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Standard Specification for Harnesses for Rescue and Sport Activities¹

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1. Scope

1.1 This specification covers harnesses for human use in technical rope rescue and climbing, mountaineering, caving, canyoneering, and other rope-based sport activities. It establishes requirements for the testing, performance, and marking of harnesses and for the instructions that are supplied with them.

1.2 This specification may contain test methods that do not entirely simulate real-life situations. The test methods are designed to give reproducible results in a laboratory and, thereby, a means for product comparison.

1.3 Three types of harnesses are covered by this specification: full body harnesses, sit harnesses, and chest harnesses.

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

1.5 *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.6 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 ASTM Standards:²

E4 Practices for Force Calibration and Verification of Testing Machines

¹ This specification 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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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

F3222 Terminology Relating to F32 Land Search and Rescue Standards and Guides

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 *adjusting device, n*—any device that allows adjustment to be made to the harness to suit the requirements of the wearer.

3.1.2 *belay/rappel loop, n*—a loop intended for attaching a belaying or rappelling device to the harness.

3.1.3 *belt, n*—the part of the harness that is around the waist.

3.1.4 *buckle, n*—a connector used for attaching webbing segments together.

3.1.5 *load-bearing parts, n*—parts of the harness that transmit load during testing in accordance with Section 12.

3.1.6 *nonload-bearing parts, n*—other parts of the harness.

3.1.7 *performance rating for a harness, n*—a pass/fail designation indicating if the harness has passed all required tests presented in this specification.

3.1.8 *rope attachment points, n*—parts of the harness intended for the attachment of a rope or lanyard.

3.2 For definitions of other terms used in this standard, see Terminology F3222.

4. Summary of Specification

4.1 Representative samples of harnesses shall be tested for minimum strength.

5. Significance and Use

5.1 The strength of harnesses is one of the properties used to evaluate their suitability for a task.

5.2 Marking and instructions aid in the selection and use of harnesses.

5.3 Due to the diverse requirements of various rescue activities and environments, any of the included harness types may be suitable for rescue, including those marketed principally for climbing, and those with frontal and/or dorsal attachment points. It is the responsibility of the AHJ or user to determine if a specific harness design is appropriate for a particular task. The exception is the sole use of a chest harness which must be used with a sit harness to be effective.

6. Harness Labeling and Information

6.1 The following information shall be affixed durably to the harness:

6.1.1 The location(s) and method of rope or lanyard attachments,

6.1.2 The location(s) and method of rappel and belay device attachments,

6.1.3 The method of properly using buckles and adjusting devices,

6.1.4 Manufacturer's or distributor's name and logo,

6.1.5 The date of manufacture, and

6.1.6 The size of the harness.

6.2 The following information shall accompany the product through the point of sale:

6.2.1 The weight of the harness,

6.2.2 Performance rating, if applicable,

6.2.3 Care and maintenance of the product,

6.2.4 *Life of Product*—Information about attributes that indicate the product is worn out,

6.2.5 If the product is primarily marketed for climbing, mountaineering, or other sport activity; accompanying the product shall be a three-part statement designed to alert consumers to the inherent risks in that targeted activity, and the most basic guidelines for use of the product. The warning shall read as follows:

6.2.5.1 Failure to follow these warnings increases the risk of injury or death.

6.2.5.2 You are responsible for your own actions and decisions.

6.2.5.3 Special knowledge and training are required to use this product.

7. Performance Requirements

7.1 During each of the tests described in Section 12, no load-bearing part shall break completely. In addition, the harness shall not be released from the torso.

7.2 The webbing in all buckles and adjusting devices shall slip no more than 20 mm.

7.3 If there are multiple independent rope attachment points, the tests shall be repeated for each rope attachment point specified in the manufacturer's instructions. If multiple attachment points are designed to be employed only in combination, as specified in manufacturer's instructions (such as side D-rings or shoulder D-rings), they shall be tested as a combination, with the combination meeting single-point performance standards.

7.4 Each load-bearing attachment point on the harnesses shall be tested as described in Section 12, including belay/rappel loops, if present.

8. Apparatus

8.1 *Body-Shaped Torso* (see Fig. 1),

8.2 *Tensile Test Machine*, used to apply loads to the harness, and

8.3 *Load Cell*, for measuring the tensile force applied to the harness.

9. Sampling, Test Specimens, and Test Units

9.1 Harness test specimens shall be new and in unused condition, selected randomly from a production lot of a given model of harness. They shall conform in all respects to the manufacturer's specifications for the model to be tested and shall be the proper size to fit the test torso. Two or more samples shall be tested annually and after any design or materials change. A sample may be reused to test different attachment points.

10. Calibration and Standardization

10.1 Test equipment is to be in compliance with Practices E4 and other requirements specific to the equipment.

11. Conditioning

11.1 Tests may be completed under ambient conditions. In cases of dispute, harness samples will be conditioned in accordance with 11.2.

11.2 The harness samples are first dried in an atmosphere with a relative humidity of less than 10 % for a period of 24 h. Then they are placed in an atmosphere of 50 ± 5 % relative humidity, 20 ± 2 °C for a period of 72 h. Tests may then be done outside the conditioning room, but the temperature shall be 23 ± 5 °C. The tests shall begin within 5 min of removal from conditioning and be completed within 4 h.

12. Harnesses

12.1 *Full-Body Harnesses:*

12.1.1 The harness shall be put on a test torso and attached to the test machine in accordance with the manufacturer's instructions for use.

12.1.2 *Upright Position of the Torso:*

12.1.2.1 The harness shall be loaded up to 800 ± 10 N in the upright position of the torso. Under this load, adjust the torso and harness so that the attachment points are approximately symmetric about the vertical axis of the torso.

12.1.2.2 With the torso in an upright position, a tensile force shall be applied to the lower ring, increasing to $16 + 0.3/-0$ kN over a period of 2 ± 0.25 min. This tensile force shall be held for 1 ± 0.25 min, and the tension then shall be completely released over a maximum of 1 min. The tensile force shall be reapplied and increased to $16 + 0.3/-0$ kN as before and held for 3 ± 0.25 min before release.

12.1.3 *Head-Down Position of the Torso*—Following the same setup as in 12.1.1 and 12.1.2.1, with the torso in a head-down position, a tensile force shall be applied to the upper ring, increasing to $10 + 0.2/-0$ kN over a period of 2 ± 0.25 min. This tensile force shall be held for 1 ± 0.25 min, and the tension then shall be completely released over a maximum of 1 min. The tensile force shall be reapplied and increased to $10 + 0.3/-0$ kN as before and held for 3 ± 0.25 min before release.

12.1.4 The harness shall pass or fail according to 7.1 and 7.2.

12.2 *Sit Harnesses:*

12.2.1 Sit harnesses are to be tested in accordance with 12.1.2 and either 12.1.3 or 12.2.2.