requirements 47 Pes 48 Electric igniter permitted 49 Yes 40 Chemical Restrictions 40 Chemical Restrictions 41 Chemical restrictions 42 Restrictions 43 See General Requirements for lift and burst che restrictions. 45 Pes 46 Device permitted in a multi-shot (Cake) 47 Pes 48 Device permitted in a multi-shot (Combination) 48 Series applications permitted 49 Yes 40 Special Conditions 40 Special Conditions 41 Pes 42 Special conditions 42 Special conditions 43 Series are limited to Secondary effects 44 (e.g., crossettes and inserts).			No
Shell required   No	40		
Inner shells permitted  Base, Spike and Handle Requirements  Attached base required  No  Spikes, handles, or sticks required  No  Spikes, handles, or sticks permitted  Yes  Ignition Requirements  Ignition fuse permitted  Yes  Ignition fuse permitted  Yes  Ignition fuse permitted  Yes  Chemical Restrictions  Restrictions  Restrictions  See General Requirements for lift and burst chrestrictions.  Multi-Shot and Series  Device permitted in a multi-shot (Cake)  Device permitted in a multi-shot (Combination)  Series applications permitted  Yes  Special Conditions  Are there any special conditions  Burst charges are limited to Secondary effects (e.g., crossettes and inserts).	41	Inserts permitted	Yes
50       Base, Spike and Handle Requirements          51       Attached base required       No         52       Spikes, handles, or sticks required       No         53       Spikes, handles, or sticks permitted       Yes         60       Ignition Requirements          62       Ignition fuse permitted       Yes         65       Electric igniter permitted       Yes         70       Chemical Restrictions          71       Chemical restrictions       Yes         72       Restrictions       See General Requirements for lift and burst chrestrictions.         80       Multi-Shot and Series          81       Device permitted in a multi-shot (Cake)       Yes         82       Device permitted in a multi-shot (Combination)       Yes         83       Series applications permitted       Yes         90       Special Conditions          91       Are there any special conditions       Yes         92       Special conditions       Burst charges are limited to Secondary effects (e.g., crossettes and inserts).	42	Shell required	No
Attached base required  Spikes, handles, or sticks required  No  Spikes, handles, or sticks permitted  Yes  Ignition Requirements  Ignition fuse permitted  Yes  Electric igniter permitted  Yes  Chemical Restrictions  Chemical restrictions  Restrictions  See General Requirements for lift and burst chrestrictions.  Multi-Shot and Series  Device permitted in a multi-shot (Cake)  Device permitted in a multi-shot (Combination)  Series applications permitted  Yes  Pes  Special Conditions  Are there any special conditions  Burst charges are limited to Secondary effects (e.g., crossettes and inserts).	44	Inner shells permitted	Yes
Spikes, handles, or sticks required Spikes, handles, or sticks permitted Fes Gold Ignition Requirements Gold Ignition fuse permitted Fes Gold Ignition fuse permitted fuse fuse fuse fuse fuse fuse fuse fuse	50	Base, Spike and Handle Requirements	
Spikes, handles, or sticks permitted  Ignition Requirements  Ignition fuse permitted  Yes  Electric igniter permitted  Yes  Chemical Restrictions  Chemical restrictions  Restrictions  See General Requirements for lift and burst chrestrictions.  Multi-Shot and Series  Device permitted in a multi-shot (Cake)  Device permitted in a multi-shot (Combination)  Series applications permitted  Yes  Special Conditions  Are there any special conditions  Burst charges are limited to Secondary effects (e.g., crossettes and inserts).	51	Attached base required	No
Ignition Requirements	52	Spikes, handles, or sticks required	No
Ignition fuse permitted   Yes	53	Spikes, handles, or sticks permitted	Yes
65 Electric igniter permitted  70 Chemical Restrictions  71 Chemical restrictions  72 Restrictions  80 Multi-Shot and Series  81 Device permitted in a multi-shot (Cake)  82 Device permitted in a multi-shot (Combination)  83 Series applications permitted  90 Special Conditions  91 Are there any special conditions  92 Special conditions  93 Burst charges are limited to Secondary effects (e.g., crossettes and inserts).	60	Ignition Requirements	
70 Chemical Restrictions 71 Chemical restrictions 72 Restrictions  80 Multi-Shot and Series 81 Device permitted in a multi-shot (Cake) 82 Device permitted in a multi-shot (Combination) 83 Series applications permitted 84 Yes 85 Special Conditions 86 Yes 87 Special Conditions 88 Series applications permitted 89 Special Conditions 80 Multi-Shot and Series 81 Pevice permitted in a multi-shot (Combination) 82 Pevice permitted in a multi-shot (Combination) 83 Series applications permitted 84 Yes 85 Special Conditions 86 Yes 87 Special Conditions 86 Special Conditions 97 Are there any special conditions 98 Special conditions 99 Special conditions 90 Special conditions 90 Special conditions 91 Are there any special conditions 92 Special conditions 93 Burst charges are limited to Secondary effects (e.g., crossettes and inserts).	62	Ignition fuse permitted	Yes
71 Chemical restrictions  Restrictions  See General Requirements for lift and burst charges restrictions.  80 Multi-Shot and Series  B1 Device permitted in a multi-shot (Cake)  B2 Device permitted in a multi-shot (Combination)  B3 Series applications permitted  See General Requirements for lift and burst charges are limited burst charges are limited to Secondary effects (e.g., crossettes and inserts).		Electric igniter permitted	Yes
Restrictions  See General Requirements for lift and burst charges restrictions.  Multi-Shot and Series  Device permitted in a multi-shot (Cake)  Device permitted in a multi-shot (Combination) Yes  Series applications permitted  Special Conditions  Are there any special conditions  Special conditions  Burst charges are limited to Secondary effects (e.g., crossettes and inserts).	70	Chemical Restrictions	
restrictions.  Multi-Shot and Series  Device permitted in a multi-shot (Cake)  Device permitted in a multi-shot (Combination) Yes  Series applications permitted  Special Conditions  Are there any special conditions  Special conditions  Burst charges are limited to Secondary effects (e.g., crossettes and inserts).	71	Chemical restrictions	Yes
81 Device permitted in a multi-shot (Cake)  82 Device permitted in a multi-shot (Combination) Yes  83 Series applications permitted  90 Special Conditions  91 Are there any special conditions  92 Special conditions  93 Burst charges are limited to Secondary effects (e.g., crossettes and inserts).	72	Restrictions	See General Requirements for lift and burst charge restrictions.
81 Device permitted in a multi-shot (Cake)  82 Device permitted in a multi-shot (Combination) Yes  83 Series applications permitted  90 Special Conditions  91 Are there any special conditions  92 Special conditions  93 Burst charges are limited to Secondary effects (e.g., crossettes and inserts).	80	Multi-Shot and Series	
82 Device permitted in a multi-shot (Combination) Yes 83 Series applications permitted Yes 90 Special Conditions 91 Are there any special conditions Yes 92 Special conditions Burst charges are limited to Secondary effects (e.g., crossettes and inserts).		Device permitted in a multi-shot (Cake)	Yes
83 Series applications permitted  90 Special Conditions 91 Are there any special conditions 92 Special conditions 93 Burst charges are limited to Secondary effects (e.g., crossettes and inserts).			Yes
91 Are there any special conditions  92 Special conditions  Burst charges are limited to Secondary effects (e.g., crossettes and inserts).	83		
91 Are there any special conditions  92 Special conditions  Burst charges are limited to Secondary effects (e.g., crossettes and inserts).			
92 Special conditions Burst charges are limited to Secondary effects (e.g., crossettes and inserts).			Yes
100 Packaging	92	Special conditions	Burst charges are limited to Secondary effects only
	100	Packaging	-
101 Packaging limits No	101	Packaging limits	No

