



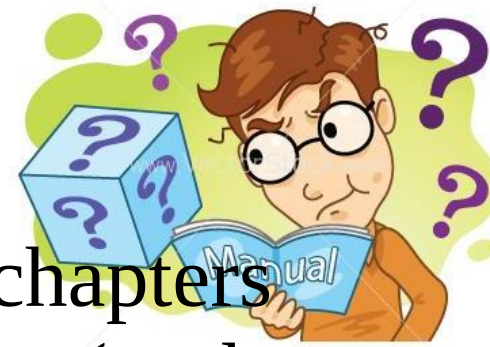
Rope access

ברוכים הבאים לפ.ס.ק. רופ אקסס בע"מ
בית הספר להכשרת עובדי גובה

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First of all



The content displayed is divided into chapters for convenience in locating information (each chapter is set in a different color).

You can go through the entire continuously or use the action buttons to switch between themes (Main menu / secondary).

The content was written by P.S.K to centralize, organize, and display the respective field for course participants and practitioners.

This product should not be considered as substitute for training required by the law.

First of all

Remember!.

- The material presented in brief is a basis.
- There are more options than those shown.
- There is no substitute for seeing the writing requirements of the law and the provisions of the manufacturers.
- If in doubt you can consult with p.s.k. instructors



First of all

Organization chart themes

entry	Equipment	Workstation	Motion on a line	Basic skill	Attache
Background	General	General	Entry	General	Knots
Rope access	Descending devices	Anchors	Start rappelling	Passing knot	Pulley system
Safety rules	Fall arrest devices	Forces on the anchor point	Descending	Traverse	rescue
Advantages Disadvantages	Ascending devices	Backup	Ascending/ climbing	Basic rescue	
Sports vs Industry	Rope	Anchor equalizer			
	Work seat				

Main Menu

entry 

Equipment 

Workstation 

Motion on a line 

Basic skill 

Attache 

summary 



מבוא

Background



Rope access



Safety rules



Advantages Disadvantages



Sports vs Industry



www.rockclimbing.com

Background

History

Man has always tried to reach high places in various ways.

Modern era of industrial rope access adopted sports methods to address problem areas.



Background

What is abseiling/rappelling?

Movement on the ropes (down, up, and even sideways).

Unique action area (relative to other modes of working at height).

apparently simple activity, But:

- A wide range of products and options.
- various/different Methods (anywhere in the world).
- broad discretion rests on simple basic principles.



Background

Demands from worker for this field:

- Personal skills.
- Double coping (rope+professional work skills).
- Skill acquisition process is relatively long.
- The difference between the types of work in the field (windows, signs, etc.).
- professionalism in routine work.



Rope access

Characteristics of this method:

- requires access to a top spot.
- Extended stay on the rope.
- Problem with carrying cargo and equipment.
- Be Alone, personal coping.
- different/Exceptional work environment .
- Limited to certain types of work.
- Whom is it for?? (Probably not for everyone).



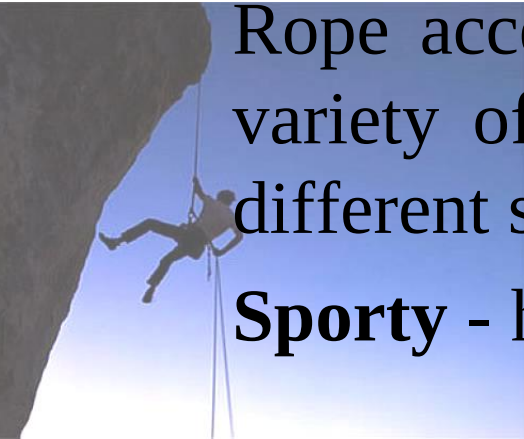
Rope access

Rope access techniques are implemented in a wide variety of users and groups. Each domain runs by different standards tailored to the needs

Sporty - hiking, abseiling, and challenge activities.

Climbing - a field which dictated Minimalistim based products.

Caves and canyons - access to distant places using single rope (in most cases).



Primary

Secondary

Rope access

Search and rescue



Special Forces



Rope access

Work at height - adopting the course of action for the industry while establishing strict safety demands for equipment and mode of action.



Arborist - an area that uses a unique work methods on rope.



Safety rules



Main requirements :

- Performance the work by an authorized worker.
- presence of "abseiling professional manager".
- Short fall arrest connection to upper point on the harness/
- Using standard ascender/descender.
- Closing the danger zone below working area.
- protect rope from sharp corners and working tools.

Advantages Disadvantages

rope access - Advantages

Access to complex situations in height.

Light equipment (unlike scaffold / Platforms).

Availability and speed (depending at work).

High level of safety.



Advantages Disadvantages

Rope access - Disadvantages

Requires skilled staff.

The method is not intended for heavy/difficult works.

ropes injuries from Environmental factors

Requires access to the top spot (usually).



Sports vs Industry

As in any field, even here, there is a difference between work and sports. Existing industries and jobs that require additional treatment.

The difference between sports and industrial area can be measured in several ways:

- Standards and equipment.
- Methods
- Rules and regulations.
- Exposure time, skill.
- Products and manufacturers



Sports vs Industry

Industry

Full body Harness
Automatic descender
Stricter requirements
professional manager.
Heavy equipment
Stringent characteristics



Sport

half harness.
Open descender
Basic Standard.
Broad discretion.
Light equipment
improvisation Options



Equipment

General.



Descending devices



Fall arrest devices



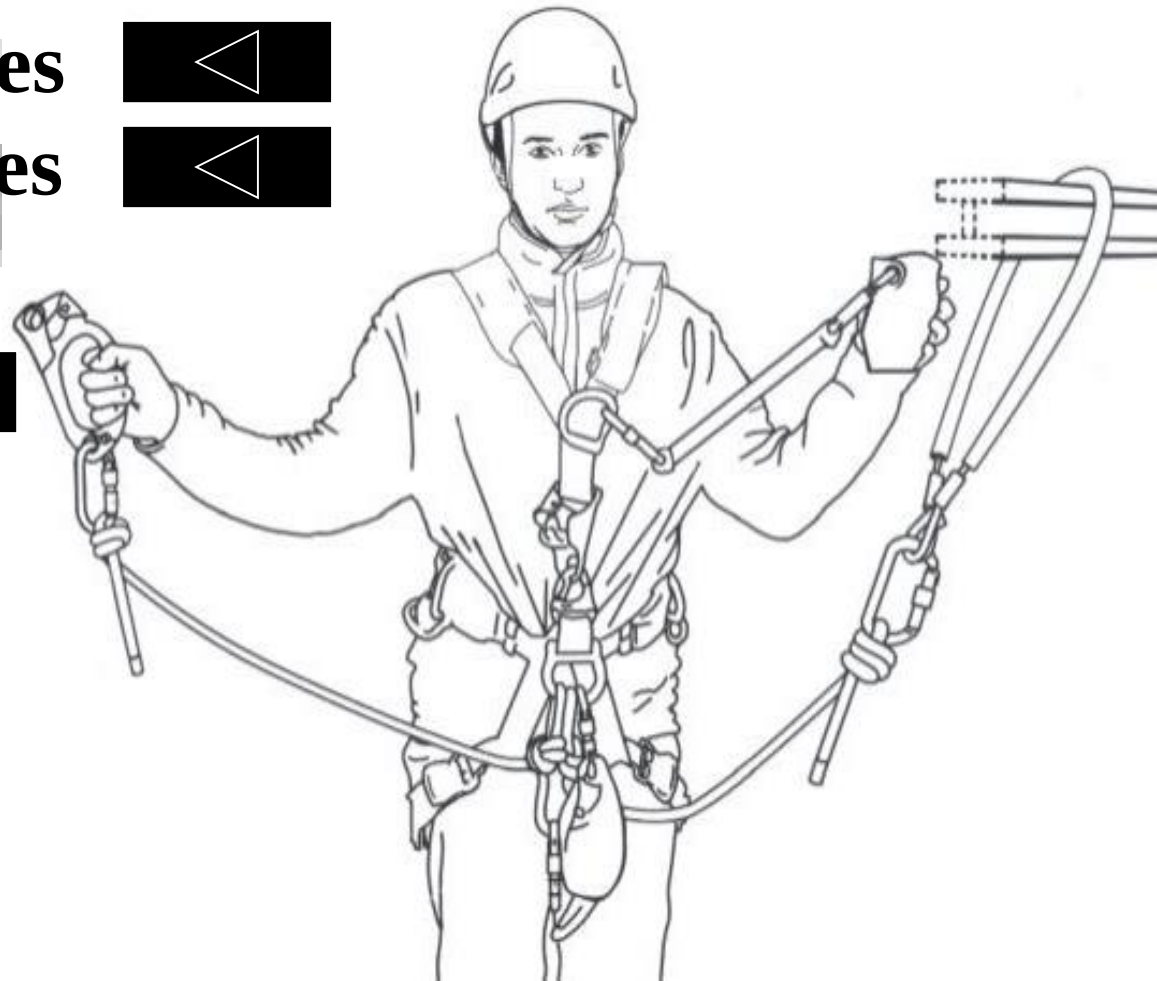
Ascending devices



Rope



Work seat



General

Background

- Rope access Equipment is different and unique from other works in height.
- selecting equipment will be adjusted to the type of work and user comfort.
- Recognition of the equipment and operating characteristics will advantage an high efficiency of the equipment at work.
- From time to time, a new product comes out into the market, we must catch up, and not remain far behind.



General

General operation with rope access equipment.

- Check product completeness and matching the type of work required.
- Prevention of textiles on textiles (movement / friction).
- Preventing metal on metal (twist / bending).
- 100% working rope connecting to lower point.
- 100% safety rope connecting to the upper point.

Note: These instructions come in addition to p.p.e rules.

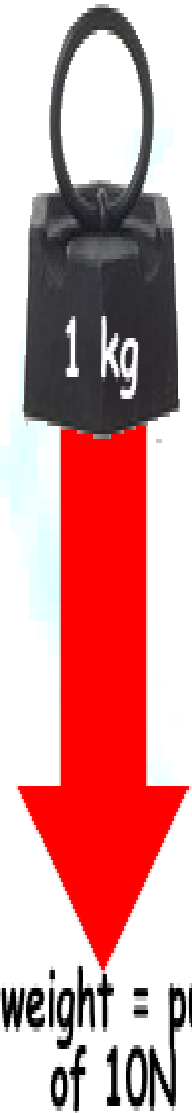
General

KN :tearing strength load testing (gross).

European standard requirement for testing static load for each item of personal protective equipment, defines a load operation for three minutes (at a defined standard of attraction), to test resistance to tearing.

KG: Maximum working load (net).

Given shown in "kg" units (similar to lifting accessories), shows the allowed weight and safe to use. Manufacturer committed to product safety factor for the product, which ensures greater strain to prevent tearing.



General



Standard

For works at height, were defined a number of standards, which are under common title (PPE) to protect against a fall from a height.

Also, there is a group of standards characterized and incorporated into sport under a different title (equipment for mountain).

Despite the differences between the groups, there is an ideological affinity for the two groups and users often becomes borrow of products between fields.

General

The manufacturer's instructions.

Height labor regulations do not define courses of action for rope access workers, and training programs which were published by the Ministry of Industry, imply about the procedures and practices required.

Manufacturer's data source completes the work rules for the user.

Reading and understanding the manufacturer's instructions will lead to Correct and efficient use of the product



Descending devices

Definitions

EN-341: Friction device for download rescue

EN-12841: rope access ascender.

"PANIC PROOF": Automatic locking mechanism in case of:

1. Leaving hands (intentionally / unintentionally).
2. Clicking on the handle overflow control (present on some devices).

"STUPID PROOF": Safety lock in case of incorrect connection.



Descending devices

General action with descender.

- Select the appropriate device.
- Make sure the device matching rope (diameter), and the weight is loaded.
- Use both hands while rappelling (strong hand on the rope).
- Device connected without harmful pressure or twisting.
- Choosing how to connect the device by the user convenience (right / left to prevent crossover rope).



Descending devices

Products on the market.

Range of products in the market is wide and varied. All the time new products are developed .

Grouping

Sporty: small, easy, simple friction devices.

Industry: Automatic friction devices, safety aspect improved .

Improvised: knots, coiling rope on a ring to create friction.

Other: unique products for rescue, escape, Arborist, special units, etc.



Descending devices

I.D.

Small model 10 to 11.5 mm diameter ropes.

Large model from 11.5 to 13 mm diameter ropes.

Standards EN-341, EN-12 841 / C.

Advantages:

dual Mechanism for preventing drop.

Protection against incorrect.

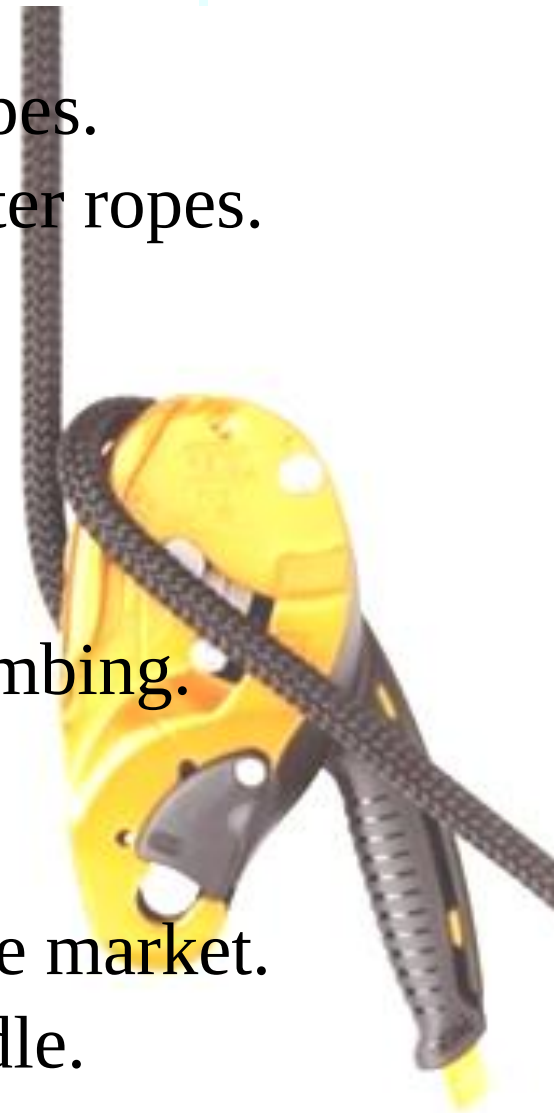
Comfort with flowing the rope while climbing.

Secure mode (does not require tying).

Disadvantages:

Large compared with other devices in the market.

Requires skill working with control handle.



Descending devices

STOP

Rope diameter 9-12 mm.

Standard: EN-341.

Advantages:

Allows quick rappelling.

Allows disabling automatic locking mechanism.

Cheap (relatively).

Familiar, and is commonly used for many years.

Disadvantages:

Abrasion Quickly (relatively).

Requires locking wrapping / tying.

Difficulty with rope Flowing while climbing.

single "Panic" Action.

No "stupid proof"



Descending devices

RIG

Year: 2010

10.5 to 11.5 mm diameter ropes.

standards: EN 12 841, EN-341

Is heir to "STOP".

Advantages:

Smaller than I.D.

Comfort with flowing the rope while climbing.

Disadvantages:

single "Panic" Action.

No "stupid proof"

Difficulty with locking If slide.



Fall arrest devices

Definitions

EN 353-1: Guided fall arrest for temporary vertical anchor line.

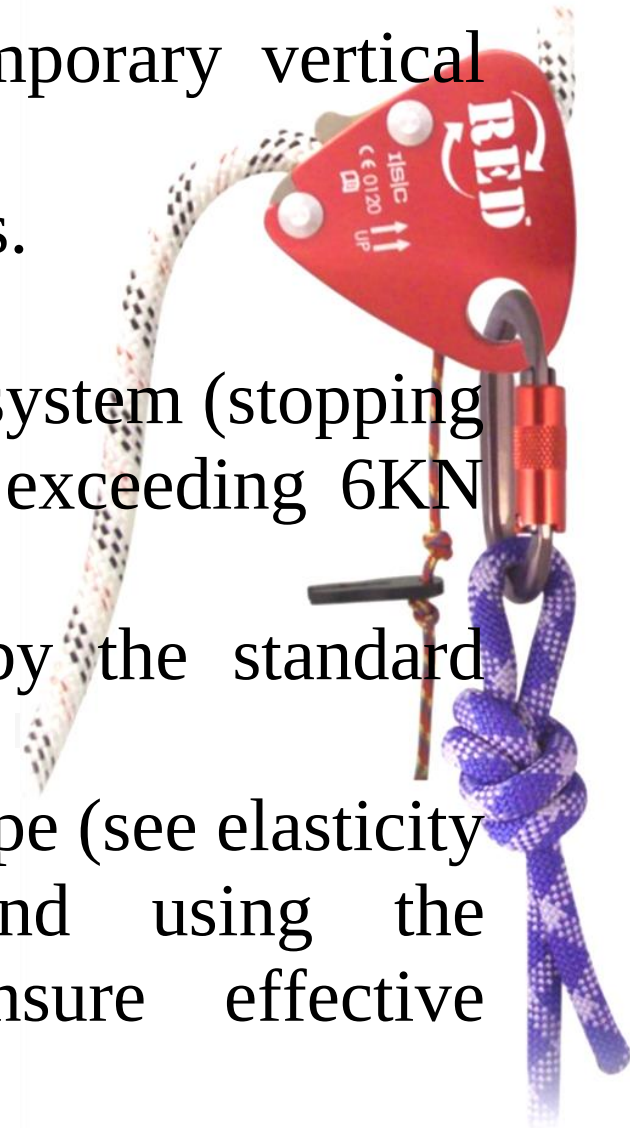
EN-12841: safety for rope access works.

