



**ANSI E1.4-1 - 2016**  
**Entertainment Technology—**  
**Manual Counterweight Rigging Systems**

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**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/>

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## 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  
[Insert updated information here]  
Knoxville, TN 37914  
Phone: 1-432-694-7070  
FAX: 1-432-689-3805

Mike Wood  
Mike Wood Consulting LLC  
6401 Clairmont Drive  
Austin, TX 78749  
Phone: 1-512-288-4916  
Fax: 1-866-674-2179

### Rigging Working Group Co-chairpersons

Christine Kaiser  
Syracuse Scenery & Stage Lighting Co., Inc.  
1-315-453-8096  
ckaiser@syracusescenery.com

Bill Sapsis  
Sapsis Rigging, Inc.  
Phone: 1-215-228-0888  
bill@sapsis-rigging.com

### Rigging Working Group Voting Members

(as of 11 October 2016)

Mike Adamovich; M.G. McLaren, P.C.; G  
Jesse Adams; Rose Brand; DR  
Tracie Allen; R&M Materials Handling; MP  
Frank Allison; M.G. McLaren, P.C.; G  
Matthew Antonucci; Contract Services Administration Trust Fund; U  
Dana Bartholomew; Foy Invenerprises, Inc.; CP  
Scott Battaglia; LMG Inc.; DR  
William Beautyman; Limelight Productions, Inc.; DR  
Ian Bevan; Walt Disney Company; U  
Keith Bohn; Keith Bohn; G  
William Bradburn; Aerial Arts, Inc.; U  
Bennett Brian; Reed Rigging Inc.; DR  
Joseph Champelli; Entertainment Project Services, LLC; DE  
Dan Culhane; SECOA; CP

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Bruce Darden; Rigging Innovators, Inc.; CP  
Robert Dean; ZFX Flying Inc.; G  
Jonathan Deull; JSD Projects LLC; U  
Brad Dittmer; Stage Labor of the Ozarks; U  
Russ Dusek; I Weiss; MP  
Don Earl; Earl Girls, Inc.; DR  
Patrick Finn; Wenger Corp.; CP  
Adrian Forbes-Black; Total Structures Inc.; MP  
Mike Garl; Mike Garl Consulting LLC; DE  
Ethan William Gilson; Advanced Lighting and Production Services; U  
Sanford P. Gilzow; Shur-Rig LLC; G  
William B. Gorlin; M.G. McLaren, P.C.; G  
Jerry Gorrell; Theatre Safety Programs; G  
Pat Grenfell; Hoist Sales & Service; DR  
Rod Haney; I.A.T.S.E. Local 891; U  
Tim Hansen; Oasis Stage Werks; DR  
Herb Hart; Columbus McKinnon Corp.; MP  
Jeremy Hodgson; Cirque Du Soleil, Inc.; U  
Donald Hoffend\_III; Avista Designs, LLC; G  
Joseph Jeremy; Show Distribution Group, Inc.; MP  
Ted Jones; Grand Stage; U  
Christine L. Kaiser; Syracuse Scenery & Stage Lighting Co., Inc.; DR  
Jerald Kraft; JTH Lighting Alliance; CP  
Edwin S. Kramer; I.A.T.S.E. Local 1; U  
Kyle Kusmer; Steven Schaefer Associates; G  
Tom Lapp; Cirque Du Soleil, Inc.; U  
Roger Lattin; I.A.T.S.E. Local 728; U  
Jon Lenard; Applied Electronics; MP  
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Dan Lisowski; University of Wisconsin - Madison; U  
Daniel H. Louis; Theta Consulting LLC; G  
Joseph McGeough; Foy Invention Enterprises, Inc.; CP  
Bob McVay; Schuler Shook; DE  
Sam Michael; Thern, Inc.; MP  
Steven Michelman; Entertainment Project Services, LLC; DE  
Orestes Mihaly; Production Resource Group; DR  
Jeff T. Miller; Walt Disney Company; U  
Rick Montgomery; R&M Materials Handling; MP  
John P. Moore; Hall Associates Flying Effects; CP  
Reid Neslage; H & H Specialties Inc.; MP  
Jim Niesel; Theatre Projects Consultants, Inc.; DE  
Richard J. Nix; ZFX Flying, Inc.; G  
Shawn Nolan; Production Resource Group; DR  
Tracy Nunnally; Hall Associates Flying Effects; CP  
Jennifer O'Leary; Columbus McKinnon Corp.; MP  
Kimberly Corbett Oates; Schuler Shook; DE  
Carlos Ortega; PSAV Presentation Services; U  
Gregory Orth; WNP Services, Inc.; DR  
Miriam Paschetto; Geiger Engineers; G  
Rocky Paulson; Freeman Companies; DR  
Galen Price; Blue Man Group; U  
Steven Ricks; Electronic Theatre Controls, Inc.; MP  
John Ringelman; Freeman Companies; DR  
Heather Rowe; Contract Services Administration Trust Fund; U

