

# HARNESS HANDBOOK

---



## INTRO

Your climbing harness is the central link in the safety chain. Whether you're climbing multi-pitch alpine routes, cranking your way up sport routes or training at your local climbing wall, you need a harness you can rely on. There are numerous different types of harness on the market. They all have their pro and cons, and are all intended for different types of climbing. We've put this handbook together to share our expertise and provide an overview of the most important harness types and their materials and construction. It also offers advice on which harness to choose and how to use and look after your harness. At EDELRID, we're constantly working to improve our harnesses to meet the demands of modern climbers. This handbook also provides a glimpse behind the scenes to give you an insight into how we design, manufacture and test our harnesses.

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 innovative harnesses 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 and sustainability our highest priorities.

## EDELRID

88316 Isny im Allgäu

Germany

Tel. +49 (0) 7562 981 - 0

Fax +49 (0) 7562 981 - 100

mail@edelrid.de

www.edelrid.de



# CONTENT

---

|    |                             |
|----|-----------------------------|
| 4  | A history of harnesses      |
| 6  | Harness types               |
| 12 | Construction                |
| 18 | How many buckles?           |
| 20 | Leg loops                   |
| 22 | Harness features            |
| 24 | Which harness do I need?    |
| 30 | Looking after your harness  |
| 32 | The birth of a new harness  |
| 34 | Certification and standards |
| 36 | Index                       |

---

## IMPRESSUM

### **Art Direction:**

Marcus Suchert; Miriam Heberle, Jan Hoffmann

### **Photography:**

Christian Pfanzelt photography, Simon Graf,  
Jan Hoffmann, Alexandre Buisse, Claudia Ziegler

### **Text:**

Jan Hoffmann Sebastian Straub, James Heath

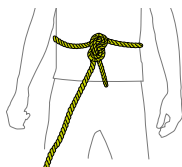
### **Corrections:**

Sebastian Straub, Anne Leidenfrost, Daniel Gebel,  
Martin Senghas, Natalie Berry, Amanda Barnes

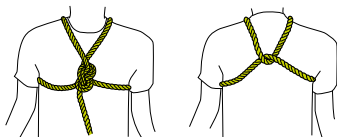


# A HISTORY OF HARNESSES

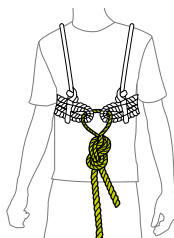
Walk into any climbing shop and you'll find a huge range of sophisticated climbing harnesses. It wasn't always like this. Climbing harnesses have come a long way.



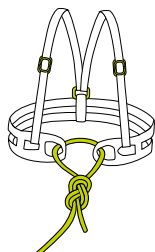
Einfaches Hanfseil



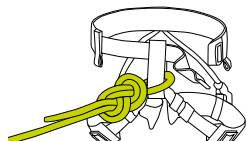
Brustgurt aus Hanfseil



Brustgurt mit parallelen Hanfseilen



Brustgurt mit Bändern



Sitzgurt mit Bändern

In the early days of climbing there were no harnesses. Climbers had to improvise. Ropes were made from natural fibres like hawser-laid manila or hemp and were not very strong. Climbers simply whipped a few coils of rope around their waist tied with a bowline and made do. No wonder the adage was: "The leader must not fall." Hemp ropes have a low energy-absorption capability and breaking strain, meaning they offered more in the way of psychological rather than actual protection.

The next development involved tying one end of a hemp rope to form a chest harness. In some cases, a separate piece of rope was knotted to make a rudimentary chest harness, this was then tied to the main rope. Today's chest harnesses are still based on the same principle as these early prototypes. However, falling wearing only a chest harness (without an additional sit harness) is a very dangerous affair. Important blood vessels run under the arms and if these are restricted by hanging in a chest harness Suspension Trauma can occur (also known as 'orthostatic shock while suspended' or HHS - 'Harness hang syndrome'). It is the natural physiological response to the human body being held motionless strapped in a vertical position for a period of time, resulting in a loss of consciousness.

Chest harnesses made from a number of parallel sections of rope were an improvement. Their larger contact area and better load distribution prevented the harness from pinching and chafing. At the same time, the first harnesses made from leather straps instead of rope were developed.

The real breakthrough came with the first use of wide, flat webbing (strong nylon woven as a flat strip). to make harnesses instead of rope. They offered significantly better load transmission and also had a significantly lighter construction. In the United States, the first rudimentary harness was developed in the mid war years - the swami belt. It consisted of a piece of webbing around the waist secured with a carabiner or tied with a tape knot. Simultaneously, load-bearing buckles started to be used. These buckles allowed the webbing to be adjusted to fit well at the hips.

The first sit and full-body harnesses prepared the way for the modern climbing harness. Leg loops were introduced for the first time. Used together with dynamic ropes, which were launched around the same time, in the mid 1960's, it became justifiable to take falls when climbing. These original climbing harnesses were further optimised by improving the padding and webbing. Eventually the load-bearing webbing was stitched onto foam padding, paving the way for harnesses as we know them today.

# ... ZUM THEMA SITZGURT



## Endlich können sich auch die Kletteramazonen bequem anseilen.

Mit dem maßgeschneiderten „Special-Eve“, dem superleichten (410 g), voll verstellbaren (auch an den Schenkelschlingen), ersten, der weiblichen Anatomie angepaßten Sitzgurt, welcher mit jedem Brustgurt kombiniert werden kann.

Der in Körpermitte vorderseitig senkrecht verlaufende Zentralgurt sorgt dafür, daß das Gurtsystem im Brustbereich nicht auf schmerzempfindliche Stellen drückt.

Special-Eve



Wir schicken Ihnen gerne den Edelrid-Spezialprospekt für Kletterer und Bergsteiger.

Schreiben Sie an Salewa, Postfach 151828, 8000 München 15 oder an Edelrid-Werk, 7972 Isny/Allgäu. (Schutzgebühr DM 1,- in Briefmarken beilegen)



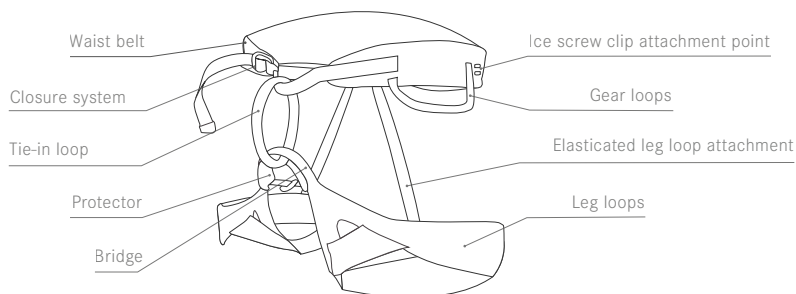
VERBAND DER BERGVEREINE  
DEUTSCHLAND

**EDELRID**  
**DER GURT**

# HARNESS TYPES

## Sit harness

When most people think of climbing harnesses, they think of a sit harness. Most sit harnesses have these parts and features:



You'll find sit harnesses worn for practically every type of climbing – they are the real all-rounders. Whether for sport climbing, ice climbing, multi-pitch routes, mountaineering, ski-mountaineering or via ferratas. Sit harnesses allow good freedom of movement and a high degree of safety without weighing much. In addition, sit harnesses have plenty of room for adjustment and up to eight gear loops for all your equipment. Sit harnesses allow you to sit comfortably in them when hanging. They also spread the load to the upper thighs in the event of a fall.

