PYROTECHNICS DOCUMENTATION

PYROTEK
SPECIAL EFFECTS INC.

Hardy

North America 2024

FLAME INFORMATION PACKAGE

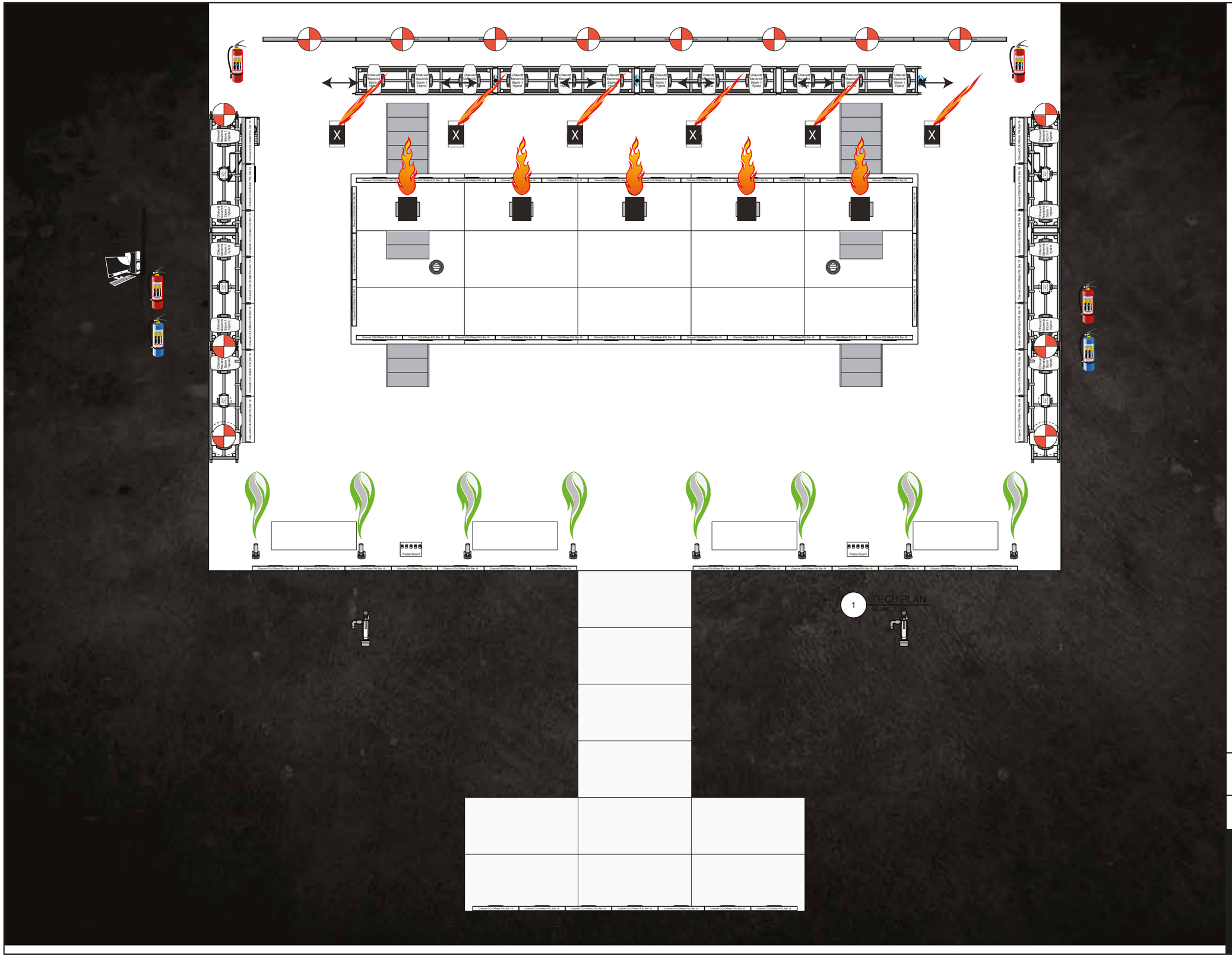
Complete Credentials and Copies of Licenses are located after the plots

Lead Pyrotechnician	Enrique LaFuente Mobile: 512-750-4565 Email: enriqueglafuente@gmail.com

Lindsay Standfast	Senior Regulatory & Compliance Coordinator Telephone: 289-301-5322 Email: lstandfast@pyrotekfx.com
Angelica Fiorillo	Permitting & Logistics Manager Telephone: 416-560-5579 Email: alarocca@pyrotekfx.com

2.5L	Isopropyl Alcohol
20	Salamander Cannisters – PYROTEK SPECIAL EFFECTS
6	X2 Wave Flame Units – EXPLO
5	Salamander Units – LE MAITRE
8	Cryo Jets – PYROTEK SPECIAL EFFECTS

CRYO JET	CO2 effect.
SALAMANDER QUAD PRO SYSTEM	Four cannister-based flame unit. Can be operated with each canister being fired independently or at the same time. Firing individual cannisters the flame can reach 3.5m -4.5m in height. Firing the canisters at the same time can have the flame reach up to 6m-8.5m.
X2 WAVE FLAMER (Explo)	Connects a liquid driven flame-system with Moving Head Technology within a compact device. The swiveling head allows the X2 WAVE-Flamer to produce very fast and accurate flame surges from 3m to 10m in height within a radius of 210°.



Legend

- Wave Flamer
- Salamander Flame Unit
- Cryo Jet
- Fire Extinguishers (CO2)
- Fire Extinguishers (H20)
- CONTROL

Hardy Country Thunder 2025

2-19-2025

PYROTEK SPECIAL EFFECTS INC.

BRINGING LIVE ALIVE

PYROTEK SPECIAL EFFECTS INC.

pyrotekfx.com

1.800.481.9910

Enrique (Rico) Lafuente

548 Rothwood Ave
Madison, TN 37115
512-750-4565

Pyrotechnician
Licensed and Insured Pyrotechnics - Worldwide
Insured for $10,000,000.00 Liability for any Venue

- Hardy Red Rocks – Morrison, CO – Oct 20th & 21st, 2024
- Shinedown Alabama Fest – Huntsville, AL – Sept 28th, 2024
- Hardy – Knoxville, TN – Sept 20th & 22nd, 2024
- Hardy - Starkville, MS – Sept 13th, 2024
- Hardy North America 2024 Tour
- Hardy North America Festivals 2024
- CMAs – Nashville, TN – Nov 8th, 2023
- Kelsea Ballerini – Knoxville, TN – Nov 2nd, 2023
- Hardy North America 2023 Tour
- Fall Out Boy NA 2023 Tour
- Tomorrow X Together NA Tour 2023
- Imagine Dragons Innings Festival – Tampa, FL – Mar 18, 2023
- Imagine Dragons Superbowl – Phoenix, AZ – February 11th, 2023
- Morgan Wallen NA 2022 Tour – LEG 1
- Mastodon Bonnaroo Festival 2021
- Morgan Wallen NA 2021 Tour
- Nashville Predators Playoffs – Nashville, TN – May 14, 2021

U.S. Department of Justice
Bureau of Alcohol, Tobacco, Firearms and Explosives

Federal Explosives License/Permit
(18 U.S.C. Chapter 40)

In accordance with the provisions of Title XI, Organized Crime Control Act of 1970, and the regulations issued thereunder (27 CFR Part 555), you may engage in the activity specified in this license or permit within the limitations of Chapter 40, Title 18, United States Code and the regulations issued thereunder, until the expiration date shown. **THIS LICENSE IS NOT TRANSFERABLE UNDER 27 CFR 555.53.** See "WARNINGS" and "NOTICES" on reverse.

Direct ATF Correspondence To	ATF - Chief, FELC 244 Needy Road Martinsburg, WV 25405-9431	License/Permit Number	**9-BL--19-5J-12923**
Chief, Federal Explosives Licensing Center (FELC)	Mama Howard	Expiration Date	**September 1, 2025**

Name
PYROTEK SPECIAL EFFECTS LAS VEGAS INC

Premises Address (Changes? Notify the FELC at least 10 days before the move.)
6120 NORTH HOLLYWOOD BLVD SUITE 105
LAS VEGAS, NV 89115-

Type of License or Permit
19-MANUFACTURER OF EXPLOSIVES

Purchasing Certification Statement

The licensee or permittee named above shall use a copy of this license or permit to assist a transferor of explosives to verify the identity and the licensed status of the licensee or permittee as provided by 27 CFR Part 555. The signature on each copy must be an original signature. A faxed, scanned or e-mailed copy of the license or permit with a signature intended to be an original signature is acceptable. The signature must be that of the Federal Explosives Licensee (FEL) or a responsible person of the FEL. I certify that this is a true copy of a license or permit issued to the licensee or permittee named above to engage in the business or operations specified above under "Type of License or Permit."

Mailing Address (Changes? Notify the FELC of any changes.)

PYROTEK SPECIAL EFFECTS LAS VEGAS INC
6120 NORTH HOLLYWOOD BLVD SUITE 105 POC: A LAROCCA
LAS VEGAS, NV 89115-

K.R.E.	V.P. / General manager
Licensee/Permittee Responsible Person Signature	Position/Title
Karl R. Seymour	10/12/2022
Printed Name	Date

Previous Edition is Obsolete PYROTEK SPECIAL EFFECTS LAS VEGAS INC:6120 NORTH HOLLYWOOD BLVD SUITE 105:89115:9-BL--19-5J-12923:September 1, 2025:19-MANUFACTURER OF EXPLOSIVES

ATF Form 5400.14/5400.15 Part I
Revised September 2011

Federal Explosives License (FEL) Customer Service Information

Federal Explosives Licensing Center (FELC)
244 Needy Road
Martinsburg, WV 25405-9431

Toll-free Telephone Number: (877) 283-3352
Fax Number: (304) 616-4401
E-mail: FELC@atf.gov

ATF Homepage: www.atf.gov

Change of Address *(27 CFR 555.54(a)(1))*. Licensees or permittees may during the term of their current license or permit remove their business or operations to a new location at which they intend regularly to carry on such business or operations. The licensee or permittee is required to give notification of the new location of the business or operations not less than 10 days prior to such removal with the Chief, Federal Explosives Licensing Center. The license or permit will be valid for the remainder of the term of the original license or permit. **(The Chief, FELC, shall, if the licensee or permittee is not qualified, refer the request for amended license or permit to the Director of Industry Operations for denial in accordance with § 555.54.)**

Right of Succession *(27 CFR 555.59)*. (a) Certain persons other than the licensee or permittee may secure the right to carry on the same explosive materials business or operations at the same address shown on, and for the remainder of the term of, a current license or permit. Such persons are: (1) The surviving spouse or child, or executor, administrator, or other legal representative of a deceased licensee or permittee; and (2) A receiver or trustee in bankruptcy, or an assignee for benefit of creditors. (b) In order to secure the right provided by this section, the person or persons continuing the business or operations shall furnish the license or permit for for that business or operations for endorsement of such succession to the Chief, FELC, within 30 days from the date on which the successor begins to carry on the business or operations.

(Continued on reverse side)

Cut Here ✂

Federal Explosives License/Permit (FEL) Information Card

License/Permit Name: **PYROTEK SPECIAL EFFECTS LAS VEGAS INC**

Business Name:

License/Permit Number: **9-BL--19-5J-12923**

License/Permit Type: **19-MANUFACTURER OF EXPLOSIVES**

Expiration: **September 1, 2025**

Please Note: Not Valid for the Sale or Other Disposition of Explosives.

Safety Data Sheet
ISOPROPANOL 99%

Version 1.9 Revision Date: 11/05/2022

SECTION 1. IDENTIFICATION

Product name : ISOPROPANOL 99%

Synonyms : 2-PROPANOL; ISOPROPYL ALCOHOL; IPA

Recommended use of the chemical and restrictions on use

Recommended use : Alcohol solvent

Restricted Uses : No data available

Manufacturer or supplier's details

Company : Univar Solutions Canada Ltd.
Address 64 Arrow Road
North York, ON, M9M 2L9
Canada

Emergency telephone number:
Local Emergency Contact : During Office hours Monday-Friday, 8.00 am - 4.30 pm (Pacific Standard Time) : 1-866-686-4827

Additional Information: : Responsible Party: Product Compliance Department
E-mail: SDSNA@univarsolutions.com
SDS Requests: 1-855-429-2661
Website: www.univarsolutions.com

SECTION 2. HAZARD IDENTIFICATION

Hazardous Classification of the substance or mixture

Flammable liquids : Category 2

Eye irritation : Category 2A

Specific target organ toxicity - single exposure : Category 3 (Central nervous system)

Label elements

Hazard pictograms :

Signal word : Danger

Hazard statements : H225 Highly flammable liquid and vapour.
H319 Causes serious eye irritation.
H336 May cause drowsiness or dizziness.

Precautionary statements : **Prevention:**
P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P233 Keep container tightly closed.
P240 Ground and bond container and receiving equipment.
P241 Use explosion-proof electrical/ ventilating/ lighting equipment.
P242 Use non-sparking tools.
P243 Take action to prevent static discharges.
P261 Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P264 Wash skin thoroughly after handling.
P271 Use only outdoors or in a well-ventilated area.
P280 Wear protective gloves/ eye protection/ face protection.
Response:
P303 + P361 + P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water.
P304 + P340 + P312 IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/ doctor if you feel unwell.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P337 + P313 If eye irritation persists: Get medical advice/ attention.
P370 + P378 In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
Storage:
P403 + P233 Store in a well-ventilated place. Keep container tightly closed.
P403 + P235 Store in a well-ventilated place. Keep cool.
P405 Store locked up.
Disposal:
P501 Dispose of contents/ container to an approved waste disposal plant.

Other hazards

None known.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance / Mixture : Substance

Hazardous components

CAS-No.	Chemical name	% by Weight	Synonyms
67-63-0	Isopropyl alcohol	80 - 100	Isopropyl alcohol

The exact ranges of this mixture are being withheld due to a Trade Secret.

SECTION 4. FIRST-AID MEASURES

General advice : Move out of dangerous area.

		Show this safety data sheet to the doctor in attendance. Do not leave the victim unattended.
If inhaled	:	Consult a physician after significant exposure. If unconscious, place in recovery position and seek medical advice.
In case of skin contact	:	If on skin, rinse well with water. If on clothes, remove clothes.
In case of eye contact	:	Immediately flush eye(s) with plenty of water. Remove contact lenses. Protect unharmed eye. Keep eye wide open while rinsing. If eye irritation persists, consult a specialist.
If swallowed	:	Keep respiratory tract clear. Do not give milk or alcoholic beverages. Never give anything by mouth to an unconscious person. If symptoms persist, call a physician. Do not induce vomiting without medical advice.

SECTION 5. FIREFIGHTING MEASURES

Suitable extinguishing media	:	Alcohol-resistant foam Carbon dioxide (CO2) Dry chemical
Unsuitable extinguishing media	:	High volume water jet
Specific hazards during fire-fighting	:	Do not allow run-off from fire fighting to enter drains or water courses.
Hazardous combustion products	:	Carbon oxides formaldehyde corrosive vapors Nitrogen oxides (NOx)
Further information	:	Collect contaminated fire extinguishing water separately. This must not be discharged into drains. Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations. For safety reasons in case of fire, cans should be stored separately in closed containments. Use a water spray to cool fully closed containers.
Special protective equipment for firefighters	:	Wear self-contained breathing apparatus for firefighting if necessary. Use personal protective equipment.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures	:	Use personal protective equipment. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.
Environmental precautions	:	Prevent product from entering drains. Prevent further leakage or spillage if safe to do so. If the product contaminates rivers and lakes or drains inform respective authorities.
Methods and materials for containment and cleaning up	:	Contain spillage, and then collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see section 13).

SECTION 7. HANDLING AND STORAGE

Advice on protection against fire and explosion	:	Do not spray on a naked flame or any incandescent material. Take necessary action to avoid static electricity discharge (which might cause ignition of organic vapours). Use only explosion-proof equipment. Keep away from open flames, hot surfaces and sources of ignition.
Advice on safe handling	:	Avoid formation of aerosol. Do not breathe vapours/dust. Avoid exposure - obtain special instructions before use. Avoid contact with skin and eyes. For personal protection see section 8. Smoking, eating and drinking should be prohibited in the application area. Take precautionary measures against static discharges. Provide sufficient air exchange and/or exhaust in work rooms. Container may be opened only under exhaust ventilation hood. Open drum carefully as content may be under pressure. Dispose of rinse water in accordance with local and national regulations.
Conditions for safe storage	:	No smoking. Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Observe label precautions. Electrical installations / working materials must comply with the technological safety standards.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

CAS-No.	Components	Value type (Form of exposure)	Control parameters / Permissible concentration	Basis
67-63-0	Isopropyl alcohol	TWA	200 ppm 492 mg/m3	CA AB OEL
		STEL	400 ppm 984 mg/m3	CA AB OEL
		TWA	200 ppm	CA BC OEL
		STEL	400 ppm	CA BC OEL
		TWAEV	400 ppm 983 mg/m3	CA QC OEL
		STEV	500 ppm 1,230 mg/m3	CA QC OEL

Personal protective equipment

Respiratory protection : Use respiratory protection unless adequate local exhaust ventilation is provided or exposure assessment demonstrates that exposures are within recommended exposure guidelines.

Filter type : Organic vapour type

Hand protection

Remarks : The suitability for a specific workplace should be discussed with the producers of the protective gloves.

Eye protection : Eye wash bottle with pure water
Tightly fitting safety goggles
Wear face-shield and protective suit for abnormal processing problems.

Skin and body protection : Impervious clothing
Choose body protection according to the amount and concentration of the dangerous substance at the work place.

Hygiene measures : When using do not eat or drink.
When using do not smoke.
Wash hands before breaks and at the end of workday.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance : liquid

Colour : Clear, colorless

Odour : alcohol-like, characteristic

Odour Threshold : 200 ppm

pH	:	No data available
Freezing Point (Melting point/freezing point)	:	-88 °C (-126 °F)
Boiling Point (Boiling point/boiling range)	:	82 - 83 °C (180 - 181 °F) (1013 hPa)
Flash point	:	12 °C (54 °F) Method: Tag closed cup
Evaporation rate	:	< 3.9 (Butyl Acetate = 1)
Flammability (solid, gas)	:	No data available
Upper explosion limit	:	13 %(V)
Lower explosion limit	:	2 %(V)
Vapour pressure	:	No data available
Relative vapour density	:	< 2.1 @ 15 - 20 °C (59 - 68 °F) (Air = 1.0)
Relative density	:	0.785 - 0.787 @ 20 °C (68 °F) Reference substance: (water = 1)
Density	:	0.785 - 0.787 g/cm3 @ 20 °C (68 °F)
Solubility(ies) Water solubility	:	completely miscible
Solubility in other solvents	:	No data available
Partition coefficient: n-octanol/water	:	log Pow: 0.05 @ 25 °C (77 °F)
Auto-ignition temperature	:	399 - 425 °C
Thermal decomposition	:	No data available
Viscosity Viscosity, dynamic	:	2.4 mPa.s @ 20 °C (68 °F)
Viscosity, kinematic	:	2.66 mm2/s @ 25 °C (77 °F)
Surface tension	:	22.7 mN/m, 20 °C

SECTION 10. STABILITY AND REACTIVITY

Reactivity	:	No dangerous reaction known under conditions of normal use.
Chemical stability	:	Stable under normal conditions.
Possibility of hazardous reactions	:	Vapours may form explosive mixture with air.
Conditions to avoid	:	Keep away from heat, flame, sparks and other ignition sources.
Incompatible materials	:	Strong acids Aldehydes Oxidizing agents Rubber Oils Plastics Amines Metals Halogenated compounds Peroxides Bases
Hazardous decomposition products	:	Carbon oxides Sulphur oxides

SECTION 11. TOXICOLOGICAL INFORMATION

Serious eye damage/eye irritation

Components:

67-63-0:
Species: Rabbit
Result: Irritating to eyes.

STOT - single exposure

Components:

67-63-0:
Assessment: The substance or mixture is classified as specific target organ toxicant, single exposure, category 3 with narcotic effects.

Further information

Product:

Remarks: Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting.
Concentrations substantially above the TLV value may cause narcotic effects.
Solvents may degrease the skin.

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity
No data available

Persistence and degradability
No data available

Bioaccumulative potential
No data available

Mobility in soil
No data available

Other adverse effects
No data available

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods

Waste from residues	:	Dispose of in accordance with all applicable local, state and federal regulations. For assistance with your waste management needs - including disposal, recycling and waste stream reduction, contact Univar Solutions ChemCare: 1-800-637-7922
		Dispose of in accordance with all applicable local, state and federal regulations. For assistance with your waste management needs - including disposal, recycling and waste stream reduction, contact Univar Solutions ChemCare: 1-800-637-7922
Contaminated packaging	:	Empty remaining contents. Dispose of as unused product. Do not re-use empty containers. Do not burn, or use a cutting torch on, the empty drum.

SECTION 14. TRANSPORT INFORMATION

TDG (Transportation of Dangerous Goods):
UN1219, ISOPROPANOL, 3, II

IATA (International Air Transport Association):
UN1219, ISOPROPANOL, 3, II

IMDG (International Maritime Dangerous Goods):

UN1219, ISOPROPANOL, 3, II, Flash Point:12 °C(54 °F)

SECTION 15. REGULATORY INFORMATION

This product has been classified according to the hazard criteria of the Hazardous Products Regulations (HPR) and the SDS contains all of the information required by the HPR.

NPRI Components : 67-63-0

The components of this product are reported in the following inventories:

TSCA	:	On TSCA Inventory
DSL	:	All components of this product are on the Canadian DSL
AICS	:	On the inventory, or in compliance with the inventory
NZIoC	:	On the inventory, or in compliance with the inventory
ENCS	:	On the inventory, or in compliance with the inventory
KECI	:	On the inventory, or in compliance with the inventory
PHIL	:	On the inventory, or in compliance with the inventory
IECSC	:	On the inventory, or in compliance with the inventory

SECTION 16. OTHER INFORMATION

The information accumulated is based on the data of which we are aware and is believed to be correct as of the date hereof. Since this information may be applied under conditions beyond our control and with which we may be unfamiliar and since data made become available subsequently to the date hereof, we do not assume any responsibility for the results of its use. Recipients are advised to confirm in advance of need that the information is current, applicable, and suitable to their circumstances. This SDS has been prepared by Univar Solutions EHS Product Compliance Department (1-855-429-2661) SDSNA@univarsolutions.com.

Revision Date : 11/05/2022

Legacy SDS: : R0001444, 100000027693, 100000061297

Material number:
16141730, 16187819, 16141123, 16185016, 16187197, 16185038, 16185039, 16184473, 16184512, 16184020, 16184810, 16184408, 16184314, 16185097, 16186271, 16183109, 16182974, 16178967, 16182648, 16175816, 16176549, 16175656, 16176457, 16176751, 16175879, 16174714, 16176870, 16175445, 16174727, 16174726, 16175555, 16180539, 16163494, 16151614, 16169230, 16169779, 16168235, 16170647, 16170200, 16170163, 16168234, 16173689, 16172502, 16145669, 16149765, 16171308, 16158552, 16146859, 16147074, 16147313, 16148783, 16148704, 16144452, 16146351, 16146089, 16144123, 16143652, 16167327, 16166321, 16165964, 16161591, 16149329, 16158191, 16152613,

16138602, 16137598, 16143917, 16140147, 16138087, 16137628, 16137534, 16137389, 16137356, 16156747, 16145782, 16160060, 16154121, 16159435, 16144176, 16152980, 16144004, 16153058, 16135462, 16143649, 16143998, 16148561, 16148563, 16135027, 16141526, 16159251, 16159182, 16143653, 16140155, 16140875, 16134646, 16134617, 16140663, 16157169, 16144470, 16143650

Key or legend to abbreviations and acronyms used in the safety data sheet			
ACGIH	American Conference of Government Industrial Hygienists	LD50	Lethal Dose 50%
AICS	Australia, Inventory of Chemical Substances	LOAEL	Lowest Observed Adverse Effect Level
DSL	Canada, Domestic Substances List	NFPA	National Fire Protection Agency
NDSL	Canada, Non-Domestic Substances List	NIOSH	National Institute for Occupational Safety & Health
CNS	Central Nervous System	NTP	National Toxicology Program
CAS	Chemical Abstract Service	NZIoC	New Zealand Inventory of Chemicals
EC50	Effective Concentration	NOAEL	No Observable Adverse Effect Level
EC50	Effective Concentration 50%	NOEC	No Observed Effect Concentration
EGEST	EOSCA Generic Exposure Scenario Tool	OSHA	Occupational Safety & Health Administration
EOSCA	European Oilfield Specialty Chemicals Association	PEL	Permissible Exposure Limit
EINECS	European Inventory of Existing Chemical Substances	PICCS	Philippines Inventory of Commercial Chemical Substances
MAK	Germany Maximum Concentration Values	PRNT	Presumed Not Toxic
GHS	Globally Harmonized System	RCRA	Resource Conservation Recovery Act
>=	Greater Than or Equal To	STEL	Short-term Exposure Limit
IC50	Inhibition Concentration 50%	SARA	Superfund Amendments and Reauthorization Act.
IARC	International Agency for Research on Cancer	TLV	Threshold Limit Value
IECSC	Inventory of Existing Chemical Substances in China	TWA	Time Weighted Average
ENCS	Japan, Inventory of Existing and New Chemical Substances	TSCA	Toxic Substance Control Act
KECI	Korea, Existing Chemical Inventory	UVCB	Unknown or Variable Composition, Complex Reaction Products, and Biological Materials
<=	Less Than or Equal To	WHMIS	Workplace Hazardous Materials Information System
LC50		Lethal Concentration 50%	

PYROTEK FLAME FUEL RECEPTACLE

SAFETY DATA SHEET

OSHA HCS (29 CFR 1910.1200)

SECTION 1: PRODUCT AND COMPANY IDENTIFICATION

Product identifier

Chemical Name	Mixture
CAS No.	Mixture
Trade Name	PYROTEK FLAME FUEL RECEPTACLE
Product Code	10-502379

Relevant identified uses of the substance or mixture and uses advised against

Identified Use(s)	FLAME EFFECTS APPLIANCE FUEL SUPPLY
Uses Advised Against	None
Company Identification	Pyrotek Special Effects Inc. 6120 N Hollywood Blvd. Suite 104 Las Vegas, NV 89115
Telephone	(702)-450-7976
E-Mail (competent person)	info@pyrotekfx.com

Emergency telephone number

Emergency Phone No.	**Transportation Emergency:** Velocity EHS 24 hr. **1-800-255-3924**

SECTION 2: HAZARDS IDENTIFICATION

Classification of the substance or mixture

OSHA HCS (29 CFR 1910.1200) — Flam. Aerosol 1; Liquefied gas; Skin Irrit. 2; STOT SE 3; Asp. Tox. 1

Label elements

Hazard Symbol

Signal word(s): **DANGER**

Hazard Statement(s):

Extremely flammable aerosol.

