

**Resolutions to 2nd public review comments on
BSR E1.4-3 – 20xx, Manually Operated Hoist Systems**

Referenced document:

BSR E1.4-3 – 20xx, Entertainment Technology—Manually Operated Hoist Rigging Systems (document number Rig/2015-2022r7)

ANSI public review period: 1 December 2017 through 15 January 2018

Question: Do you think that BSR E1.4-3 – 20xx, Entertainment Technology—Manually Operated Hoist Rigging Systems (document number Rig/2015-2022r7), should be accepted as an American National Standard, that its requirements are not too lax, too onerous, or too vague, nor that it would unreasonably negatively impact materially affected parties in the entertainment industry? Please indicate "Yes" (accept it), "Yes with comments," or "No with reasons" (don't accept it).

Responses:

Name	Representing	Yes	Yes with comments	No with reasons
Brad Dittmer	Stage Labor of the Ozarks (SLO)	X		
Bruce Darden	InterAmerica Stage, Inc. (IAS)			X
William Bradburn	Aerial Arts, Inc. (AAI)		X	
Steve A. Walker	Steve A Walker & Associates (SAW)			X
Dan Culhane	Wenger (WDC)		X	
Paul Zagajeski	JR Clancy / Wenger (WPZ)			X
Trey Merritt	Elite Multimedia Productions	X		

These resolutions were approved at the 19 July 2019 Rigging Working Group meeting.

#	Commenter	Clause	Comment or reason	Resolution
1.	AAI	General	I believe that these suggestions are only editorial in nature and do not affect the normative requirements of the draft standard. [Applicable to all comments by AAI.]	Accept.
2.	IAS	General	Absent are requirements for removing the handle when not in use if same would present a protrusion hazard.	Reject. The risk assessment should identify and mitigate such hazards, if the manufacturer's recommendations do not address them directly.

#	Commenter	Clause	Comment or reason	Resolution
3.	IAS	General	Absent is a requirement for the crank handle center to be located within a given range of distance to the floor. Units mounted high up on the wall present new hazards to the operator if they can only be accessed from a ladder.	Accept. See section 10.6.
4.	IAS	General	Absent are guidelines for clearance distance to prevent hand, head or elbow injuries while cranking.	Reject. The risk assessment should identify and mitigate such hazards, if the manufacturer's operational recommendations do not address them directly.
5.	IAS	General	Absent are guidelines for maximum allowable input torque requirements. This might be supplemented with annex notes distinguishing maximum torque in an educational environment vs. a professional environment.	Reject. Manually operated hoists are inherently designed to facilitate human operation. The design criteria establishes that the components must be designed to withstand the forces placed upon them during operation. Under normal operating conditions, a human cannot exert torque sufficient to cause damage to the machine, which would not also inherently cause damage to the human.
6.	IAS	General	Ergonomics The standard is devoid of any requirements that would protect the user, even though that is one of the goals per clause 1.5.	Reject. Section 1.5 makes no reference to ergonomics.
7.	WDC	General	Approved Resolutions to Public Review Responses BSR E1.4-3 – 20xx, Manually Operated Hoist Systems, Item #7 Comment resolution references ANSI E1.2, update E1.2 version to 2012. The current document still references the 2006 version of this standard.	Accept.
8.	IAS	TOC	Table of Contents 6.4 Manual hoist drive Augmentation.....7 PROBLEM: No such section in document 2nd Problem: There should be.	Accept. Section 7 added.

#	Commenter	Clause	Comment or reason	Resolution
9.	IAS	TOC	<p>Table of Contents</p> <p>1.4 Exclusions.....1</p> <p>1.4.2 Powered rigging.....1</p> <p>1.4.3 Other rigging.....1</p> <p>PROBLEM:</p> <p>1.4.1 Performer Flying [is not included in the table of contents]</p>	<p>We believe the commentor is suggesting that the outdated table of contents be updated to reflect current content. The table of contents has been properly updated.</p>

