

NFPA 1983 Standard on Fire Service Life Safety Rope and System Components

1995 Edition



National Fire Protection Association, 1 Batterymarch Park, PO Box 9101, Quincy, MA 02269-9101
An International Codes and Standards Organization

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NFPA 1983

Standard on

Fire Service Life Safety Rope and System Components

1995 Edition

This edition of NFPA 1983, *Standard on Fire Service Life Safety Rope and System Components*, was prepared by the Technical Committee on Fire Service Protective Clothing and Equipment, released by the Technical Correlating Committee on Fire and Emergency Services Protective Clothing and Equipment, and acted on by the National Fire Protection Association, Inc., at its Annual Meeting held May 22-25, 1995, in Denver, CO. It was issued by the Standards Council on July 21, 1995, with an effective date of August 11, 1995, and supersedes all previous editions.

This edition of NFPA 1983 was approved as an American National Standard on August 11, 1995.

Origin and Development of NFPA 1983

The Technical Committee on Protective Equipment for Fire Fighters (now renamed the Technical Committee on Fire Service Protective Clothing and Equipment) began work on this standard in 1982 in answer to requests from the fire service to establish requirements for rope used by the fire service to perform rescues. During the development of this standard, it became necessary to include harnesses and hardware that are used with the rope in rescue operations. The work was completed in the Spring of 1984 and submitted to the NFPA for official adoption. The first edition was issued on June 6, 1985.

The Subcommittee on Life Safety Ropes began the revision to the 1985 edition in late 1987 and turned over its proposals to the Technical Committee in December, 1988. The Technical Committee completed its work on the document in April, 1989, and it was submitted for the Annual Meeting 1990 cycle. The second edition was issued on July 20, 1990.

During the year 1993, the NFPA restructured the manner in which committees were organized, and all standing subcommittees were eliminated. Within the Technical Committee on Fire Service Protective Clothing and Equipment, the former standing subcommittees were reorganized as task groups to address specific technical issues, and the technical committee assumed the entire responsibility for NFPA 1983.

In October 1994, just after the revisions for the third edition were completed, the Standards Council appointed the Technical Correlating Committee on Fire and Emergency Services Protective Clothing and Equipment to oversee all fire and emergency services protective clothing and equipment issues. The existing Technical Committee on Fire Service Protective Clothing and Equipment ceased to exist in May 1995, and seven new technical committees, each responsible for a different segment of the fire and emergency services protective clothing and equipment spectrum, are now in place. The future responsibility for NFPA 1983 now rests with the new Technical Committee on Special Operations Protective Clothing and Equipment, operating under the Technical Correlating Committee on Fire and Emergency Services Protective Clothing and Equipment.

This third edition of NFPA 1983 is a comprehensive complete revision to the document. The document was reformatted to present the certification requirements, the product labeling and user information requirements, the design requirements, the performance requirements, and the testing requirements each in separate chapters. A different approach has been taken to life safety rope and the various items used in conjunction with this rope. While the

life safety rope remains as the key subject of this document, other items used in conjunction with the rope are now addressed as system components.

New criteria for personal escape rope have been included to cover a type of life safety rope that is carried by fire fighters/rescuers and used only for fire fighter/rescuer escape or self-rescue in critical entrapment situations where the rope would provide the only viable means of escape. There is also new criteria, in addition to the harness requirements, for three types of belts: one intended for use to position a fire fighter on a ladder, a second type for escape/self-rescue using a life safety rope, or a third type for both applications. Definitions have been expanded to provide better understanding of terms. The testing requirements have been greatly expanded to provide the criteria with which to evaluate the performance and determine pass/fail.

This third edition was acted on by the membership of the Association at the Annual Meeting in Denver, Colorado on May 24, 1995, and was issued with an effective date of August 11, 1995.

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Committee Scope: This Committee shall have primary responsibility for documents on the design, performance, testing, and certification of protective clothing and protective equipment manufactured for fire and emergency services organizations and personnel, to protect against exposures encountered during emergency incident operations. This Committee shall also have the primary responsibility for documents on the selection, care, and maintenance of such protective clothing and protective equipment by fire and emergency services organizations and personnel.

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This list represents the membership at the time the Committee was balloted on the text of this edition. Since that time, changes in membership may have occurred. A key to classifications is found at the back of this document.

NOTE: Membership on a committee shall not in and of itself constitute an endorsement of the Association or any document developed by the committee on which the member serves.

Committee Scope: This Committee shall have primary responsibility for documents on the design, construction, and performance criteria for protective clothing and equipment for the fire service including chemical protective clothing and aircraft rescue and fire fighting protective clothing.

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NFPA 1983**Standard on****Fire Service Life Safety Rope and System Components****1995 Edition**

NOTICE: An asterisk (*) following the number or letter designating a paragraph indicates that explanatory material on the paragraph can be found in Appendix A.

Information on referenced publications can be found in Chapter 7.

Chapter 1 Administration**1-1 Scope.**

1-1.1 This standard shall specify minimum performance criteria, design criteria, and test methods for new life safety rope and new system components including personal escape rope, life safety harness, belts, and auxiliary equipment used for rescue and training by the fire service or similar emergency service organizations.

1-1.2 This standard shall not apply to utility rope. This standard shall not apply to rope and equipment used for special rescue operations, including but not limited to mountain rescue, cave rescue, water rescue, lead climbing operations, or where specific rescue situations dictate other performance requirements. This standard shall not apply to industrial fall situations or for recreational uses.

1-1.3* This standard shall not apply to rope or equipment for operations where personnel are required to work above anchor points or in operations where the fall factor might exceed 0.25.

1-1.4 This standard is not intended to serve as a detailed manufacturing or purchase specification, but shall be permitted to be referenced in purchase specifications as minimum requirements.

1-2 Purpose.

1-2.1* The purpose of this standard shall be to provide minimum performance requirements and a reasonable degree of safety for new life safety rope and new system components used to support fire service personnel, or other emergency services personnel, and civilians during rescue, fire fighting, and other emergency operations, or during training evolutions.

1-2.2 Controlled laboratory tests used to determine compliance with the performance requirements of this standard shall not be deemed as establishing performance for all situations to which this equipment might be exposed.

1-2.3 Nothing herein shall be construed as intended to restrict any jurisdiction or manufacturer from exceeding these minimum requirements.

1-3 Definitions.

Adjusting Device. An auxiliary equipment system component; a connector device that allows adjustment to be made to the harness to meet the needs of the wearer.

Approved.* Acceptable to the authority having jurisdiction.

Ascent Device. An auxiliary equipment system component; a friction or mechanical device utilized to allow ascending a fixed line.

Authority Having Jurisdiction.* The organization, office, or individual responsible for approving equipment, an installation, or a procedure.

Auxiliary Equipment. System components that are load-bearing accessories designed to be utilized with life safety rope and harness including, but not limited to, ascending devices, carabiners, descent control devices, rope grab devices, and snap-links.

Belt. A system component; material configured as a device that fastens around the waist only and designated as a ladder belt, an escape belt, or a ladder/escape belt.

Escape Belt. A belt that is certified as compliant with the applicable requirements of this standard and is intended for use only by the wearer as an emergency self-rescue device.

Ladder Belt. A belt that is certified as compliant with the applicable requirements of this standard and is intended for use as a positioning device for a person on a ladder.

Ladder/Escape Belt. A belt that is certified as compliant with the applicable requirements of this standard for both a ladder belt and an escape belt, and that is intended for use both as a positioning device for a person on a ladder as well as for use only by the wearer as an emergency self-rescue device.

Block Creel Construction. Rope constructed without knots or splices in the yarns, ply yarns, strands or braids, or rope. Unavoidable knots might be present in individual fibers as received from the fiber producer.

Buckle. A load-bearing connector that is an integral part of an auxiliary equipment system component and used to connect two pieces of webbing.

Carabiner. An auxiliary equipment system component; an oval or D-shaped metal, load-bearing connector with a self-closing gate used to join other components of a rope system.

Certification/Certified. A system whereby a certification organization determines that a manufacturer has demonstrated the ability to produce a product that complies with the requirements of this standard, authorizes the manufacturer to use a label on listed products that comply with the requirements of this standard, and establishes a follow-up program conducted by the certification organization as a check on the methods the manufacturer uses to determine compliance with the requirements of this standard.

Certification Organization. An independent, third-party organization that determines product compliance with the requirements of this standard with a labeling/listing/follow-up program.

Compliant. Meeting or exceeding all applicable requirements of this standard.

Continuous Filament Fiber. Fiber of indefinite or unmeasurable length.

Corrosion. A condition exhibiting any signs of deterioration, including pitting or loss of metal.

Descent Control Device. An auxiliary equipment system component; a friction or mechanical device utilized with rope to control descent.

Diameter (Rope). The length of a straight line through the center of the rope as calculated in 5-1.7 of this standard.

Elongation. The increase in length, expressed in a percent of the original gauge length, that occurs in a sample of new rope when tested as specified herein.

Escape Belt. See Belt.

Fall Factor.* A measure of fall severity calculated by dividing the distance fallen by the length of rope used to arrest the fall. See illustration in Appendix A.

Follow-Up Program. The sampling, inspections, tests, or other measures conducted by the certification organization on a periodic basis to determine the continued compliance of labeled and listed products that are being produced by the manufacturer to the requirements of this standard.

General Use. A designation of auxiliary equipment system components intended for use where the system could be subjected to a two-person load.

Hardware. A type of auxiliary equipment that includes, but is not limited to, ascent devices, carabiners, descent control devices, pulleys, rings, and snap-links.

Harness. See Life Safety Harness.

Impact Load. Sudden application of a force, which causes kinetic energy and momentum to be converted into other forms of energy. For the purposes of this document, fall factors greater than 0.25 generate unacceptable impact loads.

Labeled. Equipment or materials to which has been attached a label, symbol, or other identifying mark of an organization that is acceptable to the authority having jurisdiction and concerned with product evaluation that maintains periodic inspection of production of labeled equipment or materials and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner.

Ladder Belt. See Belt.

Ladder/Escape Belt. See Belt.

Life Safety Harness. A system component; an arrangement of materials secured about the body used to support a person during fire service rescue.

Life Safety Rope. See Rope.

Line. Rope when in use.

Listed.* Equipment or materials included in a list published by an organization acceptable to the authority having jurisdiction and concerned with product evaluation that maintains periodic inspection of production of listed equipment or materials and whose listing states either that the equipment or material meets appropriate standards or has been tested and found suitable for use in a specified manner.

Load-Bearing Connector. An auxiliary equipment system component; a device used to join other system components including, but not limited to, carabiners, rings, rapid links, and snap-links.

Manufacturer's Lot. An identifiable series of products that can be the same as or a subset of a production lot; used by the manufacturer for quality control or identification purposes.

Maximum Working Load. Weight supported by the life safety rope and system components that must not be exceeded.

Melt. A response to heat by a material resulting in evidence of flowing or dripping.

Minimum Breaking Strength (MBS). The result of subtracting three standard deviations from the mean result of the lot being tested using the formulas in 6-1.1.4 and 6-2.1.3.

One-Person Load. 300 lb (136 kg).

One-Person Rope. See Rope.

Personal Escape Rope. See Rope.

Personal Use. A designation of auxiliary equipment system components intended for the sole use of the rescuer for personal escape or self-rescue, or for the sole use of the rescuer in gaining access to victims.

Product Label. A label affixed to the product by the manufacturer containing general information, warnings, care, maintenance, or similar data. This product label is not a certification organization's label, symbol, or identifying mark; however, the certification organization's label, symbol, or identifying mark can be attached to it or be part of it.

Production Lot. An identifiable series of products manufactured with identical design specifications and identical materials, and produced without any alterations to technique or procedure.

Proof Load. The application of force to a material as a non-destructive test to verify the performance of that material. The applied proof load is usually well above the allowable service load, but low enough so as not to damage the product being tested.

Ring. An auxiliary equipment system component; an ungated load-bearing connector.

Rope. A compact but flexible, torsionally balanced, continuous structure of fibers produced from strands that are twisted, plaited, or braided together, and that serve primarily to support a load or transmit a force from the point of origin to the point of application.

Life Safety Rope. Rope dedicated solely for the purpose of supporting people during rescue, fire fighting, other emergency operations, or during training evolutions. (See also *Personal Escape Rope*.)

One-Person Rope. Life safety rope designed to support a one-person load when in use; also can be used to support a two-person load when used in systems where two ropes are used as separate and equal members.

Two-Person Rope. Life safety rope designed to support a two-person load when in use.

Personal Escape Rope. A system component; a single-purpose, one-person, *one-time use*, emergency self-escape (self-rescue) rope; not classified as a life safety rope. (See also *Life Safety Rope*.)

Rope Grab Device. An auxiliary equipment system component; a device used to grasp a life safety rope for the purpose of supporting loads; can be used in ascending a fixed line.

Sample. A specified number of life safety ropes or a specified number of system components taken from a manufacturer's current production lot.

Self-Destructive Action. Interaction of materials in a manner that leads to deterioration.

Shall. Indicates a mandatory requirement.

Should. Indicates a recommendation or that which is advised but not required.

Snap-Link. An auxiliary equipment system component; a self-closing, gated, load-bearing connector.

