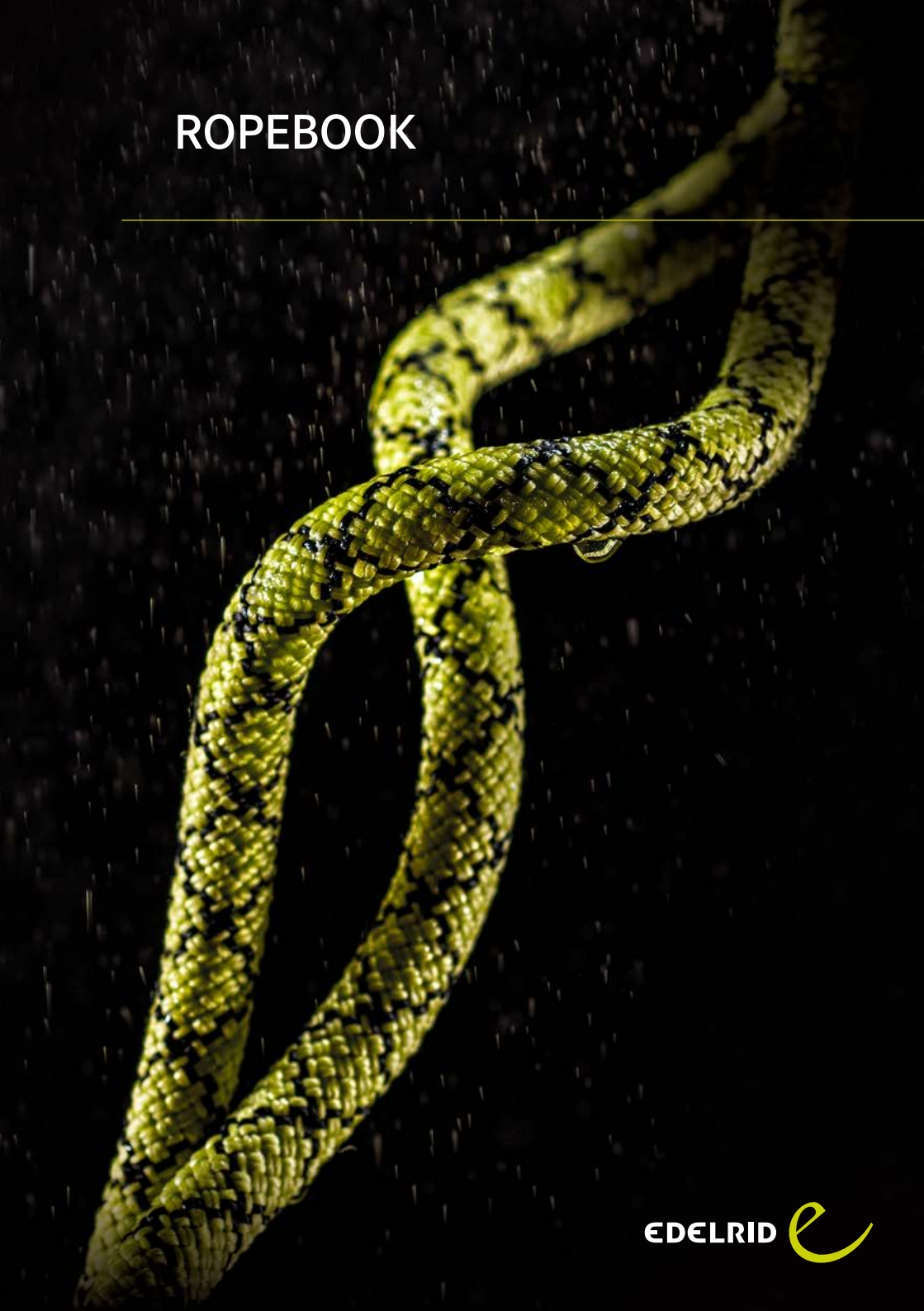
ROPEBOOK



EDELRID

We've put together this handbook to share our passion for ropes and pass on our expertise. A climbing rope is more than just a piece of equipment; your life might depend upon it. Our goal is to make the best ropes possible. However, even the best rope in the world is not much use if it's not used properly. This is why we want to raise awareness about what our ropes are capable of and about their limitations. This handbook contains lots of useful information about ropes. There's a description of how our ropes are produced, advice for selecting the right rope and tips for how to best look after your rope. This handbook also explains factors that can damage a rope and some things that you should avoid at all costs. You'll also find lots of interesting facts, tips and some suggestions for what to do with your old climbing rope.

As climbers, we trust our ropes with our lives. This is why EDELRID guarantees the highest quality and the greatest possible care when manufacturing its ropes. Our ropes benefit from over 150 years of expertise, experience and passion. CREATIVE TECHNOLOGY is our credo – we apply it to our ropes to make versatile products that meet the highest quality standards. We are well aware that modern climbing ropes need to be able to cope with a wide range of different uses. Our ropes are known for their optimal combination of different characteristics. This does not mean that we make compromises. On the contrary, we are constantly seeking to ensure maximum performance.
All our ropes are designed, tested and continuously improved at our production facilities in Allgäu, Germany. Our designers, who are all passionate climbers themselves, work together with professional climbers to produce innovative products that are constantly setting new standards. Their ideas are transformed into reality using carefully selected, high-quality raw materials and rigorous production standards. This is Quality Made in Germany. Moreover, as a bluesign® system partner, we make environmental protection, sustainability and quality management our highest priority.

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SUSTAINABILITY

To boost our quality and safety standards, we partnered with bluesign® technologies ag from Switzerland since 2009. We are the first manufacturer to adapt our ropes to meet the tough demands of the bluesign®® standard. The bluesign® standard is the most stringent environmental standard for the production of functional textiles. It is independent, internationally recognised and based on five principles of sustainability. These are resource productivity, air emission protection, water emission protection, occupational health and safety and consumer protection. The bluesign® standard follows these five principles throughout the whole textile manufacturing chain.

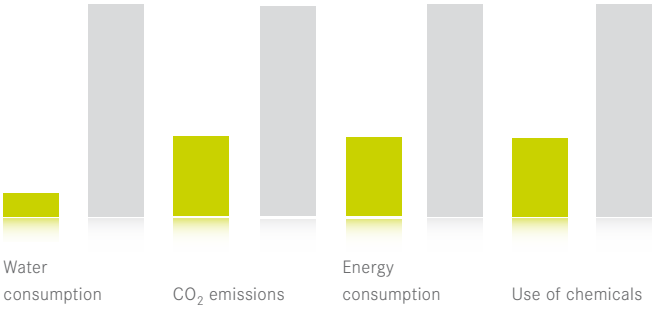
EDELRID has created new benchmarks throughout the industry for innovative and sustainable rope production. All the materials used to make our ropes are bluesign® approved. Therefore, we can guarantee that we use as few pollutants as possible without making any compromises in terms of functionality, quality and design. Our ropes carry the bluesign® product label thanks to this combination of certified source materials and our advanced rope production facilities in Isny.
The bluesign® product label is a sign of quality. It guarantees an eco-friendly manufactured product that is low in pollutants and safe for health and the environment. In this manner, we are responding fully to consumers' demands for safe, environmentally friendly and sustainable products.

Our many years of partnership with bluesign® technologies ag allow us to draw on in-depth experience of sustainable rope production. By converting all our rope production to the tough demands of the bluesign® standard we were able to make the following efficiencies when dyeing sheath yarns:

62 % CO_2 reduction,
89 % water saved,
63 % less energy and 63 % fewer chemicals.

bluesign SYSTEM PARTNER

bluesign® PRODUCT



Green: Production following implementation of the bluesign® system

Grey: Conventional rope production

For EDELRID, this represents a further step towards a healthy future for its products. We have pursued the route of pushing forward sustainable rope production consistently so that we can continue to create trust in the future. We do not consider these steps a virtue, but a natural response to the demands of the modern world. As the inventor of the kernmantel rope, we continue to set new and ever-higher standards. As a result, we can confidently say that **our ropes are eco-friendly.**

FROM FIBER TO ROPE

In 1953 EDELRID invented the kernmantel rope and consequently revolutionized climbing. The kernmantel rope set the standard for modern climbing ropes. Up until then, ropes were generally hawser laid (twisted) or braided constructions made of hemp or basic nylon. However, only kernmantel ropes are able to meet the requirements of ambitious alpinists and climbers. They are lightweight, strong and have high safety reserves. The kernmantel construction we invented has two-parts: a core (Kern) and a protective sheath (Mantel). The core is a rope's main load-bearing element. The sheath is braided around the core to protect it from external influences.
In order to use a rope correctly, it's important to understand what a kernmantel rope is made of and how it's manufactured. A rope has to pass through many stages before the finished product is ready for use.

