Fire Sculpture Approval Process

The approval process for your fire art project involves a number of steps, starting well before you arrive at the Loveland Fire & Ice Festival, as well as culminating at the Event. This multiple-step approval process is not meant to bog Artists down, but rather to ensure that all safety requirements are adhered to.

1. **Pre-Event**
    a. Designate qualified persons to fill the following *Project Team* roles (defined below): *Fire Safety Liaison*.
    b. Complete and submit the Art Installation questionnaire, including:
        i. Fire Safety Liaison name and contact information
        ii. Flame Effect Scenario
        iii. Required Diagrams
        iv. Safety and Emergency Plans
    c. LFIF and Loveland Fire Authority reviews your submitted documentation.
    d. Your Project Team, through the Fire Safety Liaison, engages in an ongoing dialogue with a **LFIF and Loveland Fire Authority Artist Liaison** to ensure that your plans are complete and in conformity with LFIF and Loveland Fire Authority guidelines.
    e. Your Fire Safety Liaison maintains email contact with LFIF and Loveland Fire Authority to ensure that all parties are notified of updates and changes.
2. **At the Event**
    a. Check in at the Event Production Office, first at the main desk.
    b. Set up your artwork and Flame Effects.
    c. Visit the Event Production Office main desk to schedule an inspection of your Flame Effects.
    d. LFIF and Loveland Fire Authority inspector inspects the Flame Effects, with Fire Safety Liaison in attendance. Depending on the outcome of the inspection, the inspector may call for modifications or additional work to be done. In this case, you will need to schedule another inspection when ready.
    e. Once the Flame Effects pass inspection, the inspector issues a Flame Effects License (laminate) signifying that they may be operated. The laminate must be worn by a designated Flame Effects Operator, who has responsibility for the safe operation of the Flame Effects.

Project Team Roles

Artist must designate knowledgeable and capable individuals to fill the key roles listed below. Together, the individuals filling these roles, plus the artist him/herself, make up your Flame Effect.

Project Team.

It is the joint responsibility of the Artist and the Fire Safety Liaison to disseminate information and applicable deadlines to all Project Team members. The Artist registering the artwork and the Fire Safety Liaison can be the same person or two different people.

Each of the following roles are important and will require the full attention of the person chosen to fill it.

Fire Safety Liaison

The Fire Safety Liaison serves as the primary point of contact for all communication between your project and LFIF and Loveland Fire Authority, and is responsible for ensuring that the artwork's use of fire conforms to all applicable guidelines. This responsibility includes:

- Ensuring that all items of required documentation are complete and accurate.
- Receiving feedback and addressing questions and safety concerns raised by the LFIF and Loveland Fire Authority Artist Liaison assigned to evaluate the project's documentation.
- Promptly providing documentation updates to LFIF and Loveland Fire Authority, whether in response to LFIF and Loveland Fire Authority feedback or to design changes independently undertaken by the project.
- Ensuring that the artwork is constructed and operated in accordance with the plan approved by LFIF and Loveland Fire Authority, and that the artwork will not be operated while any identifiable safety hazards are present.

Site Leader

The Site Leader is responsible for organizing daily clean-up around the artwork and post-event clean-up after the art installation is dismantled. The person selected to be Site Leader should be an early riser, and should be adept at recruiting and organizing others to participate in clean-up efforts. Specific responsibilities include:

- Recruiting and organizing crew and ensuring there are enough people for the task.
- Securing proper clean-up tools, including trash cans.
- Leading crew in both daily and post-event clean-up efforts.

The post-event clean-up includes pickup and removal of any materials left after dismantling the artwork, including any fuel or chemical residue, loose parts, pyrotechnic debris and any other trash on site. All trash removed must be discarded in LFIF and Loveland Fire Authority approved refuse dumpsters.

Once the post-event clean-up has been completed, the Artist and the Site Lead must meet with Art Support Services for an inspection of the site and final check-out.

Fire Art Safety Plan – Required Documentation

The following items of documentation must be submitted for review and approval by LFIF and Loveland Fire Authority.

Flame Effects Scenario

Your Flame Effects Scenario is a complete, detailed description of how your artwork incorporates and uses fire. It should include details such as:

- How your device operates
- The fuel(s) it uses, how its fuel is stored, and how fuel flow is controlled
- The types and rated capacities of the components it incorporates, including hoses, valves, solenoids, regulators (and the pressures you intend to set them to), pressure vessels, pumps, pressurization systems, fans/blowers, the pilot light or ignition system, and any other details you may have.

When writing your Flame Effects Scenario, please be as clear and concise as possible, while also being as detailed and technical as necessary, to fully convey how your fire elements will work and what will go into making them work that way. If you have not completed the design or construction of your artwork, just be as accurate and complete as you can. If we need further details or clarifications we will contact you.