Software. A type of auxiliary equipment that includes, but is not limited to, anchor straps, pick-off straps, and rigging slings.

Standard Deviation. A parameter that indicates the way in which a probability function is centered around its mean. In this standard, standard deviation is calculated using the formulas in 6-1.1.4 and 6-2.1.3.

System Components. Personal escape rope, life safety harness, belts, and auxiliary equipment devices. (*See respective definitions herein.*)

Test Lanyard. Nonadjustable-type web strap used to connect the test mass to anchorage in dynamic drop tests.

Two-Person Load. 600 lb (272 kg).

Two-Person Rope. See Rope.

Virgin Fiber. Fiber that is new and previously unused.

Webbing. Woven material in the form of a long strip; can be of flat or tubular weave.

1-4 Units.

1-4.1 In this standard, values for measurement are followed by an equivalent in parentheses, but only the first stated value shall be regarded as the requirement. Equivalent values in parentheses shall not be considered as the requirement, as these values might be approximate.

Chapter 2 Certification

2-1 General.

2-1.1 Life safety rope and system components that are labeled and listed as being compliant with this standard shall meet or exceed all applicable requirements specified in this standard and shall be certified.

2-1.2 All certifications shall be performed by an approved certification organization that meets at least the requirements specified in Section 2-2.

2-1.3 Compliant life safety rope and compliant system components shall be labeled and listed. Each compliant life safety rope and each compliant system component shall also have a product label or labels that meet the applicable requirements specified in Sections 3-1, 3-2, 3-3, 3-4, and 3-5. The certification organization's label, symbol, or identifying mark shall be permitted to be attached to the product label or to be part of the product label.

2-2 Certification Organization.

2-2.1* The certification organization shall not be owned or controlled by manufacturers or vendors of the product being certified. The certification organization shall be primarily engaged in certification work and shall not have a monetary interest in the product's ultimate profitability.

2-2.2 The certification organization shall refuse to certify products to this standard that do not comply with all applicable requirements of this standard.

2-2.3* The contractual provisions between the certification organization and the manufacturer shall specify that certification is contingent on compliance with all applicable requirements of this standard. There shall be no conditional, temporary, or partial certifications. Manufacturers shall not be authorized to use any label or reference to the certification organization on products that are not manufactured in compliance with all applicable requirements of this standard.

2-2.4* The certification organization shall have laboratory facilities and equipment for conducting proper tests available, a program for calibration of all instruments in place and operating, and procedures in use to ensure proper control of all testing. Good practice shall be followed regarding the use of laboratory manuals, form data sheets, documented calibration and calibration routines, performance verification, proficiency testing, and staff qualification and training programs.

2-2.5 The certification organization shall require the manufacturer to establish and maintain a program of production inspection and testing that at least meets the requirements specified in Section 2-4. The certification organization shall audit the manufacturer's quality assurance program to ensure that the quality assurance program provides continued product compliance with this standard.

2-2.6 The certification organization and the manufacturer shall evaluate any changes affecting the form, fit, or function of the certified product to determine the product's continued compliance with this standard.

2-2.7* Product certification shall include a follow-up inspection program, with at least two random and unannounced visits per 12-month period. At least one of the random and unannounced visits shall include selected retesting as determined by the certification organization. The certification organization either shall select sample product from the manufacturer's production line or shall purchase sample product in the open market.

2-2.8 The certification organization shall have a program for investigating field reports alleging malperformance or failure of listed products.

2-2.9 The certification organization's operating procedures shall provide a mechanism for the manufacturer to appeal decisions. The procedures shall include the presentation of information from both sides of a controversy to a designated appeals panel.

2-2.10 The certification organization shall be in a position to use legal means to protect the integrity of its name and label. The name and label shall be registered and legally defended.

2-3 Inspection and Testing.

2-3.1 Sampling levels for testing and inspection shall be established by the certification organization and the manufacturer to assure a reasonable and acceptable reliability at a reasonable and acceptable confidence level that products certified to this standard are compliant. This information shall be provided to the purchaser upon request.

2-3.2 Inspection by the certification organization shall include a review of all product labels to ensure that all required worded statements, warnings, and other information specified in Sections 3-1, 3-2, 3-3, 3-4, and 3-5 are correctly stated and presented on the product labels as applicable for the specific product.

2-3.3 Inspection by the certification organization shall include a review of any graphic representations used on product labels, as permitted by 3-1.4, 3-2.4, 3-3.3, 3-4.3, and 3-5.4, to ensure that the symbols are consistent with the worded statements or warnings, are readily understood, and clearly communicate the intended message.

2-3.4 Inspection by the certification organization shall include a review of the user information required by Section 3-6 to ensure that the information has been developed and is available.

2-3.5 Inspection by the certification organization for determining compliance with the design requirements specified in Chapter 4 shall be performed on whole or complete products.

2-3.6 Testing by the certification organization for determining product compliance with the applicable requirements specified in Chapters 5 and 6 shall be performed on samples representative of materials and components used in the actual construction of products certified to this standard. The certification organization also shall be permitted to use sample materials cut from a representative product.

2-3.7 The certification organization shall not allow the substitution or repair of any product during testing.

2-4 Manufacturer's Quality Assurance Program.

2-4.1 The manufacturer shall provide and maintain a quality assurance program that includes a documented inspection and product recall system. The manufacturer shall have an inspection system to substantiate conformance to this standard.

2-4.2 The manufacturer shall maintain written inspection and testing instructions. The instructions shall prescribe inspection and test of materials, work in process, and completed articles. Criteria for acceptance and rejection of materials, processes, and final product shall be part of the instructions.

2-4.3 The manufacturer shall maintain records of all pass/fail tests. Pass/fail records shall indicate the disposition of the failed material or product.

2-4.4 The manufacturer's inspection system shall provide for procedures that ensure the latest applicable drawings, specifications, and instructions are used for fabrication, inspection, and testing.

2-4.5 The manufacturer shall, as part of the quality assurance program, maintain a calibration program of all instruments that are used to ensure proper control of testing. The calibration program shall be documented as to the date of calibration and performance verification.

2-4.6 The manufacturer shall maintain a system for identifying the appropriate inspection status of component materials, work in process, and finished goods.

2-4.7 The manufacturer shall establish and maintain a system for controlling nonconforming material, including procedures for the identification, segregation, and disposition of rejected material. All nonconforming materials or products shall be identified to prevent use, shipment, and intermingling with conforming materials or products.

2-4.8 The manufacturer's quality assurance program shall be audited by the certification organization to determine that the program is sufficient to ensure continued product compliance with this standard.

Chapter 3 Product Labeling and Information

3-1 Life Safety Rope Product Labeling and Marking.

3-1.1* Each life safety rope shall be marked for its full length by insertion of a continuous identification tape. At least the following statement and information shall be legibly printed on the tape not less than once every 3 ft (1 m):

"Meets requirements for Life Safety Rope of NFPA 1983, 1995 edition"

Certification organization's label, symbol, or identifying mark

Name of manufacturer

Year and quarter of manufacture (not coded)

(1- or 2-) person rope

3-1.2* Life safety rope shall have a product label or labels affixed to each rope.

3-1.2.1 At least the following warning shall be printed on the product label(s). All letters shall be at least $\frac{1}{16}$ in. (1.6 mm) high. The format, color, and letter style of the warning shall be in accordance with Chapters 6, 7, and 8 of ANSI Z535.4, *Standard for Product Safety Signs and Labels*.

"



WARNING

• YOU COULD BE KILLED OR SERIOUSLY INJURED IF YOU DO NOT READ AND UNDERSTAND THIS LABEL BEFORE USING ROPE.

• SPECIAL TRAINING AND KNOWLEDGE ARE REQUIRED TO USE THIS ROPE.

• YOU MUST THOROUGHLY READ AND UNDERSTAND ALL MANUFACTURER'S INSTRUCTIONS BEFORE USE.

• USE AND INSPECT THIS ROPE ONLY IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS.

• USE THIS ROPE ONLY FOR EMERGENCY LIFE SAFETY OR FOR ROPE RESCUE TRAINING.

• REFER TO ADDITIONAL MANUFACTURER'S INSTRUCTIONS FURNISHED WITH THIS ROPE BEFORE USE. YOU CAN CONTACT THE MANUFACTURER AT (Manufacturer shall provide contact information here.) FOR IMPORTANT SAFETY INFORMATION.

SAVE THIS LABEL"

3-1.2.2 At least the following statement and information also shall be legibly printed on the product label(s). All letters shall be at least $\frac{1}{16}$ in. (1.6 mm) high.

“THIS ROPE MEETS THE LIFE SAFETY ROPE REQUIREMENTS OF NFPA 1983, STANDARD ON FIRE SERVICE LIFE SAFETY ROPE AND SYSTEM COMPONENTS, 1995 EDITION. NFPA 1500, STANDARD ON FIRE DEPARTMENT OCCUPATIONAL SAFETY AND HEALTH PROGRAM, PROVIDES USE REQUIREMENTS FOR LIFE SAFETY ROPE.

CLASS: _____ PERSON ROPE

MAXIMUM WORKING LOAD: _____ lbf

MINIMUM BREAKING STRENGTH: _____ lbf

CIRCUMFERENCE: _____ in.

DIAMETER: _____ in.”

Certification organization’s label, symbol, or identifying mark

Type of fiber(s)

Name of manufacturer

Manufacturer’s product identification

Manufacturer’s lot number

Month and year of manufacture (not coded)

Country of manufacture

3-1.2.3 The class designation and maximum working load of the life safety rope required to be stated on the product label shall be as determined by the certification organization in accordance with Section 4-1.

3-1.2.4 The minimum breaking strength of the life safety rope required to be stated on the product label shall be as determined by the certification organization in accordance with 5-1.1 or 5-1.2, as applicable.

3-1.2.5 The circumference of the life safety rope required to be stated on the product label shall be as determined by the certification organization in accordance with 5-1.5 or 5-1.6, as applicable.

3-1.2.6 The diameter of the life safety rope required to be stated on the product label shall be as determined by the certification organization in accordance with 5-1.7.

3-1.3 All worded portions of the required marking tape and product label shall be printed at least in English.

3-1.4 Symbols and other pictorial graphic representations shall be permitted to be used to supplement worded statements and warnings on the product label(s). Such graphic representations shall be consistent with the worded statements and warnings, shall be readily understood, and shall clearly communicate the intended message.

3-1.5 Any life safety rope that is designed to include components with electrical carrying capabilities shall also meet labeling requirements of Class I, Division 1, hazardous locations specified in ANSI/UL 913, *Standard for Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations*.

3-2 Personal Escape Rope Product Labeling and Marking.

3-2.1* Each personal escape rope shall be marked for its full length by insertion of a continuous identification tape. At least the following statement and information shall be legibly printed on the tape not less than once every 3 ft (1 m):

“Meets requirements for Personal Escape Rope of NFPA 1983, 1995 edition”

Certification organization’s label, symbol, or identifying mark

Name of manufacturer

Year and quarter of manufacture

3-2.2* Personal escape rope shall have a product label or labels affixed to each rope.

3-2.2.1* At least the following warning shall be printed on the product label(s). All letters shall be at least $\frac{1}{16}$ in. (1.6 mm) high. The format, color, and letter style of the warning shall be in accordance with Chapters 6, 7, and 8 of ANSI Z535.4, *Standard for Product Safety Signs and Labels*.

“



WARNING

• YOU COULD BE KILLED OR SERIOUSLY INJURED IF YOU DO NOT READ AND UNDERSTAND THIS LABEL BEFORE USING ROPE.

• SPECIAL TRAINING AND KNOWLEDGE ARE REQUIRED TO USE THIS ROPE.

• YOU MUST THOROUGHLY READ AND UNDERSTAND ALL MANUFACTURER’S INSTRUCTIONS BEFORE USE.

• USE AND INSPECT THIS ROPE ONLY IN ACCORDANCE WITH THE MANUFACTURER’S INSTRUCTIONS.

• USE THIS ROPE ONLY FOR EMERGENCY SELF-RESCUE/ESCAPE. THIS IS A SINGLE-PURPOSE, ONE-PERSON, ONE-TIME USE ROPE.

• ROPE MUST BE PREVIOUSLY UNUSED. DESTROY AFTER USE!

• REFER TO ADDITIONAL MANUFACTURER’S INSTRUCTIONS FURNISHED WITH THIS ROPE BEFORE USE. YOU CAN CONTACT THE MANUFACTURER AT (Manufacturer shall provide contact information here.) FOR IMPORTANT SAFETY INFORMATION.

SAVE THIS LABEL”

3-2.2.2 The following statement and information also shall be legibly printed on the product label(s). All letters shall be at least $\frac{1}{16}$ in. (1.6 mm) high.

“THIS ROPE MEETS THE PERSONAL ESCAPE ROPE REQUIREMENTS OF NFPA 1983, STANDARD ON FIRE SERVICE LIFE SAFETY ROPE AND SYSTEM COMPONENTS, 1995 EDITION.

MAXIMUM WORKING LOAD _____ lbf

MINIMUM BREAKING STRENGTH: _____ lbf

DIAMETER: _____ in.”

