

safe mountaineering

Mountaineering in the high mountains is a great way to

experience nature, companionship and adventure. The aim

of the following recommendations is to effectively respond

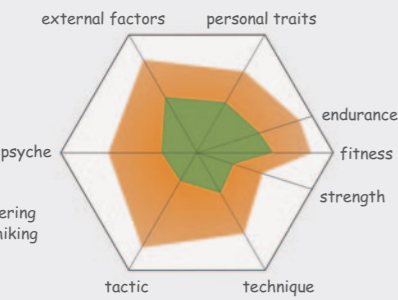
to the many risks mountaineers may be exposed to.

Attending rock and ice courses will give you the nuts and bolts,

venturing outside will give you ever more experience.

1 be in good health and fit

Mountaineering takes you into high alpine regions and demands a lot of stamina. It makes your heart and circulation as well as your muscles and joints work hard, so a high fitness level and a realistic assessment of your abilities are required. Avoid having to rush and adopt a pace that everybody can keep up with. Mountaineering in high alpine regions is the supreme discipline of mountaineering. A lot of experience, excellent skills and very good fitness are prerequisite to be able to live up to the varied demands on body movement, awareness of danger, orientation and navigation as well as rope handling and belaying. Since air pressure, humidity and temperatures drop the higher you climb, your body experiences considerably more stress in altitudes of 2500 m and above than when hiking in lower regions. In addition, mountaineering takes you to exposed, remote areas and covers great altitude differences and horizontal distances. These criteria require a very good physical condition and a sufficient reserve of physical and psychological strength. If you are not sure, in an advanced age or have recently recovered from an illness, a professional health check by a sports physician is recommended.



2 take acclimatisation into account

Once you are above 2500 m, your body needs time to acclimatise. To do so, it is crucial to gain height slowly and increase your sleeping heights moderately. The best remedy for symptoms of altitude sickness such as headaches, dizziness or nausea is descending.



If you are in good health and give your body enough time, you can fully acclimatise up to an altitude of approx. 5500 m. In contrast, everyone will become sick if climbing into high altitudes too quickly. Fast ascents by car or cable-car are a challenge for our organism and should be avoided. Be strongly advised against taking prophylactic medication for altitude acclimatisation.

An important parameter to check on the acclimatisation is your heart rate. If your resting heart rate is more than 20 % higher than in the valley, you are in the critical phase of acclimatisation. Go easy on yourself and your body during this adaptation phase. The principle is: Walk slowly in order to not exhaust yourself and travel lightly. In addition, regular hydration is particularly important in high altitudes.

Problems caused by altitude are very often disregarded or deliberately concealed by mountaineers. Therefore it's important to know the cardinal symptoms and alarm signals of acute mountain sickness: sudden drop in performance, persistent headaches, balance problems and dizziness, difficulty breathing, nausea and vomiting.

3 plan and prepare carefully

Maps, guide books, the internet and experts provide information on distances, altitude difference, difficulty and current conditions. Pay particular attention to the weather forecast because thunderstorms, a sudden deterioration of weather and poor visibility increase the risk of accidents. Plan for alternative routes. The check-list below will help you to gather the most important information for your tour planning:

Tour?

- You know the difficulties in rock and ice, the distances and altitudes?
- You know where the cruxes of the tour are?
- Are there alternative routes?
- Can you find the way when setting out in the dark?

Current conditions?

- Do you have information about the current conditions, especially the approaches to the glacier and the condition of the glacier surface itself (firm or ice, open crevasses)?
- Does your timing match the current conditions?

Weather?

- Is the weather forecast good enough for your tour?
- Are heat thunderstorms expected in the course of the day?
- Is a cold front approaching, possibly causing snowfall, even in summer (avalanche danger)?
- May poor visibility be expected, which makes route finding on the glacier difficult?
- Are high winds predicted, which become a danger on exposed ridges?

Group?

- Are all group members up to the tour (fitness, technique, psyche)? Does anyone take medication?
- Did you let responsible people know where you are going?

Equipment?

- Is your equipment appropriate and suitable for your destination?
- As much as necessary, as little as possible?
- Did you pack orientation and navigation aids like map, altimeter, compass, GPS?
- Did you bring a first-aid kit, bivouac bag, mobile phone and headtorch in case of emergency?