Contains gas under pressure; may explode if heated.

May be fatal if swallowed and enters airways.

Causes skin irritation.

May cause drowsiness or dizziness.

Precautionary Statement(s):

Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.

Do not spray on an open flame or other ignition source.

Do not pierce or burn, even after use.

Wash hands and exposed skin after use.

Wear protective gloves/protective clothing/eye protection/face protection.

Avoid breathing dust/fume/gas/mist/vapours/spray.

Protect from sunlight and do not expose to temperatures exceeding 50 ºC/122 ºF.

Other hazards

Toxic to aquatic life. Harmful to aquatic life with long lasting effects.

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

Hazardous Ingredient(s)	% wt. *	CAS No.	Hazard classification
Propane	20-30	74-98-6	Flam. Gas 1; H220 Liquefied gas; H280
n-Butane	70-80	106-97-8	Flam. Gas 1; H220 Liquefied gas; H280
Ethanol	<1	64-17-5	Flam. Liq. 2; H225 Eye Irrit. 2; H319
Ethanethiol	<0.1	75-08-1	Flam. Liq. 2; H225 Acute Tox. 4; H332 Harmfulif swallowed H302 May cause allergic skin reaction H317 Very toxic aquatic H400 Ver toxic aquatic H410

* The exact percentage withheld as a trade secret in accordance with 29 CFR 1910.1200.

Additional Information - None

SECTION 4: FIRST AID MEASURES

Description of first aid measures

Inhalation	Move person to fresh air. If breathing is labored, administer oxygen. If symptoms develop, obtain medical attention.
Skin Contact	Wash affected skin with soap and water. If symptoms develop, obtain medical attention.
Eye Contact	Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists, get medical advice/attention.
Ingestion	Do not give anything by mouth to an unconscious person. Seek medical treatment. Do NOT induce vomiting.
Most important symptoms and effects, both acute and delayed	May be harmful if swallowed and enters airways.
Indication of any immediate medical attention and special treatment needed	IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician. Do NOT induce vomiting.

SECTION 5: FIRE-FIGHTING MEASURES

Extinguishing Media

-Suitable Extinguishing Media	Extinguish with carbon dioxide, dry chemical, foam or water spray.
-Unsuitable Extinguishing Media	Do not use water jet.
Special hazards arising from the substance or mixture	Highly flammable vapor (flash point below 23°C).
Advice for fire-fighters	A self contained breathing apparatus and suitable protective clothing should be worn in fire conditions. Keep containers cool by spraying with water if exposed to fire.

SECTION 6: ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures	Keep away from heat/sparks/open flames/hot surfaces. – No smoking. Avoid contact with skin and eyes. Avoid breathing gas/spray.
Environmental precautions	Prevent liquid entering sewers, basements and work pits.
Methods and material for containment and cleaning up	Cover spills with inert absorbent material. Transfer to a container for disposal or recovery.
Reference to other sections	None
Additional Information	None

SECTION 7: HANDLING AND STORAGE

Precautions for safe handling	Keep away from heat/sparks/open flames/hot surfaces. – No smoking. Avoid contact with skin and eyes. Use product in a well-ventilated area only. Avoid breathing gas/spray.

Conditions for safe storage, including any incompatibilities

-Storage temperature	Keep in a cool, well ventilated place. Store at temperatures not exceeding 50 °C / 122 °F.
-Incompatible materials	This product should be stored away from sources of strong heat or oxidizing chemicals.
Specific end use(s)	Protective coating

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

Occupational Exposure Limits

SUBSTANCE.	CAS No.	(8hr TWA) PEL (OSHA)	(8hr TWA) TLV (ACGIH)	(STEL) PEL (OSHA)	(STEL) TLV (ACGIH)	Note:
Propane	74-98-6	1000 ppm	Aspyx.#	-----	-----	#
Ethanol	64-17-5	1000 ppm	-----	-----	1000 ppm	-----
n-Butane	106-97-8	600 ppm	250 ppm	750 ppm	-----	

^NIC = Notice of Intended Changes (ACGIH®); #Assure minimum oxygen content

Recommended monitoring method	NIOSH 1500 (hydrocarbons, B.P. 36 - 126 ºC)

Exposure controls

Appropriate engineering controls	Provide adequate ventilation to ensure that the occupational exposure limit is not exceeded.

Personal protection equipment

Eye/face protection 	Wear protective eyewear (goggles, face shield, or safety glasses).
Skin protection (Hand protection/ Other) 	Wear suitable gloves if prolonged skin contact is likely (Butyl rubber). Check with protective equipment manufacturer's data.

Respiratory protection 	Normally no personal respiratory protection is necessary. In case of insufficient ventilation, wear suitable respiratory equipment. Check with protective equipment manufacturer's data.
Thermal hazards	Not normally required. Use gloves with insulation for thermal protection, when needed.
Environmental Exposure Controls	Avoid release to the environment.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Appearance	Aerosol spray
Color.	Not available
Odor	Propane odor
Odor Threshold (ppm)	20,000 ppm
pH (Value)	Not available
Melting Point (°C) / Freezing Point (°C)	Not available
Boiling point/boiling range (°C):	Not available
Flash Point (°C)	-104 (Propane)
Evaporation Rate	Not available
Flammability (solid, gas)	Flammable aerosol
Explosive Limit Ranges	2.1% - 9.5% v/v (Propane)
Vapor pressure (Pascal)	ca. 95 x 10^4 (Propane)
Vapor Density (Air=1)	ca. 1.56 @ 0 ºC (Propane)
Density (g/ml)	Not available
Solubility (Water)	Not available
Solubility (Other)	Not available
Partition Coefficient (n-Octanol/water)	Not available
Auto Ignition Point (°C)	Not available
Decomposition Temperature (°C)	Not available
Kinematic Viscosity (cSt)	<20.5 @ 40 °C
Explosive properties	Not explosive.
Oxidizing properties	Not oxidizing.
Other information	Not available

SECTION 10: STABILITY AND REACTIVITY

Reactivity	Stable under normal conditions.
Chemical stability	Stable.
Possibility of hazardous reactions	None anticipated.
Conditions to avoid	Avoid contact with heat and ignition sources.
Incompatible materials	Strong oxidizing agents
Hazardous decomposition product(s)	Carbon monoxide, Carbon dioxide, Acrid smoke

SECTION 11: TOXICOLOGICAL INFORMATION

Exposure routes: Inhalation, Skin Contact, Eye Contact

Propane (CAS# 74-98-6):

Acute toxicity	Inhalation: LC50 = 1237 mg/L (2-hr, mouse, gas)
Irritation/Corrosivity	No evidence of irritant effects from normal handling and use.
Sensitisation	It is not a skin sensitiser.
Repeated dose toxicity	NOAEC: ≥19678 mg/m3 (28-day, rat, Systemic effects) LOAEC: 21641 mg/m3 (28-day, rat, effects: Body weight)
Carcinogenicity	No data. It is unlikely to present a carcinogenic hazard to man.
Mutagenicity	There is no evidence of mutagenic potential.
Reproductive toxicity	None anticipated

SECTION 12: ECOLOGICAL INFORMATION

Ecotoxicity

Propane (CAS# 74-98-6):

Short term (estimate)	LC50 (96 hour): 27.98 mg/L (fish) LC50 (48 hour): 14.22 mg/L (crustacea) EC50 (96 hour): 7.71 mg/L (algae)
Long Term	No data.
Persistence and degradability	Readily biodegradable.
Bioaccumulative potential	The product has no potential for bioaccumulation.
Mobility in soil	Not available.
Results of PBT and vPvB assessment	Not classified as PBT or vPvB.

SECTION 13: DISPOSAL CONSIDERATIONS

Waste treatment methods — Disposal should be in accordance with local, state or national legislation. Consult an accredited waste disposal contractor or the local authority for advice.

SECTION 14: TRANSPORT INFORMATION

	U.S. DOT	Sea transport (IMDG)	Air transport (ICAO/IATA)
UN number	1950	1950	1950
Proper Shipping Name	Aerosols, flammable	Aerosols, flammable	Aerosols, flammable
Transport hazard class(es)	2.1	2.1	2.1
Packing group	Not applicable	Not applicable	Not applicable
Environmental hazards	None assigned	None assigned	None assigned
Special precautions for user	None assigned	None assigned	None assigned

Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code: Not applicable

SECTION 15: REGULATORY INFORMATION

Safety, health and environmental regulations/legislation specific for the substance or mixture:

TSCA (Toxic Substance Control Act) - Inventory Status**:** All components listed or polymer exempt.

Designated Hazardous Substances and Reportable Quantities (40 CFR 302.4):

Chemical Name	CAS No.	Typical %wt.	RQ (Pounds)
None	------	------	

SARA 311/312 - Hazard Categories: See SECTION 2: HAZARDS IDENTIFICATION

SARA 313 - Toxic Chemicals (40 CFR 372):

Chemical Name	CAS No.	Typical %wt.

None	----	----

SARA 302 - Extremely Hazardous Substances(40 CFR 355):

Chemical Name	CAS No.	Typical %wt.	TPQ (pounds)
None	----	----	----

California Proposition 65 List:

Chemical Name	CAS No.	Type of Toxicity
None	----	----

SECTION 16: OTHER INFORMATION

The following sections contain revisions or new statements: 1-16.
Date of preparation: August 23, 2023

Hazard Statement(s)

- H220: Extremely flammable gas.
- H225 Highly flammable liquid and vapor.
- H280: Contains gas under pressure; may explode if heated.
- H302: Harmful if swallowed
- H317: May causes an allergic skin reaction.
- H319: Causes serious eye irritation.
- H332: harmful if inhaled.
- H400: Very toxic to aquatic life.
- H401: Toxic to aquatic life.
- H410: Very toxic to aquatic life with long lasting effects.

Training advice: None.

Disclaimer: We believe the statements, technical information and recommendations contained herein are reliable, but they are given without warranty or guarantee of any kind. The information contained in this document applies to this specific material as supplied. It may not be valid for this material if it is used in combination with any other materials. It is the user's responsibility to satisfy oneself as to the suitability and completeness of this information for the user's own particular use.

Explo
Zündtechnik

X2 Wave Flamer

Manual v1.4

May 2015

Software version: v1.25

ExploZündtechnik
Harald Kulterer
Völkermarkterstrasse 240
A-9020 Klagenfurt
Tel: +43 (0) 463 / 32 2 45
Fax: +43 (0) 463 / 32 2 45 75
Mobil: +43 (0) 664 / 51 007 51

www.explo.at
office@explo.at

Preamble

Dear Explo-Customer,

Please read through this set of instruction before operating your devices. Many of the informations held within are crucial to learning about- and handling your system.

We ask of you to follow the mentioned safety and user guidelines closely.

Note: This Manual is a pre-version. If you have any questions, or should any vagueness appear, which this manual cannot answer, please do not hesitate to contact us either by phone, or by E-Mail.

We wish you a lot of fun and success with your Explo-Ignition System!

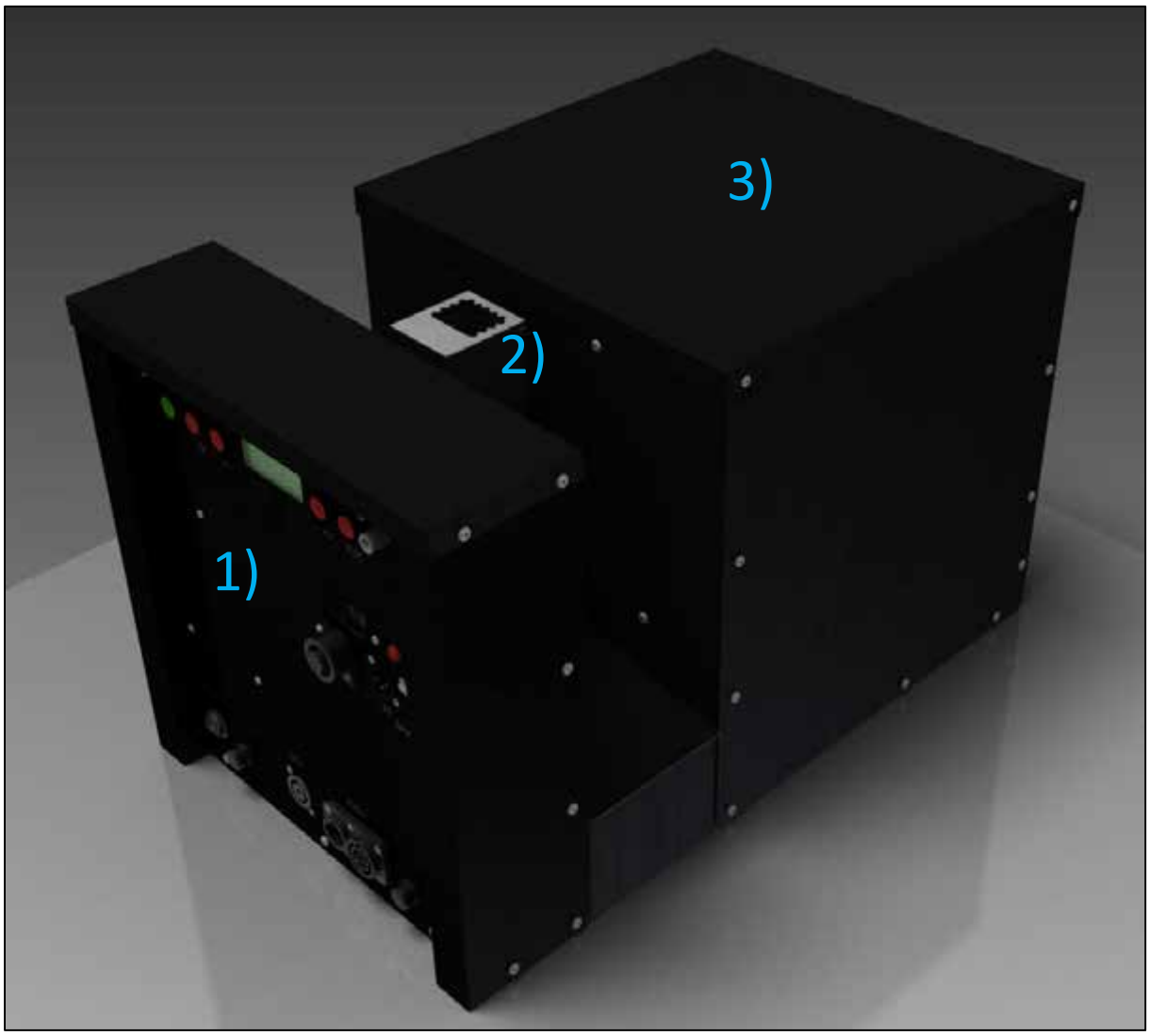
~ The Team of Explo IGNsystems

Explo Zündtechnik
Harald Kulterer
Völkermarkterstraße 240
9020 Klagenfurt
Tel: +43 (0) 463 / 32 2 45
Fax: +43 (0) 463 / 32 2 45 75
Mobil: +43 (0) 664 / 51 007 51
office@explo.at
www.explo.at
Made in AUSTRIA

1 Index

2 General/Description of Components

2.1 Overview X2 Wave Flamer



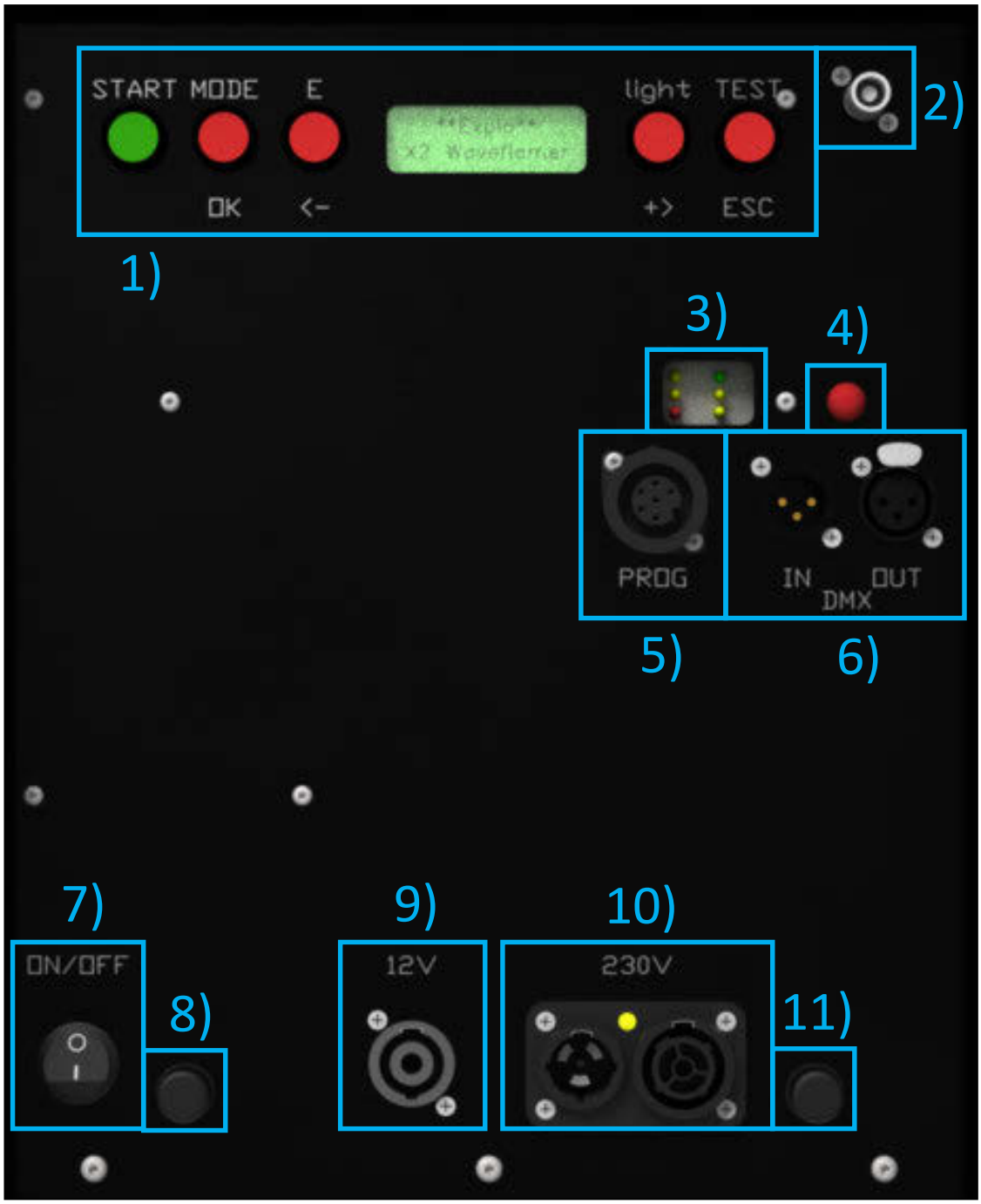
1) Controls

2) Moving Head

3) Pumping Station with Canister

Explo Zündtechnik
Harald Kulterer
Völkermarkterstraße 240
9020 Klagenfurt
Tel: +43 (0) 463 / 32 2 45
Fax: +43 (0) 463 / 32 2 45 75
Mobil: +43 (0) 664 / 51 007 51
office@explo.at
www.explo.at
Made in AUSTRIA

2.2 Overview of the Controls



1) Buttons and Display
2) Antenna socket
3) Control LEDs
4) Status LED
5) Programing socket
6) DMX-Connectors
7) ON/OFF Switch
8) Fuse for 12VDC
9) Connector for 12VDC
10) Connector for 230VAC
11) Fuse for 230VAC

2.3 Description of Front-Panel Components

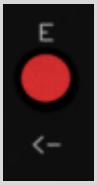
2.3.1 Buttons and Display

The X2 Wave-Flamer is fitted with a two line LCD-Display, with background lighting. This display is the optical output for the Device Status, as well as the menu handling.

The following control buttons are available next to the Display:

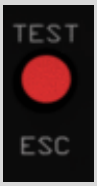
Start-Button
This Button must be pushed after using the ON/OFF Switch, to activate the Device.

Mode/OK-Button
Outside of the Menu, this button can be used to access the Menu.
Inside the Menu, this button is used to confirm.



Discharge/Minus-Button
Outside of the Menu, this Button is used to discharge the Pump (only in Test-Mode).
Inside the Menu, this Button is used as Minus-Button.

Light/Plus-Button
Outside of the Menu, this Button toggles the background light on and off.
Inside the Menu, this Button acts as a Plus-Buttondient diese Taste als Plus-Taste.



Test/ESC-Button
Outside of the Menu, a Test signal can be sent to the Transmitter to test the radio connectivity (only in Test-Mode).
Inside the Menu, this Button is used as an Escape-Button.

2.3.2 Antenna socket

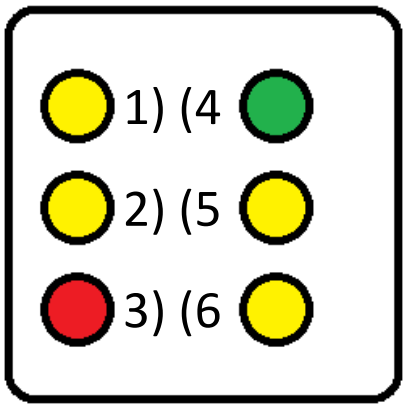
The antenna is used to receive data. To bend or clamp the antenna or antenna-cable can lead to severe damage, and should be avoided. Please make sure the antenna is mounted correctly and in an upright position during a performance, to guarantee the best possible radio connectivity.

Wetness entering the antenna socket can drastically reduce the connectivity.

Explo Zündtechnik
Harald Kulterer
Völkermarkterstraße 240
9020 Klagenfurt
Tel: +43 (0) 463 / 32 2 45
Fax: +43 (0) 463 / 32 2 45 75
Mobil: +43 (0) 664 / 51 007 51
office@explo.at
www.explo.at
Made in AUSTRIA

2.3.3 Control LEDs

The control LEDs can give you information about the status of the device.



1) Pump is working
2) Pump is at 100%
3) Pump Error
4) Battery
5) Radio signal
6) DMX

2.3.3.1 Pump is working

This LED tells you if the pump is working. It should only be lit in Armed-Mode, not in Test-Mode.

2.3.3.2 Pump is at 100%

This LED shows if the pump has reached the neccessary pressure.

2.3.3.3 Pump Error

This LED shows if there is an error at the pump. If this LED is lit, it may indicate an empty Liquid-canister, You may not use the Wave-Flamer if this LED is lit, since it may cause severe damage to the device.

2.3.3.4 Battery

This LED indicates the Battery status. If it is continually alight, the voltage is okay. If it should start to flash, the device does not get enough power. If the device is powered by the 230V connection, and the LED starts to flash, this may indicate a damage to one of the transformers.

2.3.3.5 Radio signal

This LED flashes if the X2 Wave-Flamer receives a radio signal.

2.3.3.6 DMX

If the device is fitted with DMX, and ready, this LED will be lit permanently. If the device receives DMX signals, the LED will flash for confirmation.

2.3.4 Status LED

Optional Status LED. In the current version of the device, it is not used.

2.3.5 Programing socket

This socket is used to program the device.

2.3.6 DMX-Connectors

Optional connectors to control the device via DMX.

2.3.7 ON/OFF Switch

ON/OFF Switch of the X2 Wave-Flamer. To activate, the "Start"-Button must also be pushed.

2.3.8 Fuse for 12VDC

Fuse (10A delay) to protect internal electronics.

2.3.9 Connectors for 12VDC

Connector for an external supply with 12VDC.

2.3.10 Connectors for 230VAC

Connectors for a supply with 230V.

2.3.11 Fuse for 230VAC

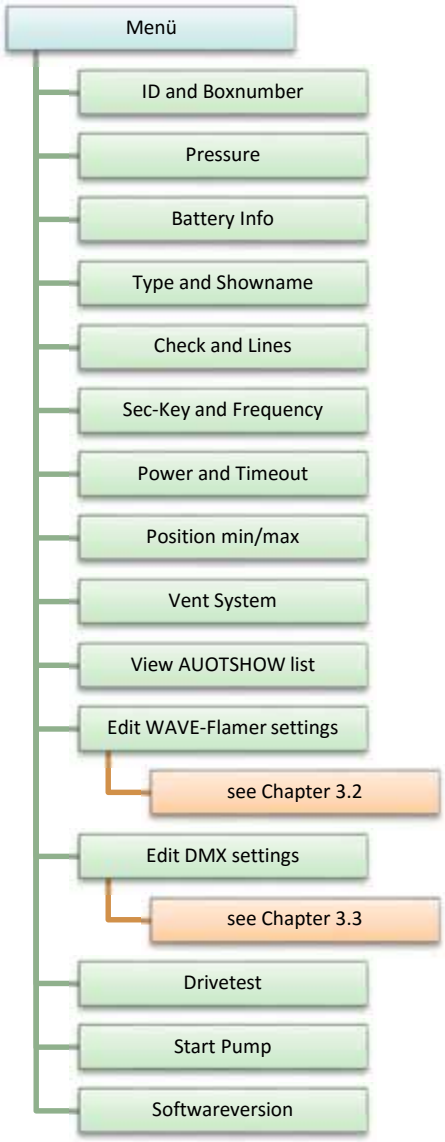
Fuse (10A delay) to protect the device.

Explo Zündtechnik
Harald Kulterer
Völkermarkterstraße 240
9020 Klagenfurt
Tel: +43 (0) 463 / 32 2 45
Fax: +43 (0) 463 / 32 2 45 75
Mobil: +43 (0) 664 / 51 007 51
office@explo.at
www.explo.at

3 Menu items

The menu can be entered by use of the Mode/OK-Button.

3.1 Main menu



3.1.1 ID and Boxnumber

Here you can see the ID-Number (line 1) and Boxnumber (line 2) of the device.

