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## Rope Rescue

### Terms & Definitions

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## Purpose

The purpose of this document is to provide a set of definitions for technical terms used within ITRA rope rescue standards, guidelines, and other associated documentation.

## Scope

This document intends to provide a consistent set of terminology that is used within ITRA rope rescue discipline documentation. There are many substitutes for words used to refer to the same topics. ITRA has chosen these terms have been chosen for consistency and transparency in expectations for communication.

## Rope Rescue Terms & Definitions

### **Accessory Cord**

Smaller diameter rope used for auxiliary purposes such as creating friction hitches, anchors, and slings. Typically tested only for minimum breaking strength and is not certified for use as a life safety rope.

### **Anchor Material**

Rope rescue components and equipment that establish an interface between an anchor point(s) and the other components of a rope rescue system.

### **Anchor Point**

An object that is used in the construction of an anchor system capable of supporting a rope rescue system.

### **Anchor System**

One or more Anchor Points and material, rigged to a master or focal point.

### **Arrest**

To stop

### **Artificial High Directional (AHD)**

A portable system constructed to provide an anchor point above ground level. Such as Tripods, A-frames, Gin Poles, and Aerial Ladders.

### **Ascender**

See **Ascent Device**.

### **Ascending**

Traveling up a fixed rope in a controlled manner through the use of ascent devices.

### **Ascent Device**

A type of rope grab, mechanical or friction hitch, that is used primarily for ascending a rope by gripping the rope when loaded in one direction and sliding freely in the opposite direction.

### **Assessment**

A systematic process used to evaluate whether a candidate has demonstrated the required knowledge, skills, and awareness of a discipline

**Assessor**

The role an instructor or evaluator has when assessing level 1, 2, or 3 candidates. A current member of the organization with the status of instructor or evaluator can be an assessor.

**Awareness**

To demonstrate knowledge of a subject or perception of a situation.

**Backup Rope**

When a secondary rope is used to protect against the failure of a life safety rope.

**Backup System**

A secondary rope rescue system used to provide safety in the event of a partial or complete failure of the primary (main) rope rescue system. (see also **Belay System**)

**Backtie**

The use of components to secure, back up, add strength, position, and/or add redundancy to a rope rescue system.

**Bend (Knots)**

A type of knot used to join two ends of a rope together. Common bends include the Double Fisherman, Flemish/Figure 8 Bend, Water Knot, and Overhand Bend.

**Belay System**

A backup system designed to catch and hold a load in the event of a primary system failure. (see also **Backup System**)

**Bight**

Made by folding a piece of rope so that the two parts lie alongside each other. When tied near the rope's end, the parts will be the Tail lying beside the Standing End.

**Candidate**

Individuals seeking to undergo an assessment to obtain qualification.

**Carabiner**

A load-bearing connector with a self-closing gate used to join components in a rope rescue system.

**Catastrophic Safety Issue**

Rigging or an event that would result in injury or death if not corrected.

**Catastrophe Knot**

When a knot is used as a safety precaution with the intention of limiting potential fall distance and inhibiting the loss of control to its point.

**Certification**

The process of earning an official document, or the act of providing an official document, as proof that something has happened or been done.

**Critical**

An extremely important factor that ensures a process is carried out safely and/or effectively.

**Compatible**

Functioning properly together in the manner intended.

**Component**

These are individual parts or smaller elements that come together to create a larger system. In the context of rope rescue, components include items like carabiners, pulleys, ropes, knots, prusiks, and anchors. They are the building blocks used to create more complex systems.

**Connector**

See Carabiner.

**Customized Equipment**

Equipment used in a manner different from its original purpose. Also, certified or non-certified components that have been modified from their originally manufactured form. For example, PVC pipe cut for use as rope protection.

**Danger Zone**

See Hazard Zone.

**Discrepancy**

- Non-critical safety issue performed by a candidate, while being evaluated, which demonstrates a lack of compliance with ITRA safety standards or equipment manufacturer's specifications.
- A risk of minor injury or damage to equipment, property or person(s).

**DCTTRS**

Dual Capability Two-Tensioned Rope Systems

**Descent Control Device**

A device that allows its operator to control the lowering or descending of a person(s) and/or load through the use of components, or friction hitches.

**Descender**

See Descent Control Device

**Descending**

Traveling down a fixed rope in a controlled manner through the use of a descent control device.

**Deviation**

Redirects the natural fall line of the rope on the rock face. A deviation point may or may not be subjected to the same force as the primary rig point.

**Directional**

Rigging technique to change the path of a rope via a pulley attached to a separate anchor. Such as a change of direction or high directional.

**Directional Anchor System**

An anchor system where a rope(s) pass through components such as a carabiner or pulley.

**Difficult Edge**

For assessment purposes, ropes running on (or very close) and parallel to the ground in a vertical environment to an edge between 70 to 90 degrees, or an overhang, without an available high anchor point or high directional.

**Dynamic Load**

Increase in force created by the sudden cessation of a movement.

**Dynamic Safety Factor**

The ratio of the breaking strength to the dynamic force applied.

**Edge Line**

A restraint line that is used in a fall zone to prevent the possibility of falling.

**Edge Protection**

Materials such as pads, rollers, or other protective devices used to reduce abrasion and friction on ropes at edges.

**Estimated Breaking Strength**

An estimated force required to break a rope or component. This takes into account potential reductions in a manufacturer's stated minimum breaking strength caused by rigging decisions, knots tied in cordage, age, exposure to hazards, and other conditions. During an assessment, the assessor shall make the final determination of the percentage loss of strength based on industry best practices.

**Equipment**

In rope rescue, equipment could include harnesses, rescue litters, or devices. Equipment often integrates multiple components into a single unit that performs a

specific task. Equipment is often a complete tool or apparatus made up of multiