

**Pyrotechnics**

**Before a**

**Proximate**

**Audience**

# Pyrotechnics FAQ

## **Q: What are 1.4S (special effects) fireworks**

A. 1.4S (special effects) fireworks (or 1.4g special) are pyrotechnic devices for professional use in the performing arts in conjunction with theatrical, musical or other productions. 1.4S fireworks are similar to “consumer fireworks” in chemical composition and construction but are not intended for consumer use. Such fireworks shall be classified as “Article Pyrotechnic 1.4S” by the United States Department of transportation and marked and labeled in conformance with Title 49 of the Code of Federal Regulations (including 1.4G (UN 0431 as classified by United States Department of Transportation regulations) and 1.4S (UN 0432 as classified United States Department of Transportation regulations). 1.4S fireworks may be packed or designed so that any hazardous effects arising from a malfunction do not significantly hinder or prohibit firefighting or other emergency response efforts in the immediate vicinity of the package.

## **Q. What are close proximity effects?**

A. Close Proximity fireworks refers to a type of pyrotechnics that can be utilized within a relatively close range of spectators. They are designed to project only to a limited height, typically 75-200 feet. These types of effects, when utilized in a properly designed display, can have as much impact as the much larger standard aerial fireworks since they are safe to place much closer to the audience. Refer to NFPA 1126 section 8.4 for required separation distances.

## **Q. What’s different about staging indoor effects?**

A. Several aspects must be taken into immediate consideration right after you decide what you want to accomplish, and what your motivation is for doing the display. The first is the size of the room: is there adequate ceiling height, ventilation, and distance from the effect to the audience? Are the drapes and set pieces flame proofed? Will the smoke overpower or block the audience’s vision for the balance of the show? Most effects require a minimum safety distance of 15 feet from effect to audience. (Refer to NFPA 1126 section 8.4 for required separation distances)

## **Q. Why are pyrotechnic displays regulated?**

A. Using pyrotechnics (fireworks) anywhere is dangerous especially in close proximity to the audience. Improper use, or storage, creates risk to individuals and property. Inspectors from the AHJ establish appropriate safety measures that include crowd management, security, fire protection clearance zones, and emergency response procedures.

## **Q. When does the working relationship between the exhibitor and the fire department begin and how can we make it better?**

A. Communication is the key to a successful show. The exhibitor should make contact with the AHJ well in advance of the exhibition to find what their requirements are. Fireworks, pyrotechnic, and flame effect exhibitions must follow all NFPA and OFC standards, but those requirements are the minimum standard for a show. The jurisdiction(s) where an exhibition is being held may require additional measures to ensure that it is a safe & incident free performance. Talking early and talking often can cut down or eliminate those little surprises or miscommunications that create problems. It also gives the exhibitor enough time to provide support documents and any other information that might be required.

**Q. What laws and rules apply to the use of 1.4S fireworks before an audience either indoors (like a theatrical event) or outdoors?**

**A.** Similar to other exhibitions of fireworks, the use of 1.4S fireworks before an audience triggers the following requirements:

- Use of an exhibitor licensed by the State to conduct pyrotechnics exhibition;
- The licensed exhibitor must obtain a permit from the fire official and law enforcement officials with jurisdiction over the exhibition;
- The exhibition must be conducted in accordance with the safety standards outlined in the Ohio Revised Code, Ohio Fire Code, and the National Fire Protection Association (NFPA) standards incorporated into the Ohio Fire Code, particularly NFPA 1126 (2006 edition), the Standard for Use of Pyrotechnics Before a Proximate Audience.

**Tips for Exhibitors**

1.4S and 1.4G (special) fireworks used are not consumer fireworks under Ohio law, so they must be manufactured, labeled, and sold in conformance with the regulations of United States Consumer Product Safety Commission found in Title 16 of the Code Federal Regulations. Carefully look at the labels of all of fireworks to make sure that you are using correct types of fireworks at your exhibitions.

