

BSR ES1.19-2020, Safety Requirements for Special Event Structures

Approved by the ANSI Board of Standards Review on 02 June 2020

ES/2017-20007r5

© 2020 Entertainment Services and Technology Association (ESTA) and Event Safety Alliance (ESA) All rights reserved.

Safety Requirements for Special Event Structures

Notice and Disclaimer

ESTA does not approve, inspect, or certify any installation, procedure, equipment or material for compliance with codes, recommended practices or standards. Compliance with an ESTA standard, recommended practice, or an American National Standard developed by ESTA is the sole and exclusive responsibility of the document user and is entirely within their control and discretion. No markings, identification or other claims of compliance shall constitute any certification or approval whatsoever by ESTA.

ESTA neither guarantees nor warrants the accuracy or completeness of any information published herein and disclaim liability for any personal injury, property or other damage or injury of any nature whatsoever, whether special, indirect, consequential or compensatory, directly or indirectly resulting from the publication, use of, or reliance on this document.

In issuing and distributing this document, ESTA does not either (a) undertake to render professional or other services for or on behalf of any person or entity, or (b) undertake any duty to any person or entity with respect to this document or its contents. Persons using this document should rely on his or her own independent judgment or, as appropriate, seek professional advice when determining the exercise of reasonable care in any given circumstance.

Published by:

ESTA 630 Ninth Avenue, Suite 609 New York, NY 10036 USA Phone: 1-212-244-1505 Fax: 1-212-244-1502 standards@ESTA.org http://www.ESTA.org/

Safety Requirements for Special Event Structures

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 ESA, USITT and VPLT, as well as representing the interests of ESTA members to ANSI, ICC, UL, and the NFPA. The Technical Standards Program is accredited by the American National Standards Institute.

The Technical Standards Council (TSC) was established by ESTA to oversee and coordinate the Technical Standards Program. Made up of individuals experienced in standards-making work from throughout our industry, the Committee approves all projects undertaken and assigns them to the appropriate working group. The Technical Standards Committee employs a Technical Standards Manager to coordinate the work of the Committee 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 Positions, Photometrics, Rigging, and Stage Machinery.

ESTA 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 three hundred people, you must complete an application which is available from the ESTA 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 ESTA 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 Event Safety Working Group, which authored this Standard, consists of a cross section of entertainment industry professionals representing a diversity of interests related to event production, insurance and legal matters, rigging and stage machinery for theatrical events. ESTA is committed to developing consensus-based standards and recommended practices in an open setting. Future Event Safety Working Group projects will include updating this publication as changes in technology and experience warrant, as well as developing new standards and recommended practices for the benefit of the entertainment industry.

Safety Requirements for Special Event Structures

Investors in Innovation

The Technical Standard Program (TSP) is financially supported by ESTA and by companies and individuals who make undirected donations to the TSP. Contributing companies and individuals who have helped fund the TSP are recognized as "Investors in Innovation." The Investors in Innovation when this standard was approved by ANSI's Board of Standards Review include these companies and individuals:

| VISIONARY LEADERS (\$50,000 & up) ETC | PLASA | ProSight Specialty Insurance |
|--|---|------------------------------|
| VISIONARY (\$10,000 & up; >100 employees/members) Chauvet Professional Cisco Columbus McKinnon Entertainment Technology | Robe Disney Parks Live Entert | ainment |
| VISIONARY (\$5,000 & up; 20–100 employees/members) Altman Lighting, Inc. German Light Products JR Clancy McLaren Engineering Group Rose Brand | Stage Rigging Theatre Projects Theatre Safety Programs TMB | 3 |
| VISIONARY (\$500 & up; <20 employees/members) About the Stage B-Hive Industries, Inc. Scott Blair Boston Illumination Group Candela Controls, Inc. Clark Reder Engineering Tracey Cosgrove & Mark McKinney Doug Fleenor Design EGI Event Production Services Entertainment Project Services Neil Huff Interactive Technologies Jules Lauve Brian Lawlor Michael Lay | Limelight Productions, In Link John T. McGraw Mike Garl Consulting Mike Wood Consulting Reed Rigging Reliable Design Services Alan Rowe Sapsis Rigging Inc. Dana Taylor Steve Terry Vertigo Steve A. Walker & Assoc WNP Services | 3 |
| INVESTOR (\$3,000–\$9,999; >100 employees/members) Actors' Equity Association Barbizon Lighting Company Golden Sea Professional Lighting Provider IATSE Local 728 IATSE Local 891 | Lex NAMM Rosco Laboratories Texas Scenic Company | |
| INVESTOR (\$1,500–\$4,999; 20–100 employees/members American Society of Theatre Consultants BMI Supply City Theatrical Inc. H&H Specialties, Inc. | i) InterAmerica Stage, Inc. Lycian Stage Lighting Morpheus Lights Niscon Inc. | |