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3.2.1 El&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.	, , , ,
	Attribute	Requirements
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
20	Reports	
21	Reports permitted	No
23	Multiple reports permitted	No
30	Tubes	-
31	Tube required	Yes
32	Multiple tubes permitted	No
35	Driver required	No
36	Multiple drivers permitted	No
40	Inserts and Shells	-
41	Inserts permitted	No
42	Shell required	No
44	Inner shells permitted	No
50	Base, Spike and Handle Requirements	
51	Attached base required	No
52	Spikes, handles, or sticks required	No
53	Spikes, handles, or sticks permitted	Yes
60	Ignition Requirements	
62	Ignition fuse permitted	Yes
65	Electric igniter permitted	Yes
70	Chemical Restrictions	
71	Chemical restrictions	Yes
72	Restrictions	See General Requirements for lift charge restrictions.
80	Multi-Shot and Series	
81	Device permitted in a multi-shot (Cake)	Yes
82	Device permitted in a multi-shot (Combination)	Yes
83	Series applications permitted	Yes
90	Special Conditions	<b></b>
91	Are there any special conditions	No
100	Packaging	
101	Packaging limits	No

## **3.2.1 El&T Pyrotechnic Devices** 3.2.1.17 - Mortar Hit Mine (Fireball Effect)

3.2.1.	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.		
	Attribute	Requirements	
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	
20	Reports		
21	Reports permitted	No	
23	Multiple reports permitted	No	
30	Tubes		
31	Tube required	Yes	
32	Multiple tubes permitted	No	
35	Driver required	No	
36	Multiple drivers permitted	No	
40	Inserts and Shells	-	
41	Inserts permitted	No	
42	Shell required	No	
44	Inner shells permitted	No	
50	Base, Spike and Handle Requirements		
51	Attached base required	No	
52	Spikes, handles, or sticks required	No	
53	Spikes, handles, or sticks permitted	Yes	
60	Ignition Requirements		
62	Ignition fuse permitted	Yes	
65	Electric igniter permitted	Yes	
70	Chemical Restrictions		
71	Chemical restrictions	Yes	
72	Restrictions	See General Requirements for lift charge restrictions.	
80	Multi-Shot and Series		
81	Device permitted in a multi-shot (Cake)	No	
82	. ,	Yes	
83	Series applications permitted	Yes	
90	Special Conditions	-	
91	Are there any special conditions	Yes	
92		M/han tha dayina haa a nanatrahla manahrana it	
<i>52</i>	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.	
100	Special conditions  Packaging	must be protected during transportation with a cap	

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# 3.2.1 EI&T Pyrotechnic Devices 3.2.1.18 - Multi-Shot Device (Cake)

5.2.1	Note: One Design (Color)		
	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	D	
4		Requirements	
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	
/	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	
20	Reports		
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	
30	Tubes	-	
31	Tube required	Yes	
32	Multiple tubes permitted	Yes	
35	Driver required	No	
36	Multiple drivers permitted	No	
40	Inserts and Shells	-	
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	
50	Base, Spike and Handle Requirements		
51	Attached base required	No	
52	Spikes, handles, or sticks required	No	
53	Spikes, handles, or sticks permitted	Yes	
60	Ignition Requirements		
62	Ignition fuse permitted	Yes	
65	Electric igniter permitted	Yes	
70	Chemical Restrictions	-	
71	Chemical restrictions	See individual device requirements	
72	Restrictions	See individual device requirements	
80	Multi-Shot and Series	-	
81	Device permitted in a multi-shot (Cake)	No	
82	Device permitted in a multi-shot (Combination)	Yes	
83	Series applications permitted	Yes	
90	Special Conditions	-	
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.	
100	Packaging	-	
101	Packaging limits	No	

# 3.2.1 EI&T Pyrotechnic Devices 3.2.1.19 - Multi-Shot Device (Combination)

0.2.1	19 - Walti-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.	
	Attribute	Requirements
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
20	Reports	
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
30	Tubes	
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
40	Inserts and Shells	
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
50	Base, Spike and Handle Requirements	
51	Attached base required	No
52	Spikes, handles, or sticks required	No
53	Spikes, handles, or sticks permitted	Yes
60	Ignition Requirements	
62	Ignition fuse permitted	Yes
65	Electric igniter permitted	Yes
70	Chemical Restrictions	
71	Chemical restrictions	See individual device requirements
72	Restrictions	See individual device requirements
80	Multi-Shot and Series	
81	Device permitted in a multi-shot (Cake)	No
82	Device permitted in a multi-shot (Combination)	No
83	Series applications permitted	Yes
90	Special Conditions	
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.
100	Packaging	-
101	Packaging limits	No
	·	

# 3.2.1 El&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		1000 grams	
	·	No	
	Propellant charge permitted	Yes	
	Propellant charge weight per tube	1000 grams	
14	Burst charge permitted	No	
15	Secondary burst charge permitted	No	
20	Reports		
21	Reports permitted	No	
		No	
30	Tubes		
31	Tube required	Yes	
32	Multiple tubes permitted	No	
35	Driver required	No	
36	Multiple drivers permitted	Yes	
40	Inserts and Shells	-	
41	Inserts permitted	No	
42	Shell required	No	
44	Inner shells permitted	No	
50	Base, Spike and Handle Requirements		
51	Attached base required	No	
52	Spikes, handles, or sticks required	No	
	Spikes, handles, or sticks permitted	Yes	
	Ignition Requirements		
	Ignition fuse permitted	Yes	
65	Electric igniter permitted	Yes	
70	Chemical Restrictions		
71	Chemical restrictions	Yes	
72	Restrictions	See General Requirements for propellant charge restrictions.	
80	Multi-Shot and Series		
81	Device permitted in a multi-shot (Cake)	No	
	Device permitted in a multi-shot (Combination)	Yes	
83	Series applications permitted	Yes	
	Special Conditions		
91	Are there any special conditions	No	
100	Packaging		
101	Packaging limits	No	

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## **3.2.1 EI&T Pyrotechnic Devices** 3.2.1.21 - Shell

3.2.1	.21 - Shell		
	Shell – a device designed to be launched from a tube (mortar) and containing pyrotechnic and/or non-pyrotechnic components.		
	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	
20	Reports	<b></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	
30	Tubes	<b> -</b> -	
31	Tube required	No	
32	Multiple tubes permitted	No	
35	Driver required	No	
36	Multiple drivers permitted	No	
40	Inserts and Shells	-	
41	Inserts permitted	Yes	
42	Shell required	Yes	
43	Shell diameter (O.D.)	44.75millimeters	
44	Inner shells permitted	Yes	
50	Base, Spike and Handle Requirements		
51	Attached base required	No	
52	Spikes, handles, or sticks required	No	
53	Spikes, handles, or sticks permitted	No	
60	Ignition Requirements		
62	Ignition fuse permitted	Yes	
65	Electric igniter permitted	No	
70	Chemical Restrictions		
71	Chemical restrictions	No	
72	Restrictions	See General Requirements for lift and burst charge restrictions.	
80	Multi-Shot and Series		
81	Device permitted in a multi-shot (Cake)	No	
82	Device permitted in a multi-shot (Combination	)No	
83	Series applications permitted	Yes	
90	Special Conditions		
91	Are there any special conditions	Yes	
92	Special conditions	<ul> <li>Shells can be</li> <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>	
100	Packaging		
101	Packaging limits	Yes	
103	Composition weight per inner packaging	400 grams	
, 00	pointpoint worght per linter packaging	Tioo graino	