So are they suitable for everyone then? Well, not quite. Smaller children and heavier climbers should additionally wear a chest harness or a full-body harness. In both cases, due to the anatomy of their hips, relatively high centre of gravity and in certain cases reduced body tension, a sit harness alone would not be recommended.



| ADVANTAGES                           | DISADVANTAGES  |
|--------------------------------------|--|
| Sitting position → Protects the back | Can slip if hip anatomy not appropriate → Possibly dangerous in the event of an upside-down fall |
| Full freedom of movement             | Requires a certain amount of body tension  |
| Lots gear racking options            | Not ideal for hanging in while carrying with a backpack  |
| Lightweight                          |  |
| Small pack size                      |  |



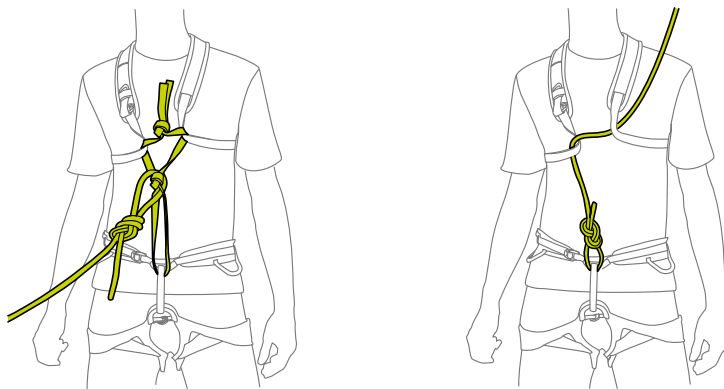
# HARNESS TYPES

## Chest harnesses

Chest harnesses are designed to be used in conjunction with a sit harness. Climbers with very skinny hips (especially kids) and very heavy adults should wear one. In the worst-case scenario, in the event of an upside-down fall, a sit harness worn without a chest harness could potentially slip off the wearer. Sit harnesses do not provide adequate protection for climbers with insufficient body tension.

It's important though that a chest harness is always used together with a sit harness. Why is this? Hanging in just a chest harness, even if only for a short while, can be extremely dangerous and lead to Suspension Trauma. This is when the webbing at the armpits restricts important blood vessels .

Climbing photographers and alpinists who spend long periods hanging on a rope while carrying a backpack and heavy gear often chose to wear a chest harness with a sit harness. Better load distribution and the upright position require less body tension and decreases the strain on the core muscles (so that the torso muscles get tired less quickly). Full-body harnesses also provide a higher attachment point, which reduces the chance of the climber turning upside-down in a fall. This is particularly useful if the user is climbing with a pack when the centre of gravity will be higher.



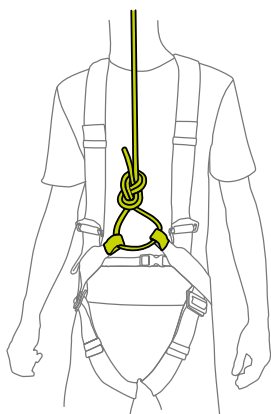
The chest harness is generally attached to the sit harness using a sling. Alternatively, you can run the rope directly through the chest harness as illustrated.





| ADVANTAGES   | DISADVANTAGES                          |
|--|--|
| Comfortable to hang in when used in combination with a sit harness | Additional sit harness needed          |
| Holds climber in an upright position                               | Slightly restricts freedom of movement |
| No danger in the event of an upside                                |  |
| Provides support and relives strain when hanging with a backpack   |  |

# HARNESS TYPES



## Full-body harnesses

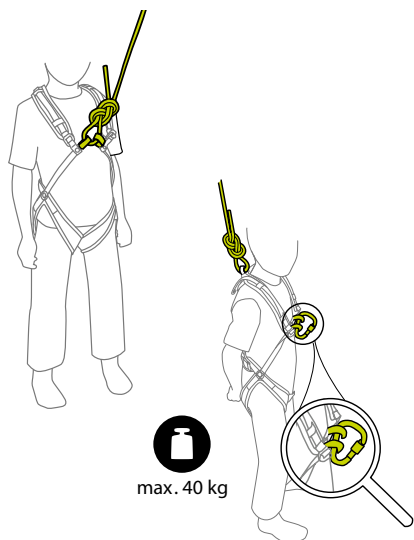
Full-body harnesses work in the same way as a sit harness and chest harness combination. In addition, these one-piece harnesses have advantages when it comes to handling and offer a wide range of adjustment. Unlike the sit harness/ chest harness combination, the full-body harness requires no sling to connect the chest harness to the harness. Full-body harnesses are easy to adjust and cater for people of all shapes and sizes. This makes them particularly popular in the rental sector and high ropes courses or adventure parks. However, full-body harnesses do weigh more than normal harnesses and take up a fair amount of space in your backpack. They also offer less freedom of movement.

| ADVANTAGES  | DISADVANTAGES                          |
|---|--|
| Holds climber in an upright position                              | Bigger pack size                       |
| Relatively easy to use  | Relatively heavy                       |
| No danger in the event of an upside-down fall                     | Slightly restricts freedom of movement |
| Provides support and relieves strain when hanging with a backpack |  |



### Children's harnesses

Children have a very different anatomy, centre of gravity and body tension to adults, therefore, child-specific harnesses are a necessity. EDELRID children's harnesses are designed so they can be put on intuitively and kids can become more independent and safety conscious. Please note: the final check should always be carried out by an adult.



### Harnesses for small children

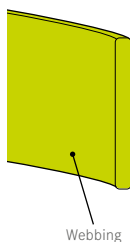
You can never start early enough. Harnesses for small children are full body harnesses for children weighing up to 40 kg. EDELRID harnesses for small children are designed specifically for budding junior climbers and "grow" with them. We combine different textile parts that can be adjusted to ensure an optimal anatomical fit for each child. Our full-body harnesses for small children also have an additional attachment point at the back. If a child is tied into a rope at this point then the front tie-in loop must always be securely closed with a locking carabiner (see illustration). The rear harness attachment point provides additional security in steep terrain or when skiing.

### Sit harnesses for children

Once children have grown and their hips have started to fill out, they then progress from a children's full-body harness to a children's sit harness, although they also need to have enough body tension. To be on the safe side you can always combine a children's sit harness with a children's chest harness. Sit harnesses for children can generally be continually adjusted to fit as they get older. So they "grow" with their owners, as it were. Our children's sit harnesses have elasticated leg loop attachments to prevent them from twisting.

# CONSTRUCTION

Not all sit harnesses are the same. There are big differences between the different types of construction. Here's a summary of the main designs used.