Fall shock absorber - "mouse"

Worker Which falls on the emergency system (stopping a fall), will exposed to the force not exceeding 6KN (600 kg).

The safety device has been tested by the standard requirements for this purpose.

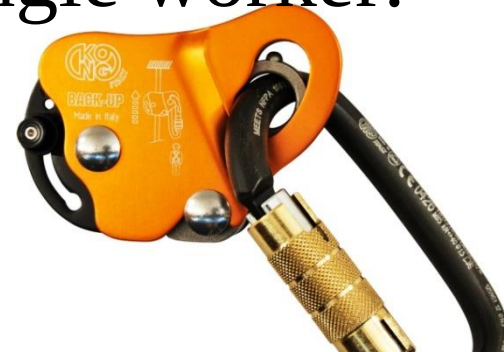
Combined with the proper use of the rope (see elasticity and dynamics of rope later) and using the manufacturer's instructions will ensure effective instrument blocking fall.



Fall arrest devices

instructions for working with backup System

- Understand manufacturer emphases and product limits.
- Confirm course of action and safe closing.
- Check the mouse matching to the rope diameter.
- Right connection will be short (about 30 cm).
- the mouse will be Connected to the harness top point.
- Safety "Mouse" is designed for a single worker.



Fall arrest devices

Products on the market.

Security devices are a subset of products that meet the definition of rope grab.

The role of the security apparatus to deal with the dynamic fall forces.

Range of products on the market that are complying with standard allow a wide choice for every mode and every employee.



Fall arrest devices



ROCKER

Manufacturer: I.S.C. England.

Year: 2000

Standard: EN-353-2, EN-358, EN-12841A.

Rope diameter: 10.5 to 12.7 mm.

Advantages

Can be lock on the rope.

Can be load up as work and position system.

Can be easily release (relatively).

Disadvantages

Does not move fluently on the rope.

Fall arrest devices

A.S.A.P.

Manufacturer: "petzl" France.

Year: 2007.

Standard: EN-353-2, EN-12841.

Rope diameter: 10-13 mm

Advantages

Free flow on the line.

Reduced falling distance (follow the user).

Disadvantages

Is not adapted to be used as rope grab committed an integral shock absorber.



Fall arrest devices

STICK - RUN

Manufacturer: KOMMET

Year: 1988

Standard: EN 353-2

Rope diameter: 10.5 to 12 mm.

Advantages

can be connected to the rope without disconnecting from the harness (cannot fall).

Moves smoothly

Disadvantages

Difficulty in releasing lock case / catch.



Ascending devices

Definitions

EN-567: rope grab into sports.

EN-12841: rope access rope ascender.

rope ascenders designed to allow one-way free movement, and are used mainly for climbing on rope.

In a great variety of products, in addition to "improvisations" and options from parallel fields.



Ascending devices

Safety Rule

- Chose the appropriate Product.
- The device is not designed to deal with stopping a fall.
- Make sure rope diameter adjustment.
- Intelligent use to prevent rope damage.



Ascending devices

Products on the market

Grouping:

grip handle Products.

foot Adjusted Products

harness Adjusted (chest).

small rope grabs (multi-purpose).

improvised rope grab.

More products can grab a rope but less fit for climbing up.



Ascending devices

jumar

Category: handle rope grab.

Standard: EN-567, EN-12841

Rope diameter: 8-13 mm.

Advantages

Comfortable grip/pulling handle .

Disadvantages

Large size.

Incorrect operation may disconnected from rope.



Ascending devices

TIBLOC

Category: rope grab.

Standard: EN-567

Rope diameter: 8-11 mm

Advantages

Small and compact.

You can not disconnect accidentally.

Disadvantages

Requires two hands to assemble and remove.

Difficulty with download.



Ascending devices

prusik

Category: improvised rope grab.

Standard: Industry?? (key Product in sports activities).

Advantages

Simple and cheap

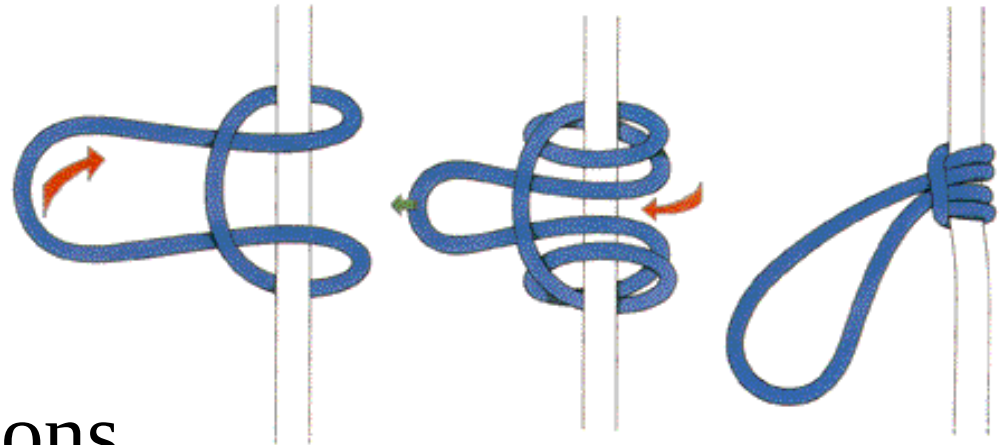
Easy to use.

Works in two directions.

Disadvantages

Non-standard (used an accessory).

Locked under load.



Rope

Definitions

EN-1891: Static rope.

EN-892: Dynamic rope.

EN-564- service/secondary rope (up to 8.5 mm).



Rope

Safety instructions

Check the ropes before each use.

Protect ropes in corner and vulnerable point.

Protect Rope from chemicals and solvents.

Avoid friction between two textile products.

Ropes should be stored in a cool, dry place.

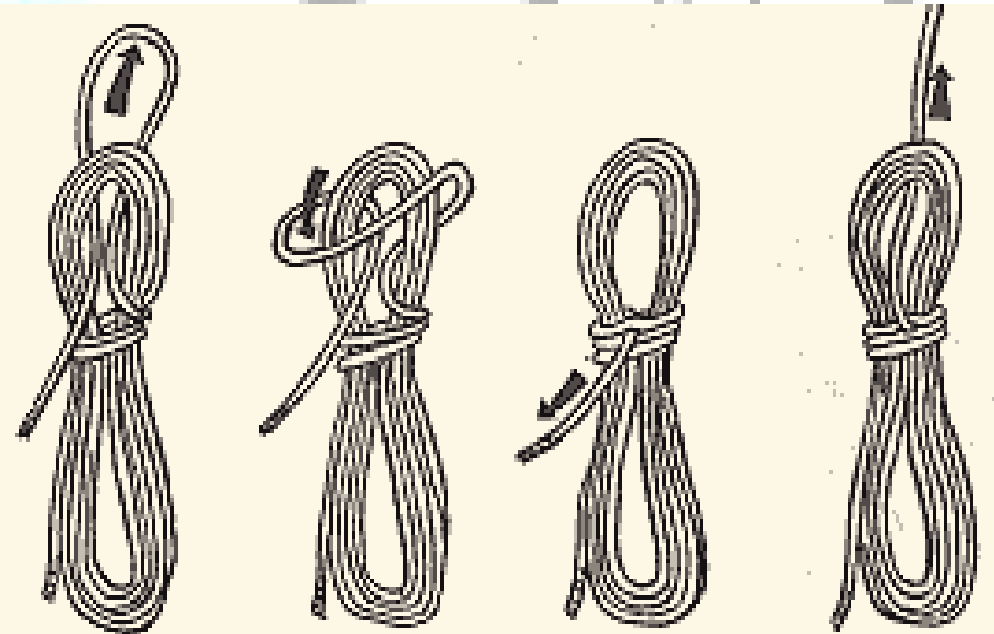
disqualify rope in the case of wear and tear,
erosion, defect noticeable.



Rope

rope folding and Storage .

Coiling rope in an organized and consistent coils, will make Easier opening toward, and maintaining better on the line during transmission and storage.



Rope

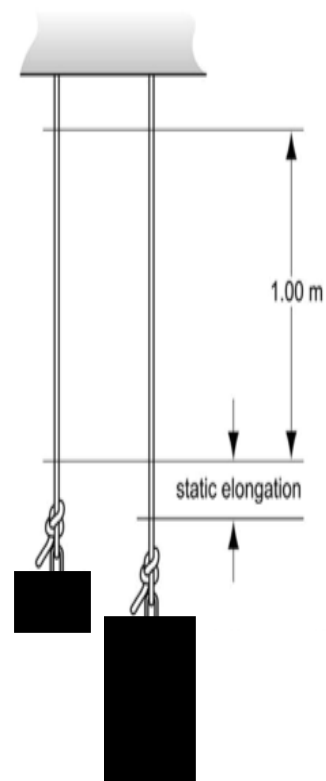
Elasticity

Degree of elasticity (by about 3%) describes the elongation of rope for adding a load of 100 kg (for rope already stretching force of 50 kg).

Adding additional load will cause prolongation of the rope, until tearing in maximum load (elasticity of about 40%).

Note:

loose safety rope, length 100 meters, will be extended more than 3 meters to remove elasticity while stopping a fall.

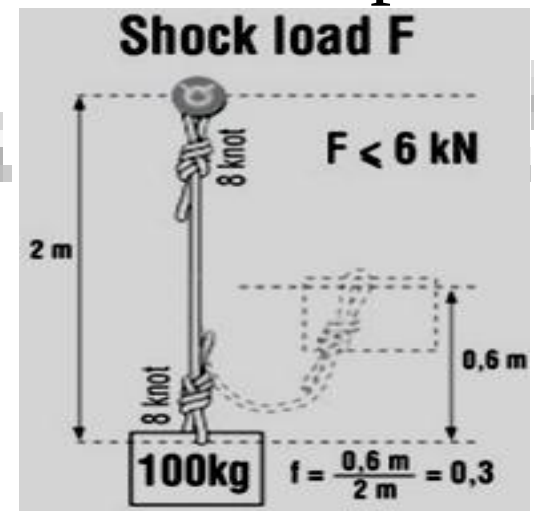


Rope

Energy suspension

Fall factor: is the ratio between the distance of free fall of the body, and the length of the rope participant braking and provides elasticity relief.

The standard requires the rope to be tested by a fall factor of 0.3 (0.6-meter free-fall rope two meters in length), to absorb limited power of 6KN on the falling body.



Primary

Secondary

Rope

Rope Accessories

rope corner Protection.

Reduces corner friction.

Rope bag

Washing Tool

Mark Ink.



Work seat

Definition

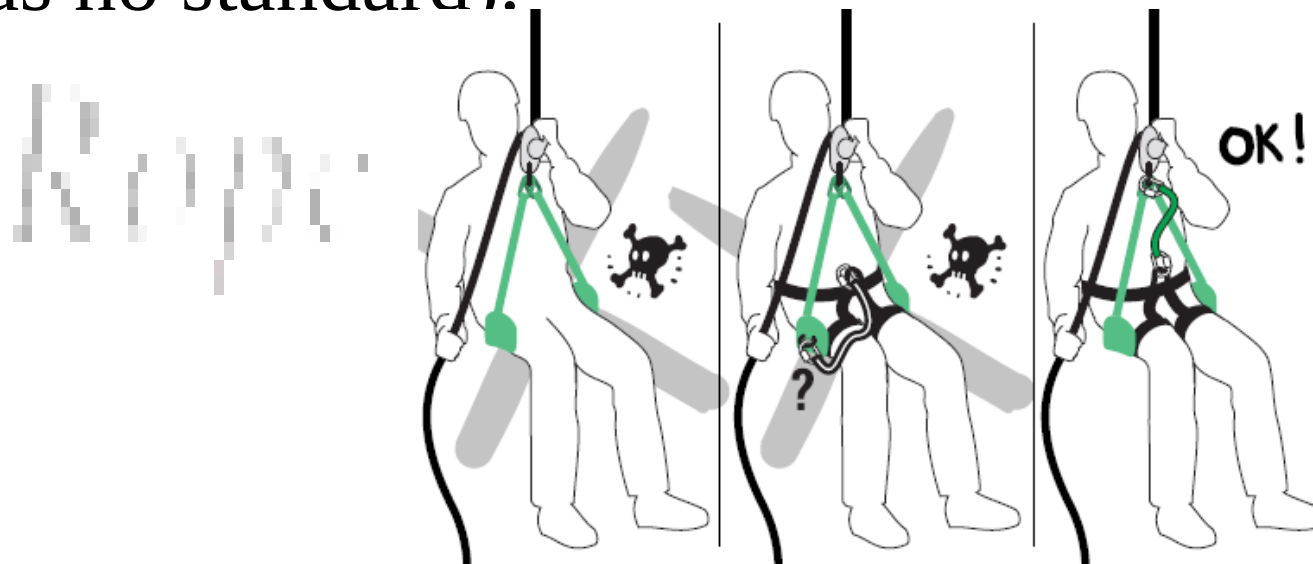
Convenience Accessory of rope access, eliminates the harness pressure and allows longer time of working.



Work seat

Safety instructions

- Be sure to adjust the seat for maximum comfort.
- long working seat will make it difficult exit/begin rappelling and solve problems if any.
- Organize the equipment on the seat for easy use.
- Connect the lower harness point to descender (work seat has no standard).



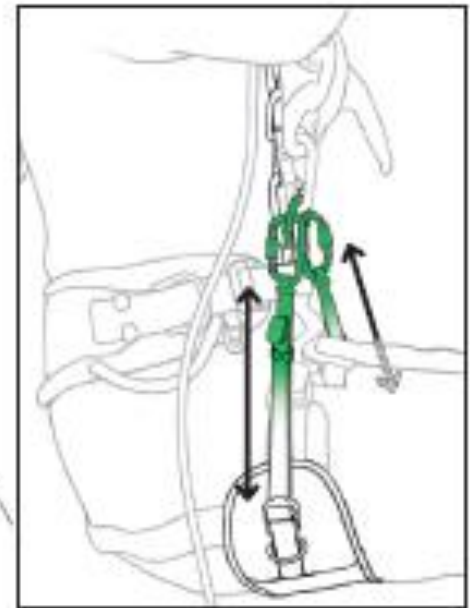
Work seat

Considerations in adapting the work chair

Set descender (right / left).

Distance of descender from board.

Equipment hanging points.



Work seat

Products on the market.

improvised chair

Industrial chair (manufacturer).

Integrated chair harness (tree works).



Workstation

General



Anchors



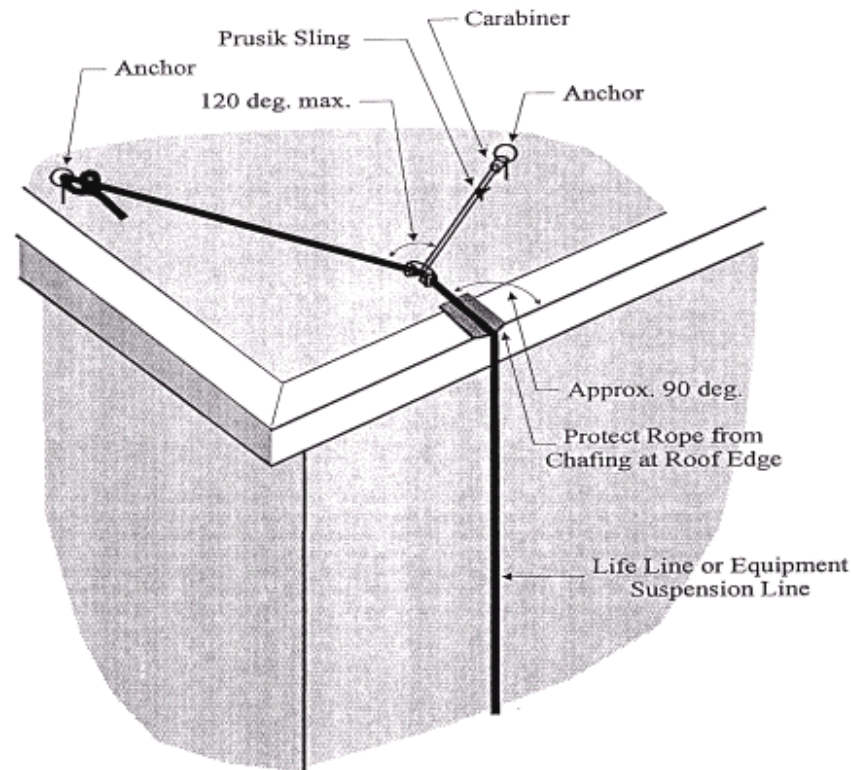
Forces on the anchor point



Backup



Anchor equalizer



General

Definition

Rappelling Station: Pair of ropes use for access between anchor point Finishing point.

