UIAA 110

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Static Ropes

Climbing and Mountaineering Equipment

International Climbing and Mountaineering Federation
UNION INTERNATIONALE DES ASSOCIATIONS D'ALPINISME

UIAA Safety Standard – 110 – Version 2.0

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Foreword

UIAA standards are the only 'globally recognized' standards for mountaineering equipment. In order to prevent multiplicity, the UIAA collaborates with its partner in standardization, CEN. The UIAA publishes user-friendly pictorials for each standard.

The UIAA standards are reviewed at intervals to see whether they meet the latest technical requirements and revised if necessary.

The UIAA invites manufacturers of mountaineering and climbing equipment worldwide to become members of the UIAA Safety Commission as Safety Label Holders. Members can participate in discussions on standard requirements, test methods, and revisions thereof (see the "Regulations for existing and potential Safety Label Holders").

A complete list of UIAA standards for mountaineering and climbing equipment can be found on the UIAA website www.theuiaa.org/safety-standards/.

NOTE – Owing to copyright restrictions, this UIAA Standard does not reproduce the full requirements of the referenced standards. To ensure full compliance, those applying this standard must obtain official copies of these documents. They are available for purchase from the CEN and ISO websites.

This standard has been created and updated based on scientific research coordinated and funded by UIAA, as a service to all mountaineers.

Copyright and Version Management

The versioning is V*x.y*, where:

- *x* Major revision of the document. Each change in requirement implies a main evolution.
- *y* Minor revision of the document. Editorial or non-technical updates.

For example, **V5.0** denotes the fifth major revision of the document.

Note that test reports comprising only the main issue, e.g., V5, are also accepted (instead of, e.g., V5.2) since the requirements are identical.

Normative References

The following documents are referenced in such a way that their content, in whole or in part, constitutes requirements of this standard. For dated references, only the edition cited applies. For undated references, the latest edition (including any amendments) applies.

EN 1891:1998, *Personal protective equipment for the prevention of falls from a height - Low stretch kernmantel ropes*

EN 892:2012+A3:2023, *Mountaineering equipment - Dynamic mountaineering ropes - Safety requirements and test methods*

UIAA 101, *Dynamic Ropes*

UIAA 107, *Low Stretch Ropes*

EN ISO 6508-1:2023, *Metallic materials - Rockwell hardness test - Part 1: Test method*

ISO 4032:2012, *Hexagon regular nuts (style 1) - Product grades A and B*

1 General Remarks on the UIAA Trademark and UIAA Label

1.1 The UIAA Trademark (see Clause 9) is copyright protected internationally. The UIAA Safety Label is only granted to items of mountaineering and climbing equipment upon approval of the prospective label holder's application by the UIAA.

1.2 The procedure to be followed by a manufacturer, when applying for a UIAA Safety Label, is laid down in the "Regulations for existing and potential Safety Label Holders" available at the UIAA website.

2 Scope

Static ropes, intended to support the weight of a human body or bodies in mountaineering, caving, canyoning, and glacier traverse when rappelling, ascending, positioning, and rescue rigging scenarios. Static ropes are not intended to dissipate energy in the instance of a shock load.

3 Requirements for Static Ropes

3.1 The UIAA Label can only be granted for ropes meeting all of the requirements below.

3.2 Requirements to be self-certified by the manufacturer

3.2.1 Middle mark location and Rope length as described in 6.8 and 6.9

3.3 Requirements to be certified by a UIAA accredited laboratory.

3.3.1 All Construction requirements (as listed in Clause 4).

3.3.2 All Performance requirements (as listed in Clause 5) tested according to 6.2 to 6.7.

3.3.3 All Requirements for Labeling and Packaging and Information to be supplied (as listed in Clause 7 and Clause 8).

4 Construction requirements

4.1 Material and construction

4.1.1 Construction shall feature two parts as a minimum: an inner part or core, and an outer part or sheath.

4.1.2 Splices within the rope construction shall not negatively impact the performance of the rope. This includes not negatively impacting the rope's usability, for example through increased stiffness or diameter at the splice, or other impact.

