

MINUTES
RIGGING WORKING GROUP
July 10, 1998, 7 p.m.
Clarion International Hotel
Rosemont, IL

Chairman: Mike Garl; James Thomas Engineering, Inc.; Principal

Recording secretary: Karl G. Ruling; ESTA

Members in attendance: Steve Butner; Aerial Rigging & Leasing, Inc.; Principal (joined at this meeting)
Andrew T. Martin; ATM Group, Inc.; Principal
Ted Jones; Chicago Spotlight, Inc.; Observer (joined at this meeting)
Wally Blount; CM Lodestar - Columbus McKinnon Corp.; Principal
Paul Brady; Grand Stage Company, Inc.; Observer
Reid Neslage; H & H Specialties Inc.; Principal
Rodney F. Kaiser; J.R. Clancy Inc.; Principal
Mike Garl; James Thomas Engineering, Inc.; Principal
Richard Nix; Performance Systems Integration; Principal
Tony Douglas-Beveridge; PLASA Standards Office; Principal
George Sabbi, PRG Lighting Division; Principal (changed to alternate at this meeting)
Rocky Paulson; Stage Rigging, Inc.; Principal
Jerry Gorrell; Theatre Safety Programs; Principal
John James; Tomcat USA, Inc.; Alternate

Visitors: Martin Moore, Unusual Rigging

1 Opening remarks

Mike Garl called the meeting to order at 7:14 p.m.

2 Attendance and membership

2.1 Introduction of those present

Those attending introduced themselves by giving their names and company affiliations.

2.2 Call for quorum

There were twelve voting members present at the top of the meeting. Nine were required for a quorum. Mike Garl announced the presence of a quorum.

2.3 Requirements for Membership

Mike Garl reviewed the requirements for voting membership. Miss three letter ballots in a row, and your status will be changed to observer. Miss three meetings in a row, and your status will be changed to observer.

If a voting member does not feel qualified to vote on a letter ballot, the member's participation can be noted by simply writing "abstain" on the ballot and sending it in. This will not count as a vote for the motion, but it will count as a returned ballot and will preserve the person's voting status.

3 Processing of new membership requests

Teddy Van Bommel; PRG/Vanco/Bash; Principal
Michael Wells; Tomcat; Principal
Thomas Michael Grannucci; Kleege Industries; Principal
Ted Jones; Chicago Spotlight; Observer.
Marty Lazarus; Chicago Spotlight; Observer
Steve Butner; Aerial Rigging; Principal

Richard Nix moved that the applicants be accepted. Rod Kaiser seconded. Unanimous by show of hands

With the election of Teddy Van Bommel, George Sabbi became an alternate for PRG. Because of Van Bommel's absence at this meeting, Sabbi represented PRG.

4 Approval of minutes from the previous meeting

George Sabbi corrected the grammar in 2.2. It should have read: "Mike Garl announced that we have a quorum."

Rocky Paulson moved that the amended minutes be accepted. George Sabbi seconded. Unanimous by show of hands.

5 ESTA declarations

5.1 Anti-trust statement:

"The ESTA Board of Directors, the Technical Standards Committee, and the leadership of this Working Group will reject or nullify any actions that restrain trade. Anyone who feels that an action restraining trade is being or has been taken is requested to bring the matter to the attention of the chair immediately. Anyone who feels that actions in restraint of trade have been taken and not properly annulled is requested to notify the TSC chair or ESTA president immediately.

"ESTA legal counsel has informed us that any member of this working group maybe found individually liable for any action that restrains trade taken by this working group. An individual convicted of a violation of the Sherman Act may be fined as much as \$100,000 and be imprisoned for up to three years. An easy to read pamphlet describing restraint of trade is available from the Technical Standards Committee."

5.2 Call for patents:

"ESTA intends to publish no standard that contains protected intellectual property, unless that property can be licensed by anyone for a reasonable fee. ESTA uses a process of open patent disclosures to implement this intent. ESTA does not conduct patent searches and does not warrant that its standards contain no protected intellectual property.

"In keeping with the open disclosure policy, I ask if anyone present wishes to notify the working group of the existence of a patent that might protect material in a standard being developed by the working group. You need not be the holder of the patent in order to notify the working group of its existence."

6 Approval of agenda

Rodney Kaiser moved that the agenda be accepted. Rocky Paulson seconded the motion. Unanimous by show of hands.

7 Old business

7.1 Report from "competent"/"qualified" task group – Rocky Paulson

Rocky Paulson described the search for definitions, and presented a selection of definitions with particular ones highlighted, and recommended that these highlighted definitions be used in our standards.

Rocky Paulson moved that we accept the recommended definitions for use by the Rigging Working Group in their standards. Jerry Gorrell seconded the motion.

The following two definitions were therefore put forth for adoption:

Qualified person: a person who by possession of a recognized degree or certificate of professional standing, or who by extensive knowledge, training, and experience, has successfully demonstrate the ability to solve or resolve problems relating to the subject matter and work.

Competent person: means one who is capable of identifying existing and predictable hazards in the workplace, and who is authorized to take prompt corrective measures to eliminate them.

George Sabbi said that the competent person definition should start out with "a person who." It would thus read:

Competent person: a person who is capable of identifying existing and predictable hazards in the workplace, and who is authorized to take prompt corrective measures to eliminate them.

This amendment was accepted by Rocky Paulson and Jerry Gorrell.

The amended definitions were accepted unanimously by a show of hands.

George Sabbi moved that the definitions be sent to the TSC for use in other standards and the ESTA Style Guide. Wally Blount seconded. Unanimous by show of hands.