#	Commenter	Clause	Comment or reason	Resolution
10.	IAS	1.4.2	<p>1.4.2 Powered rigging This standard does not apply to any equipment used in permanently powered rigging systems, nor to any manually operated system temporarily operated using powered rigging components. Powered rigging equipment shall conform to the applicable requirements of ANSI E1.6.</p> <p>PROBLEM:</p> <p>The first sentence of this clause completely dodges the responsibility for establishing a standard for drill operation of a manually operated (hand-crank) hoist. Is drill operation allowed? Must it be so labeled by the manufacturer? Annex notes about the safety issues of counter-torque to the operator. Annex notes on the hazards of excessive speed of the drill</p> <p>PROBLEM:</p> <p>The second sentence implies that there might be language within another standard (E1.6) that would establish requirements for drill operation.</p> <p>There is no ANSI standard E1.6. The closest relevant document is E1.6-1 and its scope specifically states: "Excluded are and manually powered hoists, including auxiliary drill operation."</p>	<p>Accept in principle.</p> <p>Drive Augmentation added to scope.</p>

#	Commenter	Clause	Comment or reason	Resolution
11.	WPZ	1.4.2	<p>Clause 1.4.2: Comment 4 from the previous public review noted this clause contradicted the inclusion of drill operation later in the previous draft of the standard and proposed alternate language to clear up that contradiction. The comment was accepted in principle, but was revised to mean that drill operated manual hoists were excluded from this standard "This standard does not apply to any equipment used in permanently powered rigging systems, nor to any manually operated systems temporarily operated using powered rigging components."</p> <p>The section on drill operated manual hoists was removed from the draft, which does remove the contradiction from the document. This clause refers the user to the E1.6 series of standards. The draft of E1.6-1 currently out for public review excludes "manually powered hoists, including auxiliary drill operation." As drill operated manual hoists are used in our industry, they should be included in either E1.4-3 or E1.6-1. I feel the systems are more closely related to the manual hoist systems described in E1.4-3 so they should be included here. This clause should be revised to read "This standard does not apply to any equipment used in powered rigging systems. Equipment for powered rigging systems shall comply with the applicable ANSI E1.6 standard." as suggested in the previous comment. In addition, the section (8.3) referring to drill operated manual hoists should be restored.</p>	Accept. See CR10
12.	SAW	2	2 Add reference to E1-4.1-2016 Manual Counterweight Rigging Systems. This standard is extensively referenced.	Accept. Update all such references throughout the standard.
13.	SAW	2	2 Delete the reference to ANSI/ASME B29.4 This draft has no references to roller chain and the previous draft's section on roller chain has been deleted.	Accept. Also delete section 6.2.3 as this section is no longer needed.

#	Commenter	Clause	Comment or reason	Resolution
14.	WPZ	2	Clause 2, 9.1.1-9.1.4: ANSI Z535 2006 has been revised in 2011 and again in 2017. The current versions of the standards are: ANSI Z535.1-2017, Safety Colors ANSI Z535.2-2011 (R2017), Environmental and Facility Safety Signs ANSI Z535.3-2011 (R2017), Criteria for Safety Symbols ANSI Z535.4-2011 (R2017), Product Safety Signs and Labels ANSI Z535.6-2011 (R2017), Product Safety Information in Product Manuals, Instructions and Other Collateral Materials The current versions of the standards should be referenced.	Accept. Replace/update the referenced versions.
15.	WPZ	2	Clause 2, 7.4.3: Clause 2 references ANSI E1.2-2006. Clause 7.4.3 references the 2012 version of this standard. Since 2012 is the current version, clause 2 should be changed to ANSI E1.2-2012.	Accept. See comment resolution 7
16.	AAI	3.1	3.1 Change "counterweight" to "hoist", or simply delete "counterweight". Since many manual hoist rigging systems do not include counterweight, the use of the term might be confusing.	Accept (delete the word)
17.	WPZ	3.1	Clause 3.1: Change "counterweight" in "Batten: ...that is secured to the lift lines for the purpose of connecting loads to the counterweight system." to "rigging." This standard does not apply to counterweight rigging systems.	Accept. See comment resolution 16.
18.	WPZ	3.10	Clause 3.10, 3.15: The definition for "Hoist System" sends the reader to "Line Set". This definition begins "A system of multiple lift lines, operated together...". This definition excludes a hoist system having a single lift line. This should be changed to "A system of one or more lift lines, operated together..." to include a system with a single lift line.	Accept
19.	AAI	3.15	3.15 Following "...suspend a load", change the semicolon to a period; and insert "It includes" before "All...". Also, change the capital "A" to lower case. Alternatively, simply change the capital "A" to lower case. Improves readability, or follows practice of not capitalizing a sentence fragment.	Accept. Changed to lower case "a"