4.1.3 If the properties of the rope change along its length, for example diameter, strength, or markings other than color, samples from each section shall be submitted for testing. The Information to be supplied shall all correspond to the lowest performance section of the rope.

4.1.4 Manufacturer supplied end terminations shall be easily viewable and inspectable by the end user.

4.2 Diameter

4.2.1 The diameter of static ropes is not controlled by this standard[1].

4.2.2 The rope diameter is considered to be the actual diameter rounded to the nearest 0.1 mm of the rope as measured in Clause 6.

4.2.3 The reported rope diameter shall be $\pm 0{,}2$ mm of the diameter measured in Clause 6.

4.3 Weight

4.3.1 Weight of the rope shall be reported to the nearest 1 g/m, as measured in Clause 6.

[1] This standard requires certain, critical performance aspects of a static rope. New materials and methods may result in smaller diameters; it will be possible for such ropes to meet the standard if they fulfill the performance requirements. While these aspects are critical to safe use of a static rope, diameter is an important consideration in choosing which devices and techniques to use in the field; it is also an important consideration for the wear life and ease of gripping.

4.3.2 The weight of the sheath or sheaths shall each be reported as a percent (%) of the total weight per meter as measured in Clause 6.

4.4 Coating or finish

The rope manufacturer shall certify that any finish used on the rope that differs from what was in use at time of certification shall not reduce the performance of the rope as compared with the published specifications. E.g high Visibility or water repellant.

4.5 Elongation

Static elongation shall be reported to the nearest 0.1% and must be lower than the manufacturer's claimed elongation.

5 Performance requirements

5.1 When tested in accordance with 6.4, the Static Strength without termination shall be at least the one claimed by the manufacturer and not be less than 12 kN

5.2 When tested in accordance with 6.5, the Static Strength without termination shall be at least the one claimed by the manufacturer and not be less than 8 kN

5.3 When tested according to 6.6 the maximum Elongation shall not exceed 2,5 % when tested at 150 kg. The manufacturer shall report elongation at a load of 150 kg and 250 kg[2].

5.4 When tested in accordance with section 6.7 the rope shall not break.

6 Test Methods

6.1 Mass test

6.1.1 A new section of rope shall be used to measure mass.

6.1.2 Suspend rope with a mass of (4,0 − 10,0) kg[3]. Ensure there is a minimum of 1000 mm of rope between the upper connection point and the mass. Wait a minimum of 60 s with this load applied.

6.1.3 Mark a section of the rope that is (1000^{+2}_{-0}) mm apart and free from any distortion caused by attachment to the mass or fixture.

6.1.4 Remove the mass from the rope and cut the rope at the markings. Measure mass to the nearest 0,1 g.

6.2 Diameter test

6.2.1 A new section of rope shall be used to measure diameter.

6.2.2 Suspend rope with a mass of (10,0 ± 0,1) kg. Ensure there is a minimum of 1000 mm of rope between the upper connection point and the mass. Wait a minimum of 60 s with the load applied.

6.2.3 With the load still applied, measure the diameter of the rope at three levels and in perpendicular directions. The rope shall not be distorted by any pressure from the measurement device.

6.2.4 Calculate the mean of these six measurements to the nearest 0,1 mm.

6.3 All ropes shall be conditioned before testing. Ropes shall be held at under 20 % relative humidity and (50 ± 5) °C for 24 h, then at (50 ± 5) % relative humidity and (23 ± 2) °C for 24 h directly before testing.

6.3.1 Any presoaking or preconditioning that has been done before test required conditioning as in 6.3 shall be outlined in the instructions for use.

6.4 Ropes without terminations shall be tested using standard drums of at least a 100 mm diameter. Strain rate shall be between 5 % to 10 % of the length between terminations per minute with no shock load. Pull one sample and sustain load at stated minimum for at least 3 min without releasing load.

[2] Elongation at the 250 kg level is for user information for rescue use.

[3] The difference in mass per meter for ropes with elongation in this category should vary by under 0,04 g/m when comparing measurements made with a 4 or a 10 kg mass. Allowing a range like this does not change the value reported to the user, but allows simplification for laboratories and manufacturers wishing to cross certify ropes to multiple standards.

