



MÉMENTO
DES TECHNIQUES
DE L'ALPINISME
DANS L'ARMÉE DE TERRE



VERSION 2022



A document implementing the regulations and directives in force, this memo is primarily aimed at soldiers of the Army and armies who are required to engage in mountainous environments.

As such, it constitutes a technical reference document for training and training, at EMHM, pilot in the field, and in the corps.

However, ***it in no way replaces the follow-up of training, nor the experience required in a skills course in the field.***

The skills classified in this guide must be the subject of regular practice to be mastered over time.

The choice and decision on their use are left to the discretion, in the field, of the designated technical manager.

The techniques presented in this manual are those whose use is necessary or useful in the mountains. Others, for reasons of security or less usefulness, have been deliberately omitted.

It was produced based on current techniques at the time of writing (2021). It uses equipment whose use is likely to change depending on the standards and instructions for use of the manufacturers.

TABLE OF MATERIALS

BASM - Military mountaineer and skier certificate

CEHM - High mountain team leader

BQTM - Mountain troops qualification certificate

CDHM - Head of high mountain detachment

MGM - Military guide monitor

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ROPES, KNOTS AND LANYARDS

Types of ropes

DYNAMIC / STATIC



DYNAMIC ROPE

Through its characteristics and its elasticity, it cushions the shocks and absorbs the energy of the fall. It is used in climbing and mountaineering.



SEMI-STATIC ROPE

Intended for caving or canyoning, it has a moderate elongation. Its use is reserved for abseiling or setting up a “zip line”. It is generally white in color.

ATTENTION !

Under no circumstances should semi-static ropes be used for climbing or as an anchor line when passing equipment.



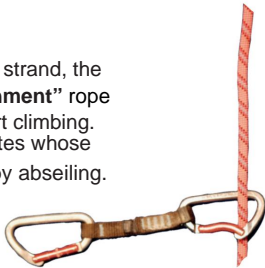
DYNAMIC STRINGS

USE

1

Made from a single strand, the “**single**” or “**attachment**” rope is designed for sport climbing. It is suitable for routes whose descent is not done by abseiling.

The endowment rope measures 70 m.



The “**double**” rope is recommended for the mountains or on major climbing routes when abseiling is necessary.

It is also preferable whenever the belay points are random, particularly in glacier climbing. Especially since to limit the pull (& the fall factor) you can carabiner the strands separately.



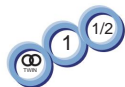
The “**twin**” rope, of a smaller diameter (weight saving) must be clipped with both strands. It allows you to make reminders.



This type of rope is no longer provided to the Mountain Troops!



The “**multi labels**”, “**jo-ker**” type rope measures 50 m. With two strands, it can be used like a double rope. The use of a single strand is possible for races on rock, snow and ice.



Personal Protective Equipment (PPE)

LIFESPAN OF ROPES AND STRAPS

Textile PPE 5 years	Thread color		Textile PPE 10 years
Cord, strap	Valid until December 31 of the year		Ropes, lanyard via ferrata
Year of manufacture			Year of manufacture
2013	Fuchsia	2017	
2014	White	2018	
2015	Orange	2019	
2016	YELLOW	2020	2011
2017	Green	2021	2012
2018	Red	2022	2013
2019	Black	2023	2014
2020	Brown	2024	2015
2021	Blue	2025	2016
2022	Purple	2026	2017
2023	Gray	2027	2018
2024	Fuchsia	2028	2019
2025	White	2029	2020
2026	Orange	2030	2021
2027	YELLOW	2031	2022
2028	Green	2032	2023
2029	Red	2033	2024

Lovage

SOME ROPES



Before coiling a rope, it is recommended to unwind it completely on the ground by untangling the knots.



RINGS

- Practical for transport around the bust;
- Source of strands*;
- Difficult to remove cleanly.

ROPE BAG

- Quick coiling;
- Protects the rope;
- Bulky: use in climbing schools for single-pitch routes.



hanks

- Fast ;
- Without strands*;
- Requires a bag for transport.

* Strands: Tendrils creating rigid loops on the rope.



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Transportation

OF ONE STRAND FOLDED INTO BANKS



Fold the rope into skeins starting from its middle and leave 2 meters of strands to hold it in place.

Tie-up knot

FIG-FIG KNOT WITH STOP KNOT

BENEFITS :

- Most commonly used;
- No risk of slipping*;
- Easy to memorize and control;
- Relatively easy unlocking.

INCONVENIENCE :

Bulky if used with two strands of rope.

NOTICED :

This is the preferred node for community practice.

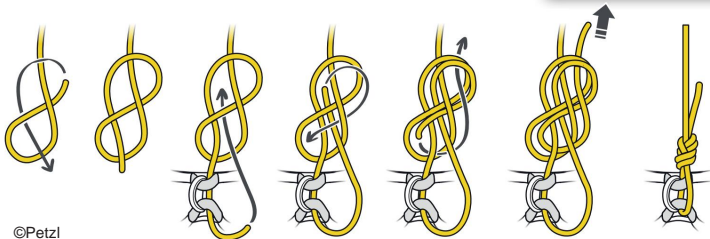
ATTENTION :

- Make sure that the rope is passed through the “load rings” and not over the trigger guard or the various harness straps;
- Slides on new ropes if it is loose (take the knot with both hands and tighten each strand separately).

* : The possible slippage of the figure eight knot, especially with a new rope, is limited by the stopper knot.



Margin greater than the width of a hand between the knot and its end.

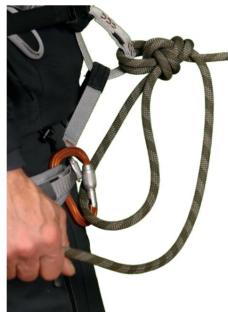
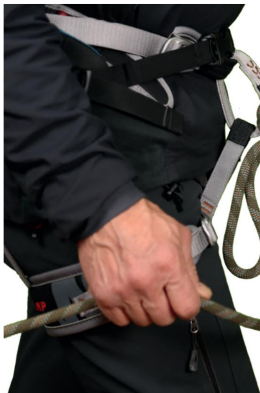


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Tie-up knot

DOUBLE CHAIR KNOT ON 1 STRAND



BENEFITS :

- Use in the middle of the rope*;
- Ease of unlocking;
- Can be done with one hand.

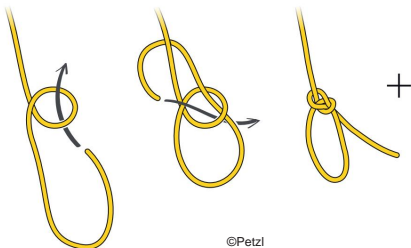
NOTICED :

Obligation to follow it with a double stop knot (single fisherman) or a carabiner in the loop.

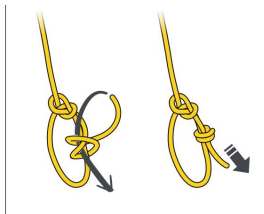
DISADVANTAGES:

Slight risk of slipping and large volume.

** Rope with reserve rope in the backpack
or in the case of a 3-person tie-up.*



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Tie-up knot

DOUBLE CHAIR KNOT ON 2 STRANDS



BENEFITS :

- Use in the middle of the rope*;
- Ease of unlocking;
- Can be done with one hand.

DISADVANTAGES:

Slight risk of slipping and large volume.

NOTICED :

Obligation to clip the loops with a safety or progression carabiner.

* : Rope with reserve rope in the backpack
or in the case of a 3-person tie-up.

Junction knot

FISHERMAN'S KNOT

SIMPLE FISHERMAN'S KNOT (MARSEILLAIS)

Used as a **stop knot** or **to lock a carabiner** on a lanyard rope.



ADVANTAGE :

Prevents the carabiner from turning over.



FISHERMAN'S KNOT DOUBLE

Making **rope loops** (e.g.: Self-locking, relay point connections, etc.).

ADVANTAGE :

No risk of slipping.

DISADVANTAGES:

- Relatively large volume;
- Risk of entrapment if maneuvering a rope (do not use to attach a rappel!);
- Difficult to undo.



Junction knot

WEBBING KNOT

BENEFITS :

- This is **the only knot to connect the straps** ;
- Reduced volume;
- Little risk of slipping.

INCONVENIENCE :

Difficult to loosen.

REMARKS :

- Never fix the ends (risk of the knot moving);
- Tighten tightly by pulling on the 4 strands;
- Can be used to connect two strands of ropes of different diameters.

Pay attention to the end length of the strap (> hand width)!



Junction knot

OF 2 REMINDER STRANDS



TWO SINGLE KNOTS

2 simple knots against each other.

BENEFITS :

- Limits the risk of entrapment; -
- No risk of rollover.

REMARKS :

- Leave at least 30 cm free and tighten each of the strands separately; -
- Tighten the knots well.

30 cm mini!

Self-locking knot

MACHARD KNOT

BENEFITS :

- Easy unlocking;
- Works in both directions;
- Simple to make.

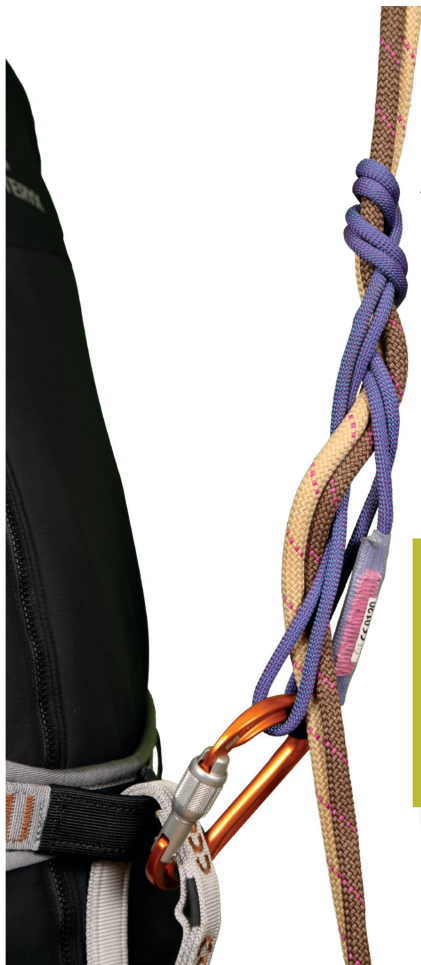


ATTENTION :

For all self-locking knots, the number of turns (minimum three) must be modulated according to the diameters used. The cord should be thinner than the rope.

Self-locking knot

BRAIDED MACHARD KNOT



ADVANTAGE :

Easy release.

DISADVANTAGES:

- Sliding on a frozen rope;
- Use in one direction only.

ATTENTION :

For all self-locking knots, the number of turns (minimum three) must be modulated according to the diameters used. The cord should be thinner than the rope.

Self-locking knot

FRENCH KNOT

ADVANTAGE :

One of the safest with frozen rope.

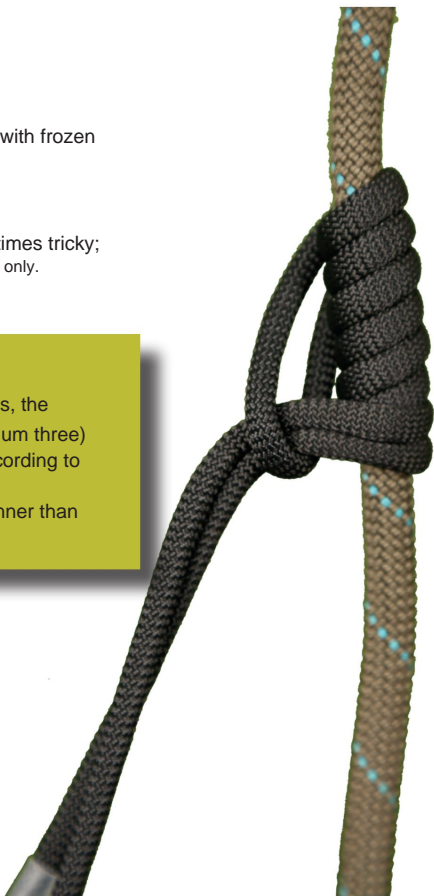
DISADVANTAGES:

- Unlocking sometimes tricky;
- Use in one direction only.

ATTENTION :

For all self-locking knots, the number of turns (minimum three) must be modulated according to the diameters used.

The cord should be thinner than the rope.



Self-locking knot

VALDOTAIN KNOT

BENEFITS :

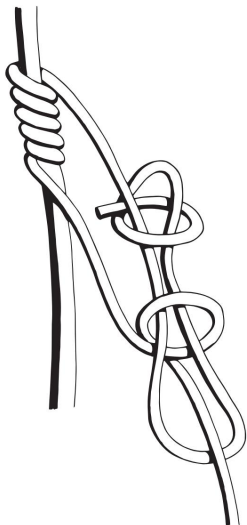
- Economical, can be made on the end of a strand;
- Easy unlocking;
- Use in both directions.

DISADVANTAGES:

- Works poorly with ropes of the same diameter;
- Be vigilant on frozen ropes.

REMARKS :

- Make a number of turns equal to the diameter of the cord;
- Closure with a bowline knot and a stopper knot.



ATTENTION :

For all self-locking knots, the number of turns (minimum three) must be modulated according to the diameters used.

The cord should be thinner than the rope.

Self-locking knot

PRUSIK KNOT



BENEFITS :

- Recommended on very slippery frosted rope;
- Works in both directions.

INCONVENIENCE :

Can be difficult to unlock.

ATTENTION :

For all self-locking knots, the number of turns (minimum three) must be modulated according to the diameters used.

The cord should be thinner than the rope.

Self-locking knot

POLISH KNOT

**ADVANTAGE :**

Makeshift knot allowing you to achieve

a self-locking device with the end of a rope (that of the rappel for example).

USE :

Foot loop when ascending on a fixed rope.

REALIZATION :

After making 5 turns, slip the end into the penultimate loop and tie a simple knot.

INCONVENIENCE :

Tends to slip, especially on frozen ropes.

ATTENTION :

Use reserved for experts.



Self-locking knot

HEART KNOT

USES:

- The heart knot can be used for fixed rope ascents;
- In the event of loss of the insurance tag, this knot allows the second person on the rope to be insured.



REMARKS :

- The core knot is more difficult to unblock under tension (difficulty giving slack to the second);
- It is best to use it with a rope simple.

ATTENTION :

- Use **two identical carabiners** without ferrule;
- The carabiners must be connected together, by a lark's head, to prevent them from crossing each other.

Blocking when this strand is under tension.

Self-locking knot

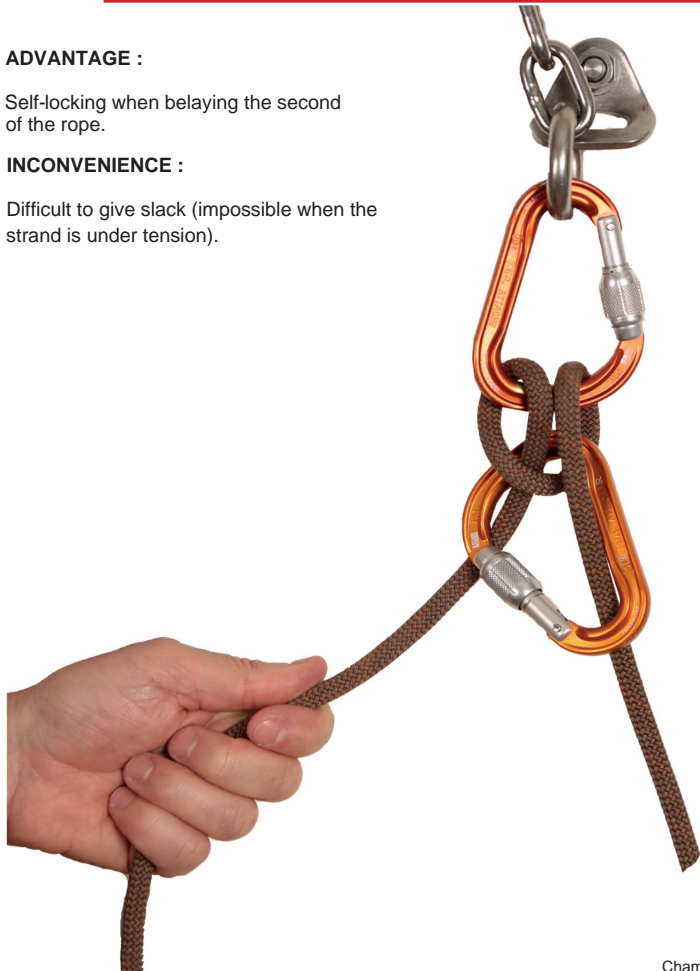
SELF-LOCKING HALF CAPSTAN

ADVANTAGE :

Self-locking when belaying the second of the rope.

INCONVENIENCE :

Difficult to give slack (impossible when the strand is under tension).



Braking knot

HALF-CABSTAN

BENEFITS :

The half-capstan can be used to belay a second person and to lower a person.

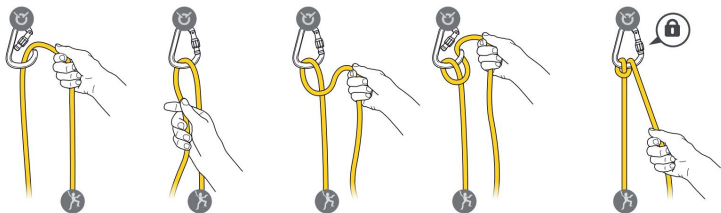
It can also be used as a brake for abseiling in the event of loss of the descender.

DISADVANTAGES:

- This rope configuration on the carabiner twists the rope.
- Use and heat the rope and carabiner.
- This knot does not allow you to let go of the rope.

