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

Approved as an American National Standard by the ANSI Board of Standards Review on 11 October 2016.

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

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The Rigging Working Group, which authored this Standard, consists of a cross section of entertainment industry professionals representing a diversity of interests related to rigging and stage machinery for theatrical events. ESTA is committed to developing consensus-based standards and recommended practices in an open setting. Future Rigging 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.
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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.
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
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.