Flame Effect Diagrams

You will be required to submit detailed diagrams or schematics showing all plumbing and electrical arrangements and controls, and any other relevant technical details. These diagrams should at a minimum illustrate the flow of fuels from the supply to the effect head(s), and all the components those fuels pass through along the way. In particular, you must indicate the locations of any shut-off or other control valves, regulators, pressure vessels, pumps, pressurization systems, fans/blowers, ignition systems and anything else that affects the flow or burning of your Flame Effect's fuels.

If you have not completed the design or construction of your artwork, just be as accurate and complete as you can. If we need further details or clarifications we will contact you.

Note: You will need to provide a final set of complete drawings by the last full work week in January.

Geographic Layout Diagrams

The following Layout Diagrams are required:

1. Installation Area Layout
    a. Fuel Location & Supply: Location of artwork in relationship to fuel tanks, showing fuel lines and tanks in relationship to flame source.
    b. Vehicle Protection: How the fuel tank(s) will be shielded from vehicle traffic.
    c. Illumination: How the installation, including fuel tanks, controls, generators, etc., will be illuminated at night.
    d. Perimeter Safety Zones: Show where the artwork stands in relationship to participants/audience/performers, indicating distances; note on the diagram how safe distances were determined.
    e. Fire extinguisher locations.
    f. Location of first aid kit with burn supplies.

Operational Plans

Safety Plan

Your Safety Plan should describe all the measures that your crew will employ to ensure that your installation will be safe for participants, performers and crew, both during and after construction, and during strike and clean-up. At a minimum, it should cover:

- Illumination and protection from vehicle traffic for all elements of the installation, including the artwork itself, fuel supplies and fuel storage, operating positions, generators, etc.
- Types, sizes and placement of fire extinguishers or other fire suppression means that will be kept on hand
- Location and contents of first aid kit(s)
- List of Material Safety Data Sheets to be kept on hand
- Safety training your crew members have
- Safety-specific crew roles and responsibilities
- Safety procedures and protocols:
    - Fueling procedures: how do you ensure that fueling is done safely?
    - Daily safety check: what conditions do you check for?
    - Operating procedures: what conditions do you watch for while operating?
- Safety features, if any, built in to the installation
- Safety perimeters, and how they are enforced

Emergency Response Plan

No matter how comprehensive your Safety Plan, things still go wrong. Your Emergency Response Plan should list all the ways things may go wrong and expose your crew or other participants to potential injury, and how your crew will respond when they do. At a minimum it should cover:

- Emergency shut-off/shut-down procedures
- Response to fuel leaks
- Response to liquid fuel spills, small and large
- Response to unplanned fires, small and large
- Response to damage (or incipient damage) caused by wind, vehicle collision or other physical forces
- Response to hazardous material exposure of crew, performer or participant
- Response to injury sustained by crew, performer or participant

Site Plan

The Artist, Site Lead and crew are responsible for all clean up at the art installation site, both nightly and when the event ends. Your Site plan describes how you will accomplish this. At a minimum it should cover:

- Nightly clean-up procedure
- End-of-event clean-up procedure
- Emergency clean-up procedures (e.g., for liquid fuel spills)
- Clean-up tools and materials to be used

Flame Effects Guidelines

Flame Effect Definition

Flame Effect is defined as "The combustion of solids, liquids, or gases to produce thermal, physical, visual, or audible phenomena before an audience." This includes all flames that are automated, switched, pressurized or having any other action than simply being lit on fire; as well as projects using propane or other liquid or gaseous fuels.

Safety Guidelines for Flame Effects

At The Loveland Fire and Ice Festival only flame effects using Liquefied Petroleum Gas (LP-Gas). LP-Gas is often commonly referred to as propane. Most of the guidelines below deal with LP-Gas as a fuel. All Flame Effects must be constructed in such a way as to meet or exceed applicable laws, codes and industry standards. Some of which are listed below. However these regulations change often without notice and are governed by local, state, and national agencies. Approval of your effect will only be given with a fire permit from the Loveland Fire Department, no less than 1 week prior to the festival.