NOTICED :

To be used with a “pear” carabiner.



Braking knot

DOUBLE HALF CABESTAN

BENEFITS :

When lowering one or two people with the rope, the double half-capstan offers **more braking and therefore safety than the half-capstan.**

DISADVANTAGES:

- This rope configuration on the carabiner twists the rope.
- Use and heat the rope and carabiner.
- This knot does not allow you to let go of the rope.

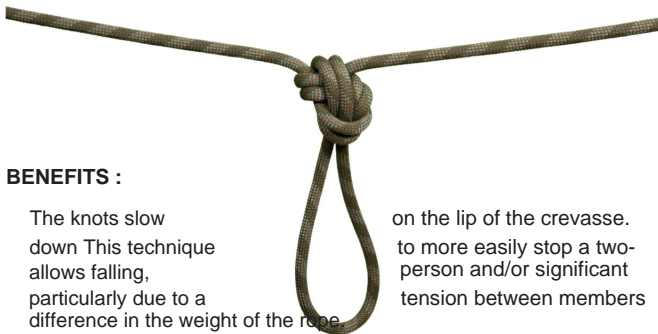
REMARKS :

To be used with a “pear” carabiner.



Braking knot

BRAKE KNOT ON GLACIER



BENEFITS :

The knots slow down This technique allows falling, particularly due to a difference in the weight of the rope

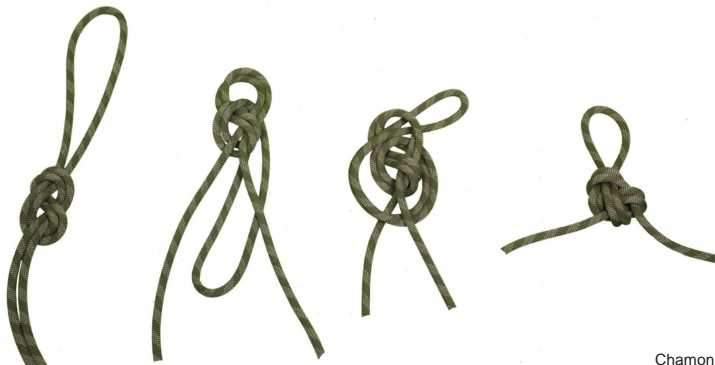
on the lip of the crevasse. to more easily stop a two-person and/or significant tension between members

DISADVANTAGES:

The presence of knots complicates the reeving or rope ascent technique and requires either a sufficient length of rope or a second strand.

NOTICED :

Depending on the quality of the snow, these knots can completely hold the fall or have no impact.



Blocking knot

CABESTAN KNOT

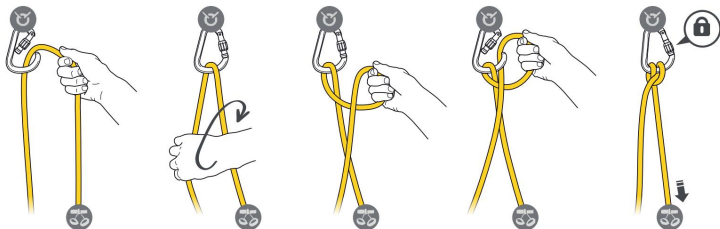


BENEFITS :

- Easy to make and adjust;
- Works on both strands;
- Possibility of adjusting the length of the strands without undoing the knot.

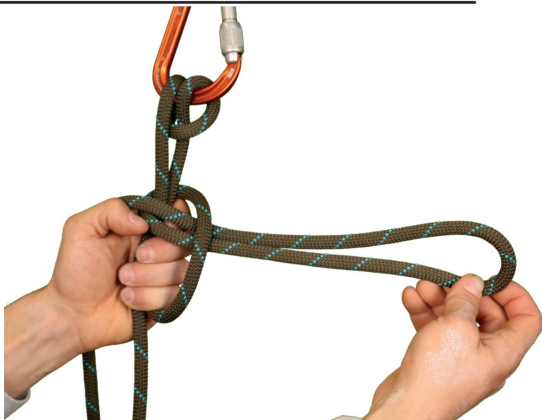
INCONVENIENCE :

Slips at 800 kg and gives way at 1200 kg.



Blocking knot

MULE KNOT



BENEFITS :

- It is the only knot that can be tied and undone with a rope in tension, especially if it is associated with a half-capstan;
- Use at the relay for self-rescue maneuvers;
- Implementation of the “disengageable recall” system.

NOTICED :

Obligation to follow it with a stopper knot or to clip the loop.

Blocking knot

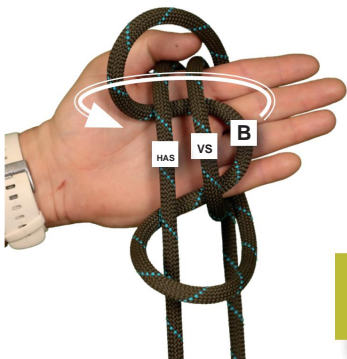
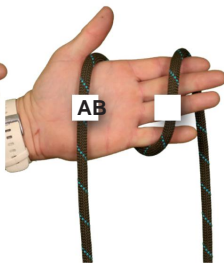
BOW KNOT

USE :

Making a loop (stem) when installing a belay rope as passing equipment.

INTEREST :

The traction on each strand puts less strain on the knot than the figure eight or the capstan.



Pass the loop -B-under -A- and -C-.

Blocking knot

BOWLINE

BENEFITS :

Easy to unlock.

INCONVENIENCE :

Slight risk of slipping.

NOTICED :

Obligation to follow it with a simple fisherman's stopper knot.



Blocking knot

DOUBLE BOULINE KNOT

BENEFITS :

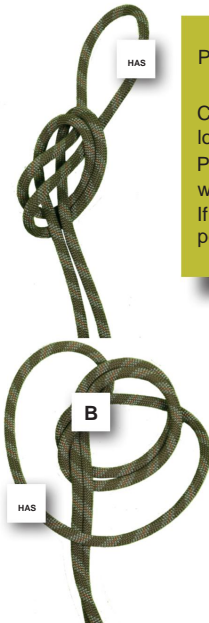
- The double bowline (or bowline) knot is particularly suitable for constructing the central point of a relay;
- Comes apart easily.

INCONVENIENCE :

Slide so poorly made.

NOTICED :

It is necessary to build a small loop in order to have the least mobility possible in the event of a rollover.



Pass the loop -A- in the well;
 Cover the well with the loop -A-;
 Pull on the 2 strands -B- which enter the well.
 If the loops slide, the knot is poorly made!



Mechanical self-locking

JUMAR HANDLE



- Usable with a rope whose diameter is between 8 and 13 mm;
- The heaviest of the mechanical self-locking devices but the most practical to implement;
- Installation of a carabiner at the top to prevent the rope from coming out of the throat (when moving on a diagonal or horizontal rope).

ATTENTION :

- Only works in one direction;
- Can slide on frozen rope;
- Do not use violent force (risk of damage to the rope);
- The handle must always be placed above the user.

Before use, refer to the manufacturer's instructions for use.

Mechanical self-locking

TIBLOC® - PETZL

- Use on one strand;
- Usable with a rope whose diameter is between 8 and 11 mm;
- Lightweight and easy to use.

ATTENTION :

- Only works in one direction;
- Do not use violent force (risk of damage to the rope);
- Use, if possible, a carabiner with a cylindrical section;
- The rope must pass through the carabiner.

Before use, refer to the manufacturer's instructions for use.



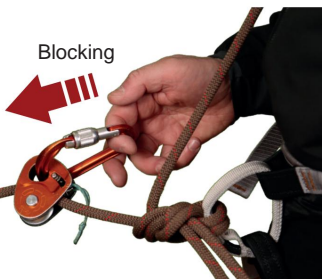
Mechanical self-locking

MINI TRAXION® - PETZL

Set up



Blocking

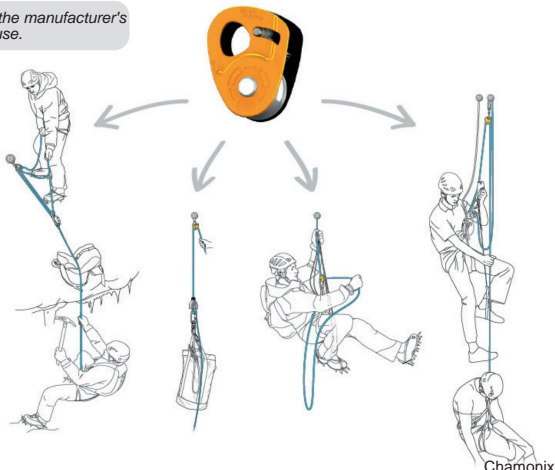


- Usable with a rope whose diameter is between 8 and 11 mm;
- Reduced friction (pulley);
- Can be used as a hauling head or for fixed rope ascent.

ATTENTION :

- Only works in one direction;
- Do not use forcefully (risk of damage to the rope).

Before use, refer to the manufacturer's instructions for use.



©Petzl

Chamonix

Mechanical self-locking

REVERSO® - PETZL

Self-locking when securing the second.

ATTENTION :

- Never charge the cable; -
- Place it in the right direction.



Lanyard

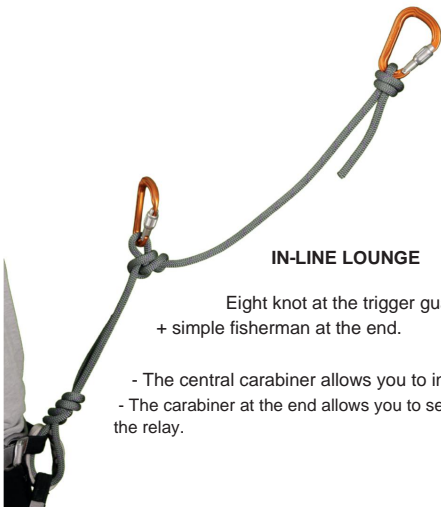
DYNAMIC ROPE LANYARD



DOUBLE LANYARD

It is made with 2m40 of single rope.

- Each of the two strands measures between 60 and 80 cm;
- The two safety carabiners used for insurance are preferably automatic locking;
- The lanyard is connected to the harness by a lark's head (made with a simple knot) and to the carabiners by simple fisherman's knots.



IN-LINE LOUNGE

Eight knot at the trigger guard + butterfly in the center + simple fisherman at the end.

- The central carabiner allows you to install the descender;
- The carabiner at the end allows you to secure yourself once you reach the relay.

Lanyard

DUAL CONNECT ADJUST® LANYARD - PETZL

Adjustable double lanyard allowing you to hang along at the belay and install a rappel system.

The adjustable strand allows you to adjust the length best suited for handling.



Lanyard

LANYARD WITH SHOCK ABSORBER

USE IN VIA FERRATA

The practice of via ferrata requires the use of a special lanyard called a “Y”. It has a system that absorbs the shock generated by a possible fall.

The use of conventional lanyards should be avoided.

It is in all cases essential to consult the instructions for use of the equipment.

This lanyard must be connected to the harness by a lark's head or possibly by a quick link.

NOTICED :

The central carabiner allows you to lock yourself in the “rest” position.

ATTENTION :

There may still be lanyards with absorbers called “V” shaped. Their use should be prohibited on via ferrata.



RELAY & MOORINGS

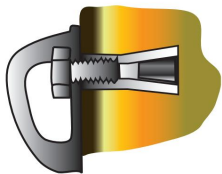
Anchor

SANITIZED GROUND: ANKLES & STUDS

Sport climbing sites and some high mountain rock routes are fully or partially equipped using expansion pins or sealed pins.

EXPANSION ANKLES IF WE :

Screws with a diameter of 8 or 10 mm are placed in a drilled hole using a hammer, a plug and a self-drilling plug or a perforator.



The principle is the insertion of a

threaded anchor onto which, once struck and locked, a belay plate will be screwed. Expansion is ensured by a cone which rests on the bottom of the hole.

REMARKS :

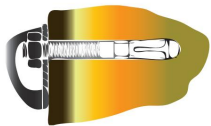
- Some routes in high mountains are still equipped with 8 mm pegs dating from their opening. This aging equipment must be used with caution.

- These dowels are a standard length which

is only sufficient in very hard rocks.

THE STUDS:

Self-



expanding threaded studs

generally have a diameter of 10 to 14 mm and the length used varies depending on the quality of the rock. They use a hole drilled using a perforator and expansion is caused when screwing in the insert by sliding a ring over the cone at the end of the stud.

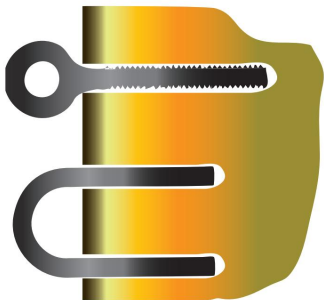


Anchor

SANITIZED GROUND: PINS

GLUED PINS:

These are threaded rods, sealed using mortar glue or resin. This type of equipment is mainly used in sport climbing sites.



WARNINGS:

- Equipping climbing sites with dry or chemical seals should only be carried out by specialists trained for this task.
- Although this type of belay means is very durable, users will still need to take a critical look at the equipment in place when they discover a climbing site. In particular, on a "bis" pin relay, you must "stick" to the quick link (not directly on a pin) and not install a windmill directly inside.

Anchor

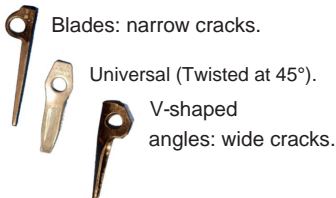
ADVENTURE GROUND: PITONS

PITONS: Use on rock.

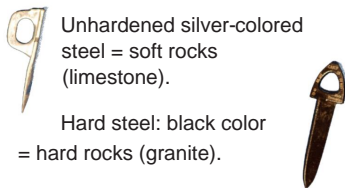
CATEGORIES OF USE (CE MARKING)

- "P" for progression pitons, their blades measure less than 3 mm thick.
- "S" for safety eyebolts, their blades measure at least 9 cm and 3 mm thick.

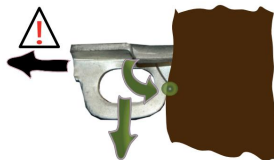
SHAPE CATEGORIES



TWO CATEGORIES OF STEEL:

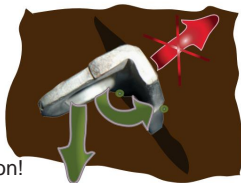


LOCKDOWN



During a fall, the piton must "lock" in the crack by twisting.

It must not hold only by friction or compression!



REMARKS :

- When a piton is not fully planted, "tie" it with a strap or a cord using a "lark's head" in order to avoid too much leverage;
- A piton that "rings clear" when struck can be considered well planted;
- To remove it, you have to tap it sideways, on one side then the other. If it doesn't come out, use a cable to pry.

Anchor

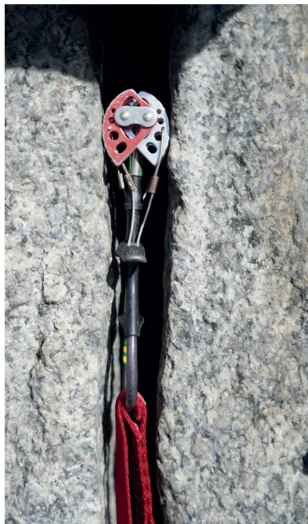
ADVENTURE GROUND: FRIENDS



“FRIENDS”

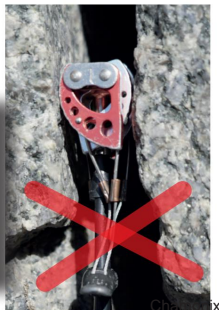
These are mechanical cam systems. They are used in rock cracks.

- All cams must be in contact with the rock;
- Avoid placing them in flared cracks where their hold is weak;
- Never push a friend into the bottom of a crack, as recovery will be impossible;
- Depending on the model, pay attention to the overhang on the edge of the crack.



ATTENTION !

Leave some clearance for the cams (Neither completely open nor completely closed)!



Anchor

ADVENTURE GROUND: CORNERS

JAMS

Metal parts of different shapes equipped with a cable or with a cord, the jammers are lodged and locked:

- Either in flared cracks: "rock", "stoppers";

- Either in cracks with parallel edges: "hexentrics", "tri-cams".

REMARKS :

- In the event of a fall, traction must be exerted in the direction of entrapment.
- During installation, block the jammer

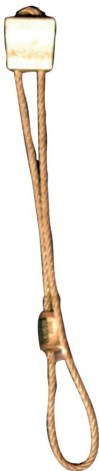
by a sharp jerk in the right direction (correct axis of resistance) in order to prevent it from coming out of its housing with the movements of the rope.

- In the event of progression only for jammer, we alternate the

carabiner-tonnage of

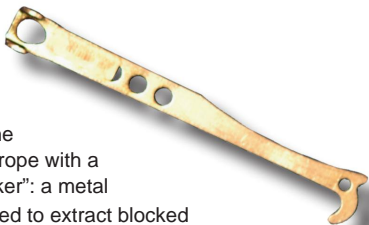
the rope strands to limit the forces on the

anchor points in the event of a fall and facilitate the sliding of the rope.



TRICK :

Equip the second rope with a "unblocker": a metal hook used to extract blocked jammers.



Anchor

ICE PROTECTION: PIN

ICE SPIKE

The spindle consists of a leg, a tube with thread and an attack bit.