| ANSI ES1.19-2020 | Safety Requirements for Special Event Structures | |
|---|---|--|
| INVESTOR (\$200-\$499; <20 employees/members) | | |
| Bruce Darden Guangzhou Color Imagination LED Lighting Kenney Drapery Associates, Inc. Indianapolis Stage Sales & Rentals, Inc. L1 Inc. Lighting Infusion LLC | Scott Madaski Mediam Sp. zo.o. Nanyi Audio & Lighting Enterprise Co., Ltd. Qdot Lighting Ltd. Show Light Oy | |
| SUPPORTER (\$50 - \$2,999; >100 employees/members) Harlequin Floors | | |
| SUPPORTER (\$50 - \$1,499; 20–100 employees/members) ACT Lighting Inc./AC Power Distribution ARM Automation, Inc. Ian Foulds, IATSE Local 873 General Lighting Electronic Co. Ltd. Guangzhou YaFeng Optoelectronic Equipment Co. Guangzhou Yilaiming Photoelectric Technology Co., Ltd. HAYA Light Equipment Ltd. Co. High Output InCord Intella Systems Co., Ltd. iWeiss LA ProPoint, Inc. Moss LED Inc. | Movecat GmbH Nanshi Lighting Oasis Stage Werks Shenzhen Ifountain Technology Skjonberg Controls Inc. Stage Equipment & Lighting Stagemaker Stageworks Syracuse Scenery and Stage Lighting Co., Inc. Taurus Light Co. Ltd. Ultratec Special Effects Vincent Lighting Systems Zhuhai Shengchang Electronics Co. | |
| SUPPORTER (\$50 - \$199; <20 employees/members) Capture Visualisation AB Clik Systems DMX Pro Sales Foshan Leiyuan Photoelectric Co. Ltd. Jack Gallagher Tony Giovannetti Pat Grenfell Beverly and Tom Inglesby Eddie Kramer Jason Kyle | LuxBalance Lighting Tyrone Mellon, Jr. Orange Pi DMX Lizz Pittsley Michael Skinner Studio T+L Terrier Marketing Stephen Vanciel Arjan van Vught | |

Planned Giving donor: Ken Vannice

All donations to the Technical Standards Program support the TSP in general, and are not directed to, or for, the benefit of any particular technical standard project, or any Working Group working on any particular standard or project.

۷

Contact Information

Technical Standards Manager

Karl G. Ruling ESTA 630 Ninth Avenue, Suite 609 New York, NY 10036 Phone: 1-212-244-1505 FAX: 1-212-244-1502 standards@ESTA.org

Technical Standards Council Co-Chairs

Mike Garl Mike Garl Consulting LLC Phone: 1-432-694-7070 mike@mikegarlconsulting.com

Event Safety Working Group Chair

Dr. Donald Cooper Event Safety Alliance 1-330-414-8938 dcc1@neo.rr.com

Safety Requirements for Special Event Structures

Assistant Technical Standards Manager Richard J. Nix

ESTA 630 Ninth Ave., Suite 609 New York, NY 10036 Phone: 1-212-244-1505 FAX: 1-212-244-1502 standards@ESTA.org

Mike Wood Mike Wood Consulting LLC Phone: 1-512-288-4916 mike@mikewoodconsulting.com

Safety Requirements for Special Event Structures

Acknowledgments

The Event Safety Working Group members, when this document was approved by the working group on 09 March 2020, are shown below.

