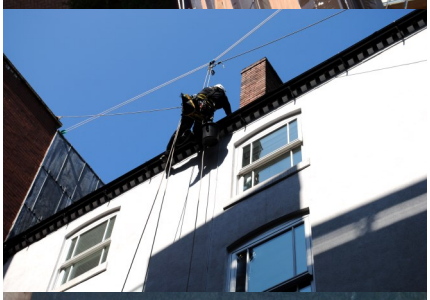
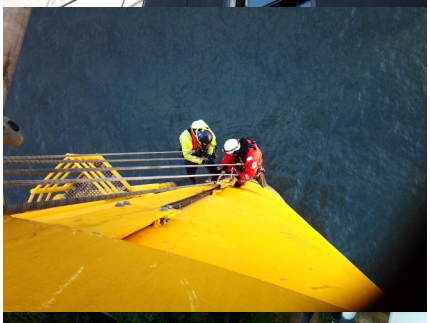
HEIGHTWORKS





Rope Access Training Manual

irata International
Industrial Rope Access Trade Association
MEMBER 8069/OT

Acknowledgments

Some text in this document has been taken directly from the following documentation:
IRATA.org
IRATA International Code of Practice
IRATA International Training and Certification Scheme
Equipment user instructions (Petzl)

All Drawings by Heightworks with help from V Rigger

Candidate Name:

IRATA Number:

Course Dates:

Location:

IRATA Instructor(s):

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ABOUT THIS MANUAL

This course manual is provided to supplement your IRATA Rope Access Course. The manual is not a substitute for training and should be used in conjunction with the following documentation:

"IRATA International Code of Practice"

"IRATA International Training, Assessment and Certification Scheme"

"Equipment user instructions"

Information for all candidates

Information for Level 2 and Level 3 candidates

Information for Level 3 candidates

PLANNING AND MANAGEMENT

IRATA INTERNATIONAL SYSTEM

IRATA is the sole global trade association in the work-at-height sector; it has member companies in every continent.

Industrial rope access has been developed by IRATA in the last 25 years to a point where it is the chosen means of access for much of the work in the offshore oil and gas industry as well as a range of projects in construction, civil engineering, the built and natural environment and much more. Its success is based on thorough training and strict work guidelines that deliver an unrivalled safe working record year after year.

IRATA International's safe system of work comprises three main elements;
a) the code of practice (ICOP);
b) the training, assessment and certification scheme (TACS);
c) audited member companies, and their operating procedures.

International Code of Practice:

The code of practice gives recommendations and guidance on the use of IRATA International rope access methods, including training, to provide a safe system of work. It is intended for use by IRATA International members, IRATA International rope access technicians, national or regional enforcement agencies, safety officers and those who commission rope access work, e.g. building contractors; multi-national oil and gas companies; the renewable energy sector. This code of practice is applicable to the use of IRATA International rope access methods for industrial purposes, i.e. for access to buildings, other structures (on or offshore) or natural features, such as cliff faces, where ropes are used as the primary means of access, egress or support and as the primary means of protection against a fall.

Training and certification scheme:

This document details the requirements of IRATA International's training, assessment and certification scheme (*the scheme*) and offers guidance to assist implementation. It provides:

- the levels of certification for new and existing IRATA International rope access technicians, and explains the training syllabuses and assessment criteria required to attain and revalidate them;
- guidance for candidates, including pre-training requirements and topics covered;
- requirements and guidance for IRATA International trainer member companies;
- requirements and guidance for IRATA International instructors;
- requirements and guidance for IRATA International assessors, including the marking process.

The scheme does not include operating procedures: these are drawn up for the specific task by operating companies following the *IRATA International code of practice*. The *ICOP* also includes more information on the applicability of IRATA International's rope access qualifications in the workplace.

Audited member companies and their operating procedures:

IRATA member companies are required to pass an IRATA audit every 3 years. This audit is carried out by an independent auditor appointed by IRATA. The audited procedures state how the IRATA member company will operate in accordance with IRATA International's requirements for quality assurance, safety, training and working practices.

Following the IRATA member companies procedures, IRATA ICOP and IRATA TACS will help to ensure that work is carried out in a safe and professional manner and that the member companies quality standards are met. Any documentation generated on-site such as toolbox talks, equipment records, daily reports and accident reports etc are essential for site safety and the companies audit.

Under the IRATA ICOP 2.6.1.2, only Level 3 rope access technicians are permitted to be rope access safety supervisors. For more information concerning Supervision see IRATA ICOP 2.6.

IRATA International qualifications and requirements are laid out in IRATA TACS Section 3,4,and 5. All technicians shall show awareness of the levels of technician competence, and the requirements for revalidation and progression between levels.

LEGAL FRAMEWORK

In the UK all work is governed by the **Health And Safety At Work Act 1974**, this act places general duties on employers, clients, contractors, owners, employees and the self-employed.

The Health and Safety Executive (HSE) is the body responsible for the encouragement, regulation and enforcement of workplace health, safety and welfare, and for research into occupational risks in England and Wales and Scotland.

The HSE are also responsible for the production of the following documents:

Regulations
Regulations are law, approved by an act of parliament or European directive.
A breach of the regulations by either an individual or a corporation is a crime in the UK which carries a fine of up to £20,000.

Approved codes of practice (ACOP)
Offer practical examples of good practice .
Have special legal status, if employers are prosecuted for a breach of health and safety law, and it is proved that they have not followed the relevant provisions of the ACOP, a court can find them at fault unless they can show that they have complied with the law in some other way.

Guidance

The main purposes of guidance are:
Help people understand what the law says
To help people comply with the law
To give technical advice

Following guidance is not compulsory and employers are free to take other action. But if they do follow guidance they will normally be doing enough to comply with the law.

The IRATA ICOP is a voluntary code of practice and as such compliance is not a legal requirement under UK law. *However, it is mandatory for members of IRATA International to comply with the principles of the code of practice and this is a condition of their membership.*

LEGISLATION

WORK AT HEIGHT REGULATIONS 2005

In the regulations arrangements 2.(1). 'Work at Height' is defined as:

'Work in any place from where, if measures required by these regulations were not taken, a person could fall a distance liable to cause personal injury.

This means:
There is no minimum height requirement for work at height. Work at Height includes all work activities where there is a need to control the risk of falling any distance liable to cause personal injury, regardless of work task and duration. This includes getting to and returning from the place of work.

Hierarchy of measures

Avoid - working at height if at all possible

Prevent - falls from height by utilising:-

Collective measure -Safe Work Platforms/Mobile Elevated Work Platforms/Scaffolds
Personal measure - Work Restraint/ Work Positioning/Work Suspension

Minimise - the consequences of falls by utilising:-

Collective measures - Airbags/ Safety Nets
Personal measures - Fall Arrest Equipment

Collective measures always take precedence over personal measures.
Planning work at height must also include planning for rescue/emergencies.

LIFTING OPERATIONS AND LIFTING EQUIPMENT REGULATIONS 1998

LOLER applies to rope access because the term 'load' used in LOLER includes the lifting or lowering of a person.

3 main aims of LOLER:

Lifting operations are properly planned and managed.
Lifting equipment is used in a safe manner.
Lifting equipment is thoroughly inspected at suitable intervals by a competent person.

Types of inspection under LOLER
- Pre-use
- 6 monthly
- Interim inspection

LEGISLATION

PERSONAL PROTECTIVE EQUIPMENT REGULATIONS 1992

Employers provide suitable and sufficient PPE
Employers provide training and information-sample of equipment instructions
PPE is inspected, maintained and stored correctly
Employees use, not interfere and report defects or deficiencies in its use

Category 1: Simple: (e.g. Gloves)
Category 2: Intermediate: (e.g. Boots, Helmets)
Category 3: Complex: e.g. Protection against mortal danger

Most rope access equipment is Cat 3 PPE. Cat 3 PPE must have CE mark and EN Number.

PROVISION AND USE OF WORK EQUIPMENT REGULATIONS 1998

Any equipment which is used by an employee at work is covered under the regulations.
Employers must ensure that work equipment is:
Suitable – for use and for the purpose and conditions in which it is to be used
Maintained – in a safe condition for use
Inspected- to ensure that it is safe for use

Employers must also ensure that any risks created by the use of the equipment are eliminated/ controlled by:
Hardware measures – providing suitable guards, protection devices, stop buttons etc.
Software measures – following safe systems of work, providing information and training etc.

REPORTING of INJURIES, DIESEASES and DANGEROUS OCCOURANCES REGULATIONS 1995

The following must be reported:
A death or major injury
An 'over 7 day' injury
A work related disease
A dangerous occurrence

CONTROL OF SUBTANCES HAZARDOUS TO HEALTH 2002

The COSHH regulations require employers to assess the risk to their employees, and to prevent or adequately control those risks.

Part 15: Tells you what the dangers are.
Part 4- 8 : Tells you about emergencies, storage and handling.

8 steps to COSHH assessment:

Work out what hazardous substances are used in your work place and find out the risks from using these substances to people's health.

Decide what precautions are needed before starting work with hazardous substances.

Prevent people being exposed to hazardous substances, but where this is not reasonably practicable, control the exposure.

Make sure control measures are used and maintained properly and that safety procedures are followed.

If required, monitor exposure of employees to hazardous substances.

Carry out health surveillance where your assessment has shown that this is necessary or COSHH makes specific requirements.

If required, prepare plans and procedures to deal with accidents, incidents and emergencies.

Make sure employees are properly informed, trained and supervised.

MANAGEMENT OF HEALTH AND SAFETY AT WORK REGULATIONS 1999

Any high risk job must have a risk assessment carried out by a competent person (work at height is a high risk job) - A competent person is someone deemed by the company to be suitably trained and experienced.

RISK ASSESMENT AND METHOD STATEMENT

Risk Assessment

A risk assessment is a careful, systematic examination of the hazards in the workplace that could cause harm to people or damage to equipment or property.

When undertaking a risk assessment it is important to balance hazard vs. risk.

A hazard is something that has the potential to cause harm/ damage to a person or property.

A risk is the likelihood of that harm/damage actually occurring.

The HSE produce a simple guide to risk assessment:

5 steps to risk assessment-

1. Identify the hazards
2. Decide who might be harmed and how
3. Evaluate the risks and decide on precautions
4. Record your findings and implement them
5. Review your assessment and update if necessary

For further information and sample risk assessments see IRATA ICOP Annex A and part 2.2.4.

Method statement

Method statement should set out working procedures to be followed for each stage of the job and are an effective way of producing a safe system of work. All method statements must include a rescue plan.

See IRATA ICOP annex N- recommended list of information to be held onsite.

Risk Assessments and Method Statements are essential for communicating safe work practices and must be read and understood by all persons involved with the work.

For further information on the contents of a method statement see IRATA ICOP Annex B and 2.2.5.

Further Information

Further information about legislation applicable to the UK can be found in IRATA ICOP Part 4.

SELECTION OF ACCESS METHOD

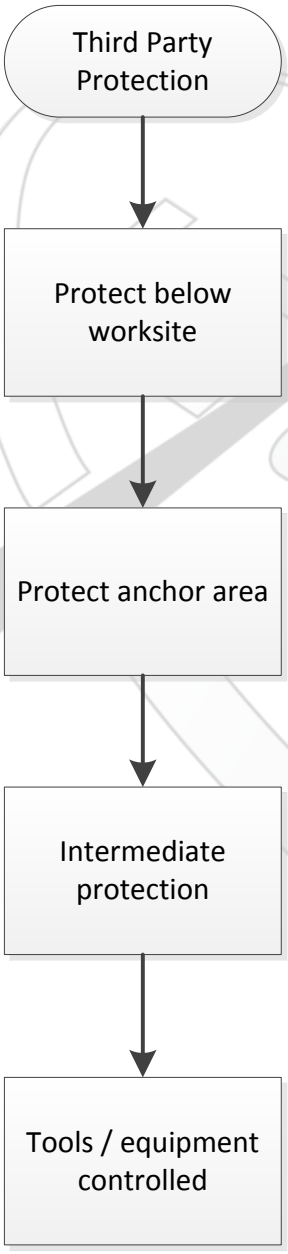
When deciding that rope access is a suitable access method for the work to be carried out, reference to the hierarchy of control measures taken from the Work At Height Regs 2005 should be made.

For further information on assessing rope access as a suitable work method see IRATA ICOP 2.2.3

SELECTION OF PERSONNEL AND COMPETENCE

IRATA ICOP 2.3 and 2.4 gives guidance on the selection of rope access technicians.

EXCLUSION ZONES AND PROTECTION OF THIRD PARTIES



Exclusion zones may need to be set up above, below or around rope access operations to protect people from exposed edges, dropped objects or protect the anchor system.

The site supervisor will Identify the exclusion area below the worksite, set up any barriers or signage as required. Ensure consideration is made for doorways access routes (emergency exits)

Set up protection for the anchor area. Consider protection of third parties from any hazard created by the worksite and any risk of third parties either accidently or purposefully effecting the rigged equipment.

Any areas during the work where third parties may be effected (balconies-, walkways, sub roofs etc) - will be controlled as required.
Set up any debris netting where necessary .

All small tools and equipment will be attached to the harness via a lanyard and /or a suitable tool bag / bucket will be used to minimise the risk of dropped objects.
Large tools >8kg will be attached to a separate safety line .

Further information about exclusion zones can be found in IRATA ICOP 2.11.8

PLANNING FOR EMERGENCIES AND FIRST AID

Arrangements for emergencies and first aid must be made during the planning stage of any rope access operation. Full details of these arrangements must be included as part of the risk assessment / method statement.

It is the responsibility of the IRATA Level 3 to take ownership of the rescue plan, communicate the emergency arrangements to the work team, implement any 'pre rigged' or 'rig for rescue' system and ensure its effectiveness throughout the work task.

Elements of the rescue plan include:

- Designated anchor points;
- Required equipment;
- Team size, competence, supervision and communication;
- Step-by-step procedure for rescue;
- First aid provision;
- Contingency plan covering possible complications.

First aid equipment and the level of training required must be adequate and appropriate for the environment the work team is operating in.

If working in remote locations the need for a more comprehensive first aid kit and advanced training maybe required, it maybe advantages to make special arrangements with the local emergency services and inform them of your location.

SUSPENSION INTOLERANCE

Also Called:
Suspension Trauma, Suspension Syncope,
Orthostatic Intolerance,
Harness-induced Pathology.

The following information is taken from IRATA ICOP Annex G.

WARNING! The advice given in this annex is known best practice at the time of publication. It is essential that persons responsible for rescue plans and rescues keep themselves fully up to date with current practices.

Suspension intolerance is a condition in which a suspended person, e.g. In a harness, can experience certain unpleasant symptoms, which can lead to unconsciousness and eventually death. The reason for this is that the body is not tolerant of being in an upright position and motionless at the same time. Persons likely to be affected are those who are suspended in a generally upright position and who are motionless, for example, when seriously injured or unconscious, or when fastened vertically in a stretcher.

The condition been suspected in cases of mountain climbers who fell and were suspended for up to several hours. Some of these climbers died after rescue up to eleven days after their fall, for reasons that have been postulated by medical professionals as being due to suspension intolerance. There have also been instances of cave explorers becoming stuck on their ropes and who have died either while still on them or not long after being rescued. The reason for some of these deaths was again attributed to suspension intolerance. Some of the symptoms have been experienced by rescuees feigning unconsciousness in rescue training scenarios. The condition has been produced under experimental circumstances in persons who were suspended in a harness in a generally upright position and who were motionless. In these clinical trials, where the test subjects were told not to move, most experienced many of the effects of suspension intolerance, some including loss of consciousness, in just a few minutes. Others managed for longer before reporting symptoms. A similar situation might arise in a worker who falls into suspension and is not moving, e.g. due to being exhausted, badly injured or unconscious.

SUSPENSION INTOLERANCE

Muscular action in moving the legs normally assists the return against gravity of blood in the veins back to the heart. When the body is motionless, these “muscle pumps” do not operate and if the person is in an upright position, an excess of blood pools in the veins of the legs, which are capable of a large expansion and, therefore, have considerable capacity. The excess of blood in the veins is known as venous pooling. The retention of blood in the venous system reduces the circulating blood volume and causes a disturbance of the circulatory system. This can lead to a critical reduction of blood supply to the brain and symptoms which include a feeling by the person that they are about to faint, nausea, breathlessness, disrupted vision, paleness, giddiness, localized pain, numbness, hot flushes, initially an increase in pulse and blood pressure and then a decrease in blood pressure below normal. The symptoms are known as pre-syncope and, if the condition is allowed to develop unchecked, can lead to unconsciousness (fainting) — when it is known as syncope — and eventually death. It is possible that other organs critically dependent on a good blood supply, such as the kidneys, could also suffer damage, with potentially serious consequences. It seems that even the fittest person may not be immune to the effects of suspension intolerance.

Normal movement of the legs (e.g. When ascending, descending or working while suspended) will activate the muscles, which should minimize the risk of excessive venous pooling and the onset of pre-syncope. It is recommended that harness leg-loops are wide and well-padded, as this should help to spread the load and reduce possible restrictions to blood-flow through the arteries and veins in the legs. The use of a work seat should be considered if one position is expected to be sustained for an extended period.

Although there is little evidence of the effects of suspension intolerance occurring in the industrial rope access environment, an effective rescue plan is essential to ensure that, following an incident, a casualty can be removed quickly from the suspended position and cared for in a proper manner. The longer the casualty is suspended without moving, the greater the chances there are of the effects of suspension intolerance developing and the more serious it is likely to be.

A person suspended motionless in a harness awaiting rescue is likely to tolerate suspension with the knees elevated. During rescue, elevation of the legs and movement of them by the casualty or assisted by the rescuer, where safely possible, may helpful. The casualty should be removed from suspension as soon as possible. This is particularly important for a casualty who is motionless.

Rope access personnel should be able to recognise the symptoms of suspension pre -syncope.
Motionless head-up suspension can lead to pre-syncope and sometimes syncope in most normal subjects within 1 hour and to 20% of subjects within 10 minutes. Syncope can follow thereafter at an unpredictable time.

During and after rescue, standard first aid guidance should be followed, with an emphasis on airway, breathing and circulation management (ABC). Assessment of any injuries should include those which may not be apparent, e.g. Damage to the neck, back and vital organs.

In accordance with the advice given in a literature research and assessment carried out by the UK Health and Safety Laboratory (HSL) in 2008 (HSE/RR708 Evidence based review of the current guidance on first aid measures for suspension trauma), the fully conscious casualty may be laid down and the semi-conscious or unconscious casualty placed in the recovery position (also known as the open airway position). This differs from earlier advice.

All casualties who have been suspended motionless in a harness should be taken to hospital immediately for further professional medical care and observation. Medical personnel should be advised that the casualty maybe suffering from the effects of suspension intolerance.

Those preparing rescue plans should regularly review current best practice.

ROPE ACCESS EQUIPMENT

Overview

This section aims to provide you with a thorough knowledge of the equipment commonly used in rope access.

Selection

Rope access equipment should be chosen based on an assessment of:

- Suitability of the equipment for the intended task and intended work environment
- Intended purpose as specified by the manufacturer
- The likelihood and consequences of misuse of the equipment– including known incidents
- Competence of the end user
- Compatibility with existing equipment
- Conformance with relevant standards

PPE

There are three categories of PPE according to its level of complexity and the level of hazard against which it protects:
Category 1—Simple (Protect against minor irritations or abrasions)
Category 2—Intermediate (Helmets, Protective footwear)
Category 3—Complex (Protect against mortal danger)

Most rope access suspension equipment and fall arrest equipment is Cat 3 PPE.

EN Standards and CE Marking

All PPE used in industrial rope access must meet the required standards for use in the country they are to be used in. Within the European Union a CE mark on a product indicates that the item has been type tested and meets a minimum standard. The EN number marked on an item indicates the relevant standard the item has been tested against. Both the EN and CE marks are not intended to be an indication of the quality of an item of equipment.

Equipment traceability

All equipment, when used in industrial rope access must be traceable to inspection records and certificates of conformity. Normally this is achieved by unique ID numbers on the equipment, whatever method is used to identify equipment it is important we do not alter, damage or affect the performance of the equipment.

Care and Maintenance

Consult the manufacturers recommendations on how best to care for and maintain your equipment.

Storage

Equipment should be stored in a secure area where access is restricted to necessary competent personnel only. Equipment should be stored in line with manufacturers recommendation, normally a cool , dry area away from direct sunlight. Care should be taken to ensure that there are no potential causes of damage to stored equipment, e.g., chemicals, sharp edges, heat etc.

Lifespan

All rope access equipment has a life span, consult the manufacturers recommendations for the item of equipment in question. In extreme cases the life of a piece of equipment may be as short as its first use due to the environment that it is subjected to or any damage or degradation that may have occurred.

EQUIPMENT STRENGTH

BL: Breaking Load: The maximum load that can be applied to an item of equipment before it breaks.

WLL: Working Load Limit: The maximum load, as determined by the manufacturer that an item of equipment is designed to raise, lower or suspend.

SWL: Safe Working Load: The maximum load, as determined by a competent person that an item of equipment is designed to raise, lower or suspend under particular conditions.

It is normally recognised that the safe working load is 1 person or 2 people in an emergency. For a more accurate calculation the below formula should be used.

Factor of Safety:

Metal Items: 5:1 $SWL = \frac{BL}{FOS}$

Textile Items: 10:1

E.g.

Low Stretch Rope

BL=3000kg SWL=$\frac{3000}{10}$ = 300kg

Steel Karabiner

BL=2500kg SWL=$\frac{2500}{5}$= 500kg

Textile items have a higher Factor of Safety as they are more susceptible to wear, heat and chemical damage knotted ropes are also up to 50% weaker depending upon which knot is used.

Never exceed the SWL of the weakest item of equipment in the rope access system.

INSPECTION

There are 3 types of inspection to which all rope access equipment should be subjected to. These are the pre-use check, the thorough examination and in certain circumstances an interim inspection.

Pre-use Check- carried out by the user of the equipment and consists of a visual, tactile and functional check. The results of a pre-use check are not normally recorded.

Thorough examination– carried out by company appointed competent person before equipment is used for the first time and then at 6 monthly intervals. The results of a thorough examination should be recorded.

Interim inspection– where equipment is used in arduous conditions or exceptional circumstances are liable to jeopardize safety, interim inspections can be carried out by a competent person in addition to the pre-use check and the thorough examination. Interim inspections should be recorded.

Further information regarding equipment inspection can be found in the manufacturers information that should be supplied with the item, and the IRATA ICOP:
Annex H- Equipment inspection checklists,
Annex I– List of information to be recorded following a detailed inspection of rope access equipment,
Annex J– Resistance to chemicals and other properties of some of the man-made fibres used in the manufacture of rope access equipment.

