

APA 87-1 Update

Changes to the 2001 Edition –
Awaiting Approval from DOT

The olden days...



- Fireworks used to require an approval/classification from the Bureau of Explosives, which was not a government agency but a division of the American Association of Railroads
- Samples were sent to the BOE lab in New Jersey - the pyrotechnic composition was weighed and tested for thermal stability. A “BE Number” was assigned to each tested item that passed the test criteria
- Classification as Class C, Class B, or Class A Explosives was assigned, based on type and weights of chemical mixtures in a device
- With the creation of the Department of Transportation (DOT), approval authority shifted to DOT, but a BOE lab exam was still required

Expensive, and time-consuming

- The BOE process was expensive, and time-consuming
- DOT entered the picture, replacing the Association of American Railroads as the approval agency for explosives, but approval times were lengthy, and lab testing (\$\$\$) was still required
- The APA had numerous meetings with DOT in an effort to simplify the fireworks approval process – as well as reduce the cost of approvals related to explosive testing

Why not write your own Standard?

In a meeting between DOT and the APA in the early 1980's, DOT suggested that we write our own standard for fireworks. If they approved of the provisions in the standard, DOT could issue an EX Number without a requirement for costly lab testing.





87-1 Is Adopted by DOT

The APA got to work, and standards for consumer and display fireworks were produced by the APA and adopted as part of the Federal Regulations, with no costly lab testing now required. The applicant certified compliance with APA 87-1 and submitted applications directly to DOT Approvals – there was now no charge/fee for an Approval!

Subsequent revisions were produced to keep the document up-to-date with industry innovations – the last revision of the Standard went into effect in 2001.

The 87-1 Revisions

- Significant changes to 87-1 in these revisions included provisions for “Class B” (now 1.3G)) display products and approvals for theatrical pyrotechnics
- All was good for a few years, and more changes occurred in the fireworks industry that were not covered in 87-1.
- This situation worsened, and the APA created a Standards Committee with the challenge to update the document



The challenge

- Produce a new version of 87-1 that had three sections – Consumer, Display, and Proximate/Theatrical
- After a lot of discussions and draft documents, consensus was reached on a new version to submit to DOT for their adoption of the document by reference into 49CFR – the DOT regulations
- DOT has been a partner throughout the development process, and it is hoped that their review will be accomplished quickly

Thanks to a hard-working Committee

- 3 sub-committees worked independently on the project to produce the final draft. Julie Heckman kept a close eye on progress at DOT
- Thanks to all of the committee members for creating the “final” version of the new document that will soon be formally submitted to DOT. The current 87-1 remains in effect until DOT acts to adopt the 2018 version.
- Now, back to Julie who will introduce the subcommittee chairmen, who will discuss their specific documents.



2018 APA STANDARD 87-1A

STANDARD FOR THE CONSTRUCTION, CLASSIFICATION, APPROVAL, AND TRANSPORTATION OF CONSUMER FIREWORKS



2018 APA STANDARD 87-1A CONSUMER FIREWORKS

GENERAL REQUIREMENTS

- APPLICANT MUST BE THE MANUFACTURER. FOREIGN APPLICANTS MUST HAVE A USA DESIGNATED AGENT.
- BURST CHARGE MUST NOT EXCEED 25% OF TOTAL COMPOSITION WEIGHT PER TUBE INCLUDING LIFT CHARGE.
- ALL MULTIPLE TUBE DEVICES MUST HAVE SEQUENTIAL FUSING, EXCEPT SPECIALTY DEVICES.
- REPORTS ARE LIMITED TO 50MG FOR GROUND DEVICES AND 130MG FOR AERIAL DEVICES
- ONLY CHEMICALS LISTED IN THE PERMITTED AND RESTRICTED CHEMICAL TABLE FOR CONSUMER FIREWORKS AND NOVELTIES CAN BE USED.