The National Fire Prevention Association (NFPA) publishes numerous codes and standards for the construction and use of LP-Gas systems, including:

- **NFPA 54** – National Fuel Gas Code
- **NFPA 58** – Liquefied Petroleum Gas Code
- **NFPA 160** – Standard for the Use of Flame Effects Before an Audience

NFPA documents are available for viewing and purchase on the NFPA website and should be reviewed by all Flame Effects artists. http://www.nfpa.org/

Construction of Flame Effects

- All LP-Gas cylinders shall be designed, fabricated, tested, and marked in accordance with the regulations of the US Department of Transportation (DOT) or the ASME Boiler and Pressure Vessel Code.
- All LP-Gas cylinders must have an unexpired certification date stamp and be in good working order. Tanks in poor condition or out of date are a danger to fill and may cause injury to the fuel team, the artists, and/or participants.
- Each LP-Gas flame effect must have a single 1/4-turn shut-off valve as the primary emergency fuel shut-off. When closed, this valve must inhibit *all* fuel flow to the flame effect, regardless of how many LP-Gas cylinders are connected to the flame effect. This valve must be exposed and visible at all times, and must be clearly marked as the emergency fuel shut-off.
- All components of the fuel system (fittings, piping, valves, connectors, etc.) must be designed and rated for both the type and pressure of fuel being used. The use of improper fittings can lead to leaks and failures in the fuel system resulting in fires and or injury.

- All LP-Gas metallic piping and fittings that will operate at a pressure greater than 125 psi shall be schedule 80 or heavier.
- All LP-Gas Hoses that will be operated in excess of 5 psi shall be designed for a working pressure of at least 350 psi and shall be continuously marked by the manufacturer to indicate its maximum operating pressure and compatibility with LP-Gas.
- Air or pneumatic line is not acceptable as fuel hose. LP-Gas degrades rubber hose not specifically designed for use with that fuel. This results in the hose cracking from the inside out, potentially leading to a catastrophic failure.
- **Hose clamps are prohibited on LP-Gas hose at any pressure.** All fuel hose connections shall be factory made, or constructed with a crimped fitting specifically designed for that purpose. Hose clamps are well known for cutting and chafing fuel lines or coming loose, possibly leading to catastrophic failure.
- All metallic tubing joints shall use flare fittings. The use of compression fittings or lead soldered fittings are prohibited.
- Accumulators, surge tanks and other pressure vessels in the system shall be designed, manufactured, and tested in accordance with the ASME Boiler Pressure Vessel Code or the Department of Transportation (DOT) for the pressure of the gas in use.
- Any welding alteration of pressure vessels, or alteration or fabrication of other system components that hold pressure, must be performed by an American Society of Mechanical Engineers (ASME) certified welder, and must be stamped and certified as such.
- If the fuel supply pressure exceeds the maximum allowable operating pressure (MAOP) of an accumulator or other pressure vessel, a regulator shall be installed between the fuel supply and the pressure vessel to reduce the pressure below the pressure vessel's MAOP. A pressure relief valve shall also be installed in the pressure vessel, with a start-to-leak setting at or below the MAOP and a rate of discharge that exceeds the maximum flow rate of the supply container.
- Fuel tanks for stationary flame effects must be supported to protect from tipping over or falling, also protected from vehicle traffic and be well illuminated at night.
- flame effects should be constructed and sited in such a way that the flame head and/or hot components are at least six inches from the roadway surface, to prevent baking or scarring of the streetscapes.
- Any artwork, towers or other structures that incorporate flame effects should be secured from the wind and encircled with an appropriate 20 foot safety perimeter to prevent injury to participants.

Operation of Flame Effects

- Flame Effect Operators
  - Flame effects operators and assistants must be 21 years of age or older and be trained in the use of fire extinguishers.
  - Operators and assistants must wear fire resistant clothing while operating flame effects.
- Personal Responsibility
  - No carelessness, negligence, or unsafe conditions with flame effects shall be tolerated. Do not drink, take drugs, or smoke when working with flame effects.
- Safety Perimeter
  - An appropriate audience safety perimeter (and performer's safety zone if applicable) shall be established well in advance of flame effects operation, and must be approved by LFIF and Loveland Fire Authority. Because of the variety of artwork that incorporates flame effects, a member of LFIF and Loveland Fire Authority will help you determine the correct perimeter distance.
  - In any case, a 20′ zone around the flame effects must be kept free of all combustible or flammable materials, and nothing should overhang this zone.
- Fueling
  - Only people familiar with the safety considerations and hazards involved are permitted to connect/disconnect LP-Gas tanks, or to do liquid fuel filling. Wearing personal safety gear (glasses, gloves, etc.) during liquid fuel filling is required.
- Daily Safety Check
  - A daily safety check of all flame effect components and connections is mandatory before operation begins. Never start operation of a flame effect until the daily safety check is completed. If a safety hazard is identified either during the safety check or during operation, the Fire Safety Liaison must delay or halt operation until the hazard is corrected.
- Operating Guidelines
  - Never light a flame effect until all performers, safety monitors and participants are in place and ready.
  - Never operate a flame effect in such a way that it poses a danger to people or property.
- Attending to Flame Effects
  - Flame effects must never be left unattended. The winds in downtown Loveland are highly variable, and may create havoc in a poorly monitored installation. Any flame effect found running unattended will be shut down. Egregious and/or repeat offenses will result in the confiscation and/or disabling of the effect.