# **3.2.1 El&T Pyrotechnic Devices** 3.2.1.22 - Shot Tube Preloaded

0.2.1	Chat Tube Preloaded and device that levelses	and invites a prolocal all all into the air that house
	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.	
4	<del>-</del>	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
20	Reports	
21	Reports permitted	Yes
22	Weight per report	6 grams
23	Multiple reports permitted	Yes
27	Multiple report weight (individual)	1 gram
30	Tubes	
31	Tube required	Yes
32	Multiple tubes permitted	No
35	Driver required	No
36	Multiple drivers permitted	No
40	Inserts and Shells	
41	Inserts permitted	Yes
42	Shell required	Yes
44	Inner shells permitted	Yes
50	Base, Spike and Handle Requirements	
51	Attached base required	No
52	Spikes, handles, or sticks required	No
53	Spikes, handles, or sticks permitted	Yes
60	Ignition Requirements	
62	Ignition fuse permitted	Yes
65	Electric igniter permitted	Yes
70	Chemical Restrictions	
71	Chemical restrictions	Yes
72	Restrictions	See General Requirements for lift and burst charge
-		restrictions.
80	Multi-Shot and Series	
81	Device permitted in a multi-shot (Cake)	Yes
82	Device permitted in a multi-shot (Combination)	
83	Series applications permitted	Yes
90	Special Conditions	
91	Are there any special conditions	Yes
92	Special conditions	Shells can be
100	Backaging	composition.
100	Packaging Packaging limits	r- No
101	rackaying iiiniis	INO

# **3.2.1 El&T Pyrotechnic Devices** 3.2.1.23 – Smoke (Cartridge,Gerb,Flare)

	Smoke Cartridge,Gerb,Flare) Smoke Cartridge – a device that produces smoke as the primary effect.		
		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	
20	Reports		
21	Reports permitted	No	
23	Multiple reports permitted	No	
30	Tubes		
31	Tube required	No	
32	Multiple tubes permitted	No	
35	Driver required	No	
36	Multiple drivers permitted	No	
40	Inserts and Shells		
41	Inserts permitted	No	
42	Shell required	No	
44	Inner shells permitted	No	
50	Base, Spike and Handle Requirements		
51	Attached base required	No	
52	Spikes, handles, or sticks required	No	
53	Spikes, handles, or sticks permitted	Yes	
60	Ignition Requirements		
62	Ignition fuse permitted	Yes	
65	Electric igniter permitted	Yes	
70	Chemical Restrictions		
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).	
80	Multi-Shot and Series		
81	Device permitted in a multi-shot (Cake)	Yes	
82		Yes	
83	Series applications permitted	Yes	
90	Special Conditions		
91	7 1	No	
100	Packaging	-	
101	Packaging limits	No	

3.2.1 El&T Pyrotechnic Devices3.2.1.24 - Spark Effect Devices / Bullet Hits / Spark Producing Devices (SPD)

	24 - Spark Effect Devices / Bullet Hits / Spark Producing Devices (SPD) Spark Effect Devices – a 'micro-mine' device that projects a spray effects composition.	
		Requirements
1	Composition weight in the finished device	6 grams
6	Lift charge permitted	No
11		No
14		No
15	Secondary burst charge permitted	No
20	Reports	
21	Reports permitted	Yes
22	Weight per report	1 gram
23	Multiple reports permitted	Yes
27	Multiple report weight (individual)	1 gram
30	Tubes	-
31		No
32	Multiple tubes permitted	No
	Driver required	No
36	Multiple drivers permitted	No
40	Inserts and Shells	
41	Inserts permitted	No
42	Shell required	No
44	Inner shells permitted	No
50	Base, Spike and Handle Requirements	
51	Attached base required	No
52	Spikes, handles, or sticks required	No
53	Spikes, handles, or sticks permitted	Yes
60	Ignition Requirements	
62	Ignition fuse permitted	No
65	Electric igniter permitted	Yes
	Chemical Restrictions	
71		No
	Multi-Shot and Series	
81		No
82	Device permitted in a multi-shot (Combination)	No
83	Series applications permitted	Yes
90	Special Conditions	
91	Are there any special conditions	Yes
92		When the device has an easily penetrable
		membrane, it must be protected during
		transportation with a removable cap or cover.
	Packaging	-
101	Packaging limits	Yes
	0 0	6 grams

## **3.2.1 EI&T Pyrotechnic Devices** 3.2.1.25 - Wheel

3.2.1	.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.			
	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	60 grams		
14	Burst charge permitted	No		
15	Secondary burst charge permitted	No		
20	Reports			
21	Reports permitted	No		
23	Multiple reports permitted	No		
30	Tubes			
31	Tube required	Yes		
32	Multiple tubes permitted	Yes		
35	Driver required	No		
36	Multiple drivers permitted	Yes		
40	Inserts and Shells			
41	Inserts permitted	No		
42	Shell required	No		
44	Inner shells permitted	No		
50	Base, Spike and Handle Requirements			
51	Attached base required	No		
52	Spikes, handles, or sticks required	No		
53	Spikes, handles, or sticks permitted	Yes		
60	Ignition Requirements			
62	Ignition fuse permitted	Yes		
65	Electric igniter permitted	Yes		
70	Chemical Restrictions			
71	Chemical restrictions	Yes		
72	Restrictions	See General Requirements for propellant charge restrictions.		
80	Multi-Shot and Series			
81	Device permitted in a multi-shot (Cake)	No		
82	Device permitted in a multi-shot (Combination)	Yes		
83	Series applications permitted	Yes		
90	Special Conditions			
91	Are there any special conditions	No		
100	Packaging			
101	Packaging limits	No		