Raw material
The basic raw material used to make all climbing ropes are ultra-thin filaments made of high-quality polyamide 6.6 (nylon). They are used to make both the core and the sheath. We would like to show the journey that each individual ultra-thin filament undertakes before it becomes a rope. In keeping with the kernmantel concept, we have broken the manufacturing process down into different stages for the core and the sheath.

Core
Up to 135 of the ultra-fine polyamide filaments are twisted together to make a strong yarn. A number of these yarns are then combined (twisted) in a multi-stage process to make a core strand. The process is called twisting. It's this twisting process for the strands in the core that gives the rope its dynamic elongation, i.e. the ability to act like a spring when shock loaded. The number of twists over a given length determine the mechanical elongation and strength of a rope. A rope may contain up to 2,000 meters of these core strands.

Autoclave

Next comes an important manufacturing stage. As nylon is only supple up to a point, the yarns are subjected to a sophisticated industrial treatment. In an autoclave, a kind of gigantic pressure cooker, the fibres are shrunk together using a special combination of heat, pressure and time. The rope is now starting to take shape. It has its main dynamic characteristics. The core is ready for use. Meanwhile, the sheath yarns are prepared simultaneously.

Sheath

The same principle is used to make the sheath as the core strands. Two to four colored twisted yarns are combined (twisted together) and wound onto spools. To ensure that the sheath yarns have the same characteristics as the core strands, they too are placed in the autoclave to shrink. To guarantee that the sheath strands are uniformly conditioned in the autoclave, they first have to be unravelled. This is done using a special machine that unravels the strands into loosely coiled lengths, or skeins. Once these skeins have been autoclaved, they are unravelled again and then spun back onto the spools ready for the next step.

FROM FIBER TO ROPE

Braiding

The next step produces the finished rope. The sheath and the core are now ready to be combined (braided). A braiding machine twists the sheath strands around the required number of core strands, depending on the type of rope being produced. The bobbins with the sheath yarns dance around the core strands at high speed – rather like dancing around the maypole . After more than a thousand meters of braiding, the bobbins are empty and the rope is ready. During this braiding process we deploy a number of innovative techniques:

ColorTec:

An innovative braiding process for making bicolor ropes. The woven design of the rope completely changes when it reaches the middle. This provides a permanent and distinctive middle marking. We use this technique exclusively for the ropes in our Pro Line. During braiding, the bobbin order of the sheath yarns alters on the braiding machine automatically at the middle of the rope. The design then changes so that two rope halves of the rope are easy to distinguish.

This is made possible by using a second braiding circle. The bobbins on the inner circle change to the outer circle and vice versa. Sheath yarns that are woven into the core in the first half of the rope, change to be woven into the sheath on the second half of the rope where they become visible. The ColorTec braiding process makes both color and design changes possible.

TouchTec:

A braiding process developed by EDELRID to slightly alter the sheath structure of a climbing rope. TouchTec technology is applied to a section at each end of the rope. The first and last five meters have a distinctive marking and are also tactilely different to the rest of the rope. This means that the belayer automatically sees and feels the end of the rope approaching when lowering their partner. TouchTec reduces the risk of accidents when lowering and enables easier rope management.

The different structure is produced by weaving a special marker ribbon into the sheath along the entire length of the rope. The two sides of the ribbon are different – in both color and texture. At the end of the rope the ribbon is turned over so that its rough side can be felt in the sheath. As a result, the last five meters of both ends of the rope look and feel distinctly different.

DuoTec:

A braiding process, patented by EDELRID, to manufacture bicolor ropes. Each half of the rope has a different design. The differently patterned rope halves are easy to distinguish. This easily-identifiable middle marking is very useful when abseiling, estimating how much rope you have left and coiling.

The design change is made possible by weaving a special bicolor marker ribbon into the sheath along the entire length of the rope. Each side of the ribbon has a different color. At the middle of the rope, the braiding machine automatically turns the marker ribbon over so that a different color shows (e.g. from green to black). This technique ensures permanent middle marking of the rope.

Sports Braid:

The sheath of EDELRID Sports Braid ropes has two yarns braided over one. This is different to a standard sheath construction where two yarns are braided over two other yarns. The result is a particularly compact and smooth sheath structure. These ropes are particularly abrasion resistant, glide easily through each piece of protection and offer incomparably supple handling. The Sports Braid sheath construction is ideal for ropes that are subject to prolonged wear and abrasion, e.g. top-roping and intensive sport climbing.

LinkTec:

LinkTec technology involves bonding the sheath and the core of the rope together during braiding. This reduces sheath slippage to a minimum and significantly prolongs the lifespan of a rope. We've been using this process for our ropes for climbing walls for a long time, as they have to withstand prolonged wear and abrasion during top-roping.

FROM FIBER TO ROPE

Finishing treatments

The exact details of our various finishing treatments are some of the most closely-guarded secrets in the mountain sports industry. These treatments give a rope specific properties that extend its lifespan, improve handling and prevent it from absorbing water. All our ropes receive a finishing treatment. The top-of the range Pro Line models get the full works, i.e. Pro Dry and Thermo Shield. Our Sports Line ropes are given a Thermo Shield treatment, which gives them their characteristic EDELRID handling and flexibility. All of our finishing treatments are bluesign® certified and use only strictly-regulated, environmentally-friendly processes that contain no harmful substances.

Pro Dry:

Untreated ropes can absorb up to 50 % of their own weight in water. When wet, such ropes become extremely heavy, difficult to handle and may freeze in cold conditions. Moreover, their safety reserves are compromised. This is why impregnated ropes are used for activities where ropes are more likely to get wet, such as ice climbing or mountaineering.

Pro Dry is a new finishing process, which provides a solution to this problem. First the core yarns are impregnated. Then, once braiding is completed, the finished rope (core and sheath) is impregnated again. In a final stage, the impregnation is thermally fixed. The result is a rope that is durably water repellent and dirt resistant. Pro Dry ropes are particularly quick drying, absorb virtually no water and are resistant to freezing in cold temperatures. Due to their minimal water absorption (1-2 %) in accordance with the UIAA water-repellent test, Pro Dry ropes hardly increase in weight. As such, they continue to perform well and provide high safety reserves even in wet conditions.

In addition, our Pro Dry finish improves the gliding characteristics of the individual fibers, which makes the rope more abrasion-resistant and extends its lifespan. Pro Dry is the first ever finishing process that makes it possible to produce extremely narrow diameter ropes without compromising on performance.

Whether mixed routes on north faces, ice climbing on frozen waterfalls or sport routes at the crag, the ropes in our Pro Dry series excel due to their outstanding handling, long lifespan and high safety reserves.

Thermo Shield:

Thermo Shield is the standard treatment that we apply to all our ropes. It gives them the famous EDELRID suppleness and handling characteristics. The thermal stabilizing process ensures that the core and sheath yarns are perfectly balanced. A special heat treatment cure first relaxes then shrinks the rope's fibers. This harmonizes the gliding characteristics of the yarns inside the rope and ensures that it remains compact and supple throughout its life. It also ensures that rope does not shrink or become stiff.