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Bill Sapsis; Sapsis Rigging, Inc.; U  
Peter A. Scheu; Scheu Consulting Services, Inc.; DE  
Chris Schmidt; Freeman Companies; DR  
Joseph S. Schuster; Simpson Gumpertz & Heger; DE  
Steven Serafin; Chubb Group of Insurance Companies; G  
Harold Ike Shippers; Syracuse Scenery & Stage Lighting Co., Inc.; DR  
John C. Snook; Thermotex Industries Inc.; CP  
Russell Solomon; Texas Scenic Company; DR  
Todd Spencer; PSAV Presentation Services; U  
Stephen G. Surratt; Texas Scenic Company; DR  
Peter V. Svitavsky; Wenger Corp.; CP  
Ken Tilson; Columbus McKinnon Corp.; MP  
Will Todd; Milos Group; MP  
James Tomlinson; Team Tomlinson; G  
Elmer Veith; Total Structures, Inc.; MP  
Steve Walker; Steve A. Walker & Associates; G  
Charlie Weiner; Milos Group; MP  
Michael Wells; Xtreme Structures and Fabrication; MP  
Marty Wesstrom; Mountain Productions Inc.; DR  
Jeff Wilkowski; Thern, Inc.; MP  
Max A. Wilson; Applied Electronics; MP  
R. Duane Wilson; Amer. Society of Theatre Consultants; DE  
Stephan Jon Wood; Tait Towers Manufacturing LLC; CP  
Paul Zagajeski; Wenger Corp.; CP

Rigging Working Group Observer Members

(as of 11 October 2016)

William Ian Auld; Auld Entertainment; U  
Robert Barbagallo; Solotech Inc.; DR  
Roger Barrett; Star Events Group Ltd.; DR  
Roy Bickel; Roy Bickel; G  
Scott M. Blair; Full Throttle Films/ VER; DR  
Lee J. Bloch; Bloch Design Group, Inc.; G  
Louis Bradfield; Louis Bradfield; U  
Buddy Braile; North Shore Theatrical Rigging; U  
David M. Campbell; Geiger Engineers; G  
Daniel J. Clark; Clark-Reder Engineering, Inc.; G  
Benjamin Cohen; Chicago Flyhouse Inc.; CP  
Jim Digby; Linkin Park Touring/The Collective; U  
Tim Franklin; Theta Consulting LLC; G  
Tony J. Galuppi; Tony J. Galuppi; U  
James M. Garner; Walt Disney Company; G  
Chris Geisler; Fluid Design Inc.; DE  
Michael P. Gosenski; Rigging Systems LLC; U  
Sean Harding; Port Lighting Systems; G  
Greg Hareld; Kleege Industries; U  
Chris Higgs; Total Solutions Group; G  
Jeremy Hochman; Full Throttle Films/ VER; DR  
Kent H. Jorgensen; IATSE Local 80; G  
Gary Justesen; Oasis Stage Werks; DR  
Nevin Kleege; Kleege Industries; U  
Wendy Manson; Cirque Du Soleil, Inc.; U  
Magali Marcheschi; Polytechnic Montreal; G

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Bartholomew J. Mueller; Recreation Engineering Inc.; DE  
Bob Murphy; Occams Razor Technical Services; G  
Edward A. (Ted) Paget; Electronic Theatre Controls, Inc.; MP  
Michael Patterson; Pook Diemont & Ohl, Inc.; CP  
Kurt Pragman; Pragman Associates, LLC; G  
Mark Riddlesperger; LA ProPoint, Inc.; CP  
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Steven C. Shaw; Levitating Productions, Inc.; MP  
Q. Brian Sickels; Q. Brian Sickels; G  
Monica Skjonberg; Skjonberg Controls, Inc.; CP  
Ross Taylor; Taylor & Taylor Associates; G  
Stephen Vanciel; IATSE Local 631; U  
Nicholas Gill Wright; I.A.T.S.E. Local 16; G

**Interest category codes:**

CP = custom-market producer

DR = dealer rental company

MP = mass-market producer

DE = designer

G = general interest

U = user



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## ANSI E1.4-1 - 2016, Entertainment Technology—Manual Counterweight Rigging Systems

### Foreword

Prior to final approval of ANSI E1.4-2009, no American National Standard had addressed safety of counterweight rigging systems for the entertainment industry. The first documented recognition that safety standards were needed occurred in the early 1960's, when the United States Institute for Theatre Technology (USITT) established its Codes Commission to monitor and report on development of national codes that might be applicable to the entertainment industry. This commission eventually expanded its scope to include the Health & Safety subcommittee. By 1965 USITT had acknowledged that industry standards were necessary to ensure safety in the industry. The first formal, documented effort to accomplish this goal spawned from a Theatre Architecture Commission panel discussion at the 1980 USITT Conference in Kansas City, Missouri. In order to improve the level of safety and to establish a minimum standard for the manufacture of rigging equipment for use in the entertainment industry, the United States Institute for Theatre Technology, Inc. (USITT) established its Rigging and Stage Machinery Standards Committee, with the mission of creating a comprehensive set of standards for this purpose. To further this goal, sub-committees were established to write standards in several areas that combine to achieve a set of standards to fully describe the mechanical equipment used in theatres. This document is an evolution of work first started by separate sub-committees for Manual Counterweight Flying Systems and for Rope and Sandbag Flying Systems. The resulting efforts were combined to form the basis of this document.

It was originally intended that this document be accepted as a standard of USITT and that it ultimately become an American National Standard. In order for the latter to happen, the USITT draft document was turned over to ESTA's Technical Standards Program. It has been further developed by the Rigging Working Group within that program. Members of the Rigging Working Group include appropriately qualified people who represent the broader industry of people who specify, manufacture, sell, and use this equipment, so that all interests are recognized and the standards represent a great depth of knowledge and experience in regards to the equipment.

In 2014, the RWG approved expansion of E1.4's scope into a suite of related standards, all pertaining to manual rigging systems.

This document establishes minimum standards for equipment. However, the proper installation and operation of this equipment are equally important. Equipment should be installed, operated and maintained under the supervision of a competent person. Further, the selection of the proper equipment for any application should be entrusted only to experienced personnel with the proper knowledge and training to recognize and understand all of the hazards and functional requirements involved in the particular installation.

This standard represents equipment manufactured under the constraints of current technology. It is not intended to restrict further developments or enhancements. Future revisions will not imply that previous editions of the standard were inadequate, nor is it the intention of this standard to suggest that equipment manufactured before the creation of this standard is inherently inadequate.

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### Reference standard organizations

The following standards organizations have developed specific standards documents that may pertain to certain normative requirements of this standard. It is not intended to identify all such organizations, or their respective standards, nor is it intended to imply that compliance with any such standard constitutes an exemption from any legal, jurisdictional, or OSHA-related safety requirements that may exist.

AISI	-	American Iron and Steel Institute, Inc.
ANSI	-	American National Standards Institute
ASME	-	American Society of Mechanical Engineers
ASTM	-	American Society for Testing and Materials
AWS	-	American Welding Society
IFI	-	Industrial Fasteners Institute
ISO	-	International Organization for Standardization
NACM	-	National Association of Chain Manufacturers
ESTA	-	Entertainment Services and Technology Association
SAE	-	Society of Automotive Engineers

## ANSI E1.4-1 - 2016, Entertainment Technology—Manual Counterweight Rigging Systems

### 1 Scope

#### 1.1 General

This standard applies to permanently installed, manually operated systems of stage rigging hardware for the raising, lowering, and suspension of scenery, lighting, and similar loads. The systems illustrated in the Figures section describe common arrangements of systems used over performance areas.

##### 1.1.1 System Variations

This standard applies to variations of manual counterweight rigging, including rope and sandbag systems.

##### 1.1.2 Building Structures

This standard applies to rigging hardware and basic functional requirements only, and not to the structure from which it is supported. While not part of this standard, building structural capacity for the intended loads shall be considered in the design and application of rigging systems.

#### 1.2 Annex note references

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 the Annex A section, identified with the referring text section number, e.g. an Annex Note to section 3.2 will be identified in the annex section as A.3.2.

#### 1.3 Exclusions

##### 1.3.1 Performer Flying

This standard does not apply to performer flying, or to raising or lowering people.

##### 1.3.2 Powered Rigging

This standard does not apply to any powered equipment used in conjunction with manual counterweight systems. Powered rigging equipment shall conform to the requirements of ANSI E1.6-1, -2, -3, and -4 as applicable to the specific powered rigging equipment and application.

#### 1.4 Intent

The purpose of this standard is to establish minimum performance requirements for manual counterweight rigging systems. This standard establishes a basis for reasonable standards of care, for safety and for general welfare with the intent to minimize hazards associated with Manual Counterweight Rigging Systems.

#### 1.5 Alternative designs

This standard is not intended to prevent alternative designs, materials, or technology. Alternative designs, materials or technology shall comply with the intent of this standard, as deemed applicable by a qualified person.

### 2 Definitions

**2.1 Arbor guide:** See **Guide**.

**2.2 Arbor pit:** An opening in the stage that extends below the stage floor to allow extended travel of counterweight arbors.

**2.3 Batten:** A pipe, tube, or other singular structural shape that is secured to the lift lines for the purpose of connecting loads to the counterweight system.

**2.4 Batten clamp (pipe clamp):** A piece of rigging hardware, usually of some rigid material, that wraps or clasps a batten, providing for the attachment of a lift line or other lifting media.

**2.5 Belaying pin:** A pin inserted into a pin rail hole, used for securing or controlling rope lift lines or spot lines.