2018 APA STANDARD 87-1A CONSUMER FIREWORKS

ADDITIONAL CATEGORIES OF DEVICES

NOVELTY DEVICES

(EX OR FC NUMBER IS NOT REQUIRED FOR SHIPMENT)

- NOW 7 CATEGORIES, WAS 5 CATEGORIES

CONSUMER FIREWORKS (UN0336 1.4G)

- NOW 35 CATEGORIES, WAS 17 CATEGORIES



2018 APA STANDARD 87-1A CONSUMER FIREWORKS

NOVELTY – INDEX OF DEVICES

APA87-1

APA87-1A

BOOBY TRAP / PULL APART

FLITTER SPARKLER

PARTY POPPER

PARTY POPPER

SNAKES, GLOW WORMS

SNAKE

SNAPPER

SNAPPER

WIRE SPARKLERS, DIPPED STICKS

WIRE SPARKLERS, DIPPED STICKS

TOY SMOKE DEVICE

SMOKE DEVICE



2018 APA STANDARD 87-1A CONSUMER FIREWORKS

FIREWORKS – INDEX OF DEVICES - GROUND DEVICES

APA87-1	APA87-1A	APA87-1	APA87-1A
CHASER	CHASER		FOUNTAIN NITROCELLULOSE
	CRACKLING BALL	GROUND SPINNER	GROUND SPINNER
	CRACKLING STRIP	ILLUMINATING TORCH	ILLUMINATING TORCH
	CRACKLING TUBE	TOY SMOKE DEVICE	SMOKE
FIRECRACKER	FIRECRACKER		SNAKE
	FLASHER/STROBE	SPECIALTY DEVICE	SPECIALTY DEVICE
FLITTER SPARKLER	FLITTER SPARKLER	WHEEL	WHEEL
CONE FOUNTAIN	FOUNTAIN CONE	WIRE SPARKLER, DIPPED STICK	WIRE SPARKLER, DIPPED STICK
CYLINDRICAL FOUNTAIN FOUNTAIN	FOUNTAIN CYLINDRICAL CYLINDRICAL		



2018 APA STANDARD 87-1A CONSUMER FIREWORKS

FIREWORKS – INDEX OF DEVICES – AERIAL DEVICES

APA87-1	APA87-1A	APA87-1	APA87-1A
HELICOPTER, AERIAL SPINNER	AERIAL SPINNER HELICOPTER	MISSILE TYPE ROCKET	MISSILE – FIN STABLIZED
MINE AND SHELL DEVICES	MINE PRELOADED MINE & SHELL PRELOADED SHELL PRELOADED	SKY ROCKETS AND BOTTLE ROCKETS	MISSILE – SPIN STABLIZED ROCKET (BOTTLE)
	GIRONDOLA	ROMAN CANDLE	ROMAN CANDLE



2018 APA STANDARD 87-1A CONSUMER FIREWORKS

FIREWORKS – INDEX OF DEVICES – CAKE & COMBINATION DEVICES

APA87-1

APA87-1A

MULTIPLE TUBE FIREWORKS DEVICES

CAKE 200

CAKE 500

COMBINATION 200

COMBINATION 500



2018 APA STANDARD 87-1A CONSUMER FIREWORKS

FIREWORKS – INDEX OF DEVICES – RELOADABLE KITS

APA87-1

AERIAL SHELL KIT,
RELOADABLE TUBE

APA87-1A

AERIAL SHELLS RELOADABLE KIT

FOUNTAINS RELOADABLE KIT

MINES RELOADABLE KIT

NEW APA87-1C WILL HAVE A NEW DEVICE CATEGORY CALLED SHELLS, THAT WILL ALLOW THE APPROVAL OF SHELLS UP TO 1.75" OUTER DIAMETER AS 1.4G UN0431 OR 1.4G UN0336, WITHOUT THE REQUIREMENT OF A LAUNCH TUBE IN EACH INNER PACKAGING.



2018 APA STANDARD 87-1A CONSUMER FIREWORKS

FIREWORKS – INDEX OF DEVICES – MISCELLANEOUS

APA87-1

APA87-1A

FUSE

(MAX. 3mm DIAMETER, 150G, BURNS
NO FASTER THAN 1" PER SECOND)

FUSE APPROVED UNDER APA87-A CAN ONLY BE APPROVED AS UN0336 FIREWORKS 1.4G AND SHOULD NOT BE CONFUSED WITH FUSE, SAFETY UN0105 WHICH REQUIRES LABORATORY EXAMINATION BEFORE IT CAN BE APPROVED AS 1.4S EXPLOSIVE.