Organizing Area: Territory between anchors and rappelling exit points (roof). Territory that used for installing rappelling Station and rescue solution.

installing Rappelling station requires experience, and required further consideration and skill in complex situations.



General

order of actions in Installing rappelling station.

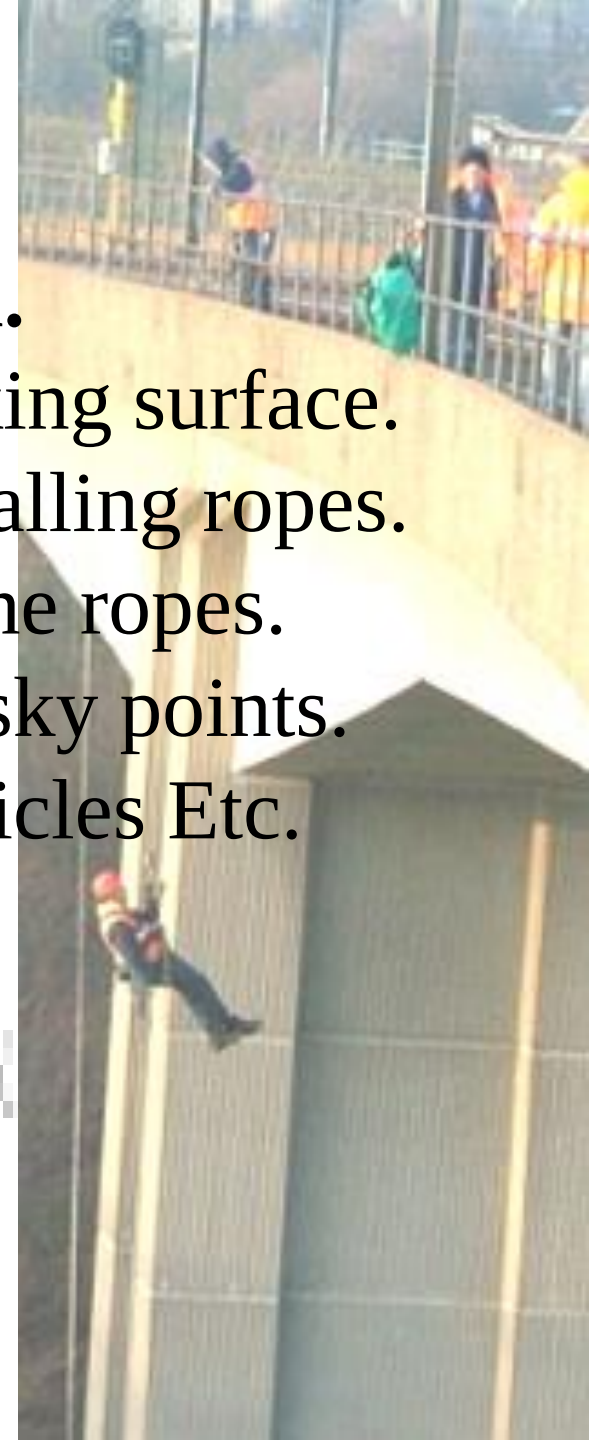
- Finding anchoring points (work/safety line).
- Rope check before use
- Rope Secure before downloading.
- Download Rope along the rappelling route the extent required.
- anchoring the rope to the anchor point.
- Divert Ropes to work point (if necessary).
- Collect extra rope by side
- Repeat steps with the second rope as well .



General

Risk factors in rappelling station.

falling objects from roof Edg/working surface.
Worker safety if needed while installing ropes.
Obstacles that may pose a risk to the ropes.
Rope edge Protection, and other risky points.
Ground point (end), obstacles, vehicles Etc.
rope threats on Organizing Area.



General

Considerations in choosing Anchors .

Far anchoring (elasticity).

too close anchoring (difficulty exit/ rescue).

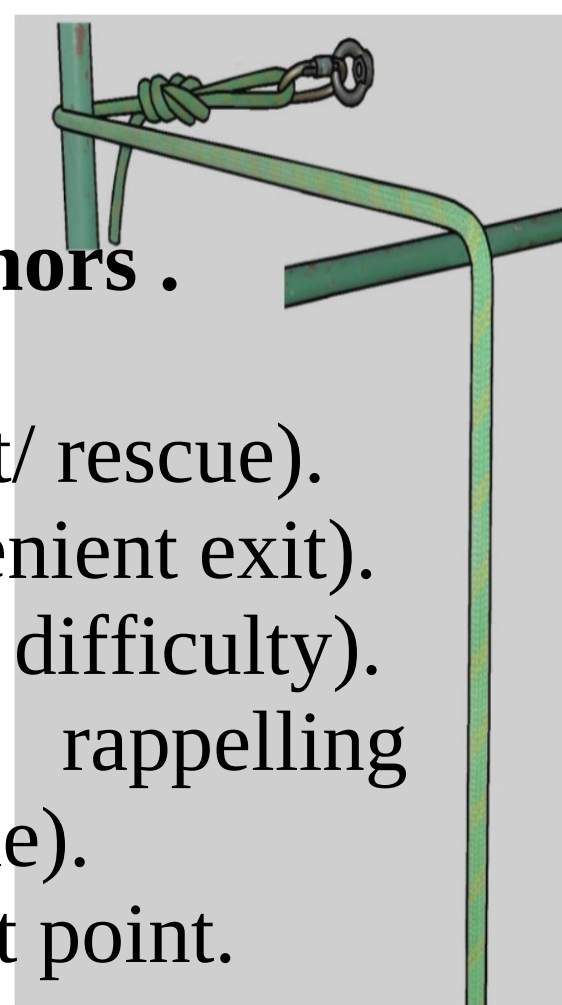
Low anchoring (difficulty/inconvenient exit).

High anchoring (anchoring/rescue difficulty).

anchoring the axis of work rappelling direction (no need to steer rope line).

obstacles between Anchor and exit point.

Selecting anchor points requires skill and experience. Urban situations poses simple solutions than outdoor Activities .



Primary

Secondary

Anchors



Simple solution for rope access are drilled anchors, In addition there are unique products to cope with problematic situations.

Definition

Anchor - rappelling/safety line connection point.

Backup - extra defensive action in case of failure

Indirect Backup - nearby additional connection point anchor.

equalizing Load - spread force between two points.

If in doubt about anchor point, make a backup, consult or examined other way of action.

Anchors

Anchor point

Drilled anchor are used in a variety of situations in everyday life. using drilled anchor into rope access work, There are a number of questions (and for some of them there isn't clear-cut and/or statutory answer).

Who may prescribe an anchor?

Who may approve an anchor point?

What about distant points, below the ceiling

How often anchor testing is required ?

What is the anchor safe load?



Primary

Secondary

Anchors

In the market – serial products.

serial products meet EN-795 standard or equivalent standard. Have to work according to the manufacturer's instructions (force directions, weight limit , etc).

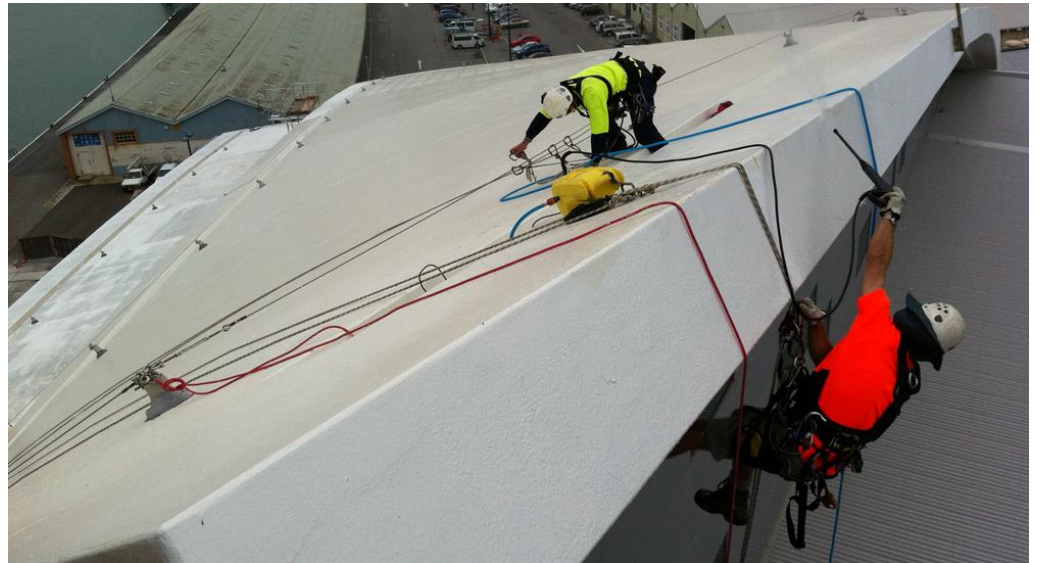


Anchors

Engineering Anchor - structured.

For unique situations anchor can be planned based on the requirements of the Standard and certified by an engineer.

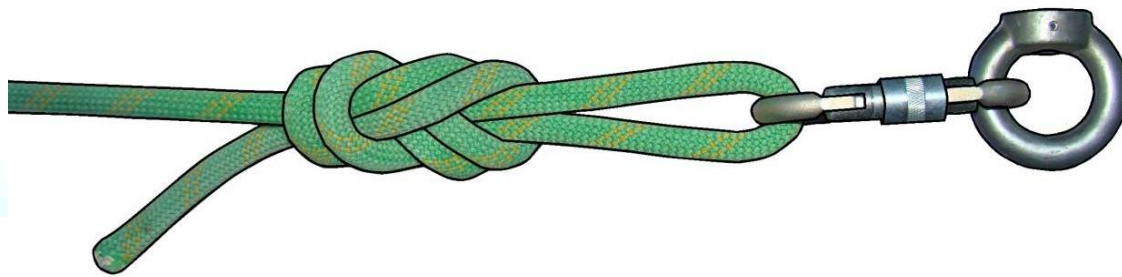
Limits will be Determined to amount of users and how to use (shock absorber).



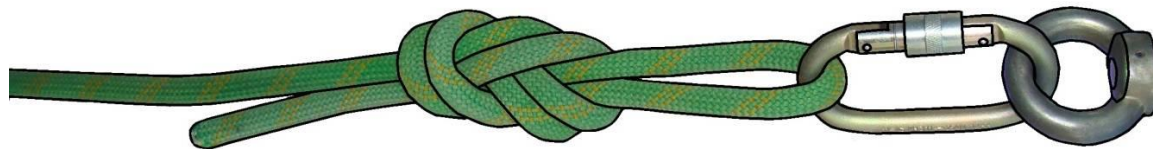
Forces on the anchor point

Retrieval vs cutting force

Retrieval power put to the test the relationships between anchor and wall to which it is connected. Shear strength test the anchor bolt survival with breaking/bending and tearing force.



cutting



Retrieval

Forces on the anchor point

Redirecting rappelling ropes.

In general, it is best to anchor rappelling rope along axis of work route. Necessity of rope Redirecting is forced under Complex terrain conditions Under Extreme situations, Complex angles create large forces on the anchor



Backup

Back up is made out of doubt to reliability of anchor point to which we are connected.

There is no doubt that choosing the anchor point requires considerable experience and judgment.

Even the regulation is not being focused or clear about the anchor point definition.

Choosing between a large object or engineering approval anchor point, creates a dilemma. It is clear that this dilemma can be turned off by connecting to both anchors

Backup

Backup indirectly.

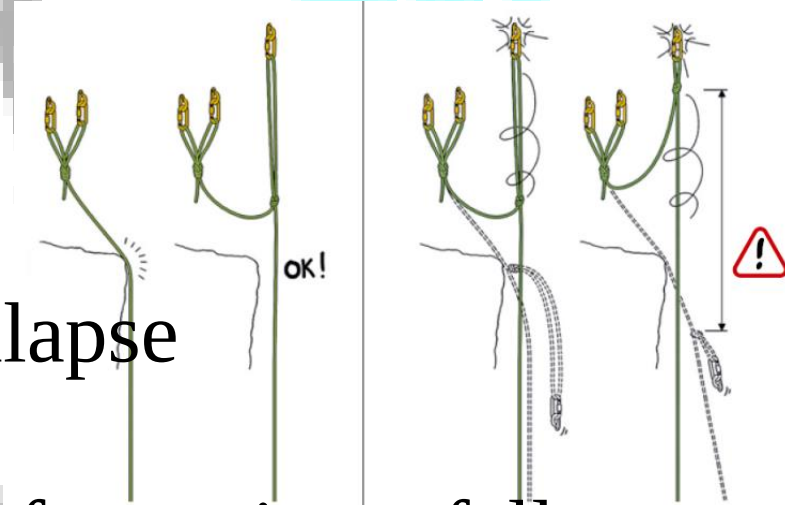
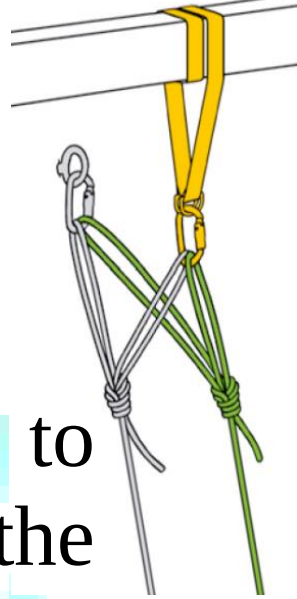
In This action the load will be transferred to an alternative point only in case of the first/Main point is collapsed.

Attention points.

Could be a chain reaction collapse

Distance and response times

Static load against the force of stopping a fall.



Backup

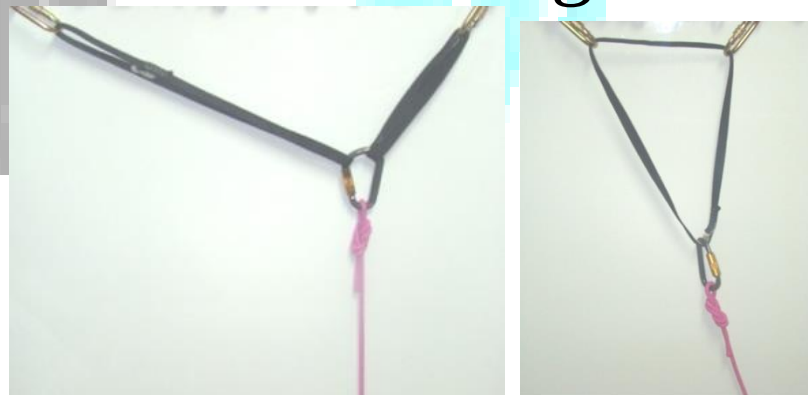
Direct backup.

Load is divided between the anchor points but not equally. This is basically a condition intermediate between indirect anchoring and classic anchor equalizer.

Attention points.

Directed force.

Consider Replacing to anchor equalizer (next issue).



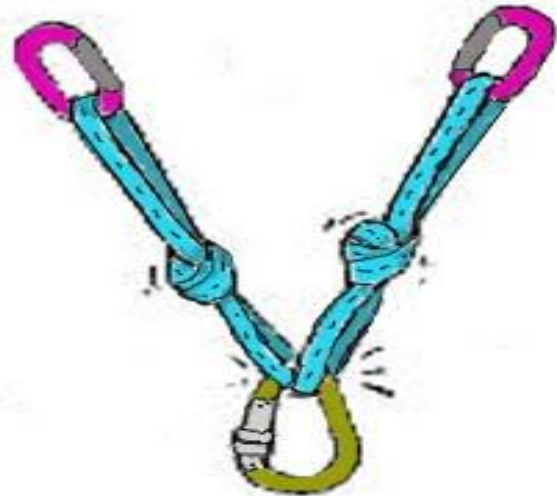
Anchor equalizer

Definition

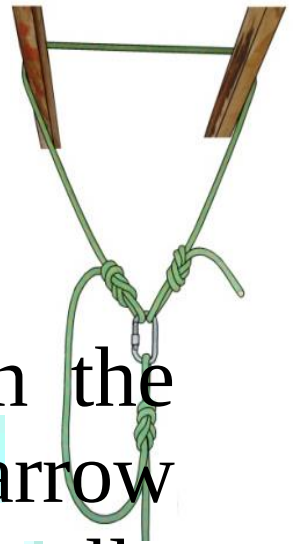
The Idea of backup requires more than a single anchor.