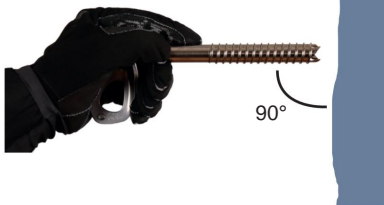
- **Choose the length of the skewer according to the quality of the ice cream ;**

- Before screwing it in, clear the surface layer to find denser glass;

- Generally speaking, installation is carried out perpendicularly to the surface;

- In very hard ice, it is possible to position the head of the pin slightly downwards;

- With mediocre quality ice the head will be tilted towards the top ;



- For fixed pins (passage equipment), monitor the evolution of their solidity. In case of sunshine, the paw must be covered to avoid heating by conduction. Favor the lunula;

- The attack bit must be sharpened for a better start.



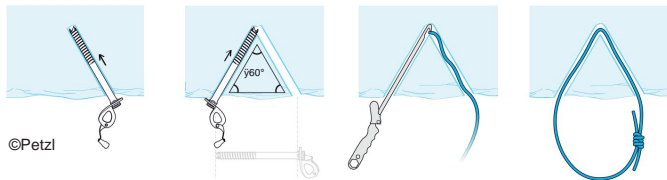
Anchor

ICE PROTECTION: ABALAKOV

This technique is named after the Russian climber Vitali ABALAKOV. Indispensable for making a mooring left in place (reminder) or for reinforcing a relay by limiting the number of pins & Ideal in the case of a fixed mooring as part of passing equipment.

RELAY MADE USING TWO LUNULES:

- Drill two converging cavities using a long pin;
- The ideal angle of 60° is obtained when the 2 holes are spaced one pin length apart;
- Insert a cord of at least 7 mm in diameter through one of the cavities;
- With a lunule hook, retrieve the cord through the second hole and then connect it using a double fisherman's knot.



©Petzl



Be careful of rings that are too short!

REMARKS

- Use the longest pin available;

Possibility of doing it vertically;

- The resistance depends on the quality of the ice and the way in which the abalakov was made (distance between the holes, angle, etc.);
- The resistance of a lunula of 15 cm side is approximately 10kN (1000kg) in compact ice;
- The lunula is not very sensitive to melting but be careful with the abalakovs in place which may show non-visible damage.



Anchor

SNOW PROTECTION: DEAD BODY

DEAD BODY - DEAD MAN

To be carried out with any object (backpack, small block of rock, ice axe, etc.).

- Dig a hole more or less deep depending on the quality of the snow;
- Fix a ring around the dead body and place it at the bottom of the hole;
- Create a trench so that the traction on the ring is exerted downwards;
- Fill in the hole and pack the snow well (especially in front of the dead body).

The use of a simple plastic bag filled with snow should be avoided (lack of resistance).



Anchor

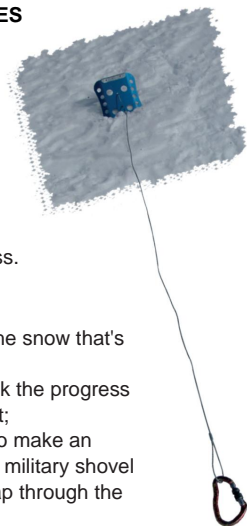
SNOW PROTECTION: ANCHOR & PILES

SNOW ANCHOR - DEAD MAN

- Use in good cohesion snow;
- Creation of a progress relay, a rappel mooring or passage equipment;
- When progressing, the climber is dynamically secured to the body or the harness.

REMARKS :

- At the first traction, sagging may occur. It's the snow that's settling!
- When installing equipment, periodically check the progress of the placement;
- It is possible to make an anchor with the military shovel by sliding a strap through the center holes.



PIOUS

Made of wood or metal, they are planted or buried in the snow.

The admissible load essentially depends on the support surface and the cohesion of the snow cover.

NOTICED :

The metal stake is the only effective protection in the frozen ground.

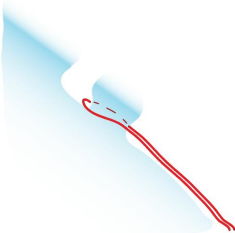
Anchor

SNOW PROTECTION: SKIS & MUSHROOMS

ON SKIS



- The skis must be buried deeply (minimum 50 cm);
- A groove dug perpendicularly allows the mooring to be worked in the direction of the most difficult tearing;
- The strap must be long enough (180cm) and must not be crushed against the edges (risk of shearing).



SNOW MUSHROOM

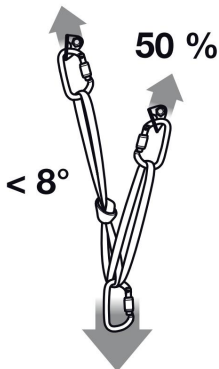
- The size of the mushroom is linked to the quality of the ice;
- To prevent the rope from coming out of the mushroom, dig a groove on the upstream side;
- Possible use in hard snow with a strap instead of the rope.



Relay

DISTRIBUTION OF EFFORTS

50 %



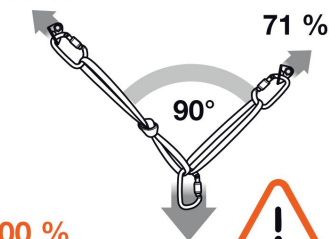
100 %

For an identical load, depending on how the relay is made, the forces on the anchors will be very different

Consequently, it is necessary to favor the **rapprochement or vertical alignment of the anchoring points** (while respecting a minimum distance between these points, particularly on ice).

Reducing the angle of traction can also be done by lengthening the strap connecting the different points.

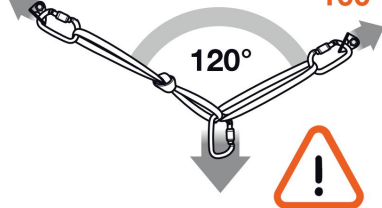
71 %



100 %

100 %

100 %



100 %

©Petzl

Relay

ON DRILLED ANCHORAGES**2 POINTS ONLINE**

In-line mooring is often used when equipping sport climbing venues with expansion dowels or sealed pins.

chain.

**PRECAUTIONS:**

- The rope must be connected to both points;
- **Never self-insure on one of the links in the chain.**

Relay

WITH MOBILE CENTRAL POINT & 2 SINGLE-DIR POINTS**2 MONO-DIRECTIONAL POINTS**

If one of the points breaks, the load is immediately taken into account by the second point.

INCONVENIENCE :

The effort is poorly distributed across the points, especially if the direction of traction is changed.



The use of safety carabiners is not obligatory on the anchors.

Relay

WITH MOBILE CENTRAL POINT & 3 SINGLE-DIR POINTS**3 POINTS MONO-DIRECTIONAL**

Greater resistance than 2-point mooring, but identical advantage and disadvantage: In the event of breakage of one of the points, the load is immediately taken into account by the second point.

INCONVENIENCE :

The effort is poorly distributed across the points, especially if the direction of traction is changed.



Chamonix

Relay

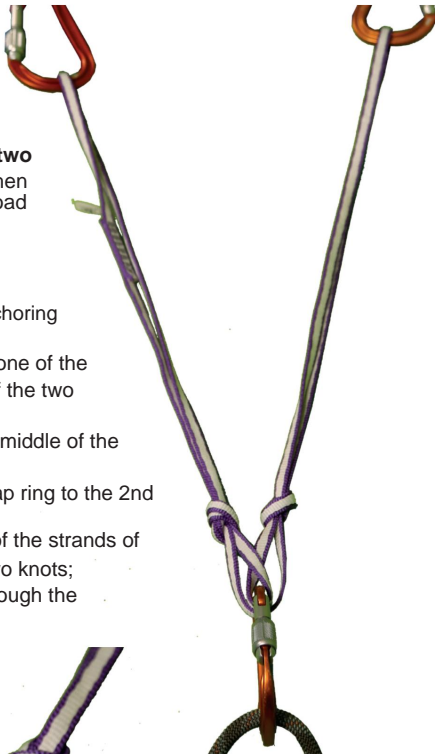
WITH MOBILE CENTRAL POINT & 2 SEMI-DIR POINTS

2 SEMI-DIREC POINTS
TIONAL

This relay allows a **good distribution of forces on the two points** of the mooring, even when the direction of traction of the load varies.

SET UP :

- Check the solidity of the anchoring points;
- Fix, without making a knot, one of the ends of a strap ring to one of the two mooring points;
- Tie two simple knots in the middle of the strap;
- Fix the other end of the strap ring to the 2nd mooring point;
- Create a half twist on one of the strands of strap located between the two knots;
- Pass a safety carabiner through the two straps.



Relay

WITH FIXED CENTRAL POINT

**SINGLE-DIRECTIONAL**

Used on ice or rock “adventure terrain”, the loop of the bowline knot acts as a “master carabiner”.

ADVANTAGE :

In the event of breakage of one of the points, the load is immediately taken into account counted by the second point.

INCONVENIENCE :

The effort is poorly distributed across the points, especially if the direction of traction is changed.

NOTICED :

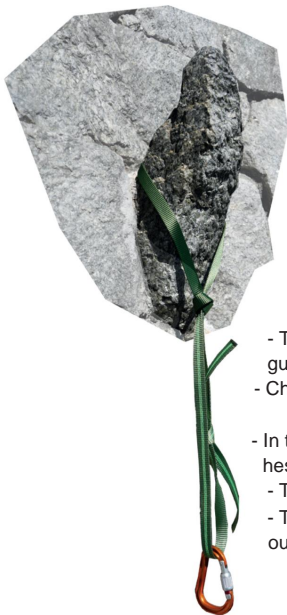
In delicate terrain, or in case of doubt, there may be more than three anchor points.

The angle formed by the strands must be less than 60° ;
Orient the direction of this traction;

Self-belaying and belaying are centralized on the loop downstream of the node.

Relay

IN ADVENTURE LAND

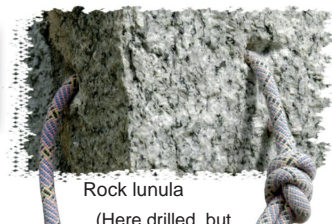


ON SPOILER, BLOCK, TREE...

PRECAUTIONS:

- The size of the block is not necessarily a guarantee of solidity;
- Check the solidity of the spoiler, shaft or block;
- In the case of rings already in place, do not hesitate to put on a new strap;
 - The traction must be exerted downwards;
 - The mooring ring is placed so that it cannot come out of its location.

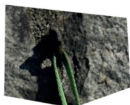
A figure eight knot on the strap allows you to "tie" the block and prevent the strap from jumping.



Rock lunula
(Here drilled, but sometimes natural).

Relay

ADVENTURE GROUND Rappel



Always **check the solidity of the anchoring** : stuck blocks, spoilers, pitons.

On the spoilers, break the sharp corners if necessary to prevent the rings from shearing.

IF THE ANCHOR IS ALREADY EQUIPPED WITH RINGS:

If in doubt about their condition, add a new strap.

Equalize the length of all its straps. Pass the rope reminder every year neaux.

**ATTENTION :**

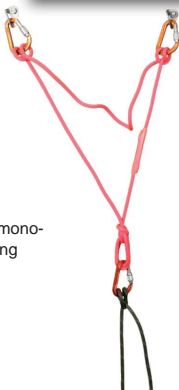
If possible use a quick link (to facilitate sliding and avoid wear on the straps due to the rope being pulled back).



Relay

BUILD A RELAY

The 2 points of the relay are **solid** :

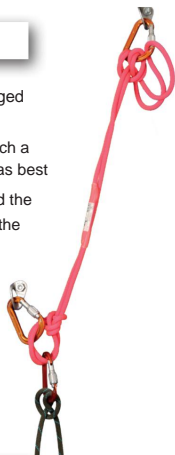


The points are arranged **horizontally** :

Triangulate with mono-directional moving central point.

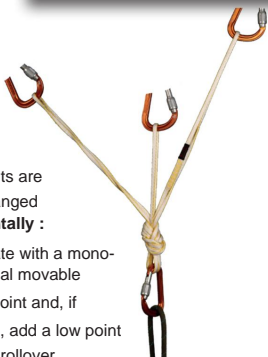
The points are arranged **vertically** :

Connect them in such a way as to use them as best as possible and build the fixed central point on the lowest point.



The 2 points of the relay are **doubtful** :

Add a 3rd point or more until the doubt is removed!

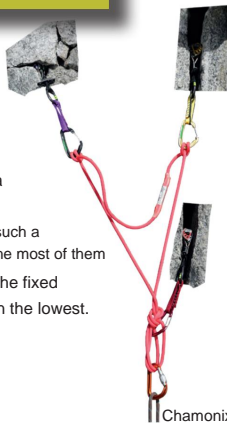


The points are arranged **horizontally** :

Triangulate with a mono-directional movable central point and, if possible, add a low point to avoid rollover.

If the points are arranged in a **triangle** :

Connect them in such a way as to make the most of them and construct the fixed central point on the lowest.



Chamonix

ESCALATION

On the cliff

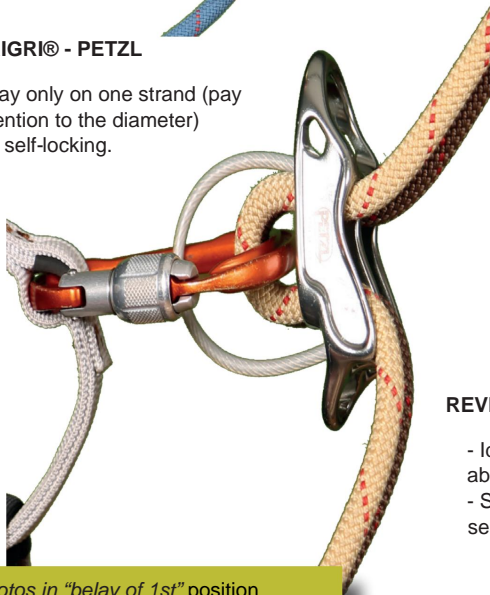
INSURANCE EQUIPMENT

**GRIGRI® - PETZL**

Belay only on one strand (pay attention to the diameter) but self-locking.

Some insurers among the many on the market...

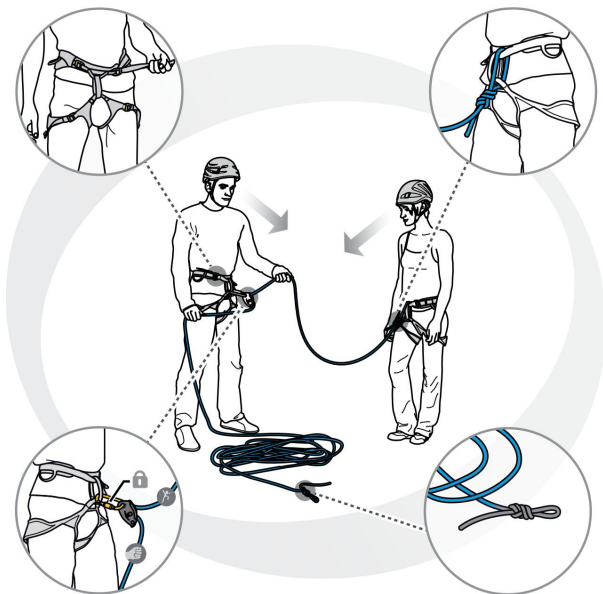
The use of gloves is recommended to avoid burns due to possible rapid friction of the rope.

**REVERSO® - PETZL**

- Ideal for belaying and abseiling;
- Self-locking when securing the second.

Photos in "belay of 1st" position rope" or "rope topping".

On the cliff

INSURING A LEAD CLIMBER: BEFORE!

©Petzl

BEFORE DEPARTURE, CHECK:

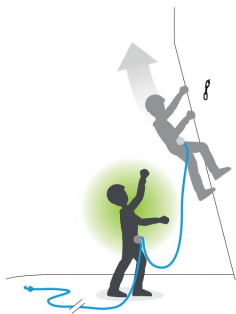
- That the length of rope is suitable;
- That the end of the rope has a knot;
- That there is not too big a difference in weight between belayer & climber.

MUTUAL VERIFICATION:

Belayer and climber do a mutual check: Rope knot and belay device + carabiner.

On the cliff

INSURING A LEAD CLIMBER: START

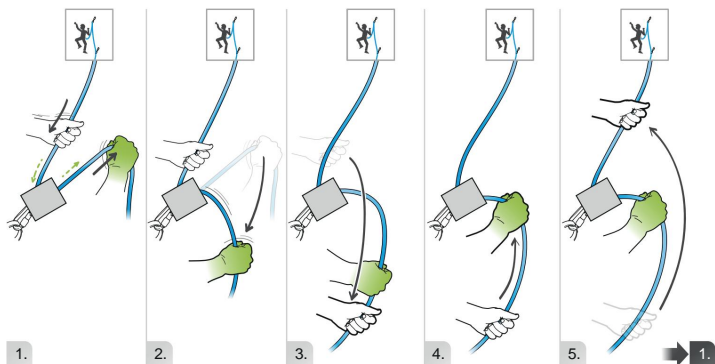


PREVENT THE FALL BEFORE THE FIRST POINT

Guide the fall before carabinering the first point so that the climber lands correctly in the right place and does not tip backwards.

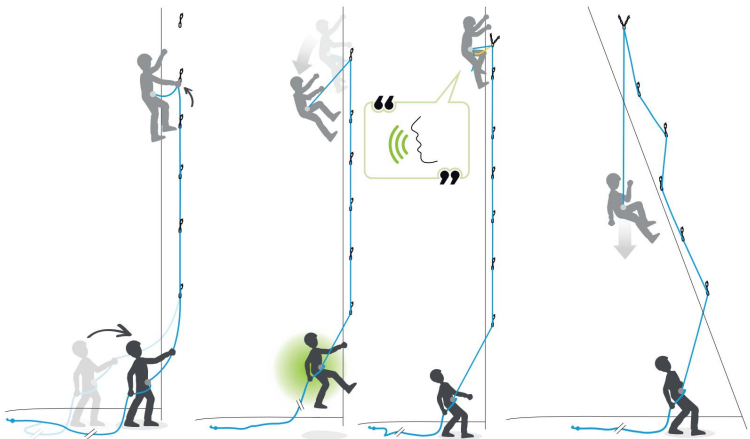
SWALLOW THE SOFT

To take up the slack, pull the climber side rope and pull the braking side rope through the device. Never let go of the rope on the braking side.