### 3.2.2 Miscellaneous

### 3.2.2.1 - Blank Requirements Table

Attribute	5.2.2.	.1 - Blank Requirements Table		
Composition weight in the finished device  Number] (grams)  Lift charge permitted  Yes or No  Lift charge weight per device  Number] (grams)  Propellant charge permitted  Yes or No  Propellant charge permitted  Yes or No  Secondary burst charge permitted  Yes or No  Secondary burst charge permitted  Yes or No  Secondary burst charge permitted  Yes or No  Number] (grams)  Lift charge weight per device  Number] (grams)  Lift per report  Number] (grams)  Lift per equired  Yes or No  Number] (grams)  Number		Device Definition		
3 Composition weight per tube 3 Lift charge permitted 4 Yes or No 5 Lift charge weight per device 7 Lift charge weight per device 8 Number] (grams) 8 Lift charge weight per tube 9 Number] (grams) 9 Number] (grams) 11 Propellant charge weight per tube 12 Propellant charge weight per tube 13 Number] (grams) 14 Burst charge permitted 15 Secondary burst charge permitted 16 Surst charge weight per device 17 Reports 18 Propellant charge weight per device 18 Number] (grams) 19 Reports 10 Reports 10 Reports 10 Reports 10 Reports 10 Reports 11 Propellant charge weight per device 19 Reports 10 Reports 10 Reports 10 Reports 10 Reports 10 Reports 11 Number] (grams) 12 Multiple report weight (individual) 19 Number] (grams) 10 Tubes 10 Reports 10 Number] (grams) 10 Tubes 11 Tube required 11 Ves or No 12 Multiple tubes permitted 12 Yes or No 13 Multiple tubes permitted 14 Yes or No 15 Driver required 16 Yes or No 17 No 18 Multiple drivers permitted 17 Yes or No 18 Multiple drivers permitted 19 Yes or No 19 Shell claimeter (O.D.) 10 Number] (millimeters) 10 Requirements 10 Requirements 10 Requirements 10 Requirements 10 Little drivers permitted 10 Yes or No 10 Spikes, handles, or sticks required 10 Yes or No 11 Spikes, handles, or sticks permitted 10 Yes or No 11 Propellant Spikes applications permitted 11 Propellant Spikes permitted 12 Yes or No 13 Spikes, handles, or sticks permitted 14 Yes or No 15 Spikes, handles, or sticks required 15 Pevice permitted 16 Yes or No 17 Chemical restrictions 17 Chemical restrictions 18 Pevice permitted Pevices or No 19 Device permitted Pevices or No 20 Spikes applications permitted 21 Pevice permitted Pevices or No 22 Spikes applications permitted 23 Spikes or No 24 Pevice permitted Pevices per inner package 25 Number] (count)				
If therappe permitted	1			
Iff charge weight per device   Number] (grams)	3			
Lift charge weight per tube   Number] (grams)	6			
Propellant charge permitted Yes or No Propellant charge weight per tube Number] (grams)  Secondary burst charge permitted Yes or No  Secondary burst charge permitted Yes or No  Burst charge weight per device Number] (grams)  Reports  Reports  Reports  Reports permitted Yes or No  Weight per report Number] (grams)  Multiple reports permitted Number] (grams)  Multiple report weight (individual)  Number] (grams)  Multiple report weight (individual)  Number] (grams)  Multiple tubes permitted Yes or No  Multiple tubes permitted Yes or No  Multiple drivers permitted Yes or No  No  Multiple drivers permitted Yes or No  Some of the second of the secon	7		[Number] (grams)	
Propellant charge weight per tube   Number] (grams)	8			
Burst charge permitted Yes or No Secondary burst charge permitted Yes or No Reports Reports Reports permitted Yes or No Number] (grams) Reports permitted Yes or No Multiple report Number] (grams) Multiple reports permitted Number] (grams) Multiple report spermitted Number] (grams) Multiple report weight (individual) Multiple tubes permitted Yes or No Multiple tubes permitted Yes or No Multiple drivers permitted Yes or No Shell required Yes or No Shell dameter (O.D.) Mumber] (millimeters) Multi-shells permitted Yes or No Spikes, handles, or sticks required Yes or No Spikes, handles, or sticks permitted Yes or No Multi-shell permitted Yes or No Multi-shell permitted Yes or No Chemical Restrictions Text] Chemical restrictions Text] Multi-Shot and Series Device permitted in a multi-shot (Combination) Yes or No Multi-Shot and Series Device permitted in a multi-shot (Combination) Yes or No Special Conditions Packaging Are there any special conditions Text] Packaging Imits Number] (count)	11	Propellant charge permitted	Yes or No	
Secondary burst charge permitted Yes or No Burst charge weight per device Number] (grams) Reports - Reports - Reports permitted Yes or No Weight per report Number] (grams) Multiple reports permitted Number] (grams) Multiple report weight (individual) Number] (grams) Tubes - Tubes - Tube required Yes or No Multiple tubes permitted Yes or No Multiple drivers permitted Yes or No Shell required Yes or No Shell required Yes or No Shell diameter (O.D.) Number] (millimeters) Multiple drivers permitted Yes or No Shell diameter (O.D.) Number] (millimeters) Multiple drivers permitted Yes or No Spikes, handles, or sticks required Yes or No Spikes, handles, or sticks required Yes or No Spikes, handles, or sticks permitted Yes or No Spikes, handles, or sticks permitted Yes or No Device permitted Yes or No Multiple drivers permitted Yes or No Spikes, handles, or sticks permitted Yes or No Spikes, handles, or sticks permitted Yes or No Chemical Restrictions - Restrictions Text] Restrictions Text] Device permitted in a multi-shot (Cake) Yes or No Spical Conditions - Device permitted in a multi-shot (Combination) Yes or No Spical Conditions Yes or No Spical Conditions Text] Packaging - Are there any special conditions Yes or No Special Conditions Text] Packaging - Are there any special conditions Yes or No Number] (count)	12		[Number] (grams)	
Reports Permitted Yes or No Weight per report Number] (grams) Multiple reports permitted Number] (grams) Multiple report weight (individual) Number] (grams)  Multiple report weight (individual) Number] (grams)  Multiple report weight (individual) Number] (grams)  Multiple tubes permitted Yes or No Multiple tubes permitted Yes or No Multiple drivers permitted Yes or No Multiple drivers permitted Yes or No Multiple drivers permitted Yes or No Shell required Yes or No Multiple drivers permitted Yes or No Multiple drivers permited Yes or No Multiple driver	14	Burst charge permitted	Yes or No	
Reports permitted Yes or No Reports permitted Yes or No Multiple reports permitted Number] (grams) Multiple report spermitted Number] (grams) Multiple report weight (individual) Number] (grams) Tubes Tubes Multiple report weight (individual) Number] (grams) Multiple report weight (individual) Number] (grams) Multiple tubes permitted Yes or No Multiple tubes permitted Yes or No Driver required Yes or No Multiple drivers permitted Yes or No Multiple	15	Secondary burst charge permitted	Yes or No	
Reports permitted	16	Burst charge weight per device	[Number] (grams)	
Meight per report  Multiple reports permitted  Multiple report weight (individual)  Multiple report weight (individual)  Number] (grams)  Multiple report weight (individual)  Tubes  -  Tubes  -  Tube required  Yes or No  Multiple drivers permitted  Yes or No  Shell required  Yes or No  Shell required  Yes or No  Shell diameter (O.D.)  Number] (millimeters)  Inner shells permitted  Yes or No  Spikes, handles, or sticks required  Yes or No  Spikes, handles, or sticks required  Yes or No  Spikes, handles, or sticks permitted  Yes or No  Governments  Governments  Chemical Restrictions  Text]  Device permitted in a multi-shot (Cake)  Special conditions  Text]  Are there any special conditions  Text]  Packaging  -  Are sor No  Special conditions  Text]  Packaging  -  Packaging  -  Number] (grams)  Pumber] (grams)  Number] (grams)  Number] (grams)  Number] (grams)  Number] (grams)  Number] (grams)  Pumber] (grams)  Pumber] (grams)  Pumber] (grams)  Pumber] (count)	20	Reports		
Multiple reports permitted Multiple report weight (individual)  Tubes  Tube required Yes or No  Multiple tubes permitted Yes or No  Multiple tubes permitted Yes or No  Multiple drivers permitted Yes or No  Shell diameter (O.D.) Mumber] (millimeters)  Mumber] (millimeters)  Mumber permitted Yes or No  Multiple drivers permitted Yes or No  Multiple drivers permitted Yes or No  Multiple reports and Shells  Multiple reports weight (individual) Number permitted Yes or No  Multiple reports weight (individual) Number permitted Yes or No  Mumber] (millimeters) Number] (millimeters) Nu	21	Reports permitted	Yes or No	
Multiple report weight (individual) Tubes Tube required Yes or No  Tuber required Yes or No  Driver required Yes or No  Multiple tubes permitted Yes or No  Multiple drivers permitted Yes or No  Shell required Yes or No  Multiple drivers permitted Yes or No  Spikes, handles, or sticks required Yes or No  Spikes, handles, or sticks required Yes or No  Multiple drivers permitted Yes or No  Counties permitted Yes or No  Chemical Restrictions Yes or No  Chemical Restrictions Text]  Multi-Shot and Series  Device permitted in a multi-shot (Cake) Yes or No  Special Conditions  Are there any special conditions Yes or No  Special Conditions Text]  Packaging Text  Humber] (count)	22	Weight per report	[Number] (grams)	
Tube required Tube required Yes or No Multiple tubes permitted Yes or No Multiple drivers permitted Yes or No Inserts and Shells Inserts and Shells Inserts permitted Yes or No Multiple drivers permitted Yes or No Shell required Yes or No Mumber] (millimeters) Multi-Shot and Series - Multi	23	Multiple reports permitted	[Number] (grams)	
Tube required Yes or No  Multiple tubes permitted Yes or No  Multiple trivers permitted Yes or No  Multiple drivers permitted Yes or No  Shell sequired Yes or No  Shell required Yes or No  Shell diameter (O.D.) Number] (millimeters)  Muntiple permitted Yes or No  Shell diameter (O.D.) Number] (millimeters)  Multiple tubes permitted Yes or No  Spikes, handles, or sticks required Yes or No  Spikes, handles, or sticks permitted Yes or No  Spikes, handles, or sticks permitted Yes or No  Spikes, handles, or sticks permitted Yes or No  Columnical Restrictions  Chemical Restrictions  Chemical restrictions  Text]  Multi-Shot and Series  Device permitted in a multi-shot (Cake) Yes or No  Special Conditions   Are there any special conditions Yes or No  Special Conditions  Text]  Are there any special conditions Yes or No  Special Conditions  Text]  Packaging limits  Yes or No  Number] (count)	27		[Number] (grams)	