Load Dividing applied the idea of reducing the load from the anchor versus indirect connection to another one (backup).

Less load/force on the anchor more safety against failure.



Anchor equalizer



Triangle Load Dividing.

This is actually interim situation between the backup and Dividing weight, and only a narrow range of situations under this method really reduces load from the anchor.

Note

Care should be taken with very small angle between the anchors.

Direction of force will be Aimed to central axis.

Anchor equalizer

anchor equalizer Principles

Set the force direction.

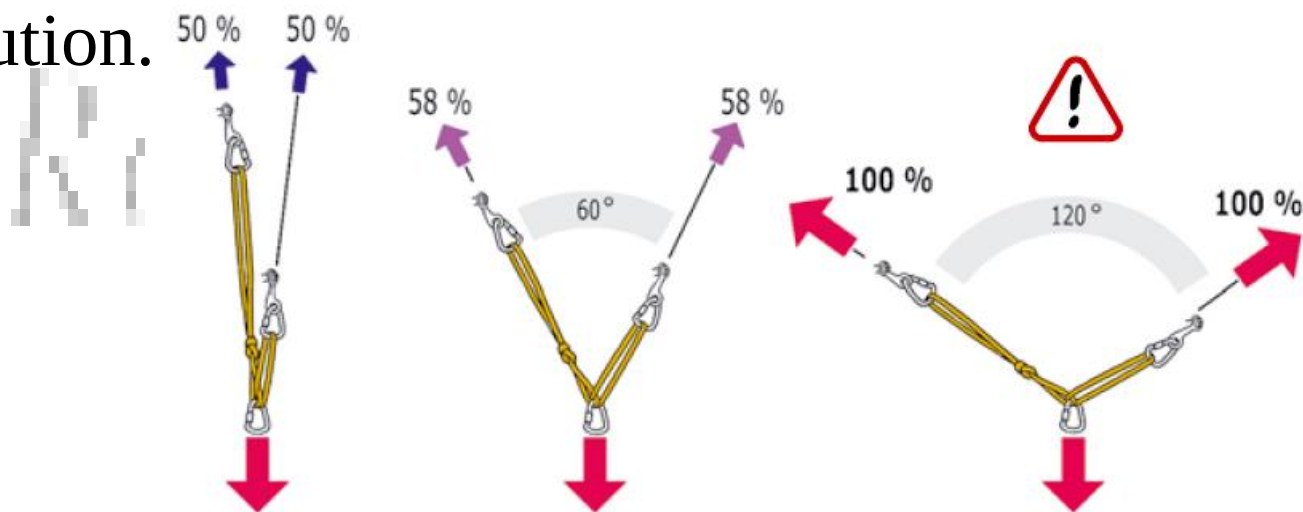
Comparing distances between anchors (front / rear).

Use a short sling to reduce fall distances.

Division between up to three points with one system.

Keeping small angle as possible between the anchors.

Possibility of combining the principles of backup and weight distribution.



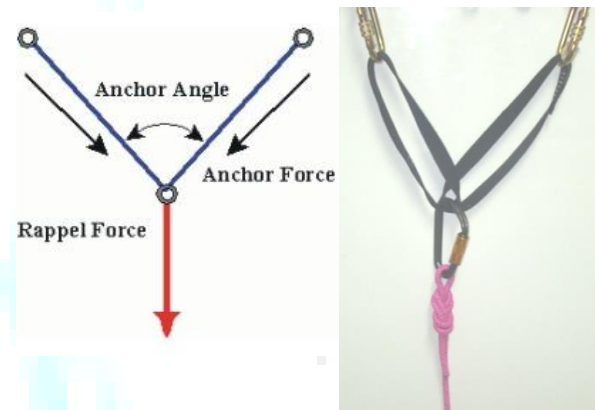
Primary

Secondary

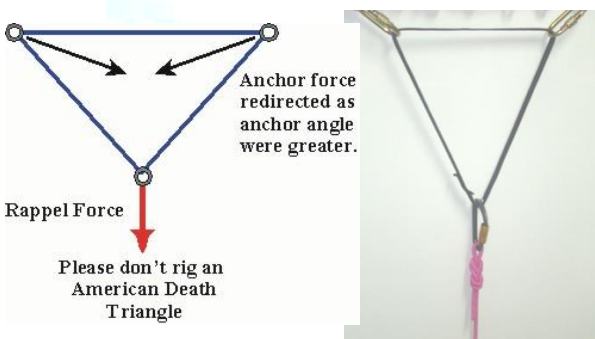
Anchor equalizer

Anchor equalizer vs triangle anchor forces

Anchor equalizer



Triangle anchor



equalizer	triangle	Anchor angle
50%	71%	0
52%	82%	30
58%	100%	60
71%	131%	90
100%	193%	120
146%	288%	140
193%	383%	150
288%	574%	160
574%	1146%	170
1146%	2292%	175
2865%	5730%	178

Motion on a line

Entry ◀

Start rappelling ◀

Descending ◀

Ascending/climbing ◀



Entry

Ascending/descending on the ropes are the basic of this method. Attention to simple basic rules will improve safety and efficiency at work.



Entry

Apparently, rappelling on ropes is a simple and basic action, especially under industrial environment.

This field is using automated devices, but requires organized with many number of elements and heavy equipment.

the early stages required guidance and patience to instill the basic principles of operation.

After the acquisition of basic skills and experience, base operations are performed automatically and sometimes excessive self-confidence (which may lead to errors).



Start rappelling

Start rappelling

Transition from standing on roof/sitting on the rail, into Hanging on the working board position, is a weakness that requires more attention.

Attention points before exiting.

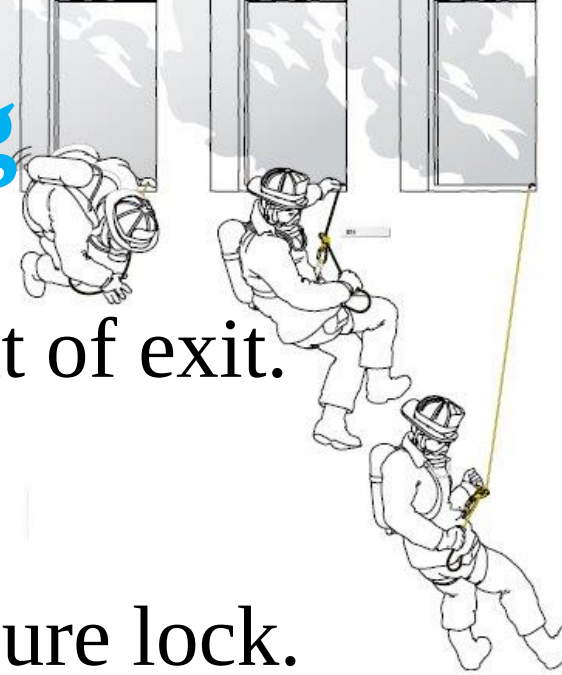
Setup ropes Directions by convenience.

Choosing Exit direction (right / left).

Difficult exit, making gradually Move.



Start rappelling



Rappelling Exit sequence.

Organization tools beyond the point of exit.

Checking safety equipment.

Connection safety device.

Connecting rappelling device + secure lock.

Put rappelling/safety devices in future Hanging position.

Exit into Hanging Position.

Full Check after positioning on ropes
(connectors, descender Secured , harness to
seat connection, rope corner protector).

Picking up working tools, beginning work.

Start rappelling

Types of start rappelling situations.

The difference of exit is stems from two factors.

Position to which we goes: Anchor Location:

A vertical wall.

Positive slope.

Negative over hang.



High and close.

Low and far.



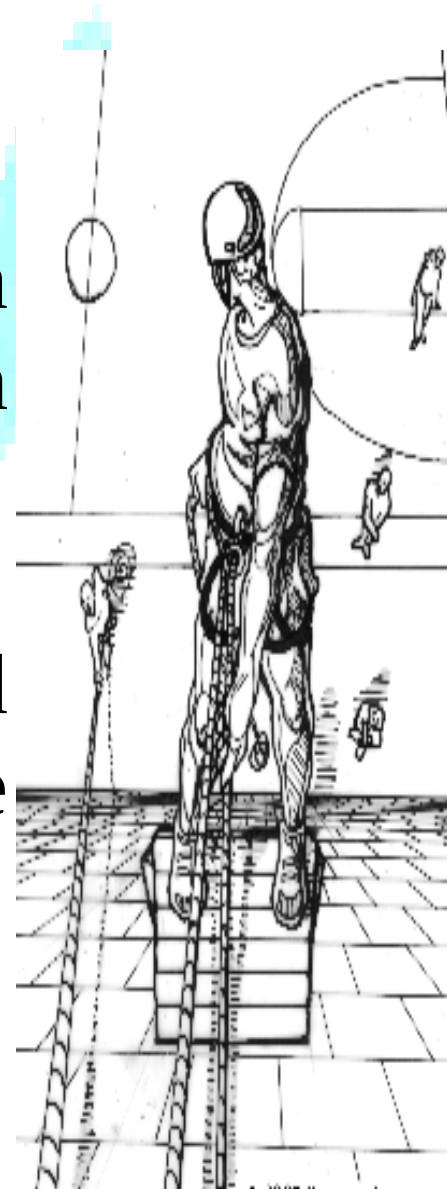
Start rappelling from close and raised anchor points to a positive slope or a vertical wall, would be easier than facing out from distant and lower anchor to over hang negative Position

Descending

Rappelling: Movement along ropes.

Rope access required working with automatic friction devices, which provide easy use and better safety

Following a few ground rules would improve Safety and removing possible risk factors.



Descending

Safety system practical rules.

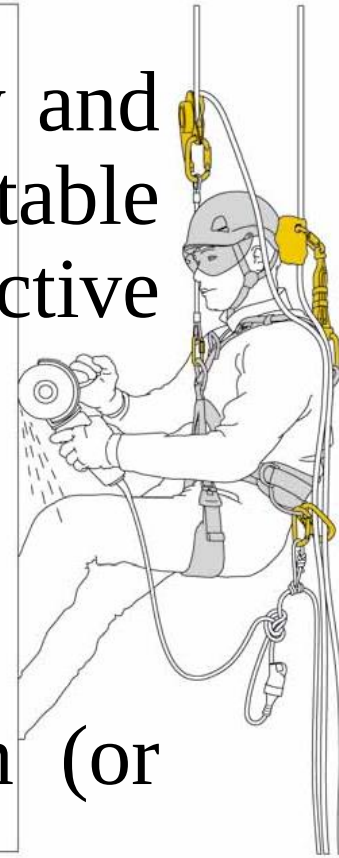
Safety device (mouse) connection, freely and not too long, will allow comfortable rappelling and the existence of effective emergency system in case of failure.

Safety system

connection to upper point on the harness.

Mouse Distance will be about 30 cm (or according to manufacturer's instructions).

Security line on the opposite side to the hand holding rappelling rope.



Descending

Working system practical rules.

Direction and distance of rappelling device is Set by the user, and Allowing better control.

Working System

setting device by your comfort (right / left).

Operating device with two hands (device+rope).

Descending control is by the hand on the rope.

Secure descender when exit/work/spot situations.



Descending

Attention points while surfing.

Heating device (faster rappelling/Heavy load).

Long runs (elastic, changed rope behavior).

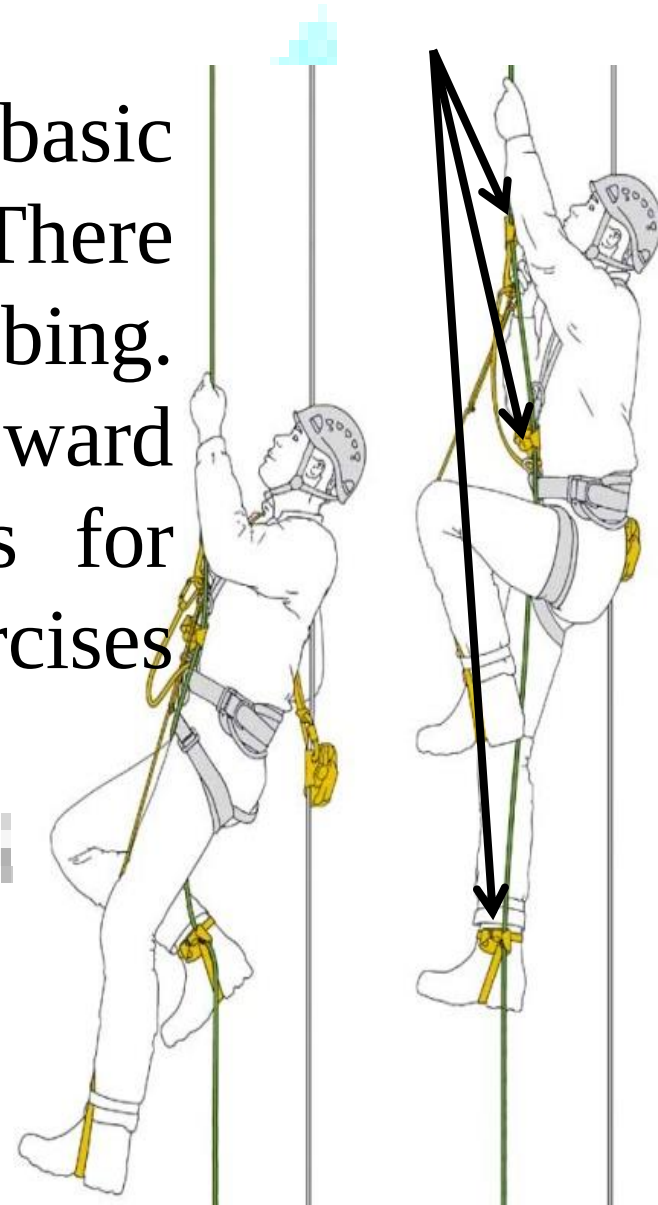
Sudden stops (device and ropes abrasion).

Rope abrasion

Ascending/climbing

climbing

rope Climbing is a necessary basic skill for rope access worker. There are several options for rope climbing. This ability completes the upward movement as well as a basis for solving problems (basic exercises below).



Ascending/climbing

Rules and regulations while climbing.

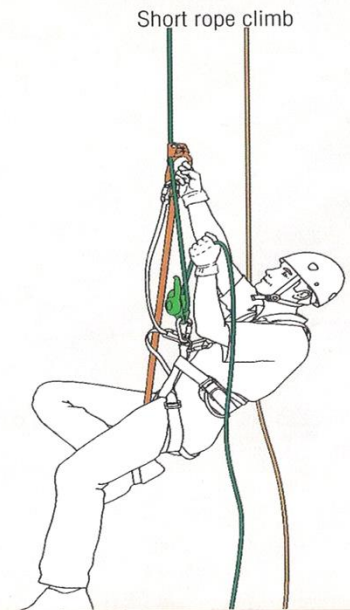
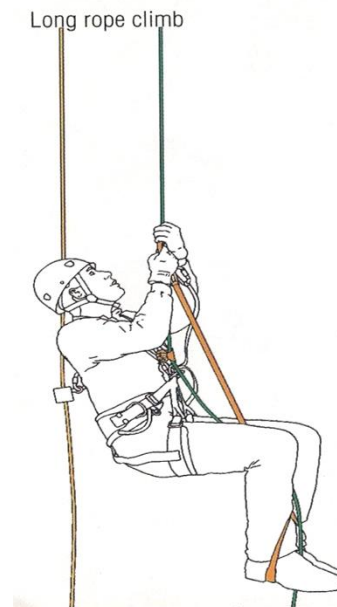
Make sure climbing device matching the rope.

Ensuring free mouse movement while climbing.

Devices position on an optimal distance.

Perform moderate steps.

Perform up effective movement using the whole body (hands / feet).



Ascending/climbing

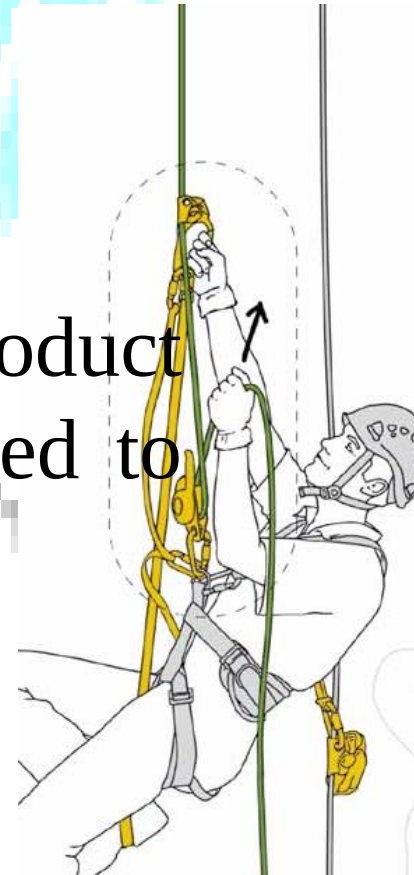
A classic (G'umars).