6.4.1 The length between terminations shall be 300 mm (+100 / 0).

6.4.2 For unterminated ropes, if the rope breaks on the drum instead of in between drums, the result should be discarded.

6.5 Testing is done with a Figure 8 knot as shown in Figure 1 and shall be tested using 10 mm diameter pulling rods/eyes. Strain rate shall be between 5 % to 10 % of the length between terminations per minute. Sample shall withstand load for 3 min without sheath or core breaking.

6.5.1 Figure 8 knot shall be dressed such that the standing line comes from the bend farther from the bite.

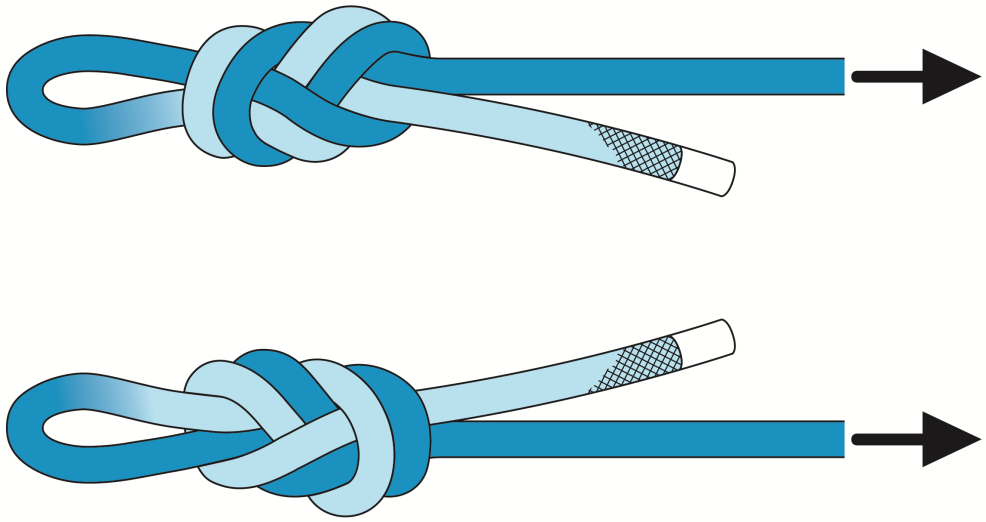

Figure 1: Figure 8 knot

6.6 Elongation is measured with a 50 kg preload. Hang preload for at least 2 min before measuring length. After applying preload and waiting, mark the rope in two locations with a length between marks of 1000 mm ± 1 mm.

6.6.1 Increase the load to 150 kg, wait a minimum of 2 min. Then measure length.

6.6.2 Increase the load to 250 kg, wait a minimum of 2 min. Then measure length.

6.6.3 Equation to calculate elongation

The total elongation shall be calculated as:

$$\text{Total elongation (\%)} = \frac{L_{\text{final}} - L_{\text{initial}}}{L_{\text{initial}}} \times 100$$

6.7 Fall testing is conducted with a guided steel mass of 80 kg. Test using a 2000 mm (+100 / 0) total length of lanyard tied with figure 8 knots at each end. Sample shall endure one impact from a height of 300 mm (+10 / 0) above the mass location at rest without breaking.