7.2 E1.1 - Wire Rope Ladder Standard - Comment Resolution - Rocky Paulson

Rocky Paulson went over the public review comment resolutions that still had negative votes with comments from the working group. It was assumed by Rocky and the working group that all the other comment resolutions that did not have negative votes with comments needed no further discussion.

Public review comment #3 - Scope, page 1, and 5.1 Scope. "These scope sections need to be merged since they both deal with the same subject. I mention this as an editorial comment."

Original task group comment resolution: "Perhaps the scope sections could be merged at a later date as a revision to the standard. We do not believe this to be an important detail"

Comments from the working group regarding the original resolution:

1. If it is not an important detail, then why not merge them to satisfy the comment?
2. Why not fix it now if you have to make any other changes?
3. What is the revision?? We should propose the exact wording.
4. It may be confusing to have 2 sections entitled "scope." Section 5.1 could be moved to Section 1, and revise the Section 5 title to say simply "Definitions and References" for clarity.
5. Merge Scope (Page 1) and Scope 5.1 as per comment #4.

Task group discussion of the working group comments:

1. When adopting a form for this standard, we used the B30 ANSI Standards as a rough form. Many of their standards have two scope sections, one as a general introductory statement and one later on that has more detail. If the E1 committee wishes to adopt another form it really makes no difference to this sub-committee.
2. Our concern is that this issue not be the thing that causes another public review.
3. If there is to be a change, we recommend the following:

Section 1 should be combine with 5.1 as follows:

1 Scope

This standard shall apply to the construction and use of wire rope ladders in the entertainment industry. Specifically, this standard shall apply to wire rope ladders used for vertical access by personnel to lighting trusses, temporary follow spot platforms, and other areas of a temporary nature where wire rope ladders are used in lieu of portable or fixed ladders. Use of wire rope ladders conforming with this standard shall be restricted in use to one person at a time.

1.1 Exclusions

This Standard does not address the construction or use of fixed or portable ladders. These are addressed in the following Standards: ANSI A14.3- 1984 and A14.1-1982.

After discussion of the response to this public review comment and other comments the consensus was to have one scope statement that defines the entertainment industry and more clearly states what wire rope ladders are, why they are used, and what this standard does not cover:

1 Scope

This standard shall apply to the construction and use of wire rope ladders in the entertainment industry. The entertainment industry includes, but is not strictly limited to, musical productions, live concerts, live theater, film production, video production, corporate events, trade shows, and broadcast production.

Wire rope ladders are distinguished from other ladders by having flexible rails, and are used in applications where ladders with rigid rails are impractical to use, or where a rigid ladder would pose a greater danger to the user or other workers in the area. Wire rope ladders are used for vertical access by personnel to lighting trusses, temporary follow spot platforms, and other areas of a temporary nature. Such areas cannot be practically served by rigid ladders because the floor underneath is not level or clear, the elevated work area is not rigidly fixed in place, or the ladder must coil for storage or to allow clear access beneath the elevated work area.

Use of wire rope ladders conforming to this standard shall be restricted in use to one person at a time.

This standard does not address the construction or use of fixed or portable ladders with rigid rails.

Public review comment #4 - Scope, page 1, and 5.1 Scope. "I suggest you review ANSI A14-3-1992 fixed ladder definition. Your proposed wire rope standard appears that it is being used as a fixed ladder installation. If you attached this wire rope ladder to a building or structure then you are within the scope of the fixed ladder standard. I am assuming this is why you are proposing this standard since wire rope fails to meet the fixed ladder design criteria and regulatory agencies are citing those who use this ladder as such."

Original task group comment resolution: "ANSI 14.3 makes no note of what a fixed ladder is fixed to in Section 1 (scope). In section 1.5 (exceptions) it states that it applies only to ladders attached to buildings, wells, and shafts. Rarely if ever are wire rope ladders attached to these types of structures. This standard was developed because wire rope ladders are a unique type of ladder that serve a real purpose and there is no existing standard to address their construction, use, and maintenance."

Comments from the working group regarding the original resolution:

1. Perhaps a clearer explanation of what these ladders are intended for is in order. Being an ANSI standard, it will be read by many people outside our industry.
2. I agree with Comment #1.

Task group discussion of the working group comments:

1. I must confess that I was looking at 14.3-1984 when making my original responses. The definition in A14.3-1992 is "A fixed ladder is a ladder permanently attached to a structure."
2. It seems that the scope clearly states the expected applications of the ladder and as well stipulates the temporary nature of the installation. We would welcome other wording suggestions for our consideration. Unfortunately even if we submitted an entirely different wording in the scope there is no assurance that it would be any more acceptable.
3. Since it appears from the original comment that we are trying to use these ladders instead of fixed ladders, we could add a sentence to 1 Scope as follows:

...a temporary nature where wire rope ladders are used in lieu of portable or fixed ladders. It is not the intent of this standard to promote the use of wire rope ladders where portable ladders, fixed ladders, or manlifts would be the more appropriate solution for access. Use of wire rope ladders conforming with this standard..

4. As an answer to RC #1 & RC #2, we disagree that because it is an ANSI standard that anyone who reads it must understand all the terms used. There are many industry specific terms that readers outside the industry should familiarize themselves with prior to using this document. We would welcome any suggestions for change as long as they do not compromise the industry specific uses listed in the existing document.
5. If the committee desires we could put definitions in the document for items such as lighting truss and follow spot to aid the reader. Without someone having at least watched these operation being performed even definitions would offer limited clarity.

After some discussion the working group decided by consensus that the original resolution to the comment is adequate and should be allowed to stand. The new scope statement makes it clear that wire rope ladders are portable ladders used in specific, temporary installations.

Public review comment #5 - Section 5.2 Definitions: "Please define entertainment industry for clarity purposes."