2018 APA STANDARD 87-1A CONSUMER FIREWORKS

SIGNIFICANT CONSTRUCTION AND COMPOSITION WEIGHT CHANGES

DEVICE

CHANGES

CAKE 500 & COMBINATION 500

IF INNER DIAMETER OF ALL TUBE DEVICES IS LESS THAN 12.7MM AND CONTAINS LESS THAN 5 GRAMS OF COMPOSITION, NO 1/2" TUBE SEPARATION IS REQUIRED.

FOUNTAIN, CYLINDER

COMPOSITION WEIGHT PER TUBE 100 GRAMS (WAS 75 GRAMS)



2018 APA STANDARD 87-1A CONSUMER FIREWORKS

SUMMARY OF TOTAL COMPOSITION WEIGHT BY DEVICE – FIREWORKS

COMPOSITION WEIGHT	TYPE OF DEVICE
0.005 GRAM	FIRECRACKER (NO LIMIT ON THE NUMBER OF FIRECRACKERS ON STRING)
5 GRAMS	FLASHER/STROBE,
15 GRAMS	FOUNTAIN, NITROCELLULOSE
20 GRAMS	CRACKLING BALL; CRACKLING STRIP; CRACKLING TUBE; GROUND SPINNER; SNAKE; SPECIALTY DEVICE; DEVICE; AERIAL SPINNER; HELICOPTER; MISSILE-FIN STABILIZED; MISSILE-SPIN STABILIZED; ROCKET; ROMAN ROMAN CANDLE;
25 GRAMS	FLITTER SPARKLER;
50 GRAMS	FOUNTAIN, CONE;
60 GRAMS	MINE PRELOADED; MINE/SHELL PRELOADED; SHELL PRELOADED;
100 GRAMS	FOUNTAIN, CYLINDRICAL; ILLUMINATING TORCH; SMOKE; WIRE SPARKLER/DIPPED STICK;
150 GRAMS	FUSE
200 GRAMS	WHEEL; GIRONDOLA; CAKE 200; COMBINATION 200;
400 GRAMS	RELOADABLE KITS OF AERIAL SHELLS, FOUNTAIN, MINES
500 GRAMS	CAKE 500; COMBINATION 500



2018 APA STANDARD 87-1A CONSUMER FIREWORKS

NEW LABELLING REQUIREMENT

A FINISHED FIREWORK OR RELOADABLE KIT MUST BE MARKED WITH THE EX NUMBER OR FC NUMBER ON THE DEVICE OR PACKAGING IF THE DEVICE IS TOO SMALL.

EXEMPTION: Any device manufactured, prior to October 1, 2018 is not required to be marked with the EX Number/FC Number



2018 APA STANDARD 87-1A CONSUMER FIREWORKS

PERMITTED AND RESTRICTED CHEMICALS FOR CONSUMER FIREWORKS AND NOVELITES

- PERMITTED AND RESTRICTED CHEMICALS IS CONTROLLED BY PHMSA.
- ONLY CHEMICALS LISTED IN THE TABLE ARE ALLOWED TO BE USED IN CONSUMER FIREWORKS.
- ALLOWANCE FOR 0.25% BY WEIGHT AS IMPURITIES
- MANUFACTURING TOLERANCE OF UP TO 1% IS PERMITTED FOR INDIVIDUAL CHEMICALS (EXCLUDING RED PHOSPHORUS AND SILVER FULMINATE)
- SPECIFIC RESTRICTIONS FOR INDIVIDUAL CHEMICALS ARE LISTED IN THE TABLE



QUESTIONS?