	***Impregnated core and sheath:*** *- durably water repellent and dirt resistant* *- high abrasion-resistance* *- outstanding performance in cold and wet conditions* *- narrow diameters for less weight per meter* *- optimal gliding characteristics*
	***Heat treatment:*** *- supple handling* *- compact* *- no shrinking* *- long lifespan*
	***Braiding technique for bicolor ropes:*** *- both color and design changes possible* *- two distinct rope halves ensure permanent middle marking* *- unmistakable design* *- two braiding circles*
	***Braiding technique for bicolor ropes:*** *- design change only* *- two distinct rope halves for permanent middle marking* *- bicolor marker ribbon woven into sheath*
	***Different sheath structure at rope ends:*** *- belayer sees and feels end of rope coming* *- improved safety* *- marker ribbon woven into sheath (2 colors, 2 textures)*
	***Double-braid sheath construction:*** *- smooth and compact structure* *- high abrasion-resistance* *- supple handling*
	***Bonded sheath and core:*** *- reduced sheath slippage* *- extended lifespan*

FROM FIBER TO ROPE

Quality control

Once a length of rope has received its respective treatments, it's off to the finishing department. The finishing department is a rope's last stop before it leaves our production facilities. During a final inspection, every single meter of the rope is checked by hand. Our employees are so experienced that they can detect even the slightest irregularities. Over the years they've developed an extraordinary feel that represents an important additional quality control measure for our ropes.

Packing

Once a batch has passed this final inspection, it's cut into the required lengths. A further machine sees to the middle marking. The rope ends are then sealed. The finished rope is coiled on a coiling machine, weighed and packed with its label and instructions for use. The rope is ready to be sent out.

The finished product

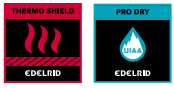
We have two separate product lines that are intended for a different set of uses. Each product line uses a different combination of braiding technologies and finishing treatments. This means that EDELRID has the right rope for every type of climbing.

Pro Line

Our Pro Line ropes feature our most innovative technologies and the most elaborate finishing treatments. They combine minimal weight and diameter with durability and superior handling. EDELRID Pro Line ropes are designed to meet the highest requirements – for climbers who only want the best.

Braiding technologies

Finishing treatments



Sports Line

The ropes in our Sports Line are designed to cover a wide range of uses. However, as the name suggests, they are primarily intended for modern sport climbing. Whether at the crag or in the gym, our Sports Line ropes are workhorses with a robust construction and wider diameter to provide extra reserves when working routes or top-roping.

Braiding technologies

Finishing treatments

TESTING AND LABELLING

To be able to climb freely, you need to be able to completely trust in your equipment. In order to warrant this trust, we have a strict testing and quality management system. The quality attributes of our products are displayed on the labelling . EDELRID has its own, state-of-the-art testing laboratory and its own drop tower. As with all laboratory equipment, the drop tower is built in accordance with the relevant standards and is regularly inspected by external agencies. Here is an overview of the main tests and information displayed on our packaging.

Batch number

This long number is a rope's specific identity number. It shows exactly which batch it was in and when it was produced. This is why it's important to keep the packaging, or at least the label with this special number, for the entire lifespan of the rope as it makes it possible to trace its exact origins if necessary.

The batch number on EDELRID ropes is displayed on the packaging label. It's made up of a combination of numbers and letters.

Number of falls

The drop test is one of the most important tests for testing ropes. At our drop tower testing facility we determine how many standard falls a rope will withstand. A standard fall is an extremely hard fall. The hardness of a fall is determined by the fall factor. This is calculated by dividing the length of the fall, by the amount of rope paid out. The standard fall for testing purposes is predefined: a free fall of 4.8 metres with 2.8 metres of rope paid out. This produces a high fall factor of approx. 1.7. Falls this hard very rarely occur when climbing. This therefore allows us to provide large safety reserves. Single and twin ropes are tested in the drop tower by letting a weight of 80 kg fall and half ropes by letting a weight of 55 kg fall for as many times as it takes until the rope breaks. Single and half ropes are tested on their own, while twin ropes are tested as a pair. Single and half ropes must withstand at least five standard falls; a doubled twin rope has to withstand at least twelve standard falls.

Impact force

In conjunction with the drop test, we also measure impact force. The impact force is the maximum force on the load in a standard fall. It is greatly influenced by the ability of the rope to absorb fall energy through elongation. The higher the impact force, the harder the fall and the greater the force transmitted via the rope to the falling climber, the protection and the belay (safety chain) . The impact force for single and twin ropes may not exceed 12 kN (1200 kg). For half ropes the impact force may not exceed 8 kN (800 kg). In practise, impact force is not that relevant. This is because during testing in the laboratory, the rope is statically fixed. This is very different to a real-life situation. Climbing falls are generally caught and absorbed dynamically. The small amount of rope that runs through the belay device (e.g. a tuber) at the moment of impact and shock absorption by the harness and other protection points in the safety chain is enough to absorb a large part of the fall energy. In addition, dynamic belaying can also absorb a significant amount of fall energy. By an active forwards and upwards movement towards the wall at the moment of impact, the belayer can arrest a fall more gradually, making the impact softer on the climber, runners and belay.

TESTING AND LABELLING

Dynamic & static elongation

Elasticity and elongation are important attributes of a climbing rope. It's important that a rope provides an optimally balanced elongation performance. As you will see from the labelling on our ropes, there are two different types of elongation.

Static elongation

Static elongation is often aptly referred to as working elongation. It indicates the elasticity of a rope with a static load. Static elongation applies in particular to scenarios such as top-roping or hauling on big walls, etc. Here's how it's measured and tested. A rope is first loaded with 80 kg, then the weight is removed. After a brief pause, the rope is loaded again, this time with 5 kg and a 100cm length is marked. Then the rope is loaded a further time, once more with 80 kg. The deviation of the 100 cm length is the elongation, which is expressed as a percentage. For single and twin ropes, static elongation may not exceed 10 %. For half ropes, it may not exceed 12 %. This type of elongation is particularly noticeable when you are top-roping. Many of us will be familiar with having struggled to complete the crux on a route, only to stop, sit on the rope and then find ourselves back underneath it. This is (thankfully) due to static elongation.

Dynamic elongation

When it comes to safety when climbing, dynamic elongation is more important than static elongation. In particular, dynamic elongation tells us more about the braking performance of a rope than static elongation. The dynamic elongation of a rope is measured by testing its first standard fall. It describes the amount of change in a rope's length (as a percentage) at the moment of the fall. Climbing ropes may not exceed a maximum permissible elongation of 40%. The importance of dynamic elongation should not be underestimated.

The dynamic elongation of a rope reflects its ability to withstand impact force and its static elongation. The greater the impact force value of a rope, the less elongation it provides – and vice versa. A rope with a higher impact force value has less dynamic elongation and consequently less static elongation. A lower impact force value indicates that a rope has greater dynamic elongation. The relationship between impact force and elongation is one of the most important features of a rope.

EDELRID ensures that these characteristics are optimally balanced and long lasting in its ropes by shrinking the fibres in an autoclave and via its Thermo Shield treatment. EDELRID ropes have a low homogeneous, dynamic elongation of 27 % to 34 %, which represents a good balance of ability to withstand impact force and provide elongation.

The dynamic characteristics of a rope decrease as it gets older. Frequent falls reduce the elasticity of the fibres. At some point the rope will have lost its elasticity and should be retired.

Weight per meter

The weight of a rope is important, particularly for performance-orientated climbers and mountaineers. Rope weight is always indicated in grams per meter (g/m). Both weight and diameter are tested by pre-loading a rope and then measuring it.

EDELRID is pioneering the development of ever lighter and simultaneously more robust ropes. Our single ropes weigh from 51 to 69 grams per meter. Our half ropes weigh in at 42 to 52 grams per meter. Our lightest rope is the Flycatcher. This ultra-light twin rope weighs just 35 grams per meter.

Diameter

When choosing a rope, diameter is an important factor according to which activities you intend to use it for. Rope diameter is not always easy to measure, as not all ropes are perfectly round – some of them have a more oval cross section. To ensure consistency and provide reproducible values, a length of rope is loaded with weights and then measured. Interestingly, certain ropes on the market clearly deviate from their manufacturer's information and are often thicker than claimed. This is because they have too much air between the yarns. In practice they are soft and spongy. By contrast, the compact and material-intensive structure of EDELRID ropes leaves little room for such abnormalities.