ROPE ACCESS EQUIPMENT SETUP


HELMETS

Helmets should be chosen that conform to a style more appropriate to rope access applications than those of a standard industrial helmet.

The helmet should provide resistance to side impacts as well as from above. It should have a fully adjustable cradle for comfort and a chinstrap to prevent accidental loss. Helmets without a peak will prove beneficial when working in a vertical environment, in that vision will not be obscured whilst looking up.

What is it called?
Helmet.
Primary Function?
Protect the head.
Secondary Function?
May allow the attachment of additional PPE, lights, ear defenders, visors etc.
Correct Use
Do:
Ensure the helmet is traceable to relevant inspection records/certificates of conformity.
Ensure the helmet is inspected before each use.
Wear the helmet the correct way around.
Ensure the helmet is correctly fitted and adjusted to fit.
Check that paint and stickers will not alter the physical properties of your helmet over time.
Protect your helmet from exposure to chemicals and solvents.

Don't:
Sit or stand on it.
Pack it to tightly.
Drop it.
Allow it to impact sharp or pointed objects.
Expose your helmet to high temperatures.

Strength:
Not applicable

Conformity:
EN 397: Specification for industrial safety helmets.
EN 14052: High performance industrial helmets.
EN 12492: Mountaineering equipment– Helmets for mountaineers– Safety requirements and test methods.

Additional Information:
Manufacturers user instructions
IRATA ICOP section 2.7.12

HARNESSES

Work positioning harnesses for rope access work may be a sit harness or full body harness, depending on the nature of the work being carried out. If the harness is to be used in a fall arrest situation a full body harness must be used.

What is it called?

Petzl Navaho Full Body Harness.

Primary Function?

Support of rope access technician in work restraint, work positioning, work suspension or fall arrest.

Secondary Function?

May allow the carrying of tools and equipment on gear loops.
May have a chest ascender built in to the harness.

Correct Use

Do:

Ensure the harness is traceable to relevant inspection records/certificates of conformity.
Ensure the harness is inspected before each use.
Ensure the harness is correctly fitted, adjusted to fit and correct size is selected.
Check that paint and other contaminants will not alter the physical properties of your harness over time, such as buckle adjustment.

Don't:

Allow it to contact sharp or pointed objects.
Expose your harness to high temperatures.
Overload gear loops.
Subject your harness to exposure to chemicals and solvents.

Conformity:

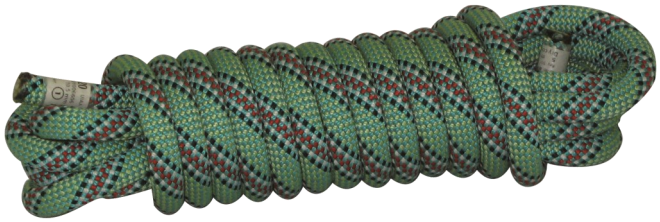
EN813: PPE against falls from height: Sit harness.
EN358: PPE against falls from height: Work positioning systems.
EN361: PPE against falls from height: Full body harness.

Strength:

Main D rings breaking load= 15kN minimum
Gear loop= 10kg maximum

Additional Information:

Manufacturers user instructions
IRATA ICOP Section 2.7.3
IRATA ICOP Annex D
IRATA ICOP Annex J



COWSTAILS/ DYNAMIC ROPE

Cowstails are tied into the central waist D-ring on the harness using dynamic rope. Dynamic ropes cushion impacts and must be used during certain procedures to absorb the energy of possible falls. Cowstails should be able to withstand any forces that might be imposed on them in times of emergency.
Cowstails that are not made from dynamic rope must not be subjected to a fall. This equipment is for suspension only.

What is it called?

Cowstails, Device Lanyard, Anchor Lanyard.

Primary Function?

Connection from the harness to an attachment point.

Secondary Function?

Dynamic rope must be used when belaying a lead climber.
Attachment of tools and work equipment.

Correct Use

Do:

Ensure the cowstails are traceable to relevant inspection records/certificates of conformity.
Ensure the cowstails are inspected before each use.
Ensure the knots in cowstails are correctly tied and tightened under body weight.
Protect your cowstails from exposure to chemicals and solvents.
Monitor Knots whilst in use.

Don't:

Allow it to contact sharp or pointed objects.
Expose your cowstails to high temperatures.

Conformity:

EN 892: Mountaineering equipment– Dynamic mountaineering ropes– Safety requirements and test methods.

Strength:

25kN

ASCENDERS

Ascending devices are attached to the working line and are used when the rope access technician wishes to climb up it. Typically, ascenders are used in pairs, a handled ascender and a chest ascender. An ascender slides long the rope in one direction and jams in the other direction. The cams teeth initiate a clamping action that pinches the rope between the cam and the frame. The slot in the cam allows mud to be evacuated. Toothed ascenders must never be used in a shock loading situation as damage or failure of the rope may occur

What is it called?
Ascenders, Jammers, Hand Jammers, Chest Jammer, Croll, Ascension.

Primary Function?
Ascend a rope.

Secondary Function?
May be used in hauling systems, descending a rope.

Correct Use
Do:
Ensure the ascender is traceable to relevant inspection records/certificates of conformity.
Ensure the ascender is inspected before each use.
Ensure the ascender is compatible with the rope diameter.
Install the ascender on the rope the correct way around.

Don't:
Shock load or overload.
Use on wire rope.
Drop it.

Strength:
Rope damage will occur between 4-6Kn depending on rope diameter

Conformity:
EN567: Mountaineering equipment– Rope clamps– Safety requirements and test methods.
EN12841-B: Personal fall protection equipment– Rope access systems– Rope adjustment devices.

Additional Information:
Manufacturers user instructions
IRATA ICOP Section 2.7.6

DESCENDERS

Descending devices are used to attach the rope access technician to the working line and to control the rate of descent

What is it called?

Descender, I'D

Primary Function?

Make a controlled descent of a rope

Secondary Function?

May be used in hauling systems

Correct Use

Do:

Ensure the descender is traceable to relevant inspection records/certificates of conformity

Ensure the descender is inspected before each use

Ensure the descender is compatible with the rope diameter

Ensure the descender is correctly installed on to the rope

Protect your descender from exposure to chemicals and solvents

Don't:

Shock load or overload

Drop it

Let go of the tail end of the rope whilst the descender is not locked off.

Strength:

150kg in normal use

250kg in a rescue

Slips at around 600kg

Conformity:

EN341-A: PPE against falls from height: Descender devices
EN12841-C: Personal fall protection equipment– Rope access systems– Rope adjustment devices.

Additional Information:

Manufacturers user instructions

IRATA ICOP Section 2.7.5

BACK UP DEVICE

Back-up devices are attached to a rope access technicians safety line. In the event of a failure of the working line or loss of control by the rope access technician, back-up devices are intended to lock on to the safety line without causing catastrophic damage to the safety line.

What is it called?
Back-Up Device.

Primary Function?
Arrest a fall following an uncontrolled descent or failure of the working line.

Secondary Function?
Back up device in a lowering system.

Correct Use
Do:
Ensure the back-up device is traceable to relevant inspection records/certificates of conformity.
Ensure the back-up device is inspected before each use.
Use the correct energy absorber (ASAP).
Use a dynamic rope cowstail maximum length of 60cm (Shunt).
Ensure the rope diameter is compatible with the device.
Ensure the back-up device is installed on the rope correctly.
Maintain a high attachment.

Don't:
Allow loops of slack rope to gather between the device and the anchor point.
Operate a descender and shunt simultaneously.

Strength:
1 person
2 people in a rescue using an L57 Absorbica (ASAP)
Slips down the rope at 2.5-3 kN (Shunt)

Conformity:
EN353-2: PPE against falls from height: Guided type fall arrestors. Part 2. Specification for guided type fall arrestors on a flexible anchorage line.
EN12841-A: Personal fall protection equipment– Rope access systems– Rope adjustment devices.

Additional Information:
Manufacturers user instructions
IRATA ICOP Section 2.7.7

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MAILLON

Screw link connectors are more appropriate than other types of connector for infrequently operat- connections or where there might a risk of cross loading across the gate.

What is it called?
Maillon , Screw Link

Primary Function?
Attaching equipment to the ventral harness attachment point.
To make a semi-permanent connection, or where there is a risk of cross loading a karabiner.

Secondary Function?
Attaching rope to anchor points.

Correct Use
Do:
Ensure the maillon is traceable to relevant inspection records/certificates of conformity.
Ensure the maillon is inspected before each use.
Ensure that maillon is compatible with other equipment used in the rope access system.

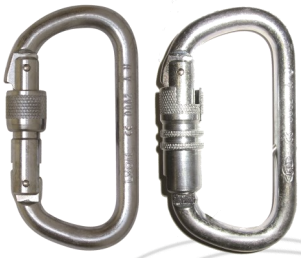
Don't:
Over tighten the screw closure.
Exceed loads recommended by the manufacturer.
Drop it.
Store with the gate open.

Strength:
Semi-circular– 10mm: 45 Kn Breaking Load
Delta– 8mm: 27.5Kn Breaking Load
Delta—10mm : 45 Kn Breaking Load

Conformity:
EN 362: PPE against falls from height: Connectors.
EN 12275: Mountaineering equipment– Connectors– Safety requirements and test methods.

Additional Information:
Manufacturers user instructions

KARABINERS



All karabiners, when used in rope access must have a locking mechanism, either screw gate or self locking.
Both aluminium and steel karabiners are used in rope access, aluminium karabiners

What is it called?
Karabiner, Carabiner, Krab, Connector.

Primary Function?
To temporarily connect elements of a rope access system together.

Secondary Function?
Connecting tools, equipment and bags.

Correct Use
Do:
Ensure the karabiner is traceable to relevant inspection records/certificates of conformity.
Ensure the karabiner inspected before each use.
Ensure any load placed on the karabiner is along the major axis.
Ensure that the gate is closed and locked.

Don't:
Place any load across the gate.
Load over an edge.
Allow 3 way loading.
Drop it.

Strength:
22Kn minimum breaking load across the major axis.

Conformity:
EN 362: PPE against falls from height: Connectors.

Additional Information:
Manufacturers user instructions
IRATA ICOP Section 2.7.4
IRATA ICOP Annex F.3.7

TAPE SLINGS

Tape slings are used to create an anchor point when placed around a structure. They are normally made from textile webbing and may have a protective sleeve to reduce damage to the sling.

What is it called?
Tape sling, Sling, Anchor Sling.

Primary Function?
Used as a temporary/ moveable anchor point.

Secondary Function?
Releasable attachments.
Lanyard for tools.

Correct Use
Do:
Ensure slings are traceable to relevant inspection records/certificates of conformity.
Ensure the sling is inspected before each use.
Protect from sharp edges/objects.
Protect your slings from exposure to chemicals and solvents.

Don't:
Allow it to contact sharp or pointed objects
Expose your sling to high temperatures

Strength:
22- 30Kn Breaking Load

Conformity:
EN 566: Mountaineering equipment– Slings– Safety requirements and test methods.
EN 795: Protection against falls from height– Anchor devices– Requirements and testing.

Additional Information:
Manufacturers user instructions
IRATA ICOP Section 2.7.8
IRATA ICOP Annex J
IRATA ICOP Annex F.3.8

WIRE STROPS

Wire stops are used to create an anchor point around a structure. Wire stops are often encased within a protective sleeve to protect the structure and strop from damage. Wire strops are less susceptible to damage from heat, chemicals and cuts.

What is it called?
Wire strop, strop, anchor slings.

Primary Function?
Used as a temporary/ moveable anchor point.

Secondary Function?
Can be used as an attachment to a rope or anchor point whilst carrying out hazardous work.

Correct Use

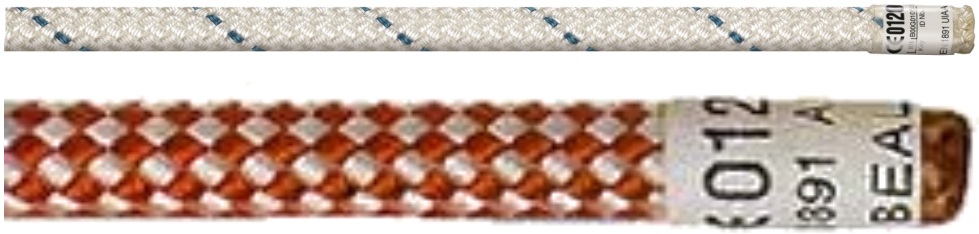
Do:
Ensure the strop is traceable to relevant inspection records/certificates of conformity.
Ensure the strop is inspected before each use.

Don't:
Drop it.

Strength:
30 kN Breaking Load.

Conformity:
EN 795: Protection against falls from height– Anchor devices– Requirements and testing.

Additional Information:
Manufacturers user instructions
IRATA ICOP Section 2.7.8
IRATA ICOP Annex F.3.8



LOW STRETCH ROPE

Low stretch rope is used to create an anchor line system.

What is it called?

Low stretch rope, semi-static rope, anchor lines

Primary Function?

Rope access anchor lines, working and safety.

Secondary Function?

Hauling equipment and tools

Correct Use

Do:

Ensure the rope is traceable to relevant inspection records/certificates of conformity
Ensure the rope is inspected before each use
Protect from sharp edges/ objects
Protect your rope from exposure to chemicals and solvents
Store in suitable places.

Don't:

Sit or stand on it
Drop it
Allow it to contact sharp or pointed objects
Expose friction and high temperatures.

Strength:

27kN Breaking Load

Conformity:

EN 1891: PPE against falls from height: Low stretch kernmantle rope

Additional Information:

Manufacturers user instructions
IRATA ICOP Section 2.7.2
IRATA ICOP Annex J

ETRIERS/ FOOTLOOPS

Footloops are used in addition with a hand ascender when climbing a rope. Etriers are used as a multi step footloop generally for aid climbing or when maintaining a comfortable work position whilst suspended.

What is it called?
Etrier, Footloops.

Primary Function?
Allow for convenient climbing up a rope or along a structure.

Secondary Function?
Use for a counterbalance technique during a rescue.

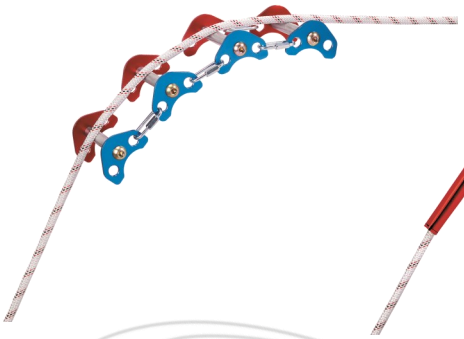
Correct Use

Do:
Ensure the footloop is inspected before each use
Protect your footloop from exposure to chemicals and solvents
Use the correct length for your body height or the task.

Don't:
Use as a load bearing item of equipment

Conformity:
None

Additional Information:
Manufacturers user instructions



EDGE PROTECTION

The best form of rope protection is to rig ropes to avoid edges and hazardous objects, where this is not reasonable practicable suitable rope protection equipment must be used. Ropes must be protected from contact with sharp or abrasive surfaces or hot surfaces, failure to do this may lead to the ropes failing with catastrophic results. Rope protection may take many forms such heavy duty wool carpet, simple canvas padding or edge rollers.

What is it called?
Rope protector, edge rollers, edge pad.

Primary Function?
Protect the ropes form sharp edges, abrasion or hot surfaces.

Secondary Function?
None

Correct Use
Do:
Ensure the protector is inspected before each use
Ensure the protector is correctly installed and in the correct place
Ensure the rope protector is fixed into position

Don't:
Assume your rope protection is adequate.
Use PVC rope protectors due to potential melting of the PVC caused by friction.

Conformance:
None

Additional Information:
Manufacturers user instructions
IRATA ICOP Section 2.7.10
IRATA ICOP Section 2.11.3.5 to 2.11.3.8
IRATA Safety Bulletin 22

PULLEYS

Pulleys are used to reduce the friction of any rope running through it for example when building hauling systems, or when changing the direction of moving ropes. Pulleys may be fixed cheek or swing cheek, other styles of specialist pulley are available but these are the most common types. As a rough guide the larger the pulley wheel is then the more efficient it is. Pulleys which include ball bearings will reduce friction further.

What is it called?
Pulley, Block.

Primary Function?
Reduce friction of a moving rope.

Secondary Function?
Used in hauling systems to reduce friction.
To change the direction/deviate moving ropes.

Correct Use
Do:
Ensure the pulley is inspected before each use.
Ensure the pulley is compatible with other components in the system.

Don't:
Drop it
Overload it
Use a swing cheek pulley with one cheek open.

Strength:
15-40 kN

Conformity:
EN 12278: Mountaineering equipment– Pulleys– Safety requirements and test methods

Additional Information:
Manufacturers user instructions

LOCKING PULLEYS

Locking pulleys are used as a progress capture device in hauling systems, they are especially useful for long or heavy hauls as they minimise friction in the system.

What is it called?
Pro Traxion, Micro Traxion, Locking Pulley.

Primary Function?
Progress capture device for hauling systems.

Secondary Function?
As a Pulley
AS an emergency ascender

Correct Use
Do:
Ensure the pulley is inspected before each use.
Ensure the pulley is compatible with other components in the system.
Ensure that the device is installed on to the rope in the correct direction.

Don't:
Subject the device to possible shock loads
Drop it
Overload it
Use a swing cheek pulley with one cheek open.

Strength:
Rope Clamp:WLL 2.5kN
WLL: 5-6 kN

Conformity:
EN 12278: Mountaineering equipment– Pulleys– Safety requirements and test methods
EN567: Mountaineering equipment– Rope clamps– Safety requirements and test methods.

Additional Information:
Manufacturers user instructions

WORK SEAT

A work seat is used to provide comfort to a rope access technician when suspended for long periods of time, a work seat is not part of the fall prevention system

What is it called?
Work seat, comfort seat.

Primary Function?
Increase the comfort and support of a rope access technician.

Secondary Function?
None.

Correct Use
Do:
Ensure the work seat is inspected before each use
Protect your work seat from exposure to chemicals and solvents
Ensure the harness remains the primary means of support

Don't:
Use the work seat as the primary means of support

Additional Information:
Manufacturers user instructions
IRATA ICOP Section 2.7.11

WORKSEAT

FALL ARREST LANYARDS

Double fall arrest lanyards are used to allow users to remain constantly attached whilst moving on a structure. Single fall arrest lanyards can only protect a worker involved in work in a fixed position. It is important that two single lanyards are not used to create a double lanyard as this can potentially double the impact force generated by a fall.

Length and style of lanyards should be suitable for the task. The overall length of the lanyard will be determined by the energy absorber used, this must not exceed 2m including all connectors.

What is it called?
Fall Arrest Lanyards, energy absorbing lanyards.

Primary Function?
Arrest a fall.

Secondary Function?
Use as a work restraint lanyard.

Correct Use
Do:
Ensure the fall arrest lanyard is traceable to relevant inspection records/certificates of conformity.
Ensure the fall arrest lanyard is inspected before each use.
Use fall arrest lanyards with a full body fall arrest harness.
Protect your fall arrest lanyards from exposure to chemicals and solvents.
Ensure there is sufficient clearance distance required should the energy absorber be deployed.
Ensure that connectors are compatible with the structure.

Don't:
Drop it.
Allow it to contact sharp or pointed objects.
Expose your fall arrest lanyards to high temperatures.
Continue to use or reuse after a significant fall has been arrested.

Conformity:
EN 355: PPE against falls from height: Energy absorbers.
EN 354: PPE against falls from height: Lanyards

Additional Information:
Manufacturers user instructions
IRATA ICOP Annex E

ADJUSTABLE WORK POSITIONING LANYARD

Work positioning lanyards are often used to support a rope access technician, either partially or fully.

What is it called?
Work positioning lanyard, Grillon, work restraint lanyard.

Primary Function?
To support a rope access technician on a structure.

Secondary Function?
May be used as a restraint lanyard.
Releasable attachment.
Anchor point.

Correct Use
Do:
Ensure the work positioning lanyard is traceable to relevant inspection records/ certificates of
conformity
Ensure the work positioning lanyard is inspected before each use
Protect your work positioning lanyard from exposure to chemicals and solvents

Don't:
Fall onto a work positioning lanyard
Allow it to contact sharp or abrasive edges.

Conformity:
EN 358: PPE against falls from height: Work positioning systems.

Additional Information:
Manufacturers user instructions
IRATA ICOP 2.7.1.5.2
IRATA ICOP Annex E.3

GRILLON

KNOTS

Tying knots and rigging ropes are a fundamental part of rope access, this section aims to give guidance of what knots are acceptable in rope access, there uses, common methods of rigging ropes and the principles of safe rigging.

Additional information can be found in the IRATA ICOP Section 2.7.9, 2.11-2.11.9.3.2 and IRATA ICOP Annex F.

The anchor system used for rope access should be unquestionable reliable.

It is beyond the scope of this manual to provide information on installation and testing of various anchor systems, all anchors used in rope access should meet the requirements of local legislation, guidance and manufacturers recommendations.

Knots form an important part of rope access. They are used to attach ropes to anchors during rigging and for attaching rope access personnel. As such the ability to tie knots and have a fundamental knowledge of various knots and their uses is essential.

The key to tying knots correctly is that they must be neat and dressed properly as this will impact directly on their strength, energy absorbency and the ease with which they can be untied. This is also an obvious gauge of the level of care and competency of the rope access technician.
See IRATA ICOP 2.11.5

The following knots will be addressed in this section:
Figure of 8 on the bight
Figure of 9 on the bight
Double figure of 8 on the bight (Bunny Knot)
Alpine butterfly
Barrel knot
Stopper knot

Once a knot has been tied, dressed and tightened properly it should have a tail of not less than 10cm (4 inches) (IRATA ICOP 2.11.5.4), when using a stopper knot in the ends of ropes the tail should be at least 30cm (12 inches) (IRATA ICOP 2.11.3.9).

If a tail end is too long then an additional stopper knot must be added to prevent descending off this tail if unintentionally used.

FIGURE OF EIGHT

Overview
The fig.8 is the most commonly used knot for rigging ropes, the knot forms a strong and secure loop in the end of the rope.

What is it called?
Figure of 8 on the bight, Figure of eight.

Primary function
To form a loop in the end of a rope.

Secondary function
A variation of a figure of eight can be used to tie two ropes together.
Can be rethreaded around attachment or anchor point.

Correct use

Do's
Ensure the knot is loaded end to end.
Keep the loop as small as possible.
Ensure the length of the tail is 10cm minimum.

Don't's
Allow the loop to be cross loaded.