## Webbing harnesses

Climbing equipment manufacturers have been making simple flat nylon webbing harnesses since the 1970s. They are still around today, especially for via ferrata or rental use. If you intend to walk in your harness all day and don't plan to be taking falls or hanging about in it for longer periods, then a simple webbing harness is the best option. Padded harnesses sometimes get in the way when you're walking. However, incorrect or prolonged use can cause folds in the webbing. If this happens, then the harness might cut in at the legs or the hips when you sit or hang in it. In addition, the simple design with no padding means that the load-bearing webbing lies directly next to the body. This means that there would be little breathability for the skin at these points – and overall comfort would be limited during strenuous climbing or on hot days. Nevertheless, these simple, but robust harnesses remain good value for money, which is why they are used so widely. In addition, they also adjust to fit a full range of body shapes and sizes, from kids through to adults. Conclusion: classic, robust harnesses, but with basic comfort.

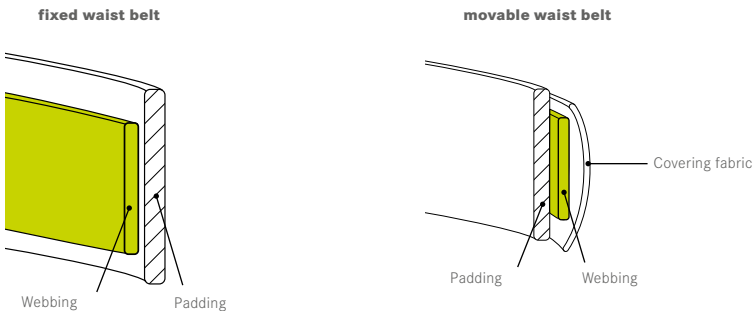
| ADVANTAGES                 | DISADVANTAGES           |
|----------------------------|-------------------------|
| Widest range of adjustment | Reduced hanging comfort |
| Low bulk                   | Reduced breathability   |
|                            | Relatively heavy        |





### Padded webbing harnesses

These harnesses have shaped pieces of foam padding attached to increase comfort when hanging or taking falls. As such, they are more comfortable than simple webbing harnesses. In addition, they also offer ventilation and moisture transport – especially when climbing in warm weather. On some harnesses, the padding is free to move at the waist. These movable or ‘floating’ waist belts mean that you can always centre the tie-in point and ensure that your gear loops are symmetric, i.e. in the right place. Conclusion: greater comfort for hanging in or taking falls.

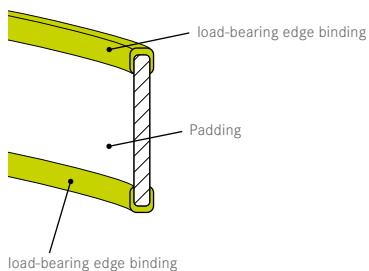


| ADVANTAGES   | DISADVANTAGES    |
|--|------------------|
| Comfortable to hang in                                 | Relatively heavy |
| Good breathability                                     |                  |
| Centred tie-in point due to movable waist belt padding |                  |

# CONSTRUCTION

## Load-bearing, edge-binding harnesses

These harnesses have load-bearing webbing at the outside edges of the padding (edge-binding, sometimes called a frame construction) and are very light. The edge binding runs around the entire harness, so it securely holds the hips and the legs. The padding material is usually air permeable to allow ventilation. The load is distributed to the padding via the webbing. The only minor drawback with this type of design is that if you are hanging for longer periods, they are not quite as comfortable as padded webbing harnesses. Conclusion: very light and breathable.



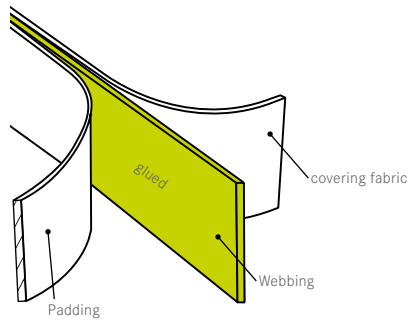
| ADVANTAGES             | DISADVANTAGES           |
|------------------------|-------------------------|
| Minimal weight         | Reduced hanging comfort |
| Maximum breathability* |                         |

\* due to open-pored spacer fabric



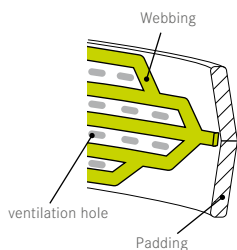
### Laminated construction harnesses

Laminated climbing harnesses? What's that then? This design involves laminating (overlaying and bonding) the load-bearing webbing to the inner padding. This ensures optimal load transmission over the entire harness. In addition, distributing the load over a wide area does away with the need for thick padding. The result: lighter designs, flatter constructions and minimal pack sizes. However, laminated harnesses are not quite as breathable as other designs. Conclusion: maximum performance, minimal pack size.



| ADVANTAGES                   | DISADVANTAGES    |
|------------------------------|------------------|
| Good hanging comfort         | No breathability |
| Small pack size, lightweight |                  |
| Low bulk                     |                  |

# CONSTRUCTION



## 3D-Vent Technology

There are three key factors for making a good harness – uniform load transmission, ergonomic fit and effective ventilation. EDELRID 3D-Vent Technology combines them all in a unique and innovative manner. The design is slightly heavier and does not pack down quite as small. However, they are more comfortable.

## Optimal load transmission via stitched webbing

Optimal uniform energy transfer and load transmission over all areas of the harness ensured by the homogeneously positioned stitched webbing. 3D-Vent Technology combines functionality and design.

## Three-dimensional form for an ergonomic fit

The three-dimensional form of the leg loops is anatomically constructed according to the shape of the human body. Their ergonomic design consists of opposing curved surfaces that provide a close fit without pinching and chafing.

## Ventilation and climate control without perspiration marks

The robust, lightweight three-layer foam padding retains its shape even when subjected to pressure. And it's air permeable with ventilation holes to allow body heat and perspiration to escape.


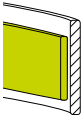
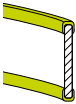
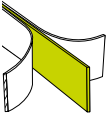
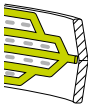
| ADVANTAGES              | DISADVANTAGES              |
|-------------------------|----------------------------|
| Optimal hanging comfort | Relatively large pack size |
| Ergonomic fit           |                            |
| Maximum breathability   |                            |





### Overview - Construction

Here's a summary of the advantages and disadvantages of the different types of harness construction.

|   |                            | HANGING COMFORT | HIGH BREATHABILITY | LIGHTWEIGHT |
|---|----------------------------|-----------------|--------------------|-------------|
|    | Webbing harnesses          | +               | +                  | +           |
|    | Padded webbing             | ++              | ++                 | +           |
|   | Load-bearing, edge-binding | +               | +++                | +++         |
|  | Laminated construction     | ++              | -                  | ++          |
|  | 3D-Vent Technology         | +++             | +++                | ++          |

# HOW MANY BUCKLES?

If your trousers fall down, it could be cold (or embarrassing). If your harness falls down, the consequences could be more serious. This is where buckles come in. They securely fasten your climbing harness and make sure it stays put. Once pulled tight, they ensure that your harness fits closely around your hips. Some harnesses also have buckles on the leg loops which adjust to give a better fit. As well as providing reliable safety, all buckles should be easy to use and allow a wide range of adjustment. As we make different harnesses for different types of climbing, we use different types of buckles depending on what they are to be used for.

