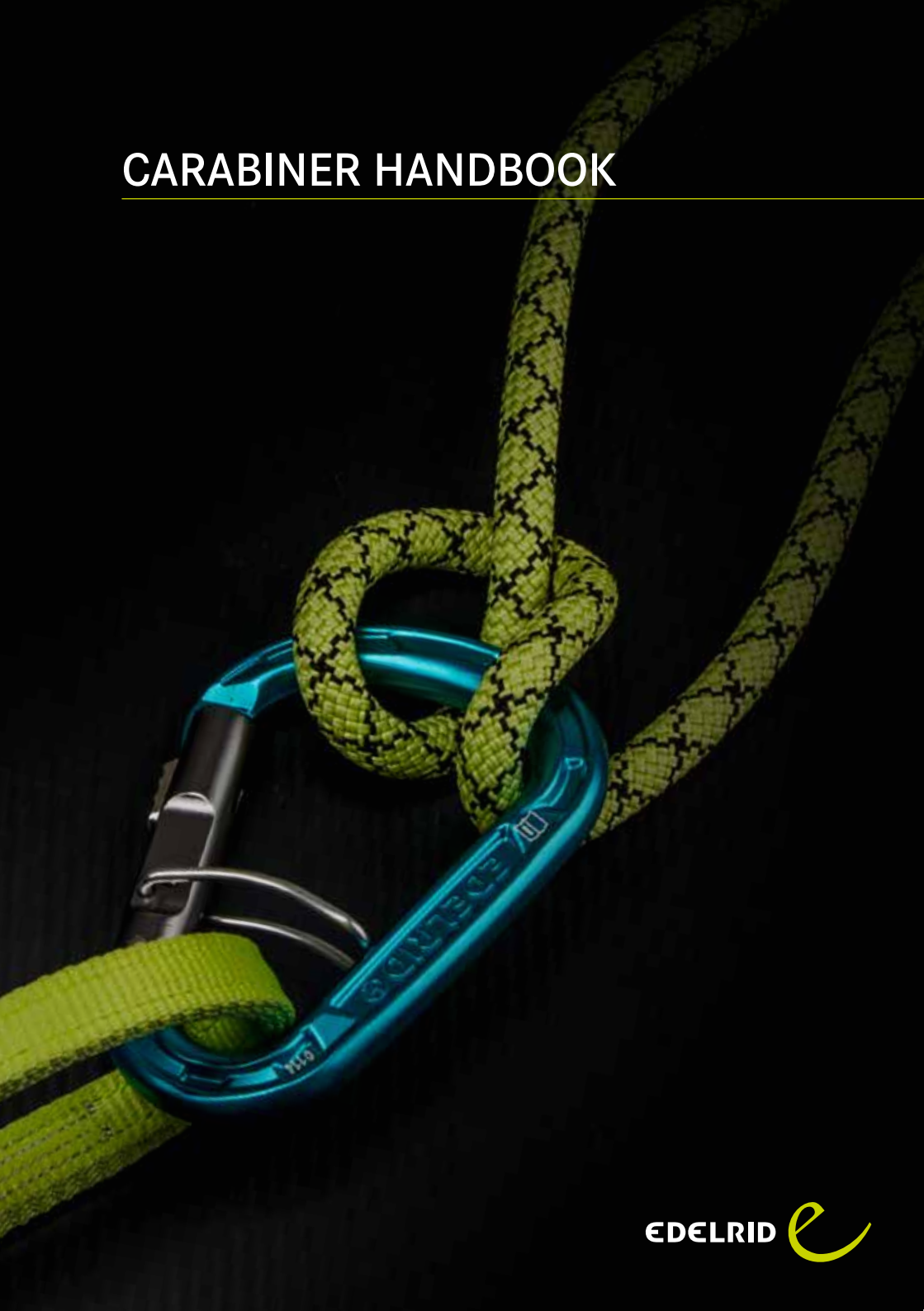
CARABINER HANDBOOK



EDELRID

Carabiners are a central part of the climbing safety chain. This is why we've put this handbook together to provide more information and share our enthusiasm for these small, but important pieces of climbing gear. At EDELRID, we're constantly working to make carabiners even lighter and more functional, but even the best carabiner in the world is not worth much if you don't use it properly. This handbook outlines all the different types of carabiners available and how they are used. In particular, we'll be looking at how to use them correctly and how to avoid potential risks and dangers. In addition, we provide a glimpse behind the scenes to give you an insight into how we manufacture and test our carabiners.

Made by climbers for climbers. The EDELRID team is made up of passionate climbers and alpinists. In addition, we work closely with professional climbers and mountain guides. We understand the demands that climbers place on their equipment. CREATIVE TECHNOLOGY is our credo – and we apply it to our carabiners to make versatile products that meet and exceed the highest quality standards. We have over 150 years of experience in mountain sports. This combination of experience and enthusiasm constantly drives us to explore new paths and only accept maximum performance. And as a mountain sports company, we naturally make quality management our highest priority.

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IMPRINT

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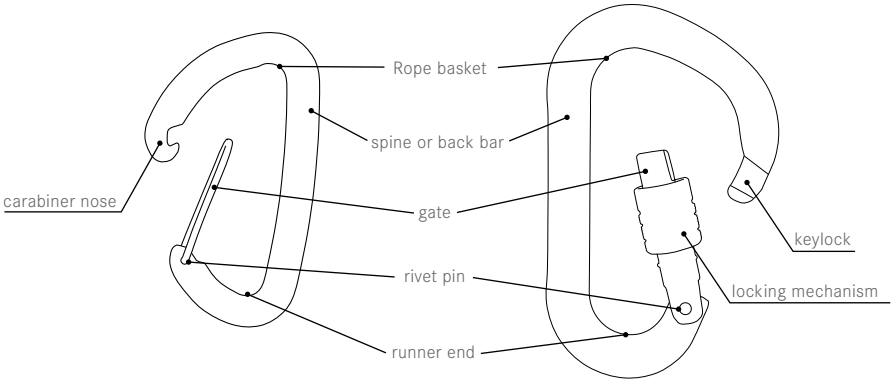
INTRODUCTION

You've the guidebook, you know which routes you want to climb, but which gear to pack? One thing is certain, you won't get far without carabiners, but which carabiners should you use? Red, green, sliver, oval, pear-shaped, screwgate, double locking, triple locking – carabiners come in all shapes and colours.