3.1.2 Pressure

Shows the current pressure (100% = 10bar) of the device(line 1). In the second line, you can see the time (in sec) it took the device to reach the maximum pressure of 10bar, as well as the lowest value the pressure sank to after reaching 100% (u97% means, the device sank to 97% of the maximum pressure).

3.1.3 Battery Info

Shows the voltage value of the 12V-supply (line 1), as well as the 24V-supply (line 2).

3.1.4 Type and Showname

Displays the Type of product, as it is named in the device-List of the transmitter (line 1), as well as the name of the show that is currently saved onto the transmitter (line 2).

3.1.5 Check and Lines

Shows the checksum of the device (line 1) and the number of ignition lines of the Show, that correspond to the device (line 2).

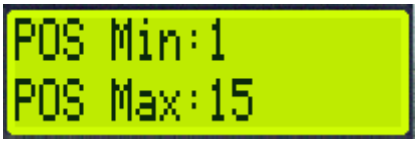
3.1.6 Sec-Key and Frequency

Show the used Secure-Key (line 1) and the chosen frequency of the integrated radio module (line 2).

3.1.7 Power and Timeout

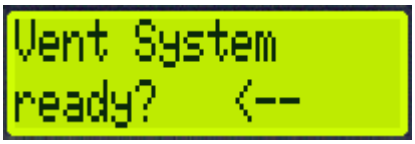
Tells you the set radio strength (line 1) and the time, after which the show will stop when there is no incoming signal from the transmitter (line 2).

3.1.8 Position min/max



Shows the minimal, and the maximum positions the device may use.

3.1.9 Vent System



This menu item can be used to vent the system. By pushing Mode/OK, you can access a sub menu, where you can make the discharge (see graphic below).

If both the Plus and Minus Buttons are pushed simultaniously, the device will begin the discharge.

WARNING	Before venting, the pump must be activated manually (see 3.1.14). During the venting, no persons may hold clothing, and/or body parts over the head of the device.

3.1.10 View AUTOSHOW list

Shows every ignition line in the show, that are used by this device.

3.1.11 Edit WAVE-Flamer settings

Allows you to change settings of the device. See Chapter 3.2.

3.1.12 Edit DMX settings

Allows you to change the DMX settings. See Chapter 3.3.

3.1.13 Drivetest

Allows you to start the "Drivetest". This Test checks if all angles can be reached by the moving head in a given timeframe. If it doesn't reach a position within the limit, it will lead to a timeout, and an error. This test is relevant if you use external batteries, whose voltage is already below the optimum value (see 3.1.3), and you still wish to check if all positions can be reached fast enough.

By pushing Mode/OK you enter a sub menu, in which the "Drivetest" can be started.

If the Plus-Button is pushed in this menu, the Drivetest will be started. During the Test, all Positions (except for Position 8, or 0°) are driven to. After the last Position has been reached (Position 15) the number of errors from 0 to 14 are displayed (see graphic below).

Errors at the Drivetest can be a sign for weak batteries. During sequences, you may be facing longer times because of this.

 **WARNING**	While the Drivetest is being made, no objects may be placed in the movement zone of the Swivel Head, and the Head itself may not be touched.

3.1.14 Start Pump

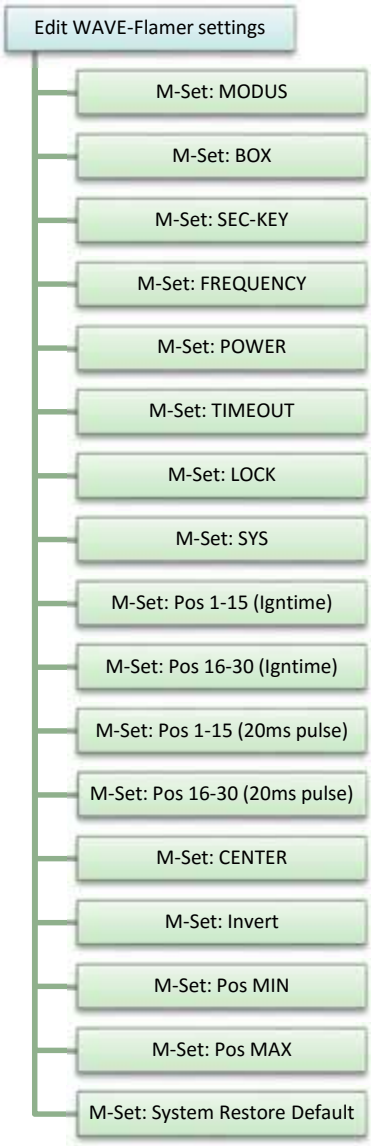
Allows you to start the pump manually, and pumping of up to 100%. By pressing Mode/OK you can enter the sub menu, allowing you to start this procedure.

If the Plus-Button is pushed, the system will start pumping (until 100% are reached).

3.1.15 Softwareversion

Shows the Softwareversion currently on the device.

3.2 WAVE-Flamer Setting



3.2.1 M-Set: MODUS

Allows you to switch Modes between Test, Armed, or Sleep.

3.2.2 M-Set: BOX

Allows you to change the Boxnumber of the device.

3.2.3 M-Set: SEC-KEY

Allows you to change the Secure-Key of the device (Standard 139). The Secure-Key can be used to encode the radio transmittance inside a given System-adress. Transmitters can only control devices set to the same Secure-Key.

3.2.4 M-Set: FREQUENCY

Allows you to change the Frequency (Standard 6).

3.2.5 M-Set: POWER

Allows you to change the strength of the radio module (Standard 10).

Explo Zündtechnik
Harald Kulterer
Völkermarkterstraße 240
9020 Klagenfurt
Tel: +43 (0) 463 / 32 2 45
Fax: +43 (0) 463 / 32 2 45 75
Mobil: +43 (0) 664 / 51 007 51
office@explo.at
www.explo.at
Made in AUSTRIA

3.2.6 M-Set: TIMEOUT

Allows you to change the value of time, after which the device stops playing the show, if it does not receive a synchronisation signal from the transmitter (set in steps of seconds from 1 to 99, standard 30). The timeout should never be below 6, since the transmitter send the synchronisation signal only every 5 seconds.

3.2.7 M-Set: LOCK

Allows you to lock the receiver menu. Also allows you to set the code to unlock the menu.

3.2.8 M-Set: SYS

Allows you to change the System-adress of the receiver.

3.2.9 M-Set: Pos 1-15 (Igntime)

This value should not be changed (a future Update will make use of this menu item, standard 40).

3.2.10 M-Set: Pos 16-30 (Igntime)

This value should not be changed (a future Update will make use of this menu item, standard 340).

3.2.11 M-Set: Pos 1-15 (20ms pulse)

This value should not be changed (a future Update will make use of this menu item, standard OFF).

3.2.12 M-Set: pos 16-30 (20ms pulse)

This value should not be changed (a future Update will make use of this menu item, standard ON).

3.2.13 M-Set: CENTER

Allows you to change the position of the middle (Position 8, 0°) a few degrees to the right or left (Standard acc. to factory settings). This may be useful if the device cannot be placed completely horizontal.

3.2.14 M-Set: Invert

If this is set to "ON", all positions (see 4.1.2) are mirrored (15↔1, 14↔2, 13↔3, 12↔4, 11↔5, 10↔6, 9↔7, 8=8).

3.2.15 M-Set: Pos MIN

Allows you to set from which position (1 to 15) the device may use certain sequences. Positions below the set one, will not be used.

 **WARNING**	Wave-Sequences are exempt from this.

3.2.16 M-Set: Pos MAX

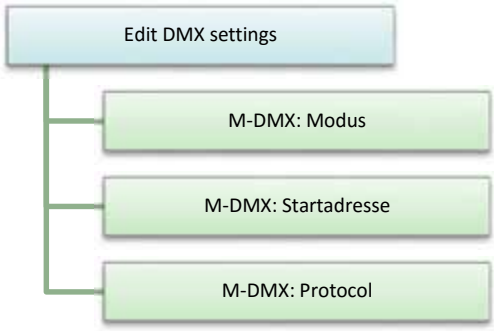
Allows you to set from which position (1 to 15) the device may use certain sequences. Positions above the set one, will not be used.

WARNING	Wave-Sequences are exempt from this.

3.2.17 M-Set: System Restore Default

Allows you to return the device to factory settings, and delete the show.

3.3 DMX-Settings



3.3.1 M-DMX: Modus

Allows you to change the DMX-Mode between ON and OFF.

3.3.2 M-DMX: Startadress

Allows you to set the adress of the starting DMX-channel from 1 to 507 (Standard 1). The starting adress is also used for Pyrodigit (maximum value 16, values higher than this will be set to 16 automatically when using the Pyrodigit-protocoll).

3.3.3 M-DMX: Protocol

Allows you to select between using DMX 512 or the Pyrodigit-protocoll.

4 Handling the X2 Wave-Flamer

Der X2 Wave-Flamer kann mittels Explo-Sender der X2-Serie, oder optional über das DMX-Protokoll angesteuert werden.

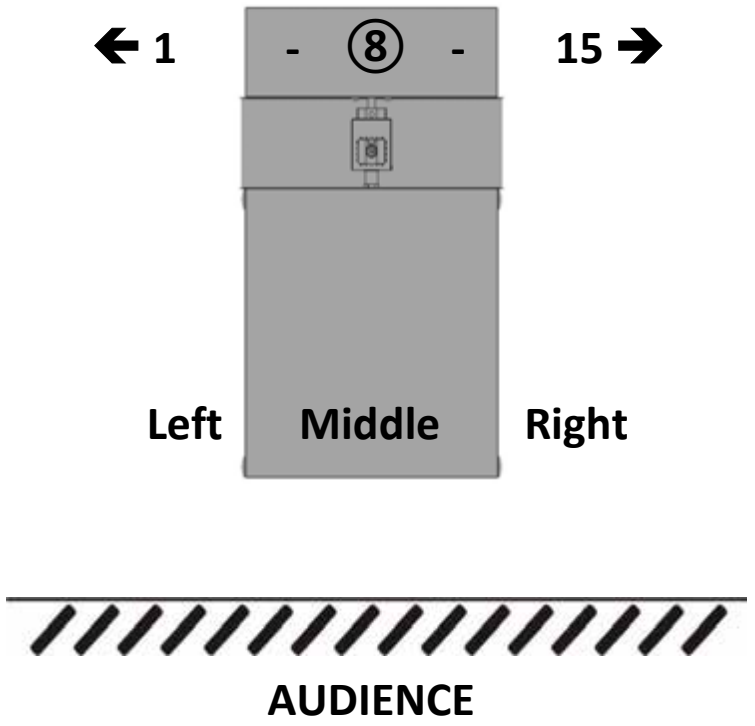
4.1 General

4.1.1 Definition of the audience-side

Opposite of the control panel side, is the audience-side of the device. This is the side the audience should be seeing during the show.

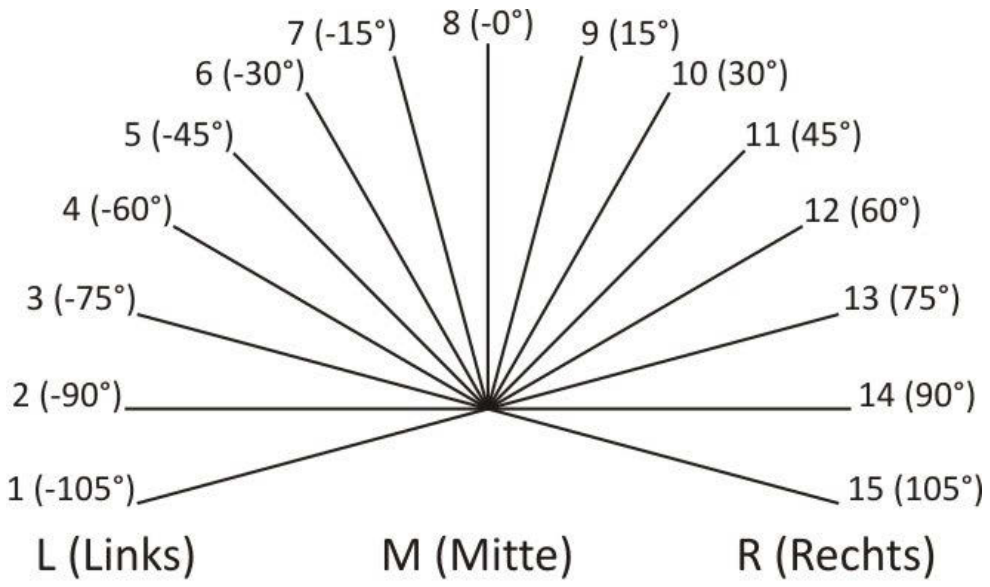
All Sequences and Positions have been made from this point of view. All important Positions for the device from 1 to 15 (see 4.1.2) as well as the movement labels left, middle and right, are only correct, if the device has been placed in this way. The following graphic shows the X2 Wave-Flamer from above, and is meant to give you an idea of the labelings.

Furthermore, a correct positioning ensures that all control LEDs are facing away from the audience, and do not bother the viewer.



4.1.2 Definition of Positions

Contrary to the control via DMX, only certain positions can be accessed, except for Waves. All in all, a spectrum of 210° (±105°) can be used. This spectrum was separated into 15 positions in steps of 15° for the control via radio. These 15 positions were numbered from 1 to 15, and the middle, vertical position (Number 8) defined as 0°. The following graphic depicts the single positions as seen from the audience side.



4.1.3 Drivetimes for the Autoshow

If you wish to make a flameshow that is synchronized to the music, the drive times between single ignitions must be calculated. For the V1 version, the drivetime to the next ignition is entered as a rise time. In the X2 version, the device automatically drives to the next angle of ignition, and waits there until the ignition is made. Between the ignitions, you always need to enter a higher time distance then drive time.

Angle	Drivetime
-105°	170 ms
-90°	150 ms
-75°	130 ms
-60°	110 ms
-45°	90 ms
-30°	70 ms
-15°	50 ms
0°	0 ms
15°	50 ms
30°	70 ms
45°	90 ms
60°	110 ms
75°	130 ms
90°	150 ms
105°	170 ms

Example Autoshow V1 or normal ignition

Channel 1 is being ignited. After the Wave Flamer has received a signal it moves to the -105° angle. This takes 170 milliseconds. After this drive, the ignition starts for about 0.11 seconds. After this, the Flamer moves to the middle position (0°) again.

Example Autoshow X2

Channel 1 is being ignited by use of the Autoshow. Since the Show has been pre-programmed onto the Wave Flamer, it moves automatically to the next angle of -105°. You do not need to enter a rise time during show creation. After this drive, the ignition is being made for about 0.11 seconds. Afterwards, the Flamer drives to the next angle used in the Autoshow.

4.2 Control via X2-Transmitter

To control the devices via radio connection, please read the instruction manual provided with the transmitter.

4.2.1 Sequence list

The X2 Wave-Flamer has a number of pre-made sequences, allowing you to access certain sequences with the right channel and Boxnumber. Below, you can find the different set sequences and single ignitions. Important: The times are only guaranteed if the device is supplied with 230VAC. When using (empty) Batteries, these values may change.

4.2.1.1 Single ignitions

Channel	Ignition	Ign.Time	Description	Movement	Time
1	-105°	110ms(40)	Single Ignition short flame		0,11 Sec.
2	-90°	110ms(40)	Single Ignition short flame		0,11 Sec.
3	-75°	110ms(40)	Single Ignition short flame		0,11 Sec.
4	-60°	110ms(40)	Single Ignition short flame		0,11 Sec.
5	-45°	110ms(40)	Single Ignition short flame		0,11 Sec.
6	-30°	110ms(40)	Single Ignition short flame		0,11 Sec.
7	-15°	110ms(40)	Single Ignition short flame		0,11 Sec.
8	0°	110ms(40)	Single Ignition short flame		0,11 Sec.
9	15°	110ms(40)	Single Ignition short flame		0,11 Sec.
10	30°	110ms(40)	Single Ignition short flame		0,11 Sec.
11	45°	110ms(40)	Single Ignition short flame		0,11 Sec.
12	60°	110ms(40)	Single Ignition short flame		0,11 Sec.
13	75°	110ms(40)	Single Ignition short flame		0,11 Sec.
14	90°	110ms(40)	Single Ignition short flame		0,11 Sec.
15	105°	110ms(40)	Single Ignition short flame		0,11 Sec.
16	-105°	410ms(340)	Single Ignition long flame		0,41 Sec.
17	-90°	410ms(340)	Single Ignition long flame		0,41 Sec.
18	-75°	410ms(340)	Single Ignition long flame		0,41 Sec.
19	-60°	410ms(340)	Single Ignition long flame		0,41 Sec.
20	-45°	410ms(340)	Single Ignition long flame		0,41 Sec.
21	-30°	410ms(340)	Single Ignition long flame		0,41 Sec.
22	-15°	410ms(340)	Single Ignition long flame		0,41 Sec.
23	0°	410ms(340)	Single Ignition long flame		0,41 Sec.
24	15°	410ms(340)	Single Ignition long flame		0,41 Sec.
25	30°	410ms(340)	Single Ignition long flame		0,41 Sec.
26	45°	410ms(340)	Single Ignition long flame		0,41 Sec.
27	60°	410ms(340)	Single Ignition long flame		0,41 Sec.
28	75°	410ms(340)	Single Ignition long flame		0,41 Sec.
29	90°	410ms(340)	Single Ignition long flame		0,41 Sec.
30	105°	410ms(340)	Single Ignition long flame		0,41 Sec.

4.2.1.3 Stepp-Sequences

Channel	Ignition	Description	Movement	Time
31	Stepp from 1-15	Steppsequence short flame	L -> R	2,4 Sec.
32	Stepp from 15-1	Steppsequence short flame	R -> L	2,4 Sec.
33	Stepp 5 > 8 > 11	Steppsequence short flame	L -> R	0,58 Sec.
34	Stepp 11 > 8 > 5	Steppsequence short flame	R -> L	0,58 Sec.
35	Stepp 6 > 10	Steppsequence short flame	L -> R	0,39 Sec.
36	Stepp 10 > 6	Steppsequence short flame	R -> L	0,39 Sec.
37	Stepp 4 > 6 > 8 > 10 > 12	Steppsequence short flame	L -> R	0,9 Sec.
38	Stepp 12 > 10 > 8 > 6 > 4	Steppsequence short flame	R -> L	0,9 Sec.
39	Stepp 8 > 6 > 10 > 4 > 12	Steppsequence short flame	M > L > R > L > R	1 Sec.
40	Stepp 8 > 10 > 6 > 12 > 4	Steppsequence short flame	M > R > L > R > L	1 Sec.
41	Stepp from 1-15	Steppsequence long flame	L -> R	6,89 Sec.
42	Stepp from 15-1	Steppsequence long flame	R -> L	6,89 Sec.
43	Stepp 5 > 8 > 11	Steppsequence long flame	L -> R	1,48 Sec.
44	Stepp 11 > 8 > 5	Steppsequence long flame	R -> L	1,48 Sec.
45	Stepp 6 > 10	Steppsequence long flame	L -> R	0,99 Sec.
46	Stepp 10 > 6	Steppsequence long flame	R -> L	0,99 Sec.
47	Stepp 4 > 6 > 8 > 10 > 12	Steppsequence long flame	L -> R	2,4 Sec.
48	Stepp 12 > 10 > 8 > 6 > 4	Steppsequence long flame	R -> L	2,4 Sec.
49	Stepp 8 > 6 > 10 > 4 > 12	Steppsequence long flame	M > L > R > L > R	2,53 Sec.
50	Stepp 8 > 10 > 6 > 12 > 4	Steppsequence long flame	M > R > L > R > L	2,53 Sec.

4.2.1.4 Wave-Sequences

Channel	Ignition	Description	Movement	Time
51	Wave 5 --> 11	Wavesequence middle	L -> R	1,79 Sec.
52	Wave 11 --> 5	Wavesequence middle	R -> L	1,79 Sec.
53	BIG WAVE 1 --> 15	Wavesequence long	L -> R	3,93 Sec.
54	BIG WAVE 15 --> 1	Wavesequence long	R -> L	3,93 Sec.
55	Wave 8 --> 1	Wavesequence middle	M -> L	2,26 Sec.
56	Wave 8 --> 15	Wavesequence middle	M -> R	2,26 Sec.
57	Wave 1 --> 8	Wavesequence middle	L -> M	2,26Sec.
58	Wave 15 --> 8	Wavesequence middle	R -> M	2,26 Sec.
59	Wave 8 -->11	Wavesequence short	M -> R	1,19 Sec.
60	Wave 8 --> 5	Wavesequence short	M -> L	1,19 Sec.
61	Wave 5 --> 8	Wavesequence short	L -> M	1,19 Sec.
62	Wave 11 --> 8	Wavesequence short	R -> M	1,19 Sec.

4.2.1.5 Additional Sequences

Channel	Ignition	Description	Movement	Time
63	Stepp 2 > 14	Steppsequence short flame	L -> R	0,48 Sec.
64	Stepp 14 > 2	Steppsequence short flame	R -> L	0,48 Sec.
65	Stepp 2 > 14	Steppsequence long flame	L -> R	1,23 Sec.
66	Stepp 14 > 2	Steppsequence long flame	R -> L	1,23 Sec.

4.3 Control via DMX 512

Optionally, the X2 Wave-Flamer can be controlled by DMX 512. 6 DMX channels are needed.

4.3.1 DMX-Channels

The followeing 6 DMX-Channels are needed for the X2 Wave-Flamer:

- Channel 1: Angle (Starting adress)
- Channel 2: Speed (Starting adress +1)
- Channel 3: Ignition (Starting adress +2)
- Channel 4: Opening Time (Starting adress +3)
- Channel 5: Program (Starting adress +4)
- Channel 6: Mode (Starting adress +5)

4.3.1.1 Channel 1: Angle (Starting adress)

The angle is the first channel (=starting adress). It defines to which angle the head of the Flamer will move to. The angle can be chosen anywhere between -105° to +105° (DMX-value 0 to 255).

Since the DMX-value itself can only be a whole number, some angles must be rounded up.

The calculated DMX-value for an angle of 0° is 127.5 (rounded up 128). Using this value, the following formula can be used to calculate all other angles $\measuredangle$ (in degrees). Please always note the prefix of the angle.:

$$\text{DMX Value} = 127{,}5 + (\measuredangle \bullet 1{,}2143)$$

To calculate a DMX value in percent, the following formula must be used:

$$\%\ \text{Value} = \text{DMX value} \bullet (100/255)$$

Below you can find some examples for the DMX value of an angle.

Channel	Angle	DMX	DMX (%)
1	**-105°**	0	0%
2	**-90°**	18	7%
3	**-75°**	36	14%
4	**-60°**	54	21%
5	**-45°**	73	28%
6	**-30°**	91	35%
7	**-15°**	109	42%
8	**0°**	128	50%
9	**15°**	146	57%
10	**30°**	165	64%
11	**45°**	183	71%
12	**60°**	201	78%
13	**75°**	219	85%
14	**90°**	237	92%
15	**105°**	255	100%

4.3.1.2 Channel 2: Speed (Starting adress +1)

The second channel (starting adress +1) defines the speed of the device. It can be set anywhere from DMX value 0 to 255. (standing still to full speed).

The speed is in raltion to time, and not power. This leads to a better synchronisation of the Flamers. This setting is not affected by "Fading", since a synchronisation can only be measured from a distance of about 8-9 DMX values (Channel1).

Example of a constant Wave

1. Drive to starting point(CH1 Angle = 0, CH2 Speed = 255, Ch3 Ignition = 0)
2. Once the starting point has been reached, set CH2, speed (Ch1 Angle = 0, CH2 Speed = 50, Ch3 Ignition = 0)
3. Set end point and ignition (CH1 Angle = 255, CH2 Speed = 50, Ch3 Ignition = 255)
4. The device will now make a constant move to the end point and ignites.

If the Flamer should fade, you must set a DMX-value of 255.

	Speed		
DMX-value	0	1 to 254	255
Speed	stop	Incremental of speed	Max. Speed

Explo Zündtechnik
Harald Kulterer
Völkermarkterstraße 240
9020 Klagenfurt
Tel: +43 (0) 463 / 32 2 45
Fax: +43 (0) 463 / 32 2 45 75
Mobil: +43 (0) 664 / 51 007 51
office@explo.at
www.explo.at
Made in AUSTRIA

4.3.1.3 Channel 3: Ignition (Starting adress +2)

The third channel (starting adress +2) activates the actual ignition. If the DMX value on this channel is higher than 253, the projector will ignite. The DMX-value of this channel must fall below 254, before an ignition can be made again with the values 254 and 255.

	Ignition	
DMX-value	0 to 253	254 and 255
Ignition	Device won't ignite	Device ignites

4.3.1.4 Channel 4: Opening time (starting adress +3)

The fourth channel (starting adress +3) indicates how long the opening time should be. The opening time can be selected in steps of 10ms, to 2540ms (2,54s) using the DMX-values from 0 to 254.

The DMX-value 255 allows a permanent ignition. This ignition ends if the value drops below 254, at the latest after 2,5 seconds.

The following formula can be used to calculate the opening time t [ms]:

$$\text{DMX value} = t / 10$$

	Opening time						
DMX-value	0	1	2	3	...	254	255
Opening time	0ms	10ms	20ms	30ms		2540ms	permanent

4.3.1.5 Channel 5: Program (Starting adress +4)

The fifth channel (starting adress +4) allows you to ignite one of the predefined sequences. Three DMX-values can be used for one of the ignition channels from the sequence list (see 4.2.1). The values 0 to 2 are unused, the first sequence (Ignition channel 1) starts with the DMX values 3 to 5.

The following formula can be used:

$$\text{DMX value} = 2 + \text{Channelnumber} \bullet (255/100)$$

The following formula can be used for the % value:

$$\%\ \text{value} = \text{Channelnumber}$$

	Program / Ignition channel						
DMX-value	0 to 2	3 to 5	6 to 7	8 to 10	11 to 12	...	179 to 181
% value	0	1	2	3	4		70
Ign. channel	N/A	1	2	3	4		70

4.3.1.6 Channel 6: Mode (Starting adress +5)

The sixth DMX channel is the Handling Mode. It allows you to set the device into Armed-Mode (DMX-value 50 to 200). The othe DMX values are the Test-Mode. Important: The device can only make ignitions in Armed-Mode.