TESTING AND LABELLING

Sheath slippage

This parameter has a direct impact on the handling characteristics of a rope. To test sheath slippage a ca. two-metre length of rope is pulled though a test device. By applying weights and using a defined mechanism the sheath and core are kneaded and twisted against each other. During this test, the axial displacement of the sheath may not exceed 20 mm. If the sheath and core of a rope slip, then it will bulge and get lumpy. Thanks to our effective manufacturing processes, EDELRID ropes only experience sheath slippage if they are used improperly. New EDELRID ropes show zero sheath slippage when tested; this is therefore indicated as 0 mm.

Knotability

Knotability is not part of any specified standard for ropes. However, it provides a practical indication of how easy a rope is to use. It is primarily stated with static ropes and determined using the following test. A simple overhand knot is tied in a rope. The rope is then loaded with 10 kg in weight. Once the load is removed, the inner diameter of the knot is measured. The knot should be so tight that the inside width, i.e. the opening in the middle, is less than 1.1 times the rope's diameter. However, we recommend not placing too much value on this measurement. In practice the knotability or suppleness of a rope is determined to a large extent by its condition and/or how well it has been looked after. A really dirty rope will generally be harder to tie a knot in than a new rope, no matter how supple it is.

UIAA-Water-Repellent-Test

The UIAA water-repellent test is a new standard and test developed by the UIAA to measure the water repellency of ropes. During the test, a rope sample is first subjected to mechanical surface abrasion over its entire length. This simulates the wear a rope is subjected to in practice on rock and ice. In a standardized procedure, the rope sample is then fixed to a slanted table and subjected to a defined water flow (2l/min) for 15 minutes. The rope sample is weighed before and after the water flow. Finally the difference between these two values is calculated and expressed as a percentage. The amount of absorbed water must not be greater than 5 % of the rope sample's weight. Ropes that meet these requirements may be labeled as UIAA water-repellent.

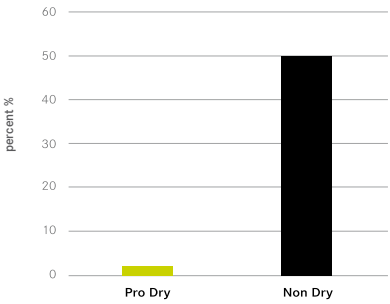
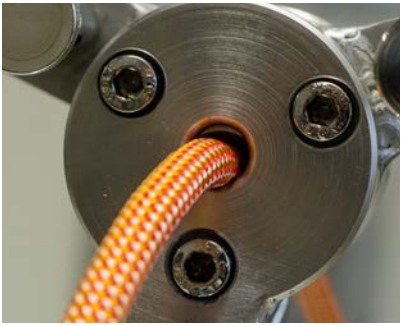
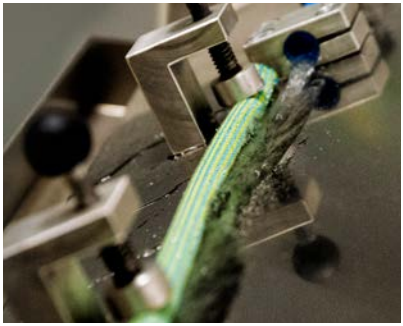


Fig.: Water absorbtion as a persentage of the ropes weight. In the UIAA Water-repellent test, Pro Dry ropes have water absorption of just 1-2 %.





TESTING AND LABELLING

Parameter	1	1/2	∞
Number of falls	min. 5 *	min. 5 **	min. 12 ***
Impact of Force	12 kN *	8 kN **	12 kN ***
Static Elongation	10 %	12 %	10 %
Dynamic Elongation	40 % *	40 % **	40 % ***
Weight per Meter	not defined	not defined	not defined
Diameter	not defined	not defined	not defined
Sheath Slippage	± 20 mm	± 20 mm	± 20 mm

Tab.: Requirements according to EN 892 - Dynamic Ropes

* tested as single strand with 80 kg

** tested as single strand with 55 kg

*** tested as double strand with 80 kg

NORMS AND STANDARDS

As you will see from the labels and hang tags on ropes and other Personal and Protective Equipment (PPE), our products do more than just meet high internal standards; they also have to comply with a range of external standards and quality management systems. EDELRID ropes not only fulfill, but also exceed these standards. Here's what the different standards and symbols stand for.

CE-Conformity Symbol

This symbol shows that the manufacturer confirms that a product meets all the relevant European Union requirements. It is a type of technical passport and is required before a product can be sold within the European Union. The CE-Conformity Symbol means that a product complies with all the relevant requirements and is officially certified. The number after the CE symbol, indicates the certification body, e.g. CE 0123 stands for the TÜV SÜD Product Service GmbH.

ISO 9001

ISO 9001 is an internationally-recognised quality management system certification. This standard is used to define, establish, and maintain effective quality manufacturing processes in order to assure the quality of a product.

EN

The European Standards (European Norms EN) are technical rules and definitions that have been especially tailored for products and product groups to be standardized. European standards ensure uniform standardisation across Europe. An EN symbol is always indicated with the number of the standard. The applicable standard for mountaineering and climbing dynamic ropes is EN 892. Products with an EN standard fulfil prescribed safety standards and have passed a type examination conducted by a testing institute.

UIAA

This symbol shows that a product fulfils the requirements of the International Union of Alpine Associations (UIAA) standard. It is a special standard for climbing and mountaineering products. The UIAA has been developing practically oriented standards for decades. The UIAA standards conform with the EN standards.

ROPE TYPES

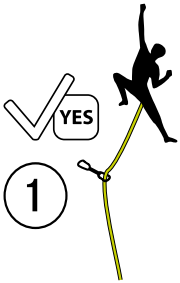
IIn recent decades the demands placed on modern climbing ropes have become more and more varied. Climbing and mountaineering have grown increasingly specialised and attract ever-greater numbers of participants. New disciplines have been created and grade boundaries are being pushed further and further. In order to cover the wide range of activities there are three different types of dynamic climbing ropes.

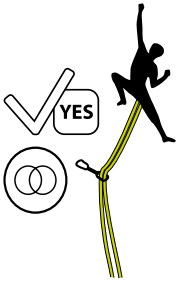
Single ropes

Single ropes are the most common type of climbing rope. They are the classic climbing rope, as it were. Single ropes come in different lengths and diameters and cover a range of different applications. They are classic sport climbing ropes, for both outdoor and indoor use, and are also used for alpine climbing and mountaineering and by big wall climbers. One of their main advantages is their simple and uncomplicated handling. EDELRID manufactures single ropes in diameters from 8.9 mm to 10.5 mm. They weigh in at 52 to 69 grams per metre. Single ropes with a thicker diameter are generally stronger and can withstand a greater number of falls. However thicker also means heavier. For intensive use, such as working routes or top-roping, there are robust single ropes with a higher sheath proportion.

Twin ropes

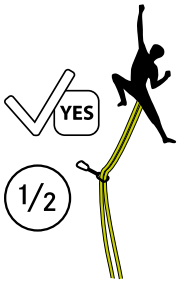
Twin ropes must always be used in pairs. They only offer standardised safety when used as a pair. It is important that twin ropes are always clipped together into each bolt or piece of protection. They have a lighter weight and a thinner diameter. Twin ropes offer greater safety reserves due to increased redundancy that comes with using two ropes. Twin-rope techniques also provides increased safety due to their significantly greater sharp edge resistance as well as reducing the risk of a total failure (stonefall, breaking over a sharp edge). This is why twin ropes are particularly suited to alpine climbing in demanding terrain or for ice and mixed climbing. Using twin ropes also allows you to abseil twice as far, which means that you can escape from a wall quicker. Twin ropes normally have a diameter of 6.9 to 8 mm and weigh around 40 grams per metre.

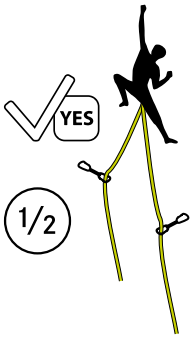


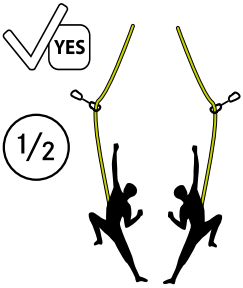


Half ropes

Half ropes (also known as double ropes) are designed, like twin ropes, to be used as a pair. The same as twin ropes they also only offer standardised safety when used as a pair. However, unlike twin ropes, half ropes do not need to be clipped together into each bolt or piece of protection. This technique is ideal for poorly protected or zig-zagging routes or for traditional climbing (trad). It allows rope drag to be reduced where protection points are spread out and considerably reduces impact force. It follows that climbing with a pair of half ropes requires using a belay device that allows you to manage two ropes simultaneously, i.e. to be able to pay out and take in both ropes. Half ropes are used for the same activities as twin ropes. They have one important difference – half ropes can be used as a single rope to bring up a second. This is particularly relevant when climbing as a party of three and bringing up two seconds. Half ropes range in diameter from 7.5 to 9 mm and generally weigh from 40 to 50 grams per metre.







