



Introduction to Modern Atmospheric Effects

5th Edition

This book is designed to inform you about current fog-making technologies and give suggestions for their safe and effective use. PLASA does not endorse any specific fog-making technology, product, or technique.

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Basic Fog Use Guidelines

- Determine the appropriate technology for the application.
- Make only as much fog as necessary.
- Deliver the fog only where it is necessary.
- Deliver the fog only when it is necessary.
- Avoid exposing people to the direct output of fog machines.
- Monitor and control liquid accumulation.
- Post appropriate warnings.
- Follow manufacturers' instructions.
- Read this book.

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NOTICE and DISCLAIMER

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Published by:

PLASA North America
630 Ninth Avenue, Suite 609
New York, NY 10036
USA
Phone: 1-212-244-1505
Fax: 1-212-244-1502
standards.na@plasa.org

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The PLASA Technical Standards Program

The PLASA Technical Standards Program was created to serve the PLASA 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. PLASA works closely with the technical standards efforts of other organizations within our industry, including USITT and VPLT, as well as representing the interests of PLASA 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, Floors, Fog and Smoke, Followspot Position, Photometrics, Rigging, and Stage Lifts.

PLASA encourages active participation in the Technical Standards Program. There are several ways to become involved. If you would like to become a member of an existing working group, as have over four hundred people, you must complete an application which is available from the PLASA office. Your application is subject to approval by the working group and you will be required to actively participate in the work of the group. This includes responding to letter ballots and attending meetings. Membership in PLASA is not a requirement. You can also become involved by requesting that the TSC develop a standard or a recommended practice in an area of concern to you.

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

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Contact Information

Technical Standards Manager

Karl G. Ruling
PLASA North America
630 Ninth Avenue, Suite 609
New York, NY 10036 USA
1-212-244-1505
karl.ruling@plasa.org

Assistant Technical Standards Manager

Erin Grabe
PLASA North America
630 Ninth Avenue, Suite 609
New York, NY 10036 USA
1-212-244-1505
erin.grabe@plasa.org

Technical Standards Council Chairpersons

Mike Garl
Mike Garl Consulting LLC
836 Smoke Creek Rd.
Knoxville, TN 37934
USA
1-865-389-4371
mike@mikegarlconsulting.com

Mike Wood
Mike Wood Consulting LLC
6401 Clairmont Drive
Austin, TX 78749
USA
1-512-288-4916
mike@mikewoodconsulting.com

Fog & Smoke Working Group Chairpersons

M. Brad Dittmer
Stage Labor of the Ozarks
2105 N. Haseltine
Brookline, MO 65619
USA
1-417-616-9948
slobrad17@gmail.com

Larry Schoeneman
DesignLab Chicago, Inc.
328 N. Albany Avenue
Chicago, IL 60612
USA
1-773-265-1100
Larry@dlabchicago.net

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The Fog & Smoke Working Group members when this document was approved by the working group on 24 July 2015 are shown below.

Voting members:

Matthew Antonucci; Contract Services Administration Trust Fund; U
Matthew R. DeLong; Rosco Laboratories; MP
Brad Dittmer; Stage Labor of the Ozarks; U
Mark Elliott; Walt Disney Company; U
Paul Jordan; NBC Universal; U
Edwin S. Kramer; I.A.T.S.E. Local 1; U
Don Phillips; Ultratec Special Effects Inc.; MP
Larry Schoeneman; DesignLab Chicago, Inc.; DR
Marnie Styles; Ultratec Special Effects Inc.; MP
Stephen Vanciel; IATSE Local 631; U
Mike Wood; Mike Wood Consulting LLC; G

Observer (non-voting) members:

Clive Bailey; Martin Professional A/S; MP
Robert Barbagallo; Solotech Inc.; U
Paul Beasley; Walt Disney Company; U
Ron Bonner; PLASA EU; G
Margaret Buckalew; Environmental Resource Management (ERM); G
Justin Cicerone; Harman International Industries; MP
Jim Cooper; USITT; U
Gary Crawford; C I T C; MP
Gary Fails; City Theatrical, Inc.; MP
Lowell Fowler; High End Systems Inc.; MP
Randy L. Fox; Walt Disney Company; U
Reuben Goldberg; Technic Services; U
Jerry Gorrell; Theatre Safety Programs; G
Kent H. Jorgensen; IATSE Local 80; G
Nathan Kahn; Look Solutions USA Ltd.; MP
Thomas V. Korder; University of Illinois; U
Peggy Lee Martindale; University of Texas, Austin; G
Greg Meeh; Jauchem & Meeh, Inc.; DR
Martin Michaud; MDG Fog Generators Ltd.; MP
Monona Rossol; Monona Rossol; G
Adrian Segeren; Ultratec Special Effects Inc.; MP
Ford Sellers; Chauvet Lighting; MP
Eric Tishman; Rosco Laboratories; MP

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Colin Waters; TMB; G
Norman Wright; Group One; DR

Interest category codes:

CP = Custom-market Producer

DE = Designer

DR = Dealer or Rental company

G = General interest

MP = Mass-market Producer

U = User

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F. Lee Iwanski; Four Star Lighting

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Edwin S. Kramer; IATSE Local 1

Martin Michaud; MDG Fog Generators Ltd.

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Eckart Steffens; Soundlight

Florian von Hofen; VPLT

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Introduction

"The spells of the hero, beneath the castle, conjure up volumes of vapor, which at first, float dimly in the air, thicken into a film, and then a mist, till the dark masses of clouds roll over and melt into each other, and the stage is entirely enveloped, like the summit of some sky-clearing mountain."

So reported the *New York Mirror* about a dramatization of *Ivanhoe* at the Bowery Theatre in 1831. Atmospheric effects have been part of theatrical productions since long before this show, almost since the beginning of theatre. The Greeks used burning pitch and resinous torches, and in Shakespeare's time the smoke from black powder charges blew across the stage of the Globe outside London. Over the years a wide variety of methods have been used to make something that looks like smoke, clouds, haze, or mist on stage. Many people working in the entertainment industry today can remember loading electric heater cones with ammonium chloride (sal ammoniac), pumping a bee smoker, or lighting smoke cookies or pellets to gain the desired effect. Titanium tetrachloride, which produces thin white smoke when exposed to the air, has been used, even though contact with moisture produces corrosive hydrogen chloride gas as well as a cloud of white titanium dioxide. With the exception of steam, the early atmospheric effects techniques offered very little control over where the effects would go and could not be easily stopped and started on cue. Many of them were unacceptably toxic by modern health standards, and many of them were fire hazards

Today's widely used atmospheric effects are fundamentally different from most of the earlier effects in that they are almost always fog effects. The fog might be shot from a machine in a big burst that looks like smoke, or it might roll across the floor as low, white clouds, or it might float almost invisibly in the air as a thin haze, but almost all modern atmospheric effects are fogs: tiny droplets of liquid floating in the air. Glycol-based fog systems (often called a "smoke machine") produce a fog in which the droplets are a mixture of water and glycol or glycerin. The familiar dry ice fog machine produces a fog in which the droplets are water. The machines known as "hazers" produce a thin haze of highly refined mineral oil, glycol, or some other fluid. All of them produce aerosols of liquid droplets suspended in the air.

Besides the burning pitch, black powder, and fumed sal ammoniac mentioned above, there are many non-fog machine ways of making smoke on stage, but they are outside the scope of this book. These methods include smoking tobacco in cigarettes and pipes; vaping e-cigarettes, e-cigars, and electric hookahs; burning incense; igniting firecrackers and gerbs; blowing dry