Ohio Fire Code 1301:7-7-33(H) section 3308 provides the requirements for fireworks and pyrotechnics exhibition. Section 3308.7 provides the following requirements when applying for a permit:

- (a) **3308.7.1** When an Ohio licensed exhibitor applies for the permit required by paragraph (H)(1)(3308.1) of this rule, the licensed exhibitor shall submit all of the following information to the local officials having jurisdiction over the exhibition. Such information shall include but not be limited to:
- (i) **3308.7.1.1** The name of the organization sponsoring the fireworks exhibition together with the names of persons actually in charge of the fireworks exhibition.
  - (ii) **3308.7.1.2** The date and time of day when the fireworks exhibition is to be held.
  - (iii) **3308.7.1.3** The exact location planned for the fireworks exhibition.
  - (iv) **3308.7.1.4** The name and license number of the fireworks exhibitor who is to supervise the discharge of fireworks and of all personnel assisting within the discharge perimeter.
  - (v) **3308.7.1.5** The class of fireworks to be discharged with the number of set pieces and shells (specify single- or multiple-break), including experimental rockets or missiles.
    - (a) **3308.7.1.5.1** For the indoor exhibition of fireworks, the requirements for pyrotechnic product information in accordance with Chapter 7 of NFPA 1126 as listed in rule 1301:7-7-47 of the Administrative Code.
  - (vi) **3308.7.1.6** The manner and place of storage of all fireworks prior to and during the fireworks exhibition for all fireworks storage shall be in accordance with paragraph (J)(1)(3310.1) of this rule.
  - (vii) **3308.7.1.7** A diagram of the premises on which the fireworks exhibition is to be held, showing the point at which the fireworks are to be discharged, the location of all buildings, highways, railroads, or other inhabited structures within one thousand

feet of the discharge and potential landing site. The diagram shall also show the line barriers behind which the audience will be restrained.

- (a) **3308.7.1.7.1** For the indoor exhibition of fireworks, the diagram must include:
  - (i) The interior of the structure to be used for the exhibition and the layout of all devices to be used at the exhibition.
  - (ii) A description of the direction the devices shall be fired and the fallout radius for each device.
  - (iii) The lines behind which the audience shall be restrained.
- (b) **3308.7.1.7.2** For the indoor exhibition of fireworks, certifications that the set, scenery and rigging materials are treated with appropriate flame retardant.
  - (viii) **3308.7.1.8** Proof that general liability insurance or indemnity bond issued by a company licensed to provide such coverages in the state of Ohio, for an amount no less than one million dollars or as otherwise required in a higher amount by the authority having jurisdiction, is in force for the applicant and includes acts of all employees.
  - (ix) **3308.7.1.9** A copy of each exhibitor's license and proof of assistant's registration for all individuals proposed to operate within the discharge perimeter.
  - (x) **3308.7.1.10** The name and license number of the fireworks manufacturer, wholesaler or out-of-state shipper who supplied all items in the fireworks exhibition.
- (b) **3308.7.2** The licensed exhibitor reflected on the fireworks exhibition permit at the time of the fireworks exhibition shall be responsible for compliance with the provisions under which the fireworks exhibition permit was granted.
- (c) **3308.7.3** A copy of the issued permit and the completed inspection checklist shall be sent to the state fire marshal by the fire official no later than five days after the date of the fireworks exhibition. In the event of any incident resulting in an investigation or other inquiry by the state fire marshal or other authority having jurisdiction, the completed permit and the completed inspection checklist shall be made immediately available to the state fire marshal or other authority having jurisdiction upon request.

# Pyrotechnics Definitions

## **Aerial Shell**

A cartridge containing pyrotechnic composition, a burst charge, and an internal time fuse or module that is propelled into the air from a mortar and that is intended to burst at or near its highest point.

## **Airburst**

A pyrotechnic device that is suspended in the air to simulate outdoor aerial fireworks shells without producing hazardous debris.

## **Assistant**

A person who works under the supervision of the pyrotechnic operator.

## **Authority Having Jurisdiction (AHJ)**

An organization, office, or individual responsible for enforcing the requirements of a code or standard, or for approving equipment, materials, an installation, or a procedure.