#	Commenter	Clause	Comment or reason	Resolution
20.	WPZ	3.15	Clause 3.10, 3.15: The definition for "Hoist System" sends the reader to "Line Set". This definition begins "A system of multiple lift lines, operated together...". This definition excludes a hoist system having a single lift line. This should be changed to "A system of one or more lift lines, operated together..." to include a system with a single lift line.	See comment resolution 18
21.	WPZ	3.20	Clause 3.20: The definition should change from "Pitch diameter: The diameter of a sheave or drum measured to the centerline of the groove." to "Pitch diameter: The diameter of a sheave or drum measured to the centerline of the rope for which it is designed." Properly designed grooves are slightly oversized, the centerline of the groove will be slightly larger than the centerline of the rope. In addition, the existing definition has no meaning for a smooth drum without grooved. The proposed definition is similar to E1.4-1.	Accept.
22.	AAI	3.23	3.23 Change "a rope" to "lifting medium". The standard permits alternate materials; but the use of "rope" is limiting.	Accept.
23.	AAI	3.31	3.31 Delete "rope or wire rope". See comment for 3.23.	Accept in principle. Replace the words with those suggested in Comment 22
24.	SAW	3.5	3.5 Design factor This definition is not consistent with its use in the draft. I recommend replacing it with the definition from E1-4.1 "A ratio of the design load to the breaking strength of a material or component."	Reject. In some cases the first definition is applicable. In other cases the second definition is applicable.
25.	AAI	3.7	3.7 At the end of the sentence, insert "a" between "as" and "stop". It improves readability.	Accept
26.	AAI	4.2	4.2 Delete "preferably" as it implies a suggestion; but the use of "shall" makes RA/RR performed by more than one competent person a requirement. Change "When" at the beginning of the next sentence, to "If". That leaves the door open for the case when more than one competent person is not available for RA/RR.	Accept with additional modification. Revise the last sentence to state, " <i>When a group of two or more competent persons are not available, completion of the risk assessment and risk reduction by one qualified person shall be permitted.</i> "
27.	AAI	4.4.11	4.4.11 Change the beginning of the sentence to read; "Document the risk assessment and risk reduction including..." This follows the pattern of the other subparagraphs of 4.4 in being the final item in the list of requirements.	Accept

#	Commenter	Clause	Comment or reason	Resolution
28.	SAW	6	6 Mechanical design The design factors permitted by this draft standard, especially in section 6.2 and 6.3 are significantly lower than permitted by any other standard. The shear stress of 33% of yield strength in 6.2.1.1 is equivalent to a 2:1 factor against failure. The requirement in 6.2.1.3 that the design load not exceed the yield strength is equivalent to a Design Factor of 1.0. The requirements for hoist frames and static load bearing components in 6.3.1 and 6.3.2 result in a Design Factor of 2. For comparison, OSHA and ASME B30.16 require hand operated hoists to have a minimum design factor of 4. E1-4.1 requires tension load path components to have a design factor of 5. A portion of this difference appears to result from copying E1-6.1 requirements for peak load without applying an increasing factor to the design load. I recommend adding a general requirement. "Design Loads shall not exceed 25% of the ultimate load carrying capacity of any component."	Accept in principle. Section 6.2.1 revised.
29.	WPZ	6.1.1	Clause 6.1.1, 7.3: The reference to ANSI E1.4-2014 should be E1.4-1 - 2016.	Accept. See comment resolution 12
30.	WPZ	6.2.1.1 - 6.2.1.3	Clause 6.2.1.1, 6.2.1.2, 6.2.1.3: 6.2.1.1 and 6.2.1.2 establish safety factors for components without manufacturer's ratings as 33% (for shear stresses) and 63% (for bearing stresses) of the materials yield strength. 6.2.1.3 allows stresses up to the yield stress of the component. All three clauses relate the yield stress to the design load. These clauses are almost identical to 6.2.1.1.1, 6.2.1.1.2 and 6.2.1.2 in ANSI E1.6-1 - 2012. In E1.6, the first two clauses compare the yield stress to the characteristic load and the third to the peak load. "Design load" should be replaced with "peak load" in 6.2.1.3 which should be defined as "The maximum force applied to a component of a hoist system while the hoist is at rest or in motion resulting from abnormal conditions or irregular operation (forseeable misuse, excessive force on the operating handle, etc.)."	See comment resolution 28