American Pyrotechnics Association

Standard 87-1B – Display Fireworks



MAJOR CHANGES:

- 25 Device Categories (6 previously)
- New Labeling Requirement
- Attachments on Shells (tails)
- Quickmatch and Time/Delay Fuse
- Chains

3.2 Index of Devices

3.2.1 Ground Devices, Individual

- 3.2.1.1 - Firecracker
- 3.2.1.2 - Flasher / Strobe
- 3.2.1.3 - Fountain (Cone, Cylindrical, Gerb)
- 3.2.1.4 - Ground Report
- 3.2.1.5 - Illuminating Torch (Lance)
- 3.2.1.6 - Smoke
- 3.2.1.7 - Waterfall / Shower
- 3.2.1.8 - Wheel

3.2.2 Aerial Devices, Individual

- 3.2.2.1 - Aerial Shell and Mine Preloaded (Color with or without reports)
- 3.2.2.2 - Aerial Shell Preloaded (Report Only)
- 3.2.2.3 - Aerial Shell (Color with or without reports)
- 3.2.2.4 - Aerial Shell (Report Only)
- 3.2.2.5 - Aerial Shell of Shells
- 3.2.2.6 - Aerial Spinner (Helicopter)
- 3.2.2.7 - Girandola
- 3.2.2.8 - Mine (Shell, Tube, Bag)
- 3.2.2.9 - Mine Preloaded
- 3.2.2.10 - Missile - Fin Stabilized
- 3.2.2.11 - Missile - Spin Stabilized
- 3.2.2.12 - Rocket (Sky Rocket)
- 3.2.2.13 - Roman Candle

3.2.3 Cake and Combination Devices

- 3.2.3.1 - Cake
- 3.2.3.2 - Combination

3.2.4 Miscellaneous

- 3.2.4.1 - Quickmatch
- 3.2.4.2 - Fuse- (Delay, Time)
- 3.2.4.3 - Blank Requirements Table



3.2.2 Aerial Devices, Individual

3.2.2.1 - Aerial Shell and Mine Preloaded (Color with or without reports)

3.2.2.2 - Aerial Shell Preloaded (Report Only)

3.2.2.3 - Aerial Shell (Color with or without reports)

3.2.2.4 - Aerial Shell (Report Only)

3.2.2.5 - Aerial Shell of Shells

3.2.2.6 - Aerial Spinner (Helicopter)

3.2.2.7 - Girandola

3.2.2.8 - Mine (Shell, Tube, Bag)

3.2.2.9 - Mine Preloaded

3.2.2.10 - Missile - Fin Stabilized

3.2.2.11 - Missile - Spin Stabilized

3.2.2.12 - Rocket (Sky Rocket)

3.2.2.13 - Roman Candle

But What About Comets??

Comets are mines, they just have one star.

New Labeling Requirement:

Finished Display
Firework

5. Marked with the EX Number on the device, or packaging if the device is too small; and
6. Any device manufactured, prior to October 1, 2018, is not required to be marked with the EX Number.

Attachments:

Tail

A chemical composition that burns during the flight of an aerial device to produce a visual effect

Aerial Shell
Attachments

Aerial shells can be approved with or without attachments.

The attachments:

1. Must remain attached to the aerial shell during transportation;
2. Must not leak chemical composition during transportation;
3. Must be constructed of sturdy materials, such as (but not limited to) plastic, Kraft paper, or cardboard (excluding tails);
4. May be ignited by its own independent fuse

Quickmatch:

Quickmatch – a thread impregnated with fine grained black powder that is encased in a loose fitting paper or plastic sheath designed to burn fast and approved as UN0101, Fuse, non-detonating instantaneous or quickmatch.

Limited to nitrate and/or perchlorate salts with charcoal and with or without sulfur and /or a binder

1. Must have a protective outer covering
2. Must provide a statement that composition is less than or equal to 6.6 grams per linear meter
3. The length must not exceed 60 meters per inner packaging

Fuse, Delay (Fuse, Time):

Fuse, Delay – a core of fine grained powder surrounded by a flexible woven fabric. When ignited, it burns at a predetermined rate without any external explosive effect. Approved under this standard as UN0335 Fireworks 1.3G.

