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Standard Guide for Determining Load Ratios for Technical Rescue Systems and Equipment[1]

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1. Scope

1.1 This guide covers the general concept of determining load ratios for technical rescue equipment and systems.

1.2 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.3 In the event of any conflict between the text of this guide and any references cited, the text of this guide takes preference.

1.4 *This standard may involve hazardous materials, operations, and equipment. This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Terminology

2.1 *Definitions of Terms Specific to This Standard:*

2.1.1 *component, n*—an individual piece of equipment in its usable form, but unconnected and unencumbered by other pieces of equipment in a system.

2.1.2 *force multiplying situation, n*—a situation where the rigging causes a force on a component to be greater than caused by the load.

2.1.3 *load ratio, n*—ratio between a specified breaking strength and an anticipated load.

2.1.4 *strength reduction situation, n*—a situation where the rigging of the system causes a component to not perform at its minimum breaking strength. An example would be a carabiner with tri-axial forces.

2.1.5 *system, n*—a group of components integrally connected for the purpose of accomplishing work.

2.1.6 *system safety factor, n*—the ratio of the load at which something in the system will fail and the load that is planned to be applied to the system.

2.1.7 *user, n*—a person, agency, or representative who has authority to make safety-related decisions for rescue applications as discussed herein.

3. Significance and Use

3.1 This guide may be used to provide a consistent method for determining load ratios for technical rescue equipment and systems.

3.2 Use of this guide will help to maintain clearer, more consistent calculation and reporting of load ratios.

3.3 It should be acknowledged that, while component load ratios are fairly straightforward to calculate, they are of limited value for estimating system load ratios. System load ratios are usually desired for field applications, but are more difficult to calculate accurately.

4. Load Ratio

4.1 Load ratio refers to the ratio between the breaking strength of the item and the load that the item is intended to suspend.

4.2 Various load ratios may be used for different reasons for a particular piece of equipment.

4.2.1 A manufacturer may or may not have a specified design factor, representing the ratio between the breaking strength of the product and the working load (that is, the load that the product is designed to carry on a normal basis).

4.2.2 Users of equipment may specify a load ratio for equipment that will help them to maintain system safety factors that are acceptable within their own scope.

4.2.3 The load ratio specified by an equipment user shall be no lower than that specified by the manufacturer, if the manufacturer specifies this information.

4.3 Load ratio is applicable only to the component, and does not address how this component affects or is affected by other components in a system.

4.4 Load ratios, when used, should always be determined using minimum breaking strength as the foundation (rather than average or maximum or other)

5. System Safety Factor

5.1 System safety factor refers to the ratio between the strength of the calculated weakest point in a system and the

[1] This guide is under the jurisdiction of ASTM Committee F32 on Search and Rescue and is the direct responsibility of Subcommittee F32.01 on Equipment, Testing, and Maintenance.

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