#	Commenter	Clause	Comment or reason	Resolution
31.	IAS	6.2.2.2	<p>6.2.2.2 At least one of the load-securing devices shall have constant engagement or automatically engage when input force is removed.</p> <p>PROBLEM: This is the only relevant clause in the standard that says that this hoist will not back-drive if you let go of the crank. This so important, it should be stated as a separate clause.</p>	Reject. See section 6.1.2 and 6.2.2.3 for requirements regarding functionality of the hoist relating to this comment, and then see section 6.2.2.4, which permits back-driving under certain circumstances.
32.	SAW	6.2.4.5	<p>6.2.4.5 This sentence does not make sense. Add “ensure an” between “to” and “even”. Note that this is the wording provided in the resolution to comment 32 in the previous review. The comment resolution also notes that an annex note will be added. This annex note is not included in the revised draft.</p>	Accept.

#	Commenter	Clause	Comment or reason	Resolution
33.	WPZ	7.1	<p>Clause 7.1: This section should be reorganized to group the requirements for the clew and the guide system listed together. The text was not changed with the exception of adding 7.1.2.5. Stops attached to the guides (as mentioned in the definition) can add significant loads and should be considered.</p> <p>7.1.1 Clews 7.1.1.1 Clews shall be used where multiple lift lines are connected to fewer haul lines. 7.1.1.2 Clews shall be designed to withstand anticipated loads. 7.1.1.3 Clews shall be guided or restrained to prevent fouling and twisting of lines during operation. 7.1.2 Guide Systems 7.1.2.1 Guide systems may be wire guides or rigid members. Other clew guiding methods shall be permitted. *(See Annex note) 7.1.2.2 Guide systems may be oriented in any direction. Non-vertical clew guide systems shall be supported as determined by a qualified person. 7.1.2.3 Guide system shall permit full intended travel of the batten or load. 7.1.2.4 The minimum spacing between adjacent clews shall be such that clew and guide system components cannot come in contact with each other under normal operating conditions. 7.1.2.5 When stops are attached to the guide system, the guide system and guide system attachment points shall be designed to accept the loads imposed on the guide system by the hoist if it hits a stop. 7.1.2.6 Wire Guides 7.1.2.6.1 Wire guide attachments shall be located to permit clew travel without excessive deflection of the clew or its guides. A load-rated tension adjustment device shall be incorporated into the assembly and shall be fixed in position after final adjustments are made. 7.1.2.6.2 Wire Guide attachment points shall be designed to accept the loads imposed by both tension in the guide wires and any loads due to sway of the clew during operation. A registered design professional shall evaluate anticipated guide wire loads to the existing structure.</p>	<p>Reject- organizational structure currently flows naturally from larger group to smaller subset (clew system towards details).</p> <p>7.1.2.5- reject- guide systems should not be designed nor intended to become part of the load path.</p>