## **Binary Materials**

See "Binary System".

## **Binary System**

A two-component pyrotechnic system where the pyrotechnic material is broken down into two separate containers. One is the oxidizer and one is the fuel. The ingredients cannot burn or explode until they are mixed together. This makes binaries safer to store and handle. Also known as binary explosive or binary materials.

## **Black Match**

A fuse made from thread impregnated with black powder and used for igniting pyrotechnic devices.

## **Black Powder**

A low explosive consisting of an intimate mixture of potassium or sodium nitrate, charcoal, and sulfur.

## **Booby Trap**

A small tube that has a string protruding from both ends that has a friction-sensitive composition and that is ignited by pulling the ends of the string.

## **Cigarette Load**

A small wooden peg that is coated with a small quantity of explosive composition and that is ignited in a cigarette.

## **Combustible**

Capable of undergoing combustion.

## **Comet**

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

**Concussion Effect**

A pyrotechnic effect that produces a loud noise and a violent jarring shock for dramatic effect.

**Concussion Mortar**

A device specifically designed and constructed, when loaded with pyrotechnic material, to produce a concussion effect.

**Electric Match**

A device containing a small amount of pyrotechnic material that ignites when a specified electric current flows through the device and initiates pyrotechnics.

**Electrical Firing System**

Electrical equipment that provides and/or controls the ignition of pyrotechnics.

**Fallout Area**

The designated area in which hazardous debris is intended to fall after a pyrotechnic device is fired.

**Fallout Radius**

A line that defines the fallout area of a pyrotechnic device.

**Flammable**

A combustible that is capable of easily being ignited and rapidly consumed by fire.

**Flare**

A pyrotechnic device designed to produce a single source of intense light for a defined period of time.

**Flash Pot**

A device used with flashpowder that produces a flash of light and directs the flash.

**Flashpowder**

A specific pyrotechnic material in powder form composed of fuel(s) and oxidizer(s) that upon ignition will produce a flash of light, sparkles, an audible report, or a combination of these effects.

**Flitter Starburst**

The Flitter Starburst is a Starburst which produces a flash of light and a burst of flitter effect stars in all directions to a diameter of 18 to 22ft.

**Gerb**

A cylindrical preload pyrotechnic device, intended to produce a controlled spray of sparks with a reproducible and predictable duration, height, and diameter.

**Hazardous Debris**

Any debris, produced or expelled by the functioning of a pyrotechnic device, that is capable of causing personal injury or unpredicted property damage.

**Holder**

Any device used to hold a pyrotechnic device other than a mortar.

**Igniter**

An electrical, chemical, or mechanical device used to fire pyrotechnics.

**Integral Mortar**

A preloaded mortar containing pyrotechnic materials and intended for a single firing only.

**Isolated Power Supply**

An ungrounded power supply that provides electricity, in which both output wires are isolated from ground.

**Labeled**

Equipment or materials to which has been attached a label, symbol, or other identifying mark of an organization that is acceptable to the authority having jurisdiction and concerned with product evaluation, that maintains periodic inspection of production of labeled equipment or materials, and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner.

**Lift Charge**

The composition in a pyrotechnic device that propels (lifts) the effect into the air when ignited

**Listed**

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

**Line Rocket**

A pyrotechnic device guided along a wire or cable.

**Magazine**

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

**Mine**

A device containing multiple pyrotechnic effects that are simultaneously ignited and dispersed into the air from a mortar or tube.

**Mortar**

A device used to direct and control the effect of the pyrotechnic material.

**Oxidizer**

Any material that readily yields oxygen or other oxidizing gas, or that readily reacts to promote or initiate combustion of combustible materials.

**Performance**

The enactment of a musical, dramatic, operatic, or other entertainment production.

**Performer**

Any person active in a performance during which pyrotechnics are used and who is not part of the audience or support personnel.

**Permittee**

The person or persons who are responsible for obtaining the required permits for a production that includes the use of pyrotechnics.

**Preload**

A pyrotechnic device supplied by the manufacturer in a ready-to-use condition.