Original task group comment resolution: We do not believe that this definition is necessary

Comments from the working group regarding the original resolution:

1. The entertainment industry is unique and does require clarification in the event this standard is evoked in court.
2. While such a definition may not be necessary for this standard, it would be an appropriate definition for ESTA in general.
3. Because this is an ANSI standard, some definition for lay people may be in order.
4. Those of us in the industry understand the meaning of the term, but those outside of the industry may not fully comprehend the extent or exclusions meant by the term. Some definition would be helpful, in fact, appreciated.

Task group discussion of the working group comments:

While we do not think that including the definition of the Entertainment Industry adds a great deal to the to the safety of the WRLs, we would offer the following definitions for consideration by the committee. If it should be in this standard however, we recommend that the committee adopt this as a standard definition for use in all standards that are specific to our industry.

1. **Entertainment Industry:** the industry that surrounds event productions for the purpose of presenting music, a message, or a story to the public or a specific group of people. The entertainment industry includes, but is not strictly limited to musical production, live theater, film production, video production, corporate events, trade shows, and broadcast production.

2. **Entertainment Industry:** the industry that supports productions that include one or more performers, athletes or speakers, conveying their message to a larger group of people called an audience. These productions generally require augmentation of the lighting, sound, and artificial scenery enhancement. It is the production of these elements of the event that constitutes the entertainment industry.

The working group decided by consensus that no definitions of the entertainment industry were needed in the definitions section. The response to the public review comment shall be:

"A series of examples of what is meant by the 'entertainment industry' has been added to the scope."

Public review comment #6 - Sections 5.2.8 and 5.2.10: "The definitions of rail and rung fail to meet any of the definitions of ladder components defined in already existing ANSI standards. I suggest you do a document research for consistency as required by ANSI procedures."

Original task group comment resolution: ANSI A14.3 defines rail as *the side member jointed at intervals by either rungs or steps*. E1.1 defines rail as *the vertical strength member of the ladder that supports the rungs*. A14.3 does not define rung. Step surface is the closest thing that A14.3 defines to a rung. The definitions are similar except there is no mention of hands being placed on the step surfaces. We recommend no change.

Comment from the working group regarding the original resolution:

1. There is a clear difference between "joining" members and a "support" system. Joining members identified in A14.3 is a better definition.

Task group discussion of the working group comments:

1. While we agree that a certain consistency should be maintained throughout the subject matter with respect to using the language, our experience in searching out definitions for competent person, for example, shows us that ANSI allows for large deviations in wording as well as overall meaning.
2. The purpose of the rails are in fact to support the rungs. The fact that they are joined to the rungs seems to us to be secondary.
3. Without consideration of further comments we still recommend no change.
4. Both A14.3-1992 fails to define rungs, but 14.1-1990 and 14.2-1994 both define rungs as "*ladder crosspieces that are intended for use by a person in ascending or descending*".
5. If the committee desires we could change the definition of rung to conform with that of 14.1 & 14.2.

5.2.10 Rung: ~~The horizontal members of the ladder, the purpose of which is to place the feet and hands when climbing.~~ Ladder crosspieces that are intended for use by a person in ascending or descending.

The working group decided by consensus to accept the new wording defining rung. The response shall be: ANSI A14.3 defines rail as *the side member jointed at intervals by either rungs or steps*. E1.1 defines rail as *the vertical strength member of the ladder that supports the rungs*. A14.3 does not define rung. Step surface is the closest thing that A14.3 defines to a rung. The definitions are similar except there is no mention of hands being placed on the step surfaces. The definition of rung has been changed to conform with that of A14.1 and A14.2:

5.2.10 Rung: ~~The horizontal members of the ladder, the purpose of which is to place the feet and hands when climbing.~~ Ladder crosspieces that are intended for use by a person in ascending or descending.

Public review comment #7 - Section 6.1.1 Ladder Rungs: "I see you mention static load testing on a 3" wide surface. Has the committee considered drop tests since climbing has dynamic forces applied."

Original task group comment resolution: "No, but one would expect them to be much lower than in a fixed ladder because the rungs can move on a horizontal plane."

Comments from the working group regarding the original resolution:

1. If ANSI A14 specifies dynamic testing then it would be appropriate; for vertical component only.
2. However the possibility exists that dynamic forces could be implied that are in excess of the static load test.
3. I would assume that the static load includes a factor to account for dynamic loads.
4. It should be noted that none of the existing ladder standards require drop testing. The load tests are all measurements of distortion or failure with static loads. The one "drop test" is for plastic top caps on step ladders, and is found in 7.5.14.8 in A14.2 and in 8.5.14.8 in A14.5. This test requires that a steel ball is to be dropped on a thoroughly chilled (-20°F) plastic top cap to see if it cracks. The only other dynamic testing is for hinges and catches, which must be able to go through 6,000 cycles without failure.

Task group discussion of the working group comments:

1. A14 standards do not require dynamic testing for these forces.
2. Our empirical evidence of having built ladders using roughly these static test requirements shows no evidence that human forces have ever damaged the rungs or the rung/rail connection on any of the ladders we have manufactured.
3. We recommend no changes to the testing requirements.

The working group decided that the task group's discussion of the working group comments would be an appropriate response to the initial public review comment.

Public review comment #9 - Section 6.1.2 Ladder Rails. "I fail to see how the wire rope diameter has anything to do with hand injuries as described in the proposed standard. The rungs and attachment to the ladder rail are not adequately addressed. To have a performance standard one needs to specify the spacing and method of attachment. (e.g. welded, tied together with a piece of rope, etc.)"

Original task group comment resolution: "The diameter of the wire affects the pounds per square inch of pressure placed on the forefinger when climbing., since the rail prevents the hand from slipping off the rung. The other issues are addressed in Section 6.1.1 and 6.1.2. As long as the rung/rail connection meets the strength requirement, it doesn't matter if it is tied on, welded, etc."