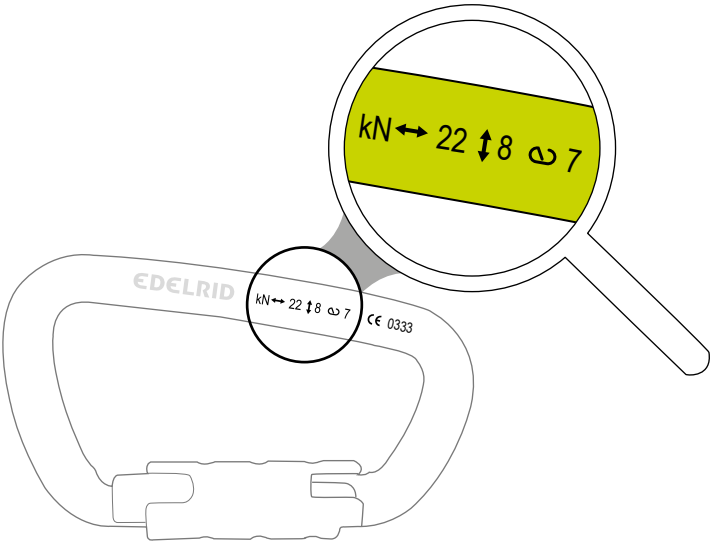
Carabiners (aka biners) are an essential component in every safety chain in mountain sports. Historically, they were invented by cavalrymen to safely attach a rifle (in English a carbine, derived from the French word carabine) when in close combat. The pear-shaped gun hook with spring closure was called a Karabinerhaken in German. British alpinists imported the word karabiner (aka krab) into UK climbing vocabulary. American climbers did the same, although the US spelling carabiner is more faithful to the original French: carabine. This is where the name karabiner or carabiner comes from. Carabiners are also referred to as connectors in the technical standards.. Today, carabiners are mainly used in mountain sports, but also in sailing or diving.

In order to make this handbook easier to follow, here's the most important biner vocabulary.



Personal Protective Equipment (PPE)

Carabiners – as climbers, we trust these small lightweight aluminium or steel connectors with our lives. However, it's important to note that not all carabiners are suitable for climbing. Carabiners for fall protection have to meet separate standards. Only carabiners which meet EU standards EN 12275 or EN 362 may be sold or used as Personal Protective Equipment (PPE) against falling for mountain sports. PPE means any device or system intended to be worn or used by an individual to protect them against one or several risks that might jeopardise their health or safety. How do I know if my carabiner is PPE certified? Look at the spine or back bar. Here, you'll see its strength ratings and a four-digit CE mark. This means that your carabiner conforms to the EU standard.



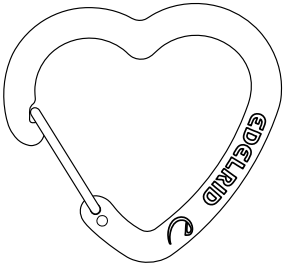
CARABINER TYPES

Carabiners are used in a wide variety of situations. This is why there are so many different types available. New models are introduced to the market every year. Locking carabiners, non-locking carabiners, non-load-bearing accessory carabiners, quickdraw carabiners, HMS carabiners, screwgates, twistlocks... sometimes it's hard to keep track. There are three main types of carabiner: non-load-bearing (accessory) carabiners, basic or normal carabiners (often referred to as non-locking carabiners) and locking carabiners.

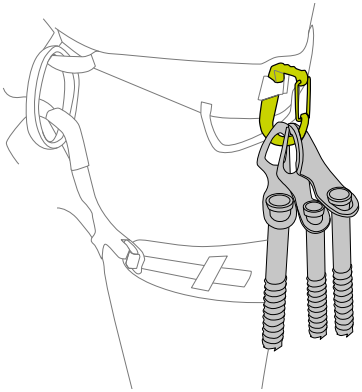
Accessory carabiners

Normal carabiner

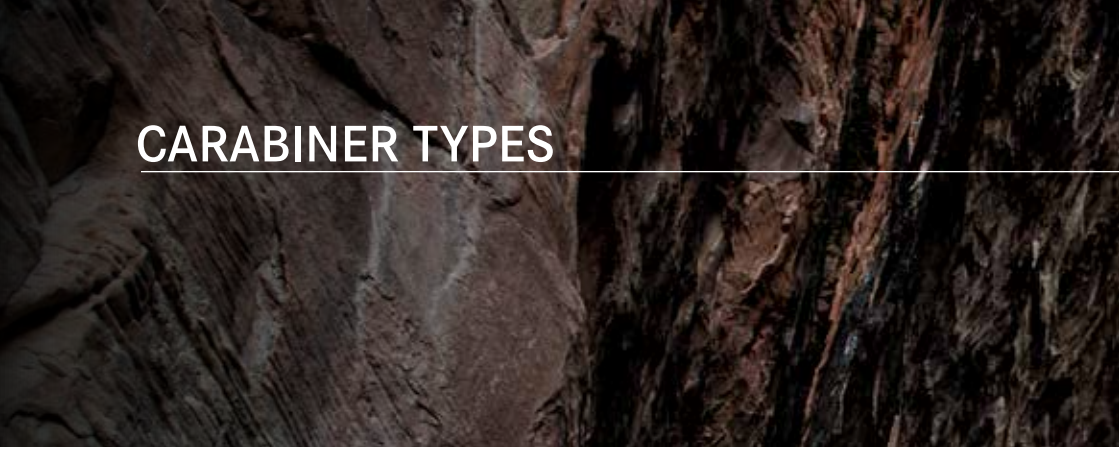
Locking carabiner



Non-load-bearing accessory carabiners (not PPE)
You'll see all kinds of weird and wonderful carabiners. For example, heart-shaped, animal-shaped etc. These non-load-bearing carabiners come in all shapes and sizes. Many of them are intended for use as ornaments only, i.e. on your key ring or the zip on your backpack. However, you can also use them to attach your chalk bag or climbing shoes to your harness or to secure a bottle to your rucksack. Please note: as the name clearly implies – non-load-bearing carabiners must never be used for climbing. They are not certified as personal protective equipment (PPE) against falling. As such, non-load-bearing accessory carabiners do not have to conform to a standard or undergo special batch testing.