Multiple tubes permitted  7es or No  Multiple drivers permitted  7es or No  Shell required  7es or No  Mumber] (millimeters)  Munders hells permitted  7es or No  Munders or No  Multiple drivers permitted  7es or No  Spikes, handles, or sticks required  7es or No  Spikes, handles, or sticks permitted  7es or No  Spikes, handles, or sticks permitted  7es or No  Multiple drivers permitted  7es or No  Chemical Restrictions  7es or No  Chemical Restrictions  7es or No  Multi-Shot and Series  Device permitted in a multi-shot (Cake)  Pes or No  Special Conditions  7es or No  Special conditions  Text]  Are there any special conditions  7es or No  Packaging  Imits  Packaging limits  Pes or No  Number] (count)	30	Tubes		
Driver required Yes or No  Multiple drivers permitted Yes or No  Inserts and Shells Inserts and Shells Inserts permitted Yes or No  Multiple drivers permitted Yes or No  Shell required Yes or No  Shell diameter (O.D.) Inumber] (millimeters)  Inner shells permitted Yes or No  Base, Spike and Handle Requirements Attached base required Yes or No  Spikes, handles, or sticks required Yes or No  Spikes, handles, or sticks permitted Yes or No  John Requirements  Ignition Requirements  Chemical Restrictions  Restrictions  Restrictions  Multi-Shot and Series Device permitted in a multi-shot (Cake) Yes or No  Special Conditions  Are there any special conditions Yes or No  Special conditions  Text  Are there any special conditions  Text  Text  Mumber of devices per inner package  Number] (count)	31	Tube required	Yes or No	
Multiple drivers permitted  Inserts and Shells Inserts permitted I	32	Multiple tubes permitted	Yes or No	
Inserts and Shells Inserts permitted Yes or No Shell required Yes or No Number] (millimeters) Inner shells permitted Yes or No Base, Spike and Handle Requirements Interpretation of the spike of the sp	35	Driver required	Yes or No	
Inserts permitted	36	Multiple drivers permitted	Yes or No	
Shell required Yes or No Shell diameter (O.D.) [Number] (millimeters) Inner shells permitted Yes or No Base, Spike and Handle Requirements Attached base required Yes or No Spikes, handles, or sticks required Yes or No Spikes, handles, or sticks permitted Yes or No Spikes, handles, or sticks permitted Yes or No Ignition Requirements Signation fuse permitted Yes or No Chemical Restrictions Chemical Restrictions Chemical restrictions Text] Substitution of the multi-shot (Cake) Yes or No Special Conditions Special Conditions Are there any special conditions Text] The multi-shot of the multi-shot (Special Conditions) Text] The multi-shot of Special conditions The multi-shot of Specia	40	Inserts and Shells		
Shell diameter (O.D.) Inner shells permitted Yes or No  Base, Spike and Handle Requirements Attached base required Yes or No  Spikes, handles, or sticks permitted Yes or No  Spikes, handles, or sticks permitted Yes or No  Ignition Requirements Ignition Requirements  Electric igniter permitted Yes or No  Chemical Restrictions Chemical restrictions Yes or No  Restrictions Text]  Multi-Shot and Series Device permitted in a multi-shot (Cake) Period Device permitted in a multi-shot (Combination) Series applications permitted Yes or No  Special Conditions Are there any special conditions Text]  Mumber of devices per inner package Number of devices per inner package Number] (count)	41	Inserts permitted	Yes or No	
Inner shells permitted  Base, Spike and Handle Requirements  Attached base required  Spikes, handles, or sticks required  Spikes, handles, or sticks permitted  Yes or No  Ignition Requirements  Ignition fuse permitted  Yes or No  Chemical Restrictions  Chemical Restrictions  Restrictions  Text]  Multi-Shot and Series  Device permitted in a multi-shot (Cake)  Device permitted in a multi-shot (Combination)  Series applications permitted  Yes or No  Special Conditions  Are there any special conditions  Text]  Are there any special conditions  Text]  Packaging  Packaging  Number of devices per inner package  Number] (count)	42	Shell required	Yes or No	
Attached base required Yes or No Spikes, handles, or sticks required Yes or No Spikes, handles, or sticks permitted Yes or No Ignition Requirements Ignition fuse permitted Yes or No Electric igniter permitted Yes or No Chemical Restrictions Chemical restrictions Restrictions Restrictions Text  Device permitted in a multi-shot (Cake) Yes or No Series applications permitted Yes or No Special Conditions Are there any special conditions Text  Text  Are there any special conditions Packaging Packaging limits Number of devices per inner package Inventor Invento	43	Shell diameter (O.D.)	[Number] (millimeters)	
Attached base required Yes or No Spikes, handles, or sticks required Yes or No Spikes, handles, or sticks permitted Yes or No Ignition Requirements Ignition fuse permitted Yes or No Electric igniter permitted Yes or No Chemical Restrictions Chemical restrictions Estrictions Items Device permitted in a multi-shot (Cake) Yes or No Device permitted in a multi-shot (Combination) Yes or No Series applications permitted Yes or No Special Conditions Are there any special conditions Text]  Are there any special conditions Text]  Packaging Packaging Inumber of devices per inner package Inumber] (count)  Yes or No Inumber] (count)	44	Inner shells permitted	Yes or No	
Spikes, handles, or sticks required Yes or No Spikes, handles, or sticks permitted Yes or No Ignition Requirements Ignition fuse permitted Yes or No Ignition fuse permitted Ignition fuse permitted Yes or No Ignition fuse permitted Ignition fuse fuse fuse fuse fuse fuse fuse fuse	50	Base, Spike and Handle Requirements		
Spikes, handles, or sticks permitted  Gold Ignition Requirements  Ignition fuse permitted  Yes or No  Electric igniter permitted  Yes or No  Chemical Restrictions  Chemical restrictions  Restrictions  Multi-Shot and Series  Device permitted in a multi-shot (Cake)  Device permitted in a multi-shot (Combination)  Series applications permitted  Yes or No  Special Conditions   Are there any special conditions  Text]  Text]  Are there any special conditions  Text]  Packaging   101  Packaging limits  Yes or No  No  Number of devices per inner package  [Number] (count)	51	Attached base required	Yes or No	
Ignition Requirements	52	Spikes, handles, or sticks required	Yes or No	
Ignition fuse permitted  Electric igniter permitted  Yes or No  Chemical Restrictions  Chemical restrictions  Chemical restrictions  Restrictions  Text]  Multi-Shot and Series  Device permitted in a multi-shot (Cake)  Device permitted in a multi-shot (Combination)  Series applications permitted  Series applications permitted  Yes or No  Special Conditions  Are there any special conditions  Special conditions  Text]  Are there any special conditions  Text]  Device permitted  Yes or No  Special Conditions  Text]  Device permitted  Yes or No  Special Conditions  Yes or No  Yes or No  Text]  Device permitted  Yes or No	53	Spikes, handles, or sticks permitted	Yes or No	
Electric igniter permitted  Chemical Restrictions  Chemical restrictions  Chemical restrictions  Electric igniter permitted  Yes or No  Yes or No  Restrictions  Text]  Multi-Shot and Series  Device permitted in a multi-shot (Cake)  Device permitted in a multi-shot (Combination)  Series applications permitted  Yes or No  Special Conditions  Fernion  Are there any special conditions  Special conditions  Fernion  Text]  Packaging  Packaging  Text]  Packaging limits  Yes or No  Number of devices per inner package  Number] (count)	60	Ignition Requirements		
Chemical Restrictions Chemical restrictions Chemical restrictions Text Restrictions Text  Multi-Shot and Series Device permitted in a multi-shot (Cake) Device permitted in a multi-shot (Combination) Series applications permitted Series applications permitted Text  Are there any special conditions Special conditions Special conditions Text  Packaging Text  Number of devices per inner package Text  Number] (count)	62	Ignition fuse permitted	Yes or No	
71 Chemical restrictions 72 Restrictions 73 Restrictions 74 Restrictions 75 Restrictions 76 Multi-Shot and Series 77 Period of the permitted in a multi-shot (Cake) 78 Device permitted in a multi-shot (Combination) 79 Period of the permitted of	65	Electric igniter permitted	Yes or No	
Restrictions [Text]  Multi-Shot and Series Device permitted in a multi-shot (Cake) Yes or No Device permitted in a multi-shot (Combination) Yes or No Series applications permitted Yes or No Special Conditions Are there any special conditions Yes or No Special conditions [Text]  Packaging Device permitted in a multi-shot (Combination) Yes or No Text]  Packaging Imits Yes or No Number of devices per inner package [Number] (count)	70	Chemical Restrictions		
Multi-Shot and Series Device permitted in a multi-shot (Cake) Device permitted in a multi-shot (Combination) Series applications permitted Series applications permitted Yes or No Special Conditions Are there any special conditions Special conditions Text Packaging Packaging Text Number of devices per inner package Number] (count)	71	Chemical restrictions		
Device permitted in a multi-shot (Cake)  Device permitted in a multi-shot (Combination)  Series applications permitted  Special Conditions  Are there any special conditions  Special conditions  Text  Packaging  Packaging  Number of devices per inner package  Yes or No  Yes or No  Text  In the packaging in the package in	72		[Text]	
Device permitted in a multi-shot (Combination) Series applications permitted Yes or No  Special Conditions Are there any special conditions Yes or No Special conditions Text  Text  Packaging Number of devices per inner package  In packaging In pa	80			
Series applications permitted  Special Conditions  Are there any special conditions  Special conditions  Text  Text  Packaging  Packaging limits  Number of devices per inner package  Yes or No  Yes or No  Yes or No  Yes or No	81			
90 Special Conditions 91 Are there any special conditions 92 Special conditions 100 Packaging 101 Packaging limits 102 Number of devices per inner package 103 Special Conditions 104 Text 105 Yes or No 106 Number (count)	82			
Are there any special conditions  Special conditions  [Text]  Packaging  Packaging limits  Yes or No  Yes or No  Number of devices per inner package  [Number] (count)	83		Yes or No	
92 Special conditions [Text]  100 Packaging  101 Packaging limits Yes or No  102 Number of devices per inner package [Number] (count)	90			
Packaging        101 Packaging limits     Yes or No       102 Number of devices per inner package     [Number] (count)	91			
101 Packaging limits  Yes or No  102 Number of devices per inner package [Number] (count)	92		[Text]	
102 Number of devices per inner package [Number] (count)	100		-	
	101		Yes or No	
103 Composition weight per inner packaging [Number] (grams)	102		[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> <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> <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> <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.
- 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.