#	Commenter	Clause	Comment or reason	Resolution
34.	WPZ	7.1	Clause 7.1: This section should be renamed "Clew and Guide Systems" to conform with the definitions in section 3.	Accept
35.	SAW	7.1.2.4	7.1.2.4 Delete "Wire" at the beginning of the first sentence. This requirement applies whether the guide is wire or rigid. This was comment 36 and 41 in the previous review and the resolution was accepted in principle but not incorporated in the revision.	Accept.
36.	SAW	7.1.2.4.1	7.1.2.4.1 Delete the last sentence. Requiring a registered design professional to evaluate the guide loads is excessive.	Reject. Wire guides are frequently the source of progressive over-tightening with associated reaction to the building structure.
37.	SAW	7.1.2.4.1	7.1.2.4.1 Delete "Wire" at the beginning of the first sentence.	Reject. See comment resolution 36. The requirement intends to address the forces associated with wire guided systems.
38.	WPZ	7.2.2.6	Clause 7.2.2.6: This clause begins a new section (Wire Rope) and should be numbered 7.2.3. Renumber following sections as required.	Accept.
39.	SAW	7.3	7.3 Revise the reference to E1-4.1 from 2014 to 2016.	Accept. See comment resolution 12
40.	WPZ	7.3	Clause 6.1.1, 7.3: The reference to ANSI E1.4-2014 should be E1.4-1 - 2016.	Accept. See comment resolution 12
41.	WPZ	7.4.3	Clause 2, 7.4.3: Clause 2 references ANSI E1.2-2006. Clause 7.4.3 references the 2012 version of this standard. Since 2012 is the current version, clause 2 should be changed to ANSI E1.2-2012.	Accept. See comment resolution 7
42.	WPZ	9.1.1 – 9.1.4	Clause 2, 9.1.1-9.1.4: ANSI Z535 2006 has been revised in 2011 and again in 2017. The current versions of the standards are: ANSI Z535.1-2017, Safety Colors ANSI Z535.2-2011 (R2017), Environmental and Facility Safety Signs ANSI Z535.3-2011 (R2017), Criteria for Safety Symbols ANSI Z535.4-2011 (R2017), Product Safety Signs and Labels ANSI Z535.6-2011 (R2017), Product Safety Information in Product Manuals, Instructions and Other Collateral Materials The current versions of the standards should be referenced.	Accept. See comment resolution 14

#	Commenter	Clause	Comment or reason	Resolution
43.	SAW	10	10 The requirement in this section are insufficient to comply with the scope and intent of this document. Comment 65 to the previous review included the following recommendations that were rejected as being covered by the hoist manufacturer's recommendations. These are specific requirement that often are not included with the manufacturer's recommendations and I recommend they be included in the standard.	Accept.
44.	SAW	10	10 Replace "system designer" with "manufacturer's". System designer has been deleted from the remainder of the draft. The proposed change to system designer was also rejected in the resolution to comment 64 in the previous review.	Accept.
45.	SAW	10.1	10.1 Manually operated hoists and other load bearing components shall be securely attached to the supporting structure. The mounting shall be designed to prevent unanticipated movement and prohibit loosening of the component or mounting hardware over time by either load or vibration.	Accept.
46.	SAW	10.2	10.2 Welding shall be permitted with the approval of a licensed professional engineer. This attachment method shall only be performed in a manner that permits removal of the hoist or component when maintenance or replacement becomes necessary.	Accept.
47.	SAW	10.3	10.3 Drilling of structural framing, for attachment of hoists and other components with bolts, shall be permitted with the approval of a licensed professional engineer.	Accept.
48.	SAW	10.4	10.4 When attaching hoists to materials requiring anchors, the anchors shall be selected and installed according to both the anchor manufacturer's recommendations and local code requirements.	Accept.
49.	SAW	10.5	10.5 Attachments to the supporting structure shall provide a minimum design factor of 5. The design factor shall be based on the static load and the ultimate strength permitted by published design standards applicable to the material.	Accept.

#	Commenter	Clause	Comment or reason	Resolution
50.	WDC	11.5.3	Section 11.5.3 Has an Asterisk at the end of the sentence with a note saying to "See Annex Note." There is no annex note provided in the annex section. Either provide an annex note or remove the Asterisk and associated note.	Accept
51.	WPZ	11.5.3	Clause 11.5.3: This clause indicates there is an annex note "(See Annex note)". There is no annex note for this clause. Remove the asterisk from the end of the sentence.	Accept
52.	AAI	A6.2.4	A6.2.4 Paragraph at the top of page 13, last sentence. Suggest changing "proportions" to "D/d ratios". This term stays consistent with what is addressed in the rest of this section.	Accept
53.	SAW	A6.3.1	A6.3.1 Delete this section. The 33% value does not match the 50% value in the standard and there is no additional 75% dynamic loading.	Accept.
54.	WPZ	A6.3.1	Clause A6.3.1: Clause 6.3.1 does not indicate it has an annex note. 6.3.1 has a required that the frame not exceed 50% of the yield strength, yet the annex note mentions 33% of the yield strength. It does not appear to apply to this clause. The annex note number needs to be corrected or the annex note should be deleted.	Accept.