Comments from the working group regarding the original resolution:

1. Suggest 1st sentence: "Wire diameter can affect hand injuries in instances when the user's hands come into contact with the wire rope." (PSI comment not appropriate.)
2. With growing concern in areas of fire hazards/effects, perhaps rung/rail connection should possess some level of integrity when heat is present. (I.e., tied-on w/cordage, etc., would not be appropriate to state.)
3. No sharp points at rung/rail connection.

Task group discussion of the working group comments:

1. We agree with RC #1. Response should be changed accordingly.
2. In response to RC #2, we would resist the concept of temperature ratings or requirements for wire rope ladders. The owner should decide whether heat is a concern and buy whatever ladder is appropriate for their needs.
3. RC #3 could be accommodated in 6.1.1 as follows:

6.1.1 Ladder Rungs

Finish

~~The rungs shall have no~~ Neither the rungs nor the rung/rail connections shall have sharp or jagged edges that could cause injury during the use of the ladder. The...

The working group agreed with Rocky Paulson's discussion of the working group comments. Accordingly, the response to the public review comment shall be:

Wire diameter can affect hand injuries in instances when the user's hands come into contact with the wire rope. The other issues are addressed in Section 6.1.1 and 6.1.2. As long as the rung/rail connection meets the strength requirement, it doesn't matter if it is tied on, welded, etc. Also, section 6.1.1 has been changed to reflect the concern for hand injury, to read:

6.1.1 Ladder Rungs

Finish

~~The rungs shall have no~~ Neither the rungs nor the rung/rail connections shall have sharp or jagged edges that could cause injury during the use of the ladder. The...

Public review comment #12 - Section 6.1.4 Ladder Anchorage: "Does 6.1.3 and 6.1.4 contradict itself since the connection hardware speaks of slings used to connect the ladder to the anchorage which has a 1000 pound minimum working load and the anchorage has no minimum strength except when used in combination with fall protection anchorage which is not recommended. What are we trying to state in this section or did I miss the point?"

"Ladder Anchorage: what is the minimum strength of the anchorage without using it in combination with the fall protection anchor. The same anchorage point for a fall arrest system and ladder anchorage is unacceptable practice. See OSHA and ANSI Z359.1-1992 standards."

Original task group comment resolution: The minimum strength of the anchorage corresponds to the strength of the ladder rails. The minimum strength of the anchorage, therefore, must be 2000 lbs. One may use the same anchorage point for the ladder and fall protection. As referenced in OSHA 1910.66(f)(5)(ii)(M) the anchorage "should" be separate, but can be the same if rigged redundantly so that the loss of one point will not cause failure of the anchorage.

Comment from the working group regarding the original resolution

1. The context of the OSHA reference in the last sentence of the response is incorrect. The OSHA reference should be presented as an example of how OSHA can be interpreted to allow the same anchorage point. The quoted text "should" infers that the OSHA reference includes that text, when in fact it does not.

Task group discussion of the working group comments:

1. The entire response should be re-worded as follows:

6.1.4 states that the ladder anchorage must be at least as strong as the ladder rails. This would mean that the anchorage must have a minimum ultimate strength of 4,000 lbs., (2,000 lbs. for each rail). This probably should be changed since it could also be interpreted to mean that if the ladder rails happened to have material with a 5,000 lb ultimate strength, the anchorage strength would then have to be 10,000 lbs. We would recommend a change in the first sentence of 6.1.4 as follows:

The anchorage shall have a minimum ultimate strength of 2,000 lbs. (8.9 kN) per rail be stronger than the ladder rail(s) connected to it.

The issue regarding the use of the same anchorage point is more complex than the commentor makes it appear. After re-reading ANSI 359.1-1992 we find no reference at all to the fact that the anchorage has to be separate from the work surface or ladder. In fact there are fall protection systems designed to attach directly to rungs of fixed ladders. Federal OSHA (CFR 1910.66, Appendix C(l)(b) Definitions) defines anchorage as follows: "*Anchorage" means a secure point of attachment for lifelines, lanyards or deceleration devices, and which is independent of the means of supporting or suspending the employee.* By looking at this definition alone one would get the idea that a common anchorage was unacceptable. However, there are several situations where the law does not require a separate anchorage. 1910.66(f)(5)(ii)(M) is an example: *(M) A vertical lifeline shall be provided as part of a fall arrest system which meets the requirements of*

appendix C, for each employee on a working platform suspended by two or more wire ropes, if the failure of one wire rope or suspension attachment will cause the platform to upset. If a secondary wire rope suspension is used, vertical lifelines are not required for the fall arrest system, provided that each employee is attached to a horizontal lifeline anchored to the platform. Other examples can be found in 1910.66(f)(5)(ii)(L) and 1910.66(f)(5)(iii)(B).

Because of these examples and others we believe there is precedent for using common anchorages. The standard does recommend against shared anchorages which is as far as we need go.

The consensus of the working group was that the entire discussion and the proposed changes to the draft standard are the appropriate resolution, with the exception of the phrase "which is as far as we need to go." Therefore, the discussion and proposed changes were accepted, with the deletion of these eight words, as the appropriate resolution to the public review comment.

Public review comment #14 - Section 6.2.1 Rung Width: "This minimum clearance of 9 inches does not meet any of the existing ladder standards. The anthropometric measurements of man and the body climbing movements do not safely support this clearance distance."

Original task group comment resolution: "The comment may be correct about 9" clearance between the rails (flexible), but since climbing a wire rope ladder is much different than methods used to climb other types of ladders the comment is irrelevant."