Permitted and Restricted Chemicals for EI&T Pyrotechnics (APA 87-1C)				
Chemical	Chemical Formula Typical Use Restrictions			
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		

Permitted and Restricted Chemicals for EI&T Pyrotechnics (APA 87-1C)			
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> H₅COOH	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)	С	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> AIF <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> CI	Color Agent	Prohibited if mixed with a chlorate
Diphenylamine	$(C_6H_5)_2NH$	Stabilizer	
Epoxy (Thermosetting polymer)	Not Required	Binder	
Flour (Wheat, Corn or Rice)	Not Required	Binder	

Permitted and Restricted Chemicals for EI&T Pyrotechnics (APA 87-1C)			
Glucose	C <sub>6</sub> H <sub>12</sub> O <sub>5</sub>	Binder	
Hexachlorophene (Nabac)	C <sub>13</sub> H <sub>6</sub> Cl <sub>6</sub> O <sub>2</sub>	Fuel	
Hexamethylenetetramine (Hexamine)	C <sub>6</sub> H <sub>12</sub> N <sub>4</sub>	Fuel	
Iron	Fe	Fuel / Sparks	Particle size is not required
Iron (II, III) Oxide (Black)	Fe <sub>3</sub> O <sub>4</sub> or FeO Ÿ Fe <sub>2</sub> O <sub>3</sub>	Oxygen Donor	
Iron (III) Oxide (Red)	Fe <sub>2</sub> O <sub>3</sub>	Oxygen Donor	
Iron/Titanium Alloy (Ferro/Titanium)	Fe/Ti	Fuel / Sparks	Particle size is not required
Isophthalic Acid ( <i>Meta</i> -Phthalic Acid)	C <sub>6</sub> H <sub>4</sub> (COOH) <sub>2</sub>	Whistle	Not to exceed 10 percent by weight in a lift and burst, or 30 percent in a propellant formulation (Excluding whistles)
Lactose	C <sub>12</sub> H <sub>22</sub> O <sub>11</sub>	Binder/Fuel	
Lampblack	С	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	Permitted only in reports     Magnesium is Prohibited in 3.2.1.21 (Shells)
Magnesium Carbonate	MgCO <sub>3</sub>	Neutralizer	
Magnesium Stearate	Not Required	Binder	
Magnesium Sulfate	MgSO <sub>4</sub>	Oxygen Donor	
Nitrocellulose ≤ 12.6 percent nitrogen by mass	Not Required	Fuel	<ul><li>1) Limited to 75 grams per tube;</li><li>2) Limited to 500 grams per device.</li></ul>
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 <sub>6</sub> H <sub>4</sub> (COOH) <sub>2</sub>	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 <sub>2</sub> CH(OH)] <sub>n</sub>	Binder	