1. Must have a protective outer covering
2. Must provide a statement that composition is less than or equal to 20 grams per linear meter
3. The length must not exceed 60 meters per inner packaging

Chain requirements:

Aerial Shell (Color with or without report) and Aerial Shell of Shells

Shell Diameter (mm)	Maximum number of shells per chain
75 or less	12
100	8
125	5
150	5

Aerial Shell (Report only)

Shell Diameter (mm)	Maximum number of shells per chain
65 or less	12

Blank Requirements Table		
	Attribute	Requirements
1	Composition weight in finished device	[Number] (grams)
3	Composition weight per tube	[Number] (grams)
6	Lift charge permitted	Yes or No
11	Propellant charge permitted	Yes or No
12	Propellant charge weight per tube	[Number] (gram)
14	Burst charge permitted	Yes or No
15	Secondary burst charges permitted	Yes or No
20	Reports	--
21	Report(s) permitted	Yes or No
24	Single report per tube or shell permitted	Yes or No
25	Single report weight	[Number] (grams)
26	Multiple reports permitted	Yes or No
27	Multiple report weight (individual)	[Number] (grams)
28	Multiple report weight in the finished device	[Number] (grams)
29	Percent of report composition in the finished device	(Number) (percent)
30	Tubes	--
31	Tube required	Yes or No
32	Multiple tubes permitted	Yes or No
35	Driver required	Yes or No
36	Multiple drivers permitted	Yes or No
37	Minimum number of drivers required	Yes or No
38	Outer tube diameter (I.D.)	[Number] (millimeters)
40	Inserts and Shells	--
41	Inserts permitted	Yes or No
42	Shell casing required	Yes or No
43	Shell diameter (O.D.)	[Number] (millimeters)
44	Inner shells permitted	Yes or No
45	Inner shell diameter (O.D.)	[Number] (millimeters)
60	Ignition Requirements	--
62	Ignition fuse permitted	Yes or No
64	Multiple ignition points permitted	Yes or No
65	Electric igniter permitted	Yes or No
70	Chemical Restrictions	--
71	Chemical restrictions	Yes or No
72	Restrictions	Text
80	Cake, Combinations and Series	--
81	Device permitted in a cake	Yes or No
82	Device permitted in a combination	Yes or No
83	Series applications permitted	Yes or No
90	Special Conditions	--
91	Are there any special conditions	Yes or No
92	Special conditions	[Text]

	Aerial Shell (Color with or without reports) - a device (cylindrical or spherical) that is launched and ignited from a tube into the air and bursts open to produce an effect (Effects may be pyrotechnic and/or non-pyrotechnic)	
	Attribute	Requirements
1	Composition weight in finished device	7000 grams
6	Lift charge permitted	Yes
11	Propellant charge permitted	No
14	Burst charge permitted	Yes
15	Secondary burst charges permitted	Yes
20	Reports	--
21	Report(s) permitted	Yes
24	Single report per tube or shell permitted	Yes
25	Single report weight	71 grams
26	Multiple reports permitted	Yes
27	Multiple report weight (individual)	25 grams
28	Multiple report weight in the finished device	1750 grams
29	Percent of report composition in the finished device	25 percent
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	Yes
42	Shell casing required	Yes
43	Shell diameter (O.D.)	250 millimeters
44	Inner shells permitted	Yes
45	Inner shell diameter (O.D.)	70 millimeters
60	Ignition Requirements	--
62	Ignition fuse permitted	Yes
64	Multiple ignition points permitted	Yes
65	Electric igniter permitted	No
70	Chemical Restrictions	--
71	Chemical restrictions	Yes
72	Restrictions	See General Requirements for lift and burst charge restrictions.
80	Cake, Combinations and Series	--
81	Device permitted in a cake	No
82	Device permitted in a combination	No
83	Series applications permitted	Yes
90	Special Conditions	--
91	Are there any special conditions	Yes
92	Special conditions	1.) Tails and external attachments are permitted 2.) Chaining, see General Requirements for chaining restrictions