ROPE SELECTION

Today there are more different types of rope than ever before. Selecting a new rope can be a daunting task. The secret is to be clear about what you want your rope for. Make sure you know which category of climber you fall in to. Ambitious climbers will probably need a number of ropes for different activities. Once you know what you want your rope for, other criteria such as length, diameter, weight, dry treatment, etc. also have to be considered. Each style of climbing has its own, particular requirements. Being clear about what you want it for should help you to determine the most suitable type of rope.

Joseph - Ice and mixed climbing

Joseph is not particularly interested in conventional winter sports, such as downhill or cross-country skiing. He prefers to climb twelve months of the year. In the winter, he's often at the icefalls. His motto is "the steeper the better." Mixed routes on north faces do not put him off. Joseph says that ice climbing fascinates him. "It's like rock climbing, only completely different, all at the same time. I like the fact that the ice places great demands on my equipment and me. Constantly evaluating whether the ice will hold and dealing with the wet and the cold are all extra challenges." He is well aware that the type of rope he uses plays a major role in whether he is successful or not. In order to cope with the specific demands of the different types of climbing he's involved in, and to deal with the often wet and difficult conditions, Josef uses lightweight and impregnated single, half and twin ropes.

Paula - Sport climbing

Paula has been climbing for years and is an ambitious climber. She's travelled to sport climbing areas all over the world. What motivates her? "You only really start to get better when you push your limits." She's not afraid of taking falls and has learned how important it is to remain relaxed when climbing above the last bolt. Paula trains on a regular basis, which means that her equipment is subjected to a lot of wear. For this reason, she has a robust single rope that can take plenty of falls. She swears by EDELRID Sports Line double-braid sheath construction ropes.

Paula recently acquired an additional rope for red pointing. It's an extremely thin, 80-meter single rope. The skinny diameter makes it ideal for when she's going for it on longer sport routes.

Thomas - Indoor and top-roping

Thomas is hooked. Laura, his girlfriend, introduced him to climbing three months ago and now he's completely addicted. He climbs once or twice a week at the wall. He doesn't yet feel that confident on harder routes and prefers to top-rope them. Nevertheless, he's noticed that climbing regularly has helped him to improve significantly. Laura has a thin single rope, which looks pretty worn from being used at the wall so often. Thomas seizes the opportunity to go and buy his first ever rope. Given the type of climbing he is mainly involved in, a sales assistant advises him to purchase a more robust rope that will last longer. Minimal weight and a dry treatment are not really that relevant for him. However, he does carefully consider the number of falls when selecting his new rope. The climbing wall that Laura and he go to is not more than 20 metres high, so a 50-metre rope is fine.

Mark - Big walls

Mark is a mountain guide and climbs at a high standard. He's drawn to big walls all over the world. As a self-confessed big-wall fanatic, the idea of spending days up in the wall is something that appeals to him. Mark has already climbed on El Capitan and in the Val di Mello. "Standing at the foot of one of these big walls and looking up is enough to send a cold shiver down your spine." As with most big-wall climbers, he uses single ropes. This applies to both climbing and hauling, although Mark uses a static rope for his haul bag. In order to have maximum safety reserves, he chooses very robust ropes. He is well aware of how dangerous abrasion and sharp edges can be. When selecting his equipment, Mark looks for ropes with a higher sheath proportion that are capable of withstanding a large numbers of falls.

ROPE SELECTION

Liz - Alpine climbing

Liz is a confident and experienced climber. She discovered a passion for alpine climbing three years ago. Since then, she has climbed numerous multi-pitch routes and enjoyed alpine adventures all over Europe. She started with bolted and has now also moved on to trad routes. Her preferred destinations are the Wetterstein Massif and the Dolomites. “That feeling of huge exposure, just you, the rock and your gear – it’s really intense.” Liz has a lot of experience and is aware how quickly conditions can change in alpine terrain. Sudden changes in the weather or running out of daylight often mean that a quick retreat is required. She’s also seen her fair share of stonefall and potentially sharp edges. In addition, the routes that she chooses to climb often involve a long walk in. As a heavy pack can drain you, she looks to save weight wherever she can. Lightweight half and twin ropes are her preferred option.

ACTIVITY	ALPINE CLIMBING	ICE / MIXED CLIMBING	MOUNTAINEERING HIGH-ALPINE USE
PRODUCT LINE	*PROLINE*		
ROPE TYPE	1 ½ ◎	1 ½ ◎	1 ½ ◎
RECOMMENDED ROPE DIAMETER	8.9 - 9.2 mm 7.1 - 8.5 mm 6.9 - 7.9 mm	8.9 - 9.2 mm 7.1 - 8.5 mm 6.9 - 7.9 mm	8.9 - 9.2 mm 7.1 - 8.5 mm 6.9 - 7.9 mm
REQUIREMENTS	• Lightweight • High abrasion resistance • Impregnated • Lower impact force • triple certification as applicable	• Lightweight • High abrasion resistance • Impregnated • Lower impact force • triple certification as applicable	• Lightweight • High abrasion resistance • Impregnated • Lower impact force • triple certification as applicable • Shortlengths as applicable

Harry - Mountaineering and high-alpine

Harry looks to get up in the mountains as much as he can – the whole year round. He's an experienced mountaineer who's climbed big routes in the Western Alps in his day. Sport routes don't really interest him; he prefers to climb in mountain boots not rock shoes. Scrambling on (easier) alpine ridges with sections of climbing – that's what he's after. Harry is often off on of high-alpine trips and has a thing about glaciers. To make sure that he doesn't end his days stuck in a crevasse somewhere, or in a spectacular fall from a summit ridge, he and his partners are always roped up. He prefers his ropes to be water resistant and as light as possible. He prefers thin single ropes, sometimes in short lengths or occasionally a pair of robust half ropes.

SPORT CLIMBING ONSIGHT / REDPOINT	SPORT CLIMBING WORKOUT	INDOOR / TOPROPE	BIG WALL
SPORTSLINE			
1	1	1	1
8.9 - 9.8 mm	9.5 mm - 10.3 mm	9.5 - 10.5 mm	> 10 mm
• Low weight per meter • Smaller diameter • Impregnated	• Robustness • Higher sheath proportion • High number of falls	• Robustness • Higher sheath proportion • High abrasion resistance • Bonded Kern-Mantel construction if applicable • Shortlengths as applicable	• High abrasion resistance • Higher sheath proportion • Static rope as applicable

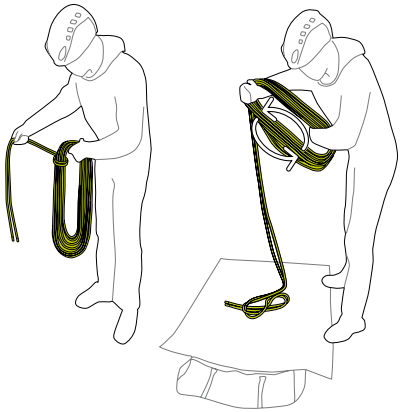
LOOKING AFTER YOUR ROPE

All EDELRID ropes meet the very highest quality and safety standards. Every meter has been carefully manufactured and finished. Our ropes are subjected to rigorous testing. They are prepared in the best way possible and are ready to be used all around the world. When you buy an EDELRID rope, our work is over; the rope becomes your responsibility and you stand at the beginning of a great adventure. There are a few basic rules that every climber should observe in order to get the best out of their rope. It's important not to forget that a rope is essentially a textile product and should be looked after and used accordingly. Here are some practical tips for looking after your rope:

Uncoiling

Most ropes are coiled and packaged before they leave the factory. This is why it's important to carefully uncoil your rope when you unpack it to reverse this process. If you don't, you might end up with unwanted twists and kinks.