Permitted and Restricted Chemicals for EI&T Pyrotechnics (APA 87-1C)			
Polyvinyl Butyral (PVB)	(C <sub>8</sub> H <sub>14</sub> O <sub>2</sub> ) <sub>n</sub>	Binder	
Polyvinyl Chloride (PVC)	(C <sub>2</sub> H <sub>3</sub> CI) <sub>n</sub>	Color Intensifier	
Polyvinylidine chloride (Saran Resin)	(C <sub>2</sub> H <sub>2</sub> Cl <sub>2</sub> ) <sub>n</sub>	Color Intensifier	
Potassium Benzoate	KC <sub>6</sub> H <sub>5</sub> CO <sub>4</sub>	Whistle	Not to exceed 10 percent by weight in a lift and burst, or 30 percent in a propellant formulation (Excluding whistles)
Potassium Chlorate	KClO₃	Oxygen Donor	Smoke formulations must contain a minimum of 2 percent of bicarbonates or carbonates
Potassium Dichromate (Potassium Bichromate)	K <sub>2</sub> Cr <sub>2</sub> O <sub>7</sub>	Oxygen Donor	Not to exceed 5 percent of the formulation
Potassium Fluorosilicate	K <sub>2</sub> SiF <sub>6</sub>	Color Intensifier	
Potassium hexafluoroaluminate (Cryolite)	K <sub>3</sub> AlF <sub>6</sub>	Color Agent	
Potassium Hydrogen Phthalate (KHP)	KC <sub>8</sub> H <sub>5</sub> O <sub>4</sub>	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 <sub>3</sub>	Oxygen Donor	
Potassium Oxalate	K <sub>2</sub> C <sub>2</sub> O <sub>4</sub>	Color Agent	
Potassium Perchlorate	KCIO <sub>4</sub>	Oxygen Donor	
Potassium Silicofluoride	K <sub>2</sub> SiF <sub>6</sub>	Color Intensifier	
Potassium Sulfate	K <sub>2</sub> SO <sub>4</sub>	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 <sub>6</sub> H <sub>4</sub> (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	SiO₂·nH₂O	Moisture Absorber	
Silicon	Si	Fuel	
Silver	Ag	Fuel	Particle size is not required
Smoke Dye (Blue) Lysine	C <sub>6</sub> H <sub>14</sub> N <sub>2</sub> O <sub>2</sub>	Smoke Dye	

Permitted and Restricted Chemicals for EI&T Pyrotechnics (APA 87-1C)			
Smoke Dye (Blue) Methylene Blue	C <sub>16</sub> H <sub>18</sub> CIN <sub>3</sub> S	Smoke Dye	·
Smoke Dye (Blue) Phthalocyanine (Blue)	C <sub>32</sub> H <sub>16</sub> CuN <sub>8</sub>	Smoke Dye	
Smoke Dye (Blue) Ultramarine	Na <sub>2</sub> S <sub>2</sub> Ÿ 3NaAlSiO <sub>4</sub>	Smoke Dye	
Smoke Dye (Green) 1,4-di- p-toluidino-anthraquinone (Solvent Green 3)	C <sub>26</sub> H <sub>20</sub> O <sub>2</sub> (NH) <sub>2</sub> (CH3) <sub>2</sub>	Smoke Dye	
Smoke Dye (Green) Lysine – 2, 6-diaminohexanoic acid	C <sub>6</sub> H <sub>14</sub> N <sub>2</sub> O <sub>2</sub>	Smoke Dye	
Smoke Dye (Orange) a-xylene-azo-b-naphthol (Orange 7)	C <sub>16</sub> H <sub>11</sub> N <sub>2</sub> NaO <sub>4</sub> S	Smoke Dye	
Smoke Dye (Orange) Oil Orange Pigment	C <sub>26</sub> H <sub>28</sub> N <sub>2</sub> O <sub>2</sub>	Smoke Dye	
Smoke Dye (Red) 1-methylamino- anthraquione (Disperse Red 9)	C <sub>15</sub> H <sub>11</sub> NO <sub>2</sub>	Smoke Dye	
Smoke Dye (Red) 1-Naphthalenol, 4-[(4- ethoxyphenyl)azo] (Solvent Red 3)	C <sub>18</sub> H <sub>16</sub> N <sub>2</sub> O <sub>2</sub>	Smoke Dye	
Smoke Dye (Red) Para Red (Pigment Red1 ) (p-nitroaniline red)	C <sub>16</sub> H <sub>11</sub> N <sub>3</sub> O <sub>3</sub>	Smoke Dye	
Smoke Dye (Violet) 1,4-diamino-2,3- dihydroanthraquinone	C <sub>14</sub> H <sub>12</sub> N <sub>2</sub> O <sub>2</sub>	Smoke Dye	
Smoke Dye (Violet) Rhodamine B (Basic Violet 10)	C <sub>28</sub> H <sub>31</sub> CIN <sub>2</sub> O <sub>3</sub>	Smoke Dye	
Smoke Dye (Yellow) 2-(2-quinolyl)-1, 3- indandione (Chinoline Yellow) (Solvent Yellow 33)	C <sub>18</sub> H <sub>11</sub> O <sub>2</sub> N	Smoke Dye	
Smoke Dye (Yellow) Auramine (Basic Yellow 2)	C <sub>17</sub> H <sub>22</sub> CIN <sub>3</sub>	Smoke Dye	

Permitted and Restricted Chemicals for EI&T Pyrotechnics (APA 87-1C)			
Smoke Dye (Yellow) Dibenzo(a,h)pyrene-7,14- dione (Dibenzochrysenedione) (Dibenzpyrenequinone) (Golden Yellow GK) (Tyrian Yellow I-GOK) (Vat Yellow 4)	C <sub>24</sub> H <sub>12</sub> O <sub>2</sub>	Smoke Dye	A OI-10)
Smoke Dye (Yellow) Methyl Yellow (Butter Yellow); Dimethyl Yellow; 4- Dimethylaminoazobenzene (N, N-Dimethyl-4- phenylazoaniline) (Solvent Yellow 2) (Oil Yellow)	C <sub>14</sub> H <sub>15</sub> N <sub>3</sub>	Smoke Dye	
Smokeless Powder	Not Required	Expelling Agent	Must be UN0161 and have a valid US EX Approval
Sodium Benzoate	NaC <sub>6</sub> H <sub>5</sub> CO <sub>2</sub>	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 <sub>3</sub>	Neutralizer	
Sodium Carbonate	Na <sub>2</sub> CO <sub>3</sub>	Neutralizer	
Sodium Chlorate	NaClO <sub>3</sub>	Oxygen Donor	Smoke formulations must contain a minimum of 2 percent of bicarbonates or carbonates
Sodium Fluorosilicate	Na <sub>2</sub> SiF <sub>6</sub>	Color Intensifier	
Sodium hexafluoroaluminate (Cryolite)	Na <sub>3</sub> AIF <sub>6</sub>	Color Agent	
Sodium Nitrate	NaNO <sub>3</sub>	Oxygen Donor	
Sodium Oxalate	Na <sub>2</sub> C <sub>2</sub> O <sub>4</sub>	Color Agent	
Sodium Salicylate	C <sub>7</sub> H <sub>5</sub> NaO <sub>3</sub>	Whistle	Not to exceed 10 percent by weight in a lift and burst, or 30 percent in a propellant formulation (Excluding whistles)
Sodium Silicofluoride	Na₂SiF <sub>6</sub>	Color Intensifier	
Sodium Sulfate	Na <sub>2</sub> SO <sub>4</sub>	Oxygen Donor	
Starch (Amylum) (Wheat, Corn, Rice)	Not Required	Binder	
Stearic Acid (Octadecanoic Acid)	Not Required	Fuel	
Strontium Carbonate	SrCO <sub>3</sub>	Color Agent	
Strontium Chloride	SrCl <sub>2</sub>	Color Agent	

Permitted and Restricted Chemicals for EI&T Pyrotechnics (APA 87-1C)			
Strontium Nitrate	Sr(NO <sub>3</sub> ) <sub>2</sub>	Oxygen Donor / Color Agent	
Strontium Oxalate	SrC <sub>2</sub> O <sub>4</sub>	Color Agent	
Strontium Phthalate	Sr(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)
Strontium Sulfate	SrSO <sub>4</sub>	Color Agent	
Sucrose	C <sub>12</sub> H <sub>22</sub> O <sub>11</sub>	Fuel	
Sulfur	S	Fuel	
Terphthalic Acid ( <i>Para</i> -Phthalic Acid)	C <sub>6</sub> H <sub>4</sub> (COOH) <sub>2</sub>	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 ≥ 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 <a href="mailto:fireworks@dot.gov">fireworks@dot.gov</a>.
- 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	<ul> <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> </ul>
Application cover letter should contain the following elements	a. Identification of the applicant; and     b. Summary of request.
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	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:  1. Mail:  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, 2. Washington, DC 20590-0001Email: fireworks@dot.gov
	Online: PHMSA online application PHMSA.DOT.GOV
Contact	APA:

