

# Flame Effects Before An Audience

# Flame Effects FAQ

## **Q: What is a flame effect?**

A. It is anything that causes an open flame. NFPA 160 (2001 edition) defines a flame effect as the combustion of flammable solids, liquids, or gases to produce thermal, physical, visual, or audible phenomena before an audience. It also lists any type of open flame that is exempt and does not require a licensed operator.

## **Q. Can I get a flame effect exhibitor's license in Ohio?**

A. Yes, upon proper application to the Division of State Fire Marshal (SFM), including:

- Written documentation demonstrating competency by experience or training in the operation of flame effects.
- Evidence that you do not have any felony convictions in this state or any other state.

The applicant will be scheduled for an examination once a completed application and \$50 fee are submitted. It is a closed book examination and you must attain a minimum grade of seventy percent (70%) to pass and be issued a license. The examination is prepared from the Ohio Revised Code (ORC) section 3743, Ohio Administrative Code (OAC) section 1301:7-7-33, and the referenced editions of the National Fire Protection Association (NFPA) standard 160 (2001 edition).

The application can be downloaded from the following website: [www.com.ohio.gov](http://www.com.ohio.gov) or copied from the forms section of this publication.

To obtain copies of the NFPA standards, call (800) 344-3555.

## **Q. How do I know if I need a flame effect exhibitor license?**

A. NFPA 160 appendix A.1.4.12 provides examples of flame effect classifications. (chart on page 51) Group I describes the smallest flame effect as "hand-held burning torches, cigarette lighters, candles, matches, and lighting paper in an ashtray." If there is an open flame and there is an audience, it's covered by NFPA 160 and you will need to be licensed as a flame effect exhibitor. NFPA 160 section 1.1.3 lists any type of open flame that is exempt and does not require a licensed operator. When in doubt, talk to your local fire official.

## **Q. What equipment is used for flame effects?**

A. For larger effects, the equipment is generally composed of a gas accumulator with a connection for an LPG cylinder for filling an outlet valve or valves to supply the burner heads that provide the flame. There is a control system and flame detectors that are designed to ensure that gas is not released from the accumulator to the burner heads unless there is either a pilot flame or ignition spark present. The burner valve setting controls the size of the flame produced. The unit is operated remotely from a control panel that can be situated out of sight of the audience. Some units have a sufficiently large accumulator to power the effects for an entire performance; others require refilling from a propane cylinder during the performance.

Operators should be trained in the use of the specific equipment preferably by the manufacturer/designer of the equipment.

## **Q. Do I need a permit for a flame effect performance?**

A. The Authority Having Jurisdiction (AHJ) should be consulted well in advance to discuss the details. If it is determined that the performance is classified as a flame effect, then a permit will be required. Ohio Administrative Code (OAC) 1301:7-7-33(L) specifies that:

(1) **3312.1** A permit shall be obtained from the local fire official of the jurisdiction for the use of all indoor and outdoor flame effects before an audience at least five days in advance of the production, exhibition, demonstration, or simulation using the flame effects. Failure to submit the permit application prior to five days in advance of the production or non-compliance with the requirements of NFPA 160 listed in rule 1301:7-7-45 of the Administrative Code may result in denial or revocation of the permit.

(2) **3312.2 Flame effects plans.** Before the performance of any production, the permit applicant shall submit a plan for the use of flame effects to the local fire official. The plan shall be made in writing in such form as is acceptable to the local fire official and shall demonstrate compliance with NFPA 160 listed in rule 1301:7-7-45 of the Administrative Code. The plan shall include but is not limited to the following:

(a) **3312.2.1** The name of the person, group, or organization sponsoring the production;

(b) **3312.2.2** The date and time of day of the production;

(c) **3312.2.3** The exact location of the production;

(d) **3312.2.4** The name of the flame effect exhibitor and proof of valid flame effect exhibitor license issued by the fire marshal;

(e) **3312.2.5** The number, names, and ages of all assistants that will be present;

(f) **3312.2.6** The qualifications and experience of the flame effect exhibitor;

(g) **3312.2.7** The flame effect classification and design criteria in accordance with NFPA 160 listed in rule 1301:7-7-45 of the Administrative Code;

(h) **3312.2.8** A diagram of the site indicating the location of all flame effect devices, the areas effected by each device, location of the audience and separation distances, means of egress, and information on all fuels and ventilation for each effect;

(i) **3312.2.9** A narrative description of the flame effect, controls and control sequences of all devices, and emergency response procedures;

(j) **3312.2.10** A valid Material Safety Data Sheet (MSDS) for each fuel utilized;

(k) **3312.2.11** Documentation that the set, scenery, and rigging materials are treated with appropriate flame retardant.

(3) **3312.3** After a permit has been granted, the permittee shall keep the plan available at the site for safety inspectors or other designated agents of each authority having jurisdiction.

(4) **3312.4** Any performance adding flame effects different from the performance described in the permittee's plan shall require approval by the local fire official having jurisdiction.

**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. Why is the use of flame effects regulated?**

A. NFPA 160, ORC, & OAC regulatory requirements were implemented to provide protection for the audience, support personnel, performers, the operator, assistants, and property where flame effects are used. These minimum requirements are intended to provide increased safety standards for the safe operation of flame effects.