Comments from the working group regarding the original resolution:

1. Have to show anthropometric proof or substantiation.
2. Have any anthropometric measurements been gathered with regard to climbing a wire rope ladder? I think the response was an easy way out. More information should be gathered/reviewed.
3. Agree [with Mr Smith]. Comment is valid.
4. In the light of the comments made, it would be a sensible precaution to try and identify supporting anthropometric distance.

Task group discussion of the working group comments:

1. The intent of RC#1 is unclear to us. Who has to prove or substantiate?
2. To our knowledge no measurements have been gathered. We think that there is no shame in doing things the easy way. We would welcome any anthropometric input if there is any regarding these issues for our evaluation, but we felt that having sought the advice of riggers and other users of the ladders was sufficient to determine the minimum rung width. There are many Wire Rope Ladders (WRLs) in service used on circuses that have only 6" width, which work, but it is felt that climbing these requires too much skill. We would like to know why it is felt that more information needs to be gathered and reviewed? There were no problems brought to our attention during the period when owners manufacturers and
3. With respect to RC #3, if you have this information, please bring it forward to evaluate.
4. Is it the word anthropometric that caught our attention. What difference does this make if the users like the 9-12" parameters?
5. Unless there is further information brought forward, we recommend changing our response to the following:

"We believe that while the minimum width requirements for the ladders specified in ANSI A14.1, A14.2, A14.3, A14.5, are between 12" and 16" and may be based on anthropometric measurements, these measurements do not apply to WRLs. Since the method of climbing is so drastically different it is hard to imagine comparing one with the other. All ladders listed in the above standards are climbed from the front, the ladder described by E1.1 is climbed from the side. Climbers of ladders described in the A14 standards are supported by their feet and balanced with their hands, climbers of WRLs are supported by their hands and only aided with

their feet since the feet are not directly under the center of gravity of the body. For these reasons we recommend no change to 6.2.1."

The consensus of the working group was to accept the new resolution.

Public review comment #15 - Section 6.2.2 Rung Rise: "This is known as vertical spacing. The proposed standard does not specify how to measure. The standard contradicts established ladder vertical spacing criteria of 12 inches. Furthermore, the inconsistent spacing is what will promote the misplacing of the foot position. The variance allows for too many installation variables to be considered safe for the user. Additionally, no tolerance should be allowed on a simple installation of this type."

Original task group comment resolution: "This standard does allow for a 12" rise. In fact it is more stringent than Section 5.1.1 of ANSI 14.3 which has no minimum vertical spacing (rise). With respect to allowing no tolerance, we find that to be impossible.

Working group comments regarding the original resolution:

1. The response failed to answer the second sentence, "...does not specify how to measure." Perhaps the response could refer to figure 1.
2. The suggested response is factually incorrect. Section 5.1.1 of ANSI 14.3 specifies a center to center rung spacing of 12 inches. However, A14.3 allows the ladder to be installed so the first rung is any distance up to 14" off the floor or ground. Mr. Smith's comment is also factually incorrect. Twelve inches is not the only acceptable rung spacing found in existing ladder standards. A14.1 allows the rung spacing on mason's ladders to be any distance from 8" to 12" as long as the spacing is uniform, and allows any spacing up to 12" for regular step ladders. A14.4 has an 8" to 12" spacing range for job made wooden ladders. A14.2 has the same 8" to 12" rung spacing range for step stools. Some of the standards give tolerances for rung spacing, and some do not. In A14.1 section 6.2.1.2, the step spacing tolerance is +1/4" to -1". In A14.2 the tolerance is plus or minus 1/8" while A14.4 has a tolerance of Plus or minus 1/2" in spacing. No standard explicitly has a zero tolerance.

Task group discussion of the working group comments:

1. RC #1 is correct, we did not respond to the second sentence. We will add the response he suggested as well as point to the definition of rise (E1.1, 5.2.9 *rise: the elevation difference between adjacent rungs.*)
2. With respect to RC #2, the reason for our error was that we were looking at A14.3-1984 as opposed to the current version A14.3-1992. The earlier version noted a *maximum* spacing of 12".
3. Without re-stating all the remarks and quotes from the A14 standards, we would like to reword our response to reflect the fact that there has not been a standard spacing specified by existing standards and that our range falls within the range and tolerances of similar standards. We would also like to state that since the method of climbing WRLs is different than the methods used for other types of ladders, simply copying their spacing requirements would not necessarily be the best course.
4. With respect to the commentors remarks about variance in rise and installation variables, the two have nothing to do with each other. The rise is determined by the manufacturer and the installation is done by the user. We do not see how the safety of the user is adversely affected by adjacent rungs that have plus or minus 1/8" of the design rise as a tolerance. Over the entire length of the ladder the variance can be no more than twice that.
5. When Stage Rigging, Inc first started building ladders, we looked at what was and is being used in the market. There are many ladders being used that have a rise of 18". We built test ladders with spacings from 6" to 18" rises and tried them. At the low end the climber expends a lot of energy and gets nowhere. At the other end, the thigh muscles get tired taking such long steps. We ended up settling on a 14" rise for our ladders. We never had a complaint. When doing research for E1.1, we discovered that 12" seemed to be the common maximum spacing

allowed, with few exceptions. We then changed our jigs to make 12" rise ladders. This seemed easier than defending a 14" rise and it makes little difference to the climber.

6. We recommend the following response:

"E1.1 defines the rise as the elevation difference between adjacent rungs. Figure 1 depicts this measurement. We feel this is sufficient information for rise to be measured. E1.1 does contradict the requirements of A14.3, but so do A14.1, 14.2, 14.4, and 14.5. It appears that A14.3 is the only standard that requires 12" spacing with no exceptions. The fact that E1.1 and A14.3 do not agree is not grounds for changing E1.1. WRLs are a different class of ladders than any previously described by ANSI standards and therefore the design parameters may vary. While we agree with Mr. Smith's implied concern about wide variations in construction being a safety concern, we believe that we have built in tolerances that are both acceptable for the user and allow manufacturers to conform to the standard. After all, if these ladders cannot be manufactured at a price the market will pay, the standard will be ignored by the marketplace."