Strength
23-34% Loss

FIGURE OF 9

Overview
The figure of 9 is used in place of a figure of 8 however it is slightly stronger and easier to untie after heavy or prolonged loading.

What is it called?
Figure of 9 on the bight, figure of 9.

Primary function
To form a loop in the end of a rope and attached to anchor points.

Secondary function
None.

Correct use
Do's
Ensure the knot is loaded end to end.
Keep the loop as small as possible.
Ensure the length of the tail is 10cm minimum.

Don'ts
Allow the loop to be cross loaded.

Strength
15-30% Loss

FIGURE OF 9

DOUBLE FIGURE OF 8

Overview
The Double Figure of Eight is another variant of the Figure of Eight knot and whilst basically the same, once tied it will give two loops that can be used as attachments. This is normally applied where the load on the rope needs to be shared between two anchors in close proximity to each other.
The advantage of the Double Figure of Eight is that should one loop fail it will not cause the other to lose strength or slip. The disadvantage of this knot however is the amount of rope used to tie it.

What is it called?
Double figure of 8 on the bight, bunny Knot, bunny Ears.

Primary function
To attach each anchor line to 2 different anchor points.

Secondary function
May be used to attach to a casualty so they may be hauled in an upright position when connecting to both ventral and sternal harness attachment points.

Correct use

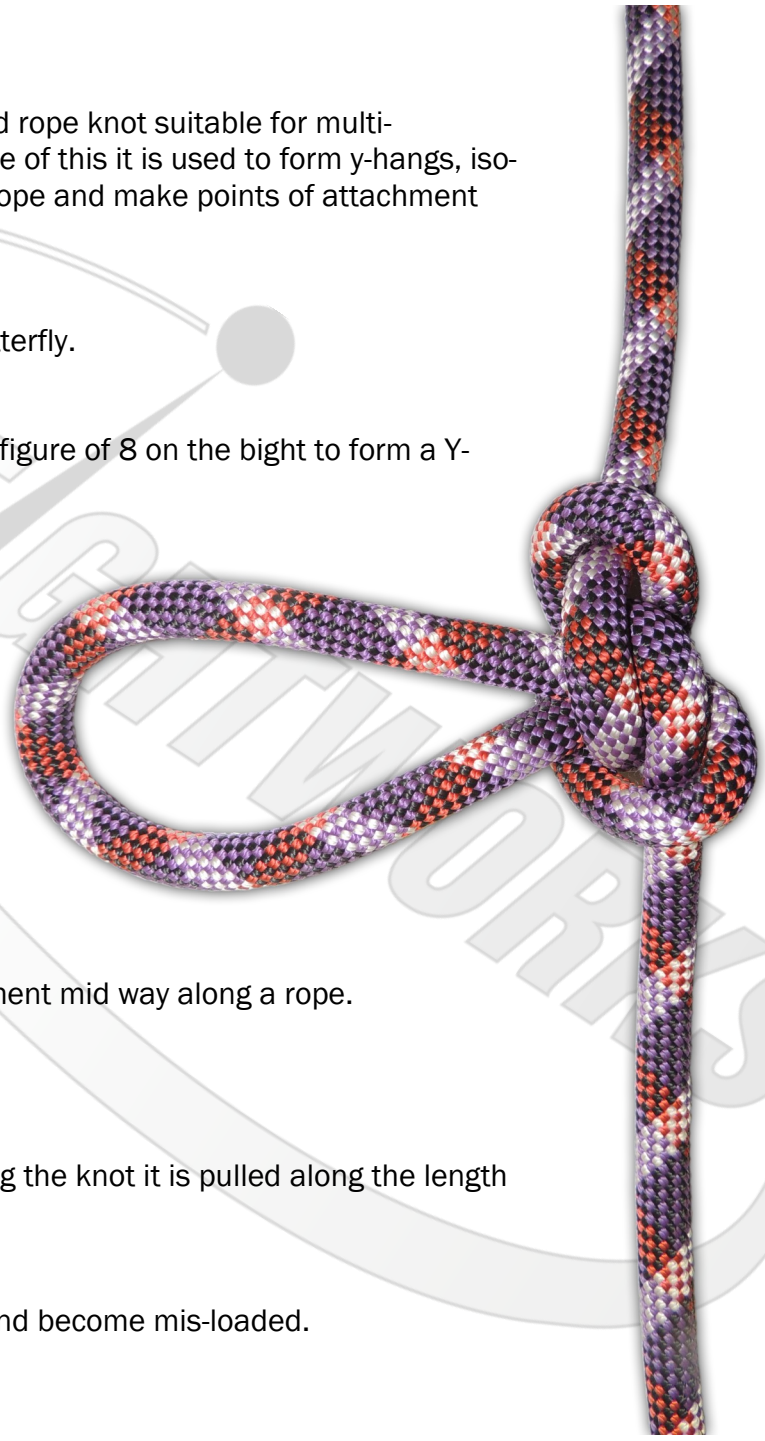
Do's
Ensure the knot is loaded correctly.
Keep the loop as small as possible.
Ensure the length of the tail is 10cm minimum.
Keep the common loop towards the centre of the knot.

Don'ts

Rig both ropes with one knot.
Attach both loops to the same anchor point.

Strength
23-39% Loss

ALPINE BUTTERFLY



Overview
The alpine butterfly is a mid rope knot suitable for multi-directional loading, because of this it is used to form y-hangs, isolate damaged sections of rope and make points of attachment along a rope.

What is it called?
Alpine butterfly, Alpine, Butterfly.

Primary function
Used in conjunction with a figure of 8 on the bight to form a Y-hang.

Secondary function
To isolate damaged rope.
To make a point of attachment mid way along a rope.

Correct use

Do's
Ensure that when tightening the knot it is pulled along the length of the rope.

Don'ts
Allow the knot to capsize and become mis-loaded.

Strength
28-39% Loss

BARREL KNOT

Overview
A barrel knot is used in the end of the cowstails as it grips the karabiner tightly and prevents it from being cross loaded. In testing the barrel knot has shown to have greater shock absorbing qualities than other knots used on the ends of cowstails. Great care must be taken when using a barrel knot to ensure it has been tied the correct way so when the cowstail is weighted, the knot tightens around the karabiner and does not pull through.

What is it called?
Barrel knot, Scaffold knot.

Primary function
Used to terminate cowstails.

Secondary function
Used where a rigging must be kept as compact as possible

Correct use
Do's
Ensure the knot tightens around the karabiner when loaded.
Ensure the tail end is 10cm (4 inches) long.

Don'ts
Overload as the knot becomes very difficult to untie.

Strength
23-33% Loss

STOPPER KNOT

Overview
A stopper knot is used to prevent rope access technicians abseiling off the end of the rope. A stopper knot will be in the end of every rope that is rigged. See IRATA ICOP 2.11.3.9

What is it called?
Stopper knot

Primary function
To prevent descending off the end of the rope.

Secondary function
None.

Correct use
Do's
Ensure a stopper knot is present in the end of each rope that is rigged.
Ensure the tail below the knot is a least 30cm (12inches).

Don'ts
Use a knot that may roll off the end of the rope.

Strength
N/A

STOPPER KNOT

FLEMISH BEND

Overview
A Femish bend is used to join two ropes together

What is it called?
Flemish Bend or Figure 8 variation

Primary function
To join two ropes together

Secondary function
None.

Correct use
Do's
Ensure the knot is loaded end to end.
Keep the loop as small as possible.
Ensure the length of the tail is 10cm minimum.

Don't's
Allow the loop to be cross loaded.

Strength
23-34% Loss

ANCHOR SYSTEMS

ANCHOR SYSTEMS

All persons engaged in industrial rope access techniques must have two independent points of attachment, this may be achieved by using two strops around a beam whilst aid climbing or with the use of an anchor system whilst abseiling. These should be arranged so that in the event of one point of attachment failing the technician remains protected by the other point of attachment and cannot suffer a fall.

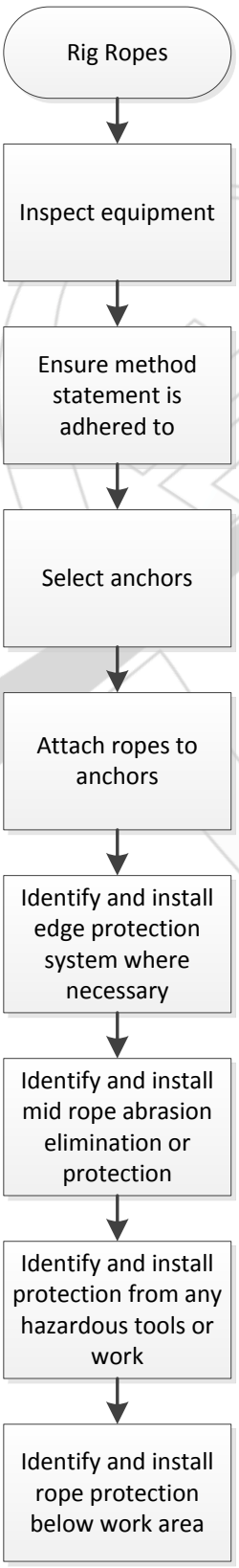
Typical arrangements of anchor system include:

Basic Anchor System
Small Y-Hang
Wide Y– Hang
Re-anchor
Deviation
Pull Through
Work restraint/ horizontal lifelines
Vertical fall arrest lines
Tensioned ropes
Releasable anchors

The ability to build a basic anchor system and a small Y-hang are skills required at all levels. Levels 2 and 3 are required to have a knowledge of more advanced rigging systems.

What ever type of system is rigged consideration must be given to avoiding sharp, hot or abrasive surfaces. Where these can not be avoided adequate rope protection must be installed. This rope protection must be resilient enough to comfortably control the hazard.

For additional information on installing and placing anchors see IRATA ICOP Annex F.



All team equipment should be inspected every time it is used, this should be done by the technician carrying out the rigging under the supervision of the IRATA I3 supervisor

The supervisor should ensure that the RAMS are adhered to at all times during the rope access operation. If there is any need to deviate from this company management should be contacted, the RAMS should be amended and agreed with the client before any work commences.

Anchor points should be selected by the Supervisor in accordance with the RAMS. IRATA ICOP annex F, 2.7.9 and 2.11.2 can be used for onsite . In all cases they should be unquestionably reliable for both normal and rescue loads and a minimum of two separate anchors per person should be used.

Consideration should be made to any abrasion points on the anchor points and suitable attachment slings, strops or connectors will be used.

Where possible ropes should be rigged to avoid any edges, where this is not possible suitable edge protection should be installed as per RAMS a radius of greater than 5mm will be achieved

Any abrasion points or other obstructions that may affect the integrity of the rope should, where practicable be avoided by the use of re-belays or deviations. If this is not practical suitable rope protectors should be used. where the rope protectors are used to protect the rope 1 protector should be fastened to each rope

The rope immediately above the technicians descender and backup device should be protected if the task involves the use of tools or equipment that may affect it (cutting, welding etc). The RAMS should outline the specific method of protection to be used.

The rope below the technician should be protected from falling debris and being walked on. Good housekeeping, and coiled or bagged ropes may be used.

ROPE PROTECTION



The correct use of rope protection is a critical element when rigging ropes, in the first instance the need for rope protection must be avoided by the use of other rigging systems such as re-belays and deviations.

Where the use of rope protection is unavoidable then consider the use of edge pads and rope protectors. An assessment must be made as to the severity of the abrasion point and therefore the type of rope protector selected.

Edge pads are often fixed to the structure and allow a wide area to be protected and allow for some side-ways movement of rope access technicians.

Rope protectors provide a limited amount of protection to ropes when rigged over an edge. When using a rope protector ropes must not be allowed to move from side to side across the edge as this may cause catastrophic failure of both rope protector and ropes. See IRATA Safety Bulletin 22.

When using rope protectors it is important that they are fixed into position and can not become dislodged. When securing rope protectors they should be attached to the back-up rope by a knot that will not slide down the rope.

Candidates: Shall show awareness of the potential consequences of such hazards affecting equipment and of methods for removing, avoiding, containing or reducing them. All candidates shall show awareness of how their movement on the ropes may increase the risk from such hazards.

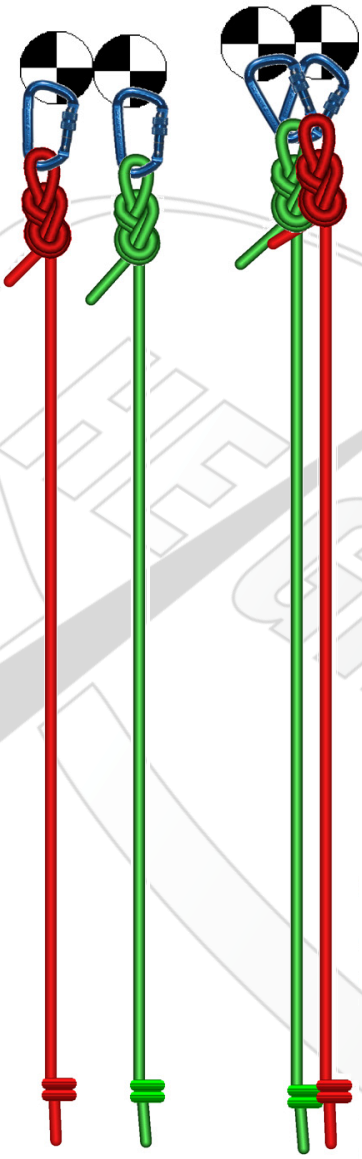
All candidates shall demonstrate attaching wrap-around style rope protectors.

Level 2 and Level 3 candidates shall be capable of identifying common hazards and shall demonstrate selecting and implementing appropriate methods of rigging or protection.

Trainers: shall emphasize the application of the hierarchical approach (as is detailed in *ICOP Part 2, 2.7* and *2.11,* and *Annex P*), which prioritizes the removal of hazards before considering avoidance through rigging methods or mitigation through rope protection. The level of protection offered by various rope protection methods should be explained. Consideration should be given to arranging separate protection for each rope.

Assessors: Should look for the appropriate choice of method and that adequate protection is achieved.

BASIC ANCHOR SYSTEM



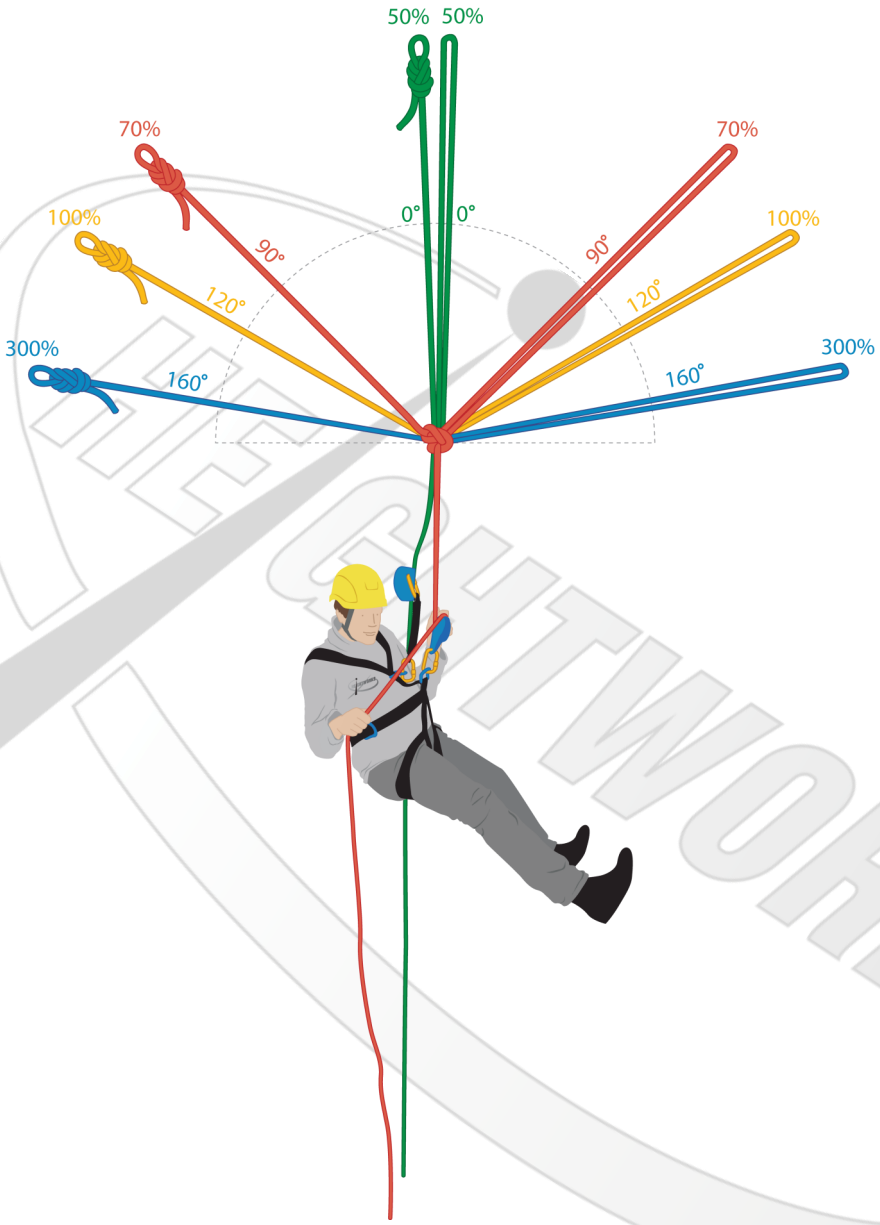
A basic anchor system uses anchors that are close together, with the least amount of components to keep the system as simple as possible. When using the above
systems the load is shared equally between the two anchor points.

A basic anchor system may use two figure of 8 knots, two karabiners and two strops these may both be clipped together to achieve load sharing.

Candidates: *All candidates shall demonstrate the rigging of a basic anchor system. Level 2 and 3 candidates shall be expected to demonstrate rigging at height*

Trainers: *shall include the basic principles of rigging and attachments in rope access work, e.g. each rope should have its own separate anchor. Both rope systems may be connected to each other for added security. Emphasis should be placed on checking that the ropes are correctly rigged so that, if one should fail, a shock load would not be passed on through the system. Knots should be dressed and set. Emphasis should also be placed on the use of different types of slings and rigging equipment, appropriate to the structure.*

Assessors: *may observe demonstrations at ground level for level 1. A variety of knots and methods are acceptable.*



All rope access technicians' should have an understanding of the angles of rigging and how the internal angle of a Y-hang affects the forces transferred to the anchor points.

The preferred angle of rigging a Y-hang is 90° or less.

The maximum angle of normal rigging is 120°. At this angle all the forces in the system are equal.

Above 120° and there is more force on the anchor points than there is suspended on the rope. Accurate calculations are required when rigging using large angles.

SMALL Y-HANG

A Y-hang is used where a load is to be shared between two different anchor points or the ropes need to be in a certain position.

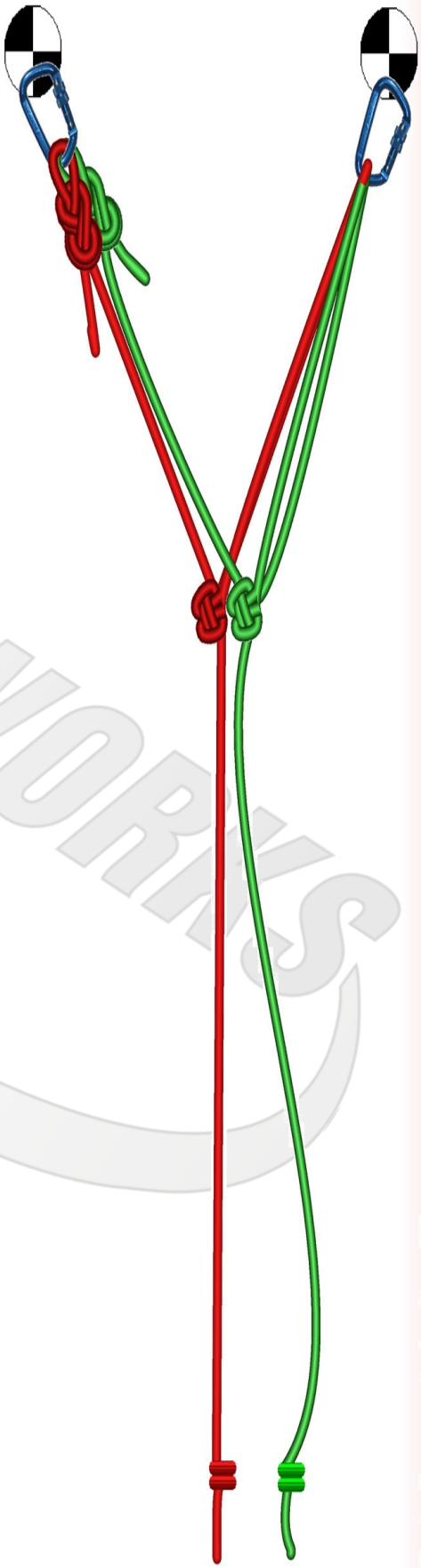
A small Y-hang is used when the anchors are too far apart for a basic anchor system.

A Y-hang is constructed using a fig. 8 or fig. 9 knot in the end of the rope, and connected to one anchor.

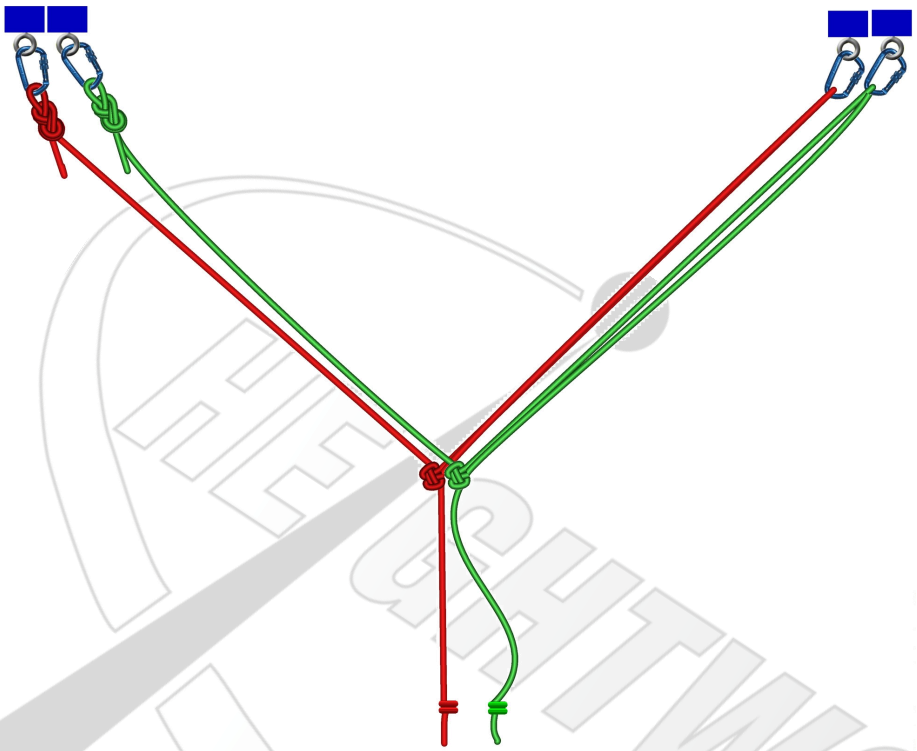
An alpine butterfly is tied further down the rope, this can then be attached to the second anchor point.