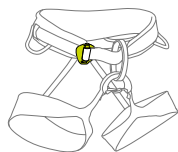
## How many buckles?

If you plan to buy a new harness, then it's worth thinking about how many buckles it should have. Some harnesses have up to four buckles, while some have none whatsoever. Allow us to explain the differences...



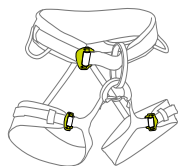
### No buckles

Harnesses without buckles, i.e. neither on the leg loops nor the waist belt are secured at the hips by the rope when you tie in. These types of minimalist, ultra-lightweight harnesses are designed for performance and competition climbing. To prevent the harness from sliding down over your hips, they normally have a simple, lightweight plastic clip at the tie-in point to hold it together. Please note: this clip is not load-bearing.



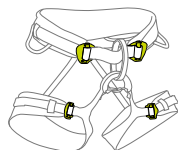
### One buckle

Most harnesses have at least one buckle which secures the harness at the waist. This means that you can adjust it according to your waist size. Harnesses with one buckle are particularly popular for sport climbing.



### Three to four buckles

Some harnesses only have one buckle to adjust at the waist while other harnesses have two. Two buckles have the advantage that you can always centre the tie-in point perfectly. This means that load is always distributed evenly. The centred tie-in point also reduces the risk that a climber might tie in to a gear loop by mistake, which could have very serious consequences. And two buckles also give a greater range of adjustability. The extra buckle does add a few grams to the overall weight though, and it means it won't pack down quite as small. It's up to each climber to weigh up which aspects are most important to them. In addition to one or two buckles at the waist, some sit harnesses have buckles on the leg loops. This allows you to adjust your harness according to how big your thighs are or how many layers you are wearing. The additional adjustability does mean slightly more weight (see the section on leg loops in this handbook for more information).

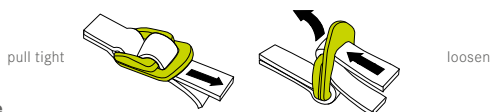


## Buckles

We use different types of buckles in our harnesses depending on their design and the type of climbing they are intended for.

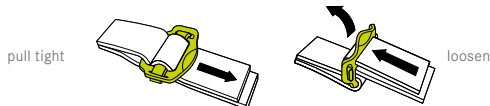
### Slide Block buckles

Slide Block buckles are very easy and intuitive to use. The buckle has two parts that slide together and block (lock) the webbing. Pull the webbing hard, and the buckle locks (rather like a seat belt). To release a Slide Block buckle, lift it back and pull the webbing. A major advantage of the Slide Block buckle is that it makes it very easy to tighten and loosen a harness. However, they can only be used on narrow webbing.



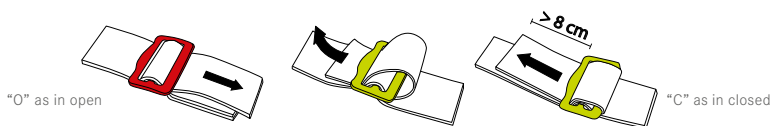
### Easy Glider buckle

Slide Block buckles are very easy and intuitive to use. The buckle has two parts that slide together and block (lock) the webbing. Pull the webbing hard, and the buckle locks (rather like a seat belt). To release a Slide Block buckle, lift it back and pull the webbing. A major advantage of the Slide Block buckle is that it makes it very easy to tighten and loosen a harness. However, they can only be used on narrow webbing.



### Mono buckles

The classic buckle. You still find mono buckles (also called back-thread buckles) being used. Their back-thread action means that it's relatively easy to insert and remove the webbing. To close them securely, thread the webbing through the buckle and then back-thread it again. Mono buckles are not as intuitive to use. However, there is a simple mnemonic to remember how to check if they are threaded properly. If the buckle forms an "O" then it's "open" and the webbing still has to be back-threaded. If it forms a "C", then it's "closed", i.e. the webbing is threaded properly. Important: mono buckles must always be back-threaded, otherwise they are not safe and your harness might come undone under load.

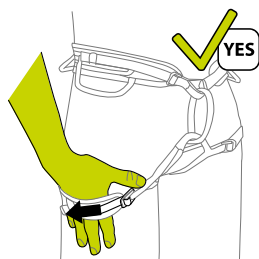
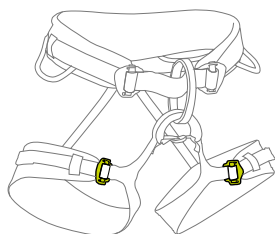


### Unthreading webbing

On most harnesses, the end of the webbing is stitched so that you can't unthread it completely. However, there are certain situations where you have to completely unthread and re-thread the webbing on the leg loops of your harness. For example, if you want to put on your harness without having to remove your boots, skis or crampons. In addition, your crampons can potentially damage your harness as you step into it. This is why some harnesses have no stitched webbing terminations – to allow the webbing to be completely un-threaded. With the right buckle, it is possible to make harnesses that can be put on while wearing skis or crampons without having to step in through the leg loops.

# LEG LOOPS

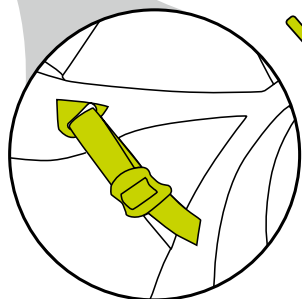
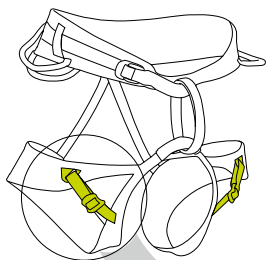
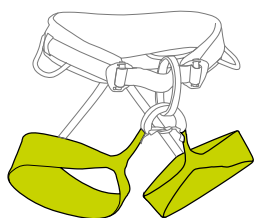
Your fingers have peeled off, you've taken a fall... The gear holds, the rope and your harness absorb the force. Relax, sit back and enjoy the view. It's the leg loops on your harness that make it comfortable enough to do this. In an average fall, approximately 80% of the fall load is transferred through the leg loops to the thighs. This is why it's so important to make sure that your harness fits properly and is comfortable. Ideally, the leg loops should allow you to fit a flat hand between the leg loop and your thigh.



## Adjustable leg loops

Climbing in alpine terrain or ice climbing? Then you'll probably be wearing several layers of functional clothing. To ensure that your harness still fits properly, regardless of how many layers you're wearing, many harnesses have adjustable leg loops. They'll have a buckle to allow to tighten or loosen them as required. This is particularly important when it comes to rental harnesses, as it means that the same harness will fit a wide range of different-sized climbers. Ice climbers often look for harnesses with leg loops that can be completely unthreaded. This makes it possible to put the harness on without having to step into the leg loops – no easy task if wearing mountaineering boots, ski boots or crampons (especially if you're wearing gloves).

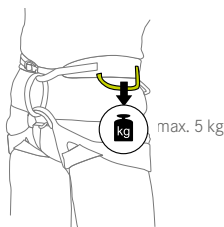




### Fixed leg loops

Harnesses with adjustable leg loops tend to weigh slightly more due to the additional buckles. This is why some sport climbers prefer harnesses with fixed leg loops. In particular, on hard routes where you are pushing the limits, every gram counts. As you are unlikely to be wearing several layers while sport climbing, adjustable leg loops are not required. In addition, harnesses without adjustable leg loops usually pack down much smaller. However, to still allow a certain amount of adjustability, some EDELRID harnesses feature stretch mesh and non load-bearing rubber elements. And we fit certain harnesses with semi-adjustable leg loops. The stretch webbing tape runs through robust, non load-bearing plastic buckles so that the length of the webbing can be adjusted. This keeps the weight down, but gives greater adjustability, including when you're wearing thicker clothing.

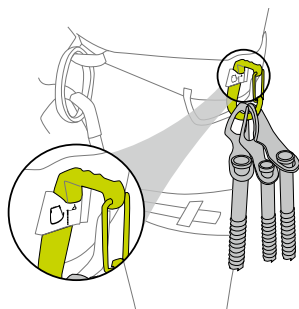
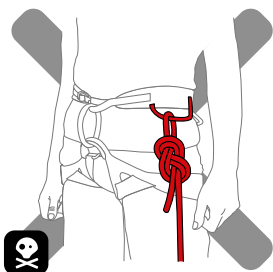
# HARNESS FEATURES



## Gear loops

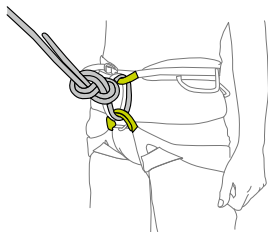
What's on your rack? Quickdraws, slings, nuts and cams, maybe a wind shell, energy bar or drink bottle... We often bring a lot of gear with us up the wall. You might be carrying couple of extra kilos in weight. To carry gear securely and have everything to hand most harnesses have four gear loops. Lightweight performance sport-climbing harnesses might only have two, to save weight. Gear loops are usually stiff with an ergonomic shape to make it easier to clip and unclip gear. In addition, they are designed so that equipment doesn't get tangled up or get in the way, allowing you to move your legs freely. For alpine climbing with a backpack, the rear gear loops should be more flexible. This prevents any discomfort or pressure points when wearing a backpack.

**Note:** Never tie into a gear loop. This could fail in a serious fall. Gear loops are not made to bear more than 5kg/ 11lbs in weight.



## Ice screw clips

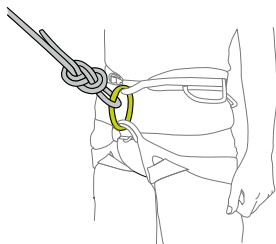
If you are climbing steep ice, then you'll need to carry ice screws. Screwed directly into the ice, they provide mobile protection. However, you can't just clip ice screws to your gear loops with a carabiner. The angle between the tube and the integrated hangar/ folding crank make them very difficult to clip and unclip from your harness. They would just get in the way. What's more, ice screws are very sharp and might damage your expensive winter pants or cause injuries. This is where ice screw clips (a special plastic backed wire gate carabiner) come in for racking your ice screws on. Attached to your harness, they keep ice screws secure and accessible. Most harnesses have dedicated slots for ice screw clips. Positioned at the side of the harness, they each take one clip. You thread the ice screw clips through the attachment point. Some models also have to be secured with a rubber strap.



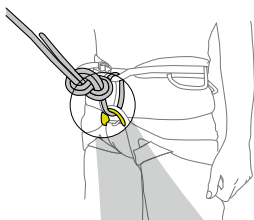
### Tie-in loop/Bridge

There are two ways of tying in to a harness. Every harness has an illustration on the inside showing which tying-in method it is certified for. Please note: Not all harnesses are certified for both methods.

You either tie in directly at the tie-in loop or parallel to the tie-in loop over the bridge (or cross-piece). When using the second method, always make sure that the rope passes through both the bridge and the loop on the waist belt.

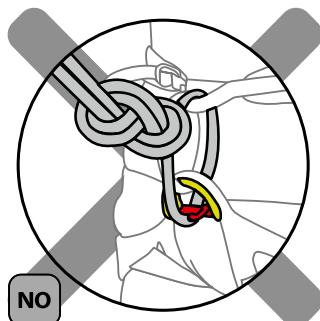
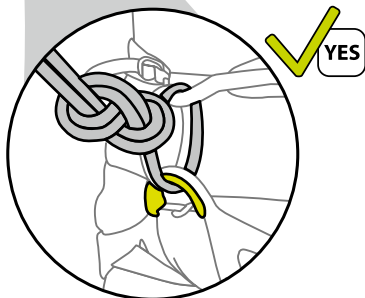


When belaying, the belay device is attached to the harness at the tie-in loop with a carabiner (some climbers also call it the belay loop). The tie-in loop normally has a distinctive colour. EDELRID harnesses always have a green tie-in loop. Tie-in loops are made of particularly abrasion-resistant stiff material, to prevent wear.



### Protector

Whether you tie-in directly at the tie-in loop or parallel to the tie-in loop via the bridge and waist belt loop, the main load and wear is always at the bridge. This point is subjected to particular abrasion. We use two different techniques to protect this part on EDELRID harnesses and give the bridge a longer lifespan. Many of our harnesses feature a Hytel® protector. The wear-resistant plastic guard protects the bridge, making it last longer, and also helps to distribute load to the leg loops. Always take care when tying in. The rope must run directly over the protector and not the piece of webbing underneath it. We also reinforce the bridge on some of our other harnesses using a textile abrasion protector. These also have a wear indicator. In the event of excessive wear, a red wear indicator warning thread becomes visible – to show that the harness should be replaced.



# WHICH HARNESS DO I NEED?

---

To provide a clear overview of the different types of harness and demonstrate what the different features mean in practice, four climbers describe here what they want from their harnesses. As they are all interested in different types of climbing, we feel that this helps to illustrate the distinctions between the different types of harnesses.

## **Marius - Mountaineering and high-alpine trips**

Marius is interested in the big summits. He travels to high peaks all over the world, both in summer and in winter. For this reason, he has a very adjustable harness that fits no matter how many layers he's wearing. He's less interested in classic rock climbing, although still enjoys scrambling up alpine ridges. As a mountaineer, his routes involve glacier crossings and exposed sections. Marius rarely needs to take a fall and seldom ends up hanging on a rope in his harness, so he prefers to wear a lightweight harness that gives him maximum comfort. He doesn't need extra padding – it would only get in the way on the long sections that don't involve climbing. As Marius usually carries a backpack, he makes sure that his harness has flexible gear loops at the back. He knows from experience that stiff gear loops rub under backpacks and can cause uncomfortable pressure points.

Marius prefers harnesses either with a laminated construction or made solely of webbing with three buckles and four gear loops. And those rear gear loops have to be flexible.



## **Christoffer – Sport climbing and competition climbing**

Chris is an ambitious sport climber and lives for his climbing. When he was younger he trained with the German Alpine Club (DAV) youth teams. He enjoys pushing his limits. Onsite ascents or redpoints are his main objective. To afford him every possible advantage, he prefers to use lightweight, minimalist harnesses. Good fit and maximum freedom of movement are important – he wants a harness that allows him to master the hardest, most acrobatic moves. Chris says that his own harness fits so well, he “can hardly feel it”. As Chris carries quickdraws only and no other equipment, he only needs a limited number of gear loops. This also allows a few more grams to be saved.

His harness of choice has a load-bearing edge binding construction, no buckles and just two gear loops, one at either side – it's also particularly lightweight.





### **Mary- Ice climbing and mixed winter routes**

During the winter months, Mary loves to get out and climb. Training at the wall was just never enough. When she discovered ice climbing, she was immediately hooked. Ever since, she's been climbing steep frozen water ice and the occasional north face with mixed winter rock and ice routes. Mary says that her winter climbing improves her summer sport climbing and vice versa. For ice climbing, she wants a harness that provides a good combination of hanging comfort and freedom of movement. In addition, she says adjustable leg loops are a must, to allow a perfect fit even when she's wearing a warm base layer under her alpine pants. As ice climbing involves carrying ice screws as well as quickdraws, she needs a harness that will accept ice screw clips.

Mary bought a 3D-Vent harness with three buckles, four gear loops and ice screw clip attachment points.



### **Monika – Via ferratas**

As a child, Monica used to go on holiday to the Alps with her family. She started to get bored with just hiking and so did her brothers and sisters. Then Monica discovered via ferratas. She went to a specialist outdoor shop to seek advice about which harness she needed. The sales personnel told her that it made sense to choose a comfortable harness that she could still wear while walking longer distances without it rubbing. In the shop, they also explained that ideally you shouldn't fall on a via ferrata and that the harness and via ferrata set were there for the worst case scenario. In addition, she was told that it's better to wear a chest harness if you are climbing with a backpack.

As a result, Monica purchased a comfortable webbing sit harness with good padding, three buckles, four gear loops and movable waist belt. She also decided to buy a chest harness to go with it.



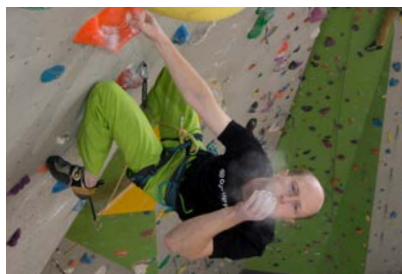
# WHICH HARNESS DO I NEED?

---

## **Daniel – Indoor climbing and top-roping**

Daniel first discovered climbing at a friend's birthday party at a climbing wall. He and his mates enjoyed it so much that they have been climbing regularly ever since. In the meantime, they are now starting to move from top roping to leading. They say that they want a lightweight harness that gives them full freedom of movement and allows them to hang comfortably when trying out new routes. As they are not leading much yet, gear loops are mainly used to secure belay devices when they are climbing. And seeing as they climb indoors and wear more or less the same type of clothes all year round, their harnesses don't need adjustable leg loops.

Daniel chose a harness with padded webbing, one buckle and two gear loops.



## **Felix - Alpine climbing**

Felix is a competent, passionate and ambitious climber. He's climbed all over the world. "Your own limits are there to be tested," that's his motto. He's no stranger to taking big falls in alpine terrain and climbing a long way above his protection. This means that he needs a very robust harness that can cope with regular punishment. Yet he still wants a harness that gives him maximum freedom of movement so that he can climb at his limit. His harness needs to be comfortable to hang in and have enough gear loops to carry a big rack. As Felix enjoys climbs in colder conditions in alpine terrain, he wants a harness with semi-adjustable leg loops that will still fit if he is wearing thicker clothing.

Felix uses a laminated construction sit harness with one buckle and semi-adjustable leg loops and four gear loops. He also considered a 3D-Vent harness.



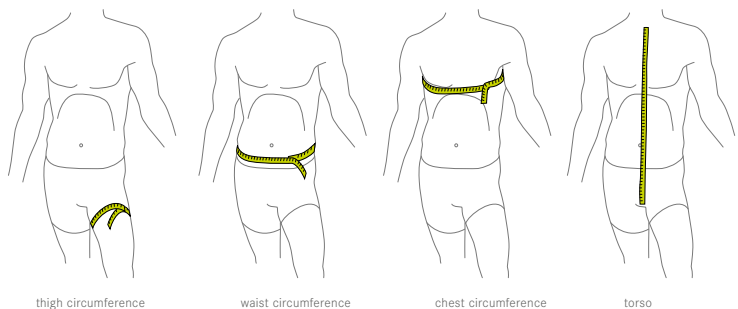


# WHICH HARNESS DO I NEED?

## Getting the right fit

Snug or baggy? Secure or restrictive? We've looked at how harnesses are made and the requirements for different types of climbing. However, finding a harness that fits well is probably the most important factor. Not only will it hold you securely in a fall, it will also provide day-long comfort. Most harnesses come in a range of sizes. To get the right fit, it's worth taking a note of your measurements:

Waist size, upper thigh and for full-body harnesses, your chest size and torso length.



Example size table for Edelrid climbing harnesses:

| SIZE | TAILLEUMFANG |    | BEINSCHLAUFEN |    | WAIST  |      | LEG LOOPS |      |
|------|--------------|----|---------------|----|--------|------|-----------|------|
|      | [CM]         |    | [CM]          |    | [INCH] |      | [INCH]    |      |
| XS   | 64           | 75 | 46            | 50 | 25,2   | 29,5 | 18,1      | 19,7 |
| S    | 96           | 82 | 50            | 55 | 27,2   | 32,3 | 19,7      | 21,7 |
| M    | 75           | 90 | 56            | 60 | 29,5   | 35,4 | 22,0      | 23,6 |
| L    | 83           | 98 | 60            | 65 | 32,7   | 38,6 | 23,6      | 25,6 |



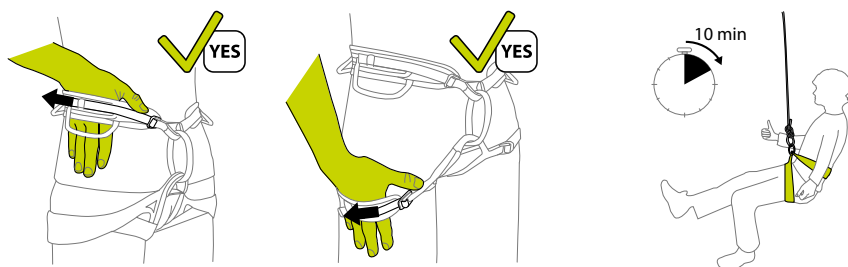
Knowing these measurements will mean that you start from the right point when choosing a harness in an outdoor shop. Please note: There are also differences in sizes from different manufacturers. The same as with clothes or footwear, the design or cut of a harness makes a big difference to the fit.