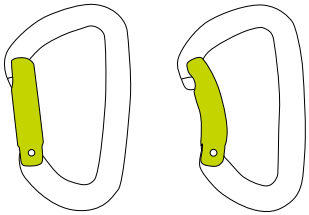
Ice screw clips (not PPE)
Ice screw clips are a special type of non load-bearing carabiner. When climbing ice or mixed routes in winter, you often need to carry a large selection of ice screws for protection. Ice screw clips are essential for securely storing these sharp pieces of equipment on your harness and keeping them close to hand. Other types of carabiners are not as effective; the ice screws would be difficult to clip or unclip from your harness and they would get in the way. Many climbing harnesses have dedicated ice screw clip attachment points. Just to reiterate: never use a carabiner for personal protection unless it conforms to EN standard 12275 or 362. Other carabiners are non load-bearing carabiners. This applies to ice screw clips too.

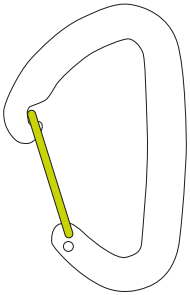


CARABINER TYPES

Normal carabiners (PPE)

Normal carabiners are basic connectors with a gate, but no gate locking mechanism. Generally, they're used in quickdraws. They can be purchased either separately or as a quickdraw set. Normal carabiners (aka basic carabiners) handle more easily than a locking carabiner, but are also easier to open accidentally. In situations where ease and speed of clipping and unclipping are more important than additional security provided by a locking gate, use a normal carabiner. Please note: only use normal carabiners in quickdraws or a redundant system.





Solid gate

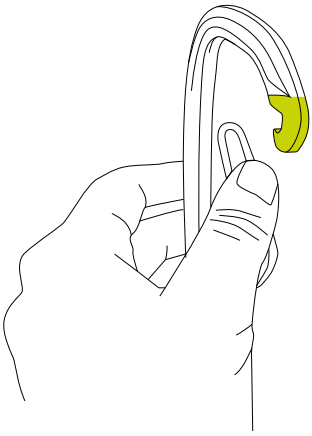
Normal carabiners come with straight (aka standard) or bent gates. Bent gates simplify clipping the rope into the quickdraw by helping to gently guide the rope in. However, use straight gates for clipping into bolts. The straight gate prevents the carabiner from getting caught in the bolt.

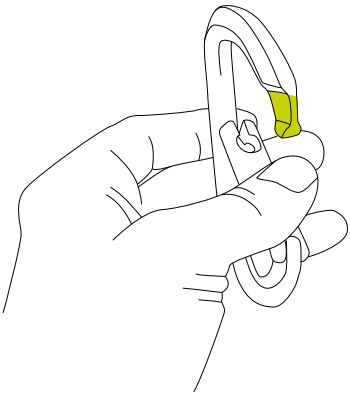
Wire gate

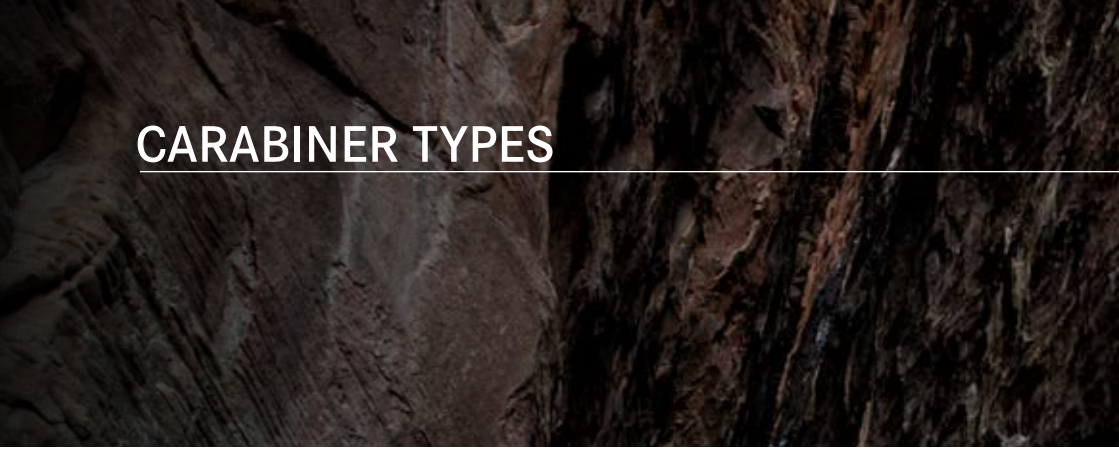
Wire gate carabiners are an alternative to solid gate carabiners. Wire gate carabiners have three important advantages. Firstly, wire gates tend to freeze up less makes them ideal for use in even the most extreme conditions. Secondly, the gate is thinner and therefore lighter. Thirdly, the lighter wire gate also reduces any whiplash effect on the gate (aka gate lash). More about whiplash effect later, in "Risks and Dangers". Wire gate carabiners also have a disadvantage due to their shape, or more specifically, their nose. Allow us to explain.

Carabiner nose design (Nose vs. Keylock)

Not everyone knows that the nose design of a carabiner also determines its strength. Carabiners are designed to be loaded lengthwise with the gate closed. In general, gate-open strength is less than half than when the gate is fully closed. There are two main forms of carabiner nose design. Older carabiners often have a hooked nose which the wire gate snaps into. Newer normal carabiners are mainly designed with the key lock closure system (sometimes called a “clean nose”). Instead of a hooked nose, there is also a T-shape design; the “key” on the end of the milled nose snaps into the correspondingly milled “lock” in the gate, like a jigsaw piece. Wire gate carabiners mainly have a nose design. The notch and the hooked nose design has a significant disadvantage. Gear such as slings, webbing, or wire can easily snag on the hooked nose (aka nose-hook) and prevent the carabiner from closing properly. This is particularly dangerous as carabiners with a hooked nose and notch design can get caught in a bolt. This dramatically reduces their strength. If loaded during a fall, fall energy acts like a lever on the open carabiner and can bend it or in the worst case break it altogether. So when clipping a carabiner with a nose notch: always check that it has closed fully and can’t snag. In this respect, the key lock system has a big advantage.







