



E1.56-2018
Entertainment Technology – Rigging Support Points

Approved by the ANSI Board of Standards Review on 06 November 2018

Rig/2015-2034r8

© 2018 The Entertainment Services and Technology Association (ESTA)

E1.56-2018

Entertainment Technology – Rigging Support Points

Notice and Disclaimer

ESTA does not approve, inspect, or certify any installations, procedures, equipment or materials for compliance with codes, recommended practices or standards. Compliance with an ESTA standard or recommended practice is the sole and exclusive responsibility of the manufacturer or provider and is entirely within their control and discretion. Any markings, identification or other claims of compliance do not constitute certification or approval of any type or nature whatsoever by ESTA.

ESTA neither guaranties 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. Anyone using this document should rely on their own independent judgment or, as appropriate, seek the advice of a competent professional in determining the exercise of reasonable care in any given circumstance.

Published By:

Entertainment Services and Technology Association (ESTA)
630 Ninth Ave., Suite 609
New York, NY 10036
USA
Phone: +1-212-244-1505
Fax: +1-212-244-1502
Email: standards@esta.org

**The Entertainment Services and Technology Association's
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) established by ESTA's Board of Directors 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 Council employs a Technical Standards Manager to coordinate the work of the Committee and its working groups as well as maintaining a "Standards Watch" on behalf of members. Working groups include: Control Protocols, Electrical Power, Event Safety, Floors, Fog and Smoke, 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 two hundred people, you must complete an application which is available from the ESTA website. 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 or any other organization is not a requirement for participation in the TSP. 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 Rigging 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.

E1.56-2018

Entertainment Technology – Rigging Support Points

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

ProSight Specialty Insurance

VISIONARY (\$10,000 & up; >100 employees/members)

Chauvet Professional

Martin by Harman

Cisco

Robe

Columbus McKinnon Entertainment Technology

Walt Disney Parks and Resorts

VISIONARY (\$5,000 & up; 20–100 employees/members)

Altman Lighting, Inc.

Rose Brand

German Light Products

Stage Rigging

JR Clancy

TMB

McLaren Engineering Group

Tyler Truss Systems, Inc.

VISIONARY (\$500 & up; <20 employees/members)

About the Stage

John T. McGraw

B-Hive Industries, Inc.

Mike Garl Consulting

Scott Blair

Mike Wood Consulting

Boston Illumination Group

Power Gems

Louis Bradfield

Reed Rigging

Candela Controls Inc.

Reliable Design Services

Clark Reder Engineering

Alan Rowe

Tracey Cosgrove & Mark McKinney

David Saltiel

Doug Fleenor Design

Sapsis Rigging Inc.

EGL Event Production Services

Stageworks

Entertainment Project Services

Dana Taylor

Neil Huff

Steve Terry

Hughston Engineering Inc.

Theatre Projects

Interactive Technologies

Theatre Safety Programs

Lankey & Limey Ltd.

Vertigo

Jules Lauve

Steve A. Walker & Associates

Brian Lawlor

Westview Productions

Limelight Productions, Inc.

WNP Services

INVESTOR (\$3,000–\$9,999; >100 employees/members)

Actors' Equity Association

Lex

Barbizon Lighting Company

NAMM

Golden Sea Professional Equipment Limited

Rosco Laboratories

IATSE Local 728

Texas Scenic Company

IATSE Local 891

INVESTOR (\$1,500–\$4,999; 20–100 employees/members)

American Society of Theatre Consultants

Morpheus Lights

Area Four Industries

Niscon Inc.

BMI Supply

Syracuse Scenery and Stage Lighting

City Theatrical Inc.

Tomcat

InterAmerica Stage, Inc.

XSF Xtreme Structures and Fabrication

Lycian Stage Lighting

E1.56-2018

Entertainment Technology – Rigging Support Points

INVESTOR (\$200–\$499; <20 employees/members)

Benjamin Cohen
Bright Ideas Custom Electronics Inc.
Bruce Darden
Guangzhou Ming Jing lighting Equipment Co.
K5600, Inc.
Indianapolis Stage Sales & Rentals, Inc.

Robert Scales
Stephen Vanciel
Suga Koubou Co., Ltd.
VU-Industry Vision Technology
Xpro Light

SUPPORTER (<\$3,000; >100 employees/members)

Ian Foulds, IATSE Local 873
Harlequin Floors

Thern Stage Equipment
USAI Lighting

SUPPORTER (<\$1,500; 20–100 employees/members)

Geiger Engineers
H&H Specialties
High Output
InCord
iWeiss
Oasis Stage Werks

Stage Equipment & Lighting
Stagemaker
Thermotex Industries, Inc.
Vincent Lighting Systems
Zhuhai Shengchang Electronics Co.