	Cake - a device that consists of multiple tubes fused together to form one device.	
	Attribute	Requirements
1	Composition weight in finished device	20000 grams
3	Composition weight per tube	See individual device requirements
6	Lift charge permitted	See individual device requirements
14	Burst charge permitted	See individual device requirements
15	Secondary burst charges permitted	See individual device requirements
20	Reports	--
21	Report(s) permitted	See individual device requirements
24	Single report per tube or shell permitted	See individual device requirements
25	Single report weight	See individual device requirements
26	Multiple reports permitted	See individual device requirements
27	Multiple report weight (individual)	See individual device requirements
28	Multiple report weight in the finished device	See individual device requirements
29	Percent of report composition in the finished device	See individual device requirements
30	Tubes	--
31	Tube required	Yes
32	Multiple tubes permitted	Yes
35	Driver required	No
36	Multiple drivers permitted	No
38	Outer tube diameter (I.D.)	See individual device requirements
40	Inserts and Shells	--
41	Inserts permitted	See individual device requirements
42	Shell casing required	See individual device requirements
43	Shell diameter (O.D.)	See individual device requirements
44	Inner shells permitted	See individual device requirements
45	Inner shell diameter (O.D.)	See individual device requirements
60	Ignition Requirements	--
62	Ignition fuse permitted	Yes
64	Multiple ignition points permitted	Yes
65	Electric igniter permitted	No
70	Chemical Restrictions	--
71	Chemical restrictions	See individual device requirements
72	Restrictions	See individual device requirements
80	Cake, Combinations and Series	--
82	Device permitted in a combination	Yes
83	Series applications permitted	Yes
90	Special Conditions	--
91	Are there any special conditions	Yes
92	Special conditions	See individual device requirements

Special Provisions (transport within the United States):

- Misfired Fireworks
 - Permitted under the original EX number
 - Must be packaged separate from unused/unfired devices
 - E-match must be shunted
- Assembled Devices/Set Pieces
 - Transported using the EX/FC approval for the individual components
 - Permitted without a box if the device is too large for non-bulk packaging
- E-match attached to devices
 - E-match must be approved and assigned a separate EX number
 - Manufacture rated no-fire current not less than 0.2 amperes
 - Securely attached to fuse or lift charge
 - Shroud covering the match head
 - Wires must be shunted
 - No transportation on aircraft with E-match installed

All above allowed by Private Motor Carrier only



QUESTIONS?



NEW APA STANDARD 87-1C

ENTERTAINMENT INDUSTRY & TECHNICAL PYROTECHNICS



EI&T PYROTECHNIC DEVICES

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

HIGHLIGHTS

Devices may be approved as

UN0431 Articles, pyrotechnic
for technical purpose, 1.4G

OR

UN0336 Fireworks [for professional use
only] 1.4G



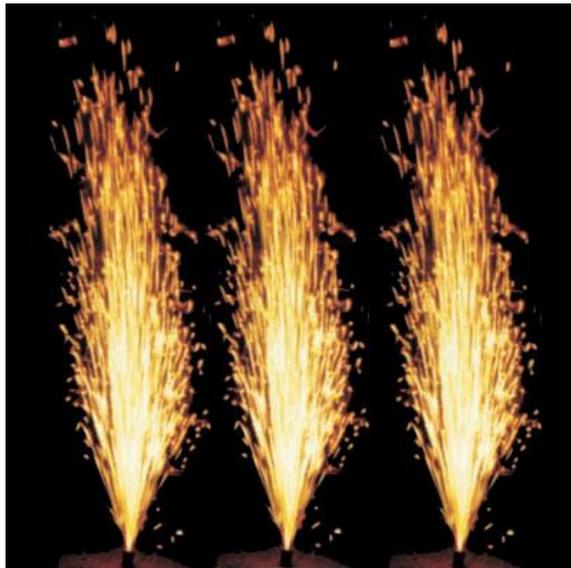
COMPOSITION LIMITS

Devices will no longer be subject to the composition limitations of consumer devices!



EXAMPLES

Tube effects such as gerbs, flares, falls, etc. may have up to 1000g of composition.



Multi-shot devices (cakes) may have up to 1000 grams of composition. AND, sequential fusing is not required.

REPORT EFFECTS



- Devices that produce a single report effect may have up to 6 grams of report composition.
- Multiple reports are permitted but limited to 1 gram each with a 25 gram total per finished device.