**Q. How can I find an Ohio licensed flame effect exhibitor?**

A. A person can search listings of all individuals or companies licensed by the Division of State Fire Marshal at the link provided below. Select *flame effect exhibitor* and choose a *county* to find those that are currently licensed in the area.

[http://www.com.state.oh.us/DSFM/fire\\_lookups.aspx](http://www.com.state.oh.us/DSFM/fire_lookups.aspx)

# Flame Effects Definitions

## **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.

## **Accumulator**

A container or piping that holds a predetermined volume of fuel that is ready for use in a flame effect.

## **Accumulator Charge Valve**

A valve used to control the flow of fuel into an accumulator.

## **Arm**

That sequence of control system functions for the establishing of a source of ignition that must be complete and verified immediately before the firing of the flame effect.

## **Cast Members**

Performers involved in a production involving the use of flame effects that may or may not be employees. (Many amusement employees are also referred to as “cast members.”)

## **Direct Ignition**

An automatic or manual ignition system that ignites fuel without a pilot.

## **Effect Valve**

The last fuel shutoff valve before the flame effect burner.

## **Emergency Stop [Emergency Shutdown (ESD) System]**

A circuit or other mechanism that when actuated, results in the complete shutdown and extinguishment of all flame effects that are controlled by it.

## **Enable**

The final set of control system functions that must be verified to be in a specific control mode immediately before the arming and firing of a flame effect may be implemented.

## **Enable Button**

The control operator that is manually actuated by the operator prior to and during the arming and firing of the effect.

## **Fail-Safe**

A state or an attribute of a system such that every single point failure in the system results in all controlling parts of the system with the ability to do harm to humans, animals, or equipment being disconnected from all sources of power and stored energy at the primary disconnect point.

## **Flame Effect**

The combustion of flammable solids, liquids, or gases to produce thermal, physical, visual, or audible phenomena before an audience.

## **Flame Effect Assistant**

A person who works under the supervision of the flame effect operator.

**Flame Effects Burner**

A burner designed to produce specific sizes and configurations of flames for flame effects. Industry calls this the cannon

**Flame Effects Operator**

The single person with overall responsibility for flame effects operations and safety.

**Holding Area**

An area where flame effect material or loaded flame effect devices are held prior to use.

**Primary Safety Control**

A control with a sensor that is directly responsive to the ignition device attributes necessary for the safe operation of the effect.

**Proven Pilot**

A pilot flame supervised by a primary safety control.

**Proof-of-Closure Valve**

A safety shutoff valve equipped with an interlock switch that is actuated only when the valve is fully closed.

**Proximate Audience**

An audience closer to pyrotechnic devices than permitted by NFPA 1123 as listed in rule 1301:7-7-45 of the Administrative Code.

**Safety Shutdown (Lockout)**

The safe shutdown of the flame effect in the event of the actuation of any flame effect primary safety control or limit switch.

**Safety Shutoff Valve**

A fast-closing valve that automatically and completely shuts off the fuel supply in response to a normal or safety shutdown.

**Safety-Critical**

The failure of a device, component, system, or mechanism, which results in a situation that is immediately dangerous to life, health, or property.

**Supervisory Cock**

A manually actuated valve with two double-pole, double-throw switches that prove the valve position.

**Supervisory Control System**

A manual or automatic control system that supervises the operation of the flame effect.

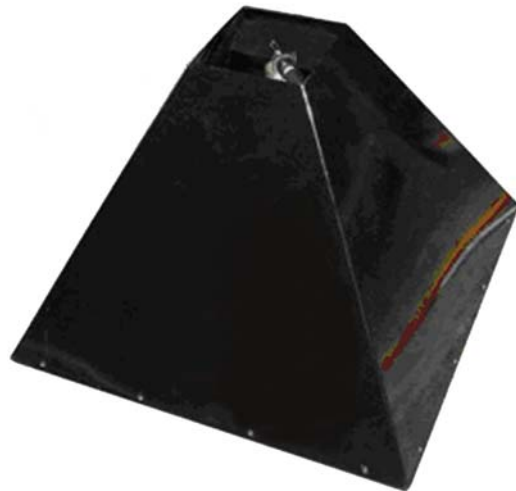
**Vent Valve**

A normally open, power-closed valve, normally located between the two safety shutoff valves.

**Venue**

The property, facility, building, or room within a building where flame effects are used, intended to be used, or are prohibited.












































# Flame Effects Burners



# Flame Bars





NFPA 160 Class	Description	Flame		Attended	Controls			Proximate Performers	Misc.
		Permanent	Temporary		Flame Verification	Effect Valve	Control System		
I	Torches, cigarette lighters, candles, matches								If it's a flame, and it's in front of an audience, it's at least a Class I effect.
II	Unattended torches, burning urns, small fires								
III	Effects in traveling shows concerts				 OR 	 OR 			Two fuel shutoff valves required, one safety
IV	Stand alone permanent flame effect								Fuel Supervisory Station Primary Limit Devices
V	A flame effect part of a large show, NO proximate performers		 						Fuel Supervisory Station Primary Limit Devices
VI	A flame effect part of a large show, WITH proximate performers		 					 	Fuel Supervisory Station Primary Limit Devices Fail-Safe Positive Manual Enable
VII	Anything else		 		 OR 			 Optional	As recommended by design and approved by AHJ