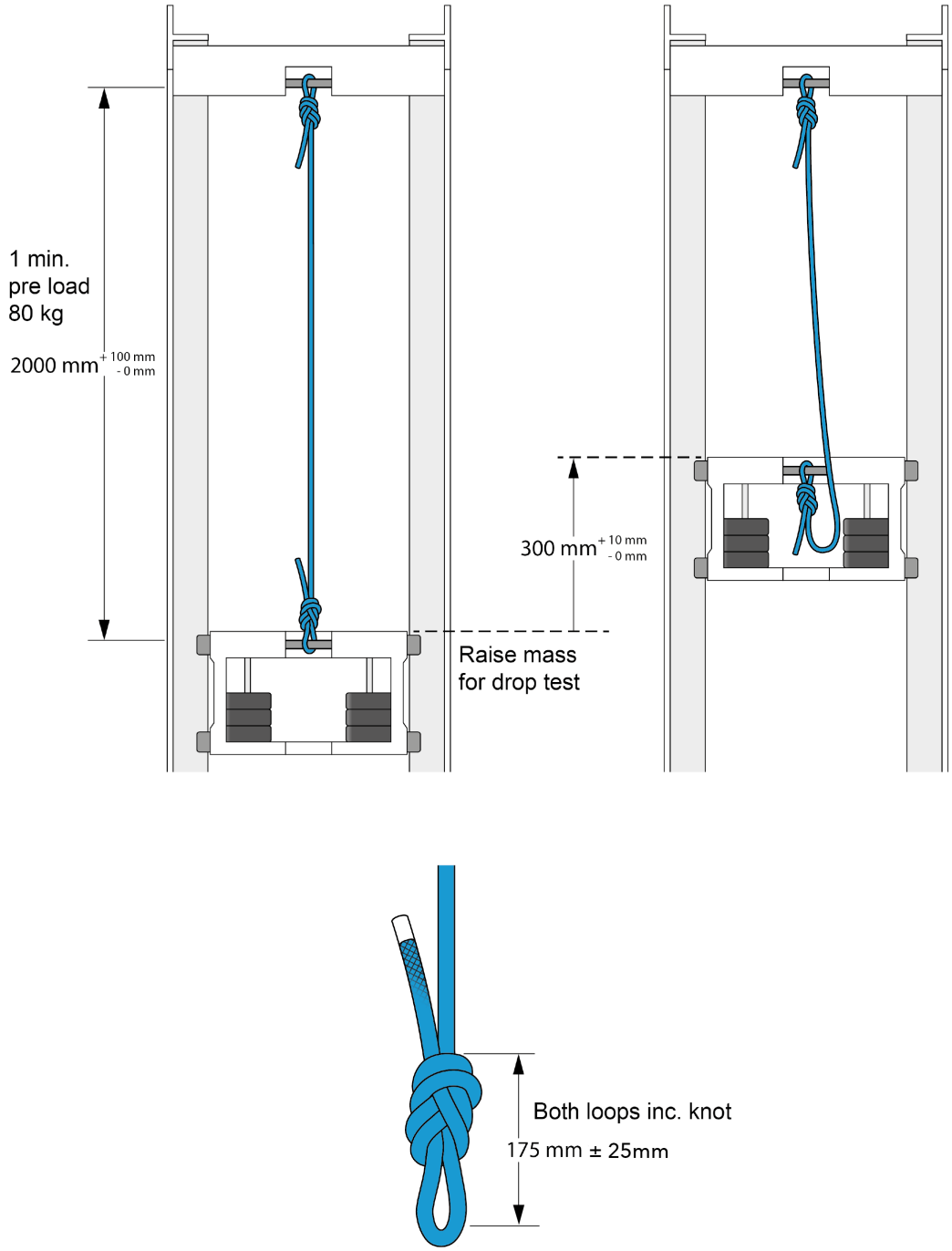

Figure 2: Fall Testing

6.7.1 Preload 1 min with 80 kg then measure total length.

6.7.2 After preloading, each loop shall be (175 ± 25) mm including the knot. Wait a minimum of 2 min after preload has been removed before testing.

6.7.3 A maximum of 10 min is permitted after rope is removed from the conditioning chamber to finish the drop test.

6.8 Middle mark testing[4]

6.8.1 Conditioning

None required.

6.8.2 Apparatus

Pulley with a sheave diameter of 20 mm to 200 mm, carabiner, measuring scale with millimeter increments, and marker pen.

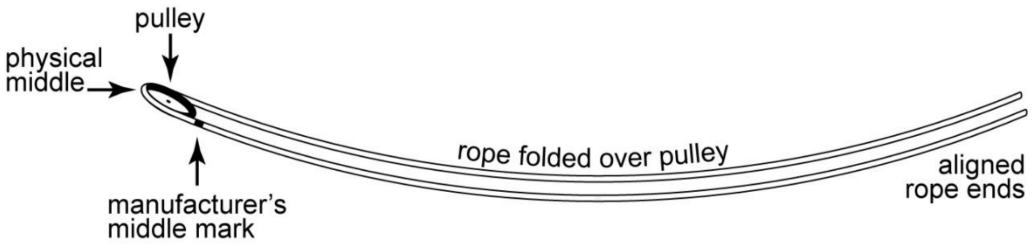

Figure 3: Apparatus for measuring location of middle mark of a rope.