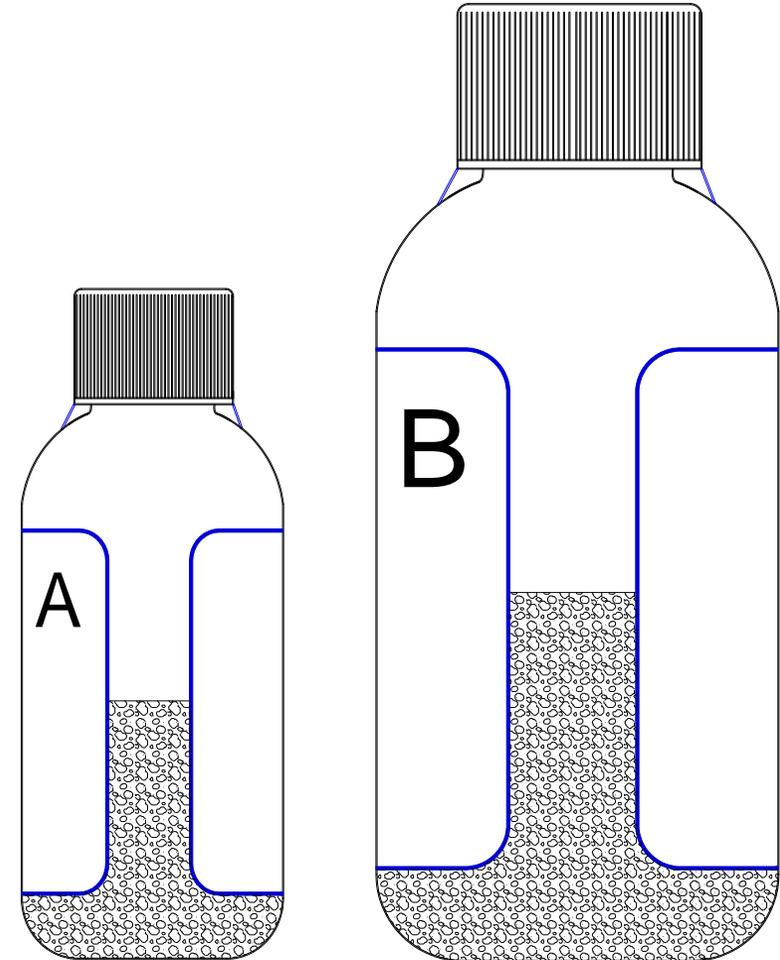
AIR BURST

- Present 87-1 does not have provisions for approving airburst.
- Special packaging and labeling restrictions are required.



BINARY KITS

- May be approved under 87-1C
- The A & B bottles may be packaged together as a kit.
- The bottles or at least the larger bottle of the binary kit must state on the label that the **EX number does not apply to the mixed**
- **(A + B) composition.**



PACKAGING REQUIREMENTS

- Devices such as airburst have specific packaging requirements. They must be packaged in closable containers with a minimum 1.5mm thick wall.
- Devices that have easily penetrable tops must be protected during transportation with removable caps or covers.

CHEMICALS

Compositions that incorporate chlorates in the formulations must contain two (2) percent or greater of an acid neutralizer (bicarbonates or carbonates)

Significance: Can make chlorate smoke devices and not have to have an equal or greater amount of acid neutralizer in the composition as required in consumer devices.



CHEMICALS

Zirconium

Added to the chemical list with the same restrictions as titanium. Particle size must be larger than 149 microns (100 mesh).



Nitrocellulose

87-1C allows for up to 75 grams of NC ($N \leq 12.6\%$) per tube.



LABELING

EX number is required to be on the label of the device.

- Allows you to use any name you wish on a device so long as the device meets the requirements of the approval.
- If a device is too small to accommodate a label, the label may be placed on the igniter wire or on the smallest inner packaging containing the device.
- Again, certain devices such as binary kits have specific wording that must be on the labels.

FOR PROFESSIONAL USE ONLY

MUST BE ON THE LABEL!



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SERIES APPLICATIONS

- **Series Application**
- 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:
 - Must contain the same chemical composition; and
 - Only vary in size, weight, and/or numbers of tubes in the device
- Effect series:
 - Must be the same size, maximum weight and numbers of tubes; and
 - Only vary in the effects produced (chemical formulations vary)
- **Dimensional and Effect Series:**
- a. **Can combine dimensional and effect series in one application**



QUESTIONS?