Voting members:

Jacob Abbott; PSAV Presentation Services; G Steven A. Adelman; Adelman Law Group, PLLC; G Mike Aug: Chicken Scratch LLC: EVP Jesse Barnes; Safewise Risk Management, Inc; G Alyxzander Bear; Insomniac; EVP Bennett Brian; Reed Rigging Inc.; DR Christian A. Buschhoff; xEMP extra Entertainment Media Publishing oHG; G Donald Cooper; Event Safety Alliance; G Monique Corbeil; CITT/ICTS; G Rebecca Cotter; City of Markham, Ontario; DE Jeremy Dixon; Digital Sound Systems; DR Don Earl; Earl Girls, Inc.; DR Ethan W Gilson; Entertainment Rigging Services, LLC; DE Sanford P. Gilzow; Shur-Rig LLC; DR Joe Golden; Gallagher Staging & Productions; DE Jerry Gorrell; Theatre Safety Programs; G Randell Greenlee; VPLT; G Robert Haycock; UC Berkeley; EW Danielle Hernandez; Furman University; G Dominic Housiaux; Lankey & Limey, LTD; EVP Neil Huff; Taylor & Taylor Insurance Brokers; INS Cedric Jackson; Screen Actors Guild - American Federation of Television & Radio Artists; PA Janine A. Jordan; Electronic Music Alliance; G Eric Kant; Phase01 Crowd Management; DE Daniel H. Louis; Theta Consulting LLC; G Richard J. Nix; Richard J. Nix; G Kevin Pew; Digital Sound Systems; DR Jeffrey M. Reder; Clark-Reder Engineering, Inc.; DE Ryan Riordan; Accurate Staging, Inc.; DR Chris Schmidt; Freeman Companies; DR Janet Sellery; CITT/ICTS; G Steven Serafin; The Hartford Group; INS Keith Sklar; Actors J Equity Association; PA Stewart Stephens; Ashford Management Group; G Will Todd; Area Four Industries; EQP Stephen Vanciel: IATSE Local 631: EW Patrick Wallace; PSAV Presentation Services; G Allen Winzler; Clark-Reder Engineering, Inc.; DE Claire Wright; Buddy, LLC; EQP

Observer (non-voting) members

Brent Armstrong; Alpine Rigging & Structural Design; O; DE Federico Augugliaro; Verity Studios AG; O; EQP Evan Bailey; Disco Donnie Presents; O; DE Justin Bennett; University of the Incarnate Word; O; EVP Keith Bohn; Area Four Industries; O; EQP Eric Colby; The Metropolitan Opera / Lincoln Center; O; EVP Jim Digby; Event Safety Alliance; O; EVP

Safety Requirements for Special Event Structures

Douglas Frawley; Atomic Design; O; DE Roderick van Gelder; Stage Safety pty ltd; O; DE William B. Gorlin; M.G. McLaren, P.C.; O; G Greg Guzzetta; Event Intelligence Group; O; EVP Tim Hansen; Oasis Stage Werks; O; DR Pete Happe; Pete Happe; O; G Markus Hehn; Verity Studios AG; O; EQP Karen Hoffman: Madison Square Garden Company: O: EVP Edwin S. Kramer; 1501; O; EW Jim Larkin; The Long Center for the Performing Arts; O; EVP George Long; Aggreko; O; DR Ross Long; I.A.T.S.E. Local 891; O; G Diane K. Mack; Mack Strategies, LLC.; O; G Franco Magliozzi; Chubb Group of Insurance Companies; O; INS Bruno Marx; Eventknowhow; O; EVP Orestes Mihaly; Production Resource Group; O; EVP Kurt J. Miner; Allianz Global Corporate & Specialty; O; INS Janine Ashley Oblak; Janine Ashley Oblak; O; EW Erik Ornberg; Encore Event Technologies; O; DR Don Parman; Actsafe; O; G Miriam Paschetto; Geiger Engineers; O; DE Dana Risinger; Walmart Stores, Inc.; O; EVP Tim Roberts; The Event Safety Shop; O; G Tim Salamon; PSAV Presentation Services; O; G Jason Showers; Advanced Staging Productions; O; DE Sean Spence; Full Spectrum Security Consultants; O; DE Eric Stuart; Gentian Events Ltd; O; DE Peter Willis; Howard Eaton Lighting Ltd.; O; EQP Jeong Sik Yoo; Ghost LX; O; G Andrew Young; Andrew Young; O; EW

Interest category codes

DE = Designer of Events DR = Equipment Dealer or Rental Company EQP =Equipment Producer INS = Event Insurance Company EVP = Event Producer G = General interest PA = Performing Artist EW = Event Worker