6.8.3 Procedure

- Mark the centre of the manufacturer's middle mark. If the middle mark is a pattern change, determine the start and finish of the pattern change, measure the length, and mark the centre.
- Place a pulley in the loop, at the middle marker, and secure it with a carabiner or other suitable device.
- While holding the rope ends with your hand, align the ends and stretch out the loop in line with enough force so the rope is not in contact with any surface.
- Have an assistant use a marker to mark the rope at the top of the pulley wheel. Alternatively, the rope on each side of the pulley wheel could be marked.
- Measure and record the distance from the centre of the manufacturer's middle mark to the measured physical middle of the rope to the nearest 1 cm.
- If a weave change is used as center marking this procedure shall be used to verify the location.

6.9 Measuring Length

6.9.1 Apparatus

Metric tape measure with millimeter increments, pulley with a sheave diameter of 20 mm to 200 mm diameter, carabiner, sling, meter stick.

6.9.2 Procedure

- Secure the center of the rope in a pulley mounted 1 m above the ground. Align the ends of the rope to be even. Pull the ends of the rope at a height of 1 m – this pulling may be done by hand. Pull with a force enough to just lift the low point of the rope off the ground.
- Use a meter stick as a "plumb-bob" to mark a position on the floor equal with the ends of the rope.
- Use a tape measure to measure between the anchor point and the mark under the ends.
- Multiply this measurement by two (2), and round down to the nearest 0,1 mm.
- Measure and record the distance from the centre of the manufacturer's middle mark to the measured physical middle of the rope to the nearest 1 cm.
- If a weave change is used as center marking this procedure shall be used to verify the location.

[4]This clause is identical to UIAA 101, Clause 3.1.

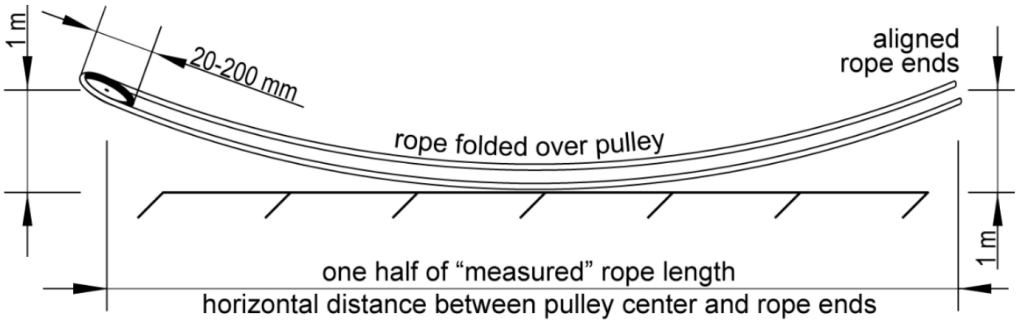

Figure 4: Test Method for Rope Length Measurement

7 Labeling and Packaging

7.1 Rope marking

7.1.1 All rope ends shall be marked

7.1.2 The rope end marking may be printed directly on the rope or done using durable bands. The rope shall be marked accurately, clearly, and permanently with required Marking information.

7.1.3 Marking information shall include:

- Manufacturer name
- Rope model or product number
- Year and month of production date
- Manufacturer claimed static strength with figure 8 knot
- Diameter
- Length
- UIAA Standard number

7.1.4 Ropes sold in lengths of 100 m or longer, or intended for user cutting shall be provided with user applyable end labels.