Information	Ms. Julie L. Heckman American Pyrotechnics Association 301-907-8181 or jheckman@americanpyro.com
	PHMSA: Chief of Energetic Materials U.S. Department of Transportation 202-366-4512 or fireworks@dot.gov

## 3. Example of EX Application Cover Letter

Your Corporate Letterhead		
(Date of Letter)		
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		
Chief of Energetic Materials:		
We wish to request an approval for the device described in the enclosed firework application, submitted under the provisions of 49 CFR § 173.64.		
Classification is requested for this device as UN0431 Articles, pyrotechnic for technical purposes, 1.4G or UN0336, Fireworks [for professional use only], 1.4G.		
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:		
Thank you for your attention to our request.		
Sincerely,		
Signature, Title		

## **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	<ul> <li>a. Item Name, item name of the series (if applicable) and/or an Item Number/Code should be provided to identify the product.</li> <li>b. The identifier (i.e.: Item Name or Item Code) must be constant throughout the application.</li> </ul>	
Name and Address of Manufacturer Applicant	<ul> <li>a. Must be the manufacturer of the device.</li> <li>b. Name of a responsible person (and their job title) at the applicant company</li> <li>c. Provide telephone number, fax number and email address.</li> </ul>	
Designated US Agent	<ul> <li>a. Include a designated U.S. Agent of Service in accordance with 49 CFR §105.40.</li> <li>b. Provide the name of designated agent, telephone number, fax number and email address.</li> </ul>	
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	<ul> <li>a. The Category of the device must be identified in the application.</li> <li>b. If not listed in APA 87-1C, the application can be submitted in accordance with 49 CFR 173.56.</li> </ul>	
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	<ul> <li>a. Tester name and title</li> <li>b. Testing location</li> <li>c. Tested item: finished product or component chemical mixtures</li> <li>d. Test date and results.</li> </ul>	
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): Ν

3. Manufacturer: (Manufacturer located outside the U.S must complete item # 4)

Name/Title: Joseph Smith, Manager Company Name: Smith Liling Fireworks Mfg. Co.

P.O. Box 5000, Liuyang City, Hunan, China 410317 Address:

86-707-234-XXXX Phone: 86-707-234-XXXX Fax:

Email: smithfireworks@smithchina.com

Physical Manufacturing Location (if different from address above):

Company Name: Smith Liling Fireworks Mfg. Co.

Huanglai Town, Liuyang City, Hunan, China 410317 Address:

Phone: 86-707-234-XXXX Fax: 86-707-234-XXXX

Email: smithfireworks@smithchina.com

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

Margie Smith/Vice-President Name/Title:

Company Name: Smith Fireworks, Inc.

236 Fireworks Lane, Sunset, KS 63456 Address:

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)

#### **EI&T Pyrotechnic Devices** 3.2.1

□3.2.1.1 - Airburst Colored □3.2.1.17 - Mortar Hit Mine □3.2.1.2 - Airburst Inert Material ⊠3.2.1.18 - Multi-Shot (Cake) □3.2.1.3 - Airburst Report □3.2.1.19 - Multi-Shot (Combination)

□3.2.1.4 - Binary Flash Powder □3.2.1.20 - Saxon

□3.2.1.5 - Binary Powder Kit □3.2.1.21 - Shell □3.2.1.6 - Cannon Simulator □3.2.1.22 - Shot Tube Preloaded □3.2.1.7 - Comet Crossette □3.2.1.23 - Smoke Cartridge □3.2.1.8 - Flame Projector □3.2.1.24 - Spark Effect Devices

□3.2.1.9 - Flare □3.2.1.25 - Wheel

Tube

□3.2.1.12 – Fountain

□3.2.1.13 – Fountain Nitrocellulose

□3.2.1.10 - Flash Tray □3.2.1.11 - Flash

□3.2.1.14 - Line Rocket

□3.2.1.15 - Mine

□3.2.1.16 - Mine Inert Material

7.	Diagram of the Device and Diagram Component Table (attac	hed)			
8.	Chemical Composition: (attached)				
9.	Description of Device (weights are considered maximum):				
	Number of tubes containing composition:	<u>8</u>			
	Total composition weight per tube(s) (grams):	<u>34</u>			
	Total lift charge per tube (grams):	<u>6</u>			
	Total burst charge per tube (grams):	0			
	Total effect per tube (grams) excluding lift and burst:	28			
Doe	es item have a report? (Yes/No)	<u>No</u>			
	Weight of individual report (grams):	<u>N/A</u>			
	Total weight of all reports in device (grams):	<u>N/A</u>			
	Number of reports in the device:	<u>N/A</u>			
	Total composition in device (grams):	<u>272</u> _			
<u>10.</u>	Electric Igniters: (check if a previously approved electric igniter  The electric igniter(s) used in this device has been approved				
11.	Thermal stability test results:				
	A thermal stability test of this device was completed on				
	7/02/14 Joseph Smith Supervisor Date Name of Tester Job Title	Smith Fireworks Mfg. Co. Company			
The test was performed on: X finished item component chemical mixtures, as present together in the device. The device did not ignite, explode, or undergo any significant decomposition during heating a 75° C (167° F) for 48 hours.  13 Certification:  This is to certify that the device for which approval is requested conforms to APA Standard 87-1C and that the descriptions and technical information contained in this application are complete and accurate. Only an authorized representative from the company can certify the firework application.					
	This device is for professional use only and will not be sold to consumers.				
	B/01/14 ()  Date Signature of applicant named above	Mr. Joseph Smith Typed name of applicant, in English			

## **Chemical Composition Sheet**

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

Total composition in device (grams): 272

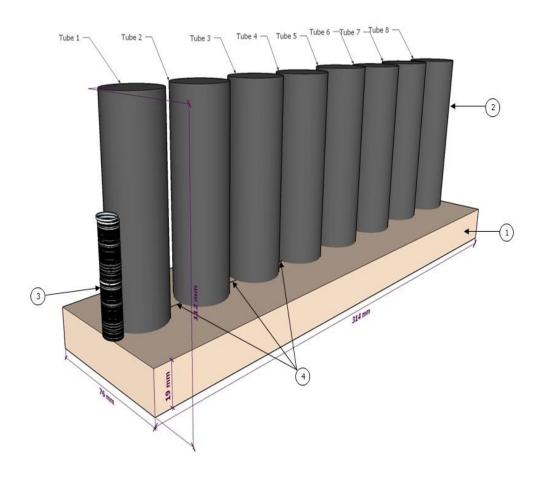
Name and Weight for each composition in device (grams):

1. <u>Lift Charge 48</u> 2. <u>White Comet</u> 112 3. Red Comet

Chemicals	Formulas	1	2	3	4	5	6
Potassium Nitrate	KNO₃	75	5				
Potassium Perchlorate	KCIO <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	С	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	(CHCICHCI) <sub>n</sub>			15			
Red Gum				3			
Restricted Chemicals	Formulas						
Aluminum (140 microns)	AI		23				
Magnalium (180 microns)	Al-Mg			9			
Total Weight Percent			100	100			

## **Diagram of Device**

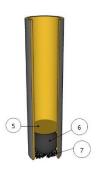
Item Name [Product Code]: 8 Shot 10 Second Red & White Comet [8S10RDWHTCOM]



## **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,
- o May represent any number of principals,
- o 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,
- o 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
- o 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:

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

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

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.