If the committee desires, in E1.1 we could change all references to "rise" to "vertical spacing."

The consensus of the working group was to accept discussion point #6 as the new comment resolution, and to change the references to "rise" in E1.1 to "vertical spacing."

Public review comment #17 - Section 7 Ladder Installation. "In the fifth (last) paragraph the application of downward force to the ladder is discussed. This does not make clear why there is a maximum force, or if the force is the amount applied to a single rail or the combined force applied to both rails or a rung.

"My interpretation of this is that the force limit is because the force is combined with the workers weight and the desire to limit the maximum force on the ladder.

"There is no mention, positive, or negative, of securing the bottom of the ladder to a stationary object such as the floor or larger weights with a minimum amount of tension as a means to stabilize the ladder."

Original task group comment resolution: "Mr. Lagerquist states that it is not clear why there is a maximum force. The reason is just as he surmised, to limit the total loading on the ladder. With respect to tying off the bottom of the ladder, it was not mentioned because I have never seen that done. Wire rope ladders are used for temporary purposes only, to my knowledge, and securing the bottom of the ladder would take too much time and effort. If the bottom were secured, steps must be taken to limit the forces imparted into the ladder because the bottom is secured."

Comments from the working group regarding the original resolution:

1. Change "I" to "we."
2. Accept [Mr. Smith's] comment.
3. The document should include wording that addresses the possible situation where the bottom of the ladder is secured. I think the last sentence of the response is appropriate (and sufficient) for this.

Task group discussion of the working group comments:

1. We agree with RC #1. Change response to read as follows:

"Mr. Lagerquist states that it is not clear why there is a maximum force. The reason is just as he surmised, to limit the total loading on the ladder. With respect to tying off the bottom of the ladder, it was not mentioned because we have never seen that done. Wire rope ladders are used for temporary purposes only, to our knowledge, and securing the bottom of the ladder would take too much time and effort. If the bottom were secured, steps must be taken to limit the forces imparted into the ladder because the bottom is secured."

2. We presume RC #2 is referring to Mr. Lagerquist's comment as opposed to our response. Without further explanation, we cannot respond to this comment.
3. We accept the suggestion in RC #3. The revision to the standard is as follows:

7 Ladder Installation

(para. 5)

... at least 30 lbs. (133 N) but shall not exceed 50 lbs. (222 N). If this stabilization is being achieved by securing the bottom of the ladder to a solid structure, steps must be taken to limit the force imparted into the ladder.

The working group agreed in general with the new comment resolution. However, the working group felt that to allow the bottom of the ladder to be fastened to a solid object by some means that would limit the force to 50 pounds would be virtually impossible in the field. There was no simple, reliable means the working group could identify that a person could use to limit the force to 50 pounds. Therefore, it was recommended that securing the bottom to an object should be specifically forbidden. The comment resolution shall be:

Mr. Lagerquist states that it is not clear why there is a maximum force. The reason is just as he surmised, to limit the total loading on the ladder. With respect to tying off the bottom of the ladder, it was not mentioned because we have never seen that done. Wire rope ladders are used for temporary purposes only, to our knowledge, and securing the bottom of the ladder would take too much time and effort. If the bottom were secured, steps must be taken to limit the forces imparted into the ladder because the bottom is secured. This would be difficult to do in practice, so securing the bottom should not be allowed. The standard is revised to read:

7 Ladder Installation

(para. 5)

... at least 30 lbs. (133 N) but shall not exceed 50 lbs. (222 N). This stabilization shall not be achieved by securing the bottom of the ladder to a solid structure.

Public review comment #19 - Section 7 Ladder Installation: "The clearance space of 6" is less than the ANSI A14.3 - 1992 of 7 inch clearance which is the minimum for proper foot placement. There is no difference how one climbs either ladder."

Original task group comment resolution: Mr. Smith's remarks about 6" versus 7" (wall clearance) distance. ANSI A14.3 section 5.4.2.1 requires a distance of 7" between the center of the rung and the wall. E1.1 requires 6" between the rung and the wall giving a net difference of 5/8" assuming the smallest diameter rung. Contrary to Mr. Smith's statement that there is no difference in climbing the two types of ladders, fixed ladders are climbed from the front and wire rope ladders are climbed from the side. Since the feet are not perpendicular to the rung, less distance would be required to avoid a slipping hazard which is the purpose of the minimum distance requirement.

Comments from the working group regarding the original resolution:

1. If 7" from rung center is already published, then perhaps E1.1 should be changed to help reduce confusion in an area where workers may be working with both types of ladders; i.e., less numbers for them to remember.
2. Blowing smoke response.

Task group discussion of the working group comments:

1. While we still agree with our original response, we have had other information brought to our attention that affects our response. Since WRLs are climbed from the side, we should allow clearance for the body as well as the feet. We recommend striking the entire response and replacing it with the following:

We Have considered your comment regarding the minimum clearance. We chose 6" since the feet are not placed perpendicular to the rungs while climbing wire rope ladders. However, your comment reminds us that we should also allow half the width of a body as well since they are climbed from the side. We will recommend a change from 6" to 18".

2. We recommend changing E1.1 Section 7 paragraph 2 to the following:

The ladder shall be installed such that the rails remain vertical through the entire length of the suspension. There shall be a minimum ~~6" (15 cm)~~ 18" (46 cm) horizontal distance between the rungs and a wall or other obstacle that would prevent the feet from being centered on the rung impede the climber from ascending or descending the ladder.