To uncoil your rope, carefully remove the securing bands, slide your lower arms though the middle of the coil and then pull them apart so that the rope forms a ring. Keeping the tension on the coils, rotate your lower arms slowly around each other to carefully unwind the rope into a pile on the floor. Take care that no loops get wrapped around your wrist. Once the whole rope has been uncoiled, run it through two or three times and shake it out to remove any last twists or kinks. When you are finished, coil up the rope, or even better store it loosely in a rope bag. It's best to carry out the whole process indoors or over a rope bag, to ensure that it remains free from dirt.

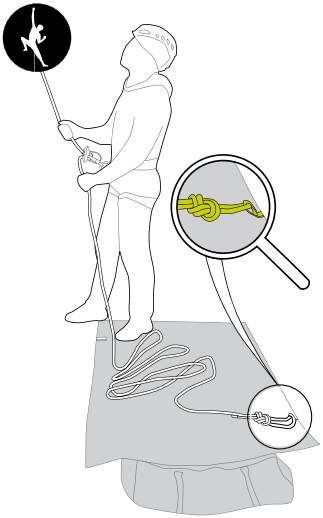


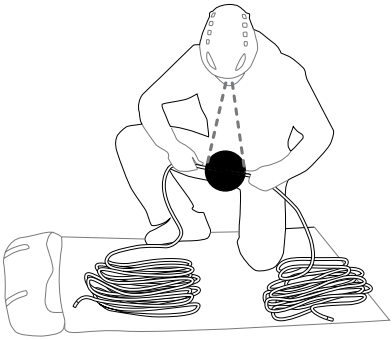
Inspecting your rope

Ropes are made to be used. However, every route you climb leaves its mark. This is why you should carefully inspect your rope before and after you use it. In addition to a visual inspection, it's important to run the rope through your hands, metre by metre. This will enable you to detect any small irregularities or signs of damage. In the event of a serious incident (e.g. stonefall, big fall) you should pay particular attention when checking your rope.

Storage and transport

Rope bags are the best way to store and transport your rope. They provide plenty of room, pack down small and have a tarp to protect the rope from dirt and moisture. Attach one end of the rope to a tie-in loop on the corner to prevent the end from running through the belay inadvertently when lowering. Then run the rope through your hands and stack it in loops on the tarp. The lead climber can now tie in to the free end. When you move on, tie the free end to the second loop on the tarp, roll it up and secure it in the rope bag.





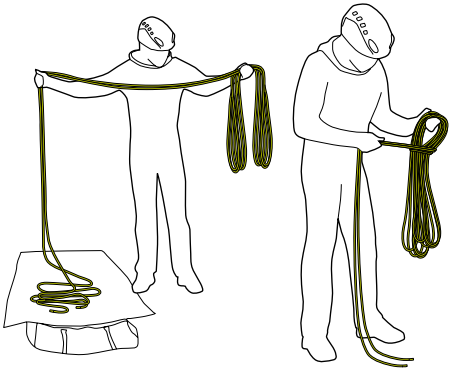
LOOKING AFTER YOUR ROPE

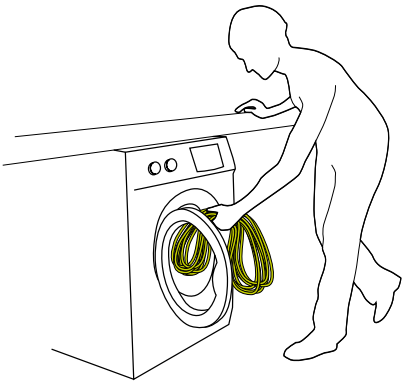
Coiling

Coiling is the best way to transport your rope if you don't have a rope bag. It keeps your rope clean and stored in a handy manner. It takes a while to learn how to coil your rope properly. Here are a few tips to bear in mind. Firstly, it doesn't really matter whether you coil your rope doubled from the middle or from the ends. It can also be coiled as a single strand from one end. The important thing is to coil it in loops and not in rings like a cable. The easiest way to do this is to collect the loops in one hand or hang them over your neck to the left and the right alternatively.

Washing

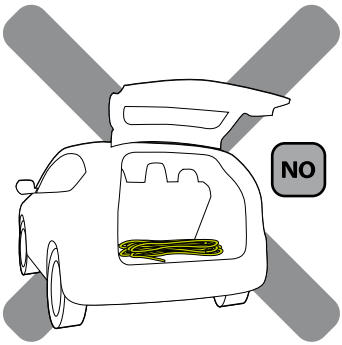
You can't avoid your rope getting dirty (especially if you don't use a rope bag). This is not a problem and it certainly does not mean that you need to replace it. A rope is a textile product and can be washed. If your rope is really dirty, washing will actually improve its handling. Use a mild synthetic detergent from a specialist retailer. The best way to wash your rope is by hand in lukewarm water. The delicates cycle (30°C) in the washing machine is also OK. Important – don't use the spin cycle and never tumble dry your rope. To dry your rope – don't hang it up and avoid direct sunlight. The best way to dry it is to spread it out on the ground in a cool, dark place.





Storage

If you don't intend to use your rope for a longer period or over the winter, then it's important to store it properly. Ideally, you should store it in a dry, dark, cool place and not in a container. The best way to do this is either in a rope bag or neatly coiled up and away from direct sunlight, chemicals, heat and any sources of mechanical damage. Do not hang the rope from one of its coils. Storing a rope permanently in the boot of your car is a bad idea. It could be exposed to large fluctuations in temperature and maybe even harmful chemicals.



Lifespan

Ropes deteriorate even when they are not used. At the very latest they should be replaced after ten years as synthetic fibres deteriorate over time. A rope that is only used occasionally and stored carefully can provide three to six years of service. If you use your rope on a very regular basis and it takes lots of falls, we advise you to downgrade it to top-rope use only after one year. It's not possible to provide exact values for rope lifespan. In particular, difficult handling or a worn sheath should make it clear to the safety-conscious user that it's time to replace a rope. It's important to replace a rope if it has been subjected to extreme forces or if it is damaged. For example if:

- the sheath is damaged and the core is visible
- there are significant axial and/or radial bulges and deformations (e.g. stiff sections, nicks, sponginess)
- the sheath slips significantly
- the sheath is extremely worn (e.g. abrasion or furring)
- heat, abrasion, or friction burns have melted or visibly damaged the rope
- the rope has come in contact with chemicals, in particular acids.

WHAT TO DO WITH YOUR OLD ROPE

xxxx

Even if you love and cherish your rope the day will come when it's time to retire it. However, this doesn't mean you should throw it away. There are lots of things you can do with old rope. Here are a few suggestions.

Rope mat

If you have the time and patience, why not transform your old rope into a rope mat – for use at home or as a sit mat for camping or the crag. Those happy climbing experiences will all come flooding back every time you use it. It looks good and might even help keep your house clean. For best results, we recommend that you wash your rope first. For more information and detailed instructions, visit www.edelrid.de.

Donate your rope to a worthy cause

Kids love playing on old ropes. There are plenty of good uses they can be put to. Let your old climbing rope continue to be a source of fun and adventure for others. Ask your local school, kindergarten or play scheme if they would like your old rope.

Monkey's Fist

The monkey's fist is a large, classic knot and a great way of re-using your old rope. In some climbing areas bolts and metal protection (nuts, cams etc.) are not allowed. Knotted slings and monkey's fists are used instead. These knots ensure that the rock is preserved and, if properly placed, provide good protection. So if you're off to climb in Saxon Switzerland then it's worth knowing how to tie a monkey's fist. Alternatively, they make great toys for your pets.

Dog lead/ toy

Old ropes are also ideal for making dog leads and toys. No self-respecting dog should be seen at the crag without one.

Should none of these ideas for recycling your old rope take your fancy, please remember that ropes are made of made of polyamide (nylon) and should be disposed of in a responsible manner, i.e. take them to your local recycling centre.

DANGERS FOR ROPES

Make sure you know your facts. To protect your rope, it's important to be aware of the potential risks. Here are some of the factors that can seriously damage a rope.