Safety Requirements for Special Event Structures

Table of Contents

| Notice and Disclaimer | |
|---|-------|
| Investors in Innovation | iv |
| Acknowledgments | . vii |
| Foreword | 1 |
| Introduction | 1 |
| 1 Scope, purpose and application | 2 |
| 1.1 Purpose | 2 |
| 1.2 Intent | 2 |
| 1.3 Application | 2 |
| 1.4 Normative references | 2 |
| 1.5 Exceptions | |
| 2 Definitions | 3 |
| 3 Essential design requirements | |
| 3.1 General. | |
| 3.2 Foundations & footings | 5 |
| 3.3 Design loads | |
| 3.4 Lateral force resisting systems | 5 |
| 3.5 Specific system requirements | |
| 3.6 Anchorage* | |
| 4 Site selection and advance planning | 7 |
| 4.1 Site selection - size and occupancy load | 7 |
| 4.2 Site location | 7 |
| 4.3 Site layout* | 7 |
| 5 Erection and dismantle | 7 |
| 6 Operation and use | |
| 6.1 Operations Management Plans | 7 |
| 7 Inspections | |
| 7.1 Inspections – general* | 8 |
| 7.2 Types of inspections | |
| 7.3 Frequency of inspections | 8 |
| 7.4 Results of inspection | |
| 8 Maintenance, repair, removal from use | 8 |
| 8.1 Repairs | |
| 8.2 Removal from service | |
| Annex A – Supplemental commentary | |
| Annex B – Overview of participant roles and responsibilities (Example only) | |
| Annex C – Preparation checklists (example only) | 12 |

Safety Requirements for Special Event Structures

Foreword

The Event Safety Guide was first published by the Event Safety Alliance in 2014, as a guideline for discourse regarding the many aspects of special event safety. It originated in the UK Health and Safety Executive's *HSG195 "The event safety guide (Second edition) A guide to health, safety and welfare at music and similar events."* where its purple cover subsequently led to its reference as, simply, "*The Purple Guide*". In 2016 the Event Safety Working Group was established within ESTA's Technical Standards Program for the purpose of converting the Event Safety Guide chapters into formally recognized, consensus-based standards that could be universally referenced across special events organizers, producers, enforcement agencies and user-groups. This document is one of many such chapters, intended to be used in conjunction with each other, as a collection of standards, which are used to establish minimum standards for care and public safety for special events. Because event technology and requirements constantly evolve, so too will this collection of standards change and evolve to accommodate industry needs.

It has been assumed in the drafting of this standard that the execution of any design provision is entrusted to appropriately qualified and experienced people, and that any fabrication and use provision is carried out by competent, suitably experienced people and organizations.

This standard presents a coordinated set of rules that may serve as a guide to government and other regulatory bodies and municipal authorities responsible for the guarding and inspection of the equipment within its scope. The suggestions leading to accident prevention are given both as mandatory and advisory provisions; compliance with both types may be required by employers of their employees. Compliance with this Standard does not of itself confer immunity from legal obligations.

This standard is equally applicable in any circumstance where temporary special event structures are used. The risks associated with temporary structures—particularly those installed outdoors—stem directly from basic principles of physics with respects to how the structures are used.

This document uses annex notes to provide additional reference information about certain specific section requirements, concepts, or intent. Subject matter with a corresponding annex note reference is identified by the asterisk (*) symbol, and the associated reference text is found in Appendix A, Commentary, identified with the referring text section number – e.g. an annex note to section 3.2 will be identified in Appendix A, Commentary as A.3.2. The annex notes are informational only, and do not add or subtract from the mandatory requirements of this standard.

Introduction

Many events require temporary structures such as grandstands, stages, scaffold, tent and roof structures. Managing the hazards connected with these structures is just as important as managing other event related hazards, such as fire or electrical shock.

The failure of any temporary structure can have devastating effects. Therefore, it is essential to design and erect structures to suit the specific intended purpose and to recognize that the key to the safety of these structures is largely in the:

- Choice of appropriate design and materials;
- Consultation with design professionals, if necessary
- Correct positioning;
- Proper planning and control of work practices; and
- Careful inspection of the finished product.

This standard provides guidance on principles of safety for temporary structures. It starts with the preliminary decisions that need to be made—choosing the site and appropriate type of structure—and continues beyond to give general guidance on:

• The safety requirements for temporary structures;