This is a basic climbing Technique which one ascender is connected to the worker and the other one used as step two feet rise.

Suitable for long distances climbing.

1:1 Progress ratio.

Efficiency depends on the type of product (foot device + chest rope grab, compared to prusik + knot as a step).



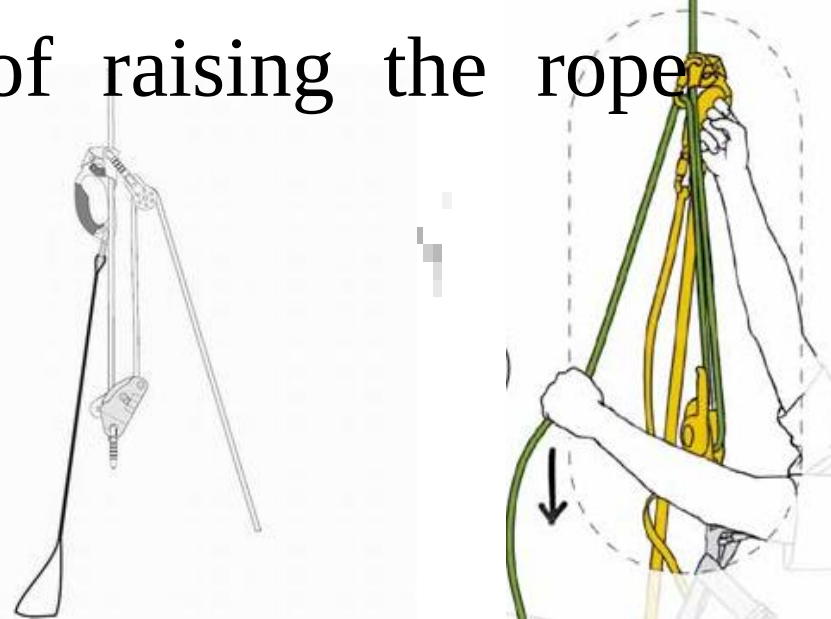
Ascending/climbing

Climbing(Combined) with descender.

This Climbing technique, basically belongs to rope access Users (not into sports). Adding rope grab Above, creates easier but slower option.

1:3 Progress ratio (Classic "Z" pulley system).

Effectiveness of the method is due to a friction device, and convenience of raising the rope grab/ascender.



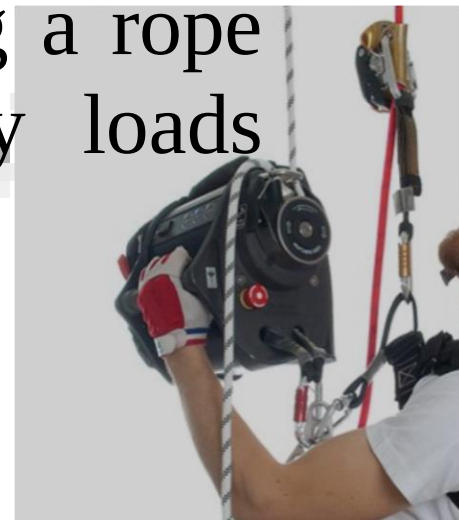
Ascending/climbing

1:2 interim situation.

This method is popular especially in Climbing trees, due to a double rope technique, and as an interim solution to previous methods.

Climbing operational / mechanical.

Development of advanced solutions for special units and rescue forces. Using a rope winch allows ascending with heavy loads quickly and easily.



Basic skill

General ◀

Passing knot ◀

Traverse ◀

Basic rescue ◀



General

The principle of load transfer.

Solving problems in rope access situations, based on the idea of transferring loads between points. Even rappelling/climbing actions based on load transfer principle (basic level). dealing with more complex problems required more attention.

Set load transfer points (two end points).

- Passive action of release and transfer of load.
- Active action of pull or put in the load.

Where the load is? And where it is transferred?

General



Think and plan.

Understanding the problem and planning a course of action will lead to easy and simple solution.

Remember: There are several courses of action and you need to select the appropriate for the situation in which you are!

Making small action steps

Every problem or exercise, consist of smaller actions. Understanding the order and precision of these steps will resolve the problem in an easy and secure way.

General



Solution

Order and organize

Density is formed around the limited working space where we are, there is a great impact for the organized aspect of operations.

Dividing work areas left / right, will prevent crosses, twists and unnecessary stress on the equipment.

Once the load exchange (between points/ systems), requires care and attention for order and location of the equipment components taking part in changing the load, to prevent dangerous pressures.

Passing knot

Passing a knot

This is a basic exercise that combines basic load transfers and initial implementation of safety principles in solving problems.

This is required when identifying a defect in the rope while rappelling (making alpine butterfly), or in the event of connecting cords.

This exercise introduces the basic concept of load transfer to alternative point, which allows to solve the problem and then return the load for continue with working.

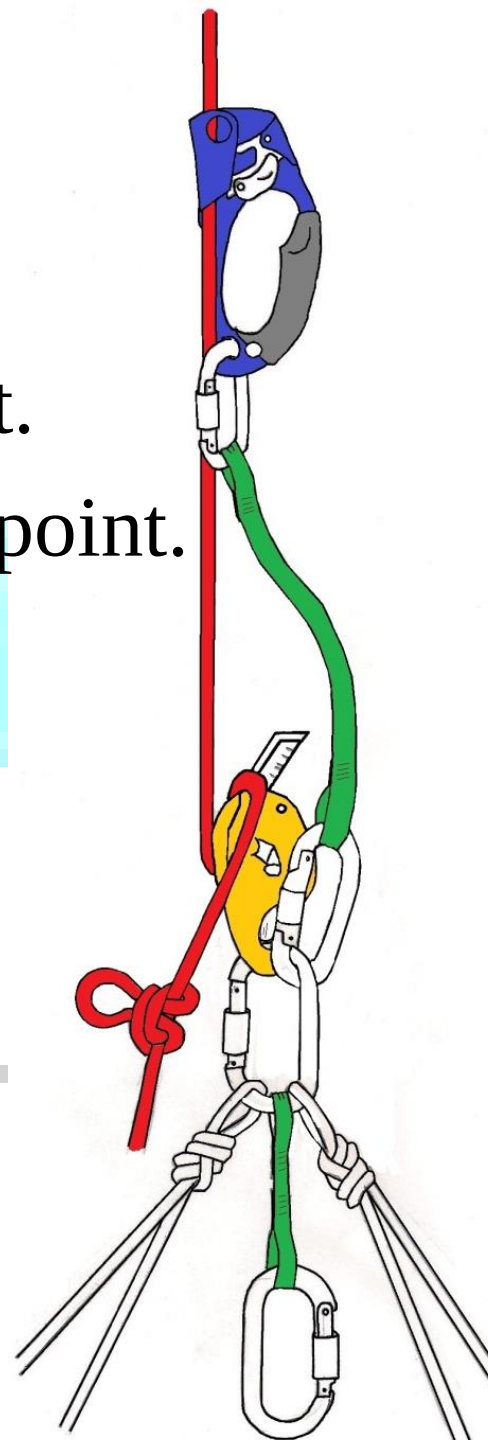
Passing knot

Step 1

Stop about half a meter above the knot.

Connecting rope grab to load transfer point.

Lifting rope grab for short-term load.



Passing knot

Step 2

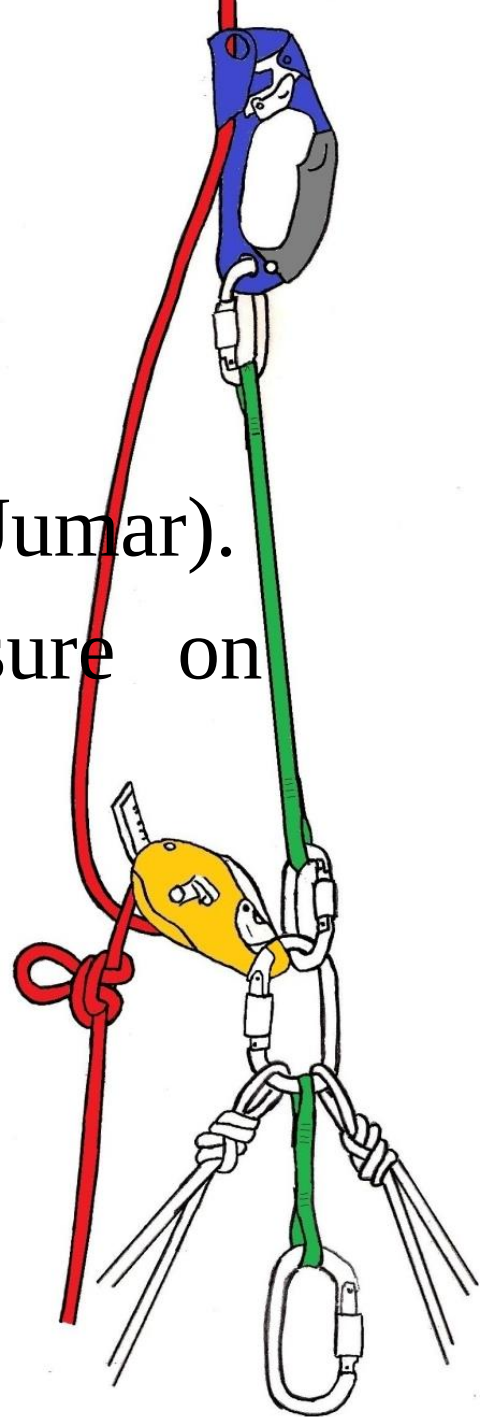
Continue rappelling.

Load controlled transfer to rope grab (Jumar).

Beware of cross, twists and pressure on
Load transfer point.

transfer descender below the knot.

Lock Check.



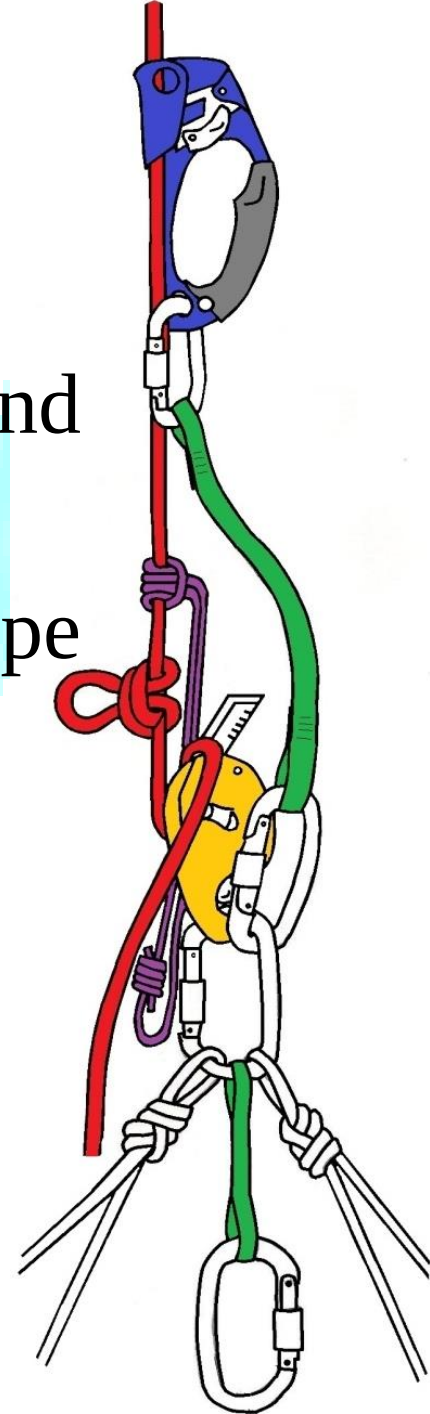
Passing knot

Step 4

Check load transfer, connection and direction of the descender

Disconnect Jumar and prosik (rope grabs).

Continue rappeling.



Traverse

Horizontal movement - Traverse.

Complex work situations require skipping between anchor points. Sometimes there are anchors, and sometimes we required to prepare them in order to progress.

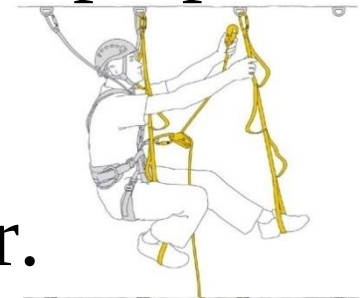
General instructions

Choosing optimized ascender/descender.

Preference of short work chair.

Preventing direct connection to
(eliminates possibility of rescue).

Ordered and controlled load transfers .



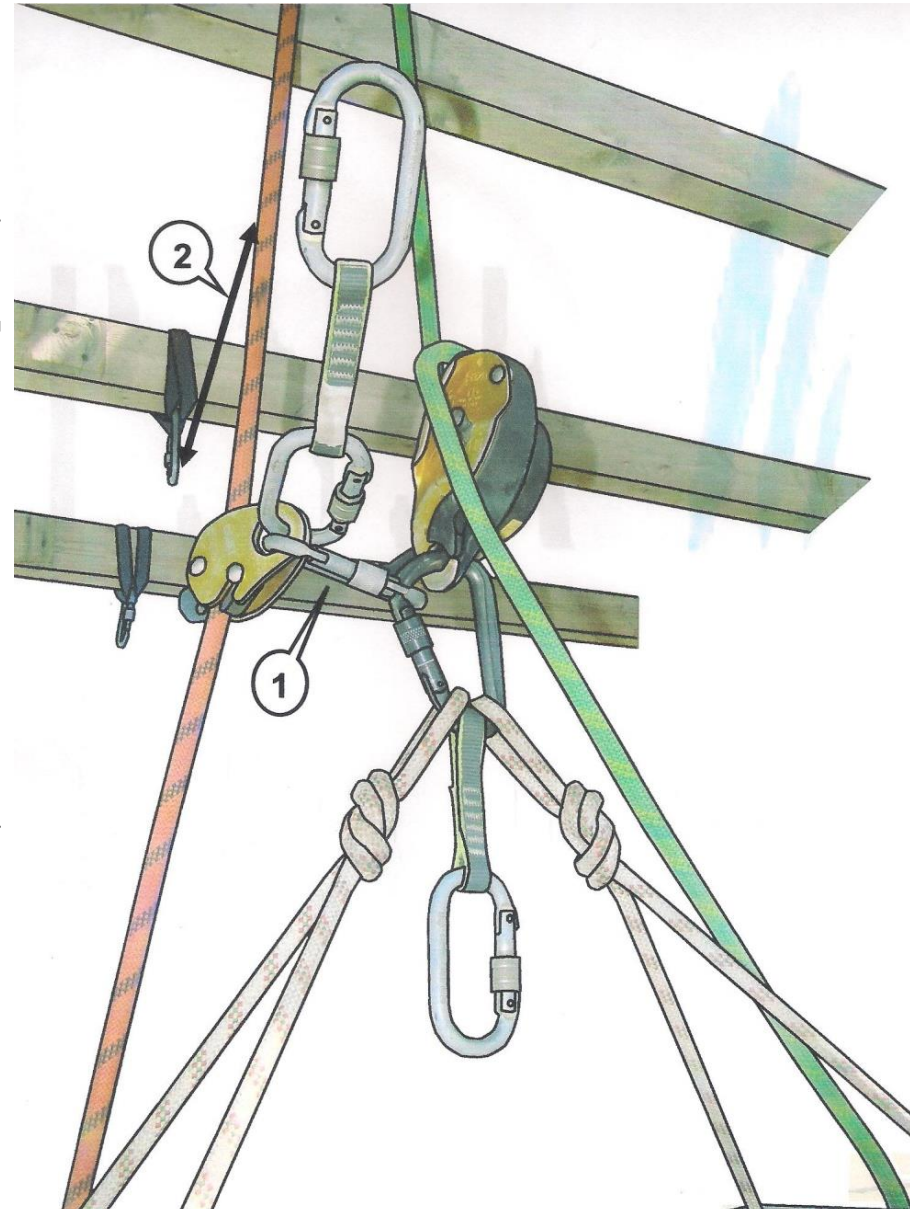
Traverse

Step 1

Connect Mouse (safety rope grab) to the chair before transfer load.

Step 2

Redirect the safety rope into progress route (new anchor).