On the cliff

INSURING A LEAD CLIMBER: DURING



VIGILANCE, ANTICIPATION AND MOBILITY

©Petzl

Give slack quickly and at the right time while remaining focused on the climber.

STOP A FALL

Hold the rope firmly on the braking side while pulling it downward.

COMMUNICATE AFTER A FALL AND BEFORE DESCENT

Allows you not to be surprised by the other's gestures, to avoid any mistakes: "ok", "go", "take me", "departure"...

LOWER

After the agreed signal, the climber lets himself be carried by the rope and has no way of controlling the descent. All responsibility for this maneuver falls on the belayer, who holds the climber's life in his hands.

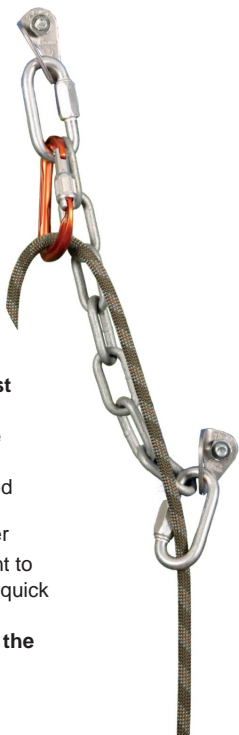
On the cliff

THE PULLEY (REEL)

Pulley belaying (commonly called “rope”) is a method of belaying from below.

REMARKS :

- The rope must be passed through the quick link or a safety carabiner. **Never pass the rope directly through a ring, a nylon strap (shearing by burning) or through one of the links of the chain** (insufficient resistance);
- The rope is **installed on an anchor whose solidity is beyond doubt, comprising at least two connected points** ;
- If the rope is passed through a carabiner, use a ferrule system or place a second one with the inverted finger; - Optionally install a carabiner with ferrule on the high point to avoid repeated wear of the quick link;
- **Check that the length of the rope is sufficient.**



On the cliff

BELAYING A REEL

Braking & blocking are obtained either by the hand placed under the device or by the mechanical system (if it is self-locking).

- In the event of a fall, **untimely braking by a hand above the device may compromise the locking** of the self-locking device or burn it;
- Pay **attention to weight differences** between climbers. If necessary, self-insure the insurer (at ground level)!

The use of a self-locking belay device is highly recommended (example: GRI-GRI® from PETZL);



After recovering the climber's slack, bring this hand under the device.



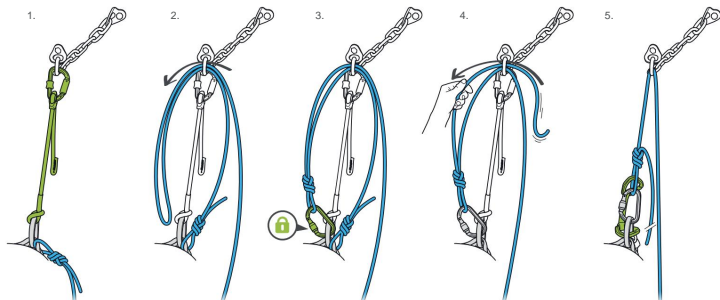
A knot must be made at the end of the rope held by the belayer: it prevents the rope from passing through the braking system and prevents the climber from returning to the ground.

On the cliff

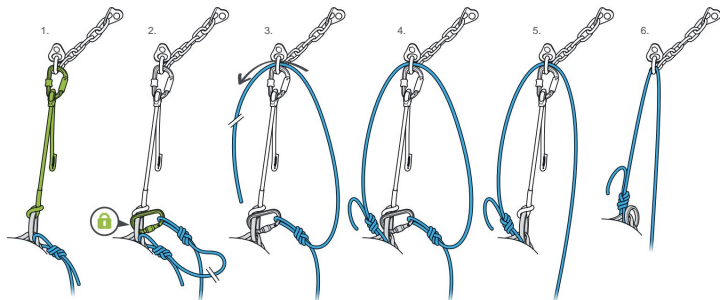
INSTALL A REEL

This maneuver is carried out by the leader of the rope.

DESCENT ON CARABINER



DESCENT ON ATTACHMENT KNOT



©Petzl

REMARKS :

– This method may not be applicable in certain cases (link too small). In this case, once self-insured, you must attach the rope to the harness to prevent it from falling, unraveling, passing the rope through the link, then re-roping yourself at the end of the rope.

– Ensure good coordination between the insurer and the insured.

On the cliff

KEY ON BRAKE

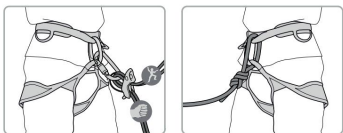


- Immobilization during a rappelling descent;
- Neutralization of belayers during a climbing session.



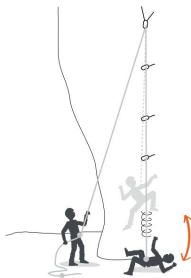
Main dangers

WHEN USING A ROPE



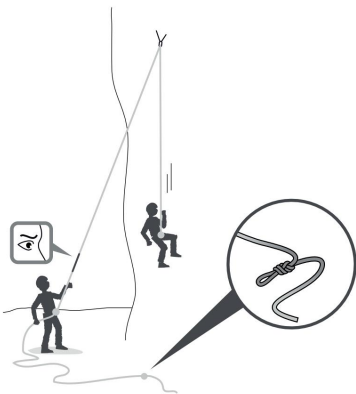
Bad tie-up, knot not finished or tied in the wrong place on the harness.

SOLUTION: Mutual verification.



Fall to the ground due to the elasticity of the rope and poor belaying.

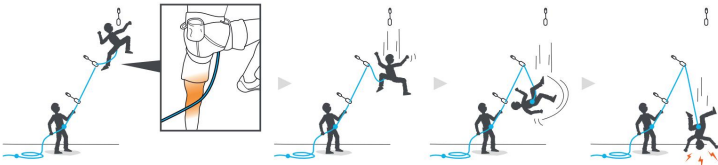
SOLUTION: Parry and until the third quickdraw be extra vigilant. Have a critical eye on your environment (ledges), considering the elasticity of the rope.



Rope too short.

SOLUTION: Systematically tie a knot at the end of the rope & check the length of the routes on the map.

Rope mower (When the climber falls with the rope behind the leg).



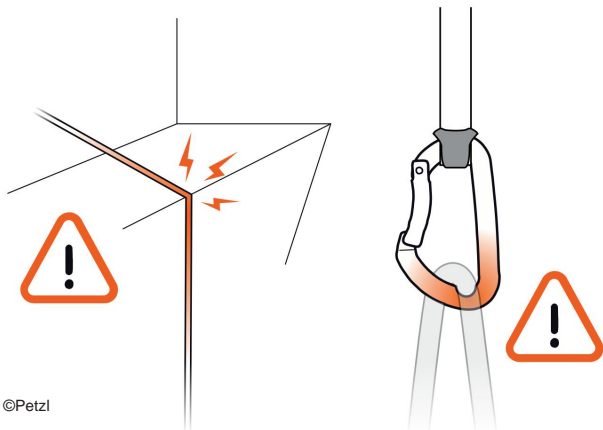
Main dangers

CUT ROPE

Every year several cases of cut ropes are recorded. For example on sharp edges of rock, falling rocks or on carabiners left permanently which have sharp edges due to wear...

SOLUTION :

Place references to avoid sharp edges, **double the rope**, change the carabiners...



©Petzl

Falls

SHOCK FORCE & FALL FACTOR

The severity of stopping a fall does not only depend on the height of the fall, because the longer the rope, the greater its absorption capacity.

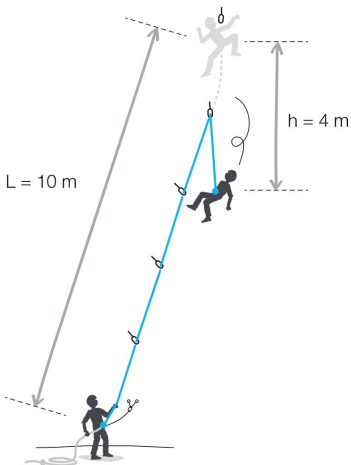
SHOCK FORCE

Energy transmitted during a fall (to the climber, to the belayer and to the belay equipment). It is proportional to the fall factor.

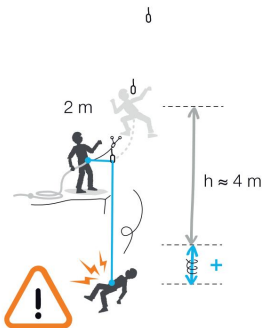
FALL FACTOR

$F = \text{Fall height} / \text{Rope length}$

The higher the fall factor, the greater the impact force will be.



$$F = \frac{4}{10} = 0,4$$



©Petzl

$$F = \frac{4}{2} = 2$$

To limit the shock force, it is important to clip the first points closely because the length of rope allowing the shock to be absorbed is reduced.

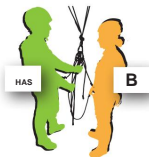
On the main road

REVERSIBLE PROGRESSION (AT 2)



AT THE START OF THE RELAY

- As quickly as possible, place a belay point to limit any possible shock to the relay;
- If the relay is safe (spit or seal), place a referral point at the start.



CHRONOLOGY & DIALOGUE

-A- progresses using the protection points for belaying. Arriving at the belay, he self-insures, shouts "Relay" then installs the belay device.

-B- removes his belay device;

-A- swallows the excess rope then shouts "OK, **belay ready**";

-B-: "Received";

-A-: "OK **you can go**";

-B- removes its auto-belay and begins its progression: "Gone";

-B- arrived at the relay, makes sure, collects the equipment and leaves in the lead.

...



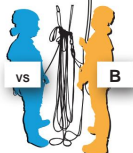
On the main road

ARROW PROGRESSION (AT 3)



CHRONOLOGY & DIALOGUE

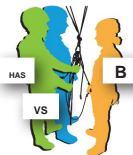
Identical to roping up for two but, when leaving, the two “seconds” indicate which rope they are climbing on:



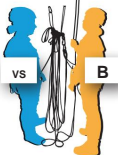
- B-: “ Gone ***on the dark rope*** ”;
- C-: “ Gone ***on the clear rope*** ”.

REMARKS :

- Use of twin rope prohibited!
- B & C can progress simultaneously at 3 m. approximately distance.



Outside of crossings, to avoid “pulling”, the leader of the rope can choose to clip each of the ropes alternately.



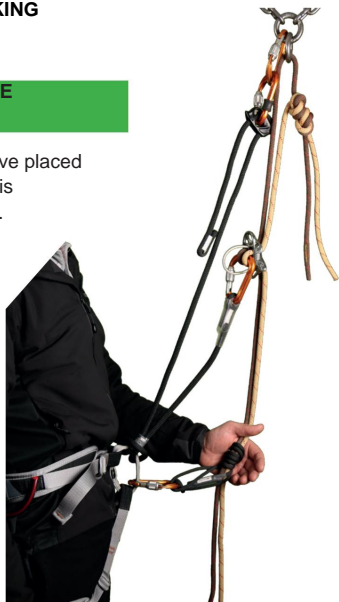
On the main road

REMINDER WITH SELF-LOCKING

Self-insurance is mandatory!

SELF-LOCKING PLACED BELOW THE DESCENDER

The self-belay system is more effective placed below the descender, this technique is recommended for beginners - BASM.



SELF-LOCKING PLACED ABOVE FROM THE DESCENDER

Allows you to more easily carry out a rappel or pass through a knot.

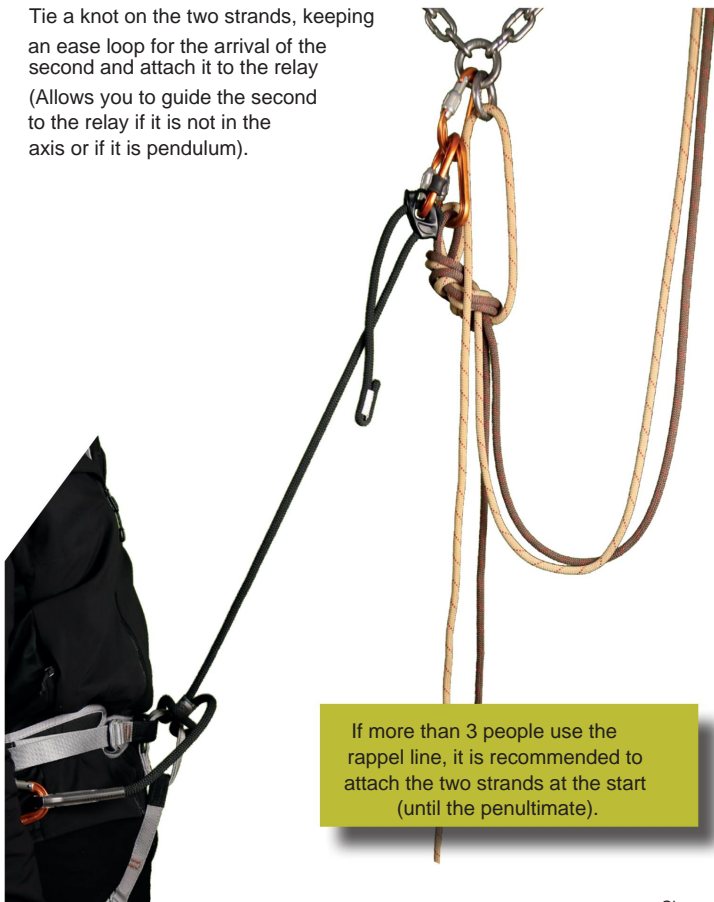
INCONVENIENCE :

The self-locking device must be well adjusted to remain within reach.

On the main road

ATTACH THE ROPE TO THE RELAY

Tie a knot on the two strands, keeping an ease loop for the arrival of the second and attach it to the relay (Allows you to guide the second to the relay if it is not in the axis or if it is pendulum).



If more than 3 people use the rappel line, it is recommended to attach the two strands at the start (until the penultimate).

MOUNTAINEERING

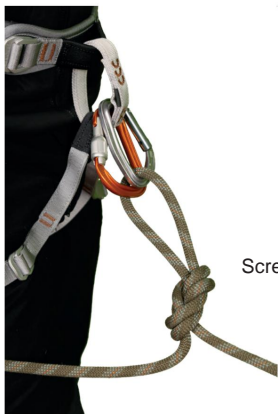
Rope up

ON GLACIER & EASY TERRAIN

IN THE CENTER BY DIVERSION WITH "UNIDIREC" CARABINER
TIONAL »

ADVANTAGE :

Easy to free yourself.



Screw carabiner + single reverse carabiner

ATTENTION !

If the screw carabiner is not held in its working axis (directional or blocked by the trigger guard), add a second carabiner.

Choice of the rope system at the discretion of the leader of the party.

Rope up

ON GLACIER TO THE CENTER BY CABLE CAR



This type of roping gives more mobility to the middle mountaineer in the event of frequent changes in rope lengths or overcoming obstacles.

REMARKS :

- The self-locking knot must be able to operate in both directions, Prusik recommended;
- No mechanical self-locking device;
- Use a ring resistant to 22 kN (Jammy®-Beal).



Rope up

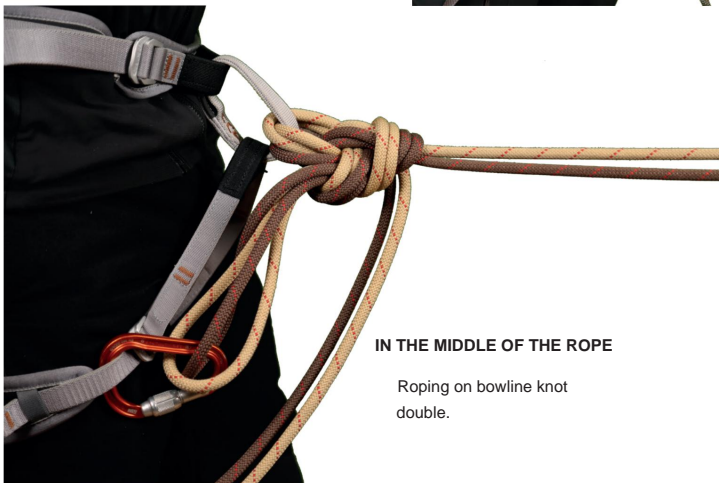
IN MODERATELY DIFFICULT TERRAIN

LEADER

Connection with:

- Eight knot **at the end of the rope**
- and **bowline** knot on 1 or 2 strands after rope reduction.

Roping onto a carabiner should be avoided if falls are potentially significant.



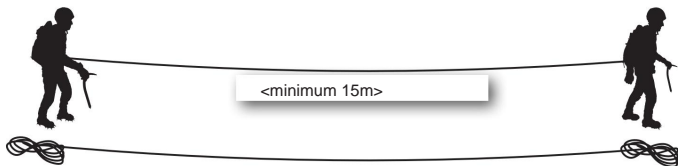
IN THE MIDDLE OF THE ROPE

Roping on bowline knot double.

Rope up

GLACIER CONNECTION DISTANCES

TOGETHER :



15 m rope
reserve

With 1 strand

15 m rope
reserve

Second 50 m rope
in the bag

With 2 strands

Reserve of
35 m rope

AT THREE OR +:



Ropes of 3 to 5 are possible, but the larger the rope, the less regular the progression. &

Large distance between limbs = More braking in the event of a fall in a crevasse!

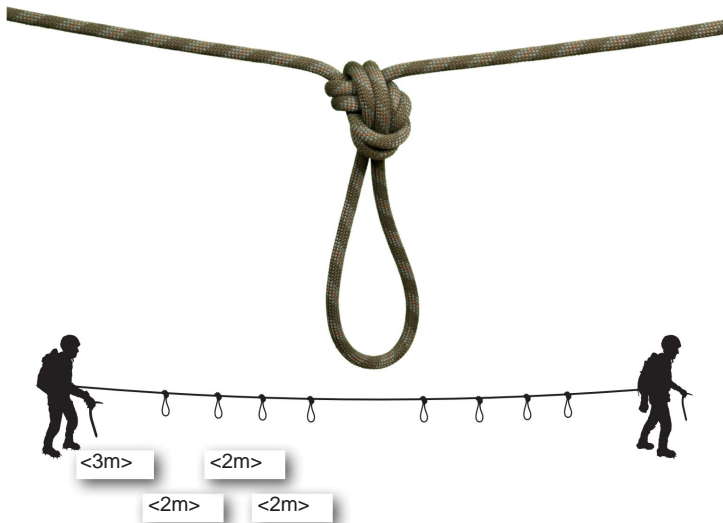
Never progress with the rings in your hand in snowy glacial terrain.



Chamonix

Rope up

BRAKE KNOTS ON GLACIER

**BENEFITS :**

- The knots slow down on the lip of the crevasse and make it easier to stop a fall (especially for a team of two with a significant difference in weight).
- Loops can help get out of the crevice.

INCONVENIENCE :

Reeving or ascent with this strand of rope made more difficult.

Rope reduction

BUST RINGS

SHORTENING THE RIGGING

Rope reserve allowing you to adapt the stringing distances to the terrain encountered. They are made and unmade ring by ring.



UNCLOSED BUST RINGS

- Used in terrain requiring very frequent changes in rope length.

DISADVANTAGES:

- Tight coiling;
- Rings not maintained;
- Impossible to keep the rings made when putting on your bag or jacket.

Rope reduction

ROPE RESERVE IN THE BAG



The rope reserve is tucked into the bag depending on the situation.

ADVANTAGE :

Carrying comfort.



HIGH RISK OF FALLING CREVASS:

Rope coiled like a fisherman on the top of the bag.



MODERATE RISK:

Rope coiled into a "dollar".

Easy terrain (Risk of slipping)

HAND RINGS



KEY

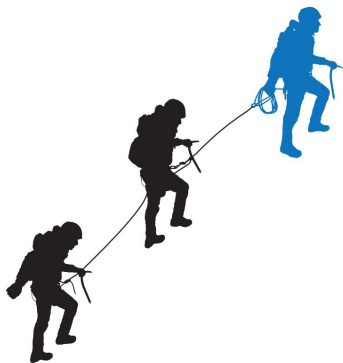
Make the key so that it does not come into contact with your hand when the rope is tightened!

Lock the key with the -A-strand then grab the rings.

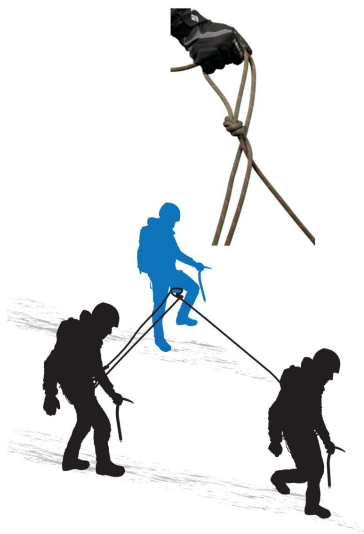


Easy terrain (Risk of slipping)

SHORT ROPE



ON THE CLIMB



CROSSING



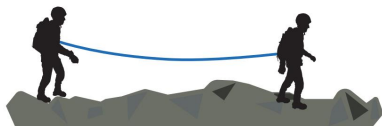
DOWNHILL

Belaying with a short rope **does not prevent a fall**, but correct application can prevent the start of a slip or an imbalance of the second.

Moderately difficult terrain (Risk of falling)

2-PAIR ROPE ON ROCKY RIDE

Short tie-in distance (3 to 5 m.) with chest rings for the leader (for possible extension of the tie-in length).



Without the risk of shearing the rope, it is possible to tie up on a single strand of a multi-label rope.

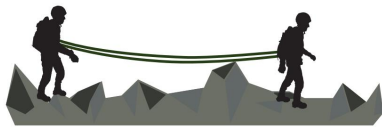
However, careful attention

Particular attention will be paid to the placement of protection points in order to limit any risk of friction/shearing of the rope.



With risk of shearing

it is possible to double the multi-label rope.



Everyone is roped on the 2 strands of the double rope (tying up on a single strand of double rope is not suitable for this type of race).

Moderately difficult terrain (Risk of falling)

3-PAIR ROPE ON ROCKY RIDE

ON MODERATELY DIFFICULT TERRAIN (DANGER OF FALLING)



Online :

Without risk of shearing the rope it is

possible to tie up in a line of 3 on a strand of multi-label rope.

However, particular attention will be paid to the placement of protection points in order to limit any risk of friction/shearing of the rope.



With the risk of the rope shearing, it is

necessary to tie up in a line of 3 **on two strands of single or multi-label rope.**

ON MEDIUMLY DIFFICULT TERRAIN & STEEP PORTIONS



Arrow: If it

is necessary to climb using short lengths of rope, it is

recommended to climb **arrow** on a multi-label rope.

Moderately difficult terrain (Risk of falling)

3-PAIR ROPE ON ROCKY RIDE

ON MODERATELY DIFFICULT TERRAIN (DANGER OF FALLING)



Online :
 1/2 With double rope, if **steep sections or risks of shearing** each one is roped in **line on the 2 strands.**

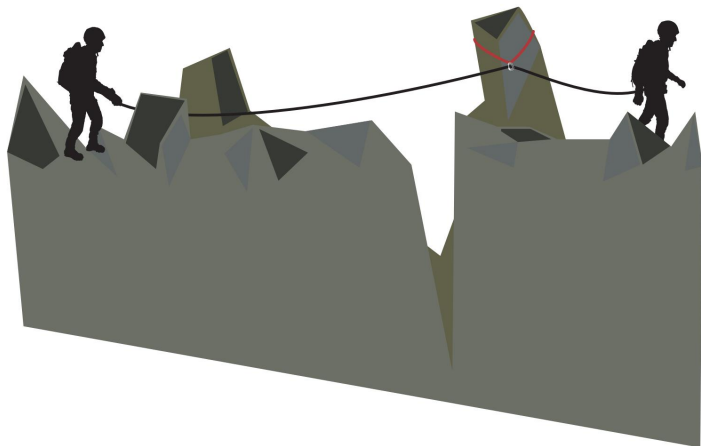


Sharply :
 1/2 This alignment is adopted if the general configuration of the race leads to progression **from relay to relay.** You will have to be particularly vigilant on crossing passages, each second finding themselves in a situation of risk equivalent to that of a leader roped on a single strand of double rope.

The decision on the type of rope to use is at the initiative of the rope leader.

Moderately difficult terrain (Risk of falling)

SIMULTANEOUS PROGRESSION BEHAVIOR IN MOTION IS LYING



Method of rapid progression using terrain to prevent a low probability fall on an **easy route**.

ATTENTION :

- If the location or shape of the spoilers is not favorable, place protection (strap ring, etc.);
- Have continuous protection between the members of the rope party;
- The length of rope between the members of the rope party must be continually adapted according to these constraints.

LONG INSURANCE:

Allows you to use a maximum of anchor points or cross longer risky passages but reduces reactivity in the event of a fall.

SHORT BEHAVIOR:

Reduces the number of belay points and exposes you to a collective fall.

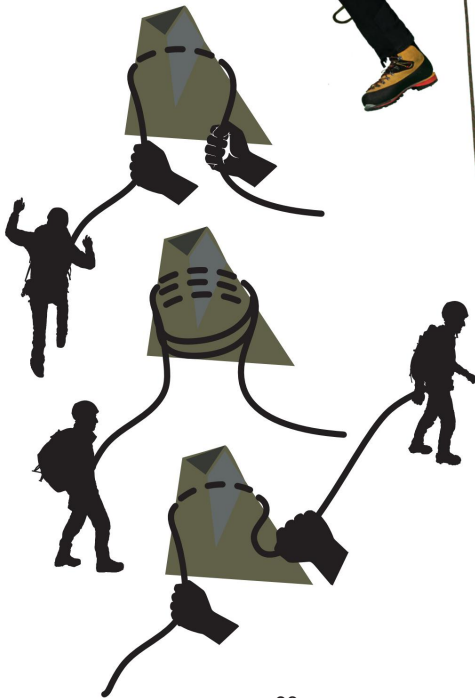
Moderately difficult terrain (Risk of falling)

INSURANCE FROM FIXED POINT TO FIXED POINT

Always tie the rope so that it is **taut** and be careful that it does not come out from behind the spoiler.

The second makes 2 turns around a solid spoiler, so it is self-insured.

The insurer can act as a fixed point if it is firmly "anchored" on the ground.



Moderately difficult terrain (Risk of falling)

SNOW INSURANCE



The resistance of snow relays, necessary during steep passages, is strongly **dependent on the quality of the snow**.

ATTENTION :

- Ensure that the belayer is not **in the climber's axis of fall**, nor that his rope comes to catch him;
- The belayer belays on the shoulder and is firmly supported on his buttocks and feet (make notches) in order to **energize** a slip and protect his relay.



Moderately difficult terrain (Risk of falling)

DUFOUR KNOT

Allows you to place a rope around a spoiler (or tree) then to return it by alternating traction of the two strands, without having to leave any equipment.

REMARKS :

- Technique to be preferred for short passages;
- Usable by a team of two without untying the rope;

- Marginal use reserved for experts.

PRECAUTIONS:

- Identify the section on which the descent is planned!
- Place a carabiner (if possible: connected to a point) in the loop. It will be removed by the last one before its de



1



2



3



4



5

Moderately difficult terrain (Risk of falling)

MARNEZOUILLE

Allows you to quickly reel two seconds in the rope without changing their ropes.

- Make a double half-castan + mule knot at belay -1-;
- Make a half-castan in -2- (in the carabiner clipped in the knot of the climber's stem -B-);
- Wind the climber -A- until the rope is taut;
- Disengage the double half-capstan -1- gently and reel the second two.

PRECAUTION

To effectively slow down the weight of the two climbers, perform a double half-capstan in -1-!

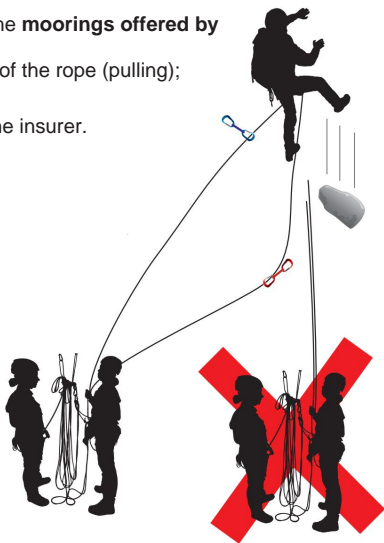


Adventure land

CHOOSING A GOOD RELAY LOCATION

In the absence of a pre-installed relay, it is important to choose its location:

- **Outside the axis** of the next length (to avoid falling stones, ice or the leader);
- By making the best use of the **moorings offered by the terrain** (spoilers, etc.);
- Allowing to **reduce friction** of the rope (pulling);
- In a **comfortable** area for the insurer.

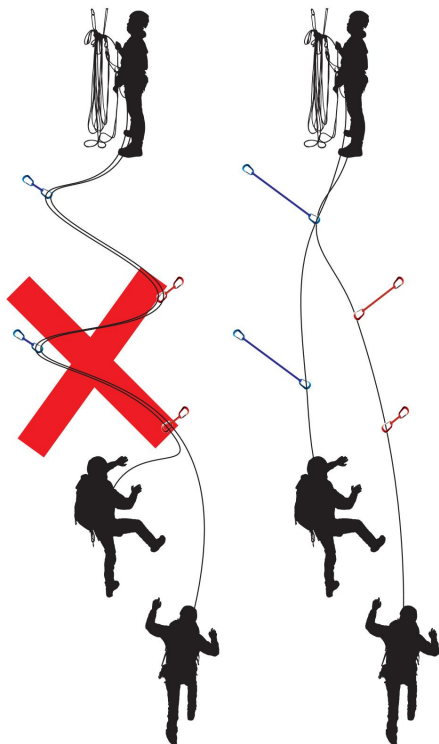


Adventure land

PLACE THE ROPE ACCORDING TO THE TERRAIN

To avoid friction generating pulling (therefore + shock force) we aim to keep the rope as straight as possible.

- By choosing the locations of the anchor points or by lengthening the straps;
- By alternately clipping one rope out of two (without crossing them).



Adventure land

INSURING THE LEADER ON THE RELAY

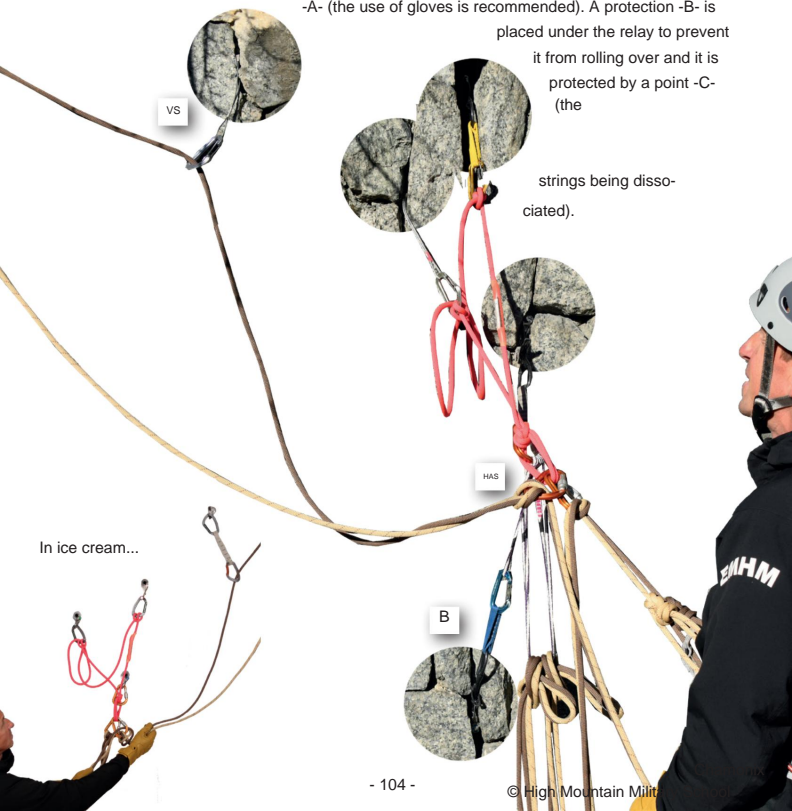
Belaying the leader on the relay can be considered:

- If there is a significant difference in weight between leader and second;
- If the risk of falling in factor 2 is difficult to avoid;
- If there is a risk of a large fall (high energy) along the length.

The belay is carried out on a screw carabiner **on the half-capstan**

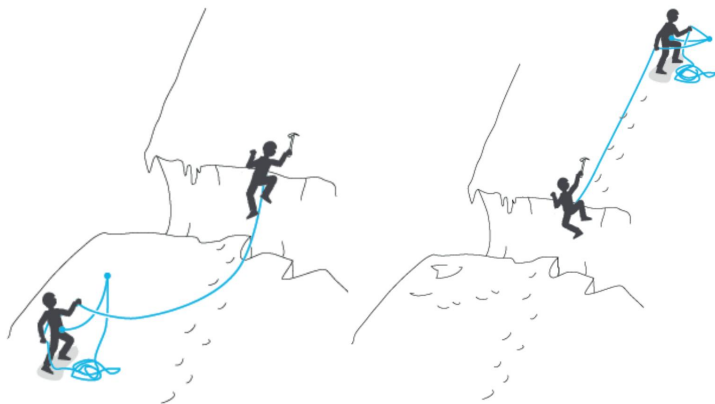
-A- (the use of gloves is recommended). A protection -B- is placed under the relay to prevent it from rolling over and it is protected by a point -C- (the

strings being disassociated).



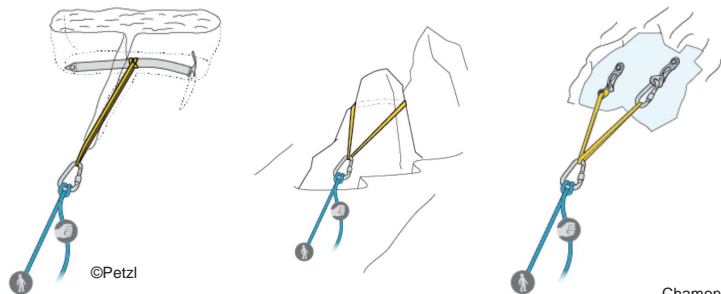
Crossing the bergschrund

INSURING THE FIRST AND SECOND



When the first passes, the counterweight of the second downstream may be enough to stop a fall in the bergschrund. In case of doubt and **if the first risks falling on the slope, the second is alongside a dead body** belay and carries out dynamic belaying.

The second is belayed by a half-capstan on a belay (dead body, pin, etc.).



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Chamonix

CROSSING

Passage equipment

GENERAL RULES

The crossing equipment is a set of temporary means put in place to allow a military detachment to cross a delicate point. These means must be adapted to the difficulties of the terrain as well as the technical level of the troop.

