All you need to know on …

Norms & Standards

Working at height is involving risk and therefore it is regulated by different norms and standards depending on the type of work and the region working in. These standards also define which ropes are allowed to be used to carry out the actions in rope-assisted work. The most important standards you should be familiar with are explained in detail in this article.

EN 1891

EN 1891 (Personal protective equipment for the prevention of falls from a height – low stretch kernmantle ropes) is the most important European standard in rope access and specifies requirements for low stretch kernmantle ropes used in working at height. The ropes complying to the standard must have a diameter between 8.5 mm and 16 mm and must be made from materials with a melting point higher than 195°C, which excludes materials like polyethylene and polypropylene. The elongation (stretch) of the rope under a load of 150 kg must not exceed 5%.

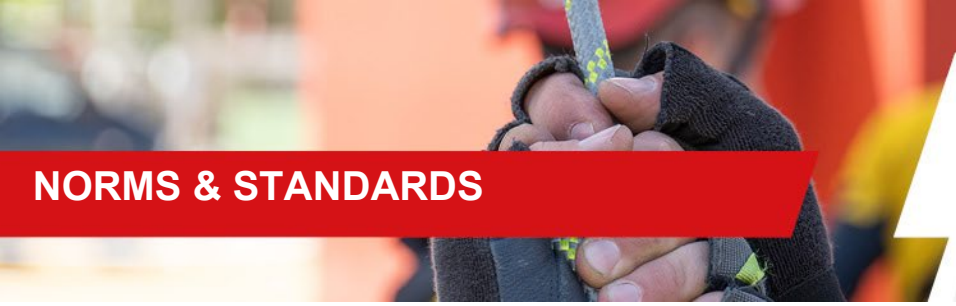
The standard classifies ropes into two types with different requirements concerning strength and dynamic performance:

- **Type A:** These ropes are designed for general use, including work positioning and restraint. They have higher performance requirements. Type A ropes must have a minimum strength of 22 kN without knots and 15 kN with knots and must withstand at least 5 falls with a load of 100 kg
- **Type B:** These ropes have lower performance requirements and are intended for situations where the rope is used less frequently or under less demanding conditions. Type B ropes must have a minimum strength of 18 kN without knots and 12 kN with knots and are tested with an 80 kg load on at least 5 falls.

All Teufelberger static ropes for safety and rescue applications are certified to EN 1891A (or B) like for example our KM III, KM Pro or Patron.

NFPA 2500 (1983)

NFPA 2500 (1983) (Standards for Operations and Training for Technical Search and Rescue Incidents and Life Safety Rope and Equipment for Emergency Services) from the National Fire Protection Association is the most important standard in the US when it comes to emergency services and set the standard.



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The standard classifies ropes into four types with the following requirements:

- **Life Safety Rope**
  These ropes must be made from materials that can withstand high temperatures and are resistant to environmental factors such as UV radiation and chemicals. They need to be designed to handle significant impact forces encountered during rescue and tactical operations. Life Safety Ropes according to NFPA 2500 (1983) are divided into two subtypes with different technical requirements:

  - General Use (G) Rated Ropes
    - Diameter: Ropes range from 9.5mm (3/8 inch) to 12.5 mm (1/2 inch)
    - Strength: Must have a Minimum Breaking Strength (MBS) of at least 40 kN (8,992 lbf)
    - Elongation: Between 1% and 10% at 10% of the rope's MBS

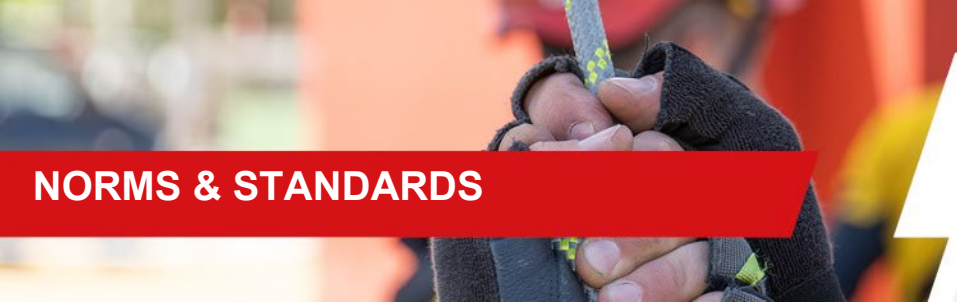
  - Technical Use (T) Rated Ropes
    - Diameter: Ropes range from 11mm (7/16 inch) to 16mm mm (5/8 inch)
    - Strength: Minimum Breaking Strength (MBS) of 40 kN (8,992 lbf)
    - Elongation: Between 1% and 10% at 10% of the rope's MBS

  The Teufelberger ropes KM III, KM III Max and KM G are certified to NFPA 2500 (1983) as Life Safety Ropes. KM G even meets the very high requirements of G-rated ropes with a small diameter of 11mm.