Primary

Secondary

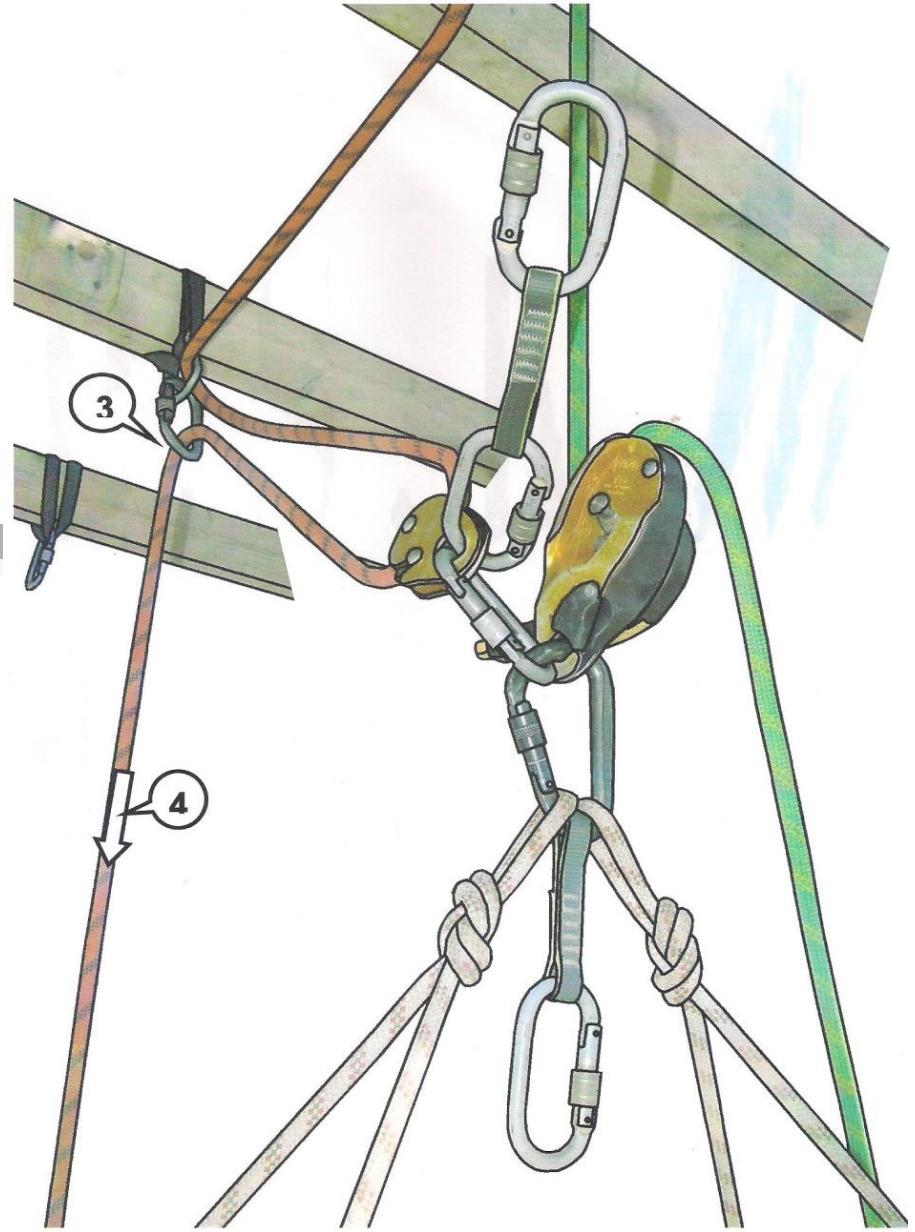
Traverse

Step 3

Create pulley system with safety rope.

Step 4

Primary load transfer by pulling safety rope.



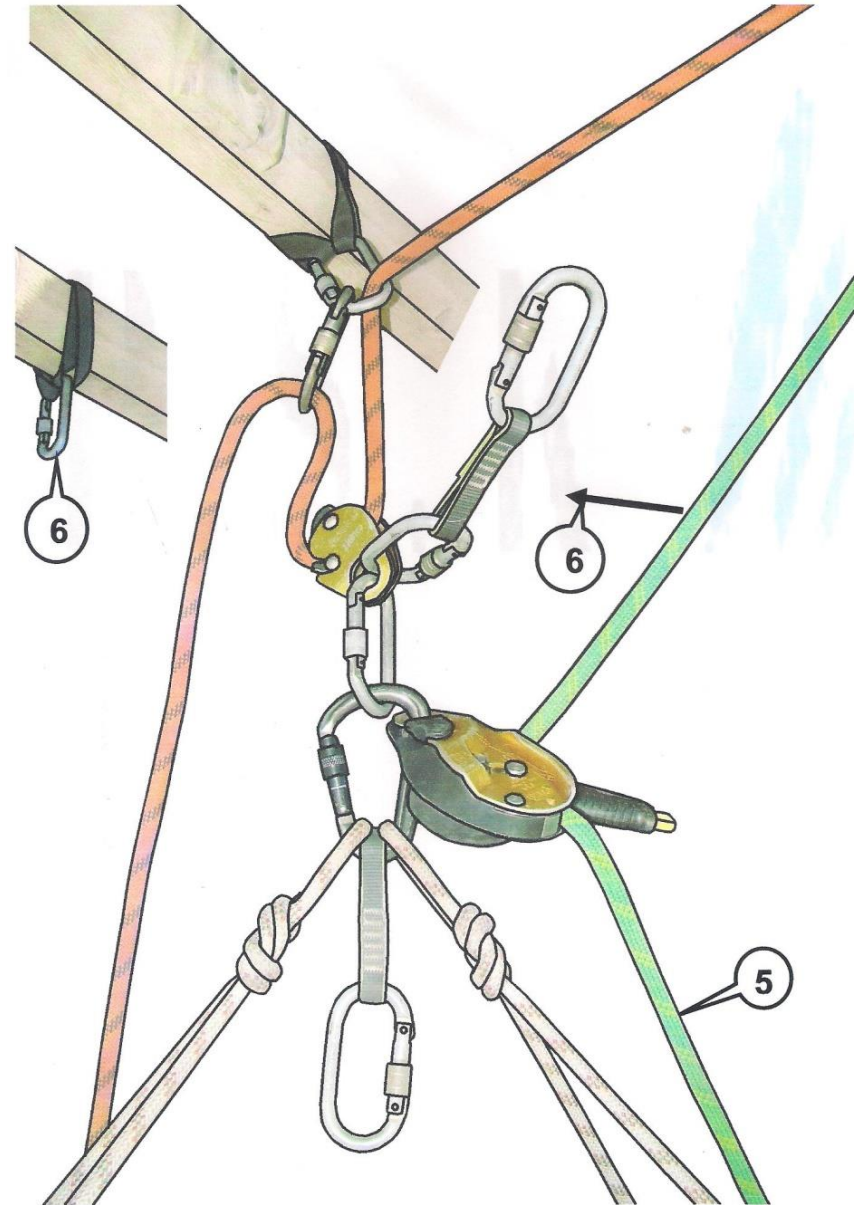
Traverse

Step 5

Descending and complete load transfer to safety mouse.

Step 6

Pulling out rope from the descender and redirect to the next anchor.



Primary

Secondary

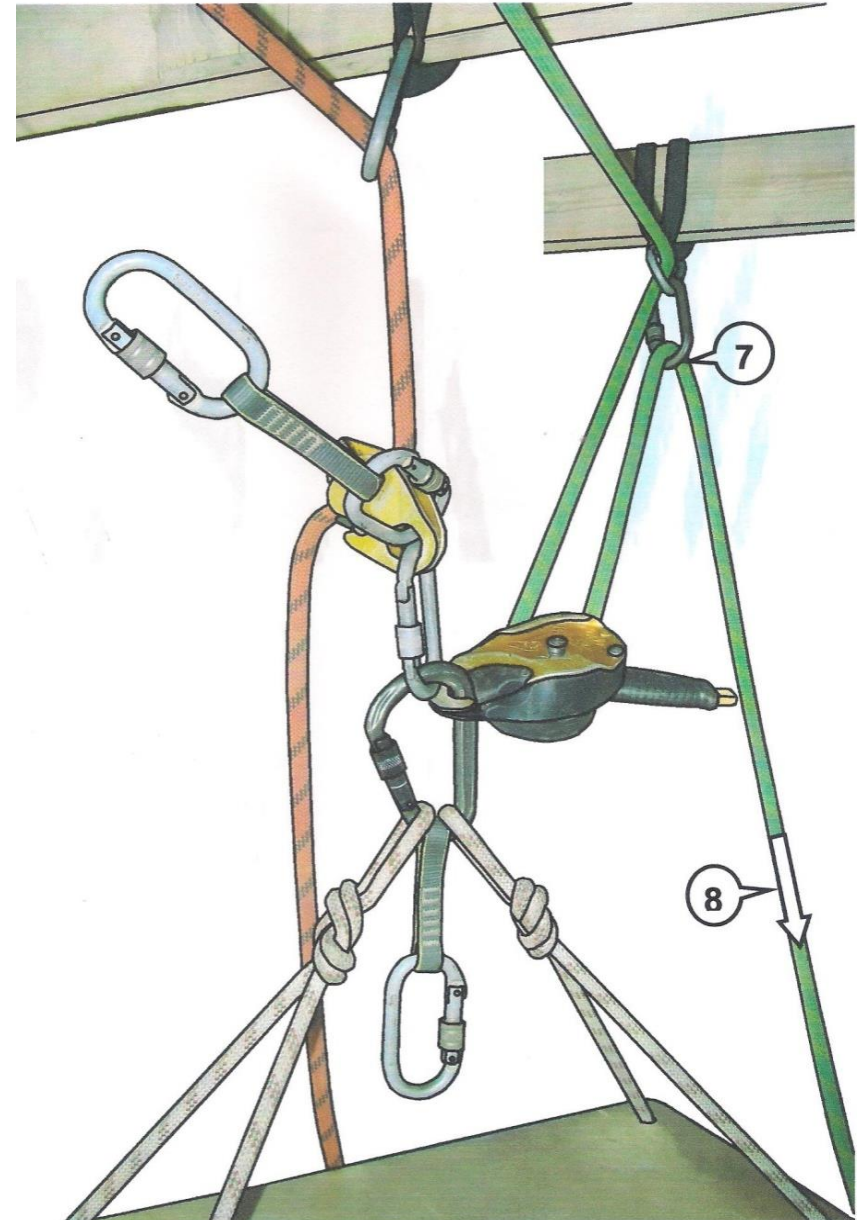
Traverse

Step 7

Create pulley system with rappelling rope

Step 8

Primary load transfer by pulling rappelling rope.



Basic rescue

General

Basic rescue exercise based on the replacement of fixed anchor points (figure eighth), into ascender.

This is a basic skill exercise which solve problems from anchor point, using a pulley system for transfers load of anchor.

For certain situations, ascender can be pre anchored.

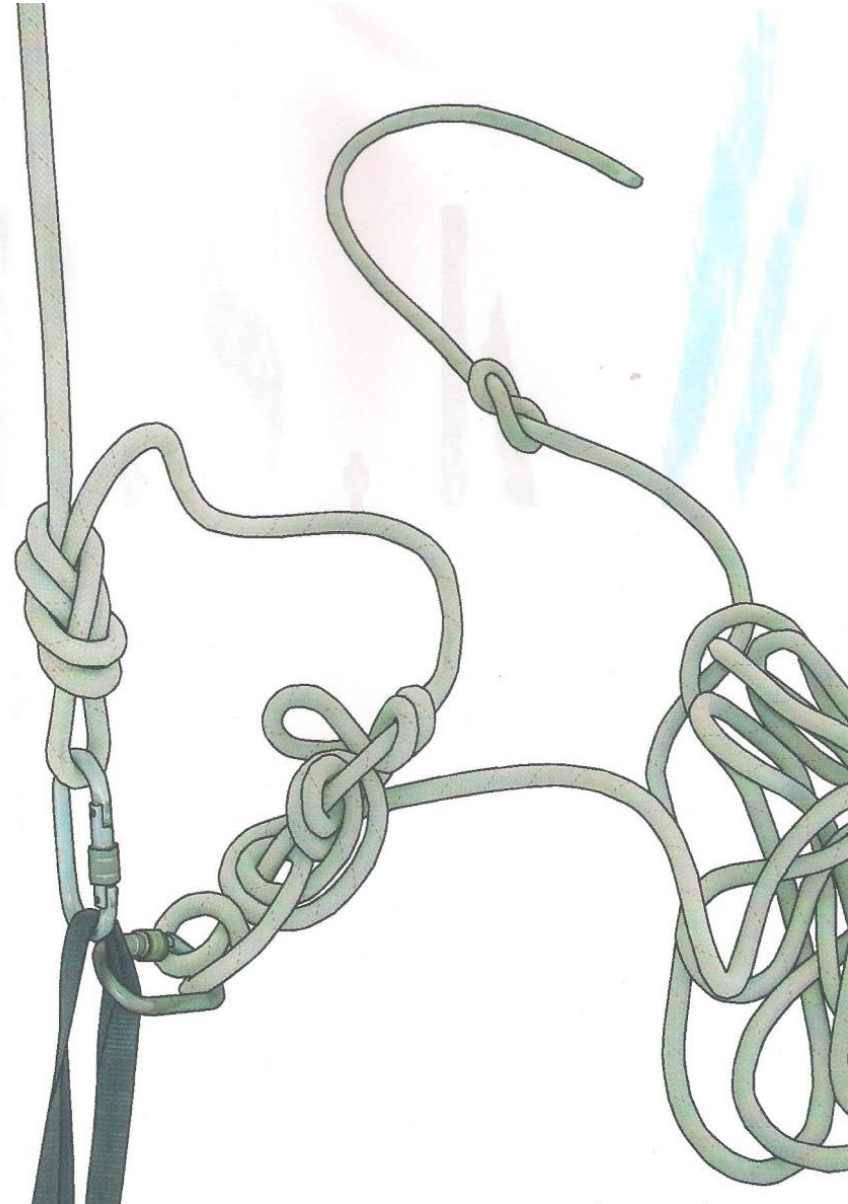


Basic rescue

Step 1

Begin work on a slack rope.

Connecting an Italian knot/ascender beyond the anchor point.



Basic rescue

Step 2

Disconnect anchor knot (figure eighth).

Opening Italian knot, and reducing back slack rope (reduction of about a meter rope).



Basic rescue

Step 3

Work on a second line (under load).

Connecting an Italian knot/ascender beyond the anchor point.

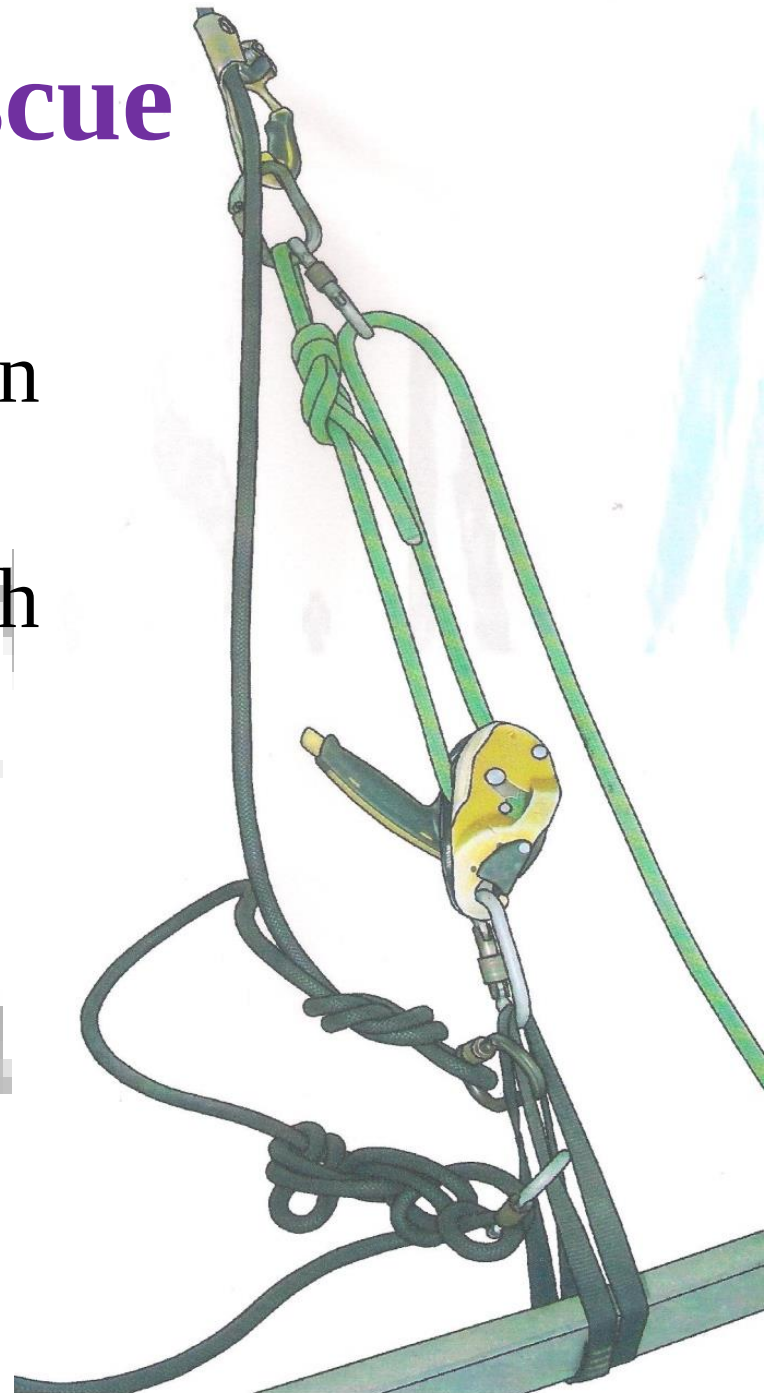


Basic rescue

Step 4

Anchor point load reduction
by using pulley system

Disconnect figure eighth
knot.