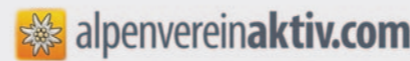


Android



iOS

For tour descriptions, a tour planning tool, current conditions, the weather forecast and information on huts visit the tour portal of the three Alpenvereine:



4 mountaineer in small groups

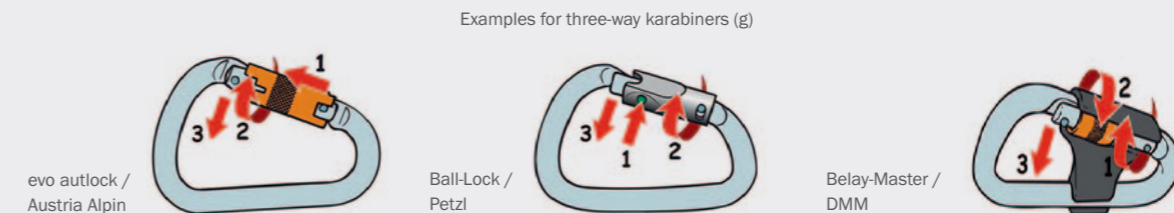
Skills, experience, motives and group size determine which tour you choose. The ideal group size is 2 to 6, more people are usually a risk factor! It is generally not advisable to go mountaineering on your own. Always let responsible people know where you are going, the trail(s) you intend to hike and when you expect to be home. Traveling on a flat or moderately steep glacier is ideal in rope teams of 4 to 6 people. This size of rope team is flexible, makes it easy to help each other and the fall of one of the team members into a crevasse can be held well, provided the rope is extended and there is no undue slack. If there is also roped climbing involved, teams of two or three mountaineers are ideal. These very small teams, especially the two person rope, must be aware of the danger of falling into a crevasse and must minimise their risk by appropriate spacing, stopper knots, "rope discipline" (no slack rope!) and careful route selection.

5 bring the right equipment

Make sure you have the right equipment for your destination and keep your rucksack light. Bring your rope and helmet to protect yourself against falls and rocks, and your crampons and ice axe for safe glacier travel. Pack sun protection. For an emergency, bring your first aid kit, bivouac bag, mobile phone (European emergency number 112) and a headtorch.

Tips for the basic technical equipment for mountaineering:

- Mountain boots.** Choose lightweight, waterproof, crampon-compatible boots with the perfect fit (a).
 - Crampons.** All round steel crampons equipped with anti-balling plates are good for mountaineering in high alpine regions. Binding types (e.g. heel lever combined with toe strap) and boots must be compatible (b). Sharpen dull crampon points with a hand file.
 - Ice axe.** A reasonable compromise for general mountaineering is an ice ax 55 to 65 cm long with a „t“ rated straight shaft, without wrist loop. Lightweight ice axes made from aluminium are only an option for easy glacier travel or ski mountaineering (c).
 - Helmet.** Nowadays, the climbing helmet is an integral part of the basic mountaineering equipment (d). Not wearing a helmet must be well justified (e.g. glacier travel without any steep terrain above).
 - Seat harness.** Lightweight, unpadded, adjustable leg loops (e).
 - Rope.** Lightweight, dry-treated single rope (marked with a circled 1 on each end of the rope), 50 m (f).
 - Karabiners.** 1 three-way carabiner for roping up on the glacier (g), 1 belay/HMS carabiner for belaying your partner, 2 screwgate karabiners for attaching yourself to an anchor and for rescue (h), 3 regular gate carabiners for attaching equipment and as spares (i).
 - Cords.** 3 accessory cords, lengths 1/3/3 m, diameter 5 to 6 mm for rescue (j).
 - Slings.** 1 sling, 120 cm. For belay stations, protection and rescue (k).
 - Ice screw.** 1 up-to-date ice screw with crank, approx. 19 cm long (l).
 - Ascender.** (e.g. „Tibloc“, „Micro-Traxion“, ...) helpful for rescue maneuvers (m).
- Additional karabiners, quickdraws, ice screws, slings, stoppers, friends depending on the difficulty and nature of the tour.



6 check the conditions

Retreating glaciers, disappearing snow and ice cover as well as the rise of the freezing level due to climate change increase the dangers of falling rocks and thinly covered crevasses. An "alpine start" is vital, as well as continuously monitoring the weather and terrain plus adapting your route to the changing circumstances.

The following sample shows you which items need to be checked while mountaineering in high alpine regions:

Start in the dark. Scout at least part of the route you will have to cover in the dark the previous day (a).