- **Escape Rope**
  Typically these ropes have a smaller diameter (minimum 7.5mm (5/16 inch) and must have a minimum breaking strength of 13.5 kN. They are designed for quick deployment in emergency self-rescue situations like the TEUFELBERGER Aramid Escape

- **Fire Escape Rope**
  Their technical specifications are similar to escape ropes. Plus, they need to withstand high temperatures as they are specifically designed for firefighters to use in emergency escape scenarios

- **Utility Rope**
  Utility ropes according to NFPA 2500 (1983) are not intended for life safety applications, so they do not have specific Minimum Breaking Strength (MBS) or minimum diameter requirements like life safety ropes, escape ropes or fire escape ropes. Utility ropes are used for general purposes such as hauling equipment and other non-life-safety tasks



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CI-1805 and CI-1805

The Cordage Institute in Pennsylvania is an international association focused on rope, twine, and related products, providing standards and guidelines for the industry. For life safety applications it offers two standards with the following specifications:

- **CI-1801: Low Stretch/Static Kernmantle Life Safety Rope**
  This standard outlines the performance requirements for low stretch and static life safety ropes used in life-saving applications, such as rescue operations.
  - Diameter: Commonly ranges from 9 mm to 13 mm.
  - Minimum Breaking Strength (MBS): Typically around 22 kN.
  - Elongation: Low stretch, generally less than 6% elongation at 10% of the breaking strength.

  Our Teufelberger KM Pro is certified to CI-1801 as a Life Safety Rope.

- **CI-1805: 3-Strand Life Safety Rope with Moderate Stretch**
  This standard specifies the requirements for 3-strand life safety ropes with moderate stretch which are mainly used as life lines with rope grabs or in challenge courses.
  - Diameter: Typically ranges from 10 mm to 16 mm.
  - Minimum Breaking Strength (MBS): Generally around 20 kN.
  - Elongation: Moderate stretch, usually between 10% to 15% elongation at 10% of the breaking strength

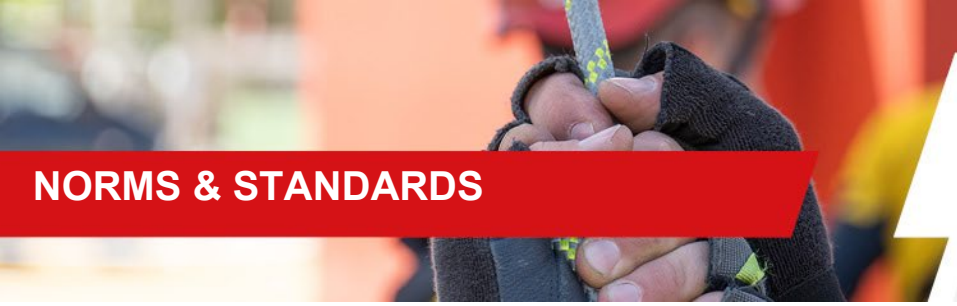
  Our New England Multiline is certified to CI-1805.

EN 892

EN 892 is the European for “Dynamic mountaineering ropes”. These ropes are designed to absorb the energy of a fall, reducing the impact force on the climber and the anchor system. There are three types of dynamic climbing ropes that need to meet different technical specifications:

- **Single ropes**
  - Diameter: from 8.9mm to 11mm
  - Minimum Breaking Strength (MBS): 22 kN on single strand
  - Falls: They must withstand at least 5 falls with an 80 kg mass (single strand)
  - Static elongation: no more than 10 % on 80 kg load
  - Dynamic elongation: no more than 40% on first fall on 80kg load

- **Half ropes**
  - Diameter: from 7.5 mm to 9mm
  - Minimum Breaking Strength (MBS): 6 kN on single strand
  - Falls: They must withstand at least 5 falls with a 55 kg mass (single strand)
  - Static elongation: no more than 12 % on 80 kg load (single strand)
  - Dynamic elongation: no more than 40% on first fall on 55kg load (single strand)



- **Twin ropes**
  - Diameter from 6.9mm to 8mm
  - Minimum Breaking Strength (MBS): 12 kN on a pair
  - Falls: They must withstand at least 12 falls with an 80 kg mass (as pair)
  - Static elongation: no more than 10% on 80 kg load (as pair)
  - Dynamic elongation: no more than 40% on first fall on 80kg load (as pair)

In working at height, dynamic ropes are only rarely used when a high shock absorption function is required.

EN 564

EN 564 is the European standard for “Accessory cords used in mountaineering and climbing”. These cords have to meet the following requirements:

- Diameter: Accessory cords come in various diameters, ranging from 4 mm to 8 mm.
- Minimum Breaking Strength (MBS): The MBS varies depending on the diameter of the cord, for example, a 4 mm cord must have a minimum breaking strength of 3 kN, while an 8 mm cord must have a minimum breaking strength of 12 kN
- Elongation: The standard specifies that the elongation should not exceed 5% when subjected to a load of 50% of the MBS.

ANSI Z133-2012

The ANSI Z133-2012 standard was published by the International Society of Arboriculture (ISA). It outlines safety requirements for arboricultural operations, including pruning, trimming, repairing, maintaining, and removing trees, as well as cutting brush. Ropes certified to ANSI Z133-2012 must meet the following specifications:

- Diameter: minimum 12.7mm (1/2 inch), in some cases 11mm are allowed when it does not create a hazard in the operation
- Minimum Breaking Strength (MBS): The minimum breaking strength is 24 kN

You can find a lot of ANSI certified climbing lines for tree care in our tree care section.

Additional standards

These additional standards also regulate the use of PPE against fall:

- EN 341 for descender devices
- EN 358 for work positioning systems
- EN 363 for fall protection systems
- EN 813 for sit harnesses
- EN566 for slings used in mountaineering
- EN 354 for lanyards used in personal fall protection equipment