In its design and construction, the passage equipment is similar to the via ferrata. It is carried out by the detachment's own means (ropes). We can then speak of "Via cordatta".

There are two types of crossing:

- **Spontaneous crossing** : Carried out during a movement, it serves to ensure the security of the detachment over a short distance (two to three lengths maximum). Of low difficulty and stiffness, it is organized, given the terrain, at the discretion of the head of the detachment who is autonomous in its construction and dismantling.
- **The crossing prepared** : Faced with significant technical difficulties, substantial resources must be deployed. This equipment is anticipated, the area recognized, it is the subject of specific planning and a particular organization. A specialized detachment works for the benefit of the main element.

Passage equipment

GENERAL PRINCIPLES OF PRODUCTION

- **Compliance with mountaineering rules** for personnel working on the site during set-up and dismantling (specific ropes, suitable roping and belaying techniques, installation of points, etc.);
- Choice of route: Favor **ascending or descending crossings** (avoid falling rocks);
- Adapt the means of crossing assistance according to the level of the detachment or the crossing conditions. **Avoid insurance breaks**, do not cross insurance and traction ropes;
- Provide **sufficient intermediate belay points**, place them judiciously (before a difficulty);
- **Disconnect the ropes** used for belaying and those used for traction;
- Ensure the **security of waiting and assembly areas**.
- Establish **guidance officers** and personnel responsible for regulating the crossing;
- Ensure the **maintenance** of the equipment (rope tension, checking of moorings, etc.).

Progress

AUTONOMOUS



1

This mode of progression is limited to routes without the risk of a significant vertical fall.



2

ATTENTION :

- Never break the belay (Always have a carabiner clipped on the cable or rope - 1 then 2 then 3);
- Place the fingers of the carabiners outwards (so that they do not open on contact with the rock);
- Only one person between two insurance points.



3

Progress

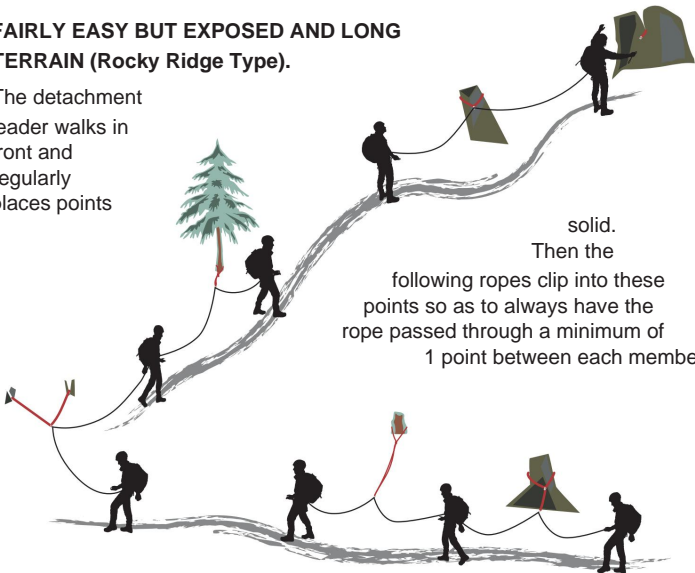
BY ROPES

Crossing which requires ropes made up of 3 people maximum with a defined rope leader (CEHM or BQTM).

FAIRLY EASY BUT EXPOSED AND LONG TERRAIN (Rocky Ridge Type).

The detachment leader walks in front and regularly places points

solid.
Then the following ropes clip into these points so as to always have the rope passed through a minimum of 1 point between each member.



REMARKS :

- The detachment leader must have a lot of equipment; - The rope team picks up the equipment with the possibility of sending it back to the detachment leader if necessary;
- The rope parties must therefore remain in close contact;
- The points must be very solid (do not hesitate to double them - relay - in case of doubt).

Standalone progression installation

EASY TERRAIN



LITTLE SHOCK FORCE IN CASE OF FALL (CROSSINGS OR LIGHT EASY ASCENTS).

- The equipment will be crossed with a double lanyard, use of swan necks -A-, layout of the terrain. Classic setup with half capstan at the top;
- Possibility of some crossing aids -B- (knotted rope if slippery area). These aids must be systematically placed on independent relays (2 points);
- No string differentiation;
- Everything must be solid;
- Be wary of friends who can move, **favor pitons or bolts.**

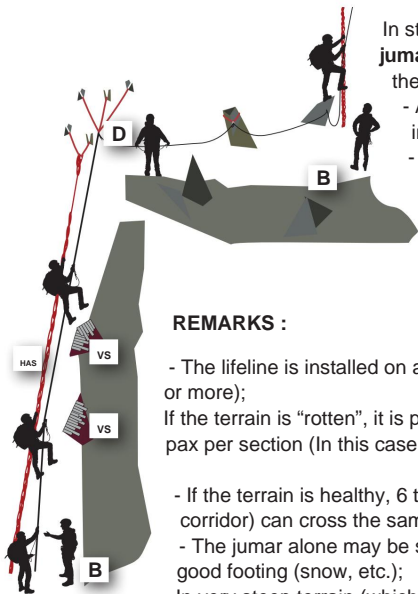
REMARKS :

This equipment should be preferred. It requires reading the mountain carefully (bypassing, crossing) to get to the simplest part.

It **should be avoided if the shock forces in the event of a fall are too great** (for the equipment AND the man).

Standalone progression installation

STEEP TERRAIN



In steep sections: - A **jumar on a lanyard** is placed on the lifeline;

- A knotted rope can be installed in parallel -A-;
- An orientator -B- remains permanently at the foot of the section to check the correct positioning of the jumar and to tighten the rope and facilitate its sliding.

REMARKS :

- The lifeline is installed on a **“concrete” relay** (3 points or more);

If the terrain is “rotten”, it is preferable to send only one pax per section (In this case, the orienteer stays sheltered);

- If the terrain is healthy, 6 to 8 people (snow corridor) can cross the same section;

- The jumar alone may be sufficient in terrain allowing good footing (snow, etc.);

- In very steep terrain (which must remain exceptional), a second mechanical self-locking device is used for safety;

- Ladders and stirrups can be useful;

- The length of the lanyard must allow you to rest while having the handle of the jumar within reach;

- The **angles of protruding rocks must be protected** with adhesive tape -C-;

- In the event of repeated friction on the same place, periodically lower the rope by 50 cm (half capstan + mule knot -D-);

- Depending on the terrain or the length of the steep section, it is possible to split the rope length (with a switcher).

Autonomous progression

STEEP TERRAIN

STARTING THE EQUIPMENT

- Place the **Jumar handle on the belay rope by adding a carabiner in the top eye** (this will hold the rope) and adjust its lanyard to the desired length.
- Place your **second lead on the same rope**.



1



2

PASSING A FRACTION

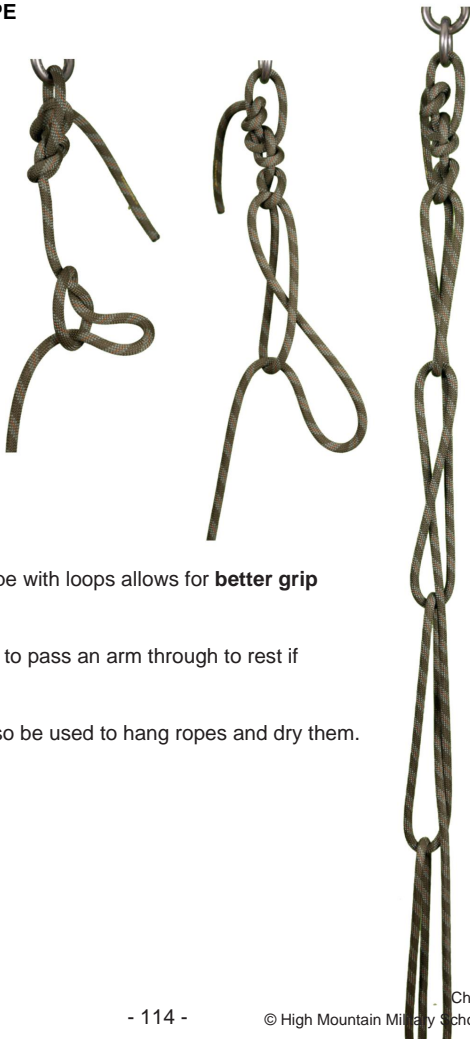
- **Clip your lanyard after splitting then the jumar handle with carabiner** (In steep terrain it is more effective to lanyard directly on the point).



3

Crossing assistance

KNOTED ROPE



The braiding of the rope with loops allows for **better grip** when crossing.

Wide straps allow you to pass an arm through to rest if necessary.

This technique can also be used to hang ropes and dry them.

Crossing assistance

DISENGAGEABLE REMINDER

In the event of an incident on the **rappel** (person stuck), simply release the mule knot -A- then lower the assembly by braking by the half-capstan -B-.

PRECAUTIONS:

- It is important to have **visual contact with the person being descended**, either directly or through a third party (by radio);
- Favor two simple knots -C- which are less likely to get stuck (Use the 3 ropes to tie the knots!).



Zipline & cable car

POWER UP



A **zip line** is used during horizontal crossings with a lanyard belay on the rope itself (or on a parallel rope).

A “back and forth” system allows the transport of equipment.

The **cable car** follows the same principles but descends. It is always equipped with a “back and forth” system.

The ropes used are **specific ropes reserved for this use**.

The tensioning of the rope is carried out by **simple reeving** (with reeving head on grigri for easy disengagement). Secure the taut ropes with a stop knot -A- clipped to the mooring -B-.

Using the grigri -C- under the pulley allows you to return to the ground upon arrival.

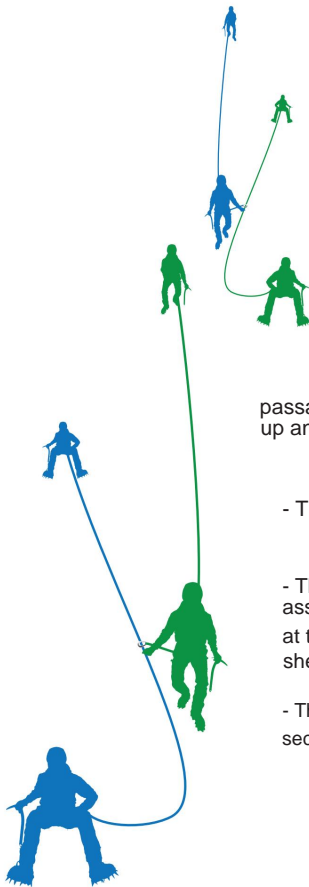
During the crossing, provide a safety knot for the device!



Chamonix

Progression on snowy terrain

SOCK



It is a means of crossing easy terrain but presenting **risks of unscrewing.**

It avoids the installation of fixed passage equipment, both on the way up and on the way down.

- The GREEN rope: Fixed anchor line;
- The BLUE rope party progresses self-assuredly on the GREEN rope. Arriving at the level of the leader of VERTE, she in turn sets up a relay;
- The GREEN rope takes its turn, self-secured on the BLUE rope...

CASCADE OF ICE

Relay

IN ICE

2-point relay with abalakov.



2 and 3 point relays with pins and center point.

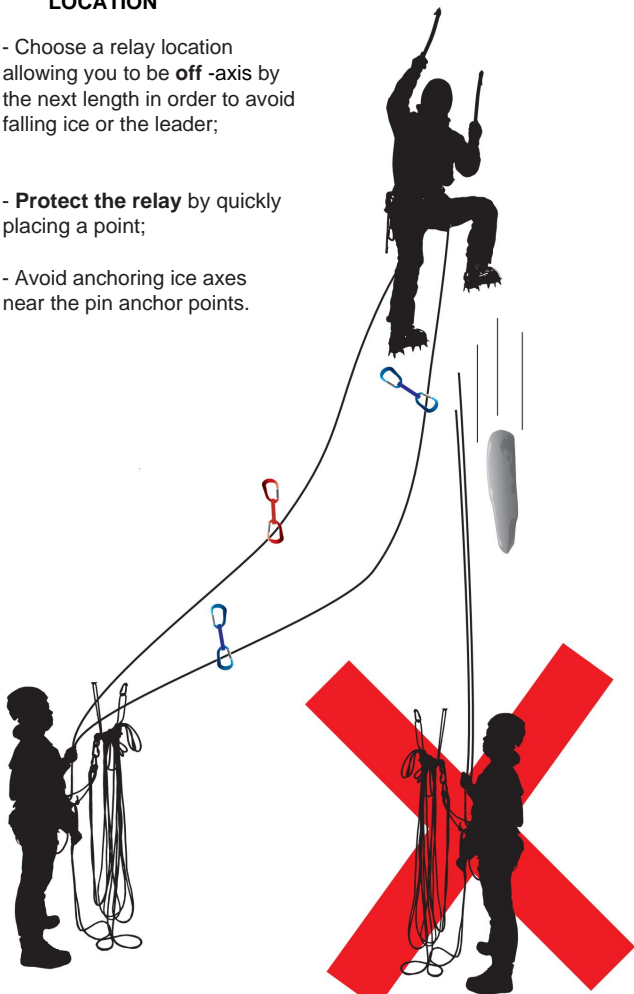


Possibility of mixing techniques (pins/abalakov).

Relay

LOCATION

- Choose a relay location allowing you to be **off** -axis by the next length in order to avoid falling ice or the leader;
- **Protect the relay** by quickly placing a point;
- Avoid anchoring ice axes near the pin anchor points.



Relay

ABSEILING

When abseiling on an abalakov, it is **advisable to test it by coupling it with an ice screw** (recovered by the last one).



It is possible to opt for the **dry lunula** solution (the rappel rope is passed directly through the holes of the abalakov).

ATTENTION

- Ensure that the rope slides sufficiently to be recalled (risk of refreezing in the lunula);
- Use a "thin" rope.



SKIING
HIKING

Steep slop

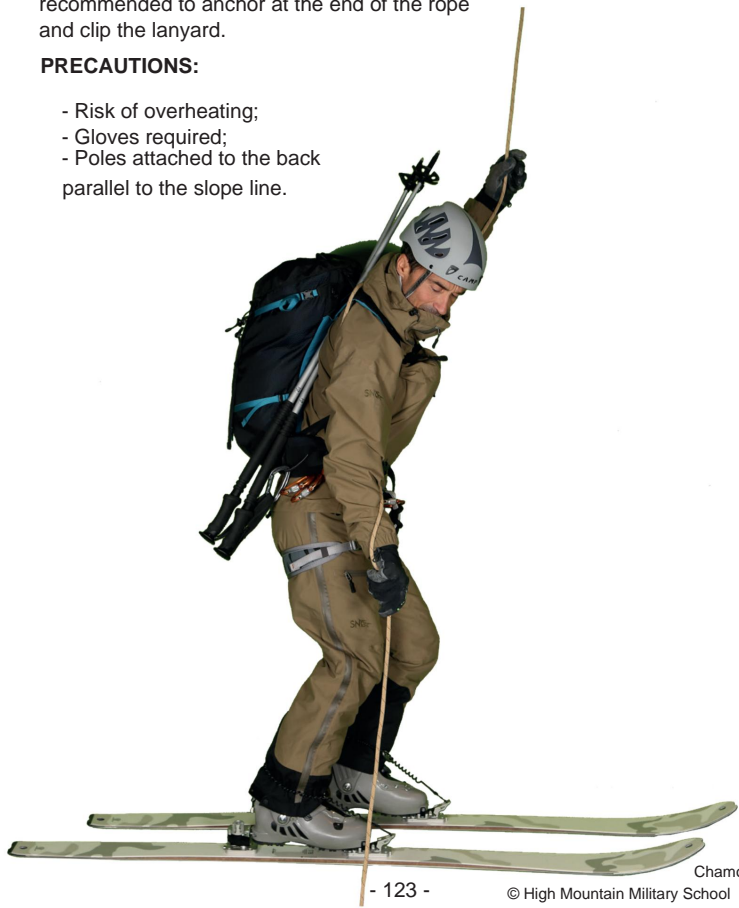
THE SWISS RECALL

Used to secure a slope when skiing.

If there is a significant risk of falling, it is recommended to anchor at the end of the rope and clip the lanyard.

PRECAUTIONS:

- Risk of overheating;
- Gloves required;
- Poles attached to the back parallel to the slope line.



Steep slop

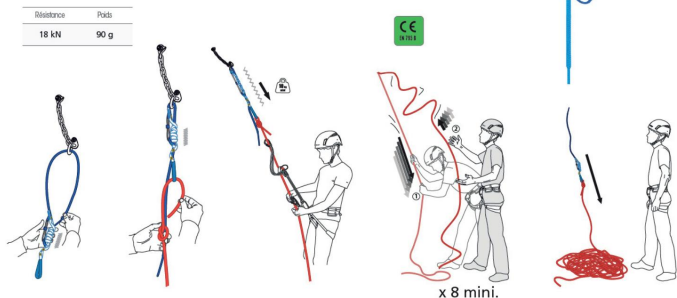
ESCAPER® - BEAL

The Escaper® allows you to **abseil on a single rope**. The rope and the Escaper® are recalled using multiple tractions/slacks on the rope (x 8 mini).

SETUP AND USE

Comply with the manufacturer's instructions for use!

- Set up the Escaper®;
- Tie a safe knot at the end of the Escaper® rope;
- Attach the rappel rope to the ring of the Escaper®;
- The leader of the rope rappels then partially carries out the recovery maneuver, which allows his companion to check that the system can be freed without problem;
- His companion returns the Escaper® to its original position;
- The last one to descend undoes the knot in the Escaper® rope;
- With the entire rope descended, perform the Escaper® recovery maneuver.