Certification organization’s label, symbol, or identifying mark

Type of fiber(s)

Name of manufacturer

Manufacturer’s product identification

Manufacturer’s lot number

Month and year of manufacture (not coded)

Country of manufacture

3-2.2.3 The maximum working load of the personal escape rope required to be stated on the product label shall be verified by the certification organization in accordance with 5-2.1.

3-2.2.4 The minimum breaking strength of the personal escape rope required to be stated on the product label shall be as determined by the certification organization in accordance with 5-2.2.

3-2.2.5 The diameter of the personal escape rope required to be stated on the product label shall be as determined by the certification organization in accordance with 5-2.4.

3-2.3 All worded portions of the required marking tape and product label(s) shall be printed at least in English.

3-2.4 Symbols and other pictorial graphic representations shall be permitted to be used to supplement worded statements and warnings on the product label(s). Such graphic representations shall be consistent with the worded statements and warnings, shall be readily understood, and shall clearly communicate the intended message.

3-3 Life Safety Harness Product Labeling.

3-3.1 Each life safety harness shall have a permanently affixed product label or labels.

3-3.1.1 More than one label piece shall be permitted in order to carry all warnings, statements, and information required of the product label; however, all label pieces comprising the entire product label shall be located adjacent to each other.

3-3.1.2 At least the following warning shall be legibly printed on the product label(s). All letters shall be at least $\frac{1}{16}$ in. (1.6 mm) high. The format, color, and letter style of the warning shall be in accordance with Chapters 6, 7, and 8 of ANSI Z535.4, *Standard for Product Safety Signs and Labels*.

“



WARNING

• **YOU COULD BE KILLED OR SERIOUSLY INJURED IF YOU DO NOT READ AND UNDERSTAND THIS LABEL BEFORE USING HARNESS.**

• **SPECIAL TRAINING AND KNOWLEDGE ARE REQUIRED TO USE THIS HARNESS.**

• **YOU MUST THOROUGHLY READ AND UNDERSTAND ALL MANUFACTURER'S INSTRUCTIONS BEFORE USE.**

• **USE AND INSPECT THIS HARNESS ONLY IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS.**

• **REFER TO ADDITIONAL MANUFACTURER'S INSTRUCTIONS FURNISHED WITH THIS HARNESS BEFORE USE. YOU CAN CONTACT THE MANUFACTURER AT (Manufacturer shall provide contact information here.) FOR IMPORTANT SAFETY INFORMATION.**

DO NOT REMOVE THIS LABEL”

3-3.1.3 The following statement and information also shall be legibly printed on the product label(s). All letters shall be at least $\frac{1}{16}$ in. (1.6 mm) high.

“THIS LIFE SAFETY HARNESS MEETS THE HARNESS REQUIREMENTS OF NFPA 1983, STANDARD ON

FIRE SERVICE LIFE SAFETY ROPE AND SYSTEM COMPONENTS, 1995 EDITION; CLASS _____.”

Certification organization's label, symbol, or identifying mark

Name of manufacturer

Manufacturer's product identification

Manufacturer's lot or serial number

Month and year of manufacture (not coded)

Country of manufacture

3-3.1.4* In addition, at least the following information shall be provided on the product label(s). All letters shall be at least $\frac{1}{16}$ in. (1.6 mm) high.

(a) For Class I and II harness:

“Fits waist size _____”

(b) For one-piece Class III harness:

“Fits waist size _____”

Fits height _____”

or

“Fits chest size _____”

Fits height _____”

(c) For multiple-piece Class III harness:

“Fits waist size _____”

Fits height _____”

or

“Fits chest size _____”

Fits height _____”

This is one part of a multiple-piece harness and must be used in conjunction with component part number tin order to fully meet the criteria of Class III harness.”

3-3.1.5 The class designation of the life safety harness required to be stated on the product label(s) shall be as determined by the certification organization in accordance with 4-3.1.

3-3.2 All worded portions of the required product label(s) shall be printed at least in English.

3-3.3 Symbols and other pictorial graphic representations shall be permitted to be used to supplement worded statements and warnings on the product label(s). Such graphic representations shall be consistent with the worded statements and warnings, shall be readily understood, and shall clearly communicate the intended message.

3-4 Belt Product Labeling.

3-4.1 Each belt shall have a permanently affixed synthetic fabric product label or labels.

3-4.1.1 More than one label piece shall be permitted in order to carry all warnings, statements, and information required of the product label; however, all label pieces comprising the entire product label shall be located adjacent to each other.

3-4.1.2 At least the following warning shall be legibly printed on the product label(s). All letters shall be at least $\frac{1}{16}$ in. (1.6 mm) high. The format, color, and letter style of the warning portion shall be in accordance with Chapters 6, 7, and 8 of ANSI Z535.4, *Standard for Product Safety Signs and Labels*.

“



WARNING

• **YOU COULD BE KILLED OR SERIOUSLY INJURED IF YOU DO NOT READ AND UNDERSTAND THIS LABEL BEFORE USING THIS BELT.**

• **SPECIAL TRAINING AND KNOWLEDGE ARE REQUIRED TO USE THIS BELT.**

• **YOU MUST THOROUGHLY READ AND UNDERSTAND ALL MANUFACTURER'S INSTRUCTIONS BEFORE USE.**

• **USE AND INSPECT THIS BELT ONLY IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS.**

• **DO NOT USE THIS BELT AS A LIFE SAFETY HARNESS. IT IS DESIGNED ONLY FOR USE AS A PERSONAL PROTECTIVE DEVICE.**

• **REFER TO ADDITIONAL MANUFACTURER'S INSTRUCTIONS FURNISHED WITH THIS BELT BEFORE USE. YOU CAN CONTACT THE MANUFACTURER AT (Manufacturer shall provide contact information here.) FOR IMPORTANT SAFETY INFORMATION.**

DO NOT REMOVE THIS LABEL!"

3-4.1.3 The following statement and information also shall be legibly printed on the product label(s). All letters shall be at least $\frac{1}{16}$ in. (1.6 mm) high.

"THIS BELT MEETS THE BELT REQUIREMENTS OF NFPA 1983, STANDARD ON FIRE SERVICE LIFE SAFETY ROPE AND SYSTEM COMPONENTS, 1995 EDITION; TYPE _____."

Certification organization's label, symbol, or identifying mark

Name of manufacturer

Manufacturer's product identification

Manufacturer's lot or serial number

Month and year of manufacture (not coded)

Country of manufacture

3-4.1.4 In addition, at least the following information shall be provided on the product label(s):

"Fits waist size _____"

3-4.1.5 The type designation of belt required to be stated on the product label(s) shall be as determined by the certification organization in accordance with 4-4.1.

3-4.2 All worded portions of the required product label(s) shall be printed at least in English.

3-4.3 Symbols and other pictorial graphic representations shall be permitted to be used to supplement worded statements and warnings on the product label(s). Such graphic representations shall be consistent with the worded statements and warnings, shall be readily understood, and shall clearly communicate the intended message.

3-5 Auxiliary Equipment Product Labeling.

3-5.1 Auxiliary equipment shall have a product label affixed to each piece.

3-5.1.1 At least the following warnings shall be printed as the warning portion of the product label(s). All letters shall be at least $\frac{1}{16}$ in. (1.6 mm) high. The format, color, and letter style of the warning portion of the product label shall be in accordance with Chapters 6, 7, and 8 of ANSI Z535.4, *Standard for Product Safety Signs and Labels*.

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WARNING

• **YOU COULD BE KILLED OR SERIOUSLY INJURED IF YOU DO NOT READ AND UNDERSTAND THIS LABEL BEFORE USING THIS PIECE OF AUXILIARY EQUIPMENT.**

• **SPECIAL TRAINING AND KNOWLEDGE ARE REQUIRED TO USE THIS EQUIPMENT.**

• **YOU MUST THOROUGHLY READ AND UNDERSTAND ALL MANUFACTURER'S INSTRUCTIONS BEFORE USE.**

• **USE AND INSPECT THIS EQUIPMENT ONLY IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS.**

• **REFER TO ADDITIONAL MANUFACTURER'S INSTRUCTIONS FURNISHED WITH THIS EQUIPMENT BEFORE USE. YOU CAN CONTACT THE MANUFACTURER AT (Manufacturer shall provide contact information here.) FOR IMPORTANT SAFETY INFORMATION.**

SAVE THIS LABEL"

3-5.1.2 The following statement and information also shall be legibly printed on the product label(s). All letters shall be at least $\frac{1}{16}$ in. (1.6 mm) high.

"MEETS NFPA 1983 (95 ED.)"

Certification organization's label, symbol, or identifying mark

Name of manufacturer or trademark

Manufacturer's lot number

Minimum rated breaking strength

(This figure shall be prefaced by the letters MBS.)

3-5.1.3 More than one label piece shall be permitted in order to carry all warnings, statements, and information required of the product label; however, all label pieces comprising the entire product label shall be located adjacent to each other.

3-5.1.4 The warning portion of the product label for any auxiliary equipment shall be permitted to be a separate label from the remainder of the product label information.

3-5.1.5 Where the warning portion of the product label is a separate label, that warning portion label shall be permitted to be hang tag affixed to each piece of auxiliary equipment, or shall be permitted to be printed on a sheet that is inserted and sealed in the packaging that immediately contains the piece of auxiliary equipment.

3-5.1.6 Load-bearing software auxiliary equipment shall have a product label or labels sewn, stapled, riveted, or otherwise permanently affixed.

3-5.1.7 Load-bearing hardware auxiliary equipment shall be stamped, engraved, or otherwise permanently marked with the required product label information.

3-5.1.8 Where auxiliary equipment are integral and nonseparable pieces of a system component and that system component is certified as compliant with this standard, such integral and nonseparable auxiliary equipment shall not be required to be individually labeled.

3-5.2 Auxiliary equipment also shall be stamped or otherwise permanently marked according to intended use and load ranges with a “G” for general use or a “P” for personal use as designated in accordance with 4-5.2.

3-5.3 All worded portions of the required product label(s) shall be printed at least in English.

3-5.4 Symbols and other pictorial graphic representations shall be permitted to be used to supplement worded statements and warnings on the product label(s). Such graphic representations shall be consistent with the worded statements and warnings, shall be readily understood, and shall clearly communicate the intended message.

3-6 User Information.

3-6.1* Life Safety Rope User Information.

3-6.1.1 The manufacturer of life safety rope that is certified as being compliant with this standard shall furnish the purchaser with at least use criteria, inspection procedures, maintenance procedures, and retirement criteria for the product.

3-6.1.2 The manufacturer shall provide information for the user to consider prior to reusing life safety rope, including that the rope be considered for reuse only if at least all of the following conditions are met:

- (a) Rope has not been visually damaged.
- (b) Rope has not been exposed to heat, direct flame impingement, or abrasion.
- (c) Rope has not been subjected to any impact load.
- (d) Rope has not been exposed to liquids, solids, gases, mists, or vapors of any chemical or other material that can deteriorate rope.
- (e) Rope passes inspection when inspected by a qualified person following the manufacturer's inspection procedures both before and after each use.

The manufacturer shall provide information for the user regarding not using the life safety rope and removing the rope from service if the rope does not meet all of the above conditions, if the rope does not pass inspection, or if there is any doubt about the safety or serviceability of the rope.

3-6.1.3* The manufacturer shall provide information for the user regarding at least the following issues:

- (a) Inspecting the rope periodically according to the manufacturer's inspection procedure.
- (b) Removing the rope from service and destroying it if the rope does not pass inspection or if there is any doubt about the safety or serviceability of the rope.
- (c) Protecting the rope from abrasion.
- (d) Not exposing the rope to flame or high temperature and carrying the rope where it will be protected as the rope could melt or burn and fail if exposed to flame or high temperature.
- (e) Keeping the product label and user instructions/information after they are removed/separated from the rope and retaining them in the permanent rope record; copying the

product label and user instructions/information and keeping the copies with the rope.

(f) Referring to the user instructions/information before and after each use.

(g) Cautioning that, if the instructions/information are not followed, the user could be seriously injured or could die.

3-6.1.4 The manufacturer shall provide information for the user that additional information regarding life safety rope can be found at least in NFPA 1500, *Standard on Fire Department Occupational Safety and Health Program*, and NFPA 1983, *Standard on Fire Service Life Safety Rope and System Components*.

3-6.1.5 The manufacturer of life safety rope that is certified as being compliant with this standard shall furnish the purchaser with a sample of suggested records to be maintained by the purchaser or user of life safety rope, and a list of items that the records need to contain.

3-6.2 Personal Escape Rope User Information.

3-6.2.1 The manufacturer of personal escape rope that is certified as being compliant with this standard shall furnish the purchaser with at least use criteria, inspection procedures, maintenance procedures, and retirement criteria for the product.

3-6.2.2 The manufacturer shall provide information for the user regarding at least the following issues:

- (a) Using the rope only with a life safety harness, escape belt, or ladder/escape belt.
- (b) Inspecting the rope periodically according to the manufacturer's inspection procedure.
- (c) Removing the rope from service and destroying it if the rope does not pass inspection or if there is any doubt about the safety or serviceability of the rope.
- (d) Protecting the rope from abrasion.
- (e) Not exposing the rope to flame or high temperature and carrying the rope where it will be protected as the rope could melt or burn and fail if exposed to flame or high temperature.
- (f) Keeping the product label and user instructions/information after they are removed/separated from the rope for future reference.