Chemicals and acids

Keep your rope away from chemicals, in particular strong acids, as they can destroy a rope. Acid damage can be especially dangerous as it is often invisible. The sheath might be only slightly discolored, but the rope's core could be destroyed. If a rope comes into contact with acids (e.g. acid from car batteries), it should be replaced immediately. Ropes should always be stored and transported carefully. This applies in particular should your ropes, like so many other things in life, get stored in the car boot or the garage. Think carefully about where you store them and keep them away from acidic chemicals.

Dirt

Dirty ropes don't just look shabby, they are also more complicated to handle. They become stiff and awkward. This is why climbing ropes should not lie in the dirt or be dragged about on the floor of a climbing wall. Instead you should use a rope bag. Sand and granite crystals can be particularly dangerous. They can work their way inside the rope and damage the core. If a rope has got exceptionally dirty, it might not be possible to clean it properly, even after several washes. In such cases, the rope should be replaced. Tests conducted by EDELRID have also shown that chalk contamination can also be a significant, although underestimated cause of abrasion. Excessive chalking can lead in particular to the first metre of a rope being coated in powdered magnesium. Ropes affected in this manner do not perform as well during testing – i.e. they withstand significantly fewer load cycles.

Friction burns

Extreme friction can cause so much heat that the polyamide yarns in a rope can start to melt. This happens in particular when ropes rub against one another. It is particularly dangerous if two ropes are routed through the same anchor point as this can result in a major fall. Lowering from a webbing or sling anchor instead of a fixed, metal anchor can also be exceptionally dangerous. It makes sense to take extra care when climbing at popular venues and on routes with poor protection, for example where threads and slings are used at the lower-off. Rappelling also causes friction and can heat up the belay device significantly. This should not be underestimated. Friction burns are recognizable by glassy or blackened areas on the sheath. The rope will be stiffer and have an unusually hard surface at these points.

Mechanical damage

Sharp rock edges can be very dangerous. They can damage a rope so badly that it may fail, especially in the event of a fall. This is why good rope management is important, to avoid any sharp edges. Stonefall and or a misplaced blow from an ice axe can also seriously damage a rope. In the best-case scenario you might get away with a damaged sheath, in the worst case the core might be damaged. If this is the case, you should not climb on and retire the rope.

The power of the sun

UV radiation from the sun has a significant effect on climbing ropes, as it does on most things in life. UV radiation causes colors to fade and accelerates ageing. Prolonged exposure to the sun will cause a rope to lose elasticity and become stiff. This is why climbing ropes should not be exposed to the sun unnecessarily. It is particularly bad to dry your rope in full sunshine after it has got wet in the rain or after washing. You'll often find old, faded webbing and rope slings at belays or to protect difficult sections. They should be used with caution.

Wet and cold

The effect of moisture on a rope should not be underestimated. Wet ropes are not only heavier and more difficult to handle, they also have less ability to absorb energy dynamically. Should temperatures plummet, and a wet rope start to freeze, it will have significantly lower safety reserves. This applies to ice climbing, fixed ropes, high-alpine use or glacier crossings and also to sudden extreme changes in weather. Impregnated ropes are more capable of dealing with such conditions. They are water resistant and can withstand the wet and the cold longer.

Abrasion

Abrasion is one of a rope's worst enemies. Rock, carabiners and belay devices can all be a major source of friction and cause wear and abrasion along the whole length of the rope. The individual sheath fibres tear and the sheath's surface gets rougher. As a result, the sheath gets thinner, and the rope becomes rough and furry. Once the core becomes visible, the end is nigh. The greater the load, the rougher the rock and the sharper the edges, the more the sheath will be damaged. Climbing on fractured rock, quartzite sandstone or sharp granite can accelerate this process. Frequent rappelling and top-roping can also accelerate ageing far more than climbing a rope without loading it.

TIPS AND TRICKS

Using thin diameter ropes (<9.2 mm)

In recent years new manufacturing techniques have made it possible to make extremely thin single, half and twin ropes. These ropes are intended for specific activities and have a more limited scope of application.

Pro

Thinner diameter ropes have an obvious advantage – they are extremely lightweight. In practice, this means that if you using two 60-metre half ropes, you could save around 1.5 kg of weight from your rucksack. Anyone who has carried an expedition pack to base camp at Fitz Roy or Cerro Torre will know what a difference this can make. Thinner diameter ropes reflect the spirit of modern alpinism and the desire to move fast and light.

In addition, skinny diameter ropes run particularly easily through bolts or protection, which can significantly reduce friction and rope drag on longer, zigzagging routes. If you're pushing your limits on a long sport route, this can make all the difference between success and failure.

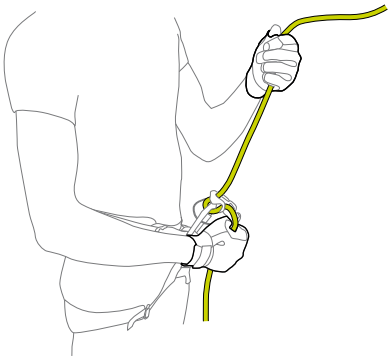
A further advantage is multiple certification. Take for example the EDELRID Swift 8.9 mm. The Swift is a single, half and twin rope all in one – and the first choice for mountain guides who need to cover all areas of use.

Contra

Of course, such ropes have their limits. Due to their extremely thin diameter, they have a shorter lifespan (they are less robust) and should therefore not be used for top-roping or working routes.

What's more, these extremely thin ropes take some getting used to and require extra caution when belaying and rappel. They are not suitable for beginners. In particular, an appropriate belay device should be used that matches the diameter of the rope. Not all belay devices are approved for such skinny ropes.

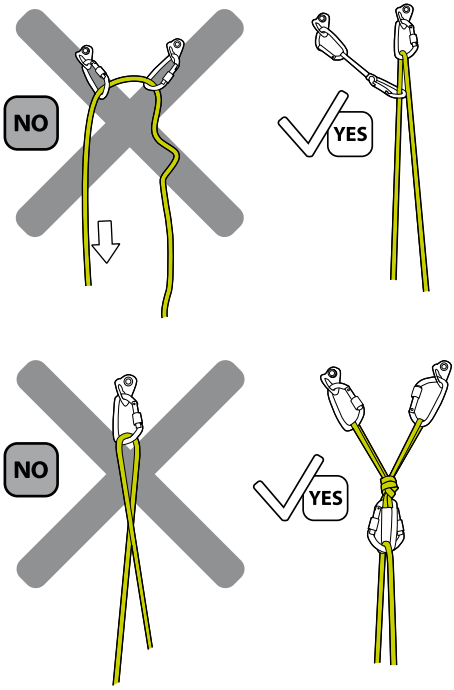
In addition, it is recommended that belay gloves are worn. Belay gloves help you to grip the rope better and can prevent burns, especially from excessively fast lowering or rappel.



Top-roping – caution required

Particular care should be taken when rigging a top-rope to ensure that the rope is properly routed. Top-roping often results in severe loading on the rope – something that is frequently underestimated. However, with careful rigging and rope management friction, abrasion, tangling and friction burns can be avoided. Extra care is needed at anchors where the rope has a 90° bend and runs through two separate anchor points. Such anchors (or lower-offs) are often found in the USA, where it is common practise to rappel from the anchor. This type of anchor arrangement can often lead to twists and kinks when a loaded rope runs through it, for example, when lowering the leader. If the rope is then loaded again, for example by a second who also takes frequent rests on the top-rope, then permanent kinks and twists may be caused. Your rope might be left looking like a curly party decoration and would certainly no longer be suitable for climbing. This is why if you have two anchors at the same height it's import to extend one of them, for example with a quickdraw. Alternatively, you could connect both anchors to create a central anchor point. Once you've finished climbing, the last climber would then attach to both of the anchors, thread the lower-off and rappel. This way, the rope will not get twisted and kinked.