Moraines, outwash plain and glacier approach. Watch out for icy spots in the morning, especially when crossing glacial streams (b). Due to the increase in water flow during the day, glacial streams can often be difficult to cross on the way back.

Before stepping onto the glacier. In a place as convenient and safe from falling rocks as possible (or even before leaving the hut), put on your harnesses and split into rope teams. Ice, hard firn or soft wet snow? The answer tells you whether you'll wear your crampons already when stepping onto the glacier or only need to put them on later - but make sure you put them on early enough! Also use the rope-up break to refuel, rehydrate and urinate (c).

Walking on the glacier. Wherever possible, avoid crevasses. Run the rope at right angles to the crevasses, do not travel parallel to them. Ideally, choose little nunataks for your rest stops. When stopping for a break on the glacier itself, all mountaineers need to stay roped up and keep the rope extended and slack-free. Expect fields of crevasses where the valley becomes steeper (basal drag zone) (d).

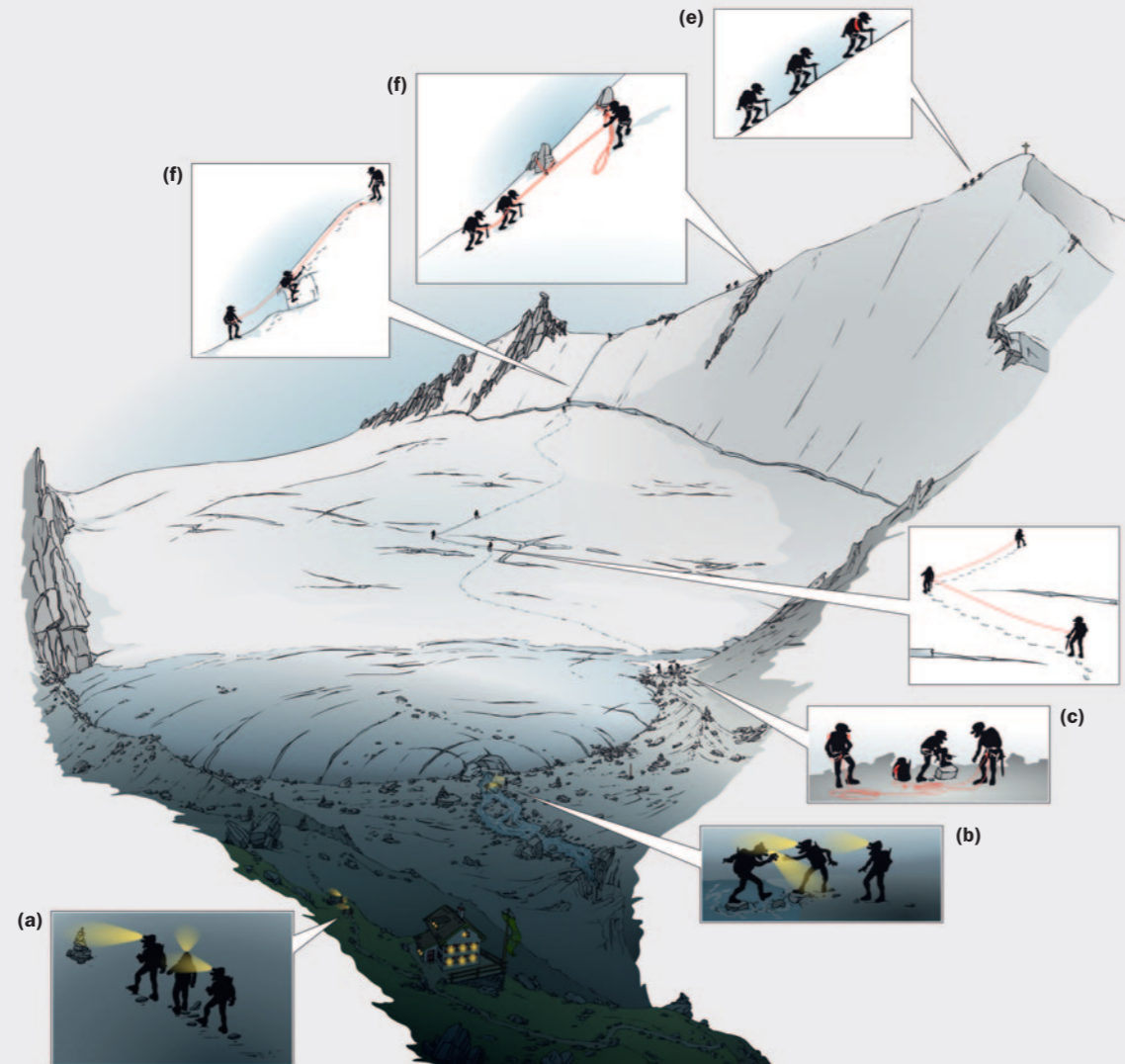
Seracs. The areas underneath towers of ice and hanging glaciers are dangerous. Pass them quickly if you cannot find a path around them.