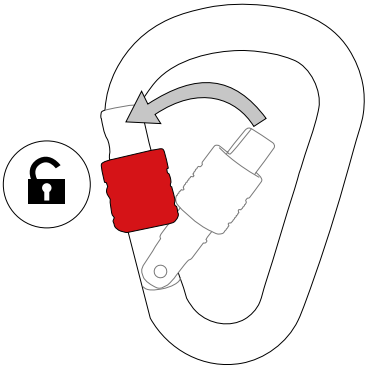
CARABINER TYPES

Locking carabiners

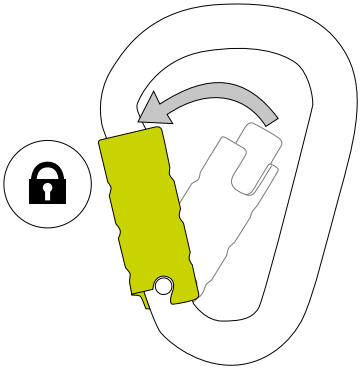
Locking carabiners do exactly what they say on the tin. They're available with a range of different locking mechanisms. In situations where a failing carabiner in the safety chain would have serious consequences, they are particularly important. Always use locking carabiners for belaying, abseiling, roping up on glaciers and at building belays. Locking carabiners with less complex opening mechanisms are also used in quickdraws to provide extra protection. New, innovative designs hit the market every year.

Locking carabiners offer maximum safety and yet need to remain easy to handle. This is where the different locking mechanisms come in.

Locking carabiners fall into two main groups: manual locking and auto-locking (aka self-closing or self-locking) carabiners. As you might expect, manual locking carabiners have a manual locking mechanism which you have to actively close. Auto-locking carabiners are self closing, and shut automatically as soon as you release the gate.



Manual locking carabiner



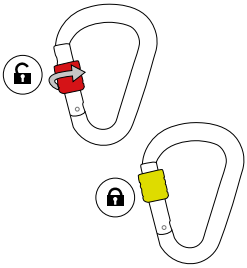
Auto-locking carabiner

Manual locking carabiners

You have to actively close carabiners with a manual locking mechanism (e.g. screwgates). When it comes to handling, this makes them slower than auto-locking carabiners. Yet, manual locking carabiners have their advantages. For example, at a belay stance. If you've not closed the locking mechanism, you can use a manual locking carabiner like a normal snap gate carabiner. Whereas auto-locking carabiners have to be released, opened and held open for every new element to be added.

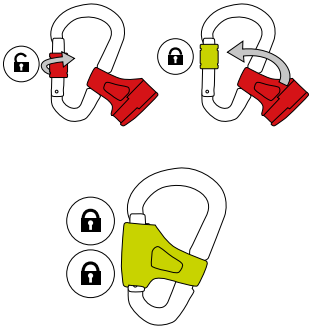
Screwgates

To lock a screwgate, close the gate and do it up by tightening the internally threaded sleeve, by twisting it up the thread. This then locks the screwgate. Always check that you've done it up properly. It's also recommended to twist the barrel back half a turn to ensure that it's not over- tightened and that you can still open it. Check that the threaded sleeve runs smoothly, as only then will it be possible to operate the carabiner with one hand. To open a screwgate, twist the sleeve back down again. Take care when using a screwgate as an HMS carabiner to belay a partner with an Italian hitch. In certain situations, the knot can run over the screwgate and open it. Always check that the braking rope is running correctly on the back bar side of the carabiner. When mountaineering and in particular when roping up on glaciers, it is recommended to use an auto-locking carabiner rather than a screwgate. This is because the vibrations from walking can slowly cause a screwgate to open.



Belay Master

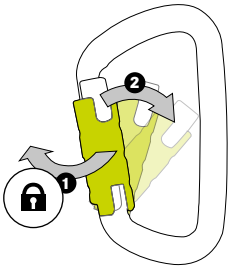
The Belay Master has a guard that additionally secures the screwgate locking mechanism. Like all screwgates, you first have to close the carabiner manually. Once the sleeve has been tightened, the large plastic guard is snapped into place. The guard prevents the screwgate from opening accidentally. This makes the Belay Master ideal for use as an HMS carabiner or for roping-up on glaciers. The plastic guard also prevents the carabiner from twisting and holds it in correct alignment. This position prevents cross-loading. It's possible to close a Belay Master with one hand, but this takes time and requires practice. To open the gate, release the guard, and then unscrew the locking sleeve. Please note: the Belay Master is not suitable for use with certain tubular belay devices and tubular devices with assisted braking. The plastic guard may prevent certain belay devices from pivoting freely. This applies in particular to semi-automatic belay devices (e.g. Eddy).



CARABINER TYPES

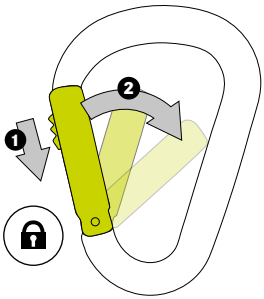
Automatic locking gates

Automatic locking carabiners (aka safelock carabiners or safebiners) have a spring-loaded gate mechanism that shuts automatically as soon as you release it. The internal spring in this type of carabiner ensures that the gate locks automatically and remains closed. This makes them quick to handle and ensures they immediately lock. However, you do have to completely unlock the gate before you can open the carabiner again.



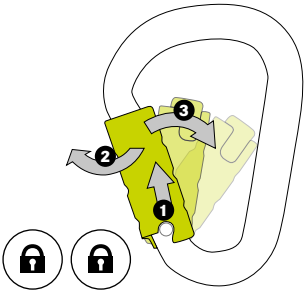
Twist-lock carabiners

Twist-lock carabiners have a twisting sleeve. You have to open them by turning the sleeve by approximately 90° before you can open the gate. With a bit of practice though, twist-lock carabiners are easy to use. The same as with screwgates, care is needed when using carabiners with a twist-lock gate for belaying with an Italian hitch. This is because if the rope is positioned wrongly, it can unintentionally open the gate.



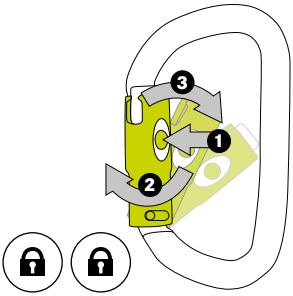
Slider carabiners

EDELRID developed a slider gate locking system for carabiners which locks quickly and is easy to use with one hand. You slide back the small bar on the outside of the gate to open it. Because it's so simple to open, this type of carabiner is ideal for all situations where you need to quickly and safely clip a locking carabiner. We also use it in our quickdraws for this reason. Slider carabiners are easy to handle and offer greater safety than normal carabiners. As there is no threaded sleeve, slider carabiners can also rotate freely. Most other carabiners with sleeves often get caught in bolts. This means that slider carabiners prevent the risk of snagging in a bolt or belay device and prevent potential cross-loading. In addition, carabiners with a slider gate locking mechanism are significantly lighter than other locking carabiners.