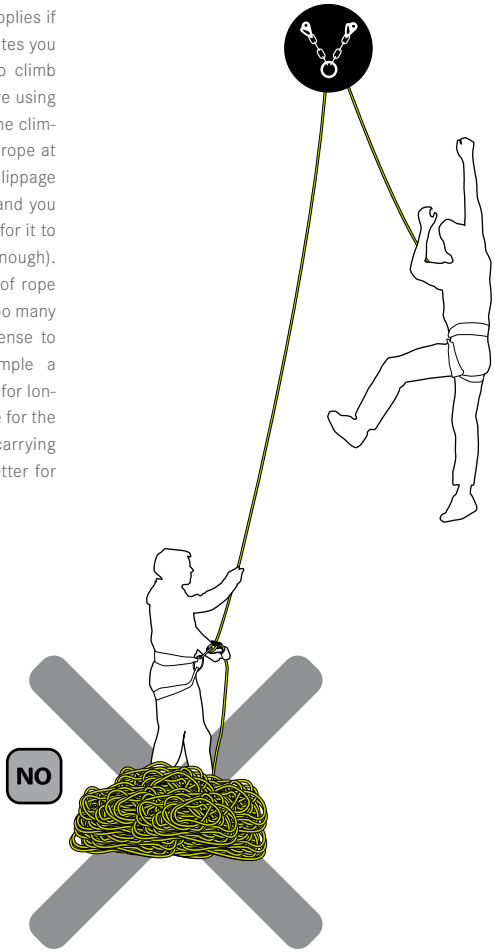
In order to minimise wear on insitu anchors when top-roping, the anchors should not be threaded with the rope directly. If a route is to be toproped, always rig a screwgate or two opposing quickdraws (with their gates opposed to each other) in the anchor.



TIPS AND TRICKS

Choose the right length

All things come to an end – at least ropes have two. It is advisable not to climb on the same end of the rope all the time, but to alternate. This ensures that the rope is used evenly. To prevent twists and kinks forming, it's worth occasionally pulling the whole rope through the belay anchor to give it a chance to straighten itself out. Please note: this only applies if your rope is an appropriate length for the routes you are climbing, e.g. using a 70-metre rope to climb routes that are 25 - 30 metres long. If you are using a long rope for short routes, for example at the climbing wall, changing ends is not good for the rope at all. By constantly changing ends any sheath slippage will be pushed into the middle of the rope, and you wont be able to hang out the rope anywhere for it to drop out (because the routes are not high enough). This is why you should buy the right length of rope for the climbing you are doing and not have too many unnecessary metres in reserve. It makes sense to own ropes in different lengths, for example a 50-metre Frankenjura rope, a 70-metre rope for longer sport routes (e.g. Spain), a 40-metre rope for the climbing gym. This means you won't be carrying extra metres unnecessarily and it will be better for your ropes too.



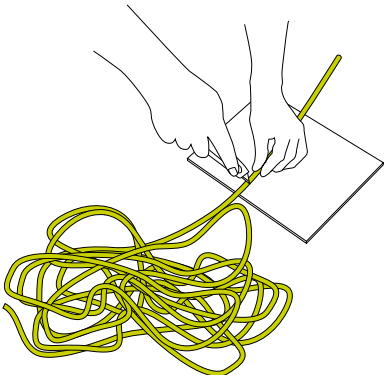
Cutting the end off

Shock loading can damage a rope. If the damage is only limited to a section near the end, then it can be cut off. However, there are a few things to bear in mind to prevent sheath slippage and fraying:

- Cut the rope 1 - 2 metres before the affected section, not directly where the damage starts.
- Once the affected section has been removed, smooth out the last 5 metres of the rope by hand. If the sheath has slipped at all, it will be smoothed out over the end of the rope.
- If there is excess sheath, cut the rope again – 20 cm in from the end of the sheath. This will help prevent the sheath from slipping in future.
- Once the cutting is completed, the ends need to be sealed, to stop the rope from fraying. The best way to do this is with a standard cigarette lighter. Pay attention not to burn the rope – you only need to melt the fibres and then carefully flatten the end.
- Please note: once you have cut one end of your rope, you will need to adjust the middle marking to prevent accidents when abseiling or lowering.

Ropes also benefit from taking a break

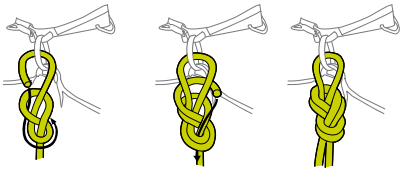
If you take a heavy fall, give your rope some time to recover. Every climber benefits from taking a break after a big fall. The same applies to your rope. To ensure that your rope continues to function for as long as possible, the polyamide yarns need around ten to fifteen minutes to return to normal after heavy dynamic elongation – something they can only do when the rope is unloaded. Do your rope and yourself a favour after a big fall. Don't just pull yourself back up to have another go. Lower off, take a break and then get back at it refreshed.



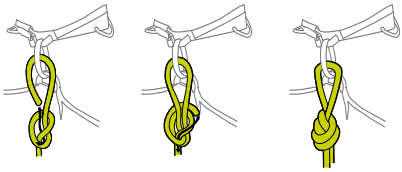
KNOTS FOR CLIMBERS

Knots are an essential skill for climbers. Whether tying in to a harness, rappel, knotting slings, joining ropes, stopper knots or belaying – you have to know your knots. These are the main knots that every climber should know:

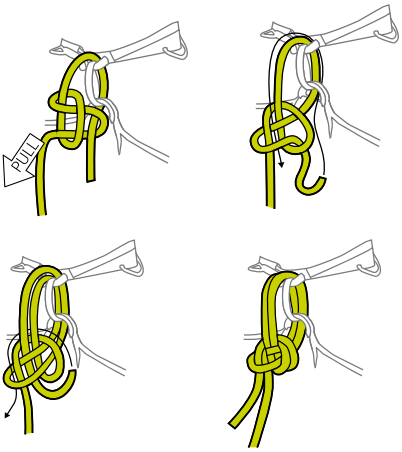
Figure of Eight
Tying in, joining rappel ropes.
Advantages: Very safe.
Disadvantages: Relatively large.



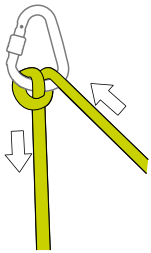
Double Overhand Knot
Tying in, joining abseil ropes.
Advantages: Easy to tie, relatively small, handy knot.
Disadvantages: Relatively hard to open once loaded



Double Bowline
Tying in.
Advantages: Relatively easy to open once loaded.
Disadvantages: Somewhat complicated and relatively large.



Italian Hitch or Munter Hitch
Belaying dynamically without a belay device.
Advantages: Secure handling, very high braking effect, no belay device required.
Please note: The Italian Hitch causes greater rope wear (high friction heat, friction burns or melting on sheath). Also causes twists and kinks in the rope when not used carefully.

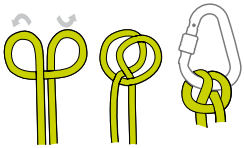


Clove Hitch

Setting up belays, attaching a rope.

Advantages: Quick and easy to tie, including one-handed. Comes undone easily, no matter how much it has been loaded. Can be adjusted without taking it off the carabiner. Easy to adjust when setting up a belay. Can be tied anywhere in the rope .

Please note: Often confused with a Girth Hitch (Lark's Foot).



Prusik Knot

A knot that clamps onto a thicker rope under load. For abseiling or rescue use. If the Prusik Knot does not hold, increase the number of loops around the rope.

Advantages: Simple and effective.

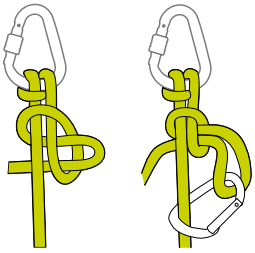
Please note: Can be difficult to undo on wet ropes.

Tying-off an Italian/ Munter Hitch

Use this slip knot to quickly and easily tie off a loaded Italian hitch.

Advantages: Easy to undo.

Please note: Must be secured with an additional knot (overhand knot) or carabiner.

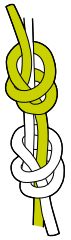


Double Fisherman's Knot

Used to set up (abseil) slings. Joining abseil ropes: particularly good for joining ropes of a different diameter.

Advantages: A particularly safe knot for joining two ropes.

Disadvantages: Somewhat complicated and relatively large.



INDEX