**Proximate Audience**

An audience closer to pyrotechnic devices than permitted by NFPA 1123, Code for Fireworks Display.

**Pyrotechnic Composition**

A chemical mixture which upon burning and without explosion, produces a visible brilliant display, bright lights, or sounds.

**Pyrotechnic Device**

Any device containing pyrotechnic materials and capable of producing a special effect as defined in this standard.

**Pyrotechnics Exhibition**

Includes any indoor and/or outdoor fireworks displays conducted in accordance with the provisions of Chapter 3743. of the Revised Code, or any variance issued thereunder, this rule and NFPA 1126 listed in rule 1301:7-7-47 of the Administrative Code.

**Pyrotechnic Exhibitor**

A licensed exhibitor who is only authorized for pyrotechnics before a proximate audience in accordance with chapter 3743 of the Revised Code, this rule and NFPA 1126 listed in rule 1301:7-7-47 of the Administrative Code.

**Pyrotechnic Material (Pyrotechnic Special Effects Material)**

A chemical mixture used in the entertainment industry to produce visible or audible effects by combustion, deflagration, or detonation.

**Pyrotechnic Operator**

The person who has overall responsibility for the operation and safety of a pyrotechnic display.

**Pyrotechnic Special Effect**

A special effect created through the use of pyrotechnic materials and devices. (See also, Special Effect.)

**Pyrotechnic Special Effect material**

A chemical mixture used in the entertainment industry, to produce visible or audible effects by combustion, deflagration or detonation. Such a chemical mixture predominantly consists of solids capable of producing a controlled, self-sustaining and self-contained exothermic chemical reaction that results in heat, gas, sound, light or a combination of these effects. The chemical reaction functions without external oxygen.

**Pyrotechnics**

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

**Saxon**

A pyrotechnic device consisting of a tube that rotates around a pivot point to produce a circular shower of sparks.

**Special Effect**

A visual or audible effect used for entertainment purposes, often produced to create an illusion.

**UN/DOTn Class 1 Explosives**

The former classification system used by DOTn included the terms “high” and “low” explosives as defined herein. The following terms further define explosives under the current system applied by DOTn for all explosive materials defined as hazard Class 1 materials. Compatibility group letters are used in concert with the Division to specify further limitations on each division noted (i.e. the letter G identifies the material as a pyrotechnic substance or article containing a pyrotechnic substance and similar materials).

**Waterfall, Falls, Park Curtain**

An effect of a cascade of sparks usually produced by multiple devices fired simultaneously.

**Wheel**

A pyrotechnic device that rotates on a central axis consisting of multiple gerbs or rockets attached to a framework.

# Mines



# Airburst



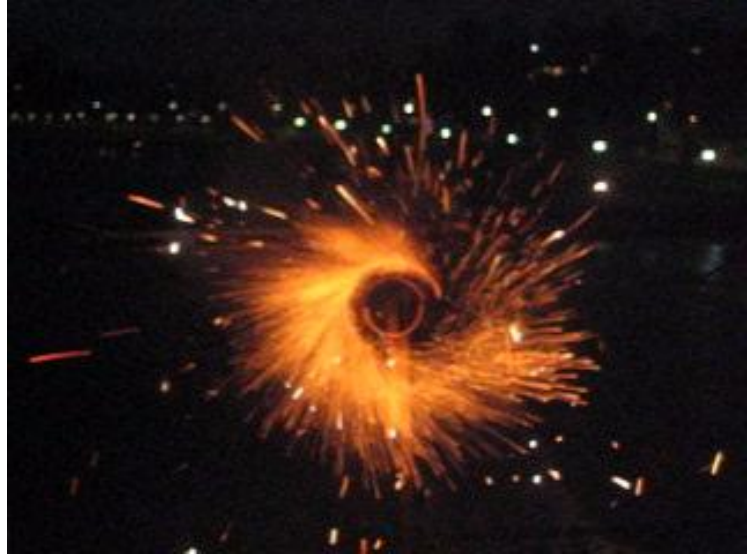
# Comet



# Gerb



# Saxons



# Concussions (concussion pots & microdets)