(g) Referring to the user instructions/information before and after each use.

(h) Cautioning that, if the instructions/information are not followed, the user could be seriously injured or could die.

3-6.2.3 The manufacturer shall provide information for the user that additional information regarding personal escape rope can be found at least in NFPA 1500, *Standard on Fire Department Occupational Safety and Health Program*, and NFPA 1983, *Standard on Fire Service Life Safety Rope and System Components*.

3-6.2.4 The manufacturer of personal escape rope that is certified as being compliant with this standard shall furnish the purchaser with a sample of suggested records to be maintained by the purchaser or user of personal escape rope, and a list of items that the records need to contain.

3-6.3 Life Safety Harness User Information.

3-6.3.1 The manufacturer of life safety harness that is certified as being compliant with this standard shall furnish the purchaser with at least use criteria, inspection procedures, maintenance procedures, and retirement criteria for the product.

3-6.3.2 The manufacturer shall provide information for the user regarding at least the following issues:

(a) Inspecting the harness periodically according to the manufacturer's inspection procedure.

(b) Removing the harness from service and destroying it if the harness does not pass inspection or if there is any doubt about the safety or serviceability of the harness.

(c) Not exposing the harness to flame or high temperature and carrying the harness where it will be protected as the harness could melt or burn and fail if exposed to flame or high temperature.

(d) Repairing the harness only in accordance with the manufacturer's instructions.

(e) Keeping the user instructions/information after it is separated from the harness and retaining it in a permanent record; copying the user instructions/information and keeping the copy with the harness.

(f) Referring to the user instructions/information before and after each use.

(g) Cautioning that, if the instructions/information are not followed, the user could be seriously injured or could die.

3-6.3.3 The manufacturer shall provide information for the user that additional information regarding life safety harness can be found at least in NFPA 1500, *Standard on Fire Department Occupational Safety and Health Program*, and NFPA 1983, *Standard on Fire Service Life Safety Rope and System Components*.

3-6.3.4 The manufacturer of life safety harness that is certified as being compliant with this standard shall furnish the purchaser with a sample of suggested records to be maintained by the purchaser or user of life safety harness, and a list of items that the records need to contain.

3-6.4 Belt User Information.

3-6.4.1 The manufacturer of belts that are certified as being compliant with this standard shall furnish the purchaser with at least use criteria, inspection procedures, maintenance procedures, and retirement criteria for the product.

3-6.4.2 The manufacturer shall provide information for the user regarding at least the following issues:

(a) Inspecting the belt periodically according to the manufacturer's inspection procedure.

(b) Removing the belt from service and destroying it if the belt does not pass inspection or if there is any doubt about the safety or serviceability of the belt.

(c) Not exposing the belt to flame or high temperature and carrying the belt where it will be protected as the belt could melt or burn and fail if exposed to flame or high temperature.

(d) Repairing the belt only in accordance with the manufacturer's instructions.

(e) Keeping the user instructions/information after it is separated from the belt and retaining it in a permanent record; copying the user instructions/information and keeping the copy with the belt.

(f) Referring to the user instructions/information before and after each use.

(g) Cautioning that, if the instructions/information are not followed, the user could be seriously injured or could die.

3-6.4.3 The manufacturer shall provide information for the user that additional information regarding belts can be found at least in NFPA 1500, *Standard on Fire Department Occupational Safety and Health Program*, and NFPA 1983, *Standard on Fire Service Life Safety Rope and System Components*.

3-6.4.4 The manufacturer of belts that are certified as being compliant with this standard shall furnish the purchaser with a sample of suggested records to be maintained by the purchaser or user of belts, and a list of items that the records need to contain.

3-6.5 Auxiliary Equipment User Information.

3-6.5.1 The manufacturer of auxiliary equipment that is certified as being compliant with this standard shall furnish the purchaser with at least use criteria, inspection procedures, maintenance procedures, and retirement criteria for the product.

3-6.5.2 The manufacturer shall provide information for the user regarding at least the following issues:

(a) Inspecting the auxiliary equipment periodically according to the manufacturer's inspection procedure.

(b) Removing the auxiliary equipment from service if the equipment does not pass inspection or if there is any doubt about the safety or serviceability of the equipment.

(c) Maintaining the auxiliary equipment in accordance with the manufacturer's instructions when metal components are subjected to corrosion or deterioration.

(d) Returning auxiliary equipment to the manufacturer or to a qualified inspection person/center if the equipment is dropped or impact loaded.

(e) Not exposing the software auxiliary equipment to flame or high temperature and carrying the equipment where it will be protected as it could melt or burn and fail if exposed to flame or high temperature.

(f) Repairing the auxiliary equipment only in accordance with the manufacturer's instructions.

(g) Keeping the user instructions/information after it is separated from the auxiliary equipment and retaining it in a permanent record; copying the user instructions/information and keeping the copy with the equipment.

(h) Referring to the user instructions/information before and after each use.

(i) Cautioning that, if the instructions/information are not followed, the user could be seriously injured or could die.

3-6.5.3 The manufacturer shall provide information for the user that additional information regarding auxiliary equipment can be found at least in NFPA 1500, *Standard on Fire Department Occupational Safety and Health Program*, and NFPA 1983, *Standard on Fire Service Life Safety Rope and System Components*.

3-6.5.4 The manufacturer of auxiliary equipment that is certified as being compliant with this standard shall furnish the purchaser with a sample of suggested records to be maintained by the purchaser or user of the auxiliary equipment, and a list of items that the records need to contain.

Chapter 4 Design and Construction Requirements

4-1 Life Safety Rope.

4-1.1 Life safety rope shall be designed and designated in accordance with one of the following classes.

4-1.1.1 Rope designed to have a maximum working load of at least 300 lbf (1.34 kN) shall be designated as a class one-person life safety rope.

4-1.1.2 Rope designed to have a maximum working load of at least 600 lbf (2.67 kN) shall be designated as a class two-person life safety rope.

4-1.2 The life safety rope person class designation shall be calculated by dividing the maximum working load by a factor of not less than 300. Fractions occurring in the product of this calculation shall be rounded downward to the nearest whole number.

4-1.2.1* The maximum working load for class one- and two-person rope shall be expressed in pounds and shall be calculated by dividing the new rope minimum breaking strength as specified in 5-1.1 or 5-1.2, as applicable, by a factor of not less than 15.

4-1.3* Life safety rope shall be constructed of virgin fiber.

4-1.4 Life safety rope shall be of block creel construction; load-bearing elements shall be constructed of continuous filament fiber.

4-1.5 Life safety rope that is designed to include components with electric current carrying capabilities shall meet the requirements for Class I, Division 1, hazardous locations of ANSI/UL 913, *Standard for Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations*.

4-2 Personal Escape Rope System Component.

4-2.1 Rope designated as personal escape rope shall be designed to have a maximum working load of at least 300 lbf (1.34 kN).

4-2.1.1 The maximum working load for personal escape rope shall be expressed in pounds and shall be calculated by dividing the new rope minimum breaking strength as specified in 5-2.1 by a factor of not less than 10.

4-2.2* Personal escape rope shall be constructed of virgin fiber.

4-2.3 Personal escape rope shall be of block creel construction; load-bearing elements shall be constructed of continuous filament fiber.

4-3 Life Safety Harness System Component.

4-3.1 Life safety harness shall be designed and designated in accordance with one of the following classes.

4-3.1.1 Harness that fastens around waist and around thighs or under buttocks and designed to be used for emergency escape with one-person loads shall be designated as Class I life safety harness.

4-3.1.2 Harness that fastens around waist and around thighs or under buttocks and designed for rescue where two-person loads can be encountered shall be designated as Class II life safety harness.

4-3.1.3 Harness that fastens around waist, around thighs, or under buttocks, and over shoulders, and designed for rescue where two-person loads can be encountered and inverting might occur, shall be designated as Class III life safety harness. Class III life safety harness shall be permitted to consist of one or more parts.

4-3.2* Life safety harness shall be permitted to be adjustable within a range of sizes, provided in a range of sizes, or custom-fitted for individuals.

4-3.3* Load-bearing textile materials used in the construction of life safety harness shall be made from virgin, synthetic, continuous filament fiber.

4-3.4* All webbing ends shall be secured by heat sealing or by another method that prevents unraveling.

4-3.5* All thread utilized in the construction of life safety harness shall be compatible with the webbing used and shall allow for ease of inspection by the unaided eye with 20/20 vision, or vision corrected to 20/20, at a nominal distance of 12 in. (30.5 cm). All stitching breaks or ends shall be backtacked not less than $\frac{1}{2}$ in. (1.27 cm).

4-4 Belt System Component.

4-4.1 Belts shall be designed and designated in accordance with one of the following types.

4-4.1.1 A belt that fastens only around the waist and is intended for use as a positioning device for a person on a ladder shall be designated as a “ladder belt.”

4-4.1.2 A belt that fastens only around the waist and is intended for use only by the wearer as an emergency self-rescue device shall be designated as an “escape belt.”

4-4.1.3 A belt that fastens only around the waist and is intended for use as a positioning device for a person on a ladder and also intended for use only by the wearer as an emergency self-rescue device shall be designated as a “ladder/escape belt.”

4-4.2* All belts shall be permitted to be adjustable within a range of sizes, provided in a range of sizes, or custom-fitted for individuals.

4-4.3* Load-bearing textile materials used in the construction of all belts shall be made from virgin, synthetic, continuous filament fiber.

4-4.4* All belts shall have webbing ends secured by heat sealing or by another method that prevents unraveling.

4-4.5* All thread utilized in the construction of all belts shall be compatible with the webbing used and shall allow for ease of inspection by the unaided eye with 20/20 vision, or vision corrected to 20/20, at a nominal distance of 12 in. (30.5 cm). All stitching breaks or ends shall be backtacked not less than $\frac{1}{2}$ in. (1.27 cm).

4-4.6 The ladder belt tether or device that connects the wearer to a ladder shall be permanently affixed to the ladder belt and shall not be greater than 18 in. (45.72 cm) in length.

4-5 Auxiliary Equipment System Component.

4-5.1 Auxiliary equipment shall not be designed or constructed in a manner that allows self-destructive action.

4-5.2 Auxiliary equipment shall be designated by the manufacturer for its intended use and load ranges as either personal use or general use.

4-5.2.1* The designation of “personal use” shall apply to auxiliary equipment intended for the sole use of the rescuer for personal escape or self-rescue, or for the sole use of the rescuer in gaining access to victims. The designation of “personal use” shall not be applied to auxiliary equipment intended for use where the system could be subjected to the load of two or more persons.

4-5.2.2* The designation of “general use” shall apply to auxiliary equipment intended for use where the system could be subjected to a two-person load.

4-5.3 Load-bearing hardware auxiliary equipment shall be constructed of forged, machined, stamped, extruded, or cast metal. Castings shall meet Class I, Grade A requirements of MIL-STD 2175A, *Castings, Classification and Inspection of*.

4-5.4 Where a buckle is an integral part of an auxiliary equipment system component, the buckles shall have a corner radius of not less than 0.25 in. (6.4 mm).

4-5.5 Where a buckle is an integral part of an auxiliary equipment system component, the buckle manufacturer shall provide written evidence that all load-bearing buckles have been proof-loaded to at least 2500 lbf (11.12 kN).

4-5.6* Snap-link and carabiner gates shall be self-closing and of a locking design.

4-5.7 Webbing used to construct auxiliary equipment software shall be constructed of virgin, synthetic, continuous filament fiber.

4-5.8 All webbing ends used to construct auxiliary equipment software shall be secured by heat sealing or by another method that prevents unraveling.

4-5.9* All thread utilized to construct auxiliary equipment software shall be compatible with webbing used and shall allow for ease of inspection by the unaided eye with 20/20 vision, or vision corrected to 20/20, at a nominal distance of 12 in. (30.5 cm). All stitching breaks or ends shall be backtacked not less than 1/2 in. (1.27 cm).

4-5.10 Rope grab devices shall be designated as being designed for use as component parts of personal ascent systems or as grabbing devices for use in rescue systems.

Chapter 5 Performance Requirements

5-1* Life Safety Rope.

5-1.1 The minimum breaking strength for new one-person life safety rope shall not be less than 4500 lbf (20 kN) when tested as specified in 6-1.1, Breaking and Elongation Testing.

5-1.2 The minimum breaking strength for new two-person life safety rope shall not be less than 9000 lbf (40 kN) when tested as specified in 6-1.1, Breaking and Elongation Testing.

5-1.3* The minimum elongation of all new life safety rope shall not be less than 15 percent at 75 percent of breaking

strength when tested as specified in 6-1.1, Breaking and Elongation Testing.

5-1.4* The maximum elongation of all new life safety rope shall not be more than 45 percent at 75 percent of breaking strength when tested as specified in 6-1.1, Breaking and Elongation Testing.

5-1.5 One-person life safety rope shall have a circumference of not less than 1.125 in. (3.18 cm) and not more than 1.50 in. (3.8 cm) when tested in accordance with Method 6003, Circumference of Cordage, of Federal Test Method Standard 191A, *Textile Test Methods*.