- No Smoking or Open Flame
    - **ABSOLUTELY** no smoking or open flame within 10 feet any storage area where flammable liquids or fuel gases are stored. All fuel and flammables must be stored in approved containers which must remain closed except when filling or dispensing, or when connected to a system for use.
- Material Safety Data Sheets
    - MSDS for any hazardous chemicals used in the construction or operation of the flame effect must be kept at the installation, so they are available to guide clean-up activities in case of a material spill, and to provide to emergency medical personnel in case of accidental exposure.

Safety Responsibility For Flame Effect Art

All artists and their crews are responsible for their own art. Due to the dangerous nature of Flame Effects, no one may operate a Flame Effect without the approval of LFIF and Loveland Fire Authority.

It is the responsibility of the Artist to secure LFIF and Loveland Fire Authority approval for their Flame Effect installation, initially based on submitted documentation, and ultimately based on a physical inspection of the construction and operating characteristics of the installation. Evidence of approval to operate a Flame Effect is in the form of a Burn License (laminate) issued and signed by a member of LFIF and Loveland Fire Authority.

Except for testing under the supervision of a member of LFIF and Loveland Fire Authority, no one may operate a Flame Effect within Loveland Fire and Ice Festival without physically possessing the license issued specifically for that Flame Effect.

Fire Extinguishers

Artist and Fire Safety Liaison agree to keep available at the art installation at least one dry chemical fire extinguisher rated 3A:40B:C, for use in case of any accidental fire at the art installation. Note that this is a *minimum*. You should plan to have on hand as many fire extinguishers as necessary for the size of your installation and the nature of the fire hazards it presents. If you are unsure how many extinguishers you should have, the Loveland Fire Authority can advise you.

Not all fire extinguishers work for fighting all fires. You and your crew should understand which type of extinguisher is appropriate for each type of fuel present at your installation.

Dry chemical extinguishers are required where fuel is stored, as they provide the best way to put out a fuel fire. They do make messes that must be cleaned up after use. Also, dry chemical extinguishers start to lose charge after a single discharge and must be serviced and refilled.

Water fire extinguishers are useful for putting out fires involving wood, paper, fabric, and performers' bodies. These extinguishers must never be used on liquid fuel fires, as they will spread the fire. Also water is a good conductor of electricity, so these extinguishers are a poor choice for fires where energized electrical equipment is present.

CO_2 (Carbon Dioxide) extinguishers are good responses to problems with fire props and fires involving electricity. They leave no residue and can be used repeatedly until they run out. But they work for small fires only. CO_2 extinguishers are also good for putting out fires on people's clothing, but use care near exposed skin, since the extinguishing agent exits the horn or nozzle at about -70°F/-56°C.

Wet towels must be available for response to accidental fire on a person (e.g., smothering fire on the face of a fire breather) or to extinguish fire props. Wet towels work better than duvetyn because (a) they both deprive a fire of oxygen and remove heat, and (b) they are more pliable and conform better to the contours of an object, making it easier to achieve an airtight seal. Wet towels can dry quickly, so be sure also to provide a closed container of water for re-wetting them, such as a cooler chest or a bucket with a lid.

First Aid

A basic first aid kit should be available and contain at least the following items for burn treatment and fuel exposure:

- Non-petroleum-based burn cream or aloe vera gel
- Several rolls of 100% cotton gauze and some large gauze pads
- A jug of clean water for cooling burns, or flushing liquid fuel from eyes
- Waterless soap for washing liquid fuel from hands

Cool a first- or second-degree burn right away with water, and continue cooling it for at least 15 minutes.

Severe burns, and fuel exposures to eyes, nose or mouth should be treated by **Emergency Medical Services by Calling 911**, be sure to provide a copy of the relevant MSDS to the responding medical personnel.

In case of fire on a person's body or clothing, remember this rule: **Stop, Drop & Roll!** Many people have saved their own lives by dropping and rolling when their clothes caught fire.

- **STOP** – Stop where you are and DO NOT RUN!
- **DROP** – Drop to the ground; cover your face with your hands to protect your eyes and airway.
- **ROLL** – Roll to put out the flames.

If you are near someone whose clothing catches fire, be sure to stop him or her from running and make them **Stop, Drop & Roll.**

Call 911 for all emergencies then see a LFIF Event staffer or security agent. CALL 911 FIRST!!