SUPPORTER (<\$200; <20 employees/members)

Roy Bickel
Tony Giovannetti
Pat Grenfell
Mitch Heffer
John Huntington
Beverly and Tom Inglesby
Eddie Kramer
Jason Kyle

Michael Lay
Lizz Pittsley
Michael Skinner
Skjonberg Controls Inc.
Stage Labor of the Ozarks
Tracy Underhill
Charlie Weiner

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. If you would like to help support the Technical Standards Program in its work, please consider becoming an Investor in Innovation by visiting our website at <http://tsp.esta.org/invest> or by contacting the ESTA office at 1-212-244-1505 and selecting "TSP" from the menu.

E1.56-2018

Entertainment Technology – Rigging Support Points

Contact Information

Technical Standards Manager

Karl G. Ruling
ESTA
630 Ninth Avenue, Suite 609
New York, NY 10036
USA
+1-212-244-1505
karl.ruling@esta.org

Assistant Technical Standards Manager

Richard J. Nix
ESTA
630 Ninth Avenue, Suite 609
New York, NY 10036
USA
+1-212-244-1505
richard.nix@esta.org

Technical Standards Council Chairpersons

Mike Garl
Mike Garl Consulting LLC
+1-865-389-4371
mike@mikegarlconsulting.com

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

Rigging Working Group Co-chairpersons

Bill Sapsis
Sapsis Rigging
+1-215-228-0888 x206
bill@sapsis-rigging.com

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

Acknowledgments

The Rigging Working Group members, when this document was approved by the working group on 18 September 2018, are shown below.

Voting members:

Jesse Adams; Rose Brand; DR
Tracie Allen; Tyler Truss Systems; CP
Dana Bartholomew; Silver State Wire Rope and Rigging; DR
William Beautyman; Limelight Productions, Inc.; DR
Ian Bevan; Walt Disney Parks & Resorts; U
Tyler Bland; Walt Disney Parks & Resorts; U
William Bradburn; Aerial Arts, Inc.; U
Bennett Brian; Reed Rigging Inc.; DR
Joseph Champelli; Entertainment Project Services, LLC; DE
Jay Cid; R&M Materials Handling / Stagemaker; MP
Dan Culhane; Wenger Corp.; CP
Bruce Darden; InterAmerica Stage, Inc.; CP
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
Nick Fleming; Columbus McKinnon Corp.; MP
Jack Gallagher; R&M Materials Handling / Stagemaker; MP
Mike Garl; Mike Garl Consulting LLC; DE
Sarah Gascoine; PSAV Presentation Services; U
Ethan W Gilson; Entertainment Rigging Services, LLC; U
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
Robert Haycock; UC Berkeley; U
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
Theresa Kelley; Xtreme Structures and Fabrication; 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
Kalen Larson; ZFX, Inc.; CP
Roger Lattin; I.A.T.S.E. Local 728; U
Jon Lenard; Applied Electronics; MP
Michael Lichter; Electronic Theatre Controls, Inc.; MP
Jacob E. Loretto; Musson Theatrical Inc.; DR
Daniel H. Louis; Theta Consulting LLC; G
Bill McIntyre; Show Distribution Group, Inc.; CP
Sam Michael; Thern, Inc.; MP
Steven Michelman; Entertainment Project Services, LLC; DE
Orestes Mihaly; Production Resource Group; DR
Rick Montgomery; Motion Laboratories, Inc.; MP
John P. Moore; Vertigo; CP
Chris Moulton; Contract Services Administration Trust Fund; U

Bartholomew J. Mueller; Recreation Engineering Inc.; DE
Reid Neslage; H & H Specialties Inc.; MP
Mark Newlin; Xtreme Structures and Fabrication; MP
Jim Niesel; Theatre Projects Consultants, Inc.; DE
Richard J. Nix; Richard J. Nix; G
Shawn Nolan; Production Resource Group; DR
Tracy Nunnally; Vertigo; CP
Carlos Ortega; PSAV Presentation Services; U
Miriam Paschetto; Geiger Engineers; G
Rocky Paulson; Freeman Companies; DR
Demian Purdy; PSAV Presentation Services; U
Steven Ricks; Electronic Theatre Controls, Inc.; MP
John Ringelman; Freeman Companies; DR
Eric Rouse; Chicago Flyhouse; CP
Bill Sapsis; Sapsis Rigging, Inc.; U
Chris Schmidt; Freeman Companies; DR
Steven Serafin; Chubb Group of Insurance Companies; G
Harold Ike Shippers; Syracuse Scenery & Stage Lighting Co., Inc.; DR
Dave Sinkhorn; R&M Materials Handling / Stagemaker; MP
John C. Snook; Thermotex Industries Inc.; CP
Russell Solomon; Texas Scenic Company; DR
Peter V. Svitavsky; Wenger Corp.; CP
Jason Tello; Tyler Truss Systems; CP
Ken Tilson; Columbus McKinnon Corp.; MP
Will Todd; Area Four Industries; MP
Elmer Veith; Eurotruss; MP
Steve Walker; Steve A. Walker & Associates; G
Mike Webb; Motion Laboratories, Inc.; MP
Charlie Weiner; Eurotruss; CP
Michael Wells; Xtreme Structures and Fabrication; MP
Marty Wesstrom; Mountain Productions Inc.; DR
Jeff Wilkowski; Thern, Inc.; MP
R. Duane Wilson; Amer. Society of Theatre Consultants; DE
Max A. Wilson; Applied Electronics; MP
Stephan Jon Wood; Tait Towers Manufacturing LLC; CP
Paul Zagajeski; Wenger Corp.; CP

Observer (non-voting) members:

Jacob Abbott; PSAV Presentation Services; U
Matthew Antonucci; Contract Services Administration Trust Fund; U
Brent Armstrong; Alpine Rigging & Structural Design; CP
William Ian Auld; Auld Entertainment; U
Robert Barbagallo; Solotech Inc.; DR
Roger Barrett; Star Events Group Ltd.; DR
Roy Bickel; Roy Bickel; G
Keith Bohn; Keith Bohn; G
David Bond; Kinesys; MP
Louis Bradfield; Louis Bradfield; U
David M. Campbell; Geiger Engineers; G
Daniel J. Clark; Clark-Reder Engineering, Inc.; G
Benjamin Cohen; Chicago Flyhouse Inc.; CP
David Collette; PSAV Presentation Services; U
David Darland; PSAV Presentation Services; U
Robert Dean; ZFX, Inc.; CP

E1.56-2018

Entertainment Technology – Rigging Support Points

Jim Digby; Event Safety Alliance; U
Tim Franklin; Theta Consulting LLC; G
James M. Garner; Walt Disney Studios; G
Sanford P. Gilzow; Shur-Rig LLC; G
Michael P. Gosenski; Rigging Systems LLC; U
Pete Happe; Pete Happe; G
Sean Harding; Port Lighting Systems; G
Chris Higgs; Total Solutions Group; G
Kent H. Jorgensen; IATSE Local 80; G
Gary Justesen; Oasis Stage Werks; DR
Jerald Kraft; JTH Lighting Alliance; CP
Dan Lisowski; University of Wisconsin - Madison; U
Ross Long; I.A.T.S.E. Local 891; G
Wendy Manson; Cirque Du Soleil, Inc.; U
Joseph McGeough; Foy Invention Enterprises, Inc.; CP
John Neal; John Neal; G
Gregory Orth; WNP Services, Inc.; DR
Kurt Pragman; Pragman Associates, LLC; G
Mark Riddlesperger; LA ProPoint, Inc.; CP
Tim Salamon; PSAV Presentation Services; DR
Peter A. Scheu; Scheu Consulting Services, Inc.; DE
Jason Schumacher; ZFX, Inc.; CP
Ford Sellers; Chauvet Lighting; MP
Steven C. Shaw; Levitating Productions, Inc.; MP
Monica Skjonberg; Skjonberg Controls, Inc.; CP
Knut Skjonberg; Skjonberg Controls, Inc.; CP
Todd Spencer; PSAV Presentation Services; U
Stewart Stephens; JSAV; DR
Ross Taylor; Taylor & Taylor Associates; G
James Tomlinson; Team Tomlinson; G
Stephen Vanciel; IATSE Local 631; U
Patrick Wallace; PSAV Presentation Services; U
Drew Wending; PSAV Presentation Services; DR
Mike Weston; PSAV Presentation Services; DR
Greg Williams; PSAV Presentation Services; G
Nicholas Gill Wright; I.A.T.S.E. Local 16; G
Jeong Sik Yoo; Ghost LX; DE