The alpine butterfly can then be adjusted to ensure equal loading on both anchor points, or to position the rope in a required position.

Alternatively a double figure of eight on the bight can be used to achieve a small Y hang.



WIDE Y HANG



Where a Y-Hang is rigged with anchor 1.5m or more apart then this would be considered a wide Y-hang.

A wide Y-hang is rigged with a double anchor system, two strops and two karabiners are required on each side of the Y-hang.

The use of a double anchor system is to protect from an out-of-control swing caused by a single item of failure.

Candidates: All candidates shall demonstrate the rigging of a small Y-hang between anchors less than one metre apart. Level 2 and 3 candidates shall demonstrate the rigging of a Y-hang between wider anchor points, where the consequence of failure of any one item needs consideration. Level 2 and 3 candidates shall be expected to demonstrate rigging at height. Training shall expand on the instruction for the basic anchor system, and explain the need to avoid large angles wherever possible. Anchors shall be equally loaded and positional adjustment demonstrated.

Trainers: shall emphasise the consequences of failure of any one item of equipment, and the need for double anchor systems where a swing could cause injury to personnel, or damage to equipment or property. Inclusion of extra rigging rope may be appropriate in some circumstances.

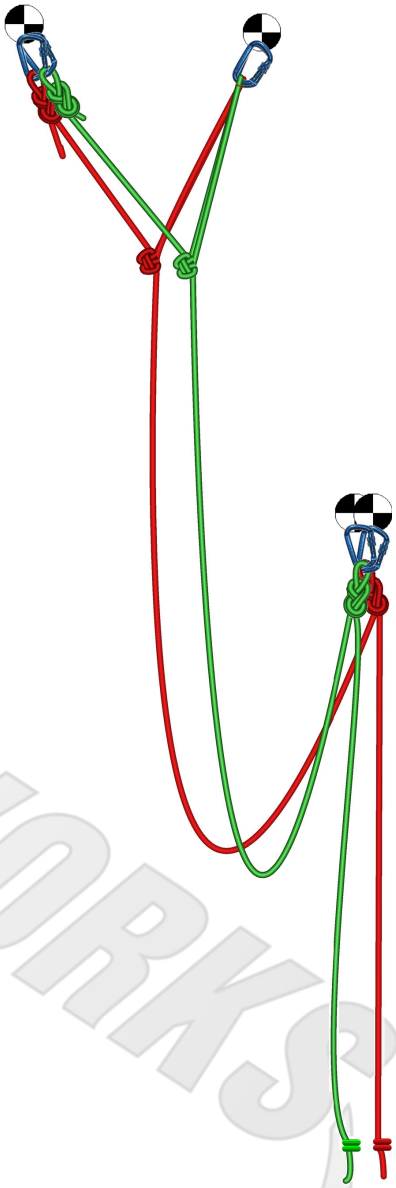
Assessors: may observe demonstrations at ground level for Level 1. A variety of

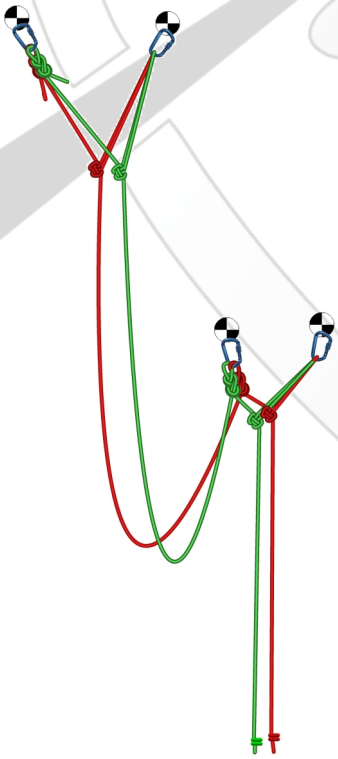
RE-ANCHORS

Ropes are re-anchored to either avoid a hazard or to position a rope access technician closer to the work area. A re-anchor may also be used to reduce the length of a single drop into multiple smaller drops to help limit the amount of stretch in the rope over long distances.

When rigging a re-anchor, consideration should be given to the size of the loops, if the loops are too small or too tight then passing through the re-anchor will be difficult.

For level 2 and 3 candidates consideration must be given to rescue past a re-anchor, again, the larger the loops the easier it is to pass yourself and a casualty through the re-anchor.





The right hand picture shows a re-anchor rigged using two figure of 8 knots, two karabiners and two strops, a re-anchor may also be rigged using a Y-hang if the anchors are offset or a distance apart.

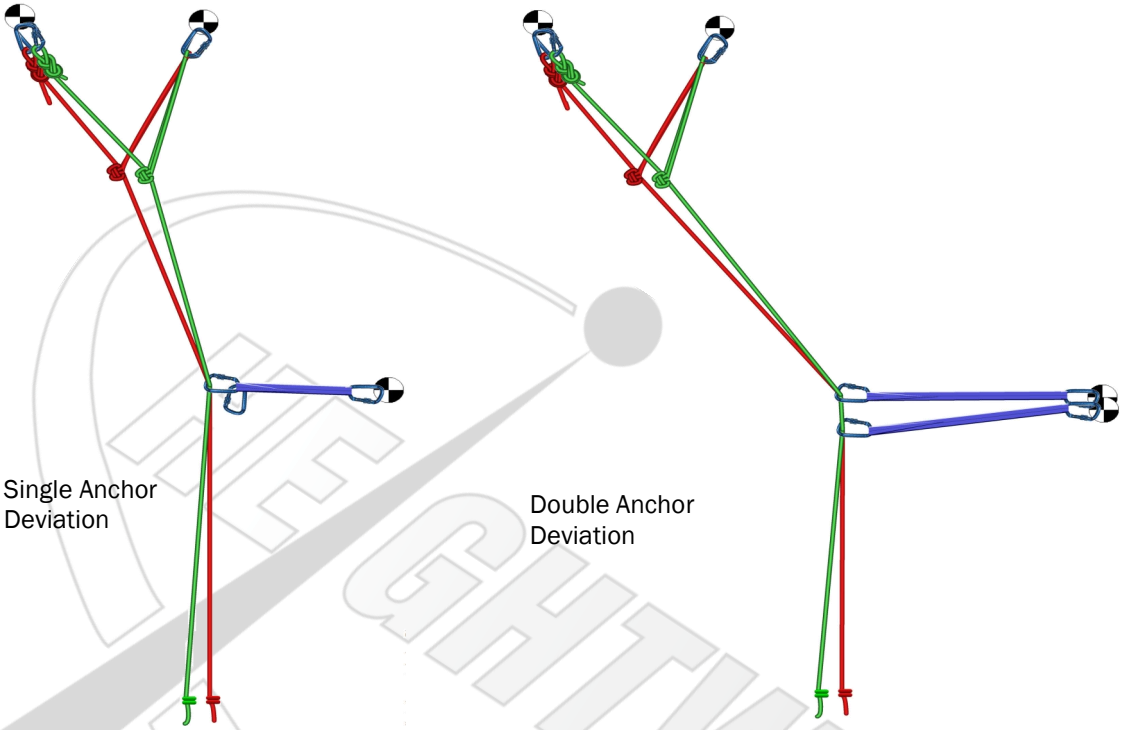
A re-anchor under 1.5m is considered small. A re-anchor over 1.5m should be considered as wide.

Candidates: Level 2 and 3 candidates shall demonstrate the correct rigging of a re-anchor at height. For Level 2 candidates the offset shall be less than 1.5 metres, whilst for Level 3 candidates the offset may be any distance apart.

Trainers: shall emphasise the consequences of failure of any one item of equipment. Rigging should consider ease of use, and take account of options and methods for rescue; generally shallow re-belay loops make both access and rescue more difficult, particularly where the offset is large.

Assessors: should note that a variety of knots and methods are acceptable.

DEVIATION

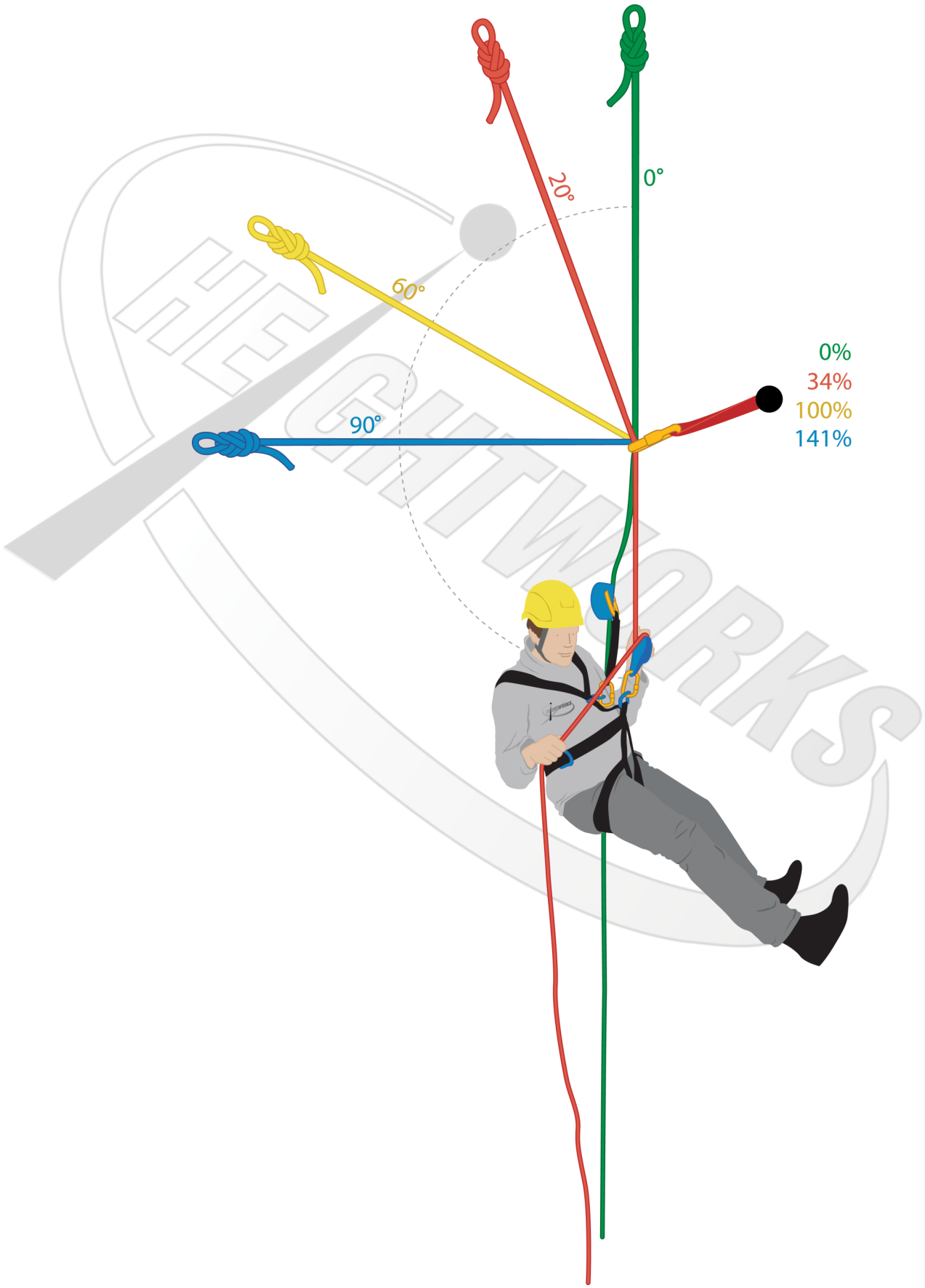


Deviations are a method of rigging which allows re-direction of the path of the ropes. Ropes may be deviated to provide more accurate positioning for the rope access technician or to avoid hazards. Unlike re-anchors, deviations allow positioning with a system rigged for rescue. On a continuously overhanging structure, or to constrain movement, a series of deviations may be used. Deviations can be divided into two types:

Single-anchor deviations are used to deviate the ropes (or the working line alone) by a small angle only. Single-anchor deviations are only appropriate where their failure would not result in serious consequences (such as a large swing into a structure, or contact with a sharp edge) and are normally rigged as a single anchor system.

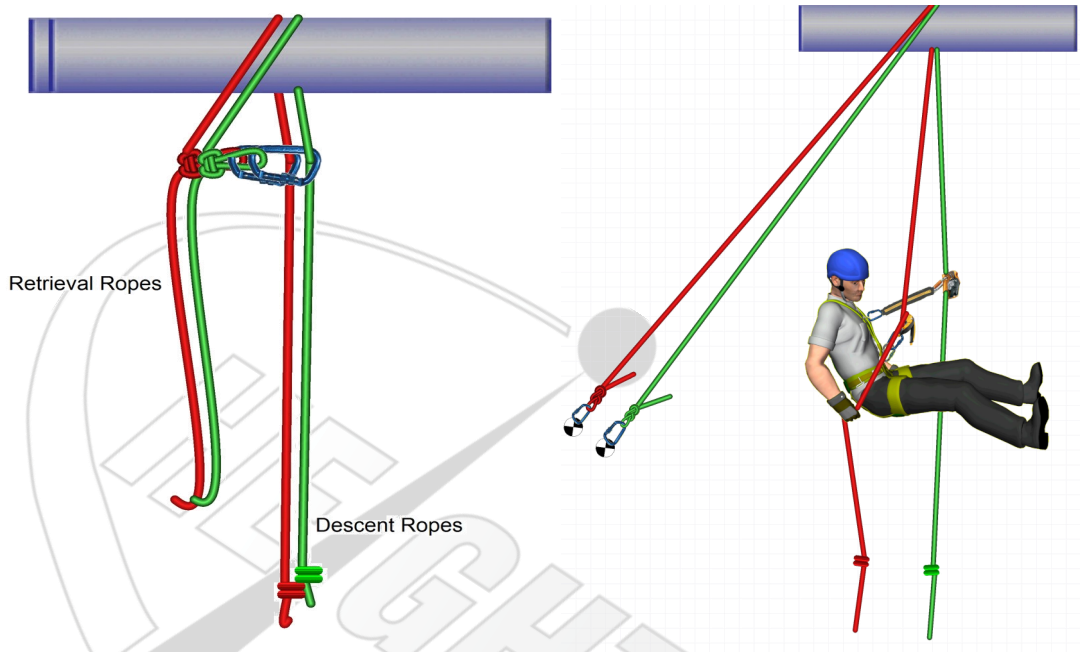
Double-anchor deviations may deviate the ropes by a greater angle and distance than a single-anchor deviation, and allow the ropes and user to be protected against more serious hazards such as a sharp edge or a large swing into a structure. Such a deviation utilizes a double anchor system, with suitably rated anchors and connection components, to provide protection against failure of any one item. Where a large angle is created, users should consider whether a re-anchor may be more appropriate.

Candidates: Level 2 and 3 candidates shall demonstrate the correct rigging of either type of deviation with due regard to the angle and distance required to achieve the repositioning, and the ease of use/ passing in both ascent and descent. At Level 2 the type of deviation required shall be specified; at Level 3 candidates shall choose the appropriate type for a given situation.
Trainers: shall explain which type of deviation is appropriate for which situation, and where other types of rigging (such as re-anchors) may be more appropriate. Anchor loading, and required anchor strength in relation to the angle of deflection of the rope should be explained.
Assessors: should note that a variety of knots and methods are acceptable.



ANGLES OF DEVIATION

RETRIEVABLE RIGGING



The use of a pull-through allows the ropes to be retrieved once work has been completed. A pull through is often used at the end of an aid climb job as an easy way to exit the work area and to save climbing back to the start.

When rigging a pull through it is important to consider suitable rope protection, but this should be rigged in a way that still allows the ropes to be pulled down.

It is vital that users of a pull through get on the correct side of it. Whilst transferring onto a pull through it is advisable to keep a separate point of attachment on to the structure.

Avoid cross loading or loading karabiners over an edge, if this is unavoidable Maillons may be more suitable.

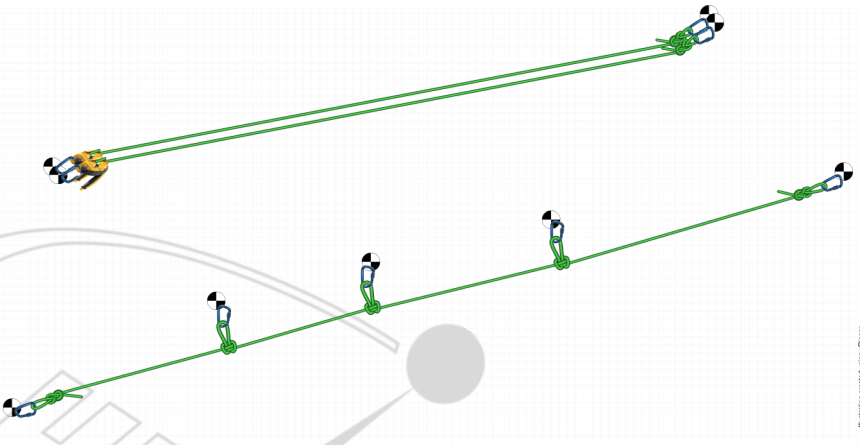
Pull-through should be considered temporary rigging for access or egress, and therefore are not considered appropriate for rescues.

Candidates: Level 2 and 3 candidates shall demonstrate the correct rigging of a pull-through from both the ground and from the anchor points.

Trainers: shall emphasise the need to protect the ropes against unseen abrasion. Good rope management shall be explained to ensure two independent systems are maintained, and to avoid cross loading of karabiners.

Assessors: should note that candidates need only demonstrate one pull-through at assessment, at the assessor's discretion. A variety of methods is acceptable.

WORK RESTRAINT/ HORIZONTAL LIFELINES



Work restraint systems should, if rigged properly, prevent rope access technicians from being in a position where a fall could take place.

Where a restraint system is used, the use of a single rope may be acceptable.

If horizontal lifelines are to be used to fully suspend a rope access technician then a double rope system should be rigged.

When a restraint system is rigged over a long distance it may be necessary to use intermediate anchors for support and to limit the amount of deflection so a fall prevention remains.

Work restraint systems should be rigged as high as possible, but still within reach of workers.

Additional work restraint systems can be attached to the horizontal lifeline or attached directly to anchor points to allow a rope access technician to belay themselves or another technician towards an unprotected edge.

Candidates: Level 2 and 3 candidates shall demonstrate appropriate rigging of work restraint lines. Candidates shall ensure that the restraint method does indeed prevent them from entering a fall hazard zone and shall demonstrate knowledge of work restraint equipment, including where and when it is appropriate to use it within rope access.

Trainers: shall emphasise that this access method restrains users within a safe area where they remain supported by the structure. Trainers should explain that work restraint lines can be rigged in a variety of ways, from a simple fixed-length lanyard anchored to a single anchor, to a system including an adjustable lanyard running along a second horizontal line anchored at both ends. When restraint lines are long, or when using a running system, allowance must be made for any potential sag and stretch of the line.

Assessors: shall verify candidates understanding and rigging of work restraint systems. The use of one point of attachment or single ropes for work restraint may be appropriate.

VERTICAL FALL ARREST SYSTEMS

Vertical fall arrest systems are typical rigged on ladders and open lattice structures to provide rope access workers with a temporary fall arrest system whilst accessing a work area. The user will attach to this system using an appropriate fall arrest device which will automatically lock into place in the event of a fall. Falls will be kept to a minimum and deviation from vertical climbing is limited. Temporary systems will be made from rope however permanent wire and rail systems are used.

A vertical fall arrest system can be used as an alternative to fall arrest lanyards or self retracting life lines.

Vertical safety systems can be employed to create a moveable anchor point for fall protection. These can be either fixed (Wire rope or Rail) or temporary (Textile rope or Webbing). When using temporary rope based systems fall arrest consider the effects of sharp and abrasive edges at all points between the anchor and the user.

When using a vertical fall arrest system it is possible to rig it in a 'rig for rescue' or 'releasable' style.

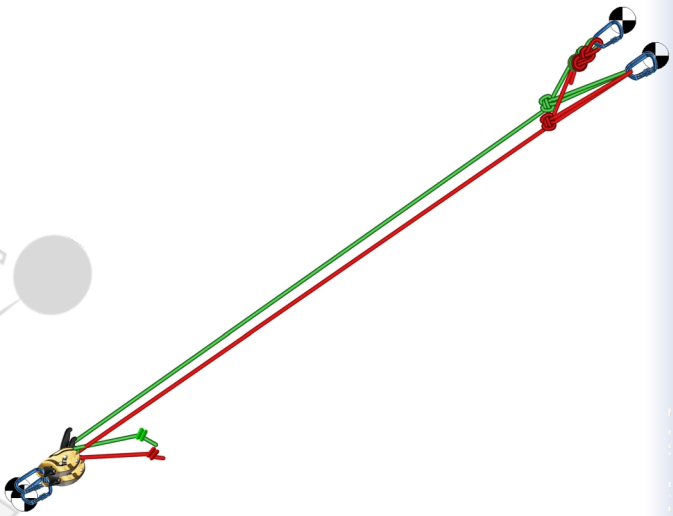
Candidates: Level 2 and 3 candidates shall demonstrate rigging a temporary fall arrest system to protect a vertical climb.

Trainers: should explain when it is appropriate to use such a system, the requirements for anchor strength and considerations for rescue.

Assessors: should ensure candidates take account of clearance distances and user numbers.

Tensioned ropes

Tensioned ropes may be used horizontally to traverse a structure or diagonally to redirect the path of descent.



Tensioned lines are normally rigged with one end of the ropes fixed in position, the other end is put through a descender, as pictured above, to allow the ropes to be tensioned and released as required.

The ropes are tensioned with a 3:1 pulley system with 1 person pulling by hand. It is important that when the ropes are tensioned that they are not over tensioned and place excessive forces on the anchor points.

