Designation: F 2116 – 01

Standard Specification for Low Stretch and Static Kernmantle Life Safety Rope[1]

This standard is issued under the fixed designation F 2116; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This specification covers the general characteristics of low stretch or static kernmantle ropes used for rescue applications, whatever their constituent material. This specification does not apply to dynamic rope intended for lead climbing.

1.2 This specification covers small diameter sizes commonly used in life safety applications. These include sizes 7 to 16 mm (9⁄32 to 5⁄8 in.).

1.3 The values stated in SI units shall be considered as standard. Values in inch-pound units are included for reference.

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

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

2. Referenced Documents

2.1 *ASTM Standards:*

F 1740 Guide for Inspection of Nylon, Polyester, or Nylon/Polyester Blend Kernmantle Rope[2]

2.2 *Cordage Institute Standards:*

CI 1801-98[3]

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *diameter*—actual rope diameter as determined in accordance with Section 9.1 of CI 1801-98.

3.1.2 *kernmantle*—a rope design consisting of two elements: an interior core (kern) and an outer sheath (mantle).

3.1.2.1 *core*—interior (kern) of a kernmantle rope. Core may be of any continuous construction including parallel strands, twisted strands, braided strands, or braided.

3.1.2.2 *sheath*—outer cover (mantle) of a kernmantle rope.

3.1.3 *knotability*—a value used to determine the ability of a life safety rope to hold a knot.

3.1.4 *life safety rope*—a rope which is mandated, supplied, or used, or a combination thereof, to support or protect a human life.

3.1.5 *low stretch rope*—a rope with an elongation greater than 6 % and less than 10 % at 10 % of its minimum breaking strength.

3.1.6 *minimum breaking strength*—for the purposes of low stretch or static kernmantle rope, the minimum breaking strength shall be a value three standard deviations below the mean of the maximum force applied to five or more specimens before failure as determined in Section 9.2 of CI 1801-98.

3.1.7 *static rope*—a rope with a maximum elongation of 6 % at 10 % of its minimum breaking strength.

4. Material

4.1 The rope shall be fabricated from continuous filament heat and light-resistant material of industrial, high tenacity grade.

4.2 Material used in the construction of life rescue rope shall be sufficient to produce a rope which meets the physical properties and performance requirements of this specification.

5. Fiber Finish

5.1 The rope maker shall certify that any finish used on the rope shall not reduce the performance of the rope below the specifications in this specification.

6. Construction

6.1 The construction shall be sufficient to produce a rope which meets or exceeds the physical properties and performance requirements of this specification.

6.2 Strand interchange (braider) splices shall not be allowed.

6.3 Core splices shall not be allowed.

7. Performance Requirements

7.1 *Diameter*:

7.1.1 For the purposes of this specification, rope diameter is considered to be the actual diameter of the rope as determined in Section 9.1 of CI 1801-98.

7.1.2 The diameter reported shall be within 5 % of the actual diameter.

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

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[2] *Annual Book of ASTM Standards*, Vol 13.01.

[3] Available from Cordage Institute, 994 Old Eagle Rd., Suite 1019, Wayne, PA 19087-1866.

7.2 *Minimum Breaking Strength (MBS)*:

7.2.1 MBS shall be determined as the new rope minimum breaking strength when tested according to Section 9.2 of CI 1801-98.

7.2.2 MBS of life safety rope shall meet or exceed those listed in Table 1.

7.3 *Elongation*:

7.3.1 Elongation shall be determined in accordance with Section 9.3 of CI 1801-98.

7.3.2 Life safety ropes that have a maximum elongation of 6 % at 10 % of the minimum breaking strength shall be classified as static per CI 1801-98.

7.3.3 Life safety ropes that have an elongation greater than 6 % and less than 10 % of the minimum breaking strength shall be classified as low stretch per CI 1801-98.

7.4 *Knotability*:

7.4.1 Knotability for all diameters of life safety rope shall be no greater than 1.5 and shall be determined in accordance with Section 9.4 of CI 1801-98.

8. Other Requirements

8.1 It is the responsibility of the manufacturer to have a Quality Assurance (QA) program in effect to ensure compliance with these requirements.

TABLE 1 Minimum Breaking Strength (MBS) By Size (Diameter)

Size, mm, (in.)		MBS, kN, (lbf)	
7	(9⁄32)	9.8	(2 200)
8	(5⁄16)	12.8	(2 875)
10	(3⁄8)	20.0	(4 500)
11	(7⁄16)	26.7	(6 000)
12.5	(1⁄2)	40.0	(9 000)
16	(5⁄8)	55.6	(12 500)

8.2 *Labeling*:

8.2.1 All rescue ropes shall have an internal marker running the entire length of the rope which includes at least the name of the manufacturer, the year of manufacture of the rope, the country of origin, and the standards with which the rope complies. All information shall be repeated at least every three feet.

8.2.2 All rescue ropes shall be sold with a tag or booklet which includes at least the following information:

8.2.2.1 Manufacturer's name and address.

8.2.2.2 Materials used in the rope.

8.2.2.3 Diameter, as specified by CI 1801-98.

8.2.2.4 Minimum Breaking Strength (MBS), as specified by CI 1801-98.

8.2.2.5 Elongation, as specified by CI 1801-98.

8.2.2.6 Inspection and care criteria. Such criteria shall be in compliance with Guide F 1740. Additional information may also be appropriate.

8.2.3 All rescue ropes shall include a warning label containing at least the following:

8.2.3.1 A warning that serious death or injury may result from the improper use of the rope.

8.2.3.2 A warning that special training and knowledge are required to use the rope.

8.2.3.3 A warning that the use and inspection of the rope shall be in accordance with the manufacturer's instructions.

9. Keywords

9.1 kernmantle; life safety rope; static kernmantle