A perfect fitting harness should fit snugly at the waist so that it can't slide down over your hips. Make sure that the gear loops are pointing down to the ground and that the tie-in loop and leg loops are not twisted. Please see the illustrations below for how to put on a harness correctly.

Although most harnesses are designed to be used by both male and female climbers, this often involves a compromise. This is why we make some of our harnesses with a men's specific or a women's specific fit. Our women's harnesses have a more curved waist belt as the angle that the hip bones sit at is different to that of men. In addition, women's legs are slightly larger relative to their waists compared to men, so women's harnesses require different waist-to-leg ratios. Also, the rise – the distance between the legs and waist – of women's harnesses tends to be longer, so there is more distance between where the leg loops sit and where the waist belt fits, i.e. the tie-in loop is longer.

For maximum comfort while hanging the leg loops and the waist belt should neither be too narrow nor too wide. This is why, if you plan to buy a harness without adjustable leg loops, you should make sure it fits perfectly. Once the leg loops are tight, it should be possible to fit a flat hand between them and your body. The same applies to the waist belt. If it is too slack it will make sitting in the harness and taking or holding a fall uncomfortable.

A good vendor will have somewhere for you to test out harnesses in practice, by sitting and hanging in them. This is the best way to check that a harness fits properly before you buy it and start climbing in it.



# LOOKING AFTER YOUR HARNESS

The same as with any other piece of climbing safety equipment, it's important to look after your harness if you want it to look after you. This means storing it correctly, inspecting it regularly and taking action if needed.



## Storage

In common with all textiles, your climbing harness should never be exposed to temperatures over + 55 degrees Celsius and under - 35 degrees Celsius. Extreme temperatures can permanently alter or damage the material. Ideally, you should store your climbing harness at room temperature – and in particular in a dry environment. Damp and cold can adversely affect the load-bearing capacity of a harness.



It makes sense to keep your harness as clean as possible. Dirty harnesses not only look shabby; dirt can make the materials stiff and brittle. Sand, grit and granite crystals can be particularly dangerous as they can grind into the material and rub it abrasively.



Whenever possible, store your harness away from direct sunlight/ ultraviolet (UV) radiation. UV radiation causes colours to fade and accelerates ageing. Prolonged, intense exposure to the sun will make the textile materials brittle and lose elasticity. It goes without saying that your harness should never come into contact with a naked flame or any other heat source. This could cause your harness to melt.



Chemicals are a harness's worst enemy. Keep your harness away from acids. Acid damage is especially dangerous as it's not visible, yet can have fatal consequences. For example, acid from a car battery could seriously damage your harness without you realising. Never store your harness next to dangerous chemicals, for example in the garage.



During climbing and also during storage, avoid any mechanical damage (crushing, pressure or tensile loading). Take care with sharp edges. If your harness is clearly damaged, you should retire it immediately.



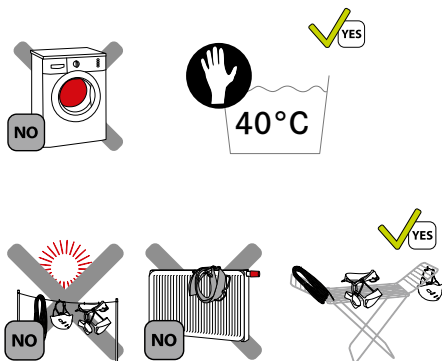


## Cleaning

As with other textile products, you should clean your harness from time to time. This is for safety-critical as well as hygiene reasons. As previously mentioned, sand, grit and granite crystals can damage the textile parts. Please note: Never wash your harness in the washing machine. Always wash it by hand. Use warm water, but never hotter than 40 degrees Celsius. We recommend using standard, non-halogenated soaps or detergents, such as gall soap.

Air dry your harness, for example on a washing line. It's best to allow it to dry slowly. However, make sure that it is not exposed to direct sunlight. UV radiation will weaken the textile materials. So it's best to dry a harness inside. Never dry it on a radiator or in a tumble dryer.

If required, oil the hinges of metal parts after cleaning. Always use acid-free oil to do this.



## Transport

During transport, it's also better to protect your harness from direct sunlight, chemicals, dirt or mechanical damage. Store it in a protective bag, such as the one supplied with all EDELRID harnesses.



# THE BIRTH OF A NEW HARNESS

Before it arrives in your local climbing shop a climbing harness goes through many stages. Initially it all starts out on paper. The initial design is pored over, modified, improved, rejected, re-designed and continually re-evaluated before the final prototype is approved.

This process starts with a requirements profile. We determine which activities the harness is going to be used for and which specifications it should have. Does it need to be particularly comfortable, particularly lightweight or particularly robust? Maybe it needs to combine all of these factors? Or include only a few of them? Once the type of construction has been chosen, we decide if it's going to be a harness specifically for women, for men, or have a uni-sex design.

When the requirements profile is finalised, we sketch the design and cut for the new harness. We complete the initial drawings by hand. Once the basic design is ready we start to work on it using computer-aided design.

Next, we cut out and stitch the first prototypes – again all by hand. Each piece (there could be up to 45 of them) is then tested, evaluated and improved – attention to detail is really important.

Once each separate piece has been perfected and every member of the design team involved feels that the harness fits the requirements profile, detailed instructions are drawn up for how to manufacture the harness and stitch it together. These instructions for the stitching department contain a detailed guide explaining the separate manufacturing stages step-by-step so that each piece (see illustration below) can be stitched together correctly to make the finished product.



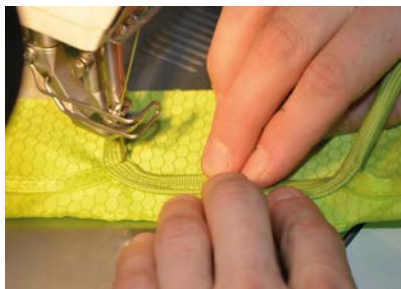


### Stitching

All our climbing harnesses are manufactured at the Vaude Vietnam production facility stitching department. Due to our close working relationship with Vaude and the high production standards, social responsibility and good working conditions at the stitching department in Vietnam, we can guarantee outstanding quality and remain committed to sustainable environmental protection. This is German quality – made in Vietnam.

A climbing harness can contain up to 45 different parts. These are stitched together step-by-step. We're not talking your granny, sat in her rocking chair next to the fire here. This is a modern assembly line process. Each seamstress specialises in a particular stitch or in stitching particular pieces. As such, each harness visits different teams in the stitching department. Non load-bearing parts are stitched partly by hand. The seamstresses are so precise that their work is nearly as accurate as that of a machine.