When rigging horizontal tensioned ropes rope access technicians should pay close attention to the angles of rigging, forces on the anchors and safe working loads of the equipment used. A Level 3 should be able to demonstrate the calculations involved with this type of rigging setup.

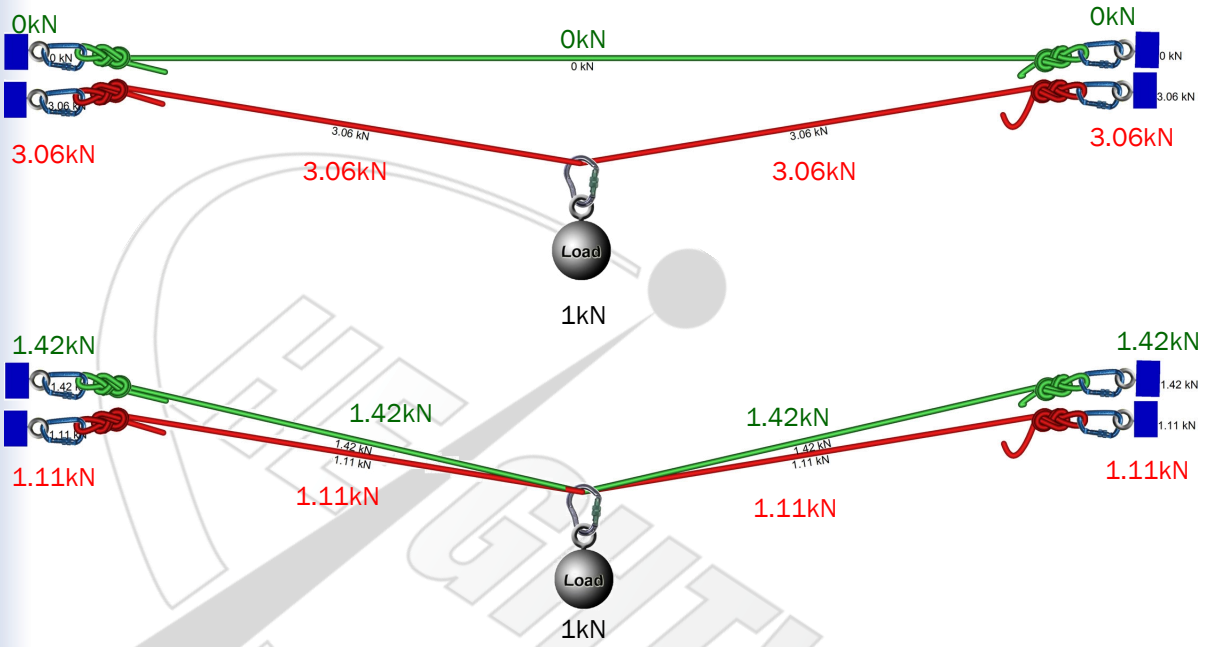
When attaching to tensioned ropes 2 points of contact must be maintained, to share the load equally on the system connectors should be around both ropes. This is normally achieved by using a long and a short cowstail. Always consider the use of a releasable attachment.

Candidates: Level 2 and 3 candidates shall demonstrate rigging tensioned ropes at any positional angle.

Trainers: should emphasise that potentially higher forces may be placed on the anchors due to the creation of wide rigging angles, and that ropes should be under as little tension as possible. Options and methods for rescue should be discussed, particularly the incorporation of releasable rigging at one or both ends. Trainers should explain how to share the technician's load across both ropes to reduce sag.

Assessors: should note that a variety of knots and methods are acceptable.

Forces on tensioned ropes



The diagram above demonstrates the importance of sharing the load over both ropes.

RIGGING FOR RESCUE AND HAULING

When using a descender as a lowering device, the manufacturers instructions may require the use of an additional braking karabiner to increase control.

This can be achieved by passing the tail end of the rope through a karabiner above the descender.

Petzl I'D Descender, Shown with additional braking karabiner

Hanging a hauling system or casualty from a releasable attachment is preferable to having to changeover a locking jammer haul or lift a casualty again during a snatch rescue.

When making a releasable attachment from a length of cord or a footloop it must not be treated as a point of attachment. Rated slings are considered to be an attachment whilst fully locked off, but not when released. It is advisable to back these up with a long cowstail.

Fully rated systems such as a Petzl Grillon or a descender threaded on a length of rope allow for longer lowers and are rated and can be treated as a point of attachment

RELESABLE ATTACHMENTS

Locking Devices

Any hauling system requires some way of locking the rope that is being hauled on. This can be achieved by the use of purpose built self-locking pulleys, pulley and rope grab combinations or a descender.

Petzl Rescue Pulley and Hand Jammer

Petzl I'D Descender

Petzl Pro Traxion

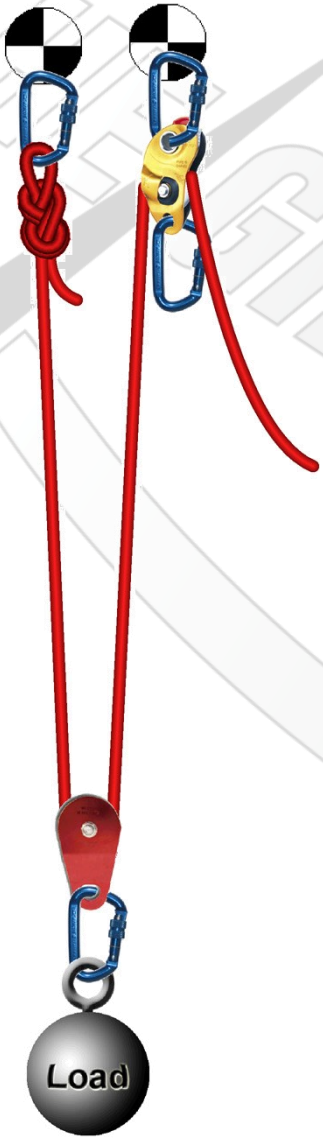
The use of a self-locking pulley is a simple, and the most efficient way to set up a hauling system, but its is difficult to lower a load once it has been raised.

Using a descender as the locking mechanism allows the hauling system to be converted to a lowering system quickly and easily, it does however create more friction and requires more effort to haul a load.

2:1 Hauling System

2:1 hauling systems are very efficient when rigged through a locking pulley (a descender creates too much friction for long hauls). The disadvantage of this type of system is the amount of rope required (2 x the height of lift) and the increased chance of tangles due to the loop in the system.

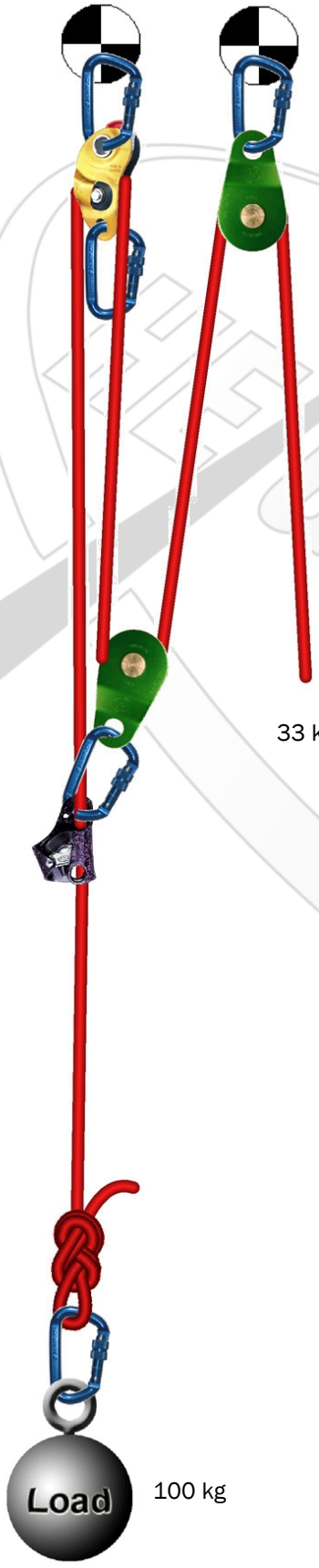
A 2:1 with the descender at the bottom of the loop is a useful way of lifting a casualty short distances during snatch rescues.



2:1 Hauling System

2:1 Hauling System

3:1 Hauling System

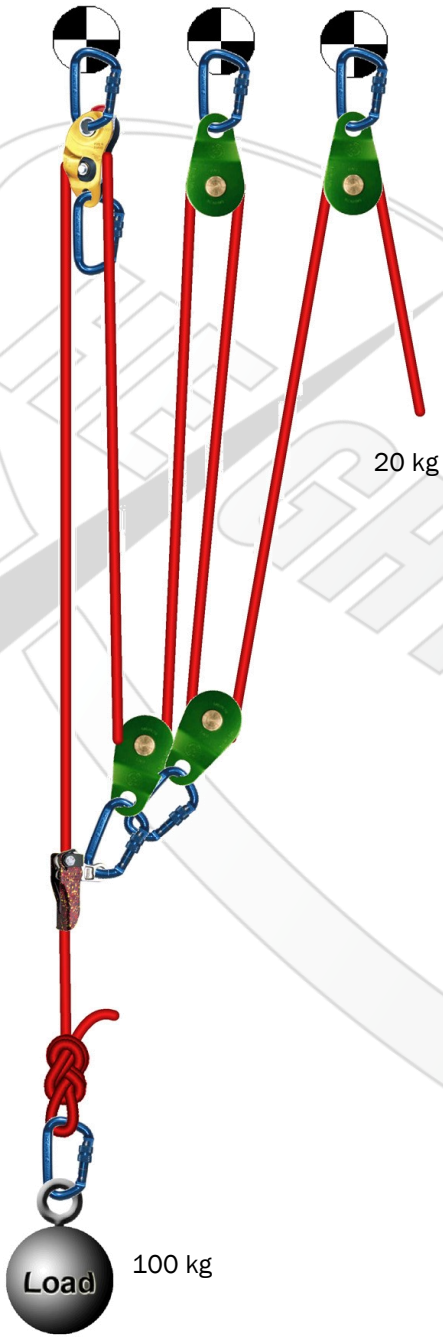


3:1 Hauling System shown with a Change of Direction pulley.

This arrangement is very efficient for hauling and uses less rope than a 2:1 system. If a short lower is also required consider using a grillon for your anchor or using a descender on the safety line to aid easy changeovers.

If the system is mainly for lowering the locking pulley can be exchanged for a descender

Increasing the Mechanical Advantage



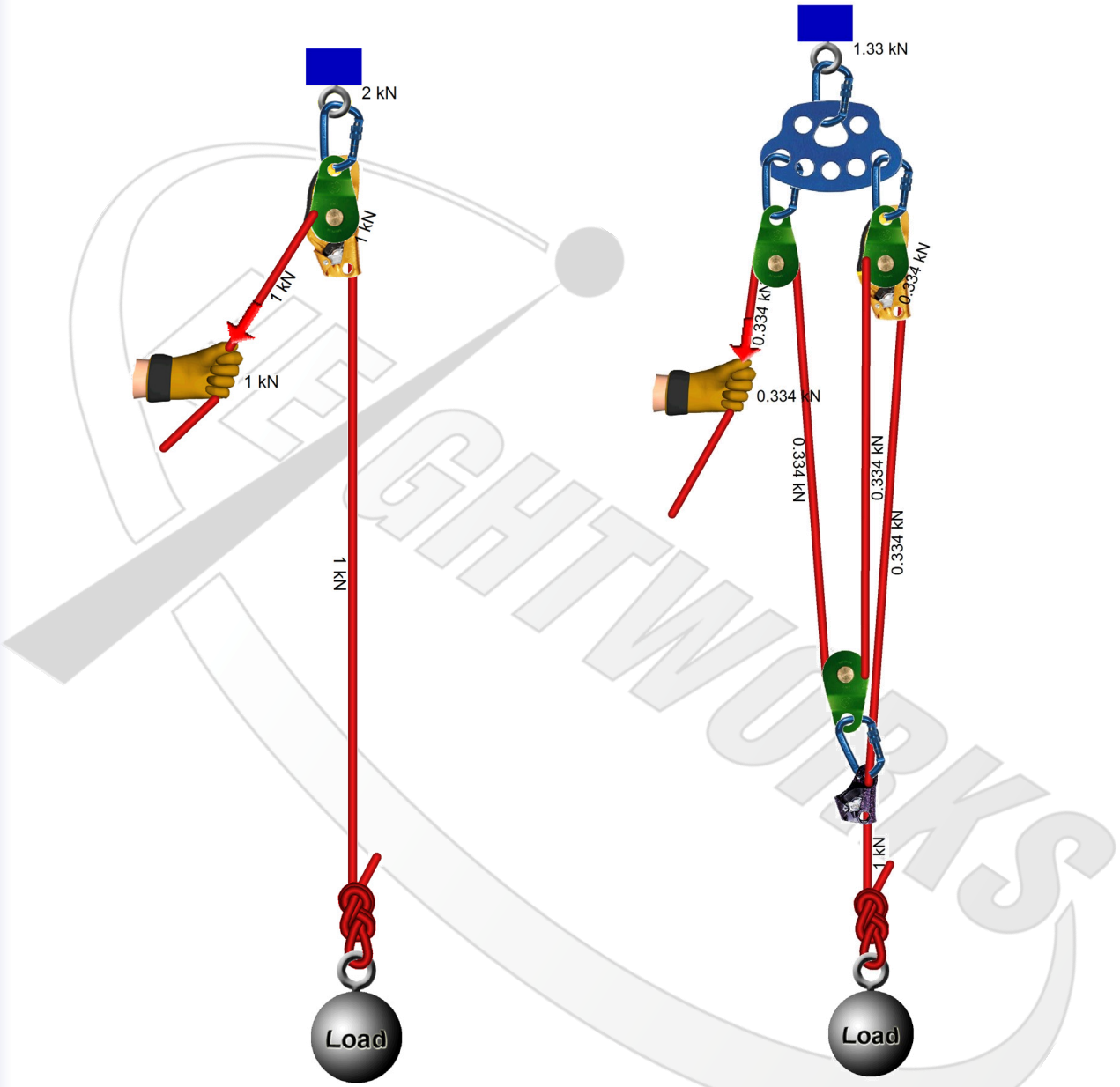
5:1 Hauling System

9:1 Hauling System

Note: Both hauling systems use the same number of pulleys, but the different configurations make a difference to the effort required to lift the load.

HAULING

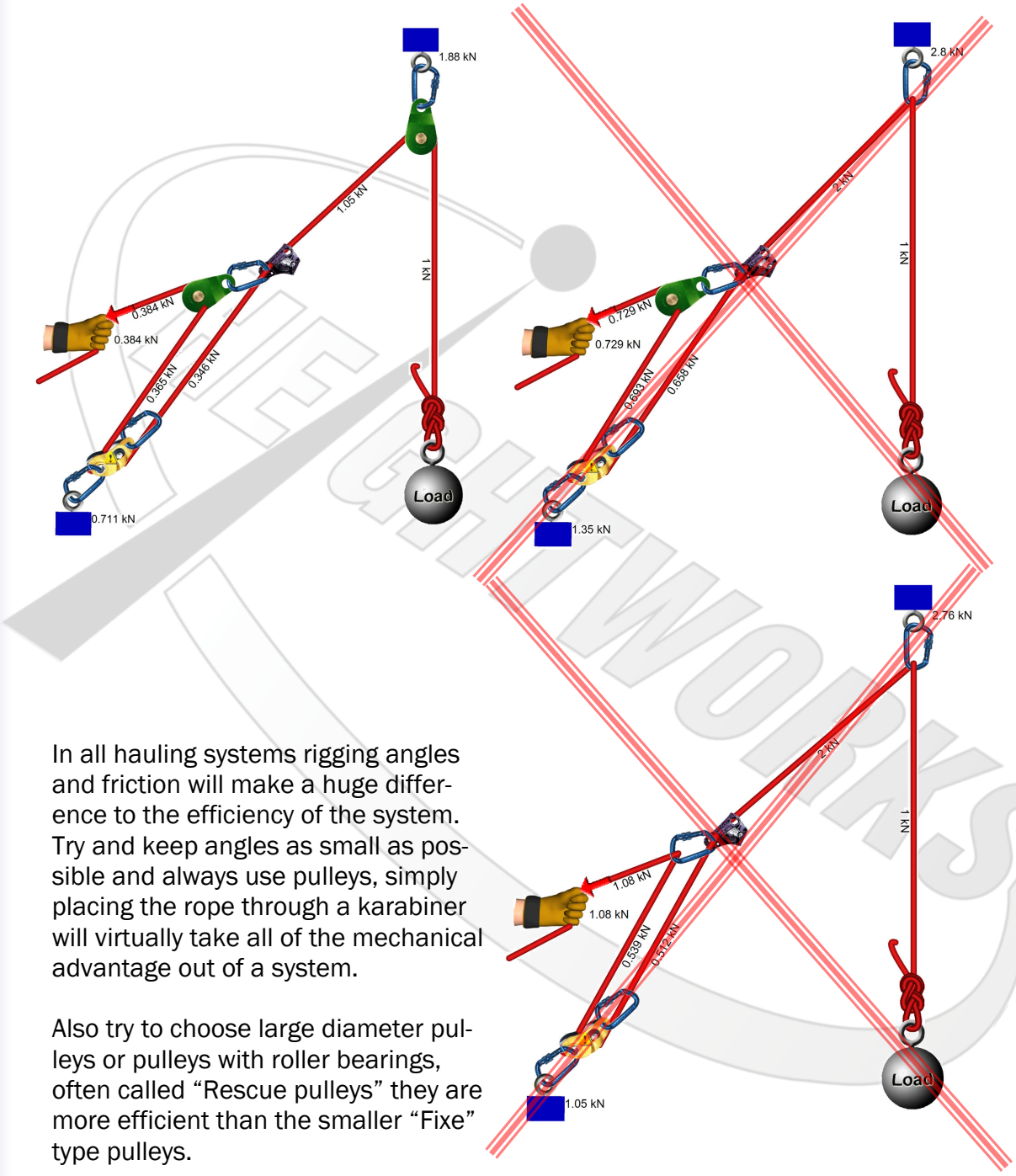
Forces in Hauling systems



When using hauling systems with high mechanical advantages potential problems arise where loads may become snagged on the structure. The load applied by the rescuer is multiplied through the system and creates a potential for failure of rope and equipment or further injury to a casualty, particularly where toothed ascenders are used. Consider the use of a Shunt in place of the Basic ascender as pictured.

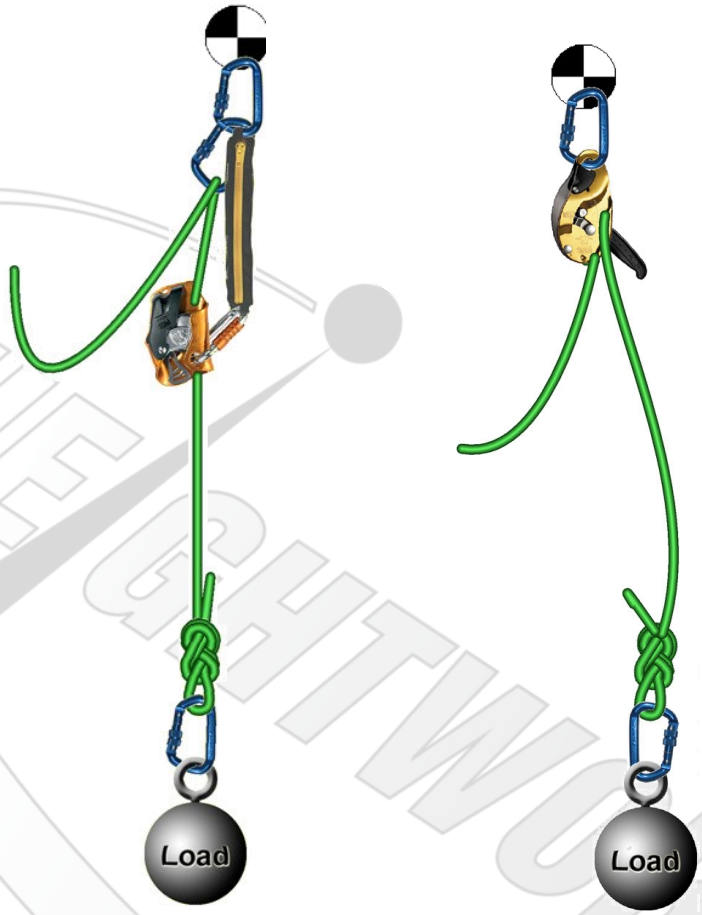
HAULING

Friction



In all hauling systems rigging angles and friction will make a huge difference to the efficiency of the system. Try and keep angles as small as possible and always use pulleys, simply placing the rope through a karabiner will virtually take all of the mechanical advantage out of a system.

Also try to choose large diameter pulleys or pulleys with roller bearings, often called “Rescue pulleys” they are more efficient than the smaller “Fixe” type pulleys.



Petzl ASAP

Petzl I'D Descender

All hauling systems require a suitable back up system to be used.

A Petzl I'D can be used as a back-up device in a haul system, this suffers from similar problems as the shunt as it can not be operated simultaneously with the haul system. The I'D can, however be converted to a hauling and lowering system if there is a problem with the main hauling system or a second person wishes to haul and make the haul easier.

A Petzl Shunt may be used as a back up device in a hauling system, during the haul both the hauling and back-up rope must be operated independently of each other which may be time consuming when hauling over a long distance.

A Petzl ASAP, when used as a back-up system may allow both the hauling and back-up ropes to be taken in and lowered at the same time, but the ASAP has a tendency to let rope run through it if not locked off.

HAULING

Basic Hauling

A basic hauling system is to be set up on a platform and a casualty raised up to the platform level, manoeuvred over the edge, then lowered to the floor.

The rescuer must consider their own safety during this rescue, the rescuer must operate the hauling system from behind a fixed barrier or handrail, or consider the use of work restraint/horizontal lifelines.

The hauling system that is used can be anyone of the systems shown on the pervious pages, and used with a suitable back-up system.

Where the casualty will have to be manoeuvred over and edge the use of a high deviation and/or a tag line may be considered.

The casualty is to be attached to the hauling system so that they are kept as upright as possible during the haul and lower.

Hanging Haul

Rescue of a casualty suspended on a set of ropes, with both working and back-up rope under tension, and must be hauled up to a safe area, there is no slack rope in the system, but a spare rope is available for a separate hauling system. The rescuer can use additional rope to create slack in the system and install a hauling system to retrieve the casualty.