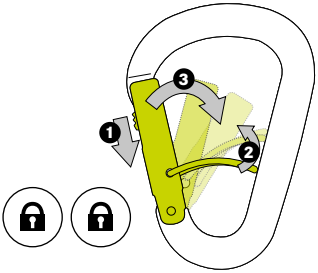
Triple-lock carabiners

Triple-lock carabiners require three separate actions to open the carabiner. There are two different types: push-and-twist and pull-and-twist. You either move the sleeve up (push) or down (pull) and then twist it to unlock it and open the gate. This offers extra safety compared to standard twist-lock carabiners. Hoever one-handed operation is pretty difficult and requires practice.



Ball-lock carabiners

Ball-lock carabiners are a special type of triple-lock carabiner. You press in the ball on the sleeve before you can turn it. This unlocks the ball-lock sleeve. With a bit of practise, ball-lock carabiners are easy to use.



Safelock slider carabiners

These carabiners combine a slider gate locking mechanism with an internal spring bar. As such, they have two completely automatic locking mechanisms which are completely independent from one another. The carabiner will only open when both the spring bar is pushed up and the slider mechanism is released. Opening the spring bar on its own, or releasing the slider on its own is not sufficient to open the gate. As it is deliberately complicated to combine both movements, these carabiners are very safe. In addition, the spring bar holds the carabiner in the correct position and ensures that it cannot be cross-loaded. The extra safety makes this type of carabiner ideal for use with most belay devices, for belaying with an Italian hitch and for roping up on glaciers. Yet, some tubular belay devices with assisted braking should not be used with this type of carabiner. This is because they get caught on the carabiner's inner spring bar which prevents their assisted braking function. The downside to the enormous very high level of safety that sliders with a safelock offer is that the combination of slider plus safelock is difficult to open with one hand.

CARABINER SHAPE

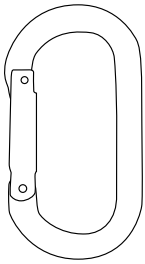
Today, you see many different carabiner shapes. This applies to non load-bearing accessory carabiners, normal carabiners and locking carabiners. However, there are three main shapes: D-shaped, pear-shaped (HMS) and oval-shaped carabiners.

D-shaped

Most normal carabiners, and also some locking carabiners, are D-shaped. The D-shape directs the load to the load-bearing back bar (major axis) which is the carabiner's strongest point. This is a great advantage when it comes to quickdraws. The design ensures that the rope slips to the back bar of the carabiner. As well as ensuring optimal alignment and making it difficult to cross-load, this has a further advantage. The rope is kept well away from the gate. This minimizes the risk of unintentional unclipping.

HMS

HMS carabiners have two main characteristics: they have a very large gate opening and a large rope basket that can accommodate all knots. Pear-shaped carabiners are used in particular for belaying with an Italian hitch and with most belay devices. Thanks to their larger radius, they are also ideal for rigging belay stances. The large rounded pear-shaped design ensures that the knot can flip sides as it's supposed to. This prevents a cross-loading situation and also reduces the risk that the knot might move and open the gate locking mechanism. Virtually all HMS carabiners are locking carabiners.



Oval-shaped

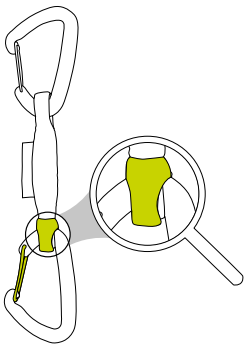
Oval-shaped carabiners are only used in special situations, for example, big wall aid climbing or in pulley systems. Their symmetrical design means that the load is always in the middle of the back bar (major axis). This is what makes oval-shaped carabiners ideal for setting up pulley systems and for use with jumars (ascenders).

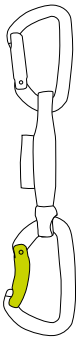
QUICKDRAWS

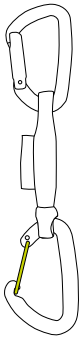
Clip... and relax... Quickdraws – where would we be without them? They are a piece of gear that you just couldn't do without. EDELRID is proud to have invented the quickdraw concept, i.e. two carabiners connected by a sling. Previously, climbers used to join one carabiner directly to another. Quickdraws generally consist of two D-shaped carabiners, connected by a stitched sling made of polyamide, polyester or Dyneema®. Quickdraws have a big advantage over using single carabiners for protection. They make rope management much easier and eliminate rope drag. In addition, quickdraws are less likely to twist in a bolt so you don't have to turn them back to the correct position to you're your rope.

Quickdraws mostly use normal carabiners. Depending on the type of climbing and also personal preference, we use quickdraw carabiners with bent gates, with wire gates or with one of each. On the side you clip the bolt, a straight gate is generally used; on the side that you clip the rope a bent gate or a wire gate is generally used. EDELRID also offers quickdraws with locking slider carabiners. Even with the locking gate, they remain easy to clip and provide extra safety against unintentional unclipping at critical points (for example, traverses) and against whiplash effect.

Please note: Clipping a quickdraw carabiner in a metal bolt can cause the bolt hangar to gouge a sharp-edged groove (aka burr) in the aluminium of the carabiner. This is why you should always clip bolts or pegs with the same end of your quickdraw. If you clip your rope through a carabiner which has a sharp edge or burr, you could damage the rope or, in the worst-case scenario, it might break. How do I know which side is which when both ends of my quickdraw have the same type of biner? Look at your quickdraw slings more carefully and you'll see that each end is different. The "rope carabiner" is fixed more securely in the quickdraw sling. All EDELRID quickdraw sets come with an antitwist fixing. These small, but important rubber keepers make sure that the carabiner sits correctly in the sling and prevent it twisting. They make clipping much easier and ensure that the load is transferred to the major axis in the event of a fall. The "bolt end" of the quickdraw sling has a slightly larger loop. Why? It allows the quickdraw to move more freely so that it won't get caught if the rope runs through the quickdraw at an angle.

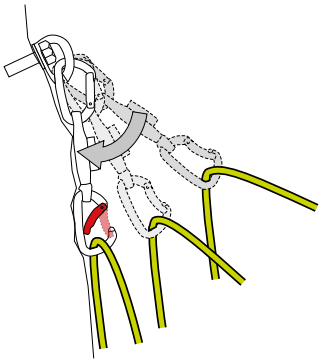






RISKS AND DANGERS

Even the best carabiner can be a potential source of risk if it's not used properly. Here are the main carabiner-associated risks and dangerous situations to avoid.



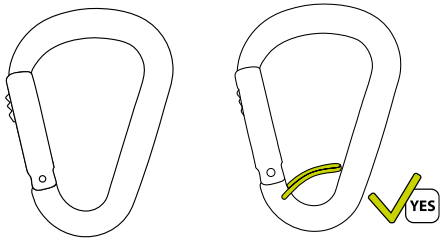
Whiplash effect

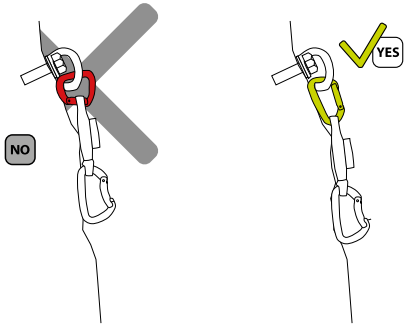
The whiplash effect (aka gate flutter) occurs when the back of a carabiner, i.e. the side opposite the gate, hits hard against a solid surface (for example a rock face). In the event of a fall, as the rope is pulled taught, the carabiner is often banged against the wall and shock loaded. Due to inertia the gate opens for a split second. It's easy to simulate the whiplash effect yourself. Simply bang the back of a normal carabiner against the edge of table or the back of your hand. You'll hear the clicking sound of the gate opening and closing, though you don't see it because it happens so quickly. This brief moment where the carabiner opens is potentially dangerous.

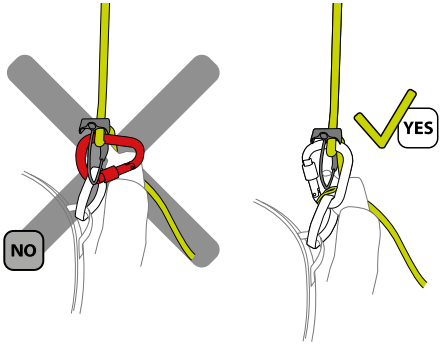
If the carabiner is loaded at the exact moment when it is open, then it will have less than half its normal breaking strength compared to when it is closed. The high forces generated during a fall can, in certain circumstances, lead to the carabiner deforming. In the worst-case scenario the forces may be so large that the carabiner might break. As wire gate carabiners have less mass and lower inertia, they have less whiplash effect than carabiners with a solid gate (full gate). Only our innovative slider quickdraws provide full protection against whiplash effect. These quickdraw carabiners have an easy-to-open locking gate. More on this later.

Cross-loading

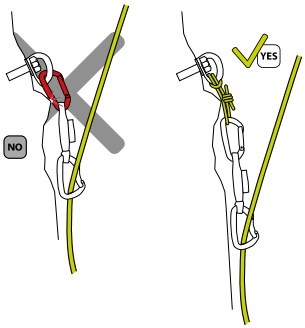
Unfortunately, many climbers are unaware that a cross-loaded carabiner has less than half the breaking strength than it has when loaded lengthwise. So how does cross-loading occur? Carabiners can rotate in a bolt and come to rest on the spine; they become cross-loaded. This often happens during traverses. D-shaped carabiners are designed to slip back into the correct position. However, this is only possible if the loop in the quickdraw sling is wide enough to ensure that the carabiner can move freely. Again, this is why it's important to always clip the right side of the quickdraw in the bolt. In addition, avoid cross-loading when attaching your belay device to your harness, belaying, lowering and abseiling. Locking carabiners are generally used for these activities. To prevent cross-loading, some HMS carabiners have an internal positioning element for the tie-in point. This prevents the carabiner slipping and ensures that it always has correct orientation for maximum breaking strength.





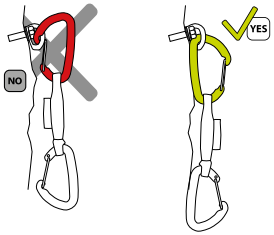


RISKS AND DANGERS



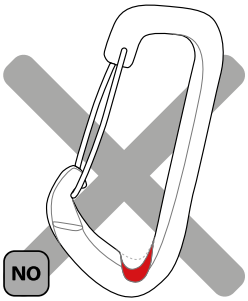
Loading over an edge

Always avoid any possibility of a carabiner being loaded over an edge. If a bolt, peg or protection is badly positioned, this might lead to a carabiner being loaded directly over a rock edge. This can have drastic results. Our tip: Extend the quickdraw by using a sling. By extending with a sling through the bolt, pro etc. you can ensure that the carabiner hangs freely and away from any edges so that it will load lengthwise where it's strongest.



Loading with gate open

Clip your bolts carefully. And take care when clipping a rope or a sling in a carabiner. Always make sure that you've closed the carabiner properly so that it has maximum breaking strength. If a rope or sling gets caught on the carabiner nose or a bolt hangar prevents the gate from closing, the carabiner will have well under 50% of its normal breaking strength. In the event of extreme force, the carabiner might even bend or break. So always make sure that your carabiner is properly closed, even if you are forced to move quick.

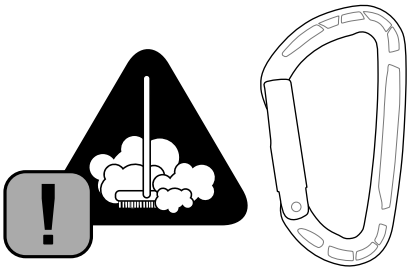


Abrasion and burrs

As with all equipment, carabiners start to show signs of wear over time. Carabiners are personal protective equipment for mountain sports. As such, you should inspect them carefully. Direct contact with bolts, but also rope wear can cause sharp edges and burrs. These can damage your rope or even cause it to break. For this reason, stop using any carabiners with sharp edges or burrs immediately. In addition, carabiners with material that shows signs of abrasion are not as strong. Abrasion can have a significant effect on breaking strength.

Dirt is bad news

Dirty carabiners are often difficult to handle. This can be potentially dangerous if they don't close properly. Clean and rinse your biners regularly with water and if necessary lubricate the gate locking mechanism with an acid-free oil. Always wipe off any excess oil. Please note: quickdraw slings and webbing must never come into contact with oil.

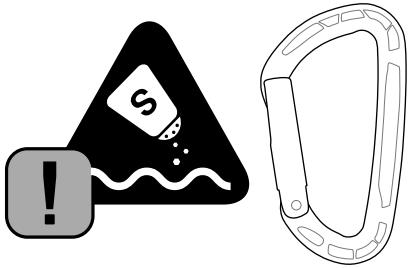


Gates can freeze

During high-alpine mountaineering or when ice climbing, your gear is subjected to extreme conditions. It's not unheard of for carabiners to freeze up completely. This might cause you a serious problem. Wire gates are less likely to freeze, so they are more suitable for use in such conditions.

Salt water

There are plenty of interesting climbing areas on the coastlines. Some of these routes involve tidal locations that literally start next to crashing waves. Bear in mind that salt water is a carabiner's worst enemy. Salt water attacks and corrodes metal. Always wash and rinse carabiners that come into contact with sea water with plenty of clean water. You might also want to lubricate the gate closure mechanism once you've washed it. Use an acid-free oil (note: make sure your quickdraw slings and webbing don't come into contact with oil).



MATERIALS AND CONSTRUCTION

Smaller, thinner, lighter. But how far can you go? After all, we trust our carabiners with our lives. Most carabiners are made of aluminium alloy (lightweight and pliable aluminium with zinc for strength). They begin their lives as a tube of extruded aluminium alloy called rod stock. This is cut into lengths and then bent into the required shape. Next the blanks are forged. High forging temperatures are used to forge carabiners with a range of different designs. Today, most carabiners have an H-shaped profile. The H-shaped profile offers an improved strength/weight ratio. However, the constant drive to save weight with ever narrower profiles does have an effect on maximum strength where loading over an edge occurs. Nevertheless, even the thinnest PPE carabiners conform to European standards EN 12275 or EN 362 and can be used in all situations. One drawback with aluminium carabiners is material wear.

This is why EDELRID also offers steel carabiners as well as aluminium carabiners. Steel carabiners are also forged. Steel carabiners are heavier, but more robust and virtually abrasion proof when it comes to wear from belay devices. And if you are belaying from the ground, then the weight of your HMS carabiner is not really that important. Using a steel carabiner, which is extremely resistant to abrasion compared to an aluminium carabiner, is also good for your rope. For top-roping or other scenarios where there is extreme, prolonged wear, we recommend using a steel carabiner.

Aluminium carabiner

Steel carabiner

WHICH CARABINER DO I NEED?

Of course, which carabiner you need depends on what you want it for. If you only want a carabiner for racking gear or attaching equipment, then an accessory carabiner (not PPE) is fine. If you want a carabiner for belaying, lowering or attaching heavier equipment then choose a PPE-certified carabiner (Personal Protective Equipment) for mountaineering. You often need several different types of carabiner.

Normal carabiner or locking carabiner? Remember: only use normal carabiners if there is already redundancy in the safety chain.
The most important characteristics of a locking carabiner are its gate locking mechanism safety and handling. Different types of carabiner have different strengths and weaknesses.

		PERSONAL PROTECTIVE EQUIPMENT	USE IN QUICKDRAWS	SAFETY OF CLOSURE SYSTEM	HANDLING
Manual gate locking mechanism	Screwgate	Yes	Not appropriate	++	++
	Belay Master	Yes	Not appropriate	+++	+
Automatic gate locking mechanism	Twist-Lock	Yes	Not appropriate	++	++
	Slider	Yes	Yes	++	+++
	Triple-Lock	Yes	Not appropriate	+++	++
	Ball-Lock	Yes	Not appropriate	+++	++
	Strike Safelock	Yes	Not appropriate	+++	+
No gate locking mechanism	Normal carabiner	Yes	Yes	-	+++
	Accessory carabiner	No	No	-	+++

CERTIFICATION AND STANDARDS

Normal carabiners and locking carabiners are Personal Protective Equipment (PPE) designed to safeguard against falls from a height, so they have to conform to a detailed system of quality control and safety standards. At EDELRID, we see these standards as the minimum requirements. Our products do more than just conform with high external standards and certifications; they also have to comply with our even stricter internal standards and rigorous quality management.

CE (European Conformity)

This symbol shows that the manufacturer confirms that a product meets all the relevant European Union requirements. It is the technical passport that 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 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

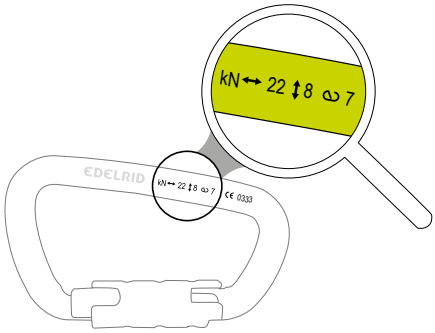
The European Standards (European Norms - EN) are technical rules and definitions that have been drawn up specifically for products and product groups requiring standardisation. European Standards ensure uniform standardisation across Europe. An EN symbol is always indicated with the number of the standard. The applicable standards for carabiners are EN 12275 and EN 365. Due to the lack of available space on a carabiner the European Standard type examination conducted by a test institute does not have to be displayed.

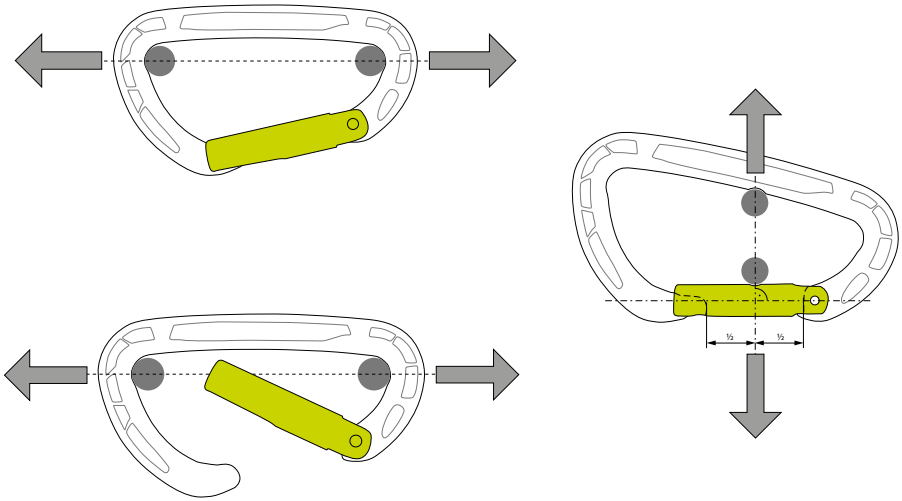
UIAA

This symbol shows that a product fulfills 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 mountaineering equipment for decades. The UIAA standards conform with the EN standards.

Understanding the standards

As you would expect, carabiners undergo rigorous testing. EN 12275 stipulates the minimum breaking strength that PPE mountaineering equipment carabiners have to provide. These are: minimum 20 kN along the major axis with gate closed, 7 kN along the minor axis and 7 kN along the major axis with gate open. But what does this all mean? Carabiner strength is measured in kilo newtons. This can be tricky to understand in climbing scenarios because it's not a static force. Instead, it means mass times acceleration, or how much weight is moving times the accelerating force of gravity. One kilo newton, 1 kN, is about 100 kg of load. The major (long) axis of PPE certified carabiners can withstand about 2,000 kg, i.e. two tons in weight. This is equivalent to very large family car. In fact, most modern carabiners far exceed these requirements. To ensure that the standards are met, regular testing is conducted. A sample of carabiners from each batch is thoroughly tested. Tensile testers slowly pull the carabiners in the different directions until they fail. As we mentioned at the beginning, a quick look at your carabiner will soon tell you if it meets the standards and how much force it can withstand.



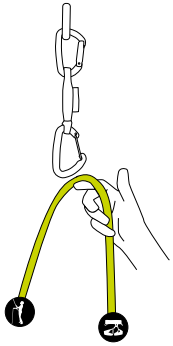


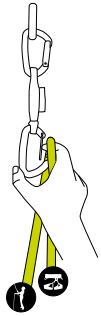
TIPS AND TRICKS

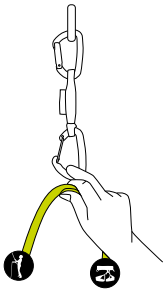
Correct clipping

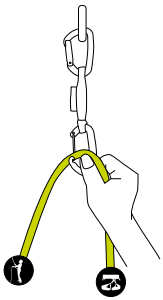
You've run it out, you're well above your last piece of pro/the last bolt. You can feel your palms sweating. Come on – get that biner clipped! In theory there's nothing to it: push the rope through the gate and you're done. Sometimes though, it's not that straightforward. If you're really tense or worried about falling, you might fumble the clip. This is why it's worth practising your clipping technique at ground level so that you can perform better on the sharp end.

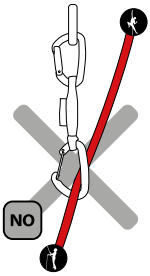
Put your finger in the bottom curve of the quickdraw carabiner below the gate. Lift the rope up with your index finger and/or thumb, then push the rope through the gate. Click, you're in. Alternatively, you can take the whole carabiner in your hand and push the rope in.

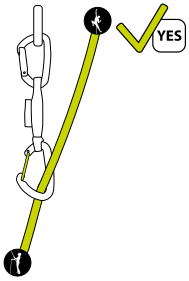


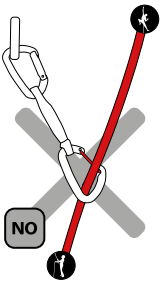


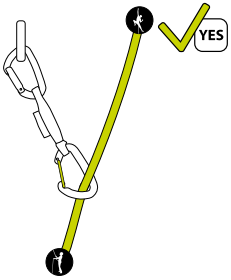










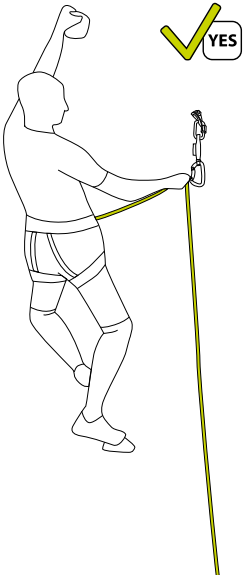


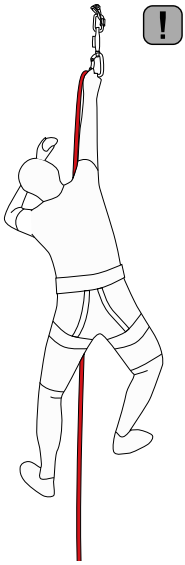
"Doesn't matter matter so long as you've got it clipped?" - Wrong! Think about it. Clip the rope in the carabiner so that the end of the rope that is tied in at the climber's harness continues to lead up to the climber. The end of the rope that leads to the belayer should run back down the wall/rock face etc. From the belayer's perspective, the rope should run up the wall, through the back of the carabiner and out of the front of the carabiner up to the lead climber. This is important. If the rope is clipped into the carabiner the wrong way around (aka back-clipping) and the climber was to fall from above the carabiner, the carabiner might unclip itself.

In addition, always clip the "rope carabiner" in the quickdraw so that it faces in the opposite direction that you are climbing in. Make sure it has its back bar to you; the gate should not be able to "bite" you. This will also help prevent unintentional clipping in the event of a fall. The German Alpine Club (Deutsche Alpenverein - DAV) recommends that the "bolt end" carabiner is also positioned with its back bar to the climber, to prevent it snagging or unclipping unintentionally at the bolt hangar. Buy an EDELRID quickdraw set and you'll see that both carabiners always face in the same direction.

When is the best time to clip?

Five-metre fall anybody? No thanks. Avoid falling when you are about to clip by making sure that you're in a good position first. Always clip from a secure position. Find a good handhold and make sure you are standing securely. Clip the rope with your other free hand. If possible, always try to clip between head and waist height. Avoid stretching to clip, i.e. clipping above your head. There is a good reason for this. If you fall, the fall potential depends on the amount of slack in the rope from the last point of protection. Pulling out lots of slack to clip a quickdraw above your head means that you greatly increase the fall potential. If you're wearing a sit harness, the rope is attached at your waist. So if you clip overhead, the rope runs from the last piece of protection below, up to your next intended quickdraw and then back down to your harness. This means the rope running back down from that overhead piece of protection to your harness is all extra slack. If you should fall while over-stretching to clip, you'll take a bigger free fall. A free fall is the distance you fall under the force of gravity only, i.e. before the rope goes tight and rope elongation enters into the equation. The braking distance (aka arrest distance) is also longer when you over-stretch to clip. This is because the more rope you've pulled out, the more rope elongation there is.





So, theoretically speaking we've covered just about everything. Of course, it's not enough to just learn about clipping carabiners simply by reading a handbook. To become a better climber, clip in a safer and relaxed manner or to master other climbing techniques, beginner's courses, refresher courses and regular fall training with supervision are a good idea. Climbing is no different to any other sport – practice makes perfect.

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