Interest category codes:

CP = custom-market producer DE = designer
DR = dealer rental company G = general interest
MP = mass-market producer U = user

Entertainment Technology – Rigging Support Points

Notice and Disclaimer.....	ii
Investors in Innovation.....	iv
Contact Information.....	vi
Acknowledgments.....	vii
1. GENERAL.....	1
STANDARD REQUIREMENTS.....	1
1.1 Scope.....	1
1.2 Purpose.....	2
1.3 Application.....	2
1.4 References.....	2
2. DEFINITIONS.....	3
3. DESIGN.....	6
3.1 General requirements.....	6
3.2 Design coordination.....	7
3.3 Loads - general.....	7
3.4 Load Combinations.....	9
3.5 Design Criteria.....	9
3.6 Rigging points - types.....	11
3.7 Wear and abrasion.....	12
3.8 Connection design.....	12
3.9 Distortion and displacement.....	13
4. FABRICATED COMPONENTS.....	14
4.1 General.....	14
4.2 Fabrication.....	14
5. DETACHABLE COMPONENTS.....	14
5.1 General.....	14
5.2 Design.....	15
6. INSTALLATION.....	15
6.1 Supervision.....	15
6.2 Welding.....	15
6.3 Friction connections.....	16
6.4 Embedded Hardware.....	16
6.5 Anchors.....	16
6.6 Interference.....	17
6.7 Hardware.....	17
7. TESTING.....	17
7.0 New rigging points.....	17
7.1 General.....	17
7.2 Fabricated assemblies.....	17
7.3 Detachable assemblies.....	18
7.4 Embedded anchor connections.....	18
7.5 Welded and bolted connections.....	19
7.6 Existing rigging point load test requirements -.....	19
7.7 Test standards.....	20
8. INSPECTION, REMOVAL, AND REPAIR.....	21
8.1 General.....	21
8.2 Detachable Assemblies.....	21
8.2.2 Frequency of Inspection.....	22
8.3 Documentation.....	23
8.4 Inspection training.....	23
8.5 Removal from Service Criteria.....	24
9. EXISTING RIGGING POINTS.....	24

E1.56-2018	Entertainment Technology – Rigging Support Points
9.1 Verification by Analysis.....	24
9.2 Verification by testing.....	25
9.3 Loads acting on existing structures.....	25
10. DOCUMENTATION.....	25
10.1 General.....	25
11. LABELING.....	26
11.1 General.....	27
11.2 Rigging point identification.....	27
11.3 Maintenance of identification.....	27
11.4 Replacement of identification.....	27
11.5 Method of labeling.....	27
11.6 Label attachment.....	28
Appendix 1.....	29

1. GENERAL

Note to the user: Explanatory information (contained in the right-hand column of this document) is intended to provide additional, non-mandatory commentary and information regarding the scope of this standard. This information is intended to provide additional clarification regarding the thoughts of the authors during the writing of this document. In addition, the user may find notes on industry standard practices, references, and resources for additional information regarding each topic at hand. It is the hope of the authors that users of this document will find that the proximity of this commentary particularly useful to their understanding of this document.

STANDARD REQUIREMENTS	EXPLANATORY INFORMATION (Not requirements of E1.56)
<p>1.1 Scope. This standard applies to stationary rigging points attached to permanent facility structure that are intended to be permanent, and provides minimum requirements for the design, fabrication, installation, inspection and documentation of these rigging points for their use to support rigging loads.</p> <p>Applicability of this standard is not dependent on direction of the applied force or duration of the applied load.</p> <p>This standard applies to rigging points that are stationary under load.</p>	<p>E1.1 <i>While this standard is intended to cover all structures, it is hoped that non-traditional entertainment structures, such as hotel ballrooms, atriums in office buildings, schools, and other structures will particularly benefit from this standard.</i></p> <p><i>This standard does not apply to engineering analysis of structures supporting rigging points. The application of new loads to existing structures, and the location of those loads, must be considered by the user. Concentrated loads, multiple loads acting in close proximity and other load combinations have the potential to exceed existing building structural capacity. It is strongly recommended that structures supporting new loads be reviewed by a qualified person.</i></p> <p><i>This standard does not apply to</i></p> <ul style="list-style-type: none"> • <i>Connection of any loads to the rigging point</i> • <i>Connections to temporary entertainment structures.</i> • <i>Equipment “below the hook”.</i> • <i>Rigging points that are intended to be temporary in nature.</i>