- Rescuer to position themselves at the casualties anchor points.
- Set up two anchor point, one for the hauling system, one for the back-up system.
- Attach the haul rope directly to the casualties harness, this will be done either prior to ascending , by a person in the rescue team, or by the casualty if able. In unusual situations where none of these are possible it may be an option to send a weighted jammer down the casualties working rope until it hits the casualties attachment.
- Install the rope in to the locking mechanism of the hauling system and remove any slack.
- Build the hauling system.
- Raise the casualty up far enough to install the casualties back-up rope into the hauling system back-up device.
- Continue to haul the casualty.
- Take care to keep slack in the back-up rope to a minimum.

Candidates: All candidates shall show awareness of the use of hauling systems for rescue.

Level 2 and Level 3 candidates shall demonstrate rigging of all three hauling systems and their operation to allow evacuation of a casualty to a platform or stance. Hauling exercises may be conducted from platform(s) or suspended on equipment at height (hanging haul).

Trainers: Shall explain the advantages of a pre-rigged system and when an additional system may be appropriate.

Trainers shall emphasize the use of a pulley system, the need for a suitable back-up and an understanding of mechanical advantages and loads on the equipment. Trainers should explain how to haul the casualty to a platform stance and bring the casualty to rest on the platform. This may include moving the casualty over safety barriers and the use of a tag line.

Assessors: Shall look for the efficient implementation of the system and correct use of equipment.

Assessors shall be satisfied that the candidate has a general awareness of the potential difficulties that could be encountered and has an understanding of the mechanical advantages and loads on the equipment, in particular, those that could result in equipment failure.

Assessors should note that candidates need only demonstrate one hauling exercise at assessment, at the assessor's discretion. A variety of methods is acceptable.

CROSS HAUL

A cross haul involves to use of two or more hauling systems to manoeuvre a casualty from one position to another.

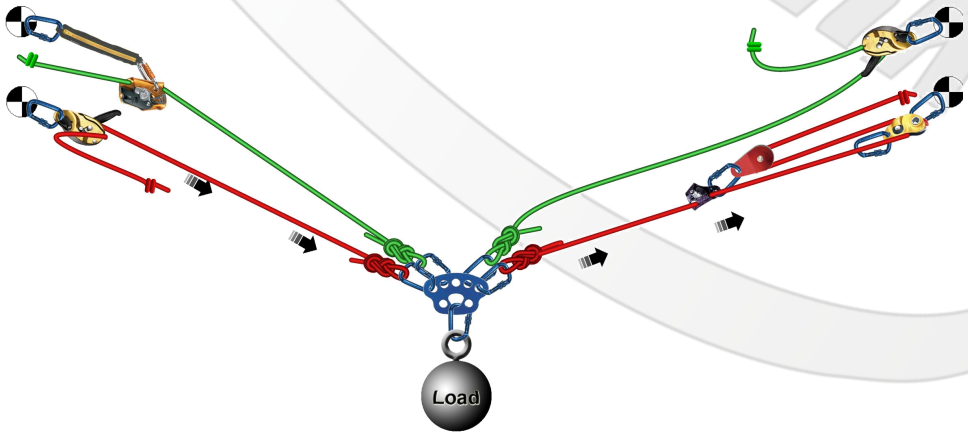
During this rescue, the rescuers may use a basic haul system from a platform or a hanging haul, or a combination of haul systems.

The casualty should be attached to the hauling systems so that they are kept as up-right as possible.

In a simple scenario one rescuer no1 will haul the casualty up whilst rescuer no2 takes in the slack rope.
Once the casualty has been raised up, rescuer no1 converts their hauling system to a lowering system, rescuer no2 builds their haul system.
With careful hauling and lowering between the two rescuers the casualty can be transferred horizontally to a new position.
Once the casualty is hanging on rescuer no2's system, rescuer no1's system can be disconnected.
The casualty can now be move onwards with another hauling system or lowered to the ground.

Throughout the rescue it is important to maintain constant communication between the hauling/lowering teams.

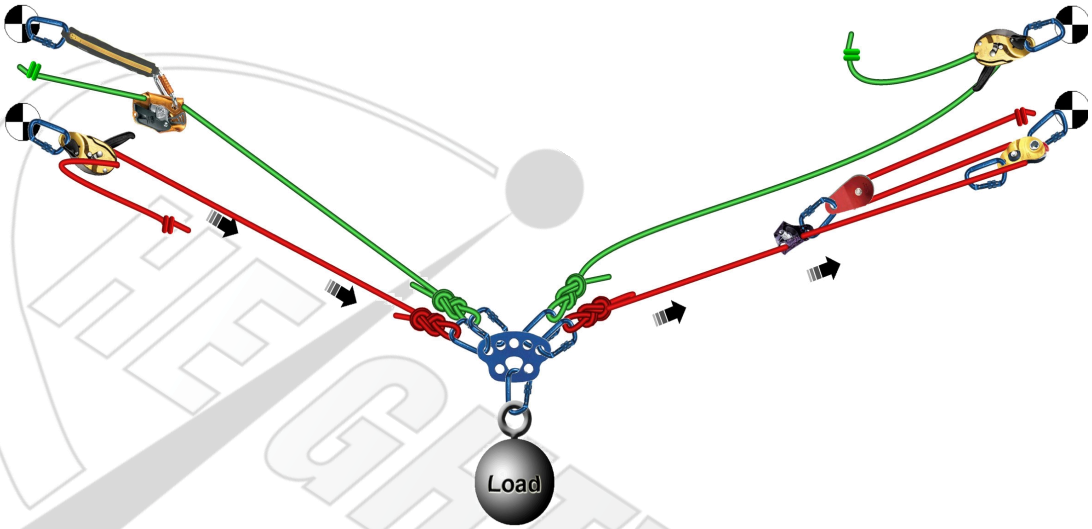
Rescuers must be aware of the loadings on the equipment and the angles created between the two hauling systems, keeping the internal angles as small as possible.



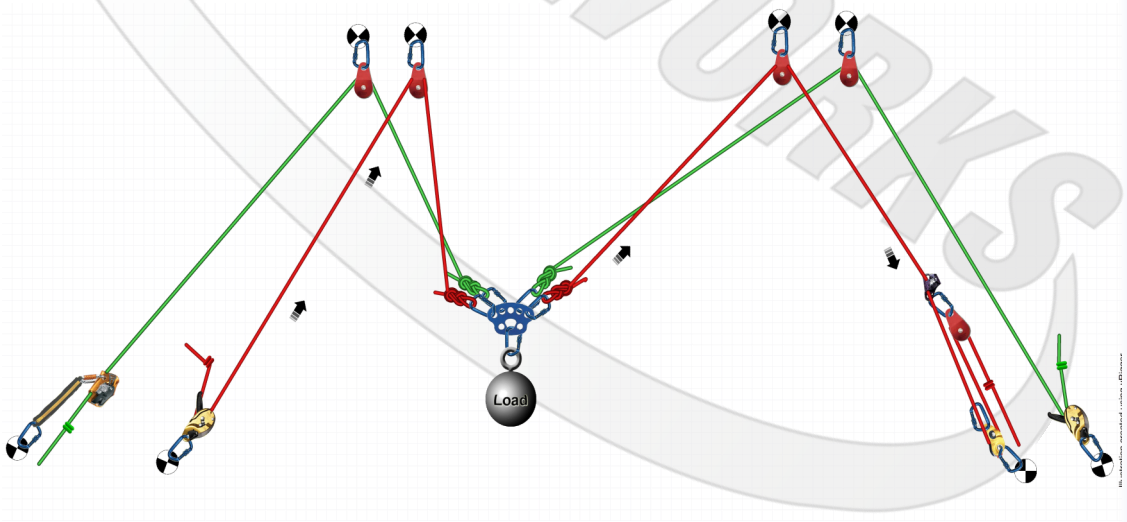
Candidates: Level 2 and Level 3 candidates shall demonstrate a cross haul of a casualty between two points.

Trainers: Should explain how two (or more) sets of haul/lower ropes and back-up systems are rigged and connected to the casualty. The casualty shall be transferred horizontally using the two systems.

Assessors: Should look for a cross haul that avoids the potential for an out-of-control swing, (e.g. one caused by the failure of a single item of equipment) by the use of an appropriate back-up. Where two persons are involved in the cross-haul rescue, assessors should be satisfied that appropriate communication is maintained.



Cross Haul operated form above.



Cross Haul operated form below.

COMPLEX RESCUE SYSTEM/ TEAM RESCUE

During advanced rescues Level 3 candidates shall take account of the following:

Team management. Candidates shall make the most effective use of their given team, taking into account the skill level of each member. Candidates shall position themselves so that they are in the most suitable place to co-ordinate the work task and likely rescue scenario.

Communication. Candidates shall communicate their intentions within the team so that each team member is clear on his/her role for the planned method of work and rescue. Clear instructions shall be given to each team member during each stage of the team rescue. Consideration shall also be given to communicating with emergency services and other site personnel.

Equipment. Candidates shall select suitable and sufficient equipment for the given task, taking into consideration the competence of the individual team members and compatibility of components.

Casualty management. Candidates shall demonstrate best practice when managing the casualty's needs, including keeping the casualty upright, providing comfort measures (e.g. a work seat or stretcher) and limiting the time spent immobile in suspension.

A level 3 rope access supervisor must be able to plan and manage a task and make appropriate provision for rescue, using all team members.

Elements of the planning stage include, but are not limited to:

- A risk assessment, which covers hazard identification, likelihood of an incident occurring and control measures to minimise the risk.
- Prior agreement of operating procedures.
- Selection of competent personnel.
- Communication.
- Selection of appropriate equipment.
- Specific procedures to deal with hazardous materials, machinery, fixtures and tools, and environmental hazards.
-

A level 3 rope access supervisor should give a toolbox talk before the start of the exercise to ensure all team members know what they have to do and how the rescue system works. A level 3 may have to demonstrate to other team members.

A level 3 supervisor should give clear instructions throughout the exercise. Do not assume that other team members, regardless of level of training or experience will know what steps to take. Eg. Do not say "Clip on that karabiner", instead say " Clip that karabiner to the casualties D ring and screw up the gate". Then ask them to hold it up so you can see it , to check it.

Candidates: Level 3 candidates shall demonstrate planning and rigging a complex rope access system, and then carrying out the associated team exercise. The system should allow evacuation of a casualty around three-dimensional obstacles.

Trainers: Should note that this exercise is designed to test the candidate's ability both to create and implement a rescue plan.

Assessors: Should plan this exercise to allow candidates between 45 and 60 minutes to plan and rig the exercise, and 15 to 30 minutes for the execution of the rescue. Assessors may use this exercise to check for a satisfactory completion of IRATA form 061, *Job planning*.

ROPE ACCESS MANOEUVRES

ROPE ACCESS MANOEUVRES

The aim of this section is to lay out the individual rope access manoeuvres required by all rope access technicians using a step by step approach, for level 1 candidates, all manoeuvres should be completed on a pre-rigged course. Level 2 and 3 candidates may be required both to rig ropes, and then to perform manoeuvres on their own rigging.

Use of the back-up device

The back-up device, which is connected to the safety line, is used to protect against falls before,
during and after attachment of the rope access technician to the working line. It should be the first
item to be attached to the anchor lines, i.e. before ascending or descending devices, and the last item to be removed at the point of egress, i.e. after removing the descending device or ascending devices. The back-up device should be managed at all times in such a way that the potential fall distance is minimized.

All candidates shall demonstrate throughout the whole of the assessment the use of a back-up device (and device lanyard, where appropriate) in accordance with best practice, the IRATA trainer member company's risk assessment and the manufacturer's instructions. This includes checking the position and function of the back-up device at appropriate times.

Ascending

Climbing a rope is the second basic technique in rope access and is accomplished by the alternate use of two ascenders, typically a chest ascender and a handled ascender with a footloop.

All candidates shall demonstrate attaching ascenders and the back-up device to a set of pre-rigged ropes, ascending, and detaching from the ropes to another system or safe area.

Descending

The controlled descent of ropes is a core technique in rope access. Rope access technicians must be able to control their speed and stop as required.
All candidates shall demonstrate attaching a descender and back-up device to a set of pre-rigged ropes. Before descending candidates shall demonstrate checking the position and function of the back-up device. During descent candidates shall demonstrate safe control of the 'tail' rope.

Candidates shall demonstrate stopping and locking off the descender device.

Changeovers

Changing from ascent mode to descent mode, and vice-versa, is an essential basic technique in rope access, and forms the basis of many other manoeuvres.

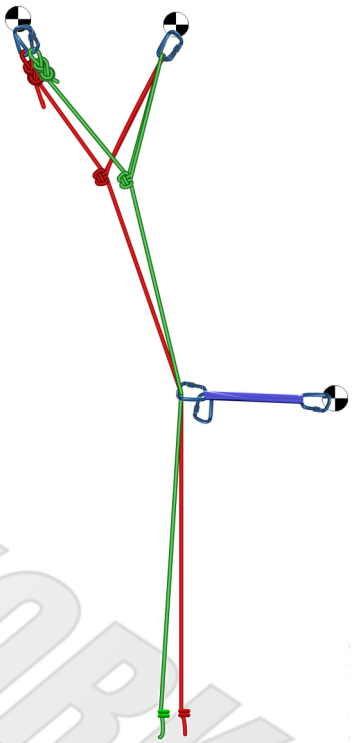
All candidates shall demonstrate changing from ascent to descent and vice-versa.

The typical methods of descending and ascending ropes will not be covered in this section as they are covered in detail in IRATA ICOP Annex K.

SINGLE ANCHOR DEVIATIONS

Single-anchor deviations are used to deviate the ropes (or the working line alone) by a small angle only. Single-anchor deviations are only appropriate where their failure would not result in serious consequences (such as a large swing into a structure, or contact with a sharp edge) and are normally rigged as a single anchor system. The sling is also rigged with a spare karabiner at the end of the deviation.

IN ASCENT



- Ascend the rope to the deviation
- Push the deviation sling up until it is horizontal, you may need to ascend further.
- Move the back up device to a position as high as it will go.
- Take hold of both ropes underneath your devices and clip them into the spare karabiner in the deviation sling.
- Ensure the karabiner is locked.
- Pull yourself along the deviation sling and remove the karabiner above your devices
- Using the deviation sling and the rope slowly lower yourself out to the vertical, you will now be above the deviation sling.

IN DESCENT

- Descend to a position level with the deviation anchor point; be careful not to descend too low.
- Make sure the spare karabiner in the deviation sling is unlocked.
- Using the rope and the deviation sling, pull yourself towards the deviation anchor point.
- When the sling has gone slack, clip the spare karabiner around the ropes above your devices.
- Ensure the karabiner is connected around both ropes and is locked.
- Undo the lower karabiner and remove the ropes.

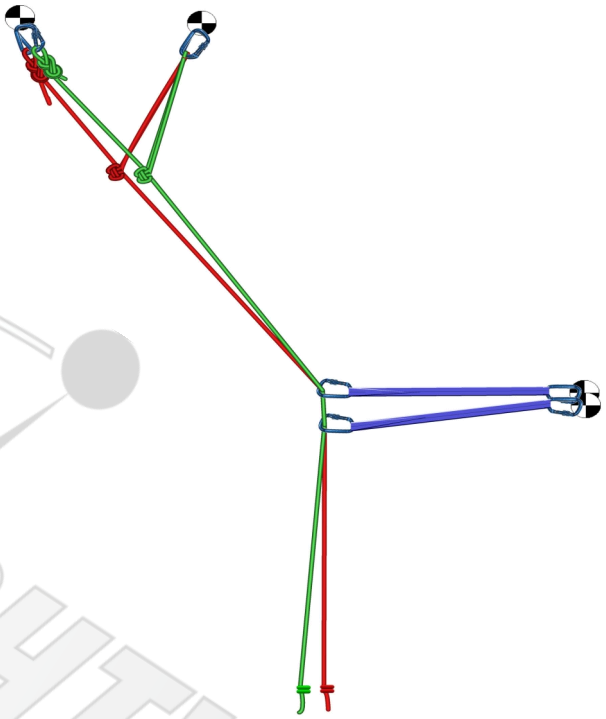
Candidates: All candidates shall demonstrate passing a single-anchor deviation in both ascent and descent modes.

All candidates shall demonstrate passing a double-anchor deviation in both ascent and descent modes.

Trainers: Shall ensure all candidates understand the two different types of deviations and the need for single or double protection as appropriate. Trainers shall stress the need to avoid out-of-control swings when passing deviations. Normally, no equipment needs to be removed from the working line or safety line in order to pass a deviation.

Assessors: Should note that a small out-of-control swing shall be considered a minor discrepancy. However, a swing that could cause injury to personnel or damage to equipment or property shall be considered a major discrepancy.

DOUBLE ANCHOR DEVIATIONS



Double-anchor deviations may deviate the ropes by a greater angle and distance than a single-anchor deviation, and allow the ropes and user to be protected against more serious hazards such as a sharp edge or a large swing into a structure. Such a deviation utilizes a double anchor system, with suitably rated anchors and connection components, to provide protection against failure of any one item. Where a large angle is created, users should consider whether a re-anchor may be more appropriate.

IN ASCENT

- Ascend the rope to the deviation
- Push the deviation sling up until it is horizontal, you may need to ascend further.
- Move the back up device to a position as high as it will go.
- Attach a long cowstail to the first sling or anchor point.
- Remove the deviation sling and replace it around both ropes beneath your ascenders.
- Ensure the karabiner is locked.
- Remove the long cowstail and connect it to the second sling or anchor.
- Remove the second deviation sling and replace it around both ropes beneath your ascenders.
- Remove the long cowstail
- Using the deviation sling and the rope slowly lower yourself out to the vertical, you will now be above the deviations.

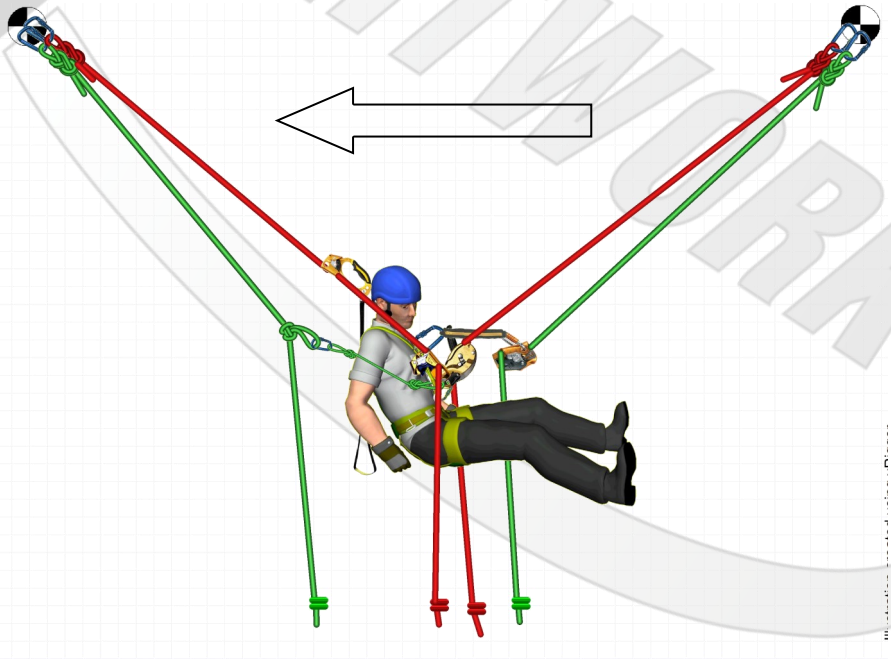
IN DESCENT

- Descend to a position level with the deviation anchor point; be careful not to descend too low.
- Using the rope and the deviation sling, pull yourself towards the deviation anchor point.
- Attach a long cowstail to the first sling or anchor point.
- Remove the deviation sling and replace it around both ropes above your descender.
- Ensure the karabiner is locked.
- Remove the long cowstail and connect it to the second sling or anchor.
- Remove the second deviation sling and replace it around both ropes above your descender.
- Remove the long cowstail.
- You will now be below the deviations.

ROPE TO ROPE TRANSFER

During the rope to rope transfer technicians must be aware of a single item failure causing an out of control swing.
The two sets of ropes being used must be joined securely together to enable the technician to move between them.
This manoeuvre will be carried out without extra equipment. As no additional backup devices are available connect to an alpine butterfly knot with a cowstail.

- Whilst on a set of ropes do a change over into descent equipment.
- Tidy the two sets of ropes, one set on one side of the body, the other set on the other side of the body, this will help to avoid tangles later on.
- Choosing one rope as the new working line place this into the chest ascender and pull through the slack, being careful not to deviate too far from vertical.
- Place the hand jammer above the chest ascender.
- Place the additional alpine butterfly knot into the backup rope, connect a cowstail to the alpine butterfly ensuring slack is kept to a minimum.
- Slowly descend or ascend to transfer your weight onto the new set of ropes.
- When the new ropes are fully weighted and the old ropes have gone slack remove the descender and backup device.
- You are now on a new set of ropes.



Candidates: Shall demonstrate transferring from one set of ropes to another set of ropes, which may be at any distance apart.

Trainers: Shall draw attention to the possibility of out-of-control swings, and the need for four points of attachment where necessary. Candidates may use two back-up devices but must have the practical knowledge of using an appropriate knot as the secondary back-up.

Assessors: Should note that a variety of recognised techniques are acceptable, but failure to install or maintain appropriate back up on one side of a wide rope-to-rope transfer leaving the possibility of a large out-of-control-swing shall be considered a major discrepancy.

RE-ANCHORS

A re-anchor is a technique for re-anchoring the ropes part way down, either to avoid a hazard or to move you in to a better work position. A re-anchor is also an effective measure of reducing the rope stretch on a long drop. Both long and short re-anchors can be approached following the method detailed below.

IN ASCENT

- Ascend the rope to the intermediate anchors.
- Change over into descent equipment
- Tidy the two sets of ropes, one set on one side of the body, the other set on the other side of the body, this will help to avoid tangles later on.
- Attach a long cowstail into the anchor point.
- Remove your back-up device and replace it on one of the ropes above the anchors.
- Stand up in your foot loop, open your chest ascender and remove the rope.
- Place the other rope from above the anchors into the chest ascender and pull through the slack.
- Remove your hand jammer and place it above your chest ascender.
- Ascend the rope until you can reach to remove your long cowstail.
- You will now be above the re-anchor.

IN DESCENT

- Descend until level with the intermediate anchors.
- Tidy the two sets of ropes, one set on one side of the body, the other set on the other side of the body, this will help to avoid tangles later on.
- Pull yourself in and attach a short cowstail to the anchors.
- Lower yourself down until you are suspended by the short cowstail.
- Remove your descender and replace it on one of the ropes below the anchors.
- Remove your back-up device and replace it on one of the ropes below the anchors.
- Attach your foot loop to the anchors, stand up and remove the short cowstail.
- Remove the foot loop.
- You will now be below the re-anchor.