5-1.6 Two-person life safety rope shall have a circumference of not less than 1.50 in. (3.8 cm) and not more than 2.25 in. (5.72 cm) when tested in accordance with Method 6003, Circumference of Cordage, of Federal Test Method Standard 191A, *Textile Test Methods*.

5-1.7* The diameter of all new life safety rope shall be calculated by dividing the result of circumference determined in accordance with Method 6003, Circumference of Cordage, of Federal Test Method Standard 191A, *Textile Test Methods*, by the value of Pi. The subsequent result shall be rounded to the nearest 1/32 in. (0.8 mm).

5-1.8 New one-person life safety rope shall have a maximum weight of 0.09 lb/ft when tested in accordance with Method 6004, Length per Unit Weight; Cordage, of Federal Test Method Standard 191A, *Textile Test Methods*.

5-1.9 New two-person life safety rope shall have a maximum weight of 0.18 lb/ft when tested in accordance with Method 6004, Length per Unit Weight; Cordage, of Federal Test Method Standard 191A, *Textile Test Methods*.

5-1.10* Fiber utilized for all life safety rope shall not have a melting point of less than 400°F (204°C) when tested in accordance with ASTM E 794, *Standard Test Method for Melting and Crystallization Temperatures by Thermal Analysis*.

5-1.11 All dyed life safety rope shall have colorfastness to crocking of at least Class 4 when tested in accordance with ANSI/AATCC Test Method 8, *Colorfastness to Crocking*.

5-1.12 All dyed life safety rope shall have colorfastness to washing of at least Class 2 color change when tested in accordance with ANSI/AATCC Test Method 125, *Colorfastness to Water and Light: Alternate Exposure*.

5-1.13 The product label(s) and the marking tape specified in Section 3-1 shall be legible to the unaided eye with 20/20 vision, or vision corrected to 20/20, at a nominal distance of 12 in. (30.5 cm), both before and after the rope, with the identification tape inserted and with the product label(s) attached, has been subjected to the washing test specified in 5-1.12.

5-2* Personal Escape Rope System Component.

5-2.1 The minimum breaking strength for new personal escape rope shall not be less than 3000 lbf (13.34 kN) when tested as specified in 6-2.1, Breaking and Elongation Testing.

5-2.2* The maximum elongation of all new personal escape rope shall not be more than 45 percent at 75 percent of breaking strength when tested as specified in 6-2.1, Breaking and Elongation Testing.

5-2.3 Personal escape rope shall have a circumference of not less than 0.90 in. (2.29 cm) and not more than 1.50 in. (3.8 cm) when tested in accordance with Method 6003, Circumference of Cordage, of Federal Test Method Standard 191A, *Textile Test Methods*.

5-2.4* The diameter of all new personal escape rope shall be calculated by dividing the result of circumference determined in accordance with Method 6003, Circumference of Cordage, of Federal Test Method Standard 191A, *Textile Test Methods*, by the value of Pi. The subsequent result shall be rounded to the nearest $\frac{1}{32}$ in. (0.8 mm).

5-2.5 New personal escape ropes shall have a maximum weight of 0.09 lb/ft when tested in accordance with Method 6004, Length per Unit Weight; Cordage, of Federal Test Method Standard 191A, *Textile Test Methods*.

5-2.6* Fiber utilized for all personal escape rope shall not have a melting point of less than 400°F (204°C) when tested in accordance with ASTM E794, *Standard Test Method for Melting and Crystallization Temperatures by Thermal Analysis*.

5-2.7 All dyed personal escape rope shall have colorfastness to crocking of at least Class 4 when tested in accordance with ANSI/AATCC Test Method 8, *Colorfastness to Crocking*.

5-2.8 All dyed personal escape rope shall have colorfastness to washing of at least Class 2 color change when tested in accordance with ANSI/AATCC Test Method 125, *Colorfastness to Water and Light: Alternate Exposure*.

5-2.9 The product label(s) and the marking tape specified in Section 3-2 shall be legible to the unaided eye with 20/20 vision, or vision corrected to 20/20, at a nominal distance of 12 in. (30.5 cm), both before and after the rope, with the identification tape inserted and with the product label(s) attached, has been subjected to the washing test specified in 5-2.8.

5-3 Life Safety Harness System Component.

5-3.1 Samples of each design and model of finished life safety harness shall meet the applicable requirements of this chapter.

5-3.2 Sample Class I life safety harness shall be tested as specified in 6-3.2, Static Test — Upright. Sample harness shall not release from the test torso, the harness buckles and adjusting devices shall not slip more than 0.4 in. (10 mm), and the harness shall show no visible signs of damage that would affect its function.

5-3.3 Sample Class I life safety harness shall be tested as specified in 6-3.5, Dynamic Drop Test. The test torso shall not contact the ground during any of the three test drops.

5-3.4 Sample Class II life safety harness shall be tested as specified in 6-3.2, Static Test — Upright; and 6-3.4, Static Test — Horizontal. Sample harness shall not release from the test torso, the harness buckles and adjusting devices shall not slip more than 0.4 in. (10 mm), and the harness shall show no visible signs of damage that would affect its function.

5-3.5 Sample Class II life safety harness shall be tested as specified in 6-3.5, Dynamic Drop Test. The test torso shall not contact the ground during any of the three test drops.

5-3.6 Sample Class III life safety harness shall be tested as specified in 6-3.2, Static Test — Upright; 6-3.3, Static Test — Head Down; and 6-3.4, Static Test — Horizontal. Sample harness shall not release from the test torso, the harness buckles and

adjusting devices shall not slip more than 0.4 in. (10 mm), and the harness shall show no visible signs of damage that would affect its function.

5-3.6.1 For sample Class III life safety harness that include shoulder attachment points, such shoulder attachment points shall be tested only during the Static Test — Upright as specified in 6-3.2. The shoulder attachment points shall not release from the test torso and shall show no visible signs of damage that would affect their function.

5-3.7 Sample Class III life safety harness including shoulder attachment points, if any, shall be tested as specified in 6-3.5, Dynamic Drop Test. The test torso shall not contact the ground during any of the three test drops.

5-3.8* All fiber and thread used in the construction of all life safety harness shall not have a melting point of less than 400°F (204°C) when tested in accordance with ASTM E 794, *Standard Test Method for Melting and Crystallization Temperatures by Thermal Analysis*.

5-3.9 All dyed life safety harness shall have colorfastness to crocking of at least Class 4 when tested in accordance with ANSI/AATCC Test Method 8, *Colorfastness to Crocking*.

5-3.10 All dyed life safety harness shall have colorfastness to washing of at least Class 2 color change when tested in accordance with ANSI/AATCC Test Method 125, *Colorfastness to Water and Light: Alternate Exposure*.

5-3.11 The product label(s) specified in Section 3-3 shall remain in place, shall be legible to the unaided eye with 20/20 vision, or vision corrected to 20/20, at a nominal distance of 12 in. (30.5 cm), and shall not be torn or otherwise damaged when tested for label permanency as specified in 6-3.6, Product Label Permanency Test.

5-3.12 The product label(s) specified in Section 3-3 shall be legible to the unaided eye with 20/20 vision, or vision corrected to 20/20, at a nominal distance of 12 in. (30.5 cm), both before and after the harness, with the product label(s) attached, has been subjected to the washing test specified in 5-3.10.

5-3.13 Product labels used on life safety harnesses system components shall be tested as specified in 6-5.6, Product Label Heat Resistance Test. Product labels shall not melt, ignite, or separate and shall be legible to the unaided eye with 20/20 vision, or vision corrected to 20/20, at a nominal distance of 12 in. (30.5 cm).

5-4 Belt System Component.

5-4.1 Samples of each design and model of finished belts shall meet the applicable requirements of this chapter.

5-4.2 Sample ladder belts shall be tested as specified in 6-4.2, Static Test — Upright; and 6-4.3, Static Test — Horizontal. Sample ladder belts shall not release from the test torso, the belt buckles and adjusting devices shall not slip more than 0.4 in. (10 mm), and the belt shall show no visible signs of damage that would affect its function.

5-4.3 Sample escape belts shall be tested as specified in 6-4.2, Static Test — Upright; and 6-4.3, Static Test — Horizontal. Sample escape belts shall not release from the test torso, the belt buckles and adjusting devices shall not slip more than 0.4 in. (10 mm), and the belt shall show no visible signs of damage that would affect its function.

5-4.4 Sample escape belts shall be tested as specified in 6-4.4, Dynamic Drop Test. The test torso shall not contact the ground during any of the three test drops.

5-4.5 Sample ladder/escape belts shall be tested as specified in 6-4.2, Static Test — Upright; and 6-4.3, Static Test — Horizontal. Sample ladder/escape belts shall not release from the test torso, the belt buckles and adjusting devices shall not slip more than 0.4 in. (10 mm), and the belt shall show no visible signs of damage that would affect its function.

5-4.6 Sample ladder/escape belts shall be tested as specified in 6-4.4, Dynamic Drop Test. The test torso shall not contact the ground during any of the three test drops.

5-4.7* All fiber and thread used in the construction of all belts shall not have a melting point of less than 400°F (204°C) when tested in accordance with ASTM E 794, *Standard Test Method for Melting and Crystallization Temperatures by Thermal Analysis*.

5-4.8 All dyed belts shall have colorfastness to crocking of at least Class 4 when tested in accordance with ANSI/AATCC Test Method 8, *Colorfastness to Crocking*.

5-4.9 All dyed belts shall have colorfastness to washing of at least Class 2 color change when tested in accordance with ANSI/AATCC Test Method 125, *Colorfastness to Water and Light: Alternate Exposure*.

5-4.10 The product label(s) specified in Section 3-4 shall remain in place, shall be legible to the unaided eye with 20/20 vision, or vision corrected to 20/20, at a nominal distance of 12 in. (30.5 cm), and shall not be torn or otherwise damaged when tested for label permanency as specified in 6-4.5, Product Label Permanency Test.

5-4.11 The product label(s) specified in Section 3-4 shall be legible to the unaided eye with 20/20 vision, or vision corrected to 20/20, at a nominal distance of 12 in. (30.5 cm), both before and after the belt, with the product label(s) attached, has been subjected to the washing test specified in 5-4.9.

5-5 Auxiliary Equipment System Components.

5-5.1 Carabiners and snap-link auxiliary equipment designated by the manufacturer for personal use shall be tensile tested in the manner of function as specified 6-5.1, Carabiner and Snap-Link Tensile Testing.

5-5.1.1 “Personal use” carabiners and snap-links shall have major axis minimum breaking strengths, with the gate closed, of at least 6000 lbf (26.67 kN).

5-5.1.2 “Personal use” carabiners and snap-links shall have major axis minimum breaking strengths, with the gate open, of at least 1650 lbf (7.33 kN).

5-5.1.3 “Personal use” carabiners and snap-links shall have a minor axis minimum breaking strength of at least 1500 lbf (6.67 kN).

5-5.2 Carabiners and snap-link auxiliary equipment designated by the manufacturer for general use shall be tensile tested in the manner of function as specified in 6-5.1, Carabiner and Snap-Link Tensile Testing.

5-5.2.1 “General use” carabiners and snap-links shall have major axis minimum breaking strengths, with the gate closed, of at least 9000 lbf (40 kN).

5-5.2.2 “General use” carabiners and snap-links shall have major axis minimum breaking strengths, with the gate open, of at least 2400 lbf (10.67 kN).

5-5.2.3 “General use” carabiners and snap-links shall have a minor axis minimum breaking strength of at least 2400 lbf (10.67 kN).

5-5.3 Ascending device auxiliary equipment designated by the manufacturer for personal use shall be strength tested in the manner of function as specified in 6-5.2, Ascending and Rope Grab Devices Testing, and shall withstand a minimum test load of at least 1200 lbf (5.33 kN) without permanent damage to the device or damage to the rope.

5-5.4 Descent control device auxiliary equipment designated by the manufacturer for personal use shall be strength tested in the manner of function as specified in 6-5.3, Descent Control Devices Testing.

5-5.4.1 “Personal use” descent control devices shall withstand a minimum test load of at least 1200 lbf (5.33 kN) without permanent damage to the device or damage to the rope.

5-5.4.2 “Personal use” descent control devices shall withstand a minimum test load of at least 3000 lbf (13.34 kN) without failure.

5-5.5 Descent control device auxiliary equipment designated by the manufacturer for general use shall be strength tested in the manner of function as specified in 6-5.3, Descent Control Devices Testing.

5-5.5.1 “General use” descent control devices shall withstand a minimum test load of at least 1200 lbf (5.33 kN) without permanent damage to the device or damage to the rope.

5-5.5.2 “General use” descent control devices shall withstand a minimum test load of at least 6000 lbf (26.67 kN) without failure.

5-5.6 Rope grab device auxiliary equipment designated by the manufacturer for general use shall be strength tested in the manner of function as specified in 6-5.2, Ascending and Rope Grab Devices Testing, and shall withstand a minimum test load of at least 2400 lbf (10.67 kN) without permanent damage to the device or damage to the rope.

5-5.7 All other auxiliary equipment designated by the manufacturer for personal use and general use that is not specifically addressed in this section shall be strength tested in the manner of function.