7.1.5 Ropes shall be continuously identifiable throughout their length. This may be achieved with coloured core strands, or labelled tape, or through other means. the identification method shall be described in the user information.Continuous marking shall include:

- Ropes of 9 mm diameter or larger may have a continuous labeled tape with manufacturer, UIAA standard, and other information.
- Year of manufacture shall be indicated continuously along the length of the rope (may be done with colored strand). The manufacturer shall provide an explanation in the Information to be supplied.

7.2 Packaging

7.2.1 If rope is supplied on a drum and consists of more than one piece, the ends of the pieces shall be clearly visible and not joined together; the number of pieces shall be stated on the drum.

7.2.2 Packaging shall clearly display:

- Manufacturer's intended use(s).
- Claimed minimum manufacturer's static strength with a figure 8 knot.
- Static strength without termination.
- Elongation
- Diameter

7.3 Middle Marking

If a rope is provided with a middle marker, the mark shall be at $\pm 1\,\%$ of the rope's published length from the physical middle of the rope when tested according to 6.7. Not all ropes are sold with middle markers.

7.4 Length

When measured according to 6.8, the length of the rope shall be equal to or greater than the published length of the rope.

8 Information to be Supplied

8.1 Language and format

The "information to be supplied" shall be given in standard English and, if required, in the official language(s) of the country in which the product is made available on the market. As an alternative to a printed form, the information may be provided via an electronic or other data storage format link (e.g., a QR code) allowing the downloading of the information. The information link shall be preceded or surmounted by an icon showing an open booklet; the information link and icon may be directly printed on the product in a clearly visible and accessible place.

8.2 Mandatory information to be supplied:

8.2.1 Rope certifications and type.

8.2.2 Manufacturer's intended use(s).

8.2.3 Claimed minimum manufacturer's static strength with a figure 8 knot.

8.2.4 Static strength without termination.

8.2.5 Elongation

8.2.6 Diameter

8.2.7 At least one device or method for abseiling

8.2.8 No dynamic use permitted.

- This rope is not intended to absorb falls.
- Abrupt stops while abseiling may result in arrest forces of 6 kN.
- This rope is not designed to limit impact forces nor prevent bodily injury from an abrupt stop.

8.2.9 Rope sheaths containing HMPE (e.g., Dyneema®, Spectra®, etc.) can melt at temperatures as low as 140 °C. These temperatures can be reached during a fast or long abseil. The coefficient of friction may also be much lower (more slippery). Extra caution is advised during abseiling.

8.2.10 Check that any rope device (e.g., pulley, abseil device, etc.) is compatible with the rope. Older devices' instructions for use and/or engravings may not match current recommendations; check with the manufacturer for updated use guidelines.

8.2.11 Instructions for whatever preconditioning was done as referenced in 6.3.1

8.2.12 Wear resistance may decrease dramatically with a reduction in cross-sectional material. Rock features may easily damage a rope under tension.

8.2.13 Maximum product lifetime.[5]

8.2.14 The minimum and maximum storage temperature

8.2.15 Rope may shrink after first uses or when wet.

8.3 Warnings required for ropes with knotted strength below 12 kN:

8.3.1 This rope could break as a result of a fall.

8.3.2 Knots can reduce rope strength by over 50 %.

8.3.3 Ropes can lose significant strength when wet.

9 Attachment of the UIAA Safety Label

9.1 Safety Label Marking

For any model of mountaineering equipment, which has been granted the UIAA Safety Label, the UIAA Trademark (see Figure 5) or the four letters "UIAA" shall be marked clearly and indelibly on each item sold in accordance with the branding guidelines specified in the "Regulations for existing and potential Safety Label Holders".

Figure 5: UIAA Trademark or the four letters "UIAA" word mark.

9.2 Other

In addition, the UIAA Trademark or the four letters "UIAA" may be included in the instructions for use and/or on a swing ticket as well as in catalogs and other publications of the manufacturer. In the last case, the illustration and/or the text shall clearly apply only to the equipment which has been granted the UIAA Safety Label.

[5] Rope strength decreases over the lifetime of the rope.

Revision History

V2.0 — May 2026

Addition of 4.5 (Elongation construction requirement) and 6.1 Mass test method

V1.0 — April 2025

Approval of new standard at the Safety Commission Plenary Meeting in Chamonix.