The working group accepted the task group's newest resolution of the public review comment. The resolution shall read:

We have considered your comment regarding the minimum clearance. We chose 6" since the feet are not placed perpendicular to the rungs while climbing wire rope ladders. However, your comment reminds us that we should also allow half the width of a body as well since wire rope ladders are climbed from the side. We recommend a change from 6" to 18". Section 7, paragraph 2 shall be changed to read as follows:

The ladder shall be installed such that the rails remain vertical through the entire length of the suspension. There shall be a minimum ~~6" (15 cm)~~ 18" (46 cm) horizontal distance between the rungs and a wall or other obstacle that would prevent the feet from being centered on the rung impede the climber from ascending or descending the ladder.

Public review comment #20 - Section 7 Ladder Installation. "No specific design details of the platform."

Original task group comment resolution: Mr. Smith is correct that there are no design details of the rest platform discussed in section 7. Since climbing greater than 50' required great physical stamina, some limit must be imposed. Since in practice these occurrences are extremely rare, perhaps climbs of greater than 50 feet should not be allowed period. To eliminate the issue of a landing platform that paragraph could be changed to "The ladder shall be installed such that no climb is longer than 50' (15.2m)."

Comments from the working group regarding the original resolution:

1. Make the response such that the text noted is changed. Change "could" to "shall" ["...that paragraph shall be changed to..."]
2. Agree with George Sabbi's comment to change "could" in response to Mr. Smith.

Task group discussion of the working group comments:

1. We agree with both RC #1 & RC #2. Change response as noted in RC #1.
2. We recommend changing E1.1, Section 7, Paragraph 3, as follows:

The ladder shall be installed such that no climb is longer than 50' (15.2m). When climbs of greater than 50' (15.2 m) are necessary, other means of access and egress shall be provided. landings shall be provided at least as frequently as once every 50' (15.2 m). Each landing shall be constructed such that a worker can safely step off the ladder and rest before continuing to climb.

The working group agreed with the task group's discussion of the working group comments on the resolution. The consensus of the group was that the resolution shall be:

Mr. Smith is correct that there are no design details of the rest platform discussed in section 7. Since climbing greater than 50' requires great physical stamina, some limit must be imposed. Since in practice these occurrences are extremely rare, climbs of greater than 50 feet should not be allowed. To eliminate the issue of a landing platform, that paragraph shall be changed as follows:

The ladder shall be installed such that no climb is longer than 50' (15.2m). When climbs of greater than 50' (15.2 m) are necessary, other means of access and egress shall be provided. Landings shall be provided at least as frequently as once every 50' (15.2 m). Each landing shall be constructed such that a worker can safely step off the ladder and rest before continuing to climb.

Public review comment #22 - Section 10 Inspection: "Why does the standard allow for individual manufacturers to determine the removal of service? This standard should place some performance criteria requirements on the manufacturer. For example: deformation tolerances of the hook, what materials the hook can be constructed of (poured zinc versus malleable iron) or if the wire has one broken strand would have to be removed since it provides for a potential hand injury to the user. More detailed explaining specific criteria."

Original task group comment resolution: "The standard allows the ladder manufacturer to specify what conditions require removal from service; however, the standard requires that the manufacturer address certain issues common to the construction of most wire rope ladders.

"Mr. Smith mentions deformation tolerance of hooks as an example of where the standard should specify removal criteria. One manufacturer may select a hook that would function safely with 50% of the cross sectional area abraded away, while another manufacturer, in an attempt to make a lighter, more compact ladder, may select a hook that would function safely with no more than 10% abrasion.

"The intent of the standard is to set performance criteria to be used by the manufacturer and user to insure workers' safety when using these ladders, not to specify every type of hook, rung, etc."

Comments from the working group regarding the original resolution:

1. Performance and manufacturing requirements should reference existing ANSI/ASME standards such as B30.X for hooks, slings etc. where applicable. [TSM note: The standards referenced in this comment are B30.9 for slings, and B30.10 for hooks.]
2. Agree with Mr. Smith.

Task group discussion of the working group comments:

1. The first paragraph of the response does not answer Mr. Smith's question in his first sentence. A second sentence should be inserted in the first paragraph of the response as follows:

...construction of most wire rope ladders. Since the standard does not specify the exact materials to be used, the standard cannot specify in detail the inspection requirements. Requiring the manufacturer to provide this information accomplishes the same goal.

2. We are not clear about the intent of RC #1. The comment was asking about inspection criteria. The response comment seems to be addressing performance and manufacturing specifications. With respect to inspection, we don't believe that the ANSI standards necessarily have the appropriate criteria for rejection. For instance, no manufacturer would allow the rejection criteria in B30.9 to be used for broken wires in the rails as this would subject the user to hand injury long before the standard would require removal from service.
3. We cannot respond to RC #2 without some concrete suggestions.

The consensus of the working group was to accept the task group's discussion of the working group's comments and the modifications to the original resolution of the comment. The comment resolution then becomes:

"The standard allows the ladder manufacturer to specify what conditions require removal from service; however, the standard requires that the manufacturer address certain issues common to the construction of most wire rope ladders. Since the standard does not specify the exact materials to be used, the standard cannot specify in detail the inspection requirements. Requiring the manufacturer to provide this information accomplishes the same goal.

"Mr. Smith mentions deformation tolerance of hooks as an example of where the standard should specify removal criteria. One manufacturer may select a hook that would function safely with 50% of the cross sectional area abraded away, while another manufacturer, in an attempt to make a lighter, more compact ladder, may select a hook that would function safely with no more than 10% abrasion.