5-5.7.1 “Personal use” auxiliary equipment shall have a minimum tensile strength of at least 1200 lbf (5.33 kN) without permanent damage to the device or other associated equipment.

5-5.7.2 “Personal use” auxiliary equipment shall have a minimum tensile strength of at least 5000 lbf (22.22 kN) without failure.

5-5.7.3 “General use” auxiliary equipment shall have a minimum tensile strength of at least 5000 lbf (22.22 kN) without permanent damage to the device or other associated equipment.

5-5.7.4 “General use” auxiliary equipment shall have a minimum tensile strength of at least 8000 lbf (35.56 kN) without failure.

5-5.8 All auxiliary equipment metal hardware and hardware that includes metal parts shall be tested for corrosion resistance as specified in 6-5.4, Corrosion Testing. Metals inherently resistant to corrosion including, but not limited to, stainless steel, brass, copper, aluminum, and zinc shall show no more than light surface-type corrosion or oxidation. Ferrous metals shall show no corrosion of the base metal. All hardware shall remain functional as specified in the manufacturer’s operating instructions.

5-5.9* All fiber and thread utilized in the construction of all auxiliary equipment software shall not have a melting point of less than 400°F (204°C) when tested in accordance with ASTM E 794, *Standard Test Method for Melting and Crystallization Temperatures by Thermal Analysis*.

5-5.10 All dyed auxiliary equipment shall have colorfastness to crocking of at least Class 4 when tested in accordance with ANSI/AATCC Test Method 8, *Colorfastness to Crocking*.

5-5.11 All dyed auxiliary equipment shall have colorfastness to washing of at least Class 2 color change when tested in accordance with ANSI/AATCC Test Method 125, *Colorfastness to Water and Light: Alternate Exposure*.

5-5.12 The product label(s) specified in Section 3-5 shall remain in place, shall be legible to the unaided eye with 20/20 vision, or vision corrected to 20/20, at a nominal distance of 12 in. (30.5 cm), and shall not be torn or otherwise damaged when tested for label permanency as specified in 6-5.5, Product Label Permanency Test.

5-5.13 The product label(s) specified in Section 3-5 shall be legible to the unaided eye with 20/20 vision, or vision corrected to 20/20, at a nominal distance of 12 in. (30.5 cm), both before and after the auxiliary equipment, with the product label(s) attached, has been subjected to the washing test specified in 5-5.11.

Chapter 6 Testing Requirements

6-1 Life Safety Rope.

6-1.1 Breaking and Elongation Testing.

6-1.1.1 Samples shall be taken from each production lot of life safety rope and shall be tested for elongation and minimum breaking strength in accordance with either Method 6015, Strength and Elongation, Breaking of Cordage; Spliced Specimen Method, or Method 6016, Strength and Elongation, Breaking of Cordage; Non-Spliced Specimen Method, of Federal Test Method Standard 191A, *Textile Test Methods*.

6-1.1.2 In conducting this test for non-spliced specimens, the drum-type grips shall have a diameter of 4 in. ± 0.1 in. (10.2 cm ± 2.5 mm). The rope shall be wrapped at least three com-

plete revolutions around each drum and shall be secured with a cleat at each end of the rope.

6-1.1.3 New rope minimum breaking strength shall be determined by subtracting three standard deviations from the mean result of five samples from the same production lot. The standard deviation shall be calculated using the formula:

$$s = \sqrt{\frac{n(\overline{Ex^2}) - (\overline{Ex})^2}{n(n-1)}}$$

6-1.1.4 Test results and calculations shall be examined to determine pass/fail.

6-2 Personal Escape Rope System Component.

6-2.1 Breaking and Elongation Testing.

6-2.1.1 Samples of personal escape rope shall be tested for elongation and minimum breaking strength in accordance with either Method 6015, Strength and Elongation, Breaking of Cordage; Spliced Specimen Method, or Method 6016, Strength and Elongation, Breaking of Cordage; Non-Spliced Specimen Method, of Federal Test Method Standard 191A, *Textile Test Methods*.

6-2.1.2 In conducting this test, the drum-type grips shall have a diameter of 4 in. ± 0.1 in. (10.2 cm ± 2.5 mm). The ropes shall be wrapped at least three complete revolutions around each drum and shall be secured with a cleat at each end of the rope.

6-2.1.3 New personal escape rope minimum breaking strength shall be determined by subtracting three standard deviations from the mean result of five samples from the same production lot. The standard deviation shall be calculated using the formula:

$$s = \sqrt{\frac{n(\overline{Ex^2}) - (\overline{Ex})^2}{n(n-1)}}$$

6-2.1.4 Test results and calculations shall be examined to determine pass/fail.

6-3 Life Safety Harness System Component.

6-3.1 Testing Setup.

6-3.1.1 Samples of each model of each life safety harness class shall be selected randomly and tested to the appropriate tests in accordance with Table 6-3.1.1. Test samples shall be new and in unused condition and shall conform in all respects to the manufacturer’s specifications for the model to be tested. At least three samples of each model of each harness class shall be tested to all the static tests specified in 6-3.2, 6-3.3, and 6-3.4 for the respective harness. At least an additional three samples of each model of each harness class shall be tested to the drop test specified in 6-3.5. A total of at least six samples of each model of life safety harness of each harness class shall be required for the test series specified in Table 6-3.1.1.

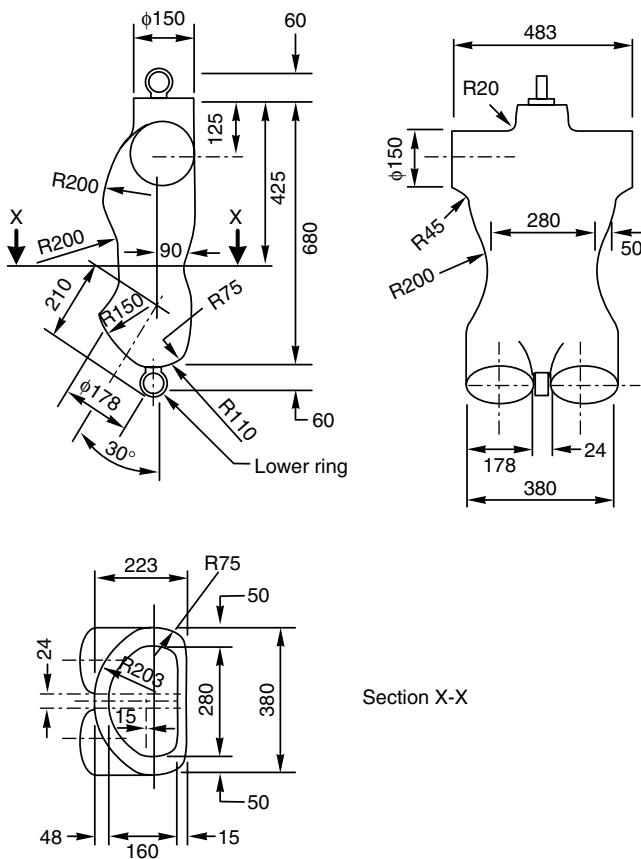
6-3.1.1.1 If there are multiple load-bearing connecting points, all tests shall be repeated for each combination of load-bearing connecting points specified in the manufacturer’s instructions or as specified in 6-3.1.1.2.

Table 6-3.1.1 Harness Test Matrix

Test (paragraph number)	Class I	Class II	Class III
6-3.2 (Upright)	YES	YES	YES
6-3.3 (Head Down)	NO	NO	YES
6-3.4 (Horizontal)	NO	YES	YES
6-3.5 (Drop)	YES	YES	YES

6-3.1.1.2 For sample Class III harness that include shoulder attachment points, the shoulder attachment points shall be required to pass only the Static Test — Upright specified in 6-3.2 and the Dynamic Drop Test specified in 6-3.5.

6-3.1.2 For all tests, samples shall be put on and secured to a rigid test torso as shown in Figure 6-3.1.2. The rigid test torso shall weigh 300 lb (136 kg). The sample harness secured to the test torso shall be identified as the test mass.



All linear dimensions are in millimeters, ± 5 mm.
The dimensions are those of a dummy developed by the UIAA for testing harnesses
Note: Waist circumference at X-X is 850 mm.

Figure 6-3.1.2 Outline of the test torso.

6-3.1.3 For all static tests, the test mass shall be attached to the test machine at the load-bearing connecting point, in accordance with the manufacturer's instruction for use, with a suitable locking carabiner.

6-3.1.4 For all static tests, each sample shall be secured to the test torso, i.e., the test mass, and shall be tested first in the upright position as specified in 6-3.2, then tested as applicable, in accordance with Table 6-3.1.1, in the head-down position as specified in 6-3.3, and finally in the horizontal position as specified in 6-3.4.

6-3.1.5 For the drop test, each sample shall be secured to the test torso, i.e., the test mass, and shall be connected to a drop tower anchorage point that shall not have a deflection greater than 0.04 in. (1 mm) when a force of 2250 lbf (10 kN) is applied.

6-3.1.6 For the drop test, the test lanyard used in connecting the load-bearing connecting point(s) to the test mass shall be a new, nonadjustable-type web that shall meet the specifications of Type XX Webbing of MIL-W-4088 *Webbing, Textile, Woven Nylon*, or other material with equivalent material strength and elongation characteristics. The test lanyard shall have connectors at each end and shall have a total length of 6 ft ± 2 in. (1.83 m ± 5.1 cm).

6-3.2 Static Test — Upright.

6-3.2.1 The Static Test — Upright shall be set up as specified in 6-3.1.

6-3.2.2 The test mass shall be properly positioned by preloading up to 181 lbf (800 N) with the test torso in the upright position. Under this load, the load-bearing connecting point(s) shall be placed approximately symmetrically about the vertical axis of the test torso.

6-3.2.3* For the Static Test — Upright, the test torso shall be in an upright position. A force shall be applied to the buttocks ring, increasing to 3600 lbf (16.01 kN) over a period of 2.0 min ± 0.25 min. This force shall be held for 1.0 min ± 0.25 min and then tension shall be completely released over a maximum of 1 min. The force shall be reapplied immediately and shall be increased to 3600 lbf (16 kN) as before and held for 5.0 min ± 0.25 min before release.

6-3.2.4 At the conclusion of the Static Test — Upright series, the sample harness shall be inspected to determine pass/fail. A harness shall be considered to be damaged to the point of failing this test if any load-bearing material is torn or otherwise destroyed, if a buckle becomes nonfunctional, or any other condition exists that would cause the safety of the user to be compromised.

6-3.3 Static Test — Head Down.

6-3.3.1 The Static Test — Head Down shall be set up as specified in 6-3.1.

6-3.3.2 The test mass shall be properly positioned by preloading up to 181 lbf (800 N) with the test torso in the upright position. Under this load, the load-bearing connecting point(s) shall be placed approximately symmetrically about the vertical axis of the test torso.

6-3.3.3* For the Static Test — Head Down, the test torso shall be oriented in a head-down position. A force shall be applied to the neck ring, increasing to 2250 lbf (10 kN) over a period of 2.0 min ± 0.25 min. This force shall be held for 1.0 min ± 0.25 min and then the tension shall be completely released over a maximum of 1 min. The force shall be reapplied immediately and shall be increased to 2250 lbf (10 kN) as before and held for 5.0 min ± 0.25 min before release.

6-3.3.4 At the conclusion of the Static Test — Head Down series, the sample harness shall be inspected to determine pass/fail. A harness shall be considered to be damaged to the point of failing this test if any load-bearing material is torn or otherwise destroyed, if a buckle becomes nonfunctional, or any other condition exists that would cause the safety of the user to be compromised.

6-3.4 Static Test — Horizontal.

6-3.4.1 The Static Test — Horizontal shall be set up as specified in 6-3.1.

6-3.4.2 The test mass shall be properly positioned by preloading up to 181 lbf (800 kN) with the test torso in the upright position. Under this load, the load-bearing connecting point(s) shall be placed approximately symmetrically about the vertical axis of the test torso as shown in Figure 6-3.4.2.

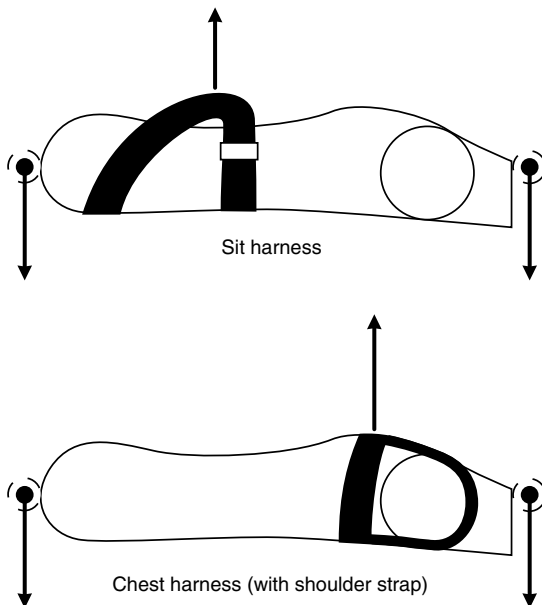


Figure 6-3.4.2 Test torso orientations for test.