However, all load-bearing parts are stitched by computer-operated sewing machines. We use bar tack stitching. This is a series of stitches often sewn in a narrow zigzag pattern, sometimes referred to as automatic stitching. The seamstress places the part to be sewn in a special holder and selects the automatic sewing pattern. The machine then does the rest with millimetre-precision according to pre-programmed parameters. Bar tack stitching is always used where the stitching is safety-critical. Load-bearing stitching is tested to ensure that it is safe and strong enough according to the EN 12277 standard (Mountaineering equipment - Harnesses - Safety requirements and test methods) and certified by an independent organisation, for example TÜV. By automating this part of the stitching process, we can offer maximum precision and eliminate the risk of human error. Where load-bearing stitching is used to provide safety and strength the visible area of stitching always has a contrasting colour and surface texture to the webbing tape. This makes it easier to check if it is intact.



# CERTIFICATION AND STANDARDS

In common with most pieces of climbing equipment, harnesses are Personal Protective Equipment (PPE) against falls from height. But what exactly does this mean? 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. As PPE, climbing harnesses have to conform to a detailed system of quality control and safety standards. These safety standards were developed to protect users from sub-standard quality products that ultimately put lives at risk. At EDELRID, we see these standards as minimum requirements. Our internal standards mostly exceed the required product safety standards.



## **CE mark (European Conformity)**

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. However, it is not mandatory for all product groups. The CE mark means that a product complies with all the relevant requirements and that it 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. Climbing harnesses sold in the EU must conform to the EN 12277 standard. Products with an EN standard fulfil prescribed safety standards and have passed a type examination conducted by a testing institute. However, external testing is not mandatory for all product groups. In such cases, the manufacturer is exempted and allowed to test products with internal quality controls.



## **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 mountaineering equipment for decades. The UIAA standards conform to the EN standards, but are not binding.

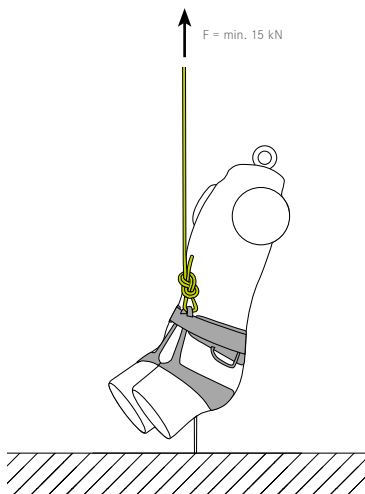
## UNDERSTANDING THE STANDARDS

You might feel confident about your harness, but do you really know that it's safe? As a certified climbing equipment manufacturer, we make scrupulous quality management our highest priority. As such, we carefully inspect our products to ensure that they meet the required safety standards and our strict internal quality controls. We do this with the help of batch testing. From every batch of 500, we select three products to undergo rigorous testing. What does the test involve? We have our own EDELRID testing laboratory in Allgäu. This is how we test a sit harness.

The harness waist belt is clamped in a tensile testing machine and loaded with a static force of ten kilonewtons for three minutes. This is equivalent to a ton in weight.

The next tests involve using a rigid test dummy which is attached to a single rope. The waist belt webbing and leg loop webbing is marked directly at the buckle. This is so that the tests can determine whether the webbing slips through the buckles during testing.

Next the dummy is placed in the head up position and force is applied, increasing gradually to 15 kilonewtons (1.5 tons) over a period of two minutes. Once the maximum load is reached the harness must be able to withstand the force for at least one minute. The tension is then released for a maximum of one minute to allow the material to relax and then the force is reapplied to the harness and gradually increased to 15 kilonewtons again. This time the harness has to be able to withstand the force for 3 minutes. Subsequently the marks on the webbing are checked to see if they are still in the same place.



In addition to batch testing, every harness that leaves the stitching department is inspected. Each stitch and every part is checked. If the harnesses tested meet the required safety standards, then the batch is released and the harnesses can be distributed to make their way into the shops.

# INDEX

---

|                                      |         |                                     |         |
|--------------------------------------|---------|-------------------------------------|---------|
| 3D Vent Technology                   | Page 29 | Mixed climbing                      | Page 08 |
| Alpine climbing                      | Page 33 | Padded webbing harnesses            | Page 09 |
| Back-thread buckles                  | Page 10 | Personal Protective Equipment (PPE) | Page 13 |
| Breathability                        | Page 24 | Protector                           | Page 37 |
| Buckles                              | Page 09 | Safety standards                    | Page 35 |
| CE mark (European Conformity)        | Page 27 | Sit harness                         | Page 36 |
| Chest harness                        | Page 27 | Slide Block buckle                  | Page 11 |
| Children's harnesses                 | Page 13 | Sport climbing                      | Page 13 |
| Cleaning                             | Page 08 | Stitching                           | Page 36 |
| Climbing wall                        | Page 17 | Storage                             | Page 27 |
| Closure system                       | Page 34 | Suspension Trauma                   | Page 15 |
| Design process                       | Page 37 | Swami Belt                          | Page 28 |
| Easy Glider buckle                   | Page 26 | Testing                             | Page 15 |
| Fit                                  | Page 28 | Tie-in loop                         | Page 37 |
| Gear loops                           | Page 07 | Top-roping                          | Page 36 |
| High-alpine use                      | Page 14 | Transport                           | Page 29 |
| High ropes courses                   | Page 14 | Tying in                            | Page 36 |
| Hytrel® protector                    | Page 18 | UIAA                                | Page 33 |
| Ice climbing                         | Page 12 | Unthreading webbing                 | Page 37 |
| Ice screw clip                       | Page 17 | Upside-down fall                    | Page 33 |
| ISO 9001                             | Page 13 | Via ferrata                         | Page 13 |
| Laminated construction harnesses     | Page 27 | Wear indicator                      | Page 38 |
| Leg loops                            | Page 39 | Webbing harnesses                   | Page 17 |
| Load-bearing, edge-binding harnesses | Page 17 | Women's specific harnesses          | Page 08 |
| Men's specific harnesses             | Page 14 |                                     |         |

Disclaimer: this handbook provides information about the different types of climbing equipment and its uses. The contents only provide an overview and make no claim to be exhaustive. In addition, we would also like to point out that the techniques shown in this booklet are not a substitute for reading the user manual belonging to the relevant product or reading the appropriate standard literature.

Mountaineering, climbing and working at heights or underground often involve hidden risks and dangers from external factors. A risk of accidents cannot be ruled out. For more detailed and in-depth information, please refer to the applicable literature. However, even user manuals and instructions will never be a substitute for experience, personal responsibility and knowledge of the risks involved in mountaineering, climbing and working at heights or underground.

They do not release the user from taking responsibility. The equipment may only be used by trained, experienced people or under appropriate supervision and instruction. Before using the equipment, users must first familiarize themselves with how to use it correctly in a safe environment. The manufacturer cannot be held liable if the equipment is misused and/or used incorrectly. Users and or the persons responsible will bear the responsibility and risks in all cases.