Dangerous runouts. The risks of roping up on steep firn, ice and rock include the danger of one mountaineer's fall pulling the entire rope team off the mountain. In this kind of terrain, it is time to unrope. In these sections and depending on the team members' skills, the climbers continue unroped (e) or use fixed belays (f).

Summit. Enjoy and get a good look at the landscape for the descent - e.g. identify location of fields of crevasses. Don't lose track of time, watch the weather and take the rise of temperature into account (slushy snow swamps!)

7 constant orientation & navigation

Off-trail walking and glacier travel as well as poor visibility can make orientation and navigation difficult. Therefore it is important to be skilled at using map, altimeter, compass and GPS. If in doubt, stop and turn around in good time. Even in times of the internet and satellite navigation, the topographic map at a scale of 1:25,000 is our most important orientation tool. An altimeter is also simple to use and very handy if it is calibrated regularly. A GPS device can be very useful when route finding on glaciers becomes difficult, but it should not tempt you to make glacier travel in poor visibility standard practice. Should you have lost your way off-trail, consider: Stay put until visibility improves? Retrace your steps? Call emergency number? Avoid the temptation to plunge hopefully on - it is usually the riskiest alternative!



8 rope up on glaciers, belay above dangerous runouts

Rock arêtes and ridges, glaciers, firn and ice faces require excellent belay and rescue skills. In the event of falling into a crevasse, roped glacier travel keeps the fallen mountaineer from dropping even deeper. Be careful in steep terrain: You risk being pulled off the mountain when moving together roped up!

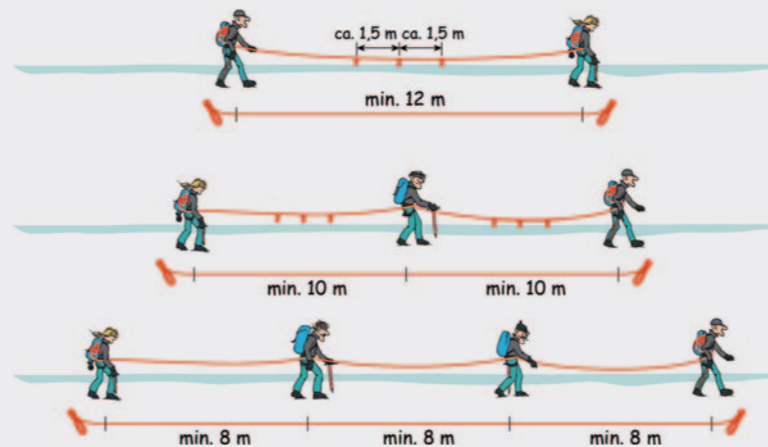
Glacier. In summer, always rope up on snow-covered glaciers. If the glacier is not covered in snow and there is no danger of falling into crevasses, you do not need to rope up. Rope up by clipping a figure-of-eight loop into a three-way karabiner. Spacing (8-10-12 m):

- Rope teams of 4 to 7 mountaineers at least 8 m apart
- Three-person-rope at least 10 m apart, 3 stopper knots
- Two-person-rope 12 to 15 m apart, 3 stopper knots

While moving, keep the right amount of tension in the rope to keep it slack-free. If you can't rule out crevasses underneath, the rope must stay extended and slack-free when you reach a rest stop, too.