"The intent of the standard is to set performance criteria to be used by the manufacturer and user to insure workers' safety when using these ladders, not to specify every type of hook, rung, etc."

Richard Nix moved that the comment resolutions, as amended above, be accepted. Reid Neslage seconded the motion. Unanimous.

Rocky Paulson moved that the draft E1.1 standard be sent to a second public review. Jerry Gorrell seconded the motion. There was a unanimous show of hands in support of the motion. However, the required supermajority was not present at the meeting (14 was needed), so the actual vote will be by letter ballot.

7.3 E1.2 - Aluminum Truss Standard – status report - Karl Ruling

Karl Ruling reported that one TSC ballot was still outstanding, so the ballot period was still open.

7.4 E1.4 - Manual Counterweight Flying Systems Standard - Rod Kaiser

7.4.1 Comment resolution

Ruling reported that the letter ballot to send the draft E1.4 to second public review had received one negative vote with comments. The letter ballot with the negative comment was recirculated. The voting period for the recirculated ballot had closed at 5:00 p.m. EDT, 24 June 1998. No votes were changed, so out of 31 possible votes, 23 were for "accept" and one was "accept in principle". The "accept in principle" vote was accompanied by comments that indicated that the vote should have been "accept in part." Seven ballots were not returned during the original ballot period. The negative vote with comments needed to be discussed, and an attempt made to resolve it.

The negative comment from Richard Nix was, "It is my opinion that the following comments have not been adequately addressed, and will cause the document to be returned for comment resolution again (Note comment numbers are as referred to in 'Summary of First Public Review Comments & Resolutions' # Rig/98-2006) 118, 168, 178, 195, 196, 202, 217-219, 240, 242, 253, 256, 283, 293, 300, 319, 339."

Rocky Paulson moved that the document be sent to the TSC with the unresolved negative comment and with the recommendation from the working group that the document be sent to a second public review. Steve Butner seconded the motion.

Richard Nix argued that the draft E1.4 standard should be held back from public review to allow time to draft new resolutions to these original comments. If this was not done, the resolutions will generate additional comments, which will require substantive changes to the document to resolve, and would thus force a third public review.

Karl Ruling said that he has additional comments on the document, that he plans to submit during the second public review. Resolving these comments might also cause the document to be revised, and thus

would force a third public review in any case. Ruling explained that these comments are all related to his recent correspondence with UL regarding proposed changes to UL 1573, the standard for theatrical luminaires and plugging strips. Proposed changes to the UL standard would require that plugging strips with brackets designed to hold a batten be designed to hold 30 pounds per lineal foot. This is too low a figure to support many popular robotic lights, which can weigh up to 125 pounds and are often hung on two to three-foot centers. However, Ruling found, to his chagrin, that the wording in sections 3.8.1 and 3.18.7.2 of the draft E1.4 standard mandates this same design load specification for plugging strip batten clamps. Ruling feels this should be changed. He intends to suggest this during the second public review, since this document is already out of the task group and all the revisions to it from the first public review have already been approved by the working group.

By a show of hands, all were in favor of the motion, except for one against. The motion to forward the draft standard to the TSC with a recommendation for a second public review and with the one dissenting vote passed.

7.4.2 Battens, Batten Clamps and UL 1573

[Ruling reported on this as part of the discussion of the motion regarding the comment resolution on E1.4, which is reported above.]

7.5 E1.6 – Powered Flying Systems – Back from 1st Public Review - Karl Ruling

Ruling reported that the comments received had been sent to the working group and task group. It is anticipated that the task group will draft a preliminary response to the comments.

7.6 E1.7 - Recommended Practice for Flying Performers - Progress Report

Ruling reported that the draft standard will go to public review on July 17, 1998.

7.7 E1.8 - Speaker Enclosures Rigging Standard - Back from 1st Public Review - Karl Ruling

Ruling reported that the comments received had been sent to the working group and task group. It is anticipated that the task group will draft a preliminary response to the comments.

7.8 E1.10 - Building Structural Requirements Task Group - Progress Report - Karl Ruling

Karl Ruling reported that one TSC ballot was still outstanding, so the ballot period was still open.

7.9 Proposal for Standard for Theatrical Lighting Trees - Richard Nix

Richard Nix moved that a task group be created to draft a standard for theatrical boom and base assemblies. Jerry Gorrell seconded the motion.

The vote by show of hands was seven in favor with four opposed. The motion carried. Richard Nix was appointed by the Chair as the task group.

7.10 Update on British Standard MHE 3/13 - Tony Douglas-Beveridge

Tony Douglas-Beveridge had had to leave by this time in the meeting. Mike Garl reported in his stead.

The current document is an omnibus document covering both theatrical rigging and trusses. Peter Hind is trying to get it broken into smaller parts covering more limited areas of rigging. It has been sent out for public comment and has received "tons (tonnes) of comments"

7.11 Arena Scoreboards and Speakers, IAAM/ESTA

It was resolved by consensus that Wally Blount, Jay Glerum, and Steve Butner will work on this project. It was deemed not to be a full-fledged task group yet. Rod Kaiser said Jack Seuss should be contacted in regard to this project, too.

8. New Business

8.1 Breaking Work Group into two groups – Jay Glerum

Jay Glerum was not present. The matter was tabled until the next meeting.

9. Other Business

None.

10. Schedule for Future Meetings

The next meeting will be held in conjunction with LDI in Phoenix, AZ. It will be on November 11, at 7:00 p.m. in the Hyatt Hotel.

11. Changes of membership status resulting from lack of attendance.

David Campbell, Geiger Engineers, moved to observer because of his lack of attendance.

12. Adjournment

Rocky Paulson moved that we adjourn. Steve Butner seconded the motion. There were no objections. The meeting was adjourned at 10:54 p.m.