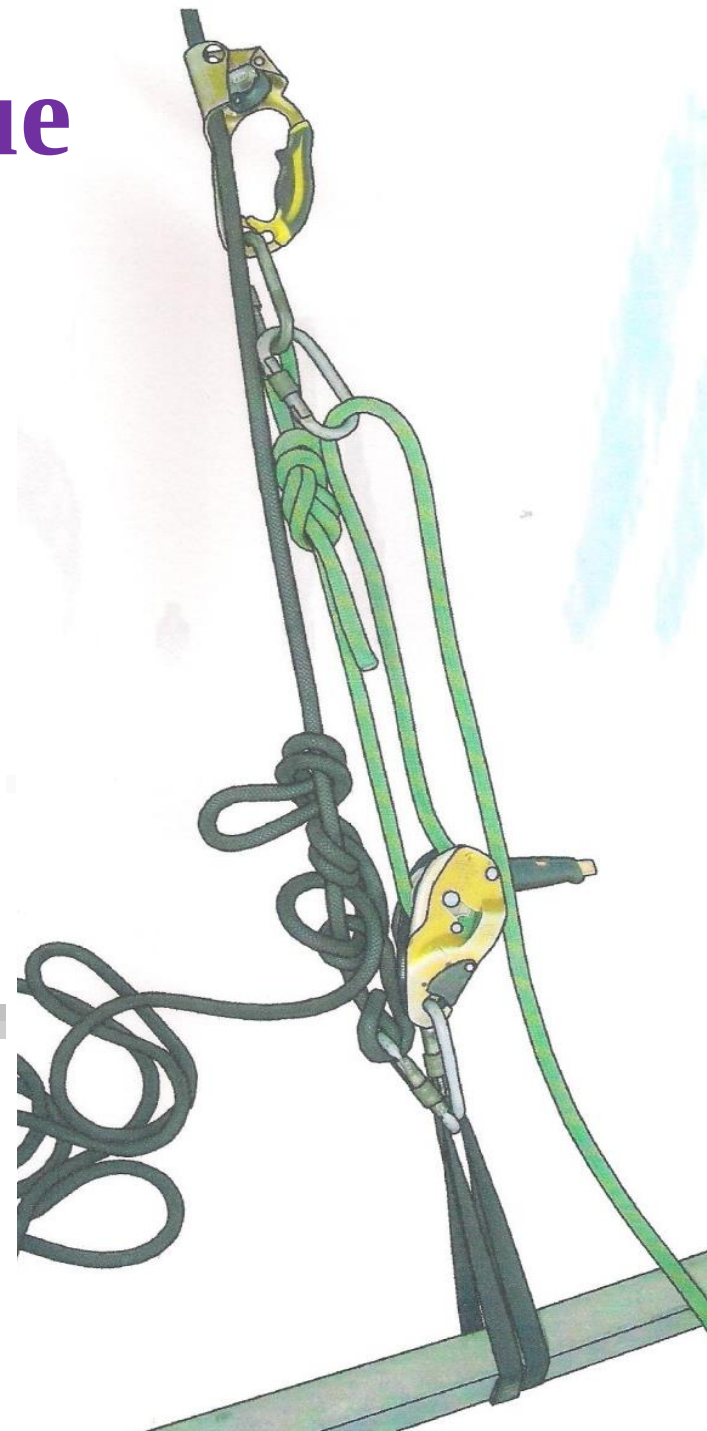


Basic rescue

Step 5

Untie figure eighth knot.

Reducing slack rope back into the Italian knot, and make sure secure lock.



Basic rescue

Step 6

Load returns to Italian knot by
Unload pulley system.

Disconnect pulley system
from the rope grab.



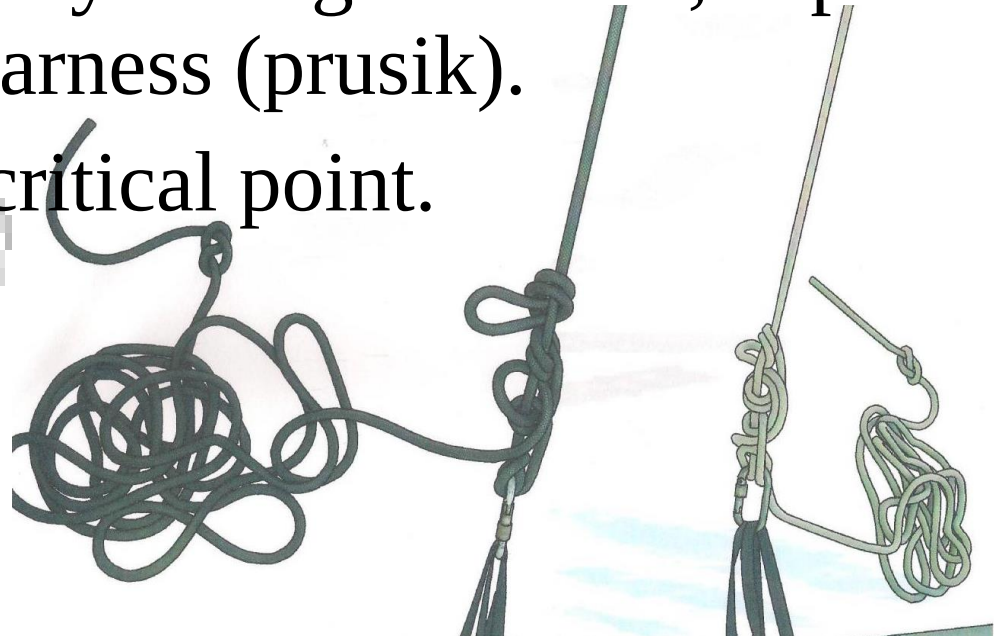
Basic rescue

Step 7

Now, when the rope access system is connected to two ascending devices, controlled downloaded can be done by two employees.

In case of a rescue by a single worker, ropes will be secured to harness (prusik).

Single rescues is a critical point.



Attache

Knots



Pulley system



rescue



R.S.K.

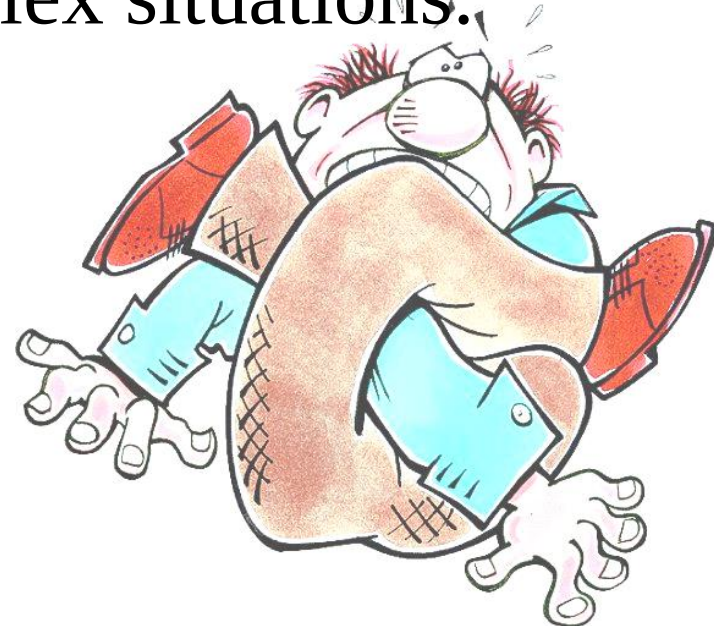
Knipe Advanced Ltd

Knots

Introduction

The presented knots use as basic which required for rope access worker.

Increased knowledge will lead to higher abilities in dealing with complex situations.



Knots

Designation :

Creating consistency / common language.
improvised knot may cause failure.

Basic rules for making knot:

- Fit into the Purpose (forces direction).
- Easy to tie/untie
- ensuring knot order ("good knot looks good").



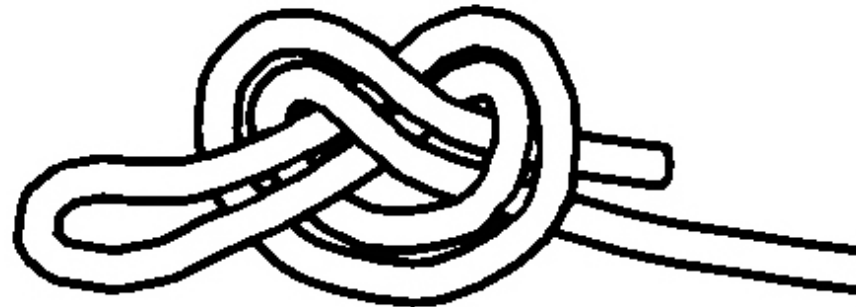
Knots

Overhand knot

Designation: Basic knot for marking end of rope / Create a loop / Secure other knots.

Rope weakness degree: 60% single rope, 45% for loop (double rope).

Practical rules: Attention to order in overhand loop.



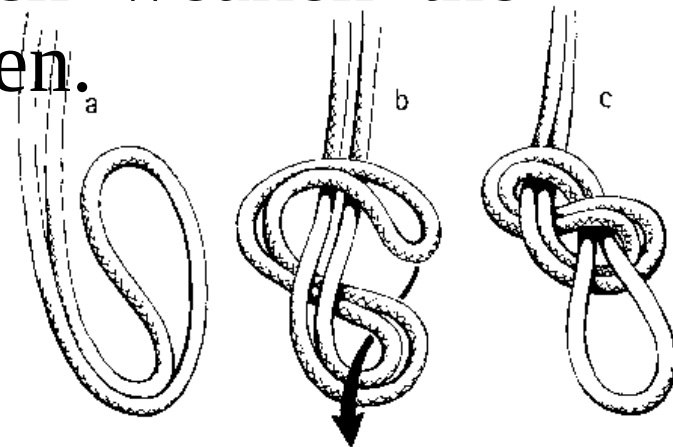
Knots

Figure eight loop

Designation: Basic anchor loop.

Rope weakness degree: About 30% in loop anchor.

Practical rules: Attention to twists/curves and crosses in the knot, which weaken the rope and make it difficult to open.



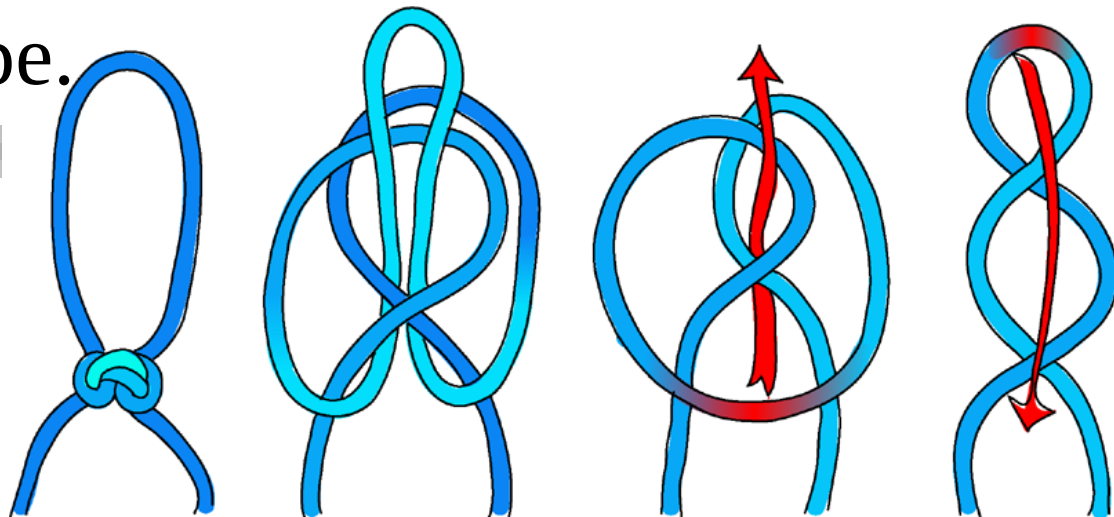
Knots

Alpine butterfly

Designation: middle rope loop which different operating directions can be load.

Rope weakness degree: about 35% in each direction of work.

Practical rules: this knot identified with mark of disqualified rope.



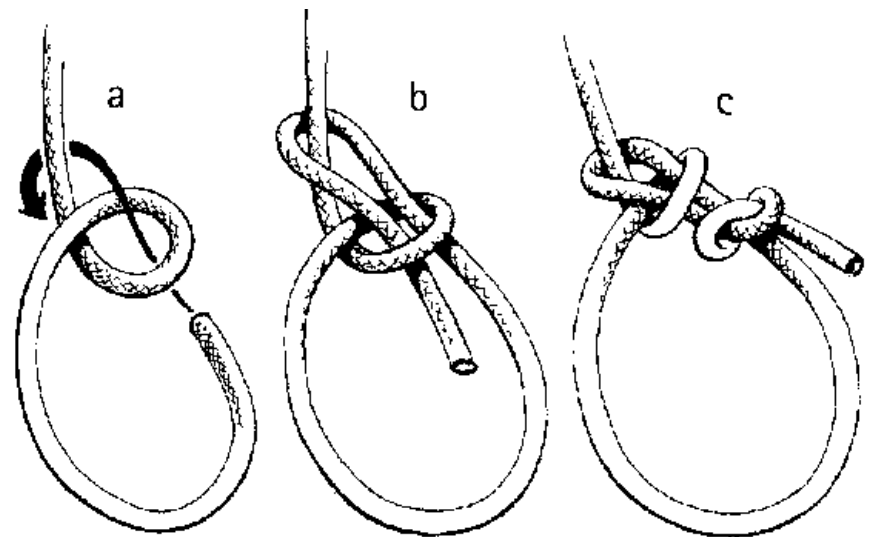
Knots

Bowline knot

Designation: Fast rope connecting around large points.

Rope weakness degree: about 30%. Knot can be opened easily even after loading Great forces.

Practical rules: must be secured with double overhand knot.



Knots

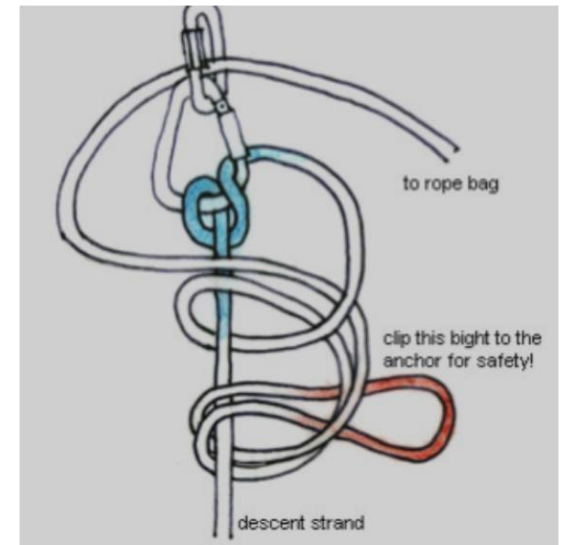
Italian knot

Designation: improvised ascender.

Practical rules: must be secured with three half lock.

Comfortable use with large/wide carabine.

Free rope (holding hand), placed on strong side of the ring (In front of the gate).



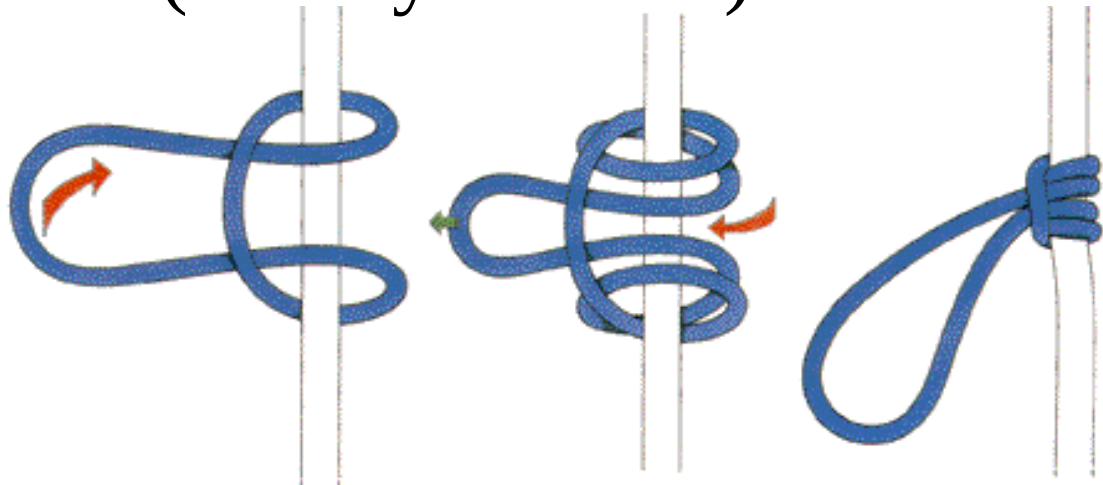
Knots

Prusik knot

Designation: Improvised rope grab.

weakness degree: depends on prusik thickness (approximately -600-750 kg).