Steep slop

SATURN

This method **ensures progression on a steep slope** (jumped turns) while keeping the rope on the upstream side. Can also be used when clearing a slope or during a snow cover test.

The rope is connected to the skier's back by a carabiner clipped to the lanyard (or a strap, going around the waist and attached to the trigger guard).



Progression on glacier

ROPED SKI

Roping up for glacier skiing must respect the same conditions as in summer:

- **Sufficient distance** ;
- Rope reserve at the front and rear;
- Roping on unidirectional carabiner or

safety + classic.

To avoid skiing on the rope, maintain a certain tension and compensate for variations in distance, **the upstream skier can hold a comfort loop.**

It must be as small as possible in order to reduce the fall distance.



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Progression on glacier in bad weather

THE WHIP

Technique for **estimating the immediate relief of snow in foggy weather and white day.**

- Tie a brightly colored cord on one of the poles and, using a whipping motion, throw it regularly on the ground in the path of the skis.



Progression on glacier in bad weather

THE PROBE

Technique allowing **you to anticipate the immediate relief of the snow in foggy weather** and white days.

- Attach a bottle (or equivalent) to the end of the probe and sweep the ground in the path of the skis.

ADVANTAGE

Allows better fluidity in movement than the whip technique.



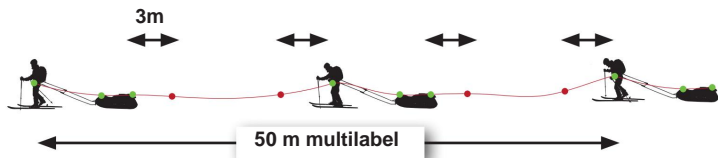
CROSSING EXTREME COLD

On glacier

MINIMUM 3 LINEUPS!

With loaded pulkas it is imperative to rope up with 3 people (at least) so as to be able to sufficiently stop a fall into a crevasse and set up a hauling system.

- **The rope must be stretched** between the skier -A- and the two attachment points on his pulka (capstans -B- and -C-) (green circles);
- Make braking knots on the rope 3 meters in front of the skier and 3 meters behind their pulka (red circles).



On glacier

CREVASS FALL WITH PULKA

During a crevasse fall with pulka, he **It is necessary to quickly disengage the rigid arms** which allow it to be towed (with the handle -A-).

The skier then finds himself only suspended by his belay rope and can perform a **classic ascent with the passage of knots.**



On steep terrain

ON THE CLIMB



To hoist the pulka to the relay:

- Stay long and, using a self-locking -A- and a self-locking pulley
- B-, exert downward traction with the mass of your body **(balance technique)** ;
- The strap -C- allows you to attach the pulka to the relay upon receipt.

On steep terrain

ON THE DESCENT



When descending pulkas from relay to relay:

- **Secure the pulka coming from upstream on a lanyard system equipped with a debrailable system** - A (Looped cord with mule knot + stopper knot);

- Once the rope has been brought back to the belay, make a half or double-half capstan (depending on the load) + mule knot + stopping knot then disengage the rope and continue the descent.

This technique allows you not to have to lift the weight of the pulka to “unleash” it. It is possible to lower several cowled pulkas simultaneously, one under the other.

RESCUE

Evacuation

SEAT ON STICKS



Evacuation

TRAIL CACOLET



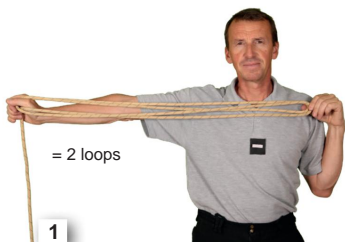
NOTICED :

It is possible to replace the strap with 3 m. of rope left free.



Wall rescue

THE FORTUNE BALDER



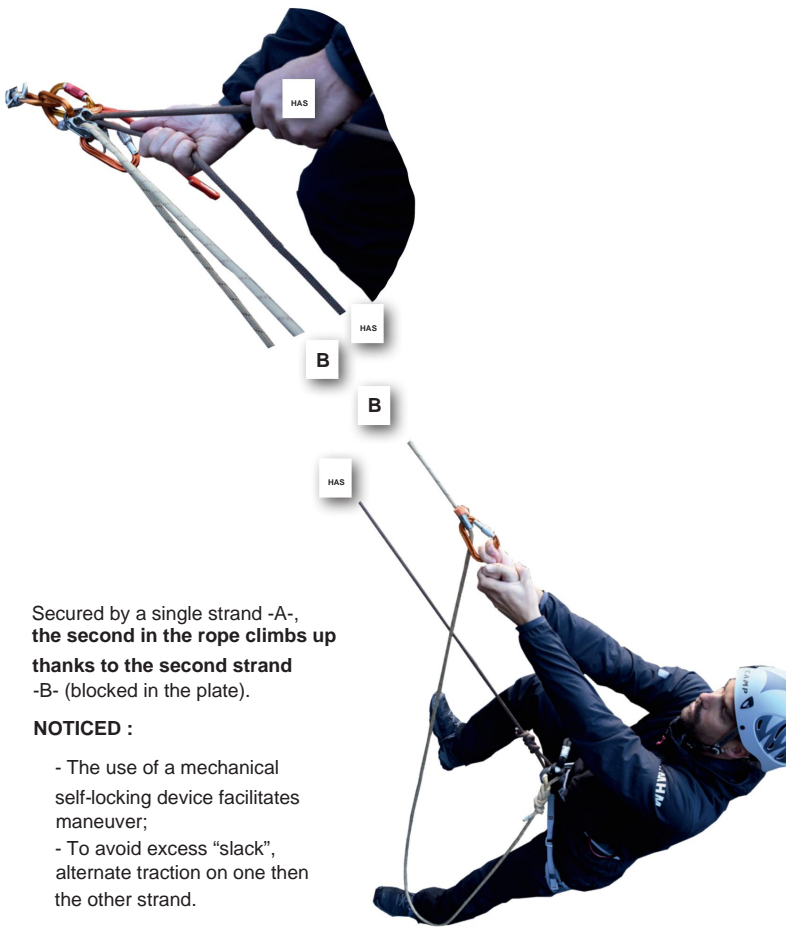
- Exceptionally allows belaying in easy terrain, second in line;

- Makeshift means usable for abseiling.



Wall rescue

SECOND ASSISTANCE BY TRACTION/INSURANCE



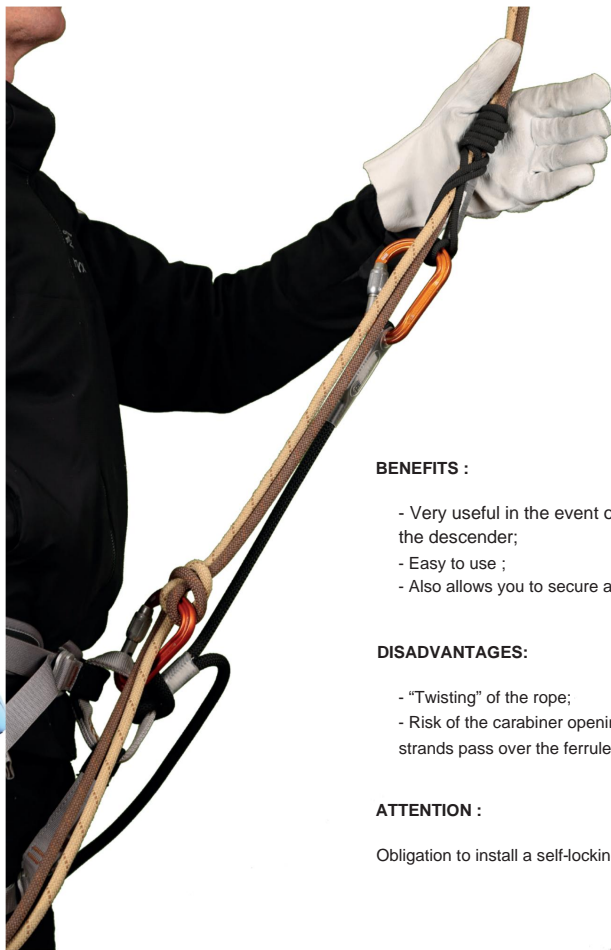
Secured by a single strand -A-,
the second in the rope climbs up
thanks to the second strand
 -B- (blocked in the plate).

NOTICED :

- The use of a mechanical self-locking device facilitates maneuver;
- To avoid excess "slack", alternate traction on one then the other strand.

Rock rescue

REMINDER ON HALF-CABSTAN



BENEFITS :

- Very useful in the event of loss of the descender;
- Easy to use ;
- Also allows you to secure a lead rope.

DISADVANTAGES:

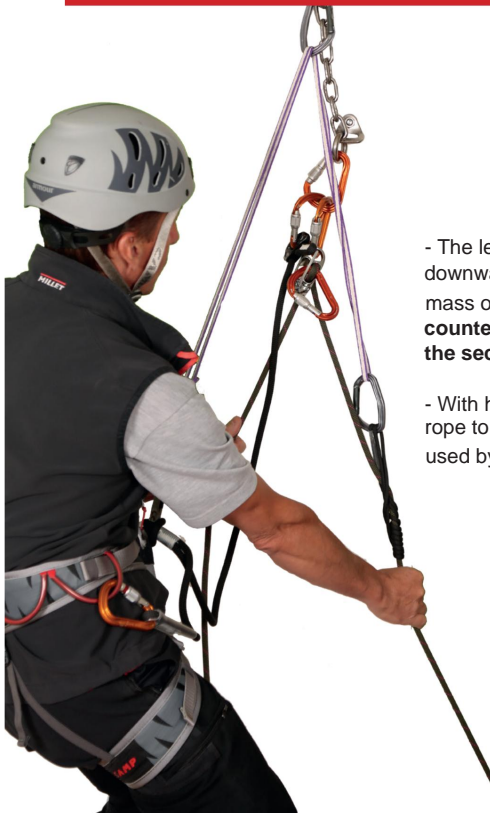
- "Twisting" of the rope;
- Risk of the carabiner opening if the strands pass over the ferrule.

ATTENTION :

Obligation to install a self-locking system!

Wall rescue

BALANCER



- The leader exercises a downward pull using the mass of his body to **counterbalance and help the second** ;

- With his arms, he helps the rope to slide in the reverso used by self-locking at the belay.

Wall rescue

FROG TRACTION



In the event of difficulty for the second person to cross a passage, of blockage in an overhanging area or in the event of injury, the leader must be able to hoist his companion up to the belay.

By the action of the arms alone, it is almost impossible to tow someone. The frog pull **combines arm action and a push on the legs**, which develop greater power.

NOTICED :

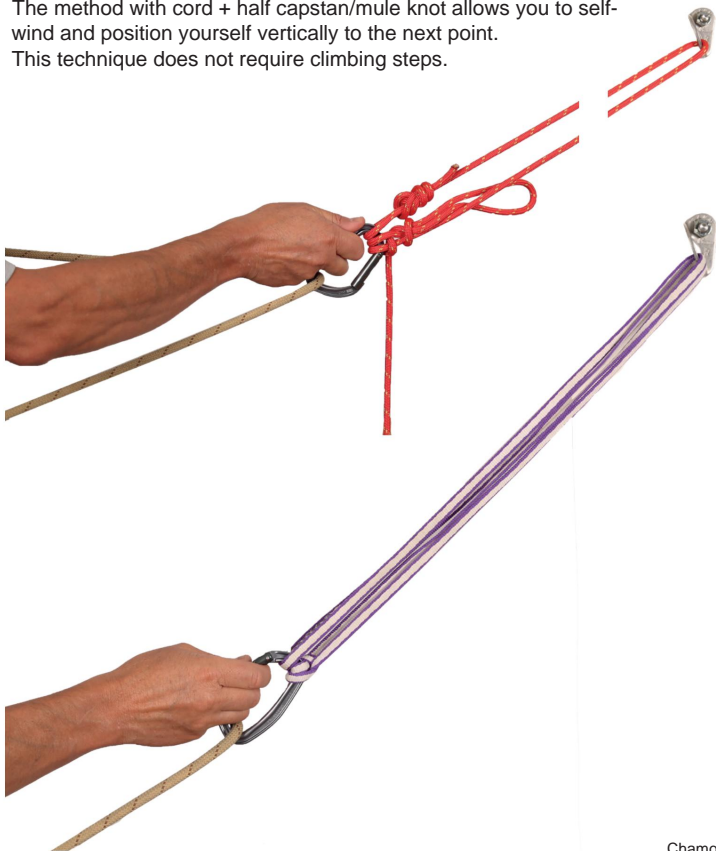
If the lanyard is not long enough to carry out the movements, self-secure using a capstan.

Wall rescue

ASSISTANCE TO SECOND CROSSING

A strap, or cord, passed through the point helps you in crossing and is easily recovered after the delicate passage.

The method with cord + half capstan/mule knot allows you to self-wind and position yourself vertically to the next point. This technique does not require climbing steps.



Wall rescue

REMINDER FOR TWO

Allows you to lower a slightly injured person (or help a beginner) either alongside or on the back of the rescuer.

- The carrier and the injured person are hanging in the same place on the descender;
- Descent regulated by the carrier;
 - Mandatory self-locking;
 - Carrier and injured person are connected by a lanyard.

REMARKS :

- Precisely adjust the length of the lanyard on the belay device (self-locking adjustment system);
- To increase the brake swimming, it is recommended to put two carabiners on the descender;
- Method that can be used for lowering heavy loads (load in front of you).

VARIANT :

- Use without a lanyard with a free end.



Wall rescue

WALL EVACUATION

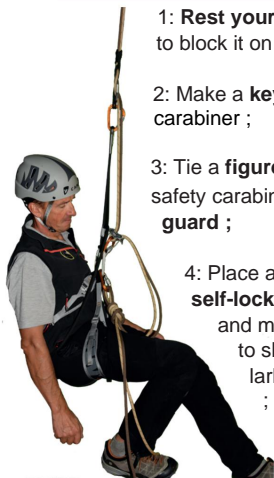
For a rope of 3!

- To be used with a transportable casualty;
- Great speed of maneuver;
- The carrier and the injured person are linked together with a lanyard;
- To facilitate descent, the injured person is slightly higher than the carrier;
- Possibility of precisely adjusting the length of the injured person's belay;
- At the relay, the descent is regulated by the third member of the team. It uses a **double half-capstan** with a **self-locking** safety and must be able, if necessary, to extend the rope under tension.



Wall rescue

ASCENT BY Rappel



1: **Rest your weight on the self-locking device** so as to block it on the rope;

2: Make a **key on the brake** on the **reverso®** carabiner ;

3: Tie a **figure eight knot** with a safety carabiner **on the trigger guard** ;

4: Place a **strap on the self-locking device** and make a loop to slip a foot in (in a lark's head)
;

5: Place a **carabiner between the trigger guard and the eye** of the **reverso®** then separate the other carabiner from the trigger guard;

6: **Reassemble the two self-locking systems alternately.**



Wall rescue

RECOVERABLE ROPE



This system can be used for abseiling, particularly **if one of the strands is damaged**. The descent is then carried out on a single strand.

Wall rescue

Rappelling on a tight rope

USE :

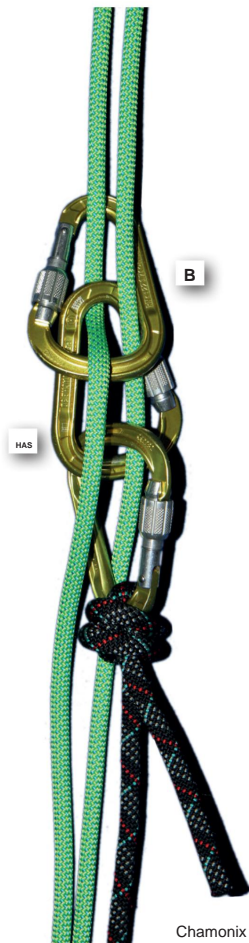
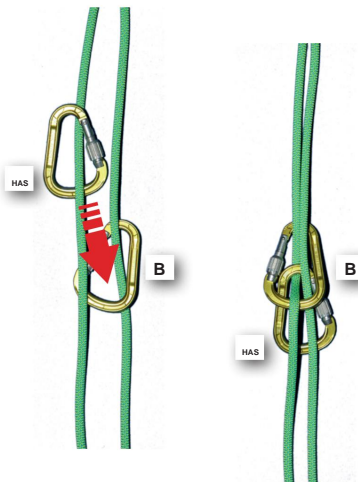
Allows you to descend on a tensioned rope to rescue a stranded person.

SET UP :

Pass the carabiner -A- through the carabiner -B- and attach the lanyard to descend.

ATTENTION :

If the rope slackens, the braking is eliminated, the use of a self-locking device is therefore obligatory!



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Wall rescue

ROLLING A NODE

In the case of a **damaged strand**, isolate the wear with a **simple knot -A-** (on this single strand!).

Then :

- 1: 30 cm before the knot to pass, lock on its self-locking device;
 - Make a safety strap and clip it to the trigger guard with a safety carabiner;
- 2: Place your descender under the knot and make a lock on it;
- 3: Slide the self-locking knot until it is once again in tension on its descender;
 - Undo and redo the self-locking device under the knot.