Roping up by clipping a figure-of-eight loop into a three-way carabiner



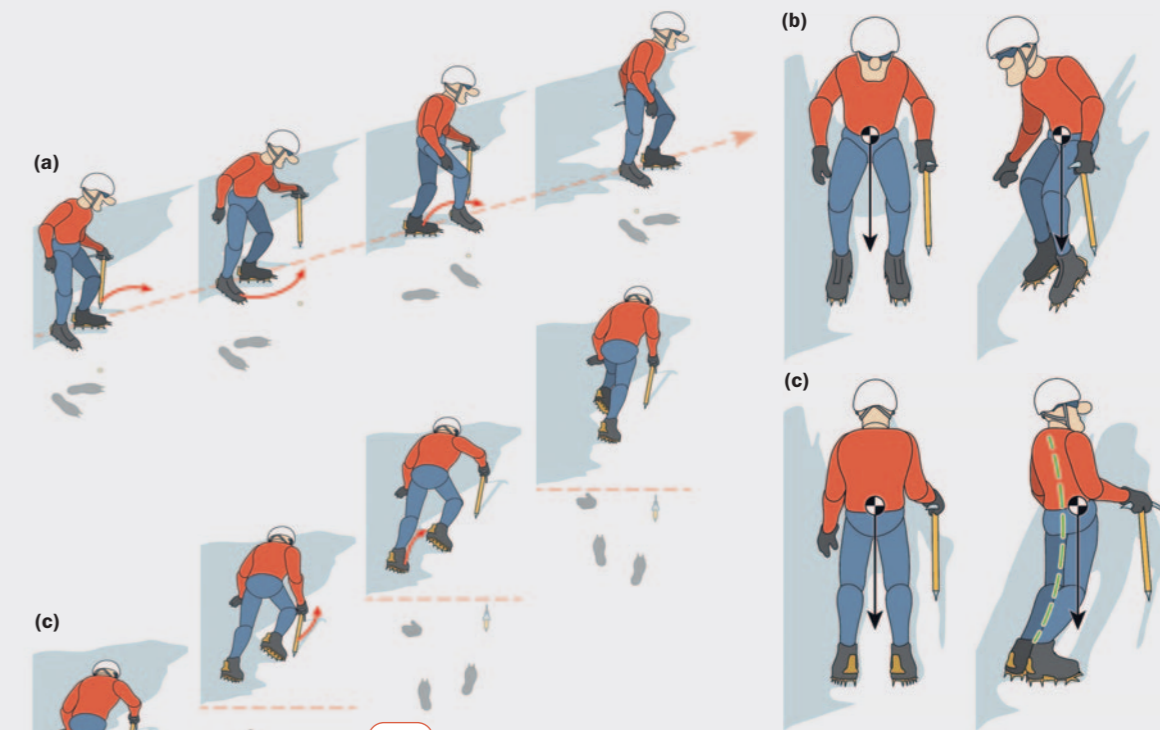
9 surefootedness is key

The leading cause of accidents are falls from slipping or tripping. Mind that too brisk a pace or fatigue can seriously affect your surefootedness and concentration. It takes a lot of practice to use crampons and your ice axe safely.

Do not underestimate the danger of tripping or hurting yourself while wearing crampons. Therefore, only put on crampons where they are useful and necessary and pay utmost attention to impeccable crampon technique. There are two basic techniques: Flat-Footing (French or "Eckenstein" technique) and Front-Pointing (German technique).

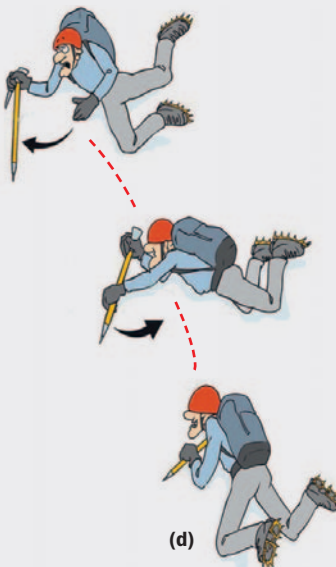
Flat-Footing. Generally used on lower-angle slopes of up to approx. 35°. Press all bottom points of each crampon firmly into the ice, simultaneously and as flat against the ice as possible. On slopes, flat footing requires good flexibility in your ankles (a). When descending, be sure to keep your crampon points flat against the ice as well. Slightly bend your knees, splay your toes outward in duck walk fashion, lean forward to keep the weight of your body over the crampons (b).

Front-Pointing. On slopes steeper than approx. 35°, the technique of front-pointing comes into play. Carefully and deliberately kick the two forward points plus the two vertical points immediately behind them into the ice. Boot heels need to be slightly lower. (c).



10 respect for nature and the environment

The high mountain regions are a precious playground for experiencing the wilderness. Enjoy this freedom and respect the fragile mountain environment. Be considerate of others and help the alpine associations in protecting and caring for the natural environment.



In the event of a slip or fall, you must roll over onto your stomach and arrest the slide by using your ice axe as a brake. Never use your crampons as brakes - you may get caught in the firn and start to roll, tumble and bounce (d).