Candidates: Shall demonstrate, in both ascent and descent modes, passing a re-anchor whose offset shall be less than 1.5 metres. Level 2 and 3 candidates shall demonstrate passing a re-anchor whose offset may be any distance apart.

Trainers: Shall emphasise that a back-up must protect any potential out-of-control swing or movement that may cause injury to personnel or damage to equipment or property. Therefore, a wide re-anchor (or 'loop') may require techniques similar to a rope-to-rope transfer, and the use of two back-up devices.

Assessors: Should note that a variety of techniques are acceptable for this manoeuvre. Assessors should note that a small out-of-control swing shall be considered a minor discrepancy. However, a swing that could cause injury to personnel or damage to equipment or property shall be considered a major discrepancy.

PASSING MID—ROPE KNOTS

In this manoeuvre it is assumed that knots are present in both working and backup ropes, the knot is an alpine butterfly with an additional overhand knot used to isolate a damaged section of rope. The knots are at the same level in both ropes. Knots in ropes may also be used to join ropes together. Whenever a joining knot is tied, a loop should accompany it to assist the technician in passing the knot(s). The implications of tying a knot mid rope in a rescue situation should be considered.

IN ASCENT– BACK UP ROPE

- Ascend the rope to the knot.
- Move the backup device as high as possible below the knot.
- Using the shortest possible cowstail clip into the safe loop between the alpine butterfly and the overhand knot.
- Remove the backup device and place it above the knot.
- Remove the cowstail.

IN ASCENT—WORKING ROPE

- Ascend the rope to the knot.
- Install the descender underneath the chest ascender and lock off.
- Remove the hand jammer and place above the knot.
- Stand in the foot loop, remove the chest ascender and replace above the knot.
- Remove the descender.

IN DESCENT– WORKING ROPE

- Descend to the knot.
- Change over from descent to ascent.
- With the descender now unloaded, replace it below the knot.
- Descend a short distance on the ascenders to the knots.
- To reduce the chance of hanging from the backup device it may be necessary to move it now.
- Stand in the footloop and remove the chest ascender, lower yourself onto the descender.
- You should be able to retrieve your hand jammer easily.

IN DESCENT– BACK UP ROPE

- Using the shortest possible cowstail clip into the safe loop between the alpine butterfly and the overhand knot.
- Remove the backup device and place it below the knot.
- Remove the cowstail.

Candidates: Shall demonstrate passing such a knot in both ascent and descent. Knots may be in either one or both ropes, and may be level or offset. Level 2 and 3 candidates shall demonstrate identifying, isolating and passing minor damage in a rope by tying appropriate knots (Level 1s should be capable of doing so under supervision). In addition, Level 2 and 3 candidates may be required to tie knots to join ropes.

Trainers: Shall emphasise that in the workplace damaged rope should be replaced as soon as possible. Knots may complicate rescue; therefore knots joining ropes should be avoided wherever possible, and knots used to isolate damaged rope shall be considered an emergency temporary measure. Single knots used to isolate damage should not be used as an attachment.

Assessors: Should note that a variety of techniques and knots are acceptable for this manoeuvre. Damage to rope may be simulated with the use of marker tape or similar methods.

EDGE OBSTRUCTIONS

EDGE OBSTRUCTONS

Always attach to the ropes from a safe area where there is no risk of a fall occurring, if this is not possible then work restraint or fall arrest techniques may be utilised to reach the work area safely. When ascending over an edge care must be taken not to have a potential for falls onto ascenders. Consider attaching with a long cowstail or changing onto a descender. The use of an additional etreir, tied to the rope may assist with passing an edge obstruction.

Candidates: Shall demonstrate passing a top edge obstruction, where anchor points are at or near right angles to the line of descent, in both ascent and descent modes.

Trainers: Shall ensure candidates take care to attach their equipment correctly before approaching the edge. Trainers shall draw attention to hazards associated with edges, including rope stretch and the potential for shock loads.

Assessors: Should look for appropriate safe control during this manoeuvre, and avoidance of shock loads and cross loads on equipment.

WORKSEAT

USE OF WORK SEATS

The use of a seat is to aid the comfort of the rope access technician only. It must never be used as a primary means of support, for this reason a work seat is not considered an item of PPE and therefore requires no testing or certification

Candidates: Shall demonstrate the correct attachment and use of a work seat.

Trainers: Shall emphasise that the work seat is not typically part of the fall protection system, but is intended to provide additional comfort only.

Assessors: Should note that a variety of seats and techniques are acceptable.

PASSING MID ROPE PROTECTION

Wrap-around canvas rope protectors may be installed mid-rope to protect the ropes against minor abrasive hazards.

IN ASCENT

- Ascend the ropes to the bottom of the rope protectors.
- Open the rope protectors, whilst holding yourself off the structure.
- Remove the rope protectors and replace securely on each rope underneath your devices.
- Re-secure the rope protectors around each rope, ensuring the rope protectors protect the ropes from abrasion for the next climber.

IN DESCENT

- Descend to the rope protectors
- Open the rope protectors, whilst holding yourself off the structure
- Remove the rope protectors and replace securely on the ropes above your devices
- As you ascend re-secure the rope protectors around each rope, ensuring the rope protectors protect the ropes from abrasion for the next climber.

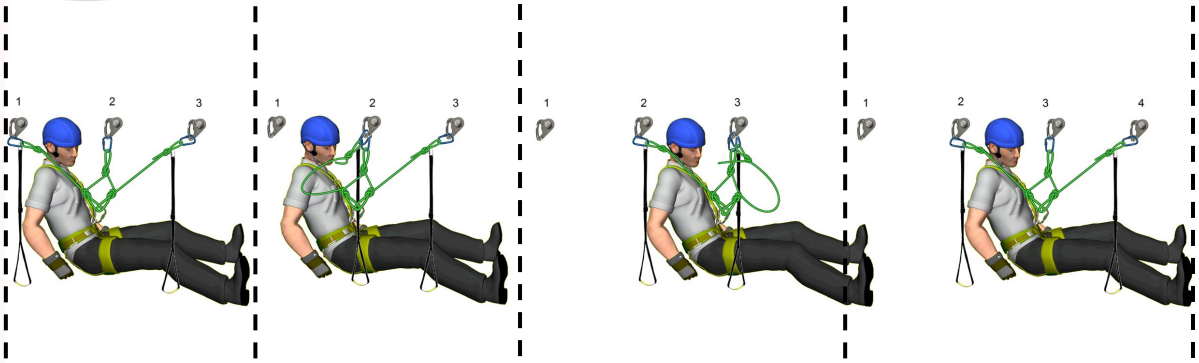
Candidates: Shall demonstrate passing and replacing mid-rope protection in either ascent or descent. Normally separate protectors should be used for each rope.

Trainers: Should ensure that candidates are able to, pass the protectors and reinstate them in the appropriate place, including securing them to either structure or rope as required. Trainers should ensure such exercises are carried out in a realistic practical setting, i.e. at a potential contact hazard on a structure.

Assessors: Should look for safe and appropriate use of rope protectors and their correct installation.

CLIMBING TECHNIQUES

HORIZONTAL AID CLIMBING



The use of aid climbing techniques enable rope access technicians to reach parts of a structure without the use of ropes, instead fixed (bolts) or movable anchors (tape slings or wire strops) are used. Additional foot loops or etrier are often required for aid climbing.

A typical and efficient setup utilises an etrier on the end of each of your two long cowstail and a spare karabiner connected to your short cowstail.

These cowstails are then connected to your anchors with the left cowstail on the left anchor.

The short cowstail connected to the middle anchor

And the right cowstail on the right anchor.

To pass an obstruction you must always maintain two points of attachment with the structure, by using three cowstails to climb with this ensures you always have two points of attachment leaving one cowstails to move past the obstruction.

Candidates: Shall demonstrate horizontal aid climbing, progressing primarily in suspension by moving along:
a) a series of fixed anchors;
b) with the use of moveable anchors such as strops or slings.

Trainers: Shall emphasise the need for a minimum of two independent attachments at all times; therefore the use of at least three lanyards is required. Trainers shall emphasise the need to select suitably positioned and sufficiently strong anchors, and also the need to minimise potential fall distances and shock loads.

Assessors: Should be aware that this exercise is intended to demonstrate the candidate's ability to both move across the structure, and to change from aid to ropes and vice versa. Suitable aid climbs for assessment should cover at least five metres horizontal movement, and with movable anchors should pass at least two separate obstructions.

VERTICAL AID CLIMBING

When aid climbing vertically the same procedure is used as for horizontal aid climbing. Consideration needs to be made to the possibility of a failure of equipment resulting in a fall factor of above 1. An energy absorbing lanyard can be used to allow for the higher forces involved, however the increase in clearance distances required must also be considered.

Candidates: Level 2 and 3 candidates shall demonstrate vertical aid climbing, progressing primarily in suspension in an upward direction.

Trainers: shall explain the suitability of different types of lanyards, and emphasise the need to minimise potential fall factors, distances and shock loads.

Assessors: should note that a variety of lanyards and techniques are acceptable. Suitable aid climbs for assessment should cover at least three metres vertical distance.

CLIMBING WITH FALL ARREST LANYARDS

Fall arrest lanyards can only be used with a full body fall arrest harness to EN361. Heightworks Ltd and IRATA recommend the use of a front (sternal) fall arrest point, although a rear (dorsal) fall arrest point may be used in certain situations. Whilst using fall arrest lanyards only one lanyard needs to attached to the structure at a time, this is one point of attachment; the other point of attachment is your hands and feet.

It is important that the fall arrest lanyards selected will arrest the fall before you hit the ground or structure. Use as short lanyards as practical and always attach them as high as you can in relation to your own body. Ensure that connectors on the lanyard are compatible with the structure.

The unused leg of a Y shaped lanyard must not be attached back to your harness, this can potentially isolate the energy absorber and prevent it from extending during a fall.

Any attachment point must be unquestionably reliable and fixed, attachment to vertical and diagonal steelwork should be avoided as this can result in increased fall factors (>FF2).

When combining fall arrest lanyards with a work positioning lanyard, attach the work positioning lanyard to an independent attachment where it cannot slip. Do not remove your fall arrest lanyards. It is important that work positioning equipment does not become slack as they do not include an energy absorption.

Candidates: All candidates shall demonstrate a vertical climb with the use of a pre-installed temporary or permanent fall arrest system.

All candidates shall demonstrate climbing using a twin-tailed fall arrest lanyard, maintaining appropriate attachments at all times. Candidates shall demonstrate changing to and from work positioning (i.e. supported by a work positioning lanyard such as a cow's tail) during this exercise.

Trainers: Should ensure candidates understand the specific equipment requirements of fall arrest systems, including a full body harness, an energy absorber and appropriate connectors, which meet the requirements of recognized standards.

Trainers should ensure candidates are able to identify safe anchor points, that they connect to them correctly and that they understand the need for an adequate clearance distance below. Specific guidance on clearance distances is typically provided in manufacturers' instructions.

A fall factor measures the theoretical severity of a fall and is calculated using the following formula:

$$FF = \frac{\text{Length of fall}}{\text{Length of rope or lanyard}}$$

EN355 Energy absorbing lanyards are designed to reduce the impact force to below 6KN when using a lanyard of maximum length 2m and a 100kg load.

The distance of fall should be kept to a minimum, the less distance of fall the less energy will be created this will affect how far the energy absorber deploys and have an impact on clearance distances. Users of fall arrest lanyards should use lanyards that are as short as practical for the task and aim to keep their fall factor to a maximum of 1. Where fall factors of more than 1 are unavoidable extra care must be taken with regard to any obstructions in the path of the fall.

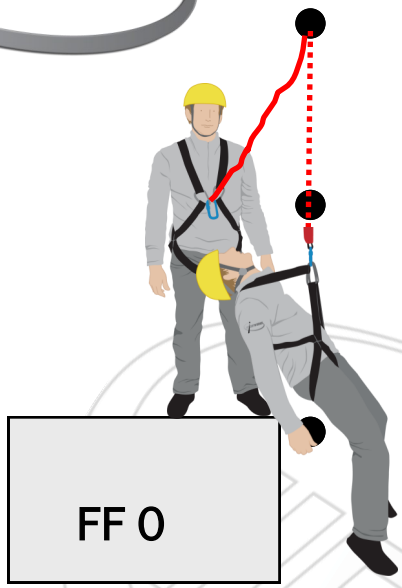
Extreme care must be taken when lanyards with no energy absorbers are used. Falls of any distance are forbidden and longer falls (2-4m) are likely to cause serious or fatal injuries.

When using dynamic rope cowstails for fall protection the maximum permissible fall factor is 1. Consideration must be made as to the length of the cowstail (approx 60cm) and the knots used to terminate the cowstail. A barrel knot will provide more shock absorbency than an overhand or figure of 8 knot.

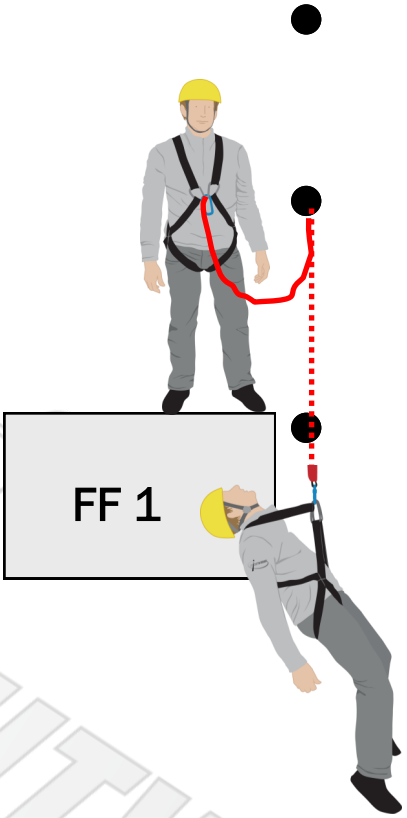
Heavy (>100kg) users of fall arrest equipment must be careful as not to overload the energy absorber during a fall. A 120kg person can fall a maximum of 3.3m onto a 2m lanyard in order to create a load of less than 6KN, this is just above a fall factor 1.5. It can be advantageous to use shorter lanyards which will not allow a fall greater than 3.3m to be created (1.65m with a full sized energy absorber).

Guidance on fall factors, clearance distances and associated risks is provided in *ICOP Part 3, Annex Q*.

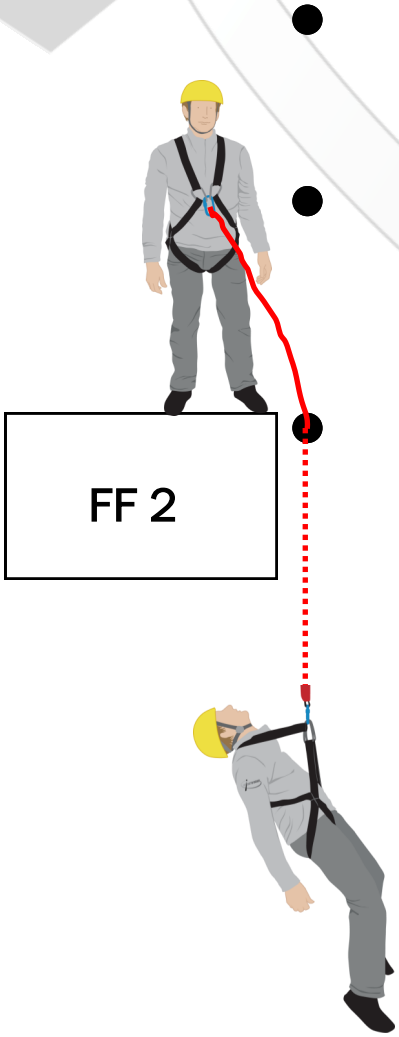
FALL FACTORS



It is acceptable to fall onto a work restraint , fall arrest or dynamic rope lanyard (cowstail)

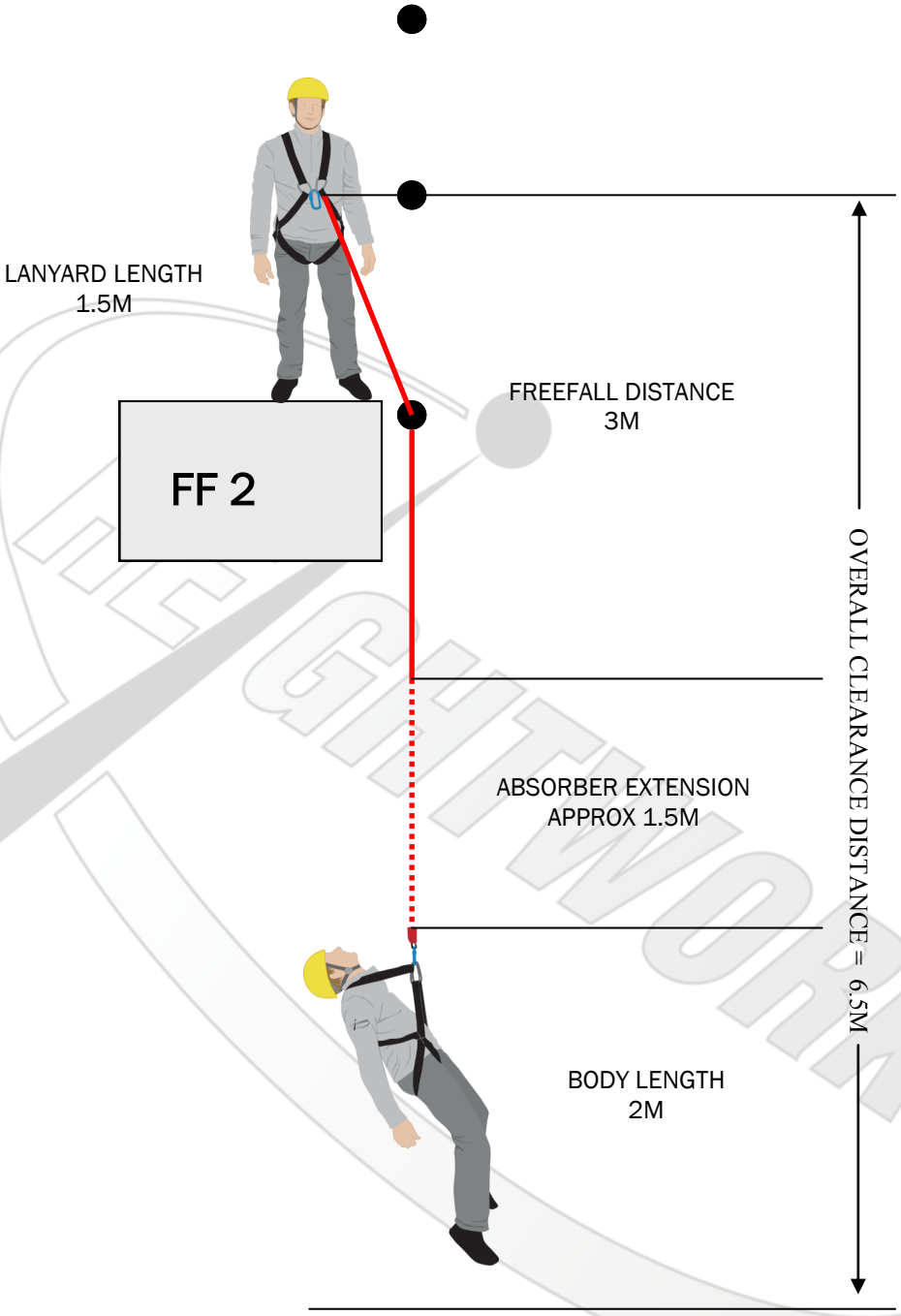


It is acceptable to fall up to 2m onto a fall arrest lanyard or 60cm onto a dynamic rope cowstail (FF1). It would be advisable to use Barrel knots in your cowstails to minimise shock loads



It is acceptable to fall up to 4m (FF2)onto a fall arrest lanyard although this is not recommended and measures should be put in place to prevent this. Although the lanyard is designed to hold the fall you are likely to strike the structure during the fall and be left in an exposed position post fall

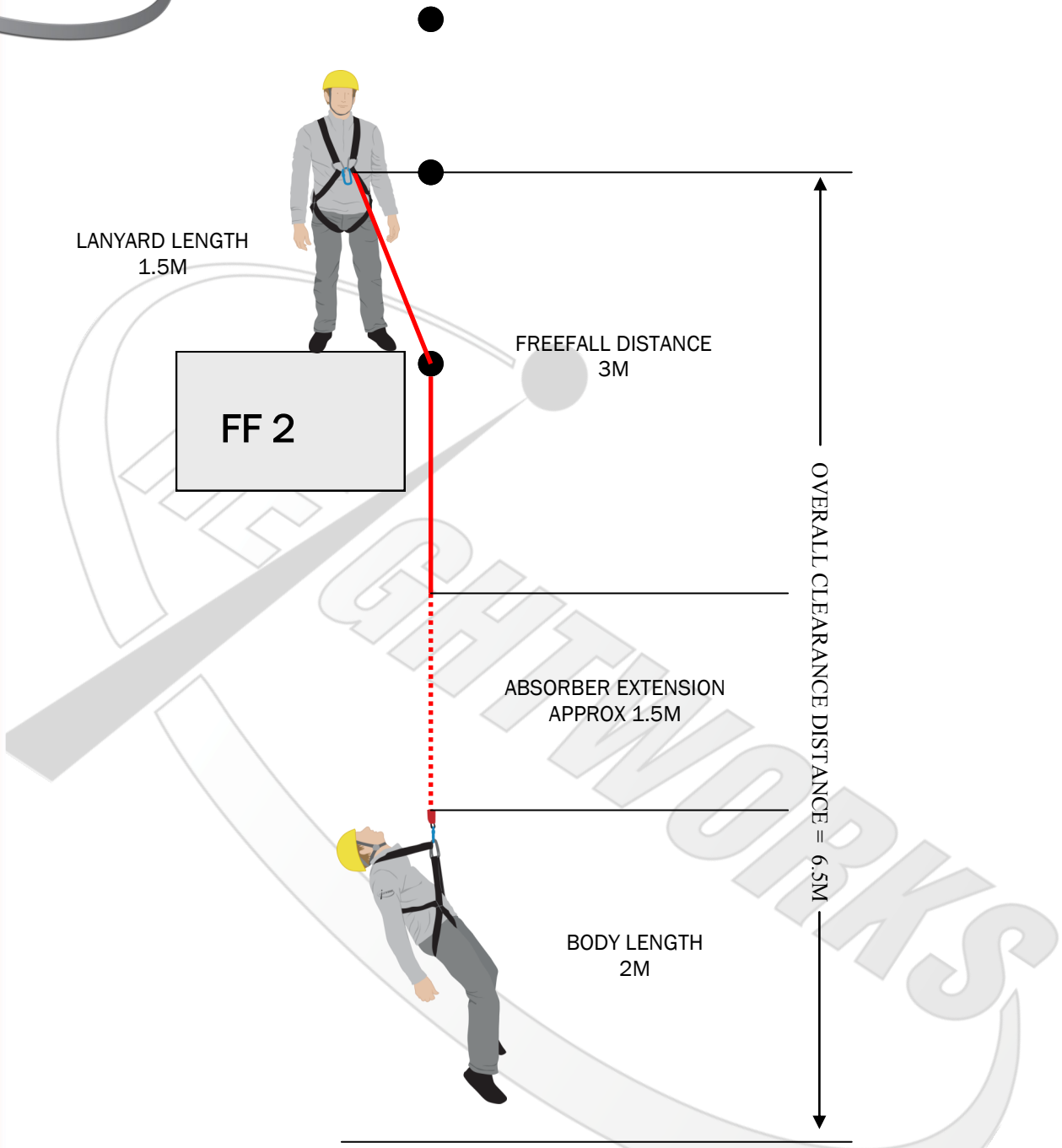
Where fall arrest lanyards are used the energy absorber will extend in order to dissipate energy. Care should be taken in ensuring that there is adequate clearance below the operative. (see clearance distances overleaf)



This shows a worse case scenario for a 1.5m lanyard, a 2m lanyard positioned for a fall factor 2 fall would result in worse fall in terms of fall distance.