1



2



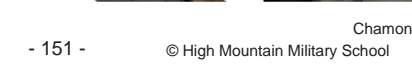
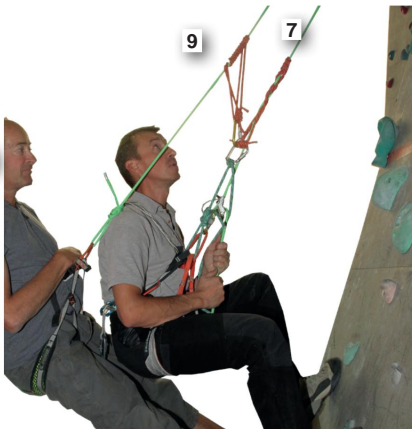
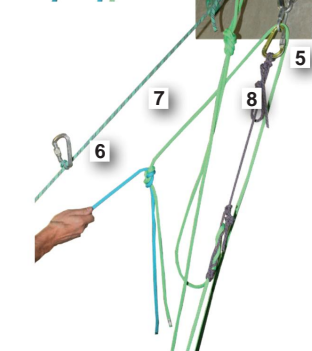
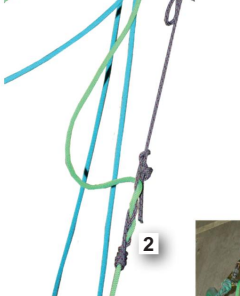
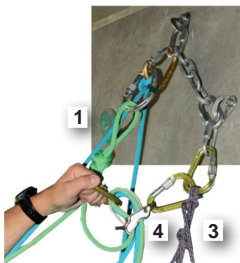
3

Wall rescue

AUTO-MOULLINETTE

Allows you to **lower an injured person stuck in tension on the rope.**

- 1- Secure one of the injured person's ropes by connecting it to the relay;
- 2- Place a self-locking device on this rope;
- 3- Keep it in tension with a half-cabes-tan + mule knot;
- 4- Recover the belay system;
- 5- After unstrapping, slip the rope into the belay and swallow it (taking care to connect it to the second strand -6-);
- When the injured person's rope is taut, place yourself on the strand -7- and unlock the self-locking device -8-;
- Once at the injured person's height, install a self-locking device on his side -9- and continue the descent with him;
- Halfway down, pass node -6-.



Wall rescue

ROPE EXTENSION UNDER TENSION

This maneuver is used to safely carry out the passage of the addition knot during a long slowed descent requiring 2 ropes (Italian cacolet, wall evacuation, etc.).

1: Secure the rope with a mule knot

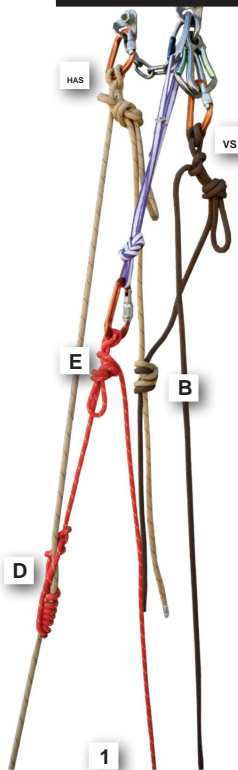
-HAS- ;

- Make, after the junction knot -B-, a half-castan + mule knot -C- on the second rope;

- With a long cord to support the rope (Valdotain knot -D- and half-capstan -E-);

2: Remove the half-capstan -A- then lower the first rope with the rope until the second is supported by the new half-capstan -C-;

3: Recover the rope.



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Self-rescue

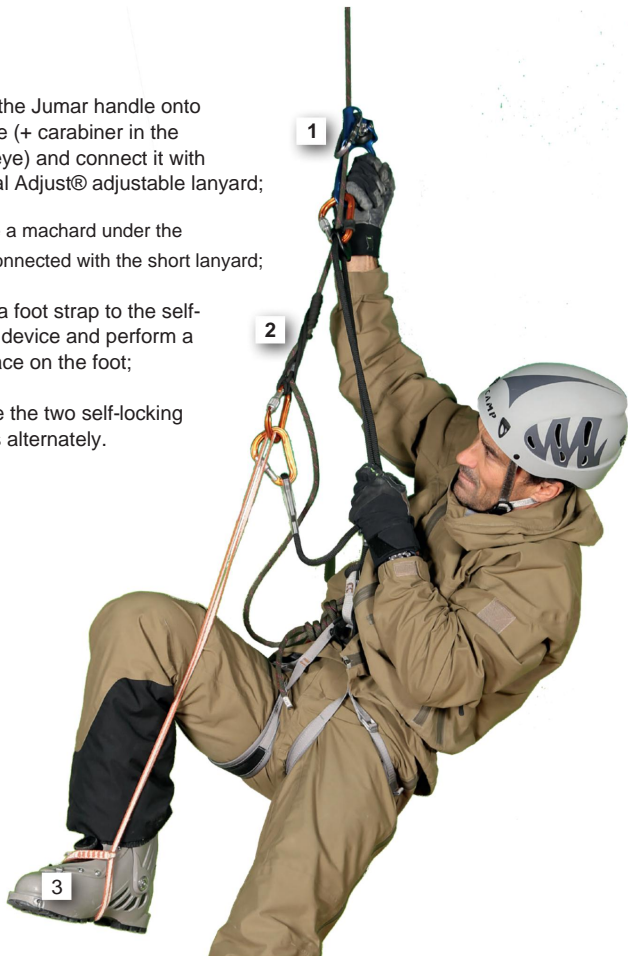
ROPE ASCENT WITH JUMAR

1: Clip the Jumar handle onto the rope (+ carabiner in the upper eye) and connect it with the Dual Adjust® adjustable lanyard;

2: Place a machard under the jumar connected with the short lanyard;

3: Add a foot strap to the self-locking device and perform a lark's face on the foot;

4: Move the two self-locking devices alternately.



Self-rescue

ROPE ASCENT WITH JUMAR & BLOCKER

ADJUSTABLE LANYARD & HEART OR MIC KNOT TRAXION

- 1: Jumar handle on the rope + carabiner -A- in the upper eye.
- 2: Using a screw carabiner, connect the Dual adjust adjustable lanyard to the Jumar -B-
- 3: Install a 120 cm lark's head strap on the Jumar to make a -C- pedal.
- 4: Hoist yourself up by pushing with one foot into the strap and pulling simultaneously on the Jumar and on the adjustable lanyard (to obtain a 30 cm slack loop).
- 5: Using 2 carabiners of identical progression, make a heart knot at the bridge of the harness -D- (or micro traxion).
- 6: Raise the jumar handle by adjusting the lanyard to hold the handle at arm's length.
- 7: Each time the climber climbs up on the pedal he swallows the slack at the heart knot.



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Self-rescue

ROPE ASCENT WITH KNOTS

HAS



1

1: Relieve yourself from the bag by hanging it on the rope, then go up to the level of the knot -A-;

2: Place the handle above the knot, hoist yourself onto it by reducing the length of the lanyard;

3: Reattach the self-locking device moved above the knot to the trigger guard.

HAS



2

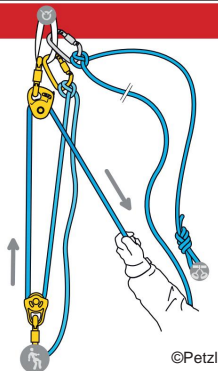
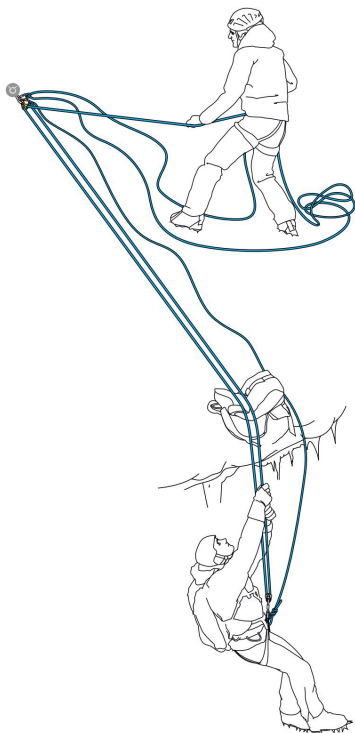
3

HAS



Crevasse rescue

"LOOP" REILING



©Petzl

To be used if the victim is conscious and able to help der to his recovery. Also called "N-reeving".

NOTICED :

- It is possible to provide the injured person with one (or two) safety **carabiner(s)** , a **simple pulley**, a **self-locking pulley** (put in the right direction!).

TRACTION FORCE REQUIRED:

From 50* to 110***% of the load to be extracted.

* : Function of the traction assistance exerted by the victim on the rope which goes back down.

*** : Not very useful in this case...

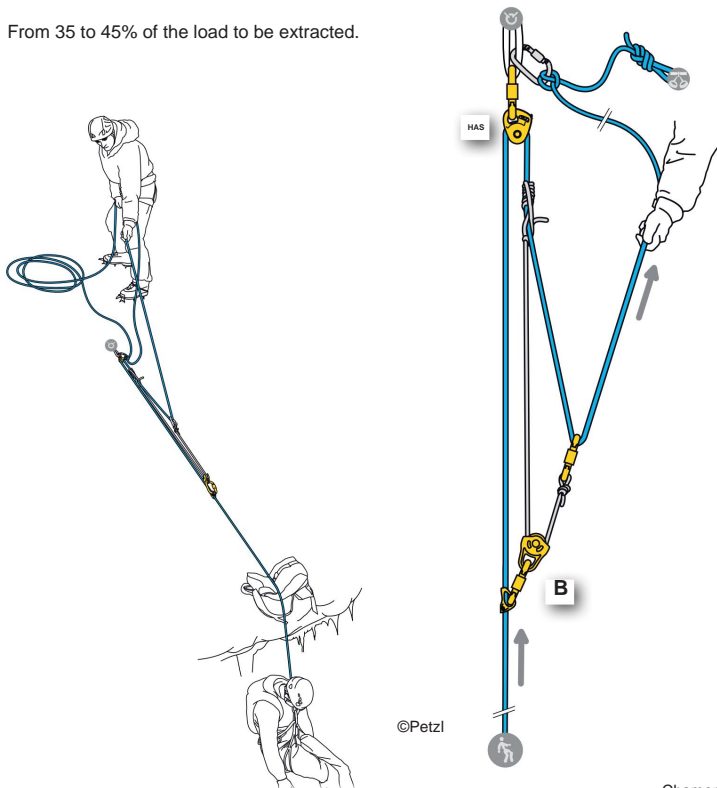
Crevasse rescue

MARINER WITH DOUBLE MULTIPLICATION

- **Reeving has the best performance** ; - It requires an additional strand of cord of 3 or 4 meters (it is also possible to use the end of the rope); -A-: Jumar handle or self-locking pulley (preferred); -B-: French knot or pulley + Tibloc® (preferred).

TRACTION FORCE REQUIRED:

From 35 to 45% of the load to be extracted.

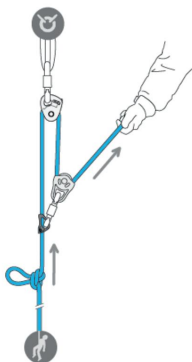


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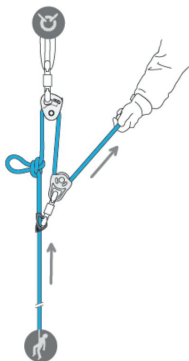
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Self-rescue

REEKING ON A ROPE WITH KNOTS



1 - Hoist up to the knot.



2 - Pass the carabiner under the knot, the load being supported by the pulley.

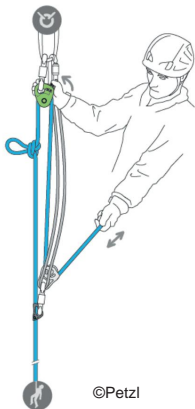


3 - Connect the self-locking device to the anchor using a strap.

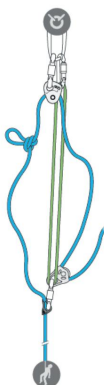
4 - Unlock the pulley and load the self-locking device.

5 - Undo the knot.

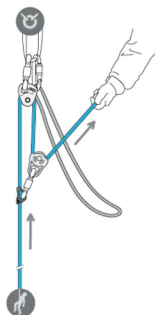
6 - Resume traction.



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© High Mountain Military School

Snow evacuation

“UT 2000” SLED

Made up of two clip-on elements that can be transported on the backs of two people.

BENEFITS :

- Easy to use and solid;
- Hard plan to immobilize a victim;
- Possibility of being molded into a wall or carried;
- Helicopter winch.

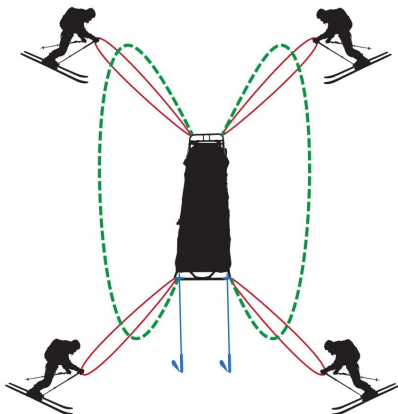
DISADVANTAGES:

- Bulky and quite heavy;
- Requires to be carried by good skiers on the descent.

ATTENTION CONFIGURATIONS

WAGE DEPENDING ON THE TERRAIN:

- One skier at the front guiding with the poles and two skiers braking;
- 4 skiers on the loops of each angle (red);
- More than 4 skiers with side loops (green) if necessary to tow it or hold it on a slope;
- It is also possible to mix techniques.



Snow evacuation

KONG® SLED

- Add two pairs of sticks to the different accessories;
- Spider: Shoulders back;
- Position the hand bars- hold the bindings so that the skis are converging (right-left);
- The holes in the plastic plate are not intended for the poles but for attaching the cords!
- Black straps: Assembling the sled;
- Green straps: Immobilization of the victim.

BENEFITS

- Lightweight and split into several elements, which allows the transport to be carried again;
- Significant insulation from the cold due to the height compared to the snow;
- Good skiability whether on slopes, slopes or powder.

INCONVENIENCE

- Requires know-how so that the assembly is efficient and solid;
- Lack of rigidity of the whole (deformation of the skis);
- No hard plan.



Snow evacuation

ORTOVOX® FORTUNE SLED

The makeshift sled is, as its name suggests, the last resort to evacuate a person.

Can be made with the shovel, its handle, long cords, a pair of sticks, ...



ADVANTAGE

Its weight is negligible because it can be achieved with the bottom of the bag.

DISADVANTAGES

- Discomfort and maneuverability;
- Requires two 7 m cords.

RADIO & EVACUATION

Rescue message

EVASAN MESSAGE

HAS **CONCERNED UNIT:
IDENTITY OF THE APPLICANT:**

B **PLACE :
DATE :
HOUR :**

VS **NATURE OF ACCIDENT:**

D **INJURIES:
NUMBER AND NATURE:**

E **NUMBER OF MISSING:**

F **TYPE OF RELIEF REQUESTED**

- HELICOPTER -
- WINCH -
- DOCTOR -
- DOG -

EVACUATION: sitting / lying

G **ACTION TAKEN ON THE FIELD:**

RESEARCH :
DZ - Contact details:

Radio

ICOM ICF-51

Button (red) to
"open"
the
relay

On Off
and volume

Alternate
press to
speak/
release to
listen

PO button:
blocking/
keyboard

unlocking
(long press)



Selection of
canals



Radio relay

USE & TRIGGERING OF RELAYS



- Turn on the station (the identifier number appears briefly).
- Select the code or relay using the arrows (Icom).

If it is a “ simplex ” communication (that is to say from station to station without using relays), use the alternating pedal.

If it is a “ duplex ” communication (i.e. by triggering a relay):

- Press the relay opening button (red on the Icom, on the top side on the Simoco);
- A tone code is emitted;
- A background noise indicates that the relay is “open”. If no background noise is audible, the relay could not be opened; start the operation again, move or change relays;

- Communication is then possible. During this, the identifier must specify the name of the relay on which it operates. For example: “ PGHM here detachment X on Fontsancte, speak ”.

Please note: opening a relay more than ten times, without communication behind it, is considered by the PGHM to be an emergency procedure!

Radio relay

GREAT ALPS NETWORK



Radio relay

EMERGENCY CHANNEL

Installations for the “E” channel 161.300MHz

Relay to:

- CODIS: Departmental fire and rescue operational center
- PGHM: High mountain gendarmerie platoon
- VIVA: Radio call sign for the Valais medical call center
- REGA: Swiss Air Guard for helicopter rescue
- COR: Regional operational center - Aosta



WARNING SIGNALS



No: I am not asking for intervention.

Yes: I would like an intervention .



Red cloth



yes



yes



Red rocket

Helicopter evacuation

CHOICE OF A DROPPING ZONE (DZ)

- The installation area must be sufficiently far from high obstacles (trees, houses, power lines, etc.);
- Keep the equipment on the ground (bag, skis, etc.);



- The approach area must be free of any obstacle, knowing that, if possible, the helicopter lands facing the wind;
- The DZ must be marked on the ground. The wind direction can be given when the landing area is not obscured;
- On snow, the landing area must be groomed or marked out;
- **A “ground” reference must be given to the pilot in the axis of the landing by a man with his back to the wind (no bags or unstable equipment)**



Helicopter evacuation

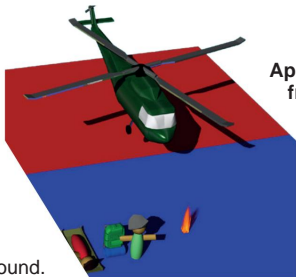
BOARDING/UNBOARDING PRECAUTIONS

-Any object likely to fly away is attached or stored (hairstyle, card, etc.);

- Skis, poles or ice axes are held horizontally on the ground. Backpacks are hand-held;

- Boarding or disembarking is done according to the mechanic's instructions ;

- Inside, do not hold on to the instruments so as not to disturb the pilot;



Approaching from the rear is prohibited (Tail rotor)!

- The approach of a helicopter is done in a crouching position generally facing the door on the mechanic's side;

- Be careful of cracks and the risk of unscrewing when disembarking;

- On snow, the helicopter sinks, remember to duck!

- Wear a ski mask to protect yourself from snow or dust.



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Realization :
EMHM Chamonix

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