6-3.4.3 For the Static Test — Horizontal, the test torso shall be positioned in a horizontal position supported by the neck and buttocks rings. A force shall be applied to the neck and buttocks rings in the plane of symmetry of the test torso and normal to its axis as shown in Figure 6-3.4.2. The force shall be increased to 2250 lbf (10 kN) over a period of 2.0 min $\pm$ 0.25 min. This force shall be held for 1.0 min $\pm$ 0.25 min and then the tension shall be completely released over a maximum of 1 min. The force shall be reapplied immediately and increased to 2250 lbf (10 kN) as before and held for 5.0 min $\pm$ 0.25 min before release.

6-3.4.4 At the conclusion of the Static Test — Horizontal series, the sample harness shall be inspected to determine pass/fail. A harness shall be considered to be damaged to the point of failing this test if any load-bearing material is torn or otherwise destroyed, if a buckle becomes nonfunctional, or any other condition exists that would cause the safety of the user to be compromised.

6-3.5 Dynamic Drop Test.

6-3.5.1 The Dynamic Drop Test shall be set up as specified in 6-3.1. At least three separate sample life safety harnesses shall be used for the dynamic drop test series.

6-3.5.2 There shall be three drop tests for each sample. Two of the three required Dynamic Drop Tests for each sample shall be conducted with the test mass in a head-up position and one of the Dynamic Drop Tests shall be conducted with the test mass in a head-down position.

6-3.5.3 With one end of the test lanyard attached to the load-bearing connecting point and the other end to the anchorage, the test mass shall fall freely from a distance of 1.5 ft (46 cm) above the anchorage level, a total distance of 7.5 ft (2.3 m), to a free-hanging position without interference or obstruction, or striking the floor, ground, or any other object during the test.

6-3.5.4 During the Dynamic Drop Test series, the test drops shall be observed to determine pass/fail. A harness shall be considered to have failed the test if, during any one of the three required drops for each sample, the test mass impacts the ground.

6-3.6 Product Label Permanency Test.

6-3.6.1 Test specimens of synthetic fabric product label samples shall be tested in accordance with ASTM D 4966, *Standard Test Method for Abrasion Resistance of Textile Fabrics*.

6-3.6.2 At least four test specimens shall be cut from product label(s) samples. At least two test specimens shall include the edge of the product label(s).

6-3.6.3 At least two test specimens shall be subjected to 160 dry abrasion revolutions, 10 cycles; and at least two test specimens shall be subjected to 80 wet abrasion revolutions, 5 cycles. At least one dry and one wet test specimen shall be edge specimens.

6-3.6.4 Test specimens shall then be examined visually with the unaided eye to determine pass/fail.

6-4 Belt System Component.

6-4.1 Testing Setup.

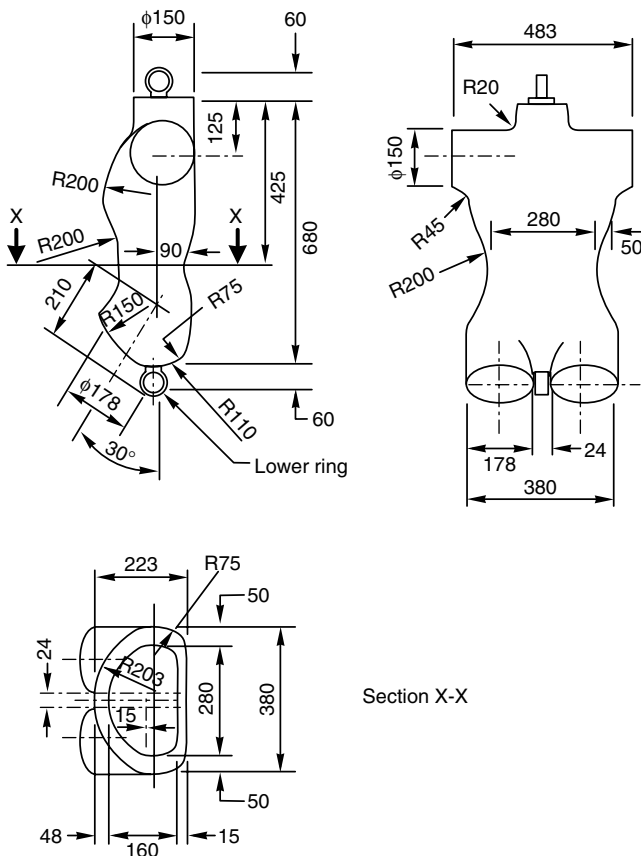
6-4.1.1 Samples of each model of each belt type shall be selected randomly and tested to the appropriate tests in accordance with Table 6-4.1.1. Test samples shall be new and in unused condition and shall conform in all respects to the manufacturer's specifications for the model to be tested. At least three samples of each model of each belt type shall be tested to all the static tests specified in 6-4.2 and 6-4.3. At least an additional three samples of each model of each belt type shall be tested to the drop test specified in 6-4.4. A total of at least six samples of each model of each belt type shall be required for the test series specified in Table 6-4.1.1.

6-4.1.1.1 If there are multiple load-bearing connecting points, all tests shall be repeated for each combination of load-bearing connecting points specified in the manufacturer's instructions.

6-4.1.2 For all tests, samples shall be put on and secured to a rigid test torso as shown in Figure 6-4.1.2. The rigid test torso shall weigh 300 lb (136 kg). The sample belt secured to the test torso shall be identified as the test mass.

Table 6-4.1.1 Belt Test Matrix

Test (paragraph number)	Belt Types		
	Ladder Belt	Escape Belt	Ladder/Escape Belt
6-4.2 (Upright)	YES	YES	YES
6-4.3 (Horizontal)	YES	YES	YES
6-4.4 (Drop)	NO	YES	YES



All linear dimensions are in millimeters, ± 5 mm.

The dimensions are those of a dummy developed by the UIAA for testing harnesses

Note: Waist circumference at X-X is 850 mm.

Figure 6-4.1.2 Outline of the test torso.

6-4.1.3 For all static tests, the test mass shall be attached to the test machine at the load-bearing connecting point, in accordance with the manufacturer's instruction for use, with a suitable locking carabiner.

6-4.1.4 For all static tests, each sample shall be secured to the test torso, i.e., the test mass, and each sample shall be tested twice, first in the upright position as specified in 6-4.2, then in the horizontal position as specified in 6-4.3.

6-4.1.5 For the drop test, each sample shall be secured to the test torso, i.e. the test mass, and shall be connected to a drop

tower anchorage point that shall not have a deflection greater than 0.04 in. (1 mm) when a force of 2250 lbf (10 kN) is applied.

6-4.1.6 For the drop test, the test lanyard used in connecting the load-bearing connecting point(s) to the test mass shall be a new, nonadjustable-type web that shall meet the specifications of MIL-W-4088 Type XX Webbing, or other material with equivalent material strength and elongation characteristics. The test lanyard shall have connectors at each end and shall have a total length of 6 ft $\pm$ 2 in. (1.83 m $\pm$ 5.1 cm).

6-4.2 Static Test — Upright.

6-4.2.1 The Static Test — Upright shall be set up as specified in 6-4.1.

6-4.2.2 The test mass shall be properly positioned by preloading up to 181 lbf (800 N) with the test torso in the upright position. Under this load, the load-bearing connecting point(s) shall be placed approximately symmetrically about the vertical axis of the test torso.

6-4.2.3* For the Static Test — Upright, the test torso shall be in an upright position. A force shall be applied to the buttocks ring, increasing to 3000 lbf (13.34 kN) over a period of 2.0 min $\pm$ 0.25 min. This force shall be held for 1.0 min $\pm$ 0.25 min and then tension shall be completely released over a maximum of 1 min. The force shall be reapplied immediately and shall be increased to 3000 lbf (13.34 kN) as before and held for 5.0 min $\pm$ 0.25 min before release.

6-4.2.4 At the conclusion of the Static Test — Upright series, sample belts shall be inspected to determine pass/fail. A belt shall be considered to be damaged to the point of failing this test if any load-bearing material is torn or otherwise destroyed, if a buckle becomes nonfunctional, or any other condition exists that would cause the safety of the user to be compromised.

6-4.3 Static Test — Horizontal.

6-4.3.1 The Static Test — Horizontal shall be set up as specified in 6-4.1.

6-4.3.2 The test mass shall be properly positioned by preloading up to 181 lbf (800 N) with the test torso in the upright position. Under this load, the load-bearing connecting point(s) shall be placed approximately symmetrically about the vertical axis of the test torso as shown in Figure 6-4.3.2.

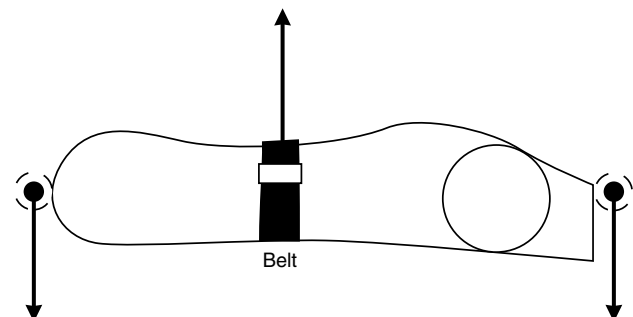


Figure 6-4.3.2 Test torso orientations for test.

6-4.3.3 For the Static Test — Horizontal, the test torso shall be in a horizontal position supported by the neck and buttocks rings. A force shall be applied to the neck and buttocks rings in the plane of symmetry of the test torso and normal to its axis

as shown in Figure 6-4.3.2. The force shall be increased to 2250 lbf (10 kN) over a period of 2.0 min $\pm$ 0.25 min. This force shall be held for 1.0 min $\pm$ 0.25 min and then the tension shall be completely released over a maximum of 1 min. The force shall be reapplied immediately and increased to 2250 lbf (10 kN) as before and held for 5.0 min $\pm$ 0.25 min before release.

6-4.3.4 At the conclusion of the Static Test — Horizontal series, the sample belts shall be inspected to determine pass/fail. A belt shall be considered to be damaged to the point of failing this test if any load-bearing material is torn or otherwise destroyed, if a buckle becomes nonfunctional, or any other condition exists that would cause the safety of the user to be compromised.

6-4.4 Dynamic Drop Test.

6-4.4.1 The Dynamic Drop Test shall be set up as specified in 6-4.1. At least three separate sample life safety harnesses shall be used for the Dynamic Drop Test series.

6-4.4.2 There shall be three drop tests for each sample. Two of the three required Dynamic Drop Tests for each sample shall be conducted with the test mass in a head-up position, and one of the Dynamic Drop Tests shall be conducted with the test mass in a head-down position.

6-4.4.3 With one end of the test lanyard attached to the load-bearing connecting point and the other end to the drop tower anchorage point, the test mass shall fall freely from a distance of 1.5 ft (46 cm) above the anchorage level, a total distance of 7.5 ft (2.3 m), to a free hanging position without interference or obstruction, or striking the floor, ground, or any other object during the test.

6-4.4.4 During the Dynamic Drop Test series, the test drops shall be observed to determine pass/fail. A belt shall be considered to have failed the test if, during any one of the three required drops for each sample, the test mass impacts the ground.

6-4.5 Product Label Permanency Test.

6-4.5.1 Test specimens of synthetic fabric product label samples shall be tested in accordance with ASTM D 4966, *Standard Test Method for Abrasion Resistance of Textile Fabrics*.

6-4.5.2 At least four test specimens shall be cut from product label(s) samples. At least two test specimens shall include the edge of the product label(s).

6-4.5.3 At least two test specimens shall be subjected to 160 dry abrasion revolutions, 10 cycles; and at least two test specimens shall be subjected to 80 wet abrasion revolutions, 5 cycles. At least one dry and one wet test specimen shall be edge specimens.

6-4.5.4 Test specimens shall then be examined visually with the unaided eye to determine pass/fail.

6-5 Auxiliary Equipment System Components.

6-5.1 Carabiner and Snap-Link Tensile Testing.

6-5.1.1 At least five randomly selected samples shall constitute a test series for each model of carabiner or snap-link. A separate test series shall be tested for each performance requirement.

6-5.1.2 Both “personal use” and “general use” designated carabiners and snap-links shall be tested in the manner of function at the specified force for major axis minimum breaking strength with gate closed as shown in Figure 6-5.1.2.

6-5.1.3 Both “personal use” and “general use” designated carabiners and snap-links shall be tested in the manner of function at the specified force for major axis minimum breaking strength with gate open as shown in Figure 6-5.1.3.

6-5.1.4 Both “personal use” and “general use” designated carabiners and snap-links shall be set up for testing for minor axis minimum breaking strength as shown in Figure 6-5.1.4.