Practical rules: match the prusik diameter to the rope which we use (usually 6-7 mm).



Pulley system

Definition

Using pulleys as mechanical advantage which gain power at the expense of distance.

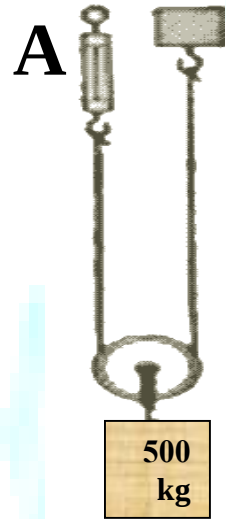
Profit ratio.

The system shows the relationship between the weight/force to be applied in relation to the original weight (1:2, 1:3, etc.), as well as this ratio shows the "price" of the distance we need to pull, meaning half weight twice distance.



Pulley system

The force principle.

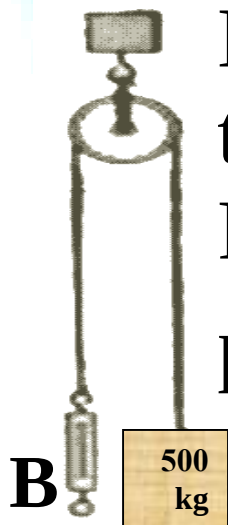


Forces above and under the pulley are equal.
 force on both sides of the pulley ropes equal.
 Point "A" forced by 250 kg (1:2).
 Point "B" forced by 500 kg (1:1).

The distance principle.

How much rope required to pull, for lifting the load a single meter

Point "A" need to be pulled two meters (1:2).
 point "B" need to be pulled one meter (1:1).



Pulley system

Rules for making pulley system.

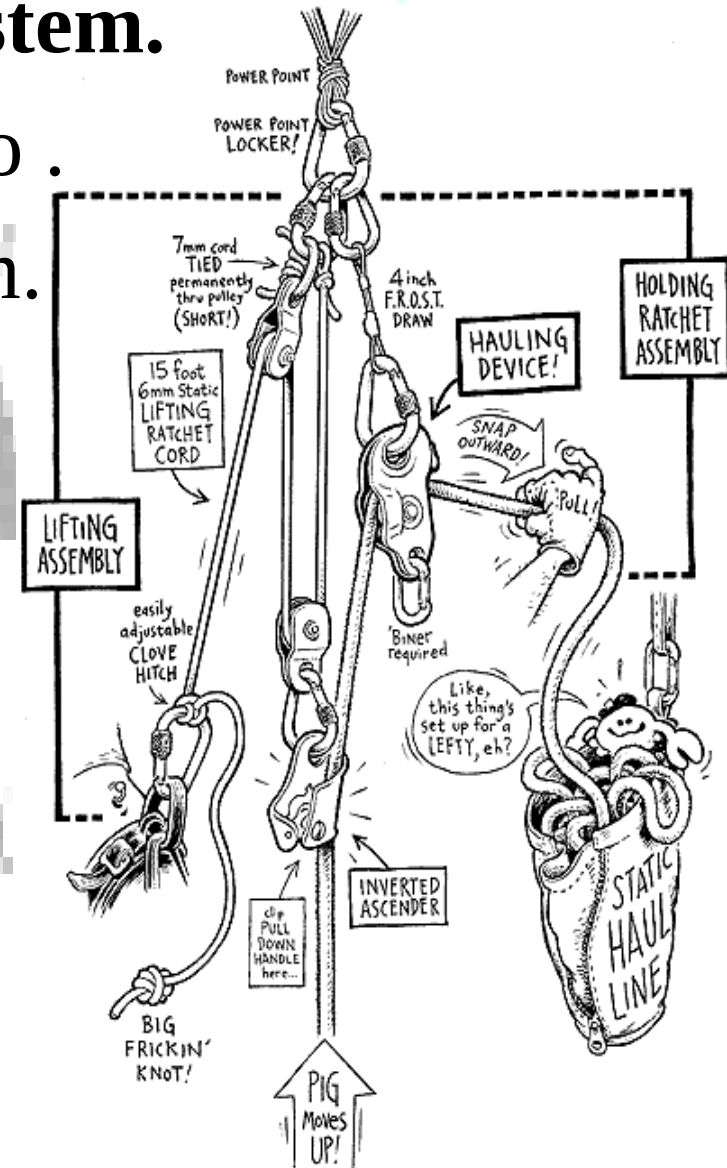
Set of an optimal system ratio .

Should aim for simple system.

defined system endpoints

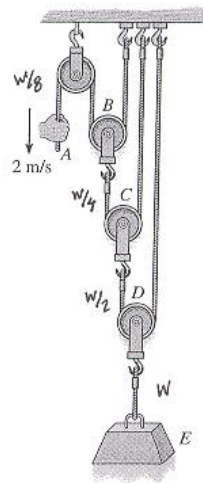
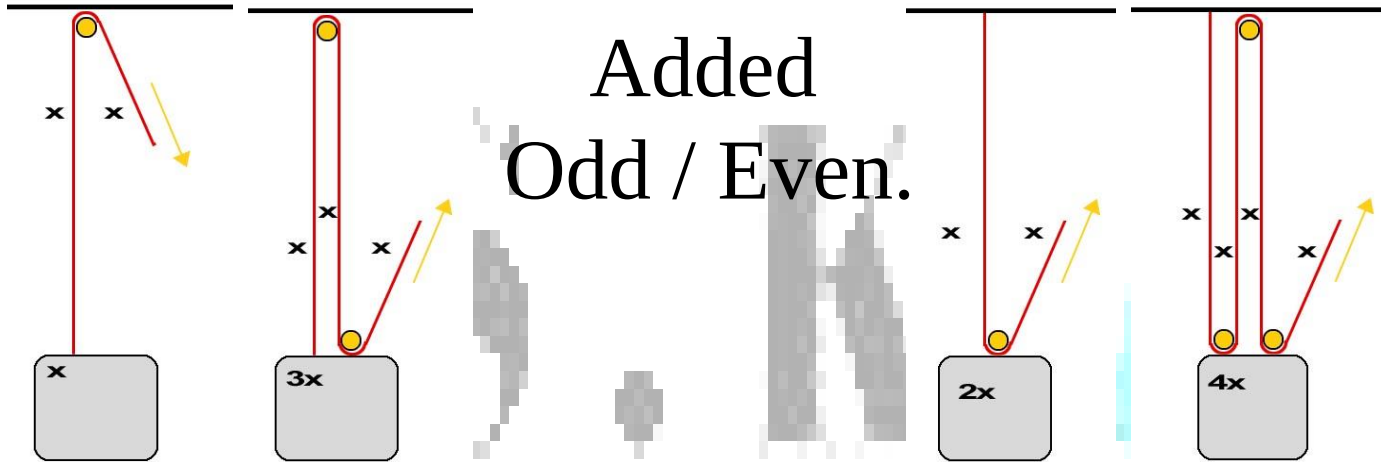
Keep order of the ropes.

Combining rope grab.

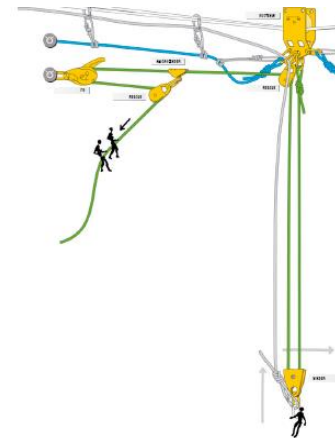


Pulley system

Types of systems.



Complex
doubles.

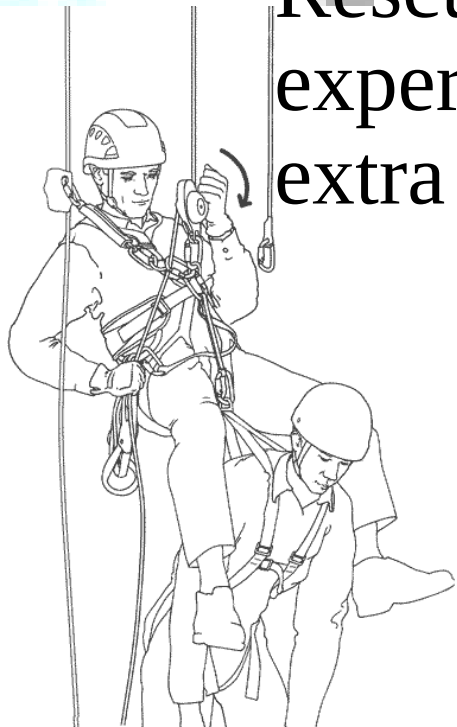


rescue

Rope access rescue.

Basic rope access devices allows rescue response. In addition, most of the forces involved in search and rescue used rope access techniques.

Rescue operation requires skill and experience which under pressure requires extra caution and judgment.



rescue

Rules and procedures.

Called for help.

Wait a minute! think and plan your course of action.

Avoid worsening the situation (injury extracted / yourself).

Do not perform any action if you do not understand and know the consequences arising from it.

Use familiar and suitable rescue equipment.

Priority for rescue operation by two people.

Out of the regulation.



rescue

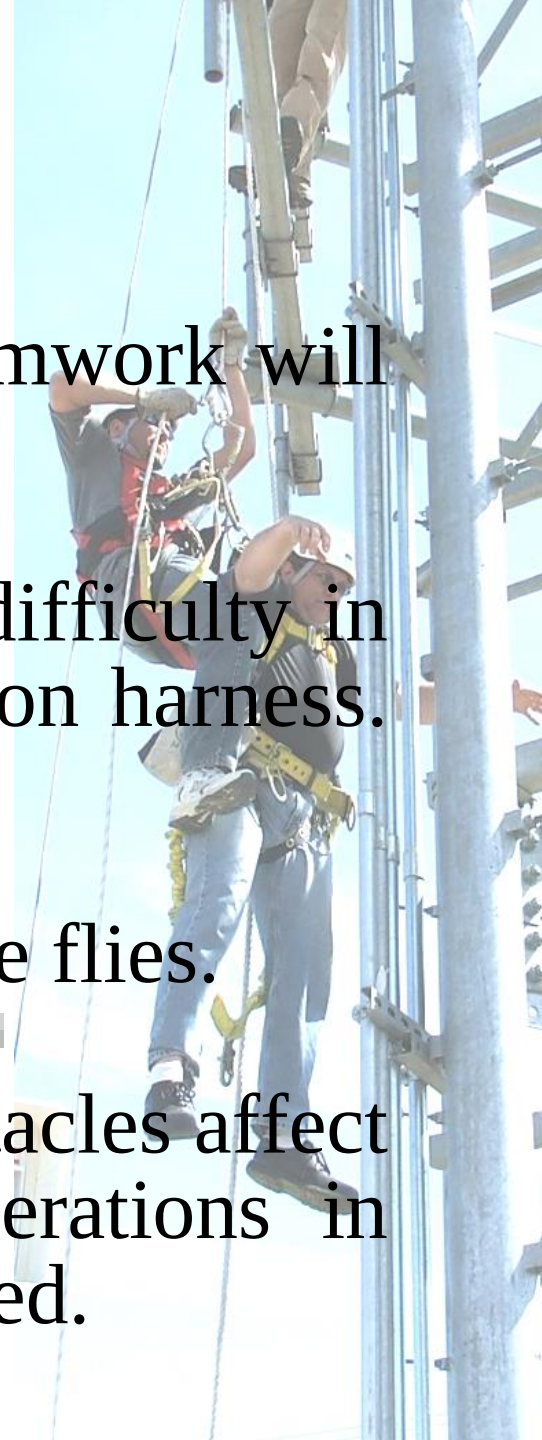
Risk assessment.

Assistance: called for help and teamwork will promote rescue operations.

Casualty situation: there is great difficulty in providing first aid to worker hang on harness. Rescue the worker to safe area.

time : Under pressure situations time flies.

Environment: height, weather, obstacles affect the rescue difficulties and considerations in choosing the course of action required.



rescue

Extraction systems.

lifting extraction system in EN-1496.

Product Definition for safe lift, while limiting the load level to prevent a possible collapse or create damage.

Download Rescue System EN-341.

Download friction device of a single / double (according to the manufacturer's instructions).

Integrated system, enables you to perform two actions to quick rescue.



rescue

Options of action

Rescue system location:

Above the worker (from anchor point).

Hanging on (rappelling with the worker).

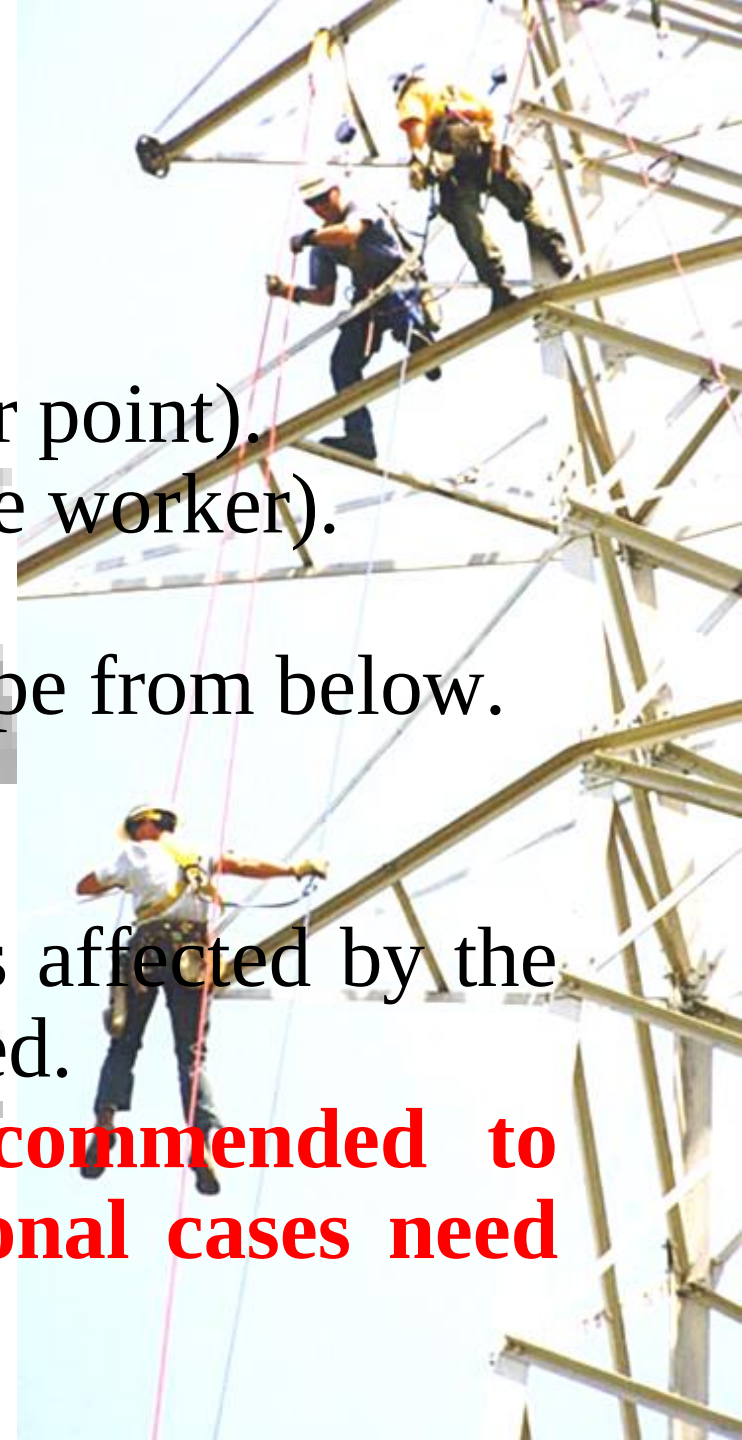
Obstacles preventing injury:

By another employee with a rope from below.

By rappelling rescuer.

Choosing the rescue method is affected by the situation/Conditions of extracted.

Note: In general, it is recommended to rescue down and in exceptional cases need to rescue up.



summary

This product is used as the basis of information, into a broad and diverse practice that brings every day new Options/solutions.

With attempt to know all the products and methods of operation, there is the most important principle of the use of personal protective equipment in case of a possible mistake