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Entertainment Technology—Design and Execution of
Theatrical Fog Effects

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This standard was originally published when the Entertainment Services and Technology Association was operating under the name of PLASA North America. ESTA has reverted to its original name, and this document has been rebranded with the current corporate name and logo. No changes have been made to the contents of the standard.

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The ESTA Technical Standards Program

The ESTA Technical Standards Program was created to serve the ESTA membership and the entertainment industry in technical standards related matters. The goal of the Program is to take a leading role regarding technology within the entertainment industry by creating recommended practices and standards, monitoring standards issues around the world on behalf of our members, and improving communications and safety within the industry. ESTA works closely with the technical standards efforts of other organizations within our industry, including USITT and VPLT, as well as representing the interests of ESTA members to ANSI, UL, and the NFPA. The Technical Standards Program is accredited by the American National Standards Institute.

The Technical Standards Council (TSC) was established to oversee and coordinate the Technical Standards Program. Made up of individuals experienced in standards-making work from throughout our industry, the Council approves all projects undertaken and assigns them to the appropriate working group. The Technical Standards Council employs a Technical Standards Manager to coordinate the work of the Council and its working groups as well as maintain a "Standards Watch" on behalf of members. Working groups include: Control Protocols, Electrical Power, Event Safety, Floors, Fog and Smoke, Followspot Position, Photometrics, Rigging, and Stage Lifts.

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The Fog & Smoke Working Group, which authored this Standard, consists of a cross section of entertainment industry professionals representing a diversity of interests. ESTA is committed to developing consensus-based standards and recommended practices in an open setting.

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DR	Dealer or rental company	G	General interest
MP	Mass-market producer	U	User

Table of Contents

NOTICE and DISCLAIMER	ii
Contact Information	v
Acknowledgments	vi
1 General.....	1
1.1 Scope	1
1.2 Purpose	1
1.3 Definitions.....	2
1.4 Other standards, regulations, and references	2
2 Personnel	3
2.1 Effect Designer	3
2.2 Effect Operator	3
3 Design and planning of the fog effect and equipment use.....	3
3.1 Selection of appropriate technology	3
3.1.1 Visual effect desired.....	3
3.1.2* Resources to use the technology safely and effectively.....	4
3.1.3 Restrictions in choices by local regulations or house rules	4
3.2 Storage of materials.....	4
3.2.1* Temperature.....	4
3.2.2* Avoidance of contamination	4
3.2.3* Ventilation	4
3.2.4 Access and egress.....	4
3.3 Siting of equipment	4
3.3.1* Access and egress.....	4
3.3.2* Protection from environmental hazards	4
3.3.3* Protection from unintended contact	4
3.3.4* Protection from heat and cold.....	5
3.4 Equipment.....	5
3.4.1* General	5
3.4.2 Commercially manufactured standard equipment.....	5
3.4.3 Custom equipment	5
3.5 Distribution of aerosol	5
3.5.1 General rules	5
3.5.2 Control of fluid residue build-up.....	6
3.5.3 Control of inhalation exposure to liquids and toxic gases	6
3.5.4* Oxygen enriched or deficient atmospheres	7
3.6 Maintenance	7
3.7* Fire detection systems	7
4 Operation of the effect	7
4.1 Cue operation	7
4.1.1 Cues shall be documented.....	7
4.1.2 Cues shall not be modified without approval	8
4.2 Monitoring distribution of the aerosol.....	8
4.2.1 Visual effect evaluation	8
4.2.2 Fluid residue build-up.....	8
4.3 Equipment maintenance	8
5 Documentation of effect.....	8
6 Approvals	9
Annex A	10

1 General

1.1 Scope

This Standard is intended to be applicable to the creation of theatrical effects using artificial fogs or mists in theatres, arenas, and other places of entertainment or public assembly.

The fogs and mists covered by this Standard are aerosols created using one or more of the following liquids:

Name	Chemical Abstracts Service (CAS) #
triethylene glycol	112-27-6
monopropylene glycol (propylene glycol; 1,2-propanediol)	57-55-6
diethylene glycol	111-46-6
dipropylene glycol	25265-71-8, 106-62-7, 110-98-5, 108-61-2
1,2-butylene glycol (1,2-butanediol)	584-03-2
1,3-butylene glycol (1,3-butanediol)	107-88-0
glycerin (glycerol; 1,2,3- propanetriol)	56-81-5
white mineral oil, medicinal or food grade	8042-47-5
water	07732-18-5
nitrogen, liquefied (LN2, L-N2))	7727-37-9
oxygen, liquefied (LOX)	80937-33-3
carbon dioxide, liquefied (LCO2, L-CO2)	124-38-9

The aerosols within the scope of this Standard are injected directly into the environment or are carried out of the fog generating equipment on a stream of ambient air, or a stream of nitrogen, argon, carbon dioxide, or a mixture of nitrogen and oxygen that approximates the composition of normal air. The Chemical Abstracts Service registry numbers for the gases that may be used as vehicles for the aerosols within the scope of this Standard are as follows:

Name	CAS #
oxygen	7782-44-7
nitrogen	7727-37-9
argon	7440-37-1
carbon dioxide	124-38-9

This Standard is not intended to be used for guidance in planning or executing any fog effect that uses a liquid or gas not listed above.

1.2 Purpose

The purpose of this Standard is to offer atmospheric effects creators and operators guidance in the planning and execution of theatrical fog effects so that the health and comfort of workers and spectators shall not be compromised by excessive exposure to chemicals and particulates that are the result of the use of such theatrical fog effects. The Standard is also intended to provide guidance related to the obscuration of hazards or paths of egress in the theatre, arena, place of entertainment or public assembly in which the fog effect is produced. In addition, the Standard is intended to help avoid