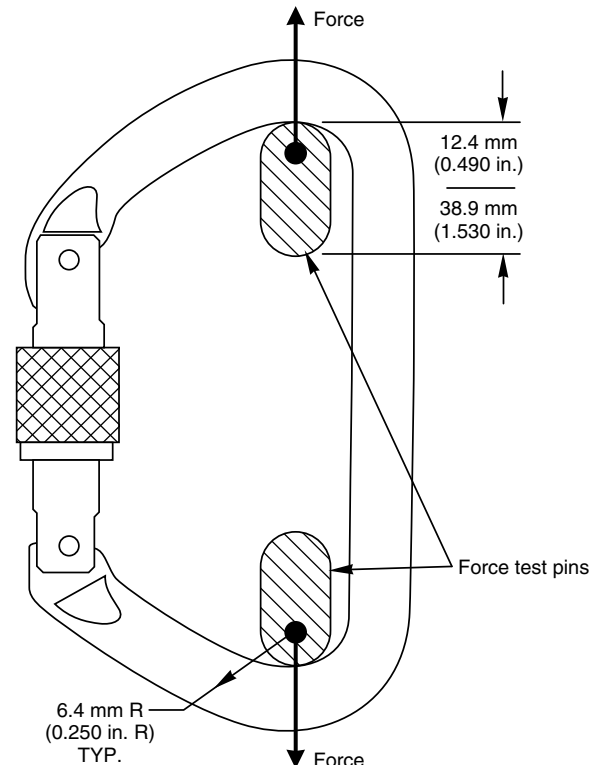


Figure 6-5.1.2 Major axis — gate closed test.

6-5.1.5 Both “personal use” and “general use” designated carabiners and snap-links shall be tested in the manner of function at the specified force for minor axis minimum breaking strength as shown in Figure 6-5.1.5.

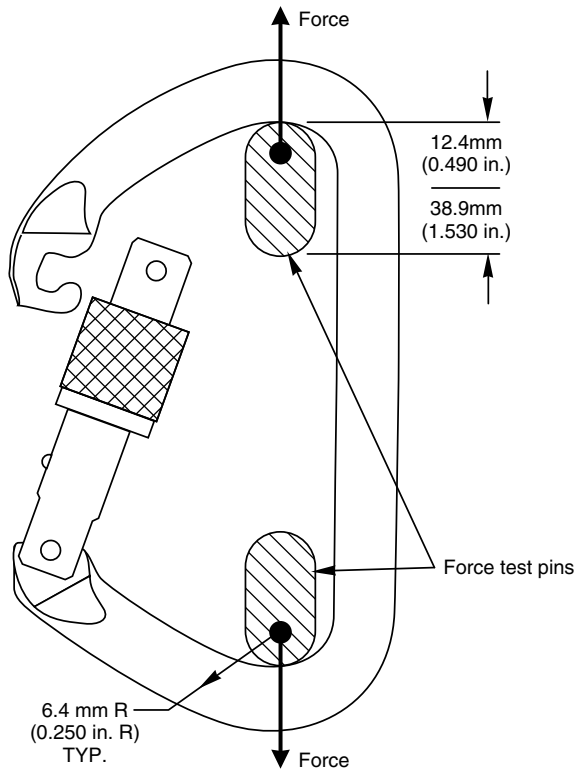
6-5.1.6 The tests shall be observed to determine pass/fail.

6-5.2 Ascending and Rope Grab Devices Testing.

6-5.2.1 This test shall apply to both personal use and general use designated ascending and rope grab devices.

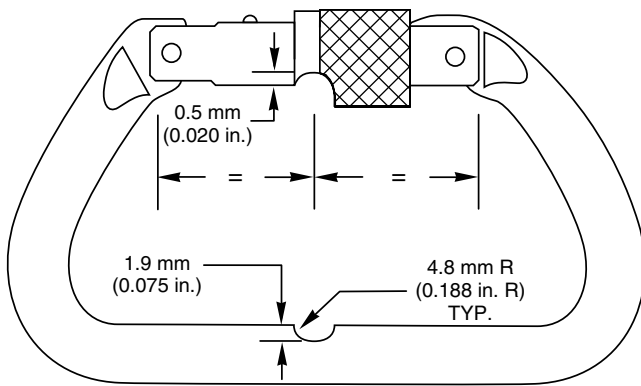
6-5.2.2 At least five randomly selected samples shall constitute a test series for each model of ascending device or rope grab device. A separate test series shall be tested for each device and each performance requirement.

6-5.2.3 The “manner of function” shall be with the device attached onto a life safety rope, whose diameter and construction is consistent with the manufacturer’s instructions for actual field operations.



All tolerances ± 0.013 mm (0.005 in.) unless otherwise specified

Figure 6-5.1.3 Major axis — gate open test.



All tolerances ± 0.013 mm (0.005 in.)

Figure 6-5.1.4 Minor axis test set-up.

6-5.2.4 The device shall be attached to the rope in the manner intended according to the manufacturer's instructions. With the end of the rope anchored, the specified force shall be applied to the device at the normal attachment point for 30 sec.

6-5.2.5 The test shall be observed and the device and rope shall be examined to determine pass/fail.

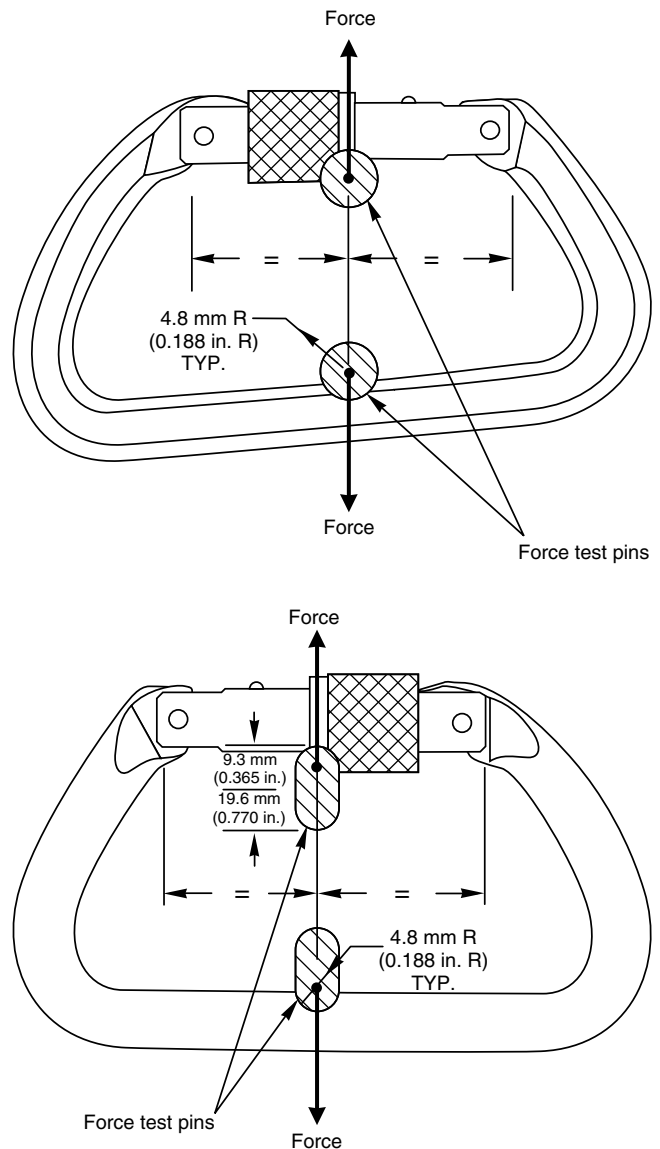


Figure 6-5.1.5 Minor axis test.

6-5.3 Descent Control Devices Testing.

6-5.3.1 This test shall apply to both "personal use" and "general use" designated descent control devices.

6-5.3.2 At least five randomly selected samples shall constitute a test series for each model of descent control device. A separate test series shall be tested for each device and each performance requirement.

6-5.3.3 The "manner of function" shall be with the device attached onto a life safety rope, whose diameter and construction is consistent with the manufacturer's instructions for actual field operations.

6-5.3.4 The device shall be attached to the rope in the manner intended according to the manufacturer's instructions and then tied off at the point where the user's hand would normally grip the rope. With the end of the rope anchored, the specified force shall be applied to the device at the normal attachment point for 30 sec.

6-5.3.5 The test shall be observed and the device and rope shall be examined, as applicable, to determine pass/fail.

6-5.4 Corrosion Testing.

6-5.4.1 Specimens shall be tested in accordance with ASTM B 117, *Standard Method of Salt Spray (Fog) Testing*. Salt spray shall be 5 percent saline solution, and test exposure shall be for 50 hr.

6-5.4.2 Immediately following the test exposure and prior to examination, specimens shall be rinsed under warm, running tap water and dried with compressed air.

6-5.4.3 Specimens shall then be examined visually by the unaided eye with 20/20 vision, or vision corrected to 20/20, to determine pass/fail.

6-5.4.4 Specimens shall be operated in the manner of function to determine pass/fail.

6-5.5 Product Label Permanency Test.

6-5.5.1 Test specimens of synthetic fabric product label samples shall be tested in accordance with ASTM D 4966, *Standard Test Method for Abrasion Resistance of Textile Fabrics*.

6-5.5.2 At least four test specimens shall be cut from product label(s) samples. At least two test specimens shall include the edge of the product label(s).

6-5.5.3 At least two test specimens shall be subjected to 160 dry abrasion revolutions, 10 cycles; and at least two test specimens shall be subjected to 80 wet abrasion revolutions, 5 cycles. At least one dry and one wet test specimen shall be edge specimens.

6-5.5.4 Test specimens shall then be examined visually with the unaided eye to determine pass/fail.

6-5.6 Product Label Heat Resistance Test.

6-5.6.1 The product label specimen to be tested shall be conditioned in accordance with Section 4, Atmospheric Conditions for Testing, of Federal Test Method Standard 191A, *Textile Test Methods*, at a relative humidity of 65 percent, ± 5 percent. Specimens shall be tested not more than 5 min after removal from conditioning.

6-5.6.2 Specimens shall be suspended in the oven utilizing metal clips.

6-5.6.3 The forced circulating air oven shall achieve and maintain an air temperature of 400°F, $+10/-0^\circ\text{F}$ (205°C , $+3/-0^\circ\text{C}$) for a period of not less than 5 min. Oven recovery time after the door is closed shall not exceed 1 min.

6-5.6.4 The product label specimen shall be suspended by metal hooks at the top and centered in the oven so that the entire specimen is not less than 2 in. (50.8 mm) from any oven surface or other specimen and airflow is parallel to the plane of the material.

6-5.6.5 Specimens, mounted as specified in 6-5.6.4 of this section, shall be placed in the circulating air oven for 5 min, $+0.15/-0$ min. Specimen exposure time shall begin when the oven has recovered to an air temperature of 400°F, $+10/-0^\circ\text{F}$ (205°C , $+3/-0^\circ\text{C}$).

6-5.6.6 Results shall be reported as pass or fail.

Chapter 7 Referenced Publications

7-1 The following documents or portions thereof are referenced within this standard and shall be considered part of the requirements of this document. The edition indicated for each reference is the current edition as of the date of the NFPA issuance of this document.

7-1.1 NFPA Publications. National Fire Protection Association, 1 Batterymarch, Park, P.O. Box 9101, Quincy, MA 02269-9101.

NFPA 1500, *Standard on Fire Department Occupational Safety and Health Program*, 1992 edition.

7-1.2 Other Publications.

7-1.2.1 ANSI Publications. American National Standards Institute, 11 West 42nd Street, New York, NY 10036.

ANSI/AATCC *Test Method 8, Colorfastness to Crocking*, 1989 edition.

ANSI/AATCC *Test Method 125, Colorfastness to Water and Light: Alternate Exposure*, 1991 edition.

ANSI Z535.4, *Standard for Product Safety Signs and Labels*, 1991 edition.

ANSI/UL 913, *Standard for Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations*, 1988 edition.

7-1.2.2 ASTM Publications. American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.

ASTM B 117, *Standard Method of Salt Spray (Fog) Testing*, 1985 edition.

ASTM D 4966, *Standard Test Method for Abrasion Resistance of Textile Fabrics*, 1989 edition.

ASTM E 794, *Standard Test Method for Melting and Crystallization Temperatures by Thermal Analysis*, 1989 edition.

7-1.2.3 GSA Publication. General Services Administration, Specifications Activity, Printed Materials Supply Division, Building 197, Naval Weapons Plant, Washington, DC 20407.

Federal Test Method Standard 191A, *Textile Test Methods*, 1978.

MIL-STD-2175A, *Castings, Classification and Inspection of*, 8/25/93.

MIL-W-4088 *Webbing, Textile, Woven Nylon*, 11/21/88.

Appendix A Explanatory Material

This Appendix is not a part of the requirements of this NFPA document but is included for informational purposes only.

A-1.1.3 Fall factors are calculated by dividing the distance the person attached to the rope will fall by the length of the rope between him and the rope anchor or belay. Thus, a 1-ft (30.5-cm) fall on a 1/2-ft (15.25-cm) rope would be a fall factor of 2.0, a 1-ft (30.5-cm) fall on a 1-ft (30.5-cm) rope would be a 1.0 fall factor, a 1-ft (30.5-cm) fall on a 4-ft (1.22-m) rope would be a 0.25 fall factor, and a 1-ft (30.5-cm) fall on a 40-ft (12.2-m) rope would be a 0.025 fall factor. Note as well that a 25-ft (7.6-m) fall on a 100-ft (30.5-m) rope is also a 0.25 fall factor. This formula assumes the fall takes place in free air without rope drag across building edges or through intermediate equipment.