	Mode		
DMX-Value	0 to 49	50 to 200	201 to 255
Mode	Test-Mode	Armed-Mode	Test-Mode

4.3.2 Steps to use the device with DMX-protocoll

1. **Set angle to 0° for safety reasons (Channel 1 to DMX-value 128)**
2. **Turn device Armed (Channel 6 to DMX value 50 to 200)**
3. **Select opening time of ignition or sequence (Channel 4 or channel 5)**
4. **Select angle (Channel 1)**
5. **Activate ignition (Channel 3 to DMX value 254 or 255)**
6. **Deactivate ignition (Channel 3 to DMX value below 254)**

Note: When using sequences, do not activate Sequences and ignitions at the same time. First choose a sequence, then make an ignition 40ms later

In rare cases the Flamer might not ignite otherwise.

5 Safety

The X2 Wave-Flamer has many safety functions, that protect the device from damages, and allow the user to make special safety preparations to avoid personal or property damage. You should follow all instructions set in chapter 5.3.

5.1 Safety functions

5.1.1.1 Double solenoid valve

The device features to serial solenoid valves. Besides the standard Flame valve, an extra safety valve has been built into the device. Without electrical ignition, the valves cannot open.

5.1.1.2 Mechanical Stop

A mechanical stop in both movement directions hinder sthe device from reaching any angles over 120° in both directions.

5.1.1.3 Automatic Safety tests

Automated safety tests after switching on the device, as well as while it's running, test the system for a variety of errors. For example, a test is made wether the moving head is blocked in any way (Drivetest), or if the system has a leak.

5.1.1.4 Deactivating single angles

The X2 Wave-Flamer makes it possible to block certain angles before the show, so they cannot be driven to. This allows you to reduce any risk of damaging objects in certain angles beforehand.

5.1.1.5 Turning armed

The device can be turned armed by radio signal. Therefore, it is not neccessary for any persons to linger in the devices vicinity to activate it.

Only after the device has been turned armed, will the pressure be built up. The pressure is constantly checked.

5.1.1.6 Power outage

In case of a power outage, the Device will cancel a currently running Sequence. After turning it on again, it will start the usual starting tests.

5.2 Safety hints

The following Safety hints must not neccessarily obeyed, but should be followed if possible.

5.2.1 Emergency stop button

It is recommended to power the devices via a 230VAC power grid, and install an emergency stop button into the power cable, to make it possible to turn the device off at any time.

5.2.2 Drip pan

If the device is placed atop flammable material, or the floor must be protected, we recommend the use of a drip pan, to be placed underneath the device. The pan should collect any leaking fluids, and protect the floor.

The pan should measure at least 60x40 cm with a depth of 5cm.

5.2.3 Collection canister

An alternative to the drip pan is a collection canister, into which the plastic canister is placed when filled. Such a Stainless Steel canister will be available as an accessory in the furture.

5.2.4 Abort an Austoshow

To abort an Autoshow, the Flamer must receive a Pause-, Disarmed-, or Test Signal. During a predefinde sequence however, no signals will be received. To ensure complete safety, you should send Test signals until the flamer no longer ignites and/or lower the Timeout (see 3.2.6).

5.3 Safety notes

The device may only be used when it is in maintained and working condition. Faulty devices must be checked and repaired by the manufacturer, or an official service person. Under no circumstances must faulty devices be used.

After longer storage, the devices should be checked for function, and leak tightness.

The devices must be placed atop firm ground. The device should be horizontal to the floor, and be proofed against unintentional tipping. When using a tripod, it must also be proofed against tipping.

 **IMPORTANT**	**<u>Needed Safety distances</u>** **At least 15m in all projection directions of the device** **Ar least 5m to the other sides of the device**

Should flammable Materials be near the ejection directions of the flamer, we recommend to check these with the local security personnel and fire fighters.

After turning the device on, no persons may linger in their vicinity anymore. All persons that are part of the show (Actors, etc...) should be informed about the safety distances, and basic functions of the device.

During the show, it is possible that small amounts of fluid can fall back to the floor. These dissipate mostly before reaching the floor however, and thus are not dangerous.

The person responsible for the control of the devices must always have clear view of these. Ideally by direct sight, or alternatively via cameras. This person must be aware of the safety distances during the show, and be able to abort the show immediately should there be danger.

When using DMX, we recommend using an own DMX-universe for the Wave-Flamer (Separaing lights and devices).

Pre emptively, you should always have a CO2 fire extinguisher and an extinguishing blanket near you. Take special care when filling the devices Fluid tank. Keep the fluid away from heat, hot surfaces, sparks, open fire and other ignition sources. Do not smoke!

6 Technical Data

Size:	560 x 330 x 360 mm (WxDxH)
Weight:	25kg (without liquid)
Usable Angles:	±105° (210° total)
Fuel:	Bioethanol 100%, Isopropylalcohol, Isobar-H, N-Butanol
Discharge rate:	ca. 50ml / Second
Flameheight:	ca. 10 Meter (no wind)
Fill:	10 Liters
Power supply:	230VAC / 350W
Safety distance:	15m in all discharge directions (especially flammable items)
	5m in front and behind the Flamer
Tripod:	Tripod connector 35-36mm
	min. 50kg load

7 Safety hints

The device may only be used if it is good operating condition. Defective devices must be checked and repaired either by the manufacturer, or an official partner. Under no circumstances may defective devices be used.

The devices must be placed safely on an adequate place. The device should be placed horizontally on the ground if possible.

The named safety distances and usage hints from the manual are to be adhered.

After switching the device on, no persons may linger in the danger area of the device, including all possible discharge locations. All persons working in the show, are to be informed about safety distances, dangers and functions of the device.

The person responsible for controling the Flamer should always have a direct line of sight to the device. This person must see to it that the safety distances are kept during the show, and be able to abort the show if there is danger.

When using DMX, we recommend using an own universe for the X2 Wave-Flamer, separating Lights and devices.

To extinguish, use a CO2 fire extinguisher, and keep an extinguishing blanket ready. When filling the Liquid into the Device, be very careful. Keep fuel away from heat, hot surfaces, sparks, open flames and other ignition possibilities. Do not smoke!

EC-Conformity Declaration

according to EC-Machinecompliance **2006/42/EC** from 17. May 2006, Attachment II and according to EC-Compliance for electromagnetic compatibility **2004/108/EC** from 15. December 2004, Attachment IV

Manufacturer and Representative

Explo Zündtechnik
Harald Kulterer
Völkermarkterstrasse 240
9020 Klagenfurt am Wörthersee
Österreich
+43 (0) 463 / 32 2 45

The sole responsibility for this Conformity Declaration lies with the Manufacturer.

Item of Declaration

Designation: Flamenprojector
Type and marketname: X2 Wave-Flamer
Model: X2 Wave Flamer v1.1
Serialnumber: xxxxxx

Function: The Flameprojector "X2-Wave-Flamer" uses the integrated pumping station to pump liquid fuels (Bioethanol, Isobar-H, N-Butanol). The liquid is ignited at the head of the device, and discharged with 10bar pressure. The discharge direction can be changed during use (see function and safety hints in the manual).

Hereby, we declare that the aforementioned Machine, in its conception and build, as well as the type brought onto the market by us, adheres to the basic safety- and healthregulations of the EC-Compliance 2006/42/EC and 2004/108/EC. This declaration is void, if any modification is made, which is not verified by us.

This declaration has been handed in at Klagenfurt a.W., on the 26.03.2014 by Mr. Harald Kulterer (Owner Explo Zündtechnik).

Explo Zündtechnik
Harald Kulterer
Völkermarkter Straße 240
A-9020 Klagenfurt
Tel.: +43 (0)664 510 07 51

Salamander Quad Pro

Flame Effect System

User Manual

Version 1.2 – January 2020

(For firmware version 1.3)

1. Maximum Flame Heights and Minimum Safety Distances

Fuel type	Canisters fired	Maximum flame height [m]	Maximum flame height [ft]	Minimum safety distance [m]	Minimum safety distance [ft]
Coloured	1	3.5	12	3.0	10
Coloured	2	4.5	15	3.0	10
Coloured	3	5.5	18	3.0	10
Coloured	4	6.0	20	3.5	12
Natural	1	4.5	15	3.0	10
Natural	2	6.0	20	3.0	10
Natural	3	7.5	25	3.5	12
Natural	4	8.5	28	3.5	12

Table 1 Maximum flame heights and minimum horizontal safety distances for bursts

Minimum horizontal safety distances presented in table 1 above serve solely as a general guideline for the usual use case. It is the **operator's responsibility** to assess the location, show scene, potential air movement and all other relevant factors to determine appropriate safety distances for their own use case. Same considerations apply to vertical safety distances.

Note: Show scene (script / firing plan) can influence the safety distance requirement since it determines how much heat there is and how long it has to dissipate. Long bursts or fires in quick succession are able to heat up the area around the machine much more than short bursts used in long separation. Thus, safety distance should be adjusted accordingly.

2. Safety Information

This information should be read and thoroughly understood before use of the Salamander Quad Pro.

It is the responsibility of the user to be fully aware of all potential consequences and actions when using this machine.

The manufacturer cannot be held responsible for events occurring due to use of this machine by unqualified or untrained personnel.

Warning: All directions in the manual should be read thoroughly and completely understood before any attempt to use the machine.

The machine should only be operated by or under the instruction of trained personnel.

Any maintenance of the machine should only be carried out by the manufacturer or after the manufacturer's strict approval.

Should there be any doubt as to the safety of operation of the machine under any circumstances, the machine should be taken out of service immediately.

The Salamander Quad Pro must not be used in confined spaces, under any conditions of rain, snow or precipitation of any fluids, or moving air which will cause the flame to divert from a vertical path.

The Salamander Quad Pro should not be subjected to temperatures below 5°C or above 45°C, nor exposed to unsheltered conditions.

Warning: Failure to observe correct operating procedures may lead to serious injury, damage by fire, or explosion.

Warning: Before initial use and each subsequent use, the Salamander Quad Pro should be checked for functional suitability. Should any damage be observed or doubt about suitability of use occur, it should be immediately decommissioned and held for service.

2.1. Operational Guidance

The Salamander Quad Pro is only suitable for indoor use, or situations that meet the same environmental conditions.

The machine must only be used vertically, secured in position, protected from unauthorised interference, impact forces and vibration.

Any installation or repositioning should only be performed when the machine is cool, disconnected from the mains supply and all data communication.

Changing canisters should only be performed when the machine is powered down, **the HSI is cold**, and no other sources of ignition are present. Operator must check **no residual fluid is present or alight**.

Safety distances must be given a priority when using the Salamander Quad Pro. This includes persons in the performance area, and surrounding flammable objects. Maximum flame heights are presented in this manual. Operators are expected to use this information to determine appropriate safety distances.

Full risk assessments must be made before use, and all relevant emergency failure procedures must be immediately available, including qualified personnel, fire extinguishers and first aid.

All operations should have undergone preliminary tests and rehearsal.

Always ensure it is possible to shut the machine down immediately in case of emergency. Use of an Emergency Stop to interrupt mains supply is recommended.

Use only Le Maitre Chameleon Flame Fuel or Le Maitre Salamander Flame Fuel. Use of alternate fuels might lead to unexpected behaviour.

The Salamander Quad Pro is controlled by instruction from the DMX-512 protocol. The manufacturer cannot be held responsible for incorrect application or malfunction of data sent via DMX. Should DMX isolation or other devices be required for safe operation, this will be deemed the responsibility of the operator.

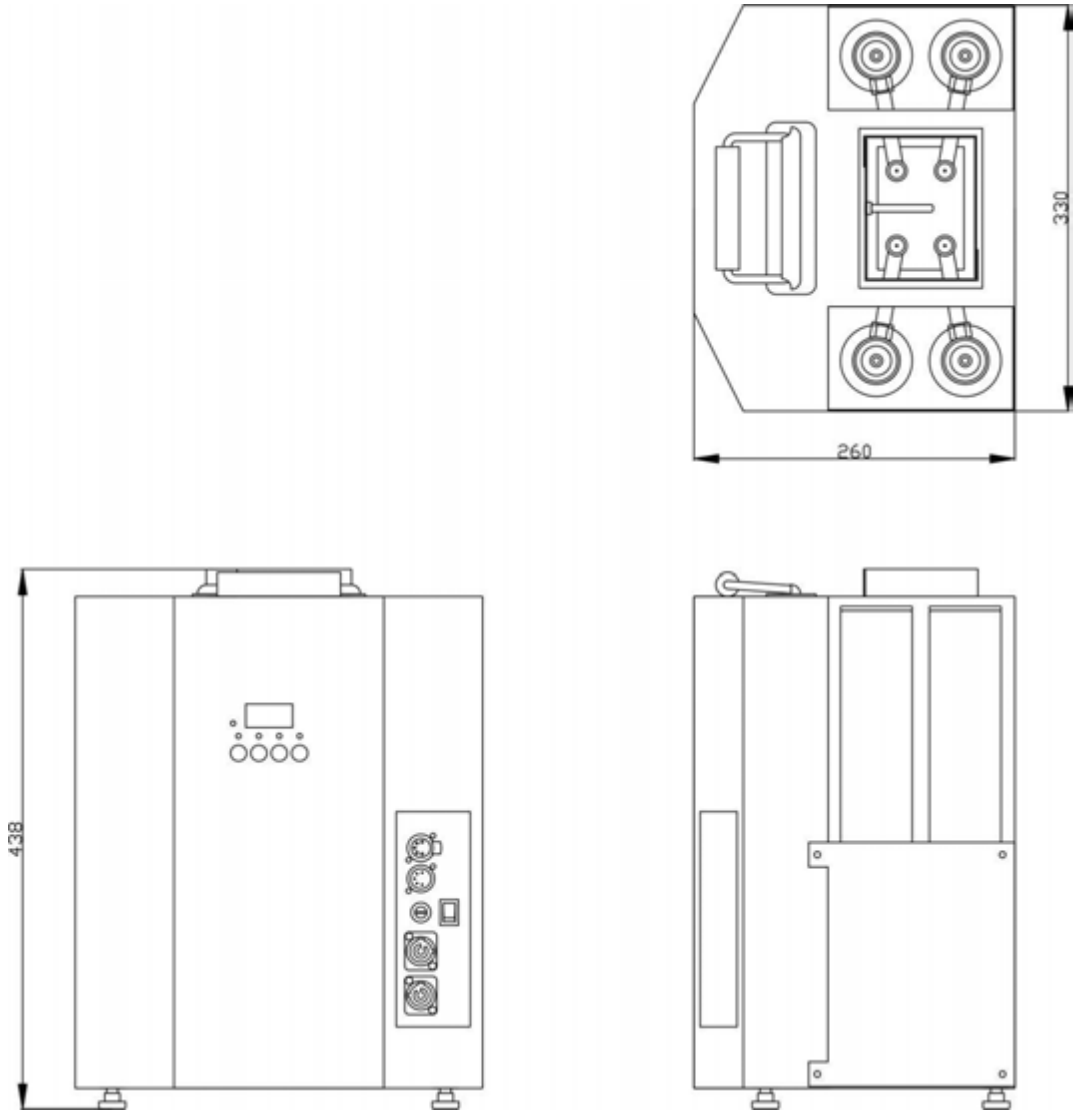
Avoid live-wiring DMX to the Salamander Quad Pro, ie. do not plug in or unplug DMX cables while the controller is actively transmitting data.

The Wireless Salamander Quad Pro is not designed for continual flame use. In order to keep the fuel canisters from overheating, short duration bursts (maximum of 5 seconds) are advised. Should conditions allow the operator may decide for longer bursts at their own discretion.

Should the Salamander Quad Pro fail to fire correctly, immediately shut down the machine and allow it to cool before investigating the problem.

Contents

3. Dimensions



Dimensions in millimetres.

4. Product Overview

4.1. Product Description

The Salamander Quad Pro is a versatile real flame effect from Le Maitre Ltd. The four-canister system allows the unit to produce flames from 3.5m to over 8.5m in height. The unique firing mechanism eliminates the requirement for internal valves and accumulators, minimising the risk of flammable gas leaks, and a robust hot surface igniter ensures reliable flame ignition.

The canister based design removes the requirement for bulky and expensive propane bottles and high pressure hosing, and allows for a choice of fuels making the Salamander Quad Pro ideal for any venue where propane is not permitted.

Details of the full range of Le Maitre products are available online at:

www.lemaitreltd.com and www.lemaitreusa.com

4.2. Features

- Flame height from 3.5m to 8.5m
- Four canister system
- Multiple colours and fuels available
- 30 seconds continuous flame or 35 fireballs per canister
- No internal valves or accumulators; flammable fuels are only stored within the canisters themselves
- DMX operation
- Robust hot surface ignitor
- Ignitor current monitoring
- Tilt safety switch

4.3. Specification

Power Requirements (EU): (US):	230VAC, 50Hz, 400W 120VAC, 60Hz, 400W
External Fusing (EU): (US):	3.15AT 6.3AT
Fuel Capacity:	4 x 500ml Canister
Fuel Type:	Propane / Butane mix OR Ethanol / Methanol mix (colour specific)
Effect Duration:	30s continuous / up to 35 fireballs per canister
Control:	DMX512 – 5 Channels (Igniter, 4x Fire)
Dimensions (mm):	433 (H) x 330 (W) x 260 (D)
Weight:	16kg

5. Operation

5.1. Getting Started

Remove the Salamander Quad Pro from all packaging and place on a flat, stable surface.

Prior to use, the Salamander Quad Pro should be inspected for damage. If the unit is found to be damaged, it should be removed from service immediately, and referred to Le Maitre for servicing and repair.

Install four canisters of Le Maitre Chameleon or Salamander flame fuel by screwing the canisters into the brass canister bases. Be careful not to over-tighten the canister as this risks damage to the canister, the canister base, and the seals within the canister base.

Unlike other flame effect systems, no gas should leave the canister as it is being installed. If escaping gas is detected, immediately remove the canister. The most probable cause is the tension of the spring supporting the firing pin. Refer to the Maintenance instructions for correct adjustment of this spring.

The unit is controlled via DMX protocol (see section 5.3). Plug in your DMX control into the DMX IN socket. DMX OUT socket allows for daisy-chaining multiple DMX units together on a single DMX output from the controller. For safety, it is advised that such network be reserved for flame units.

Power is supplied to the Salamander Quad Pro via the blue Neutrik PowerCon socket. A suitable mains cable fitted with a blue PowerCon plug must be used to connect the Salamander Quad Pro to a mains supply. The white PowerCon socket is a mains through connector allowing multiple Salamander Quad Pro to be powered from a single mains supply.

Please note: The blue Powercon must only ever be used as a mains input, and the white Powercon must only ever be used as a mains through / output.

Please note: Electrically, the Salamander Quad Pro's fuse and power switch are located after the mains through socket. This means the mains through socket will always be live while the Salamander Quad Pro is connected to a live mains supply, even if the unit is switched off, or the fuse has blown.

The power switch isolates the unit from the power socket – put it in ON position in order to turn on the machine. When turned on and loaded with canisters, the unit should be treated as if it could fire at any moment. **Immediately move to safe distance after turning the machine on and never adjust settings while canisters are fitted.**

5.2. Control Panel

The Salamander Quad Pro is configured through an on board control panel featuring a 3 x 7-Segment LED display, 5 x indicator LEDs and 4 x multi-function buttons.

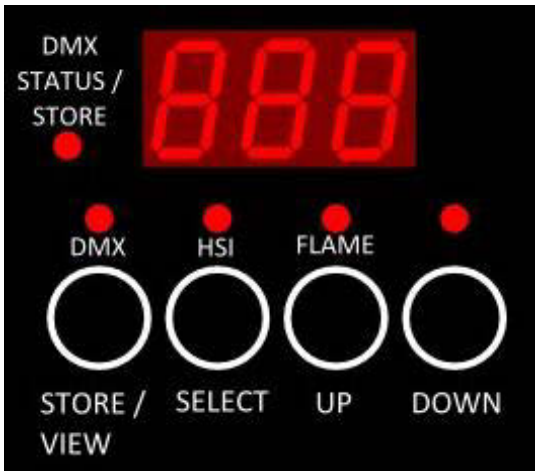


Figure 2: Salamander Quad Pro Control Panel

5.3. DMX Operation

The Salamander Quad Pro can only be operated through DMX-512. Five channels are required – one channel activates the HSI, the remaining four channels each operate one firing solenoid.

Two independent addresses can be set. The first address is for the HSI channel, the second address is the first of four fire channels. The three remaining fire channels will be the three consecutive channels.

For Example:

HSI – Channel 12. FLAME – Channel 2. HSI will be activated by channel 12. The fire channels will be 2, 3, 4 and 5.

The order of the canister channels can be seen in Figure 3.

5.4. Shutdown

Each of the following steps disables the machine. The order presented is for a recommended normal shutdown procedure. In case of an emergency always perform the easiest, safest and quickest step available first.

1. Disarm via the control system – set HSI DMX channel (and all fire channels) value to 0.
2. Cut the power to the machine.
3. Switch the power switch to the OFF position.

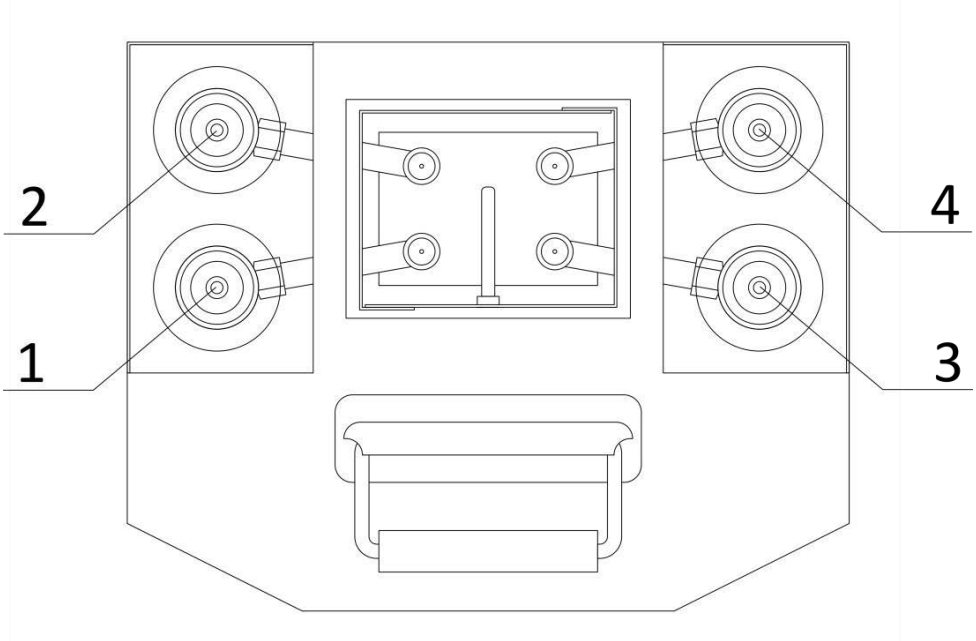


Figure 3: Salamander Quad Pro Canister Numbers

The display will show the DMX value received (0-255) on the fire channel. The HSI will be activated when the HSI channel is raised above 50% (128). At this point 'HSI delay' will begin; a timer will activate, preventing the unit from being fired until the HSI has had time to reach full temperature. While the timer is active, the 3 digit display will flash. When the display stops flashing, *rdy* will be displayed. The unit is now ready to fire.

When a Fire channel is raised above 50%, a solenoid forces a plunger into the fuel canister, opening the canister valve and allowing the pressurised fluid to escape via the output nozzle located at the base of the flue.

It is recommended that the fire channel is activated with the 'flash' buttons present on most DMX controllers. This allows for greater control over the effect produced. A brief activation of the channel (0.5 – 1s) will produce a short-duration fireball effect. A longer activation will produce a tall 'tongue' of flame.

Any number of fire channels can be activated simultaneously. Firing multiple canisters at the same time will result in a taller, broader flame. Please see the maximum flame heights presented at the start of this manual for more information.

It is recommended that operators of the Salamander Quad Pro take some time to familiarise themselves with the effects produced in order to achieve the best results.

Warning: A firing solenoid should never be continuously activated for more than 30 seconds. Keeping a solenoid powered for extended periods risks damage to the solenoid coil.

Please note: After the Salamander Quad Pro has been fired, there can occasionally be seen a small flickering flame within the flue. This is produced by residual fuel in the nozzle vaporising after the Fire channel has been released. This is expected in normal operation, however, if the effect is not desirable, it can be minimised by gently warming the fuel canisters prior to use. This increases the volatility of the fuel, allowing it to vaporise more rapidly.

Please note: If fire order is received while not in 'rdy' state, the machine will become disabled (HSI powered down, firing not possible) and display 'dEr' (DMX error). This is to ensure accidental firing by plugging the machine into DMX with all values raised is not possible – HSI delay has to be respected, fire order must be intentional and requires and input after machine is ready.

Once fire order disappears the machine is re-enabled – HSI can be powered back on and HSI delay can begin from the start.

The machine can cycle between HSI delay and 'dEr' indefinitely if the HSI delay continues to be disrespected.

6. Set-Up

The Salamander Quad Pro is programmed for operation through the control panel (see above). This must be carried out with all DMX cables unplugged.

When powered up, *doF* will flash. This is short for DMX OFF.

6.1. Setting DMX Channels:

Press the SELECT button. The HSI indicator LED will light up, and the currently selected HSI channel will be displayed. Use the UP / DOWN buttons to cycle through DMX channels. When the desired channel is selected, press STORE / VIEW to save the setting.

Press SELECT again, and the FLAME indicator LED will light up. This is the first Fire channel. Select the desired channel and save it as above. Pressing SELECT again will return to the DMX status display.

For safety reasons the machine will ignore DMX entirely if the HSI channel is set up to also be a fire channel.

6.2. Advanced Settings – tEC Menu

The Salamander Quad Pro's *tEC* menu can be accessed by pressing and holding STORE / VIEW and UP at the same time. *tEC* will be displayed, followed by the HSI delay value (*dXX*.) The fourth LED on the control panel (above the DOWN button) will be lit while in the *tec* menu (referred to from here on as the *tEC* LED.)

The first position in the *tEC* menu is the HSI delay setting. Press SELECT to access the other items in the menu: DMX Filter, Tilt Lock, Staggered Delay and firmware version information. Pressing SELECT a third time will return to the DMX Status Display.

6.2.1. HSI Delay

HSI Delay setting is indicated by the *tEC* and DMX LEDs.

dXX will be displayed, where *XX* is a value between 00 and 30. This value is the approximate HSI delay in seconds. It can be set to the nearest second by the UP and DOWN buttons, and saved by pressing STORE / VIEW. The default setting is 10 seconds.

Care should be taken when adjusting the HSI Delay. If it is set too short, the HSI might not have time to reach full temperature when the Salamander Quad Pro is fired. This can result in the fuel failing to ignite.

In addition, if the HSI Delay is reduced to 0, the HSI will not activate. This allows the firing system to be tested without the HSI active.

6.2.2. DMX Filter

DMX Filter is indicated by the *tEC* and HSI LEDs.

In order to minimise the possibility of incorrect triggering of the Salamander Quad Pro through DMX, the software contains a DMX data filter. This will cause a small delay in the unit's response to DMX commands (approximately 75ms.) In practical terms, this delay should be too short to have any effect on functionality, however it is possible to disable the DMX filter if this is desired.

Warning: If the Salamander Quad Pro is operated with the DMX filter disabled, the manufacturer will not be held responsible for any unexpected behaviour under DMX control.

The DMX filter has two settings: Filter ON (*F-1*) and Filter OFF (*F-0*)

Press UP to turn the filter ON, and DOWN to turn the filter OFF. This setting it stored automatically.

Note: HSI channel is excluded from DMX filter to ensure an accidental nudge to this channel or an odd noise spike does not disarm the machine mid-show, which would pose the need of waiting the full duration of HSI safety delay to re-enable.

6.2.3. Tilt Switch

Tilt Switch setting is indicated by the *tEC* and FLAME LEDs.

The Salamander Quad Pro contains a safety tilt switch that will disable the unit if it is tipped beyond 40 degrees from vertical. This will prevent the unit from operating should it be knocked over. It is possible to disable this tilt-switch if desired.

Warning: The Salamander Quad Pro is only designed to be used in a vertical position. If the unit is to be used in any other position, it is the sole responsibility of the user to ensure safe operation.

The Tilt Lock has two settings: Tilt Lock ON (*t-1*) and Tilt Lock OFF (*t-0*)

Press UP to turn the Tilt Lock ON, and DOWN to turn the Tilt Lock OFF. This setting it stored automatically.

6.2.4. 'Staggered delay'

Staggered Delay setting is indicated by all LEDs being off.

Reliable ignition requires a proper air to fuel mixture at the Hot Surface Ignitor (HSI). Multi-canister bursts release a sub-optimally large amount of fuel. A short single-canister burst preceding the main blast ensures proper ignition when an order to fire from multiple cans is received. The length of the 'staggered delay' after which the remaining cans join in can be adjusted in 'tEC' options:

'F-0' 0ms (feature disabled)
'F-1' 44ms (default)
'F-2' 68ms
'F-3' 90ms
'F-4' 112ms

Warning: Ignition is not guaranteed for multi-canister bursts with staggered delay disabled. If the feature is disabled the manufacturer will not be held responsible for any unexpected behaviour with multi-canister firing.

6.2.5. Firmware version information

HSI Delay setting is indicated by the single *tEC* LED.

Firmware version is viewable at the end of tEC menu – 'rEL' followed by 'X-X' indicating the release number.

7. Troubleshooting

Problem	***Cause***	***Action***
Fuse or circuit breakers blowing when HSI activated	Too many Salamander Quad Pros on single supply	Assign HSIs different DMX channels and stagger activation
	Faulty HSI	Refer to Maintenance instructions / contact Le Maitre
	HSI element in contact with chassis	Return to correct position. HSI might need to be replaced.
HSI not heating	HSI Delay set to 0	Set HSI Delay to above 0 (10 is recommended) Refer to Set-Up Instructions.
	Incorrect DMX channel	Set to correct DMX channel. Refer to Set-Up
HSI stuck in heating delay (display constantly flashing)	HSI disconnected	Re-connect HSI. Refer to Maintenance instructions / contact Le Maitre.
Firing solenoid not activating	HSI still heating	Wait until HSI is fully heated. The display will stop flashing when the Salamander Quad Pro is ready to fire.
	Incorrect DMX channel	Set to correct DMX channel. Refer to Set-Up instructions.
Firing solenoid activating, but no gas released	Empty canister	Replace canister.
	Canister nozzle damaged	Replace canister.
	Firing pin sticking	Remove firing pin and clean or replace o-ring. Refer to Maintenance instructions.
	Firing pin too low.	Increase firing pin height. Refer to Maintenance instructions.
Gas released, but failing to ignite	Cans too cold.	Warm cans with hot air or a water bath before use. Approx. 30°C is recommended.
	Insufficient air-flow.	Raise the unit from the ground by increasing the height of the adjustable feet.
No response from unit	Tilt lock-out engaged	Position on a level surface and turn unit off and on again.
	DMX signal not received	Check DMX controller and test cables.
Gas leaking when canister is installed	Firing pin too high.	Reduce firing pin height. Refer to Maintenance instructions.

8. Maintenance

Please note: While the Salamander Quad Pro contains several components that have been designed to be user-serviceable, the maintenance procedures described in this section should only be performed by qualified personnel. The manufacturer cannot be held responsible for events occurring due to incorrect maintenance of this machine.

Please note: All the procedures described in this section should be performed with the Salamander Quad Pro isolated from any power supply, after the unit has been allowed to cool for at least 10 minutes.

The Salamander Quad Pro features two service panels secured by 4xM4 bolts. Removal of these service panels allows access to the majority of user-serviceable components within the Salamander Quad Pro:

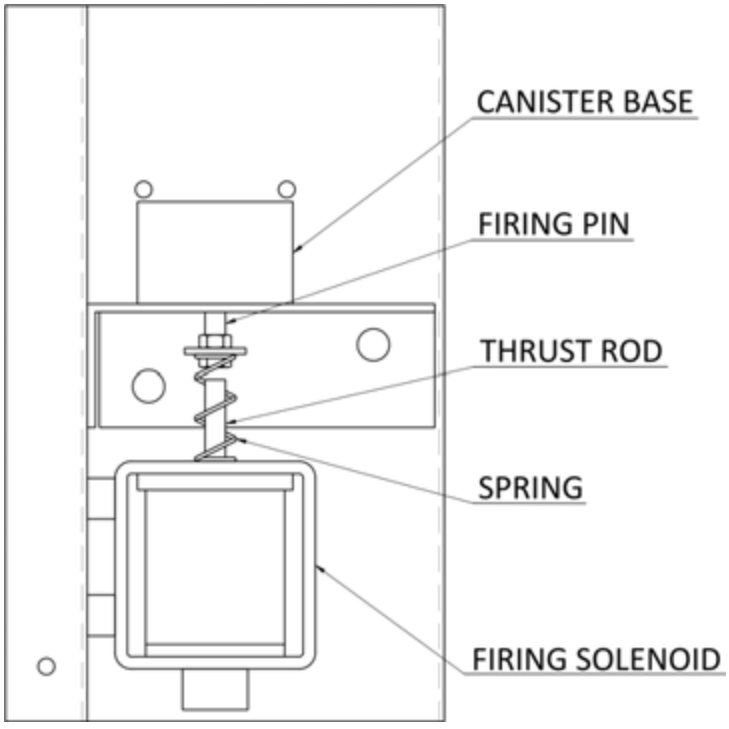


Figure 4: Salamander Quad Pro Firing Mechanism

8.1. Firing Pin Adjustment

While the firing solenoid is not active, the firing pin should not protrude above the top surface of the canister base:

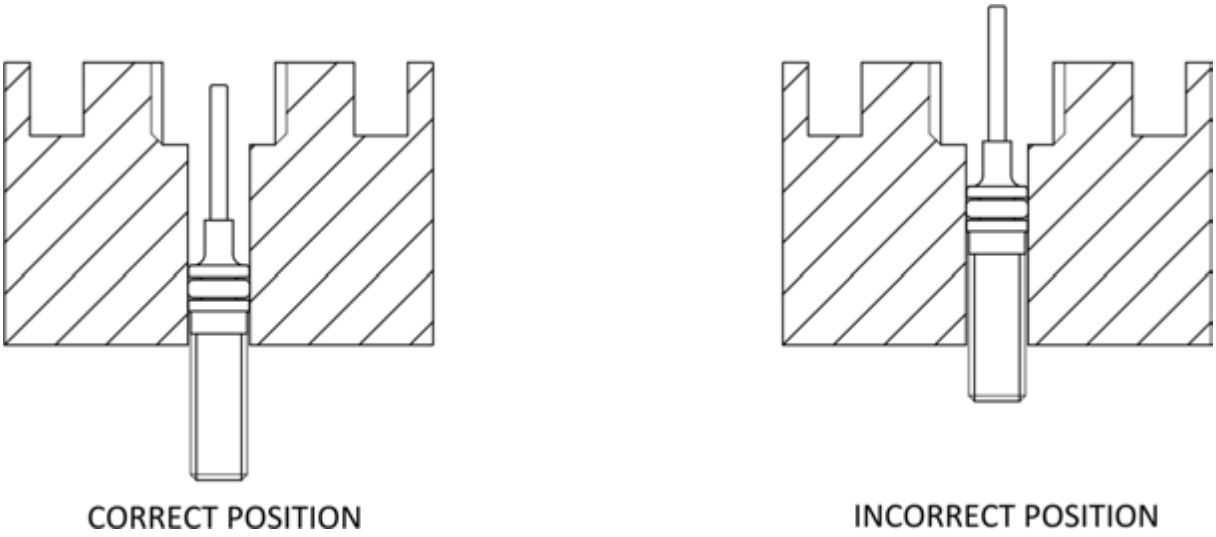


Figure 5: Correct and Incorrect firing pin positions

If the pin protrudes above the top surface of the canister base, this might lead to the pin opening the canister valve as a canister is installed, causing gas to be released.

The relaxed position of the firing pin can be changed by adjusting the position of the two M5 plain nuts and the washer on the firing pin shaft. Winding this assembly further up the pin will reduce the height of the pin while it is in a relaxed state.

To perform this adjustment:

1. Depress the spring.
2. Using a 8mm spanner, wind the nuts up the firing pin shaft one at a time.
3. When the pin is in the desired position, tighten both nuts against the washer.

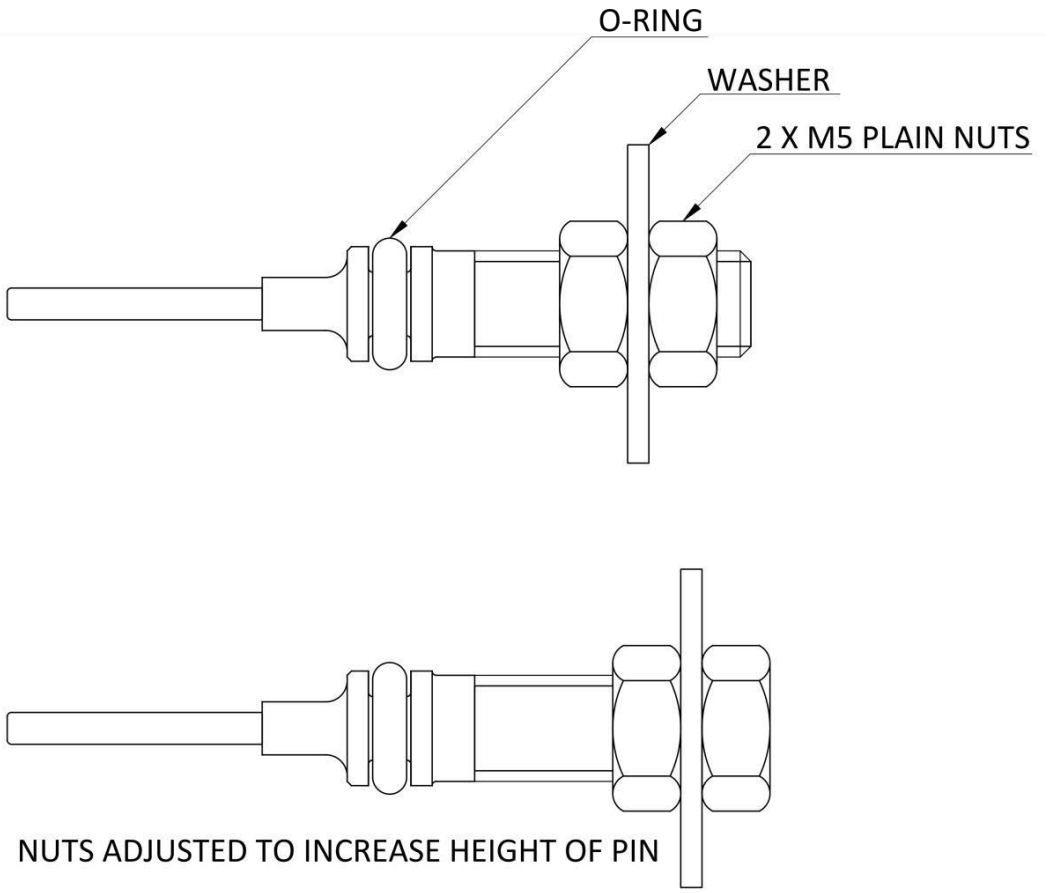


Figure 6: Firing pin assembly and adjustment

8.2. O-Ring Replacement

The Salamander Quad Pro contains two user-replaceable O-rings in each canister base.

One is located at the base of the thread in the brass canister base.

The other is located on the firing pin.

The canister base O-ring should be inspected every time the canister is changed. If the rubber appears worn, frayed or split, the O-ring should immediately be replaced. It might be necessary to cut the O-ring out of the canister base using a small blade such as a scalpel.

The replacement O-ring can simply be pressed into place.

It is recommended that the firing pin O-ring is periodically examined for damage. Checking the O-ring every 6-12 canisters is usually appropriate, however this will vary based on the precise operating conditions of the unit.

In addition, if the Salamander Quad Pro fails to fire correctly, or the response when firing is delayed or ‘sticky’, the firing pin O-ring must be cleaned or replaced.

To access the firing pin O-ring:

1. Remove the rubber plug from the base of the Salamander Quad Pro.
2. Remove the thrust rod from the solenoid by sliding it out the base of the unit, through the un-plugged hole.
3. Remove the spring from the firing mechanism.
4. The firing pin can now be removed from the bottom of the brass base.

If the O-ring appears worn, frayed or split it must be replaced. The O-ring should be cut off the firing pin with a sharp blade such as a scalpel, taking care not to scratch the firing pin itself. A new O-ring should be eased into place from the top end of the pin. Do not push the O-ring over the thread on the firing pin.

A chemically inert lubricant such as general purpose silicone grease must be applied to the O-ring before the pin is replaced. A thin layer should be applied to the O-ring, and any excess should be wiped away.

When the O-ring has been replaced, re-install the firing pin.

Please note: Under no condition should the firing pin be pushed up out of the top if the canister base. This will force the firing pin O-ring across the canister base's side opening, damaging the rubber and compromising the seal created.

Please note: If the Salamander Quad Pro is to be operated exclusively with coloured fluid (Red or Green) the pin O-ring must be inspected after at most 12 canisters per base.

Warning: Failure to apply lubricant to the O-ring may result in the pin sticking. This can lead to a delay in firing or shutting off, and reduce the life of the O-ring.

9. Contact Details

UK*:*

Le Maitre Ltd
6 Forval Close
Wandle Way
Mitcham
Surrey
CR4 4NE

Tel: +44 (0)20 8646 2222
Fax: +44 (0)20 8646 1955

Email: info@lemaitreltd.com

USA*:*

Le Maitre USA, LLC
13975 Grand Valley Parkway
Las Vegas, NV 89165
USA

Tel: +1 (702)-843-5080
Fax: +1 (702)-843-5070

Email: info@lemaitreusa.com

10. Warranty

The Le Maitre Salamander Quad Pro is sold with a one year's warranty, which includes parts and labour from the date of purchase. This warranty covers manufacturing defects, providing that the unit has been regularly serviced by an authorized agent and has only used genuine Le Maitre Canisters.

Le Maitre Ltd considers all of its products to be safe for use in the application it was intended. Le Maitre Ltd takes no responsibility for misuse or incorrect use. Always refer to the equipment owner's manual for proper use, and be aware of local legislation governing the products use.

BFL CANADA Risk and Insurance Inc.
45 Westwind Dr., Hammonds Plains,
Nova Scotia B3Z 1K6
Tel.: (902) 864-4982
1-866-864-4982
Fax: (902) 864-0200

Certificate of Insurance

Certificate No.: 0221

This is to Certify that the following described policy(ies) or cover note(s) in force at this date have been effected to cover as shown below:

Named Insured: Pyrotek Special Effects Inc., Pyrotek Special Effects US Holdings Inc., Pyrotek Special Effects Las Vegas Inc.

Address: 60 Renfrew Drive, Suite 260, Markham, ON L3R 0E1
6120 N Hollywood Blvd Suite 105, Las Vegas, NV, 89115.

Description of operations and/or activities and/or locations to which this certificate applies:
Pyrotechnics, Flame Effects, Special Effects, Fireworks, Laser Lighting, Water Wall Displays for: Hardy Concert
Display Date: 4/12/2025

Type	Insurer	Policy No.	Policy Period from (mm/dd/yyyy) to (mm/dd/yyyy)	Limit of Insurance
Commercial General Liability, Occurrence Form ☐Waiver Of Subrogation ☐Primary and Non-Contributory	AIG Insurance Company of Canada	66458485	Oct. 1, 2024 to Oct. 1, 2025	**Comprehensive General Liability** Inclusive Limit:.....$5,000,000 Per Occurrence and Aggregate, Incl. Products and Completed Operations

ADDITIONAL INSURED: The Following are added as additional Insured Only If They are: Licensing Permitting Authority, Venue\Property Owner where Shoot Occurs, Artist or Promoter of Concert or Event, Local Licensed Shooter, or if Required by Written Contract, but only with respect to the liability arising out of the operations of the named insured as it relates to the activity to which this certificate applies.
Country Thunder, Pinal County and its departments, agencies, officers, officials, agents, employees and volunteers
Mailing Address: Country Thunder 20585 E Water Way Florence AZ 85132

This certificate is issued as a matter of information only and is subject to all the limitations, exclusions and conditions of the above-listed policies as they now exist or may hereafter be endorsed.

Should any of the above described policies be cancelled before the expiration date thereof, the issuing company will Endeavor to mail 30 days written notice to the certificate holder. Limits shown above may be reduced by Claims or Expenses paid.

BFL CANADA Risk and Insurance Inc.

Signed this September 10, 2024

Per: J.L. McRae

Authorized Representative

PINAL COUNTY
WIDE OPEN OPPORTUNITY

APPLICATION FOR FIREWORKS DISPLAY

Return to: Clerk of the Board Office, P.O. Box 827, Florence, Arizona 85132 at least 30 days prior to the event date.

Arizona Revised Statutes §36-1603, Permit for public display. Every display shall be handled by a competent operator, and shall be of a character and located, discharged and fired so that it will not be hazardous to property or endanger any person. Before a permit is granted, the operator, location and handling of the display shall be approved, after investigation, by the fire chief of the city or town or the sheriff of the county as is appropriate. After a permit is granted, the sale, possession, use and distribution of fireworks for the display shall be lawful for that purpose only. No permit is transferable or assignable.

Further, A.R.S. §36-1604 requires that the governing body shall require each applicant to provide a satisfactory bond of not less than $500. In addition, the Pinal County Government also requires proof of liability insurance limits of not less than $3M per occurrence and $6M aggregate in the form of a certificate of liability insurance naming Pinal County and its departments, agencies, officers, officials, agents, employees and volunteers as Certificate Holder and Additional Insureds as respects to any and all damages which may be caused to persons or property by reason of the fireworks display. The Additional Insured Endorsement shall be attached to the certificate of insurance.

Complete the following application and return by hand-delivery to the Clerk of the Board of Supervisors 135 N. Pinal Street, Florence, Arizona 85132 **at least 30 days prior to the event date** or by mail to:

Clerk of the Board of Supervisors
PO Box 827
Florence, Arizona 85132

All applications must have the following documentation attached:

1. Proof of appropriate bond or insurance payable to Pinal County. (A.R.S. §36-1604)

2. Fireworks Display Site Map indicating the following:

- North direction
- Distance from firing area to impact/fallout area
- Spectator location
- Storage area
- Fire department access
- Hydrants
- Distance to structures
- Overhead lines

3. List of fireworks to be discharged. The Director of Display for the fireworks company is expected to be licensed and/or trained or have other verification of expertise.

4. Verification from local fire department that they were notified of event, date, location and time.

NOTE: The County's review of Fireworks Display Permits include investigation and reports from the Pinal County Sheriff's Office, Emergency Management, Risk Management, and Notification of the Local Fire District.

For more information and/or questions, please call the Clerk of Board of Supervisors at (520) 866-6068.

PINAL COUNTY

WIDE OPEN OPPORTUNITY

PINAL COUNTY APPLICATION FOR FIREWORKS DISPLAY

Return to: Clerk of the Board Office, P.O. Box 827, Florence, Arizona 85132 at least 30 days prior to the event date.

Application is hereby made for the granting of a permit to conduct a supervised fireworks display on **(DATE)** 04.13.2025 at **(TIME)** 9-10:30pm **(PLACE)** Country Thunder AZ located at **(ADDRESS)** 20585 E Water Way **(CITY)** Florence, Arizona **(ZIP)** 85132. Applicant states that Jason Wakefield 615-310-9735 will be in charge of this display and responsible for the acts performed thereby; and Caroline Scalera/Strictly FX-permitting states that she/he is a qualified and competent person to direct this display in such a manner that will not be hazardous to property or endanger any person.

(DIRECTOR OF DISPLAY) Jason Wakefield/Crew Chief

(PERSON IN CHARGE OF PREMISES WHERE DISPLAY IS LOCATED) Blair Adams PGP Production

(PHONE NUMBER) 785-925-1065

NOTIFICATION OF LOCAL FIRE DISTRICT

Name of District: Florence Fire Station #1 Person Notified Chief Mitch Snyder

Date: 02.12.2025

OFFICIAL USE ONLY

APPROVAL OF FIREWORKS DISPLAY BY SHERIFF

I have investigated the premises described by the applicant and found them to be satisfactory and found him/her to be a competent operator.

1055

Pinal County Sheriff

PERMIT FOR FIREWORKS DISPLAY

The application of Bailey Zimmerman at Country Thunder having been filed with the undersigned Board of Supervisor, pursuant to Section 36-1603, Arizona Revised Statutes, 1956, together with proper bond as provided by law and same having been approved by the Sheriff.

Permission is therefore and hereby granted to Strictly FX-permitting to conduct a fireworks display at Country Thunder Arizona AND IN THE EVENT OF POSTPONEMENT OF SAID SHOW, said display be given not later than one week from date specified above.

Dated this 5th Day of March, 2025

PINAL COUNTY BOARD OF SUPERVISORS

By:

Chairman

SAFETYPROCEDURES

To Whom It May Concern:

Following is a list of safety procedures we adhere to for each show.

- Type of device:Verify indoor/proximate use & performance specifications (NFPA 1126: 7.1, 7.2, 7.3, 7.4)
- Verify quantities, locations, and cueing of devices to be used
- Verify secure areas and methods for restricting unauthorized persons from entering.
- At least 4 extinguishers shall be readily available for use (with the manufacturer's instructions)
- Firefighting equipment as needed/required (NFPA 1126: 8.1.1.2)
- Existing on site-firefighting equipment/systems
- Separation from heat/flame sparks (NFPA 1126:5.3)
- No Smoking within 25ft (signage) (NFPA 1126: 8.5.5.1)
- Materials stored/handled neatly and orderly (NFPA 1126: 8.5.1)
- Storage of Pyrotechnic material and devices (NFPA 1126: 5.1)
- Anytime pyrotechnic material is stored within the facility, it must be stored in a Type 3 storage day box
- The mixing room shall be placarded
- A 2-1/2 gallon pressurized water fire extinguisher shall be located within 10 feet of the mixing room and the door shall be locked when unattended
- Verify operational/safety features and functions of firing systems (NFPA 1126: 8.3.2 & 8.3.3)
- Verify operator & spotters have clear view of effects and communications with operator (NFPA 1126: 8.3.5.1)
- Minimum 15 ft or 2X fallout radius (NFPA 1126: 8.4.1)
- Concussion mortars a minimum 25 ft in secured area (NFPA 1126: 8.4.2)
- Warning signal lights must be used to indicate the impending firing of a concussion special effect.
- The warning signal lights shall be located at least 25' from the concussion effect but within a distance to warn working personnel and other individuals of the impending concussion effect firing
- Trajectory of comets/mines not over audience (NFPA 1126: 8.2.10)
- Waterfall effect area free of flammable materials (NFPA 1126: 8.2.11)
- Grid rocket effects properly secured and terminated (NFPA 1126: 8.2.8.1)
- Airbursts over audience to be minimum height of 3 times the diameter of effect, and no sparks within 15 ft of floor (NFPA 1126: 8.2.13(1) & (2) & (3)
- Verify pyrotechnic plot with actual site dimensions/adjustments.

PRODUCTMSDS

MSDS - Smoke Fluid

MATERIAL SAFETY DATA SHEET

CONFIRMS TO REGULATION 1907/2006/EC (REACH)
Version: 1.0

NAME: ECO2JET FLUID 5L

SECTION 1: IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1 **Product identifier**

Trade Name: MFX3090 - MAGICFX® ECO2JET Outdoor Fluid 5L
MFX3091 - MAGICFX® ECO2JET Indoor Fluid 5L

Registration number: Not applicable

1.2 **Relevant identified uses of the substance or mixture and uses advised against**

Relevant identified use: Fog and smoke simulation
Uses advised against: Not applicable

1.3 **Details of the supplier of the material safety data sheet**

Company identification:
Company: Magic FX BV
Address: Schouwrooij 27
NL-5281 RE Boxtel
Tel: +31 (0)411-74 81 00
E-mail: info@magicfx.eu
Web: www.magicfx.eu

1.4 **In case of emergency (ICE)**

During office hours:
Magic FX BV +31 (0)411-74 81 00

Emergency telephone number:
Belgium: Antipoison Center - Brussels TEL: +32(0)70 245 245

Netherlands: National Poisoning Information Center - Bilthoven TEL: +31(0)30 274 8888
(Only for the purpose of informing medical personnel in cases of acute intoxications)

SECTION 2: HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture
CLP Regulation (EC) nº 1272/2008: This product is not classified according the CLP regulation.

2.2 Label elements
None

2.3 Other hazards
None

SECTION 3: COMPOSITION/INFORMATION OF INGREDIENTS

3.1 Ingredients

Identification	Chemical name / Classification		Concentration
CAS: 112-27-6 EC: 203-953-2 Index: REACH:	2,2'-(ethylenedioxy)diethanol	Not classified	Unknown
	Regulation 1272/2008	-	
CAS: 57-55-6 EC: 200-338-0 Index: REACH:	Propane-1,2-diol	Self-classified	Unknown
	Regulation 1272/2008	-	
CAS: 25265-71-8 EC: 246-770-3 Index: REACH:	Oxydipropanol	Self-classified	Unknown
	Regulation 1272/2008	-	
CAS: 56-81-5 EC: 200-289-5 Index: REACH:	Glycerol	Self-classified	Unknown
	Regulation 1272/2008	-	
CAS: 7732-18-5 EC: 231-791-2 Index: REACH:	Distilled water	Self-classified	Unknown
	Regulation 1272/2008		

3.2 Mixture

Chemical characterization
Mixture of higher polyalcohols, AQUA BIDEST

Hazardous ingredients
None

SECTION 4: FIRST AID MEASURES

4.1 Description of first aid measures

General information
In all cases, after cleaning, medical advice should be consulted as quickly as possible with the MSDS.
No other special measures required.

Inhalation
This product does not contain substances classified as dangerous for inhalation, however, in case of symptoms of intoxication remove the person affected from the exposure area and provide with fresh air. Consult medical advice if the symptoms get worse or persist.

Skin contact
In case of contact it is recommended to remove contaminated clothing and clean the affected area thoroughly with water and neutral soap. In case of modifications on the skin (stinging, redness, rashes, blisters,...), consult medical advice with the MSDS.

Eye contact
Rinse eyes thoroughly with lukewarm water for at least 15 minutes. Do not allow the person affected to rub or close their eyes. If the injured person uses contact lenses, these should be removed unless they are stuck to the eyes, as this could cause further damage. Consult medical advice with the MSDS.

Ingestion
In case of consumption, rinse out mount and then drink plenty of water.
Consult medical advice if the symptoms get worse or persist.

SECTION 5: FIREFIGHTING MEASURES

5.1 Extinguishing methods

Suitable extinguishing methods
Use firefighting measures that suit the environment.
Cool down containers exposed to fire by spraying them with water.

Unsuitable extinguishing media
None.

Advice for firefighters
None.

Particular risks:
Do not inhale or combustion gases.

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
See section 8.

6.2 Environmental precautions
Avoid spillage into an aqueous medium as it contains substances potentially dangerous for this.
Contain the product absorbed in hermetically sealed containers. In the case of serious spillage into an aqueous medium notify the relevant authority.

6.3 Methods and material for containment and cleaning up
It is recommended: Absorb the spillage using sand or inert absorbent and move it to a safe place. Do not absorb in sawdust or other combustible absorbents. For any concern related to disposal consult section 13.

6.4 Reference to other sections
Refer to Section 13 for disposal of product and contaminated materials.

SECTION 7: HANDLING AND STORAGE

7.1 Precautions for safe handling

Precautions for safe manipulation
Comply with the current legislation concerning the prevention of industrial risks. Keep containers hermetically sealed. Control spills and residues, destroying them with safe methods (section 6). Avoid leakages from the container. Maintain order and cleanliness where dangerous products are used.

Technical recommendations for the prevention of fires and explosions
Product is non-flammable under normal conditions of storage, manipulation and use. It is recommended to transfer at slow speeds to avoid the generation of electrostatic charges that can affect flammable products. Consult section 10 for information on conditions and materials that should be avoided.

Technical recommendations to prevent ergonomic and toxicological risks
Do not eat or drink during the process, washing hands afterwards with suitable cleaning products.

Technical recommendations to prevent environmental risks
It is recommended to have absorbent material available at close proximity to the product (See subsection 6.3)

7.2 Conditions for safe storage, including any incompatibilities

Technical measures for storage
There are no specific technical measures for storage.

General conditions for storage
Observe all local and national regulations for storage of water polluting products. Avoid sources of heat, radiation, static electricity and contact with food.

7.3 Specific end use(s)
Except for the instructions already specified it is not necessary to provide any special recommendation regarding the uses of this product.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

There is no control of exposure or personal protection required to use this product.
Remove contaminated clothing. Wash hands after work. Do not eat, drink or smoke during work.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1 **Information on basic physical and chemical properties**

Physical state at 20 ºC:	Liquid
Appearance:	Clear, colourless
Odor:	Odourless
Boiling point:	> 100°C
Flashing point:	Not available
pH:	6 – 8
Density at 20°C:	1,02 g/cm³
Water solubility:	Completely miscible
Viscosity:	Low
Auto ignition temperature:	None

SECTION 10: STABILITY AND REACTIVITY

10.1 **Packaging**
Plastic containers.

10.2 **Dangerous reactions**
No dangerous reactions known.

10.3 **Chemical stability**
No decomposition if used according to specifications.

10.4 **Incompatible materials**
Strong oxidizing agents and alkaline materials

SECTION 11: TOXICOLOGICAL INFORMATION

The product is not classified as toxic.

SECTION 12: ECOLOGICAL INFORMATION

The product is not classified as harmful to the environment.
In accordance with OECD 301E / EEC 84/449 C3 biodegradable.

Water hazard class 1: slightly hazardous for water

SECTION 13: DISPOSAL CONSIDERATIONS

13.1 **Waste treatment methods**

Recommendation:	Disposal must be made according to official regulations.
European waste catalogue:	Waste disposal key numbers from EWC have to be assigned depending on origin and processing.

13.2 Uncleaned packaging

Recommendations: Disposal must be made according to official regulations.
Recommended cleaning: Water, if necessary with cleaning agent.

SECTION 14: TRANSPORT INFORMATION

This product is not regulated for transport (ADR/RID,IMDG,IATA, ICAO).

SECTION 15: REGULATORY INFORMATION

Labelling according to Regulation (EC) No 1272/2008

SECTION 16: OTHER INFORMATION

Abbreviations and acronyms:

- ADR: European agreement concerning the international carriage of dangerous goods by road
- IMDG: International maritime dangerous goods code
- IATA: International Air Transport Association
- ICAO: International Civil Aviation Organisation
- COD: Chemical Oxygen Demand
- BOD5: 5-day biochemical oxygen demand

Additional safety requirements:

- The product has to be deployed appropriately in its as delivered condition.
- The event site regulations as well as the corresponding legislation must be adhered to. Considering the range of vision and the desired effect, the smoke fluid can be dispensed into the air in measurements between 25 and a maximum of 80 mg/m3.
- It is particularly important to measure out the smoke fluid so as to ensure that all exits and emergency exits are still visible. This also goes for the illumination of escape routes, their markings, stairs, shafts, edges, etc.
- A range of vision of 25 m (maximum distance from the nearest exit according to event site regulations) must be maintained.
- Measure out the thickness of the smoke in the air so that the well-being of the people in the room can be guaranteed.
- In order to avoid anxiety, the room where the smoke is being used should never be sealed. According to event site regulations, the operation and maintenance of technical equipment should only be dealt with by experienced and reliable adults.
- Every room where there is smoke must be supervised by trained personnel. Never drink or inhale the liquid and never apply it to your body.

- Keep out of the reach of children and store it in a place they cannot reach.

The information contained in this MSDS is based on sources, technical knowledge and current legislation at European and state level, without being able to guarantee its accuracy. This information cannot be considered a guarantee of the properties of the product, it is simply a description of the security requirements. The occupational methodology and conditions for users of this product are not within our awareness or control, and it is ultimately the responsibility of the user to take the necessary measures to obtain the legal requirements concerning the manipulation, storage, use and disposal of chemical products. The information on this security data sheet only refers to this product, which should not be used for needs other than those specified.

MSDS - Pyrotechnics

SAFETY DATA SHEET

Cannon Simulator – Sparkle X- Wide

Date Issued: 02-01-12

Revision Date: 01-09-19

Revision Number: 3

Product / Company Identification

General Use: Theatrical Special Effects / Pyrotechnics
Classification: UN0431, Articles, pyrotechnic, 1.4G Explosive
Manufacturer: Evolution Pyrotechnics MFG, Inc.
1 Nickel Way
Columbus, MT 59019
833-386-7976

24 HR. Emergency Telephone Number

INFOTRAC: 800 535 5053

Hazardous Ingredients / Identity Information

Hazardous Components (Specific Chemical Identity: Common Name(s)	OSHA PEL	ACGIH TLV	Other Limits Recommended
Pyrotechnics Composition (may contain one or more of the following)	**N/A**	**N/A**	**Not Established**

Potassium Nitrate	Copper Oxide	Potassium Benzoate	Sodium Oxalate	Titanium
Barium Nitrate	Magnalium	Potassium Perchlorate	Strontium Nitrate	Aluminum
Barium Sulfate	Magnesium	Saran Resin	Strontium Carbonate	Dextrin
Charcoal	Magnesium Carbonate	Sodium Benzoate	Barium Carbonate	Parlon
Barium Carbonate	Ammonium Perchlorate	Strontium Sulfate	Barium Sulfate	Sulfur

Physical / Chemical Characteristics

Boiling Point: N/A **Specific Gravity: N/A** **Vapor Pressure (mm Hg.): N/A** **Melting Point: N/A**
Vapor Density (AIR=1): N/A **Evaporation Rate (Butyl Acetate = 1): N/A** **Solubility in Water: Soluble**
Appearance: cardboard tube, all component securely contained
Odor: Slight sulfurous odor or orderless

Fire and Explosion Hazard Data

Flash Point (Method Used)	Flammable Limits	LEL	UEL
328° C ignition temperature (no vapor flashpoint)	all concentrations	N/A	N/A

Extinguishing Media

None, material provides its own oxygen. Use water to cool surrounding materials to prevent spread of fire.

Special Fire Fighting Procedures

Firefighters should use approved breathing and protective equipment when fighting a pyrotechnic fire. Fire should be isolated by removal or water cooling of other flammable materials in the area, and the fire should be allowed to burn out.

Unusual Fire and Explosion Hazards

Burning pyrotechnics effects may project burning projectiles as far as 200'. Products in factory packaging will not mass detonate. Combustion may cause productions of hazardous decomposition products.

Reactivity Data

Stability	Conditions to Avoid	Hazardous Polymerization
Stable	Exposure to water. Open flame and other ignition sources.	Will not occur

Incompatibility

Strong acids, water (may initiate decomposition or cause material leakage)

Hazardous Decomposition or By-products

Sulfur dioxide, potassium oxide fumes, barium oxide fumes, antimony fume metal, copper fume metal.

Health Hazard Data

Route(s) of Entry:
Inhalation Skin

Health Hazards:
Inhalation: May irritate nose, throat or lungs. (combustible products)
Ingestion of Products: See MSDS of constituent chemicals.

Carcinogenicity:
NTP – No ARC Monographs – No OSHA Regulated – No

Signs and Symptoms of Exposure:
Respiratory irritation, difficulty breathing. Eye irritation. Nausea (ingestion)

Medical Conditions Generally Aggravated by Exposure:
Persons with pre-existing or impaired respiratory functions may be more susceptible to the effects of exposure to combustion by-products.

Precautions for Safe Handling and Use

Steps to be taken in the event material is released or spilled:
Pick up intact product and return in to packages, or re-package. Broken product: Sweep up loose material and package in paper or cardboard container. Dispose by hazardous materials process, or return to manufacturer for proper handling. Avoid raising dust while sweeping. Flush residues with plenty of water.

Waste Disposal Method:
Approved incineration in accordance with local, state and federal regulations.

Precautions to be taken in handling and storage:
Store in cool, dry, well-ventilated area protected from moisture and away from open flame or other heat sources.

Other Precautions:
None

Control Measures

Respiratory Protection:
NIOSH/MSHA approved mask – TC214-279

Special:
None Required

Other:
N/A

Ventilation:
Yes – Local exhaust

Mechanical:
None Required

Protective Gloves:
Rubber

Eye Protection:
Safety Goggles

Other Protective Clothing or Equipment:
Appropriate body protection.

Other Protective Clothing or Equipment:
Use good chemical hygiene practice.

WARNING

Burn, eye, skin, respiratory irritation, ingestion, acute or chronic exposure BURN:
Wash affected area.
EYE: Flush eyes with water for several minutes.
SKIN: Wash with soap and water
RESPIRATORY: Move to fresh air and consult physician.
INGESTION: DO NOT INDUCE VOMITING, Contact poison control
ACUTE OR CHRONIC EXPOSURE: Seek medical attention immediately
SEEK MEDICAL ATTENTION IF YOU FEEL UNWELL
Keep away from heat, sparks, open flame and hot surfaces
NO SMOKING
Store in a cool dry approved area

Dispose of content/container in accordance with local/regional/national regulations

This safety data sheet has been prepared to comply with OSHA's Hazard Communication Standard, the requirements of NFPA 1123, NFPA 1126 and IFC section 3308. Users should consult current standards prior to any intended use of these products.

Evolution Pyrotechnics MFG, Inc.
1 Nickel Way
Columbus, MT 59019

Emergency Number: 800 535 5053 INFOTRAC

Information: 833-386-7976

Product:	Cannon Simulator Sparkle X-Wide
EX#:	See product label
Shipping Name:	UN0431, Articles, pyrotechnic, (1.4G Explosive)

- Product must be firmly mounted so it cannot move or be accidently re-aimed by vibrations or concussion from other effects.
- Keep away from open flames. No smoking within 50' of these materials.
- NEVER place any body part over the discharge end of the effect.
- Assure that audience setbacks, distances to flammable materials and overhead clearance adequate to the effect are maintained at all times.
- NEVER attempt to disassemble, modify or combine effects mechanically.
- Mount effects so that they are always visible to the firing technician. If malfunctions or unintentional re-aiming of effects occurs, STOP FIRING.
- All effects should be tested for specific performance before selecting them for a venue.
- Product is for professional use only!

Health Warning / First Aid

Inhalation of the smoke produced by this effect may cause irritation. In normal use, smoke dissipates quickly and does not present a problem. Persons found to be suffering from smoke inhalation should be removed to fresh air and medical assistance should be sought. **BURNS:** Treat for shock. Cover wounds with sterile dressings and seek medical attention immediately.

Malfunction or Mis-Fire (hang fire)

If an effect fails to fire, isolate it from the firing system and ascertain if it was connected correctly. Repeat the attempt to fire. If the effect fails again, remove the firing system; allow a minimum of 30 minutes standby, return to manufacturer.

Disposal Procedures

Submerge effect in water. Soak for 48 hours, then dispose of according to regulations.

Spills or Broken Packages

Return intact to the original packaging, or re-package. Sweep up broken product contents, avoid raising dust while sweeping. Package sweepings in paper or cardboard container and dispose by proper hazmat procedures. Flood residues with plenty of water.

Storage

Store in a cool, dry location away from open flame or other heat sources. Avoid freezing. High humidity (up to 95% non-condensing) for short durations before firing is acceptable. Storage humidity should remain below 70%, non-condensing.

Handling

Product should be handled with care during shipping and use. Avoid contact with rain or groundwater. Damaged products should not be used, they should be returned to manufacturer for repair or proper disposal.

MATERIAL SAFETY DATA SHEET

10mm Spark Simulator / SPD

Date Issued: 02-01-12

Revision Date: 10-01-15

Revision Number: 1

Product / Company Identification

Product Name: 10mm Spark Simulator / SPD
General Use: Theatrical Special Effects.
EX Number: 2013080417
Classification: Articles, pyrotechnic 1.4G UN0431
Manufacturer: Evolution Pyrotechnics Inc.
1 Nickel Way
Columbus, MT 59019
386-569-3017

24 HR. Emergency Telephone Number

INFOTRAC: 800 535 5053

Hazardous Ingredients / Identity Information

Hazardous Components (Specific Chemical Identity: Common Name(s)	OSHA PEL	ACGIH TLV	Other Limits Recommended
Pyrotechnics Composition (may contain one or more of the following)	**N/A**	**N/A**	**Not Established**

Potassium Nitrate	Copper Oxide	Potassium Benzoate	Sodium Oxalate	Titanium
Barium Nitrate	Magnalium	Potassium Perchlorate	Strontium Nitrate	Aluminum
Barium Sulfate	Magnesium	Saran Resin	Strontium Carbonate	Dextrin
Charcoal	Magnesium Carbonate	Sodium Benzoate	Barium Carbonate	Parlon
Barium Carbonate	Ammonium Perchlorate	Strontium Sulfate	Barium Sulfate	Sulfur

Physical / Chemical Characteristics

Boiling Point: N/A **Specific Gravity: N/A** **Vapor Pressure (mm Hg.): N/A** **Melting Point: N/A**
Vapor Density (AIR=1): N/A **Evaporation Rate (Butyl Acetate = 1): N/A** **Solubility in Water: Soluble**
Appearance: cardboard tube, all component securely contained
Odor: Slight sulfurous odor or orderless

Fire and Explosion Hazard Data

Flash Point (Method Used)	Flammable Limits	LEL	UEL
328° C ignition temperature (no vapor flashpoint)	all concentrations	N/A	N/A

Extinguishing Media

None, material provides its own oxygen. Use water to cool surrounding materials to prevent spread of fire.

Special Fire Fighting Procedures

Firefighters should use approved breathing and protective equipment when fighting a pyrotechnic fire. Fire should be isolated by removal or water cooling of other flammable materials in the area, and the fire should be allowed to burn out.

Unusual Fire and Explosion Hazards

Burning pyrotechnics effects may project burning projectiles as far as 200'. Products in factory packaging will not mass detonate. Combustion may cause productions of hazardous decomposition products.

Reactivity Data

Stability	Conditions to Avoid	Hazardous Polymerization
Stable	Exposure to water. Open flame and other ignition sources.	Will not occur

Incompatibility

Strong acids, water (may initiate decomposition or cause material leakage)

Hazardous Decomposition or By-products

Sulfur dioxide, potassium oxide fumes, barium oxide fumes, antimony fume metal, copper fume metal.

Health Hazard Data

Route(s) of Entry:
Inhalation Skin

Health Hazards:
Inhalation: May irritate nose, throat or lungs. (combustible products)
Ingestion of Products: See MSDS of constituent chemicals.

Carcinogenicity:
NTP – No ARC Monographs – No OSHA Regulated – No

Signs and Symptoms of Exposure:
Respiratory irritation, difficulty breathing. Eye irritation. Nausea (ingestion)

Medical Conditions Generally Aggravated by Exposure:
Persons with pre-existing or impaired respiratory functions may be more susceptible to the effects of exposure to combustion by-products.

Precautions for Safe Handling and Use

Steps to be taken in the event material is released or spilled:
Pick up intact product and return in to packages, or re-package. Broken product: Sweep up loose material and package in paper or cardboard container. Dispose by hazardous materials process, or return to manufacturer for proper handling. Avoid raising dust while sweeping. Flush residues with plenty of water.

Waste Disposal Method:
Approved incineration in accordance with local, state and federal regulations.

Precautions to be taken in handling and storage:
Store in cool, dry, well-ventilated area protected from moisture and away from open flame or other heat sources.

Other Precautions:
None

Control Measures

Respiratory Protection:
NIOSH/MSHA approved mask – TC214-279

Special:
None Required

Other:
N/A

Ventilation:
Yes – Local exhaust

Mechanical:
None Required

Protective Gloves:
Rubber

Eye Protection:
Safety Goggles

Other Protective Clothing or Equipment:
Appropriate body protection.

Other Protective Clothing or Equipment:
Use good chemical hygiene practice.

Product Handling Safety Sheet

This product handling safety sheet has been prepared to comply with OSHA's Hazard Communication Standard, the requirements of NFPA 1123, NFPA 1126 and IFC section 3308. Users should consult current standards prior to any intended use of these products.

Evolution Pyrotechnics, Inc.
1 Nickel Way
Columbus, Mt 59019

Emergency Number: 800 535 5053 INFOTRAC

Information: 386-569-3017

Product:	10mm Spark Simulator / SPD
US DOT EX#:	2013080417
NEQ:	.008 KG
Shipping Name	Articles, pyrotechnic 1.4G UN0431

Description of Effect

Distances are approximate, for information. Safety allowances Should be employed for prudent use.

Effect:	Projects silver sparks
Duration:	1-2 second
Height:	See product label
Fallout Radius:	N/A
Firing Angle(s):	any
Venues:	Suitable for indoor use

- Product must be firmly mounted so it cannot move or be accidently re-aimed by vibrations or concussion from other effects.
- Keep away from open flames. No smoking within 50' of these materials.
- NEVER place any body part over the discharge end of the effect.
- Assure that audience setbacks, distances to flammable materials and overhead clearance adequate to the effect are maintained at all times.
- NEVER attempt to disassemble, modify or combine effects mechanically.
- Mount effects so that they are always visible to the firing technician. If malfunctions or unintentional re-aiming of effects occurs, STOP FIRING.
- All effects should be tested for specific performance before selecting them for a venue.
- Product is for professional use only!

Health Warning / First Aid

Inhalation of the smoke produced by this effect may cause irritation. In normal use, smoke dissipates quickly and does not present a problem. Persons found to be suffering from smoke inhalation should be removed to fresh air and medical assistance should be sought. **BURNS:** Treat for shock. Cover wounds with sterile dressings and seek medical attention immediately.

Malfunction or Mis-Fire (hang fire)

If an effect fails to fire, isolate it from the firing system and ascertain if it was connected correctly. Repeat the attempt to fire. If the effect fails again, remove the firing system; allow a minimum of 30 minutes standby, return to manufacturer.

Disposal Procedures

Submerge effect in water. Soak for 48 hours, then dispose of according to regulations.

Spills or Broken Packages

Return intact to the original packaging, or re-package. Sweep up broken product contents, avoid raising dust while sweeping. Package sweepings in paper or cardboard container and dispose by proper hazmat procedures. Flood residues with plenty of water.

Storage

Store in a cool, dry location away from open flame or other heat sources. Avoid freezing. High humidity (up to 95% non-condensing) for short durations before firing is acceptable. Storage humidity should remain below 70%, non-condensing.

Handling

Product should be handled with care during shipping and use. Avoid contact with rain or groundwater. Damaged products should not be used, they should be returned to manufacturer for repair or proper disposal.

MATERIAL SAFETY DATA SHEET

19mm Gerb SD

Date Issued: 02-01-12

Revision Date: 02-01-12

Revision Number: 1

Product / Company Identification

Product Name: 19mm Gerb SD
General Use: Theatrical Special Effects.
EX Number: 2012060169
Classification: Articles, pyrotechnic 1.4G UN0431
Manufacturer: Evolution Pyrotechnics Inc.
7788 Hwy 3
Acton, MT 59002
386-569-3017

24 HR. Emergency Telephone Number

INFOTRAC: 800 535 5053

Hazardous Ingredients / Identity Information

Hazardous Components (Specific Chemical Identity: Common Name(s)	OSHA PEL	ACGIH TLV	Other Limits Recommended
Pyrotechnics Composition (may contain one or more of the following)	**N/A**	**N/A**	**Not Established**

Potassium Nitrate	Copper Oxide	Potassium Benzoate	Sodium Oxalate	Titanium
Barium Nitrate	Magnalium	Potassium Perchlorate	Strontium Nitrate	Aluminum
Barium Sulfate	Magnesium	Saran Resin	Strontium Carbonate	Dextrin
Charcoal	Magnesium Carbonate	Sodium Benzoate	Barium Carbonate	Parlon
Barium Carbonate	Ammonium Perchlorate	Strontium Sulfate	Barium Sulfate	Sulfur

Physical / Chemical Characteristics

Boiling Point: N/A **Specific Gravity: N/A** **Vapor Pressure (mm Hg.): N/A** **Melting Point: N/A**
Vapor Density (AIR=1): N/A **Evaporation Rate (Butyl Acetate = 1): N/A** **Solubility in Water: Soluble**
Appearance: high strength cardboard tube, compressed composition inside
Odor: Slight sulfurous odor or orderless

Fire and Explosion Hazard Data

Flash Point (Method Used)	Flammable Limits	LEL	UEL
328° C ignition temperature (no vapor flashpoint)	all concentrations	N/A	N/A

Extinguishing Media

None, material provides its own oxygen. Use water to cool surrounding materials to prevent spread of fire.

Special Fire Fighting Procedures

Firefighters should use approved breathing and protective equipment when fighting a pyrotechnic fire. Fire should be isolated by removal or water cooling of other flammable materials in the area, and the fire should be allowed to burn out.

Unusual Fire and Explosion Hazards

Burning pyrotechnics effects may project burning projectiles as far as 200'. Products in factory packaging will not mass detonate. Combustion may cause productions of hazardous decomposition products.

Reactivity Data

Stability	Conditions to Avoid	Hazardous Polymerization
Stable	Exposure to water. Open flame and other ignition sources.	Will not occur

Incompatibility

Strong acids, water (may initiate decomposition or cause material leakage)

Hazardous Decomposition or By-products

Sulfur dioxide, potassium oxide fumes, barium oxide fumes, antimony fume metal, copper fume metal.

Health Hazard Data

Route(s) of Entry:
Inhalation Skin

Health Hazards:
Inhalation: May irritate nose, throat or lungs. (combustible products)
Ingestion of Products: See MSDS of constituent chemicals.

Carcinogenicity:
NTP – No ARC Monographs – No OSHA Regulated – No

Signs and Symptoms of Exposure:
Respiratory irritation, difficulty breathing. Eye irritation. Nausea (ingestion)

Medical Conditions Generally Aggravated by Exposure:
Persons with pre-existing or impaired respiratory functions may be more susceptible to the effects of exposure to combustion by-products.

Precautions for Safe Handling and Use

Steps to be taken in the event material is released or spilled:
Pick up intact product and return in to packages, or re-package. Broken product: Sweep up loose material and package in paper or cardboard container. Dispose by hazardous materials process, or return to manufacturer for proper handling. Avoid raising dust while sweeping. Flush residues with plenty of water.

Waste Disposal Method:
Approved incineration in accordance with local, state and federal regulations.

Precautions to be taken in handling and storage:
Store in cool, dry, well-ventilated area protected from moisture and away from open flame or other heat sources.

Other Precautions:
None

Control Measures

Respiratory Protection:
NIOSH/MSHA approved mask – TC214-279

Special:
None Required

Other:
N/A

Ventilation:
Yes – Local exhaust

Mechanical:
None Required

Protective Gloves:
Rubber

Eye Protection:
Safety Goggles

Other Protective Clothing or Equipment:
Appropriate body protection.

Other Protective Clothing or Equipment:
Use good chemical hygiene practice.

Product Handling Safety Sheet

This product handling safety sheet has been prepared to comply with OSHA's Hazard Communication Standard, the requirements of NFPA 1123, NFPA 1126 and IFC section 3308. Users should consult current standards prior to any intended use of these products.

Evolution Pyrotechnics, Inc.
7788 Hwy 3
Acton, MT 59002 USA

Emergency Number: 800 535 5053 INFOTRAC

Information: 386-569-3017

Product:	19mm Gerb SD
US DOT EX#:	2012060169
NEQ:	.003 KG
Shipping Name	Articles, pyrotechnic 1.4G UN0431

Description of Effect

Distances are approximate, for information. Safety allowances Should be employed for prudent use.

Effect:	Spray of sparks
Duration:	½ - 1 second *see product label
Height:	See product label
Fallout Radius:	N/A
Firing Angle(s):	N/A
Venues:	Suitable for indoor use

- Product must be firmly mounted so it cannot move or be accidently re-aimed by vibrations or concussion from other effects.
- Keep away from open flames. No smoking within 50' of these materials.
- NEVER place any body part over the discharge end of the effect.
- Assure that audience setbacks, distances to flammable materials and overhead clearance adequate to the effect are maintained at all times.
- NEVER attempt to disassemble, modify or combine effects mechanically.
- Mount effects so that they are always visible to the firing technician. If malfunctions or unintentional re-aiming of effects occurs, STOP FIRING.
- All effects should be tested for specific performance before selecting them for a venue.
- Product is for professional use only!

Health Warning / First Aid

Inhalation of the smoke produced by this effect may cause irritation. In normal use, smoke dissipates quickly and does not present a problem. Persons found to be suffering from smoke inhalation should be removed to fresh air and medical assistance should be sought. **BURNS:** Treat for shock. Cover wounds with sterile dressings and seek medical attention immediately.

Malfunction or Mis-Fire (hang fire)

If an effect fails to fire, isolate it from the firing system and ascertain if it was connected correctly. Repeat the attempt to fire. If the effect fails again, remove the firing system; allow a minimum of 30 minutes standby, return to manufacturer.

Disposal Procedures

Submerge effect in water. Soak for 48 hours, then dispose of according to regulations.

Spills or Broken Packages

Return intact to the original packaging, or re-package. Sweep up broken product contents, avoid raising dust while sweeping. Package sweepings in paper or cardboard container and dispose by proper hazmat procedures. Flood residues with plenty of water.

Storage

Store in a cool, dry location away from open flame or other heat sources. Avoid freezing. High humidity (up to 95% non-condensing) for short durations before firing is acceptable. Storage humidity should remain below 70%, non-condensing.

Handling

Product should be handled with care during shipping and use. Avoid contact with rain or groundwater. Damaged products should not be used, they should be returned to manufacturer for repair or proper disposal.

MATERIAL SAFETY DATA SHEET

19mm Laser Comet

Date Issued: 02-01-12

Revision Date: 02-01-12

Revision Number: 1

Product / Company Identification

Product Name: 19mm Laser Comet
General Use: Theatrical Special Effects.
EX Number: 2012040718
Classification: Articles, pyrotechnic 1.4G UN0431
Manufacturer: Evolution Pyrotechnics Inc.
7788 Hwy 3
Acton, MT 59002
386-569-3017

24 HR. Emergency Telephone Number

INFOTRAC: 800 535 5053

Hazardous Ingredients / Identity Information

Hazardous Components (Specific Chemical Identity: Common Name(s)	OSHA PEL	ACGIH TLV	Other Limits Recommended
Pyrotechnics Composition (may contain one or more of the following)	**N/A**	**N/A**	**Not Established**

Potassium Nitrate	Copper Oxide	Potassium Benzoate	Sodium Oxalate	Titanium
Barium Nitrate	Magnalium	Potassium Perchlorate	Strontium Nitrate	Aluminum
Barium Sulfate	Magnesium	Saran Resin	Strontium Carbonate	Dextrin
Charcoal	Magnesium Carbonate	Sodium Benzoate	Barium Carbonate	Parlon
Barium Carbonate	Ammonium Perchlorate	Strontium Sulfate	Barium Sulfate	Sulfur

Physical / Chemical Characteristics

Boiling Point: N/A **Specific Gravity: N/A** **Vapor Pressure (mm Hg.): N/A** **Melting Point: N/A**
Vapor Density (AIR=1): N/A **Evaporation Rate (Butyl Acetate = 1): N/A** **Solubility in Water: Soluble**
Appearance: cardboard tube, all component securely contained
Odor: Slight sulfurous odor or orderless

Fire and Explosion Hazard Data

Flash Point (Method Used)	Flammable Limits	LEL	UEL
328° C ignition temperature (no vapor flashpoint)	all concentrations	N/A	N/A

Extinguishing Media

None, material provides its own oxygen. Use water to cool surrounding materials to prevent spread of fire.

Special Fire Fighting Procedures

Firefighters should use approved breathing and protective equipment when fighting a pyrotechnic fire. Fire should be isolated by removal or water cooling of other flammable materials in the area, and the fire should be allowed to burn out.

Unusual Fire and Explosion Hazards

Burning pyrotechnics effects may project burning projectiles as far as 200'. Products in factory packaging will not mass detonate. Combustion may cause productions of hazardous decomposition products.

Reactivity Data

Stability	Conditions to Avoid	Hazardous Polymerization
Stable	Exposure to water. Open flame and other ignition sources.	Will not occur

Incompatibility

Strong acids, water (may initiate decomposition or cause material leakage)

Hazardous Decomposition or By-products

Sulfur dioxide, potassium oxide fumes, barium oxide fumes, antimony fume metal, copper fume metal.

Health Hazard Data

Route(s) of Entry:
Inhalation Skin

Health Hazards:
Inhalation: May irritate nose, throat or lungs. (combustible products)
Ingestion of Products: See MSDS of constituent chemicals.

Carcinogenicity:
NTP – No ARC Monographs – No OSHA Regulated – No

Signs and Symptoms of Exposure:
Respiratory irritation, difficulty breathing. Eye irritation. Nausea (ingestion)

Medical Conditions Generally Aggravated by Exposure:
Persons with pre-existing or impaired respiratory functions may be more susceptible to the effects of exposure to combustion by-products.

Precautions for Safe Handling and Use

Steps to be taken in the event material is released or spilled:
Pick up intact product and return in to packages, or re-package. Broken product: Sweep up loose material and package in paper or cardboard container. Dispose by hazardous materials process, or return to manufacturer for proper handling. Avoid raising dust while sweeping. Flush residues with plenty of water.

Waste Disposal Method:
Approved incineration in accordance with local, state and federal regulations.

Precautions to be taken in handling and storage:
Store in cool, dry, well-ventilated area protected from moisture and away from open flame or other heat sources.

Other Precautions:
None

Control Measures

Respiratory Protection:
NIOSH/MSHA approved mask – TC214-279

Special:
None Required

Other:
N/A

Ventilation:
Yes – Local exhaust

Mechanical:
None Required

Protective Gloves:
Rubber

Eye Protection:
Safety Goggles

Other Protective Clothing or Equipment:
Appropriate body protection.

Other Protective Clothing or Equipment:
Use good chemical hygiene practice.

Product Handling Safety Sheet

This product handling safety sheet has been prepared to comply with OSHA's Hazard Communication Standard, the requirements of NFPA 1123, NFPA 1126 and IFC section 3308. Users should consult current standards prior to any intended use of these products.

Evolution Pyrotechnics, Inc.
7788 Hwy 3
Acton, MT 59002 USA

Emergency Number: 800 535 5053 INFOTRAC

Information: 386-569-3017

Product:	19mm Laser Comet
US DOT EX#:	2012040718
NEQ:	.005 KG
Shipping Name	Articles, pyrotechnic 1.4G UN0431

Description of Effect

Distances are approximate, for information. Safety allowances Should be employed for prudent use.

Effect:	Projects single color comet
Duration:	.5 - 2 seconds
Height:	See product label
Fallout Radius:	N/A
Firing Angle(s):	+/- 35° off vertical
Venues:	Suitable for indoor use

- Product must be firmly mounted so it cannot move or be accidently re-aimed by vibrations or concussion from other effects.
- Keep away from open flames. No smoking within 50' of these materials.
- NEVER place any body part over the discharge end of the effect.
- Assure that audience setbacks, distances to flammable materials and overhead clearance adequate to the effect are maintained at all times.
- NEVER attempt to disassemble, modify or combine effects mechanically.
- Mount effects so that they are always visible to the firing technician. If malfunctions or unintentional re-aiming of effects occurs, STOP FIRING.
- All effects should be tested for specific performance before selecting them for a venue.
- Product is for professional use only!

Health Warning / First Aid

Inhalation of the smoke produced by this effect may cause irritation. In normal use, smoke dissipates quickly and does not present a problem. Persons found to be suffering from smoke inhalation should be removed to fresh air and medical assistance should be sought. **BURNS:** Treat for shock. Cover wounds with sterile dressings and seek medical attention immediately.

Malfunction or Mis-Fire (hang fire)

If an effect fails to fire, isolate it from the firing system and ascertain if it was connected correctly. Repeat the attempt to fire. If the effect fails again, remove the firing system; allow a minimum of 30 minutes standby, return to manufacturer.

Disposal Procedures

Submerge effect in water. Soak for 48 hours, then dispose of according to regulations.

Spills or Broken Packages

Return intact to the original packaging, or re-package. Sweep up broken product contents, avoid raising dust while sweeping. Package sweepings in paper or cardboard container and dispose by proper hazmat procedures. Flood residues with plenty of water.

Storage

Store in a cool, dry location away from open flame or other heat sources. Avoid freezing. High humidity (up to 95% non-condensing) for short durations before firing is acceptable. Storage humidity should remain below 70%, non-condensing.

Handling

Product should be handled with care during shipping and use. Avoid contact with rain or groundwater. Damaged products should not be used, they should be returned to manufacturer for repair or proper disposal.

SAFETY DATA SHEET

22mm Gerb

Date Issued: 02-01-12

Revision Date: 01-09-19

Revision Number: 3

Product / Company Identification

General Use: Theatrical Special Effects / Pyrotechnics
Classification: UN0431, Articles, pyrotechnic, 1.4G Explosive
Manufacturer: Evolution Pyrotechnics MFG, Inc.
1 Nickel Way
Columbus, MT 59019
833-386-7976

24 HR. Emergency Telephone Number

INFOTRAC: 800 535 5053

Hazardous Ingredients / Identity Information

Hazardous Components (Specific Chemical Identity: Common Name(s)	OSHA PEL	ACGIH TLV	Other Limits Recommended
Pyrotechnics Composition (may contain one or more of the following)	**N/A**	**N/A**	**Not Established**

Potassium Nitrate	Copper Oxide	Potassium Benzoate	Sodium Oxalate	Titanium
Barium Nitrate	Magnalium	Potassium Perchlorate	Strontium Nitrate	Aluminum
Barium Sulfate	Magnesium	Saran Resin	Strontium Carbonate	Dextrin
Charcoal	Magnesium Carbonate	Sodium Benzoate	Barium Carbonate	Parlon
Barium Carbonate	Ammonium Perchlorate	Strontium Sulfate	Barium Sulfate	Sulfur

Physical / Chemical Characteristics

Boiling Point: N/A **Specific Gravity: N/A** **Vapor Pressure (mm Hg.): N/A** **Melting Point: N/A**
Vapor Density (AIR=1): N/A **Evaporation Rate (Butyl Acetate = 1): N/A** **Solubility in Water: Soluble**
Appearance: cardboard tube, all component securely contained
Odor: Slight sulfurous odor or orderless

Fire and Explosion Hazard Data

Flash Point (Method Used)	Flammable Limits	LEL	UEL
328° C ignition temperature (no vapor flashpoint)	all concentrations	N/A	N/A

Extinguishing Media

None, material provides its own oxygen. Use water to cool surrounding materials to prevent spread of fire.

Special Fire Fighting Procedures

Firefighters should use approved breathing and protective equipment when fighting a pyrotechnic fire. Fire should be isolated by removal or water cooling of other flammable materials in the area, and the fire should be allowed to burn out.

Unusual Fire and Explosion Hazards

Burning pyrotechnics effects may project burning projectiles as far as 200'. Products in factory packaging will not mass detonate. Combustion may cause productions of hazardous decomposition products.

Reactivity Data

Stability	Conditions to Avoid	Hazardous Polymerization
Stable	Exposure to water. Open flame and other ignition sources.	Will not occur

Incompatibility

Strong acids, water (may initiate decomposition or cause material leakage)

Hazardous Decomposition or By-products

Sulfur dioxide, potassium oxide fumes, barium oxide fumes, antimony fume metal, copper fume metal.

Health Hazard Data

Route(s) of Entry:
Inhalation Skin

Health Hazards:
Inhalation: May irritate nose, throat or lungs. (combustible products)
Ingestion of Products: See MSDS of constituent chemicals.

Carcinogenicity:
NTP – No ARC Monographs – No OSHA Regulated – No

Signs and Symptoms of Exposure:
Respiratory irritation, difficulty breathing. Eye irritation. Nausea (ingestion)

Medical Conditions Generally Aggravated by Exposure:
Persons with pre-existing or impaired respiratory functions may be more susceptible to the effects of exposure to combustion by-products.

Precautions for Safe Handling and Use

Steps to be taken in the event material is released or spilled:
Pick up intact product and return in to packages, or re-package. Broken product: Sweep up loose material and package in paper or cardboard container. Dispose by hazardous materials process, or return to manufacturer for proper handling. Avoid raising dust while sweeping. Flush residues with plenty of water.

Waste Disposal Method:
Approved incineration in accordance with local, state and federal regulations.

Precautions to be taken in handling and storage:
Store in cool, dry, well-ventilated area protected from moisture and away from open flame or other heat sources.

Other Precautions:
None

Control Measures

Respiratory Protection:
NIOSH/MSHA approved mask – TC214-279

Special:
None Required

Other:
N/A

Ventilation:
Yes – Local exhaust

Mechanical:
None Required

Protective Gloves:
Rubber

Eye Protection:
Safety Goggles

Other Protective Clothing or Equipment:
Appropriate body protection.

Other Protective Clothing or Equipment:
Use good chemical hygiene practice.

WARNING

Burn, eye, skin, respiratory irritation, ingestion, acute or chronic exposure BURN:
Wash affected area.
EYE: Flush eyes with water for several minutes.
SKIN: Wash with soap and water
RESPIRATORY: Move to fresh air and consult physician.
INGESTION: DO NOT INDUCE VOMITING, Contact poison control
ACUTE OR CHRONIC EXPOSURE: Seek medical attention immediately
SEEK MEDICAL ATTENTION IF YOU FEEL UNWELL
Keep away from heat, sparks, open flame and hot surfaces
NO SMOKING
Store in a cool dry approved area

Dispose of content/container in accordance with local/regional/national regulations

This safety data sheet has been prepared to comply with OSHA's Hazard Communication Standard, the requirements of NFPA 1123, NFPA 1126 and IFC section 3308. Users should consult current standards prior to any intended use of these products.

Evolution Pyrotechnics MFG, Inc.
1 Nickel Way
Columbus, MT 59019

Emergency Number: 800 535 5053 INFOTRAC

Information: 833-386-7976

Product:	22mm Gerb
EX#:	See product label
Shipping Name:	UN0431, Articles, pyrotechnic, (1.4G Explosive)

- Product must be firmly mounted so it cannot move or be accidently re-aimed by vibrations or concussion from other effects.
- Keep away from open flames. No smoking within 50' of these materials.
- NEVER place any body part over the discharge end of the effect.
- Assure that audience setbacks, distances to flammable materials and overhead clearance adequate to the effect are maintained at all times.
- NEVER attempt to disassemble, modify or combine effects mechanically.
- Mount effects so that they are always visible to the firing technician. If malfunctions or unintentional re-aiming of effects occurs, STOP FIRING.
- All effects should be tested for specific performance before selecting them for a venue.
- Product is for professional use only!

Health Warning / First Aid

Inhalation of the smoke produced by this effect may cause irritation. In normal use, smoke dissipates quickly and does not present a problem. Persons found to be suffering from smoke inhalation should be removed to fresh air and medical assistance should be sought. **BURNS:** Treat for shock. Cover wounds with sterile dressings and seek medical attention immediately.

Malfunction or Mis-Fire (hang fire)

If an effect fails to fire, isolate it from the firing system and ascertain if it was connected correctly. Repeat the attempt to fire. If the effect fails again, remove the firing system; allow a minimum of 30 minutes standby, return to manufacturer.

Disposal Procedures

Submerge effect in water. Soak for 48 hours, then dispose of according to regulations.

Spills or Broken Packages

Return intact to the original packaging, or re-package. Sweep up broken product contents, avoid raising dust while sweeping. Package sweepings in paper or cardboard container and dispose by proper hazmat procedures. Flood residues with plenty of water.

Storage

Store in a cool, dry location away from open flame or other heat sources. Avoid freezing. High humidity (up to 95% non-condensing) for short durations before firing is acceptable. Storage humidity should remain below 70%, non-condensing.

Handling

Product should be handled with care during shipping and use. Avoid contact with rain or groundwater. Damaged products should not be used, they should be returned to manufacturer for repair or proper disposal.

MATERIAL SAFETY DATA SHEET

22mm Mine

Date Issued: 02-01-12

Revision Date: 02-01-12

Revision Number: 1

Product / Company Identification

Product Name: 22mm Mine
General Use: Theatrical Special Effects.
EX Number: 2010091296
Classification: Articles, pyrotechnic 1.4G UN0431
Manufacturer: Evolution Pyrotechnics Inc.
7788 Hwy 3
Acton, MT 59002
386-569-3017

24 HR. Emergency Telephone Number

INFOTRAC: 800 535 5053

Hazardous Ingredients / Identity Information

Hazardous Components (Specific Chemical Identity: Common Name(s)	OSHA PEL	ACGIH TLV	Other Limits Recommended
Pyrotechnics Composition (may contain one or more of the following)	**N/A**	**N/A**	**Not Established**

Potassium Nitrate	Copper Oxide	Potassium Benzoate	Sodium Oxalate	Titanium
Barium Nitrate	Magnalium	Potassium Perchlorate	Strontium Nitrate	Aluminum
Barium Sulfate	Magnesium	Saran Resin	Strontium Carbonate	Dextrin
Charcoal	Magnesium Carbonate	Sodium Benzoate	Barium Carbonate	Parlon
Barium Carbonate	Ammonium Perchlorate	Strontium Sulfate	Barium Sulfate	Sulfur

Physical / Chemical Characteristics

Boiling Point: N/A **Specific Gravity: N/A** **Vapor Pressure (mm Hg.): N/A** **Melting Point: N/A**
Vapor Density (AIR=1): N/A **Evaporation Rate (Butyl Acetate = 1): N/A** **Solubility in Water: Soluble**
Appearance: cardboard tube, all component securely contained
Odor: Slight sulfurous odor or orderless

Fire and Explosion Hazard Data

Flash Point (Method Used)	Flammable Limits	LEL	UEL
328° C ignition temperature (no vapor flashpoint)	all concentrations	N/A	N/A

Extinguishing Media

None, material provides its own oxygen. Use water to cool surrounding materials to prevent spread of fire.

Special Fire Fighting Procedures

Firefighters should use approved breathing and protective equipment when fighting a pyrotechnic fire. Fire should be isolated by removal or water cooling of other flammable materials in the area, and the fire should be allowed to burn out.

Unusual Fire and Explosion Hazards

Burning pyrotechnics effects may project burning projectiles as far as 200'. Products in factory packaging will not mass detonate. Combustion may cause productions of hazardous decomposition products.

Reactivity Data

Stability	Conditions to Avoid	Hazardous Polymerization
Stable	Exposure to water. Open flame and other ignition sources.	Will not occur

Incompatibility

Strong acids, water (may initiate decomposition or cause material leakage)

Hazardous Decomposition or By-products

Sulfur dioxide, potassium oxide fumes, barium oxide fumes, antimony fume metal, copper fume metal.

Health Hazard Data

Route(s) of Entry:
Inhalation Skin

Health Hazards:
Inhalation: May irritate nose, throat or lungs. (combustible products)
Ingestion of Products: See MSDS of constituent chemicals.

Carcinogenicity:
NTP – No ARC Monographs – No OSHA Regulated – No

Signs and Symptoms of Exposure:
Respiratory irritation, difficulty breathing. Eye irritation. Nausea (ingestion)

Medical Conditions Generally Aggravated by Exposure:
Persons with pre-existing or impaired respiratory functions may be more susceptible to the effects of exposure to combustion by-products.

Precautions for Safe Handling and Use

Steps to be taken in the event material is released or spilled:
Pick up intact product and return in to packages, or re-package. Broken product: Sweep up loose material and package in paper or cardboard container. Dispose by hazardous materials process, or return to manufacturer for proper handling. Avoid raising dust while sweeping. Flush residues with plenty of water.

Waste Disposal Method:
Approved incineration in accordance with local, state and federal regulations.

Precautions to be taken in handling and storage:
Store in cool, dry, well-ventilated area protected from moisture and away from open flame or other heat sources.

Other Precautions:
None

Control Measures

Respiratory Protection:
NIOSH/MSHA approved mask – TC214-279

Special:
None Required

Other:
N/A

Ventilation:
Yes – Local exhaust

Mechanical:
None Required

Protective Gloves:
Rubber

Eye Protection:
Safety Goggles

Other Protective Clothing or Equipment:
Appropriate body protection.

Other Protective Clothing or Equipment:
Use good chemical hygiene practice.

Product Handling Safety Sheet

This product handling safety sheet has been prepared to comply with OSHA's Hazard Communication Standard, the requirements of NFPA 1123, NFPA 1126 and IFC section 3308. Users should consult current standards prior to any intended use of these products.

Evolution Pyrotechnics, Inc.
7788 Hwy 3
Acton, MT 59002 USA

Emergency Number: 800 535 5053 INFOTRAC

Information: 386-569-3017

Product:	22mm Mine
US DOT EX#:	2010091296
NEQ:	.015 KG
Shipping Name	Articles, pyrotechnic 1.4G UN0431

Description of Effect

Distances are approximate, for information. Safety allowances Should be employed for prudent use.

Effect:	Projects colored stars
Duration:	1-3 seconds
Height:	See product label
Fallout Radius:	N/A
Firing Angle(s):	+/- 35° off vertical
Venues:	Suitable for indoor use

- Product must be firmly mounted so it cannot move or be accidently re-aimed by vibrations or concussion from other effects.
- Keep away from open flames. No smoking within 50' of these materials.
- NEVER place any body part over the discharge end of the effect.
- Assure that audience setbacks, distances to flammable materials and overhead clearance adequate to the effect are maintained at all times.
- NEVER attempt to disassemble, modify or combine effects mechanically.
- Mount effects so that they are always visible to the firing technician. If malfunctions or unintentional re-aiming of effects occurs, STOP FIRING.
- All effects should be tested for specific performance before selecting them for a venue.
- Product is for professional use only!

Health Warning / First Aid

Inhalation of the smoke produced by this effect may cause irritation. In normal use, smoke dissipates quickly and does not present a problem. Persons found to be suffering from smoke inhalation should be removed to fresh air and medical assistance should be sought. **BURNS:** Treat for shock. Cover wounds with sterile dressings and seek medical attention immediately.

Malfunction or Mis-Fire (hang fire)

If an effect fails to fire, isolate it from the firing system and ascertain if it was connected correctly. Repeat the attempt to fire. If the effect fails again, remove the firing system; allow a minimum of 30 minutes standby, return to manufacturer.

Disposal Procedures

Submerge effect in water. Soak for 48 hours, then dispose of according to regulations.

Spills or Broken Packages

Return intact to the original packaging, or re-package. Sweep up broken product contents, avoid raising dust while sweeping. Package sweepings in paper or cardboard container and dispose by proper hazmat procedures. Flood residues with plenty of water.

Storage

Store in a cool, dry location away from open flame or other heat sources. Avoid freezing. High humidity (up to 95% non-condensing) for short durations before firing is acceptable. Storage humidity should remain below 70%, non-condensing.

Handling

Product should be handled with care during shipping and use. Avoid contact with rain or groundwater. Damaged products should not be used, they should be returned to manufacturer for repair or proper disposal.

SAFETY DATA SHEET

Flash Tray – 18”

Date Issued: 02-01-12

Revision Date: 01-09-19

Revision Number: 3

Product / Company Identification

General Use: Theatrical Special Effects / Pyrotechnics
Classification: UN0431, Articles, pyrotechnic, 1.4G Explosive
Manufacturer: Evolution Pyrotechnics MFG, Inc.
1 Nickel Way
Columbus, MT 59019
833-386-7976

24 HR. Emergency Telephone Number

INFOTRAC: 800 535 5053

Hazardous Ingredients / Identity Information

Hazardous Components (Specific Chemical Identity: Common Name(s)	OSHA PEL	ACGIH TLV	Other Limits Recommended
Pyrotechnics Composition (may contain one or more of the following)	**N/A**	**N/A**	**Not Established**

Potassium Nitrate	Copper Oxide	Potassium Benzoate	Sodium Oxalate	Titanium
Barium Nitrate	Magnalium	Potassium Perchlorate	Strontium Nitrate	Aluminum
Barium Sulfate	Magnesium	Saran Resin	Strontium Carbonate	Dextrin
Charcoal	Magnesium Carbonate	Sodium Benzoate	Barium Carbonate	Parlon
Barium Carbonate	Ammonium Perchlorate	Strontium Sulfate	Barium Sulfate	Sulfur

Physical / Chemical Characteristics

Boiling Point: N/A **Specific Gravity: N/A** **Vapor Pressure (mm Hg.): N/A** **Melting Point: N/A**
Vapor Density (AIR=1): N/A **Evaporation Rate (Butyl Acetate = 1): N/A** **Solubility in Water: Soluble**
Appearance: cardboard tube, all component securely contained
Odor: Slight sulfurous odor or orderless

Fire and Explosion Hazard Data

Flash Point (Method Used)	Flammable Limits	LEL	UEL
328° C ignition temperature (no vapor flashpoint)	all concentrations	N/A	N/A

Extinguishing Media

None, material provides its own oxygen. Use water to cool surrounding materials to prevent spread of fire.

Special Fire Fighting Procedures

Firefighters should use approved breathing and protective equipment when fighting a pyrotechnic fire. Fire should be isolated by removal or water cooling of other flammable materials in the area, and the fire should be allowed to burn out.

Unusual Fire and Explosion Hazards

Burning pyrotechnics effects may project burning projectiles as far as 200’. Products in factory packaging will not mass detonate. Combustion may cause productions of hazardous decomposition products.

Reactivity Data

Stability	Conditions to Avoid	Hazardous Polymerization
Stable	Exposure to water. Open flame and other ignition sources.	Will not occur

Incompatibility

Strong acids, water (may initiate decomposition or cause material leakage)

Hazardous Decomposition or By-products

Sulfur dioxide, potassium oxide fumes, barium oxide fumes, antimony fume metal, copper fume metal.

Health Hazard Data

Route(s) of Entry:
Inhalation Skin

Health Hazards:
Inhalation: May irritate nose, throat or lungs. (combustible products)
Ingestion of Products: See MSDS of constituent chemicals.

Carcinogenicity:
NTP – No ARC Monographs – No OSHA Regulated – No

Signs and Symptoms of Exposure:
Respiratory irritation, difficulty breathing. Eye irritation. Nausea (ingestion)

Medical Conditions Generally Aggravated by Exposure:
Persons with pre-existing or impaired respiratory functions may be more susceptible to the effects of exposure to combustion by-products.

Precautions for Safe Handling and Use

Steps to be taken in the event material is released or spilled:
Pick up intact product and return in to packages, or re-package. Broken product: Sweep up loose material and package in paper or cardboard container. Dispose by hazardous materials process, or return to manufacturer for proper handling. Avoid raising dust while sweeping. Flush residues with plenty of water.

Waste Disposal Method:
Approved incineration in accordance with local, state and federal regulations.

Precautions to be taken in handling and storage:
Store in cool, dry, well-ventilated area protected from moisture and away from open flame or other heat sources.

Other Precautions:
None

Control Measures

Respiratory Protection:
NIOSH/MSHA approved mask – TC214-279

Special:
None Required

Other:
N/A

Ventilation:
Yes – Local exhaust

Mechanical:
None Required

Protective Gloves:
Rubber

Eye Protection:
Safety Goggles

Other Protective Clothing or Equipment:
Appropriate body protection.

Other Protective Clothing or Equipment:
Use good chemical hygiene practice.

WARNING

Burn, eye, skin, respiratory irritation, ingestion, acute or chronic exposure BURN:
Wash affected area.
EYE: Flush eyes with water for several minutes.
SKIN: Wash with soap and water
RESPIRATORY: Move to fresh air and consult physician.
INGESTION: DO NOT INDUCE VOMITING, Contact poison control
ACUTE OR CHRONIC EXPOSURE: Seek medical attention immediately
SEEK MEDICAL ATTENTION IF YOU FEEL UNWELL
Keep away from heat, sparks, open flame and hot surfaces
NO SMOKING
Store in a cool dry approved area

Dispose of content/container in accordance with local/regional/national regulations

This safety data sheet has been prepared to comply with OSHA's Hazard Communication Standard, the requirements of NFPA 1123, NFPA 1126 and IFC section 3308. Users should consult current standards prior to any intended use of these products.

Evolution Pyrotechnics MFG, Inc.
1 Nickel Way
Columbus, MT 59019

Emergency Number: 800 535 5053 INFOTRAC

Information: 833-386-7976

Product:	Flash Tray – 18"
EX#:	See product label
Shipping Name:	UN0431, Articles, pyrotechnic, (1.4G Explosive)

- Product must be firmly mounted so it cannot move or be accidently re-aimed by vibrations or concussion from other effects.
- Keep away from open flames. No smoking within 50' of these materials.
- NEVER place any body part over the discharge end of the effect.
- Assure that audience setbacks, distances to flammable materials and overhead clearance adequate to the effect are maintained at all times.
- NEVER attempt to disassemble, modify or combine effects mechanically.
- Mount effects so that they are always visible to the firing technician. If malfunctions or unintentional re-aiming of effects occurs, STOP FIRING.
- All effects should be tested for specific performance before selecting them for a venue.
- Product is for professional use only!

Health Warning / First Aid

Inhalation of the smoke produced by this effect may cause irritation. In normal use, smoke dissipates quickly and does not present a problem. Persons found to be suffering from smoke inhalation should be removed to fresh air and medical assistance should be sought. **BURNS:** Treat for shock. Cover wounds with sterile dressings and seek medical attention immediately.

Malfunction or Mis-Fire (hang fire)

If an effect fails to fire, isolate it from the firing system and ascertain if it was connected correctly. Repeat the attempt to fire. If the effect fails again, remove the firing system; allow a minimum of 30 minutes standby, return to manufacturer.

Disposal Procedures

Submerge effect in water. Soak for 48 hours, then dispose of according to regulations.

Spills or Broken Packages

Return intact to the original packaging, or re-package. Sweep up broken product contents, avoid raising dust while sweeping. Package sweepings in paper or cardboard container and dispose by proper hazmat procedures. Flood residues with plenty of water.

Storage

Store in a cool, dry location away from open flame or other heat sources. Avoid freezing. High humidity (up to 95% non-condensing) for short durations before firing is acceptable. Storage humidity should remain below 70%, non-condensing.

Handling

Product should be handled with care during shipping and use. Avoid contact with rain or groundwater. Damaged products should not be used, they should be returned to manufacturer for repair or proper disposal.

EFFECTDESCRIPTION

Our highly experienced crew members Jason Wakefield and Darryl Rickheim will be on site for the Bailey Zimmerman; One-Offs 2025.

Strictly FX will be providing various smoke, and pyrotechnics for this event.

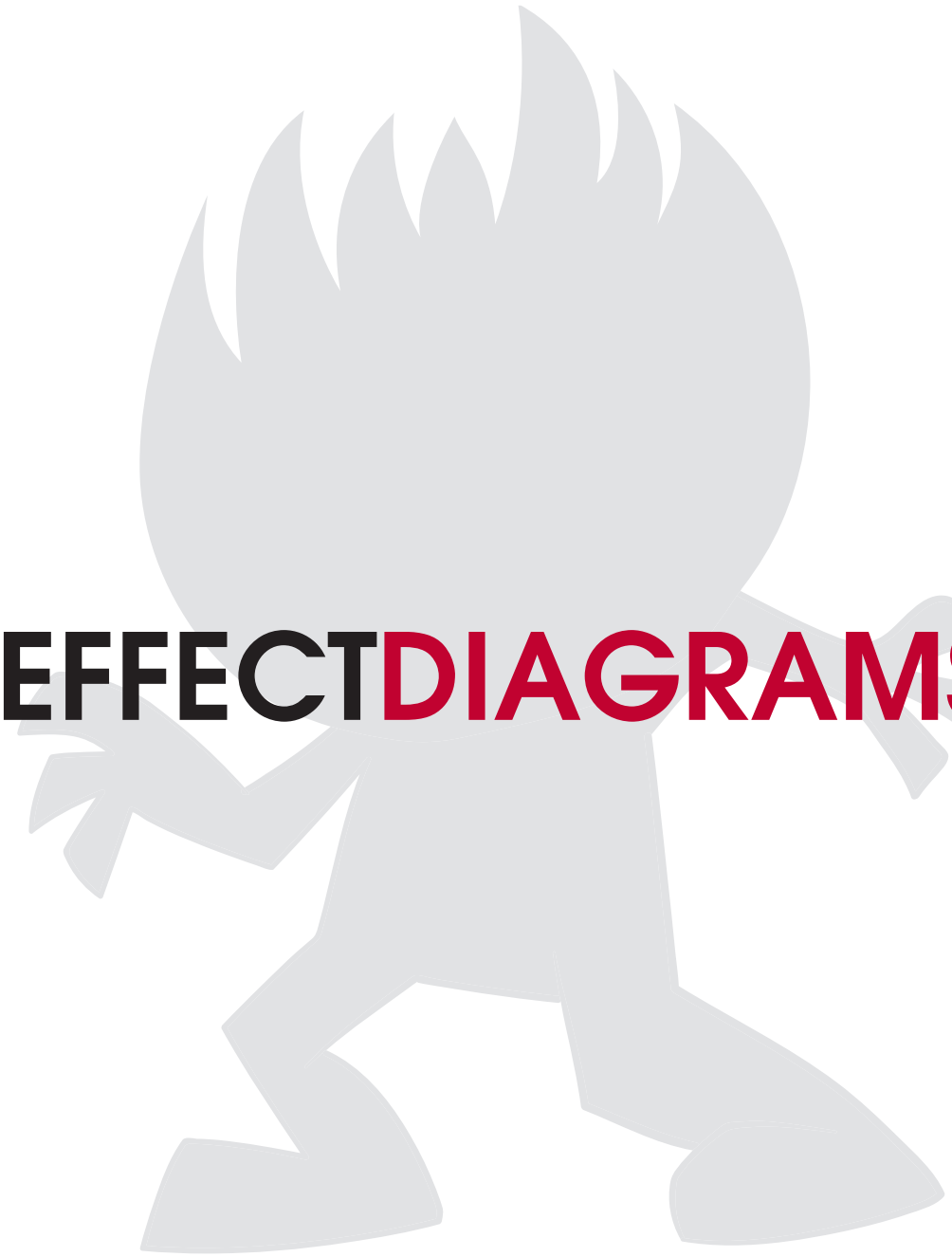
Please see diagrams for effects placement. Note: exact location of effects may change on site.

SMOKE

AMOUNT	DESCRIPTION	MANUFACTURER
12	Eco2Jets	MAGIC FX
12	Eco2Jet Fluid	MAGIC FX

PYROTECHNICS

AMOUNT	DESCRIPTION	MANUFACTURER
42	1 x 25 gerbs	EVOLUTION
18	20 x 20 gerbs	EVOLUTION
18	25' Red Laser Comets	EVOLUTION
6	18" Flash Tray Green	EVOLUTION
18	25' White Mines	EVOLUTION
18	25' Sparkle Canons	EVOLUTION
10	Cannon Simulator	EVOLUTION

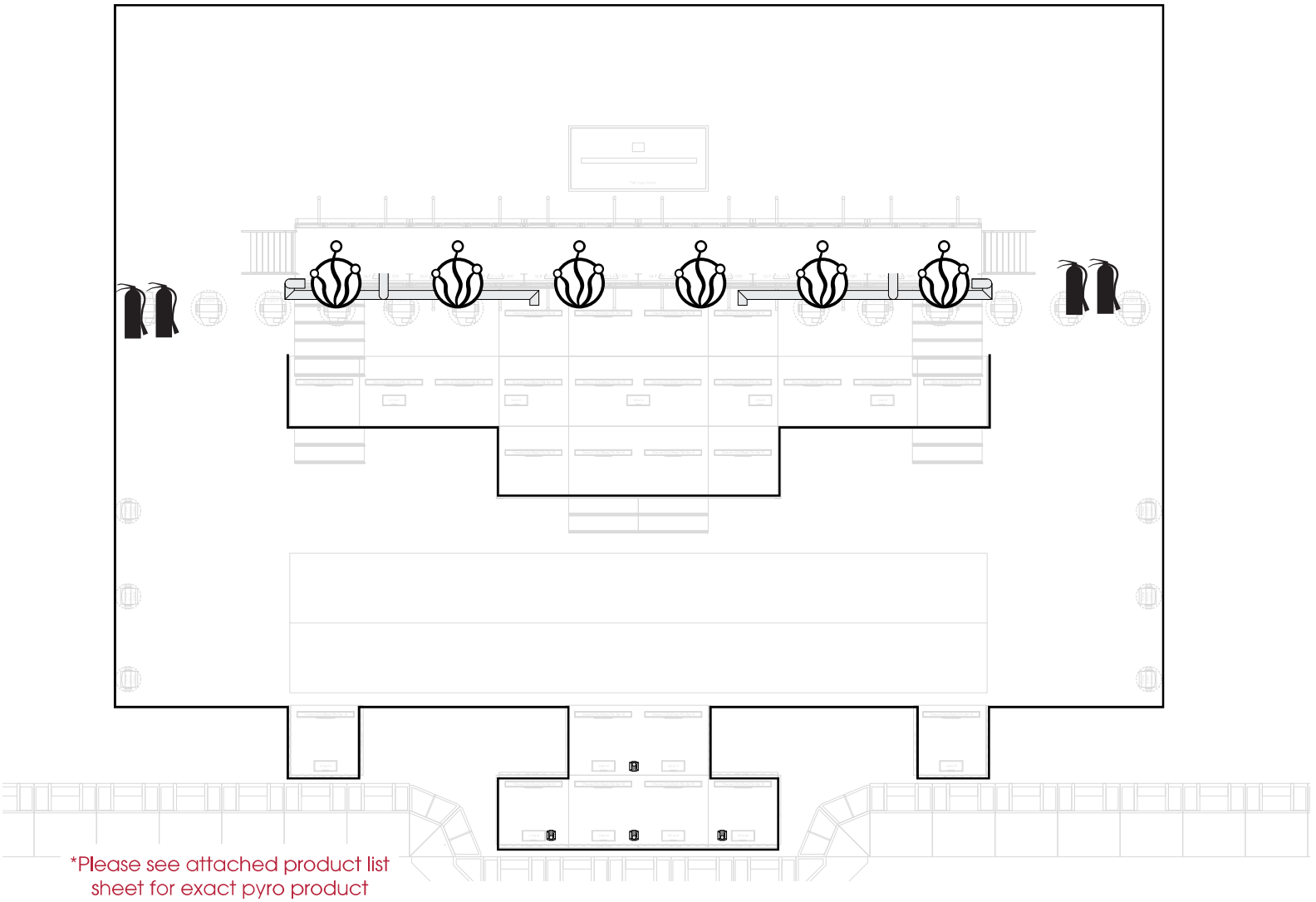


EFFECTDIAGRAMS

::PYRO::

BAILEY ZIMMERMAN Effect Layout 2025

TOP VIEW



*Please see attached product list sheet for exact pyro product being used

Scale = NTS

NOTE: All product 15' min away from audience.
All product placement TBD at show site.

Legend

= Pyro Boards
(6 PLACEHOLDERS)

= Water Pressurized Fire Extinguishers (2 total)
CO_2 Fire Extinguishers (2 total)

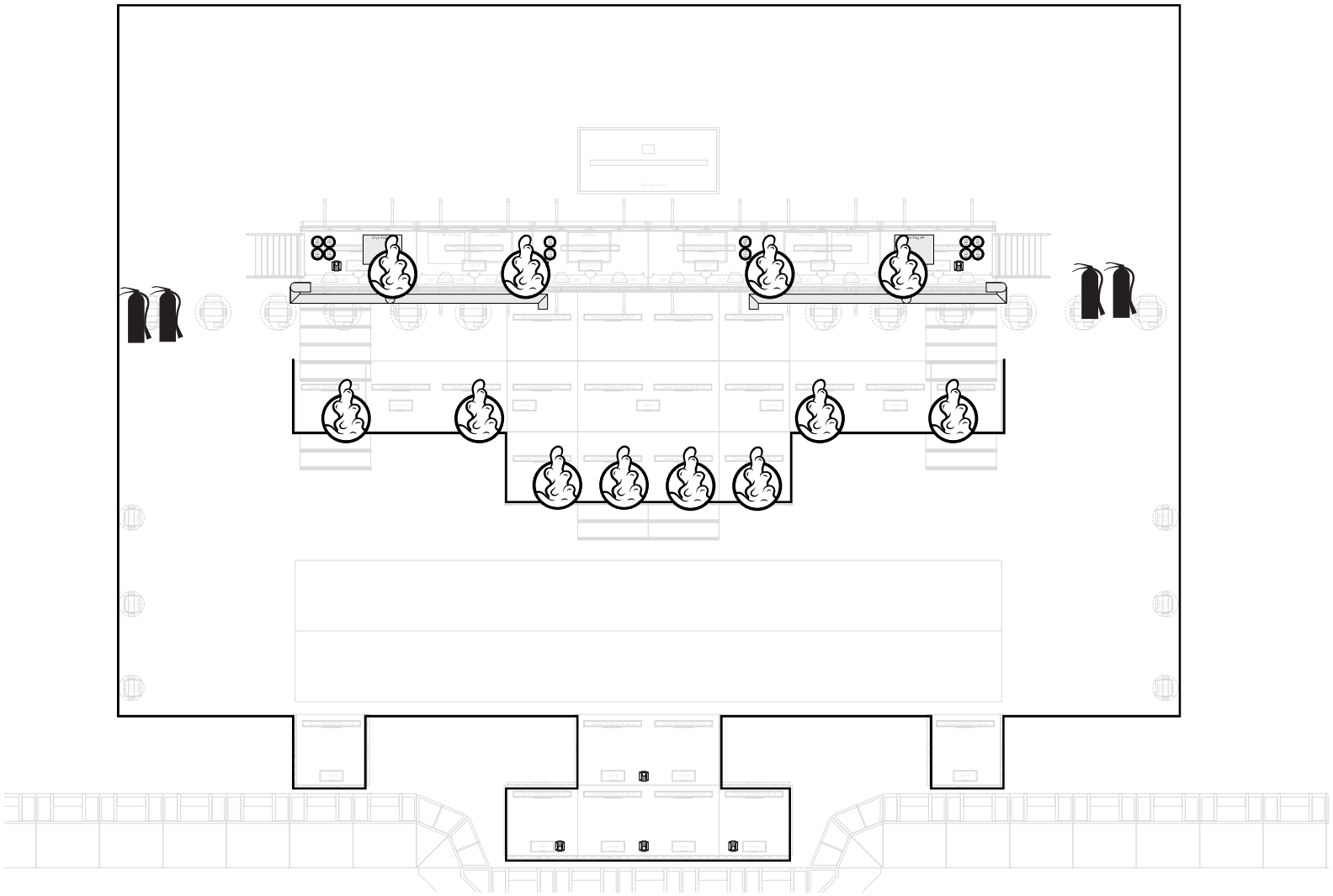
REVISED: 2025.01.14

Nashville: 120 Airpark Center Drive East, Nashville, TN 37217
strictlyfx.com p: (629)702-3639 f: (615)922-4889

::SMOKE::

BAILEY ZIMMERMAN Effect Layout 2025

TOP VIEW



Scale = NTS

*NOTE: All special effect unit placement TBD at show site.

Legend

= EcoJets
(12 PLACEHOLDERS)

= Water Pressurized Fire Extinguishers (2 total)
CO_2 Fire Extinguishers (2 total)

REVISED: 2025.02.06

Nashville: 120 Airpark Center Drive East, Nashville, TN 37217
strictlyfx.com p: (629)702-3639 f: (615)922-4889

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY) 02/24/25

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER
DRAYTON INSURANCE BROKERS INC
2500 Center Point Rd #301
Birmingham, AL 35215
CA License Nos. 0763421/0A18664

CONTACT NAME:
PHONE (A/C, No, Ext): (205)854-5806 FAX (A/C, No): (205)854-5899
E-MAIL ADDRESS: georgine@draytonins.com

INSURER(S) AFFORDING COVERAGE	NAIC #
INSURER A: ADMIRAL INSURANCE COMPANY	24856
INSURER B: Axis Surplus Insurance Company	26620
INSURER C: Arch Speciality Ins Co	
INSURER D:	
INSURER E:	
INSURER F:	

INSURED
Strictly FX, LLC
120 Airpark Center East
Nashville, TN 37217

COVERAGES CERTIFICATE NUMBER: REVISION NUMBER:

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	X COMMERCIAL GENERAL LIABILITY CLAIMS-MADE X OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: X POLICY PRO-JECT LOC OTHER:	X		CA000005300-21	11/1/24	11/1/25	EACH OCCURRENCE DAMAGE TO RENTED PREMISES (Ea occurrence) MED EXP (Any one person) PERSONAL & ADV INJURY GENERAL AGGREGATE PRODUCTS - COMP/OP AGG	$ 1,000,000 $ 100,000 $ NONE $ 1,000,000 $ 2,000,000 $ 2,000,000
	AUTOMOBILE LIABILITY ANY AUTO OWNED AUTOS ONLY HIRED AUTOS ONLY SCHEDULED AUTOS NON-OWNED AUTOS ONLY						COMBINED SINGLE LIMIT (Ea accident) BODILY INJURY (Per person) BODILY INJURY (Per accident) PROPERTY DAMAGE (Per accident)	$ $ $ $
B	X UMBRELLA LIAB X OCCUR X EXCESS LIAB CLAIMS-MADE DED RETENTION $	X		P-001-000210804-06	11/1/24	11/1/25	EACH OCCURRENCE AGGREGATE	$ 4,000,000 $ 4,000,000
	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? Y/N (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below	N/A					PER STATUTE OTH-ER E.L. EACH ACCIDENT E.L. DISEASE - EA EMPLOYEE E.L. DISEASE - POLICY LIMIT	$ $ $
C	SECOND EXCESS LIABILITY	X		UXP1050395-02	11/1/24	11/1/25	Each Occurrence Aggregate	$5,000,000 $5,000,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)
Country Thunder Arizona, Canyon Moon Ranch, City of Florence, Arizona, Florence Fire Department Pinal County and its departments, agencies, officers, officials, appointed agents, employees and volunteers, when acting in their capacity as such, are included as Additional Insureds in respect of liability caused by the Named Insureds operations for Bailey Zimmerman Event at Country Thunder Arizona/Canyon Moon Ranch in Florence AZ on April 13, 2025.

CERTIFICATE HOLDER
Pinal County
PO Box 827
Florence, AZ 85132

CANCELLATION
SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

ADDITIONAL INSURED – BLANKET

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART
COMMERCIAL PROPERTY COVERAGE PART
PROFESSIONAL LIABILITY COVERAGE PART

It is hereby declared and agreed that the following entities are included as Additional Insured(s) hereunder:

1) Sponsor(s), promoter(s), organizer(s) (including other entities having similar interests), of insured pyrotechnic events and/or insured pyrotechnic premises;

2) Owner(s) of real property (or barges) at which insured pyrotechnic events are held and/or insured pyrotechnic premises are located;

3) Owner(s), manager(s), tenant(s), mortgagee(s) (including other entities having similar interests), of buildings, stadiums, arenas, stores and other similar facilities at which insured pyrotechnic events are held and/or insured pyrotechnic premises are located;

4) The licensing or permitting authority, or other authority having jurisdiction, issuing licenses/permits for insured pyrotechnic events and/or insured pyrotechnic premises;

5) Any duly licensed pyrotechnician acting either as a licensing cover for an insured pyrotechnic event or, alternatively, as an operator for a pyrotechnic event fired by the Named Insured;

6) Any other entity for which the Named Insured is contractually obligated to provide insurance such as is afforded by the terms of this policy;

but only if such entities are listed as additional insured(s) in a certificate of insurance issued under the terms of this endorsement and always subject to the limitations or conditions set out in such certificate of insurance.

The coverage afforded such Additional Insured(s) does not apply to injury or damage arising from the failure of any such Additional Insured to fulfill its obligations specified in its contract with the Named Insured.

DRAYTON INSURANCE BROKERS, INC.

2500 CENTER POINT ROAD, SUITE 301
BIRMINGHAM, ALABAMA 35215
PHONE: (205) 854-5806
FAX: (205) 854-5899

POST OFFICE BOX 94067
BIRMINGHAM, ALABAMA 35220
EMAIL: dib@draytonins.com

CERTIFICATE OF INSURANCE

NO. 485044

We certify that insurance is afforded as stated below. This Certificate does not affirmatively or negatively amend, extend or alter the coverage afforded by the insurance policy and the insurance afforded is subject to all the terms, exclusions and conditions of the policy.

INSURER Admiral Insurance Company **POLICY NO.** CA000005300-21

NAMED INSURED Strictly FX, L.L.C.
120 Airpark Center East
Nashville, TN 37217

POLICY TERM November 1, 2024 to November 1, 2025; Both Days 12:01 A.M. Standard Time

COVERAGE Commercial General Liability: ☒ Occurrence Basis ☐ Claims Made Basis

LIMIT OF LIABILITY $1,000,000 each occurrence, $2,000,000 general aggregate, $2,000,000 products/completed operations aggregate
The limit of liability shall not be increased by the inclusion of more than one insured or additional insured.

RESTRICTION This policy applies only to displays which comprise solely Class "C" Fireworks (Explosives Classification 1.4), pyrotechnics special effects (including indoor pyrotechnics), propane, open flame effects, lasers and other non-pyrotechnic special effects. Excluding the use of Class "B" fireworks (Explosives Classification 1.3).

INSURED OPERATIONS Public fireworks display and special effects contractor

It is certified that, if named below, this policy includes as Additional Insureds 1) the sponsor(s), promoter(s), organizer(s) (including other entities having similar interests), of insured pyrotechnic events and/or 2) the owner(s) of real property (or barges) at which insured pyrotechnic events are held and/or 3) the owner(s), manager(s), tenant(s), mortgagee(s) (including other entities having similar interests), of buildings, stadiums, arenas and similar facilities at which insured pyrotechnic events are held and/or 4) the licensing or permitting authority, or other authority having jurisdiction, issuing licenses/permits for insured pyrotechnic events and/or 5) any other entity for which the insurance is required to be afforded under written contract. Coverage applies only as respects the legal liability of such Additional Insured(s) for bodily injury and property damage caused by the operations of the Named Insured. The insurance afforded any Additional Insured does not include coverage for any bodily injury or property damage arising from the failure of such Additional Insured to fulfill its obligations specified in its contract with the Named Insured.

NAME(S) OF ADDITIONAL INSURED(S)

COUNTRY THUNDER ARIZONA, CANYON MOON RANCH, CITY OF FLORENCE, ARIZONA, FLORENCE FIRE DEPARTMENT AND THEIR OFFICERS, AGENTS AND EMPLOYEES WHEN ACTING IN THE CAPACITY AS SUCH

DISPLAY LOCATION COUNTRY THUNDER ARIZONA/CANYON MOON RANCH
20585 E WATER WAY, FLORENCE AZ 85132

DISPLAY DATE(S) APRIL 13, 2025 – BAILEY ZIMMERMAN EVENT

It is certified that this policy requires a 30 day mutual notice of cancellation between the Insurer and the Named Insured. In the event of such cancellation we will endeavor to mail 10 days written notice to the Additional Insured(s), whose name and address is shown hereon, but failure to mail such notice shall impose no obligation or liability of any kind upon the insurer and/or the undersigned.

DRAYTON INSURANCE BROKERS, INC.

FEBRUARY 12, 2025

DATE OF ISSUE

A.J. STRINGER, PRESIDENT