The clearance distance can be greatly reduced by limiting fall factors to 1 and reducing the length of the lanyards. By reducing the freefall distance you reduce the energy in the fall , this will result in less extension from the energy absorber.

CLEARANCE DISTANCE



This shows a worse case scenario for a 1.5m lanyard, a 2m lanyard positioned for a fall factor 2 fall would result in worse fall in terms of fall distance.

The clearance distance can be greatly reduced by limiting fall factors to 1 and reducing the length of the lanyards. By reducing the freefall distance you reduce the energy in the fall , this will result in less extension from the energy absorber.

Various techniques exist for direct progression on a structure using personal fall protection equipment. These techniques can be broadly split into two methods:

- 'Aid' climbing suspended by work positioning lanyards (such as cow's tails);
- Climbing with fall arrest equipment (such as energy-absorbing lanyards or pre-installed fall arrest systems).

In some situations, a combination of the two methods may be used. Guidance on other methods, such as lead climbing, is provided in *ICOP Part 3, Annex L.*

Although lead climbing will not form part of a IRATA assessment, it is recommended that Level 3 candidates read and understand this annex.

ROPE RESCUES

PRINCIPLES OF RESCUE

Before rope access work begins all team members should fully understand the rescue plan should an incident occur. A thorough rescue plan should be part of the risk assessment and method statement.

All team members should be briefed on:
Their role and responsibilities during a rescue
Sequence of events during a rescue
Location of rescue and first aid equipment
Communications, between rescue team members and emergency services

All team members should fully understand the techniques involved in carrying out a rescue. If the rescue plan is particularly complex then a rescue drill maybe required.

Rescue equipment and a first aid kit should accompany the rope access team, this should include enough equipment to retrieve a casualty from any rope access situation. Dedicated rescue equipment should not be used for any other task.

If the Risk Assessment dictates that in the event of a rescue being required the rescuer cannot access the casualty's position, or that the time required setting up and implementing a rescue would prove too lengthy, a rescue system should be pre-rigged. If deemed necessary, this may be attached to the operative throughout the work task or ropes could be rigged to include the haul system.

Before any rescue is implemented it is important that the team supervisor or rescue co-ordinator assesses the situation, then tries to communicate with the suspected casualty to ascertain his/her condition and to decide whether a rescue is necessary.

The rescuer's orders of priorities are:
Not to endanger themselves
To prevent further injury to the casualty
To evacuate the casualty to the point of safety as soon as possible, where essential and effective treatment may be administered.

Casualty management must be constantly addressed throughout any rescue, with the rescuer taking sufficient steps so as not to worsen any injury sustained by the casualty. The casualty should be suspended by the sternal attachment point as this may help to manage the casualties airway. The casualty should be protected against impact with any obstacles whilst the rescue is in progress.

It is the responsibility of the rope access team to provide first aid to a casualty until medical care arrives. The rope access team must insure that suitable equipment is at the work site and that the team are suitably trained. Location and work activity will determine what measures are implemented.

DESCENT RESCUE

A snatch rescue may be implemented in the unlikely event of a casualty becoming incapacitated. This may be done on a separate set of ropes or using the casualties ropes.
All ways start in descent mode, at level 1 the casualty will also be in descent.

Separate rope:

- Descend until level with the casualty.
- Ensure all ropes are cleared from between rescuer and casualty to prevent tangles whilst descending.
- Connect a long cowstail between you and the casualties waist D ring.
- Using your short cowstail or 2 karabiners, make a connection to the karabiner from your descender to the ventral attachment point to the casualties chest D ring.
- Lower the casualty slowly to transfer their weight onto your descender
- Your casualty will now be in an upright position, suspended from your descender.
- Pass the breaking rope through a karabiner connected to a structural part of the harness below the descender (NOT the gear loop).
- Descend under control, the casualties backup device may be left in place as additional security.

Same rope:
Casualty in descent mode

- Ascend the casualties' ropes using the casualties backup rope as your working rope and the casualties working rope as your backup.
- Ascend the casualties ropes until level with the casualty.
- It may be necessary to move your hand jammer above the casualties backup device to prevent them becoming locked together.
- Use a karabiner around the casualties chest harness and clip it around the working rope.
- This will keep the casualty upright.
- Ensure all ropes are cleared from between rescuer and casualty to prevent tangles whilst descending.
- Connect a long cowstail between you and the casualties waist D ring.
- Using your short cowstails connect to the karabiner of the casualties descender.
- Remove your backup device.
- Descend on your ascenders to transfer your weight onto the casualties descender.
- Pass the breaking rope through a karabiner connected to a structural part of the harness below the descender (NOT the gear loop).
- Descend under control.
-

Candidates: All candidates shall demonstrate the rescue of an 'unconscious' casualty (i.e. feigning immobility) in descent mode, from an adjacent set of ropes.
Level 2 and 3 candidates shall demonstrate a descent rescue using the casualty's own ropes.

Trainers: Shall emphasise that candidates may be required to approach the casualty from above or below.

Assessors: Should check that correct attachments are maintained and that a controlled descent is made.

ASCENT RESCUE

Rescue of a casualty from their ascenders. This may be done on a separate set of ropes or using the casualties ropes. This technique uses a counterbalance to lift the casualty a short distance. Note: this does not create any mechanical advantage.

- Position yourself at the same height as the casualty.
- Remove the casualties hand jammer and then Install a second back-up device onto the rope above the casualties chest jammer.
- Changeover onto your descender and re-position yourself.
- Attach the casualties descender to their chest attachment point and thread the casualties working line in to it, and lock it off.
- Thread the your foot loop through the karabiner on your second back-up device above the casualty and connect it to the top of their chest ascender/maillon.
- Stand up with a straight leg, all your weight must be pushing down– your leg must be straight.
- Reach down and pull up on the casualties harness, the casualty should raise a short distance and the rope in the chest ascender go slack.
- Remove the rope from the chest ascender, pull any slack rope through the descender and lock it off.
- Sit down and remove the foot loop.
- You and the casualty should now be both on descenders with high back up devices.
- The rescue can now completed the same as a snatch rescue form a descender.

Candidates: Level 2 and 3 candidates shall demonstrate a mid-rope rescue of an 'unconscious' casualty, i.e. feigning immobility, while suspended on ascenders. The rescuer should be able to ascend or descend to a casualty, de-weight the casualty and descend to the ground.

Trainers: Shall ensure that the candidate is able to demonstrate a rescue from ascent mode of an 'unconscious' casualty, using both of the following methods:
a) from a separate set of ropes;
b) using the casualty's own ropes.

Assessors: Should note that candidates need only demonstrate one rescue from ascent during assessment, at the assessor's discretion.

DEVIATION RESCUE

Rescue of a casualty from above a deviation.
There are many different ways to pass through a deviation with a casualty.

If the deviation is small it may be possible to use the same technique as the rope manoeuvre.

For a larger deviation, an adjustable sling, such as a mariners knot may be used;

- Descend with the casualty until you are level with the deviation.
- Take a spare sling and a karabiner, clip the karabiner and the sling around the ropes above you.
- Thread the other end of the sling through the spare karabiner in the deviation sling.
- Keeping the sling as neat as possible, wrap the end of the sling between the karabiner around the ropes and the karabiner in the deviation.
- This should pull you and the casualty towards the deviation and release the tension on the karabiner in the deviation below you.
- To tie off the mariners hitch, wrap the tail end of the sling around the sling between the karabiners, then push the end through the middle of the sling and secure with a karabiner.
- You should now be underneath a new deviation with no weight on the old deviation sling.
- Remove the old deviation karabiner.
- Descend to the ground under control.

Candidates: Level 2 candidates shall demonstrate descending with a casualty through a single positional deviation.
Level 3 candidates shall demonstrate descending with a casualty through a double deviation.

Trainers: should emphasise the avoidance of out-of-control swings, loading of the casualty's cow's-tails, and potential slack in the back-up line.

Assessors: should look for the avoidance of loading of the casualty's cow's-tails.

ROPE TO ROPE TRANSFER RESCUE

Descending with a casualty and transferring from one set of ropes to another. The rescue is carried out in the same way as a basic rope to rope transfer, this rescue is made easier by the use of additional equipment from the casualty.

- Descend under control with the casualty, stop and lock off the descender.
- Ensure the back up device is in a high position.
- Sort out both sets of rope to ensure there are no tangles during the manoeuvre.
- Take the spare descender and connect it to the harness next to the loaded descender, making sure both casualties and rescuers connections are in the same karabiner.
- Thread the new working rope into the descender and pull through as much slack rope as possible.
- Install the spare back up device on to the new back up rope.
- Descend/ascend across on to the new ropes, remove the attachments from the original ropes.
- You should now be on a new set of ropes and tangle free.
- Descend to the ground under control.

Candidate: Level 2 and 3 candidates shall demonstrate transferring, with a casualty, from one set of ropes to another set of ropes rigged more than 3 metres apart.

Trainers: should emphasise:
a) good casualty management;
b) maintaining four appropriate points of attachment when required;
c) potential use of the casualty's personal equipment;

Assessors: should look for a rope-to-rope transfer that avoids the potential for an out-of control swing, e.g. one caused by the failure of a single item of equipment, by the use of appropriate back-ups.

RESCUE OF A CASUALTY FROM ABOVE A RE-ANCHOR.

This rescue is made easier by the use of additional equipment from the casualty. Rescuers should be aware of the possibility of tangles of ropes in this manoeuvre, especially descending into the loop of the re-anchor and ending up with the casualty on one side and the rescuer on the other.

- Ascend or descend to the casualty until you are level with them.
- If the casualty is in ascent mode then an ascent rescue will have to be performed first.
- With the casualty on their descender, and the rescuer on a descender transfer one person so that both casualty and rescuer are suspended by one descender and a back-up device. Whilst connecting to the casualty ensure that you sort out both ropes so there are no tangles between you and the re-anchor.
- Descend to the re-anchor using extra friction.
- Stop when level with the re-anchor and make sure both casualty and the
- rescuer are on the same side of the loop.
- Take the spare descender and connect it to the harness next to the loaded descender, making sure both casualties and rescuers connections are in the same karabiner.
- Thread the rope from under the re-anchor into the descender and pull through as much slack rope as possible.
- Install the spare back-up device onto the back-up rope below the re-anchor.
- Descend/rope to rope transfer across on to the ropes below the re-anchor, remove the gear from above the re-anchor.
- You should now be below the re-anchor and tangle free.
- Descend to the ground under control.

Candidates: Level 2 and 3 candidates shall demonstrate descending with a casualty through a small re-anchor, with an offset of no more than 1.5 metres.

Trainers: should emphasise the avoidance of tangles with the re-anchor loops and loading of the casualty's cow's-tails.

Assessors: should look for a lack of tangles and the avoidance of loading of the casualty's cow's-tails.

LARGE RE-ANCHOR RESCUE

Rescue of a casualty through a large re-anchor, sometimes called a “loop rescue”. This rescue can be made easier during the rigging stage of setting up your worksite, by making the loops of the re-anchor as large as possible. The smaller the loops the harder it is to move you and a casualty through them. The move through the loop is treated the same as a rope to rope transfer, the main difference being that you will have to climb one side of the loop to prevent yourself and the casualty becoming stuck. Do not descend into the bottom of the loop.

- If the casualty is in the bottom of the loop in may be necessary to ascend one side of the loop with the casualty in order to gain some slack in the system.
- Once at the casualty, both casualty and rescuer need to be suspended from a descender and a back up device, leaving one set of equipment spare.
- Sort out the loop of rope to ensure there are no tangles during the manoeuvre.
- Take the spare descender and connect it to the harness next to the loaded descender, making sure both casualties and rescuers connections are in the same karabiner.
- Thread the rope from the other side of the loop into the descender and pull through as much slack rope as possible.
- Install the spare back up device on to the other side of the loop.
- Descend/rope to rope transfer across on to the other side of the loop, you may need to use a spare jammer and pulley as a 2:1 pulley system to climb the ropes to avoid the bottom of the loop.
- You should now be on one side of the loop and tangle free.
- You may have to complete another rope to rope transfer onto ropes that reach the ground.
- Descend to the ground under control.

MID-TRANSFER RESCUE

Rescue of a casualty from the mid point of a rope to rope transfer.

Ascend or descend to the casualty until you are level with them.
Position yourself level with the casualty on your descender,
Using a long cowstail make a connection to the casualties waist D-ring.
Attach an additional descender to the casualties waist D-ring, thread the rope from the chest ascender into the descender.
Using a counterbalance remove the casualties chest ascender.
Using a short cowstail make a connection into both of the casualties descenders.
You should now be hanging below the casualty using their equipment.
Continue to descend to complete the rope to rope transfer.
Descend to ground under control.

Candidates: Level 3 candidates shall demonstrate the rescue of an 'unconscious' casualty, i.e. Feigning immobility, who is suspended:
a) at any point during a wide (more than 3 metres apart) rope-to-rope transfer;
b) at any point whilst crossing a wide (more than 1.5 metres offset) re-anchor (aka a 'loop').
The candidate shall attend to the casualty, manoeuvre them out of the situation, and return them to a safe platform such as the floor.

Trainers: shall stress the consequences of failure of any one item of equipment and the need for four points of attachment.

Assessors: should look for a rescue that avoids the potential for an out-of-control swing, e.g. one caused by the failure of a single item of equipment, by the use of an appropriate back-up. Assessors should note that candidates need only demonstrate one mid-transfer rescue during assessment, at the assessor's discretion.

RESCUE PASSING MID ROPE KNOTS

Rescue of a casualty and descend a set of ropes with knots tied below the rescuer and casualty. The knots are to isolate damaged rope and cannot be removed. The knots may be at the same height or off set.

- Descend to the knots under control.
- Do not abseil on to the knot, leave a short distance between the descender and the knot.
- Attach a rope grab to the rope above your descender. Install a releasable attachment to the rope grab and to your loaded attachment point.
- Install a second descender to the working rope directly below the knot.
- Transfer your weight onto the releasable attachment and remove the original descender.
- Lower your weight onto the descender below the knot.
- Pass knot on back-up rope.

Candidate: shall demonstrate descending with a casualty passing a set of mid-rope knots, and taking into account any stretch in ropes. The rescuer should take full advantage of the casualty's personal equipment.

Trainers: should ensure that knots are pre-tied in the working and back-up ropes. These knots may be offset or at the same level.

Assessors: should look for efficiency in the use of the additional equipment provided via the casualty and in the execution of the exercise.

TENSIONED ROPES FOR RESCUE

The use of a pair of tensioned ropes either horizontally or diagonally to keep a casualty above the floor.

The ropes can be tensioned by using a 3:1 hauling system, using 1 person pulling hand tight. This ensures forces on the anchors will remain within the SWL.

It is important that when the ropes a tensioned that both ropes are tensioned equally.

When connecting the casualty to the tensioned ropes two karabiners must be used around both ropes, typically this is one short cowstails and a long cowstails. If the casualty has to pass an intermediate anchor/ deviation, especially on horizontal tensioned ropes consideration should be given to having the casualty hanging from a releasable point of attachment.

Due to the large angles involved in rigging horizontal tensioned ropes, Level 3 candidates should be aware of the forces involved on the ropes, anchors and other equipment, especially when subject to two person loading.

Candidate: Level 3 candidates shall demonstrate the use of tensioned ropes for rescue purposes.

Trainers: should ensure that during this manoeuvre candidates keep the casualty above the ground during a horizontal or diagonal transfer, while using a pair of tensioned ropes. Anchors should be equalised and the load shared between the two ropes.

Assessors: should note that tensioned ropes may be rigged as part of a planned evacuation procedure, and this exercise may be assessed as part of the complex rescue.

CLIMBING RESCUES

RESCUE FROM AN AID CLIMB

Rescue of a casualty from an aid climb, suspended on either fixed or moveable anchors.

- The rescuer will aid climb to the casualty and either rig a set of ropes and descend with the casualty or rig a lowering system and lower the casualty to the ground.
- In both cases the counter balance used in the ascent rescue will be used to transfer the casualty onto the ropes rigged by the rescuer.
- For the counter balance to be effective it must be fixed as high as possible above the casualty.

Abseil Rescue

- Rescuer to position themselves at the casualties anchor points.
- Using a spare rope, rig a set of ropes next to the casualty, try to keep the rigging as neat and small as possible.
- Connect the casualties back-up device to the ropes.
- Connect the casualties descender to their sterna (chest) D-ring.
- Thread the descender onto the ropes and remove as much slack as possible.
- Using a footloop through a high anchor point, use a counter balance to lift the casualty from the aid climb.
- Lower the casualty slowly onto their descender.
- Make two attachments to the casualty.
- Descend to the ground under control.

Lowering Rescue

- Rescuer to position themselves at the casualties anchor points.
- Using an additional rope, descender and back-up device rig a lowering system next to the casualty.
- Connect both ends of the rope to the casualties sternal attachment point and remove as much slack as possible.
- Using a footloop through a high anchor point, use a counter balance to lift the casualty from the aid climb.
- Lower the casualty slowly onto the lowering ropes.
- Add extra friction to the descender.
- Lower the casualty to the ground under control.

Candidates: Level 2 and 3 candidates shall demonstrate the rescue of a casualty who is suspended by work-positioning lanyards such as cow's tails.

Trainers: should note that the rescuer shall climb to the casualty with sufficient equipment, including ropes (this may be a kit pre-rigged by the rescuer). The rescuer may either remain on the structure and lower the casualty to safety, or rig ropes and descend with the casualty.

Assessors: should note that candidates need only demonstrate one climbing rescue during assessment, at the assessor's discretion.

RESCUE FROM FALL ARREST EQUIPMENT

Rescue of a casualty who has fallen and if suspended on fall arrest lanyards.

- The rescuer will position themselves above the casualty and either rig a set of ropes and descend with the casualty or rig a lowering system and lower the casualty to the ground.
- In both cases the counter balance used in the ascent rescue will be used to transfer the casualty onto the ropes rigged by the rescuer.
- For the counter balance to be effective it must be fixed as high as possible above the casualty.

Abseil Rescue

- Rescuer to position themselves at the casualties anchor points.
- Using a spare rope, rig a set of ropes next to the casualty, try to keep the rigging as neat and small as possible.
- Connect the casualties back-up device to the ropes.
- Connect the casualties descender to their sterna (chest) D-ring.
- Thread the descender onto the ropes and remove as much slack as possible.
- Using a footloop through a high anchor point, use a counter balance to lift the casualty from the aid climb.
- Lower the casualty slowly onto their descender.
- Make two attachments to the casualty.
- Descend to the ground under control.

Lowering Rescue

- Rescuer to position themselves at the casualties anchor points.
- Using an additional rope, descender and back-up device rig a lowering system next to the casualty.
- Connect both ends of the rope to the casualties sternal attachment point and remove as much slack as possible.
- Using a footloop through a high anchor point, use a counter balance to lift the casualty from the aid climb.
- Lower the casualty slowly onto the lowering ropes.
- Add extra friction to the descender.
- Lower the casualty to the ground under control.

Candidates: Level 2 and 3 candidates shall demonstrate the rescue of a casualty who is suspended either by a fall arrest system (temporary or fixed) or by twin-tailed fall arrest lanyards.

Trainers: should note that the rescuer shall climb to the casualty with sufficient equipment, including ropes (this may be a kit pre-rigged by the rescuer). The rescuer may either remain on the structure and lower the casualty to safety, or rig ropes and descend with the casualty.

Assessors: should note that candidates need only demonstrate one climbing rescue during assessment, at the assessor's discretion.

SHORT LINK RESCUE

Rescue of a casualty who is suspended from a one connector link into a short strop or a two connector link into a bolt anchor, in both cases no higher anchors are available.

- The rescuer will aid climb into position next to the casualty, for this rescue it may be necessary to share anchor points, always ensuring you and the casualty have a suitable back up.
- When rigging ropes to attach the casualty to make sure the rigging is as small and as neat as you can. If aid climb bolts are smooth then barrel knots may be tied directly into them, if you must use additional karabiners knots must be as small as possible i.e. Barrel knot.
- Thread the casualties backup device and descender on to the ropes, remember the casualty must be in an upright position once on the ropes.
- The rescue uses a footloop through the highest point, the bolt itself or karabiner, and using a counterbalance technique to lift the casualty off their anchor point and onto the descent ropes.
- The footloop attachment to the casualty must be as low down on the harness as possible in order to maximise the distance available to lift the casualty. This may be done by threading the footloop through the harness and the choking it back on its self.
- Once the casualty is on the descent ropes the rescuer will then attach themselves to the casualty and descend under control to the ground.

SHORT LINK RESCUE

Candidates: Level 3 candidates shall demonstrate the rescue of an 'unconscious' casualty, i.e. Feigning immobility, from an aid climb, where the casualty is directly attached by a short connection and where there are no higher anchors.

Trainers: should note that the casualty shall be directly attached to the anchor point with a short connection. This shall normally be a two-connector attachment into a bolt anchor or a one-connector attachment into a short wire-strop anchor. The rescuer shall not use any higher anchor points.

Assessors: should take into account the difficulty in carrying out this type of rescue and concentrate their assessment on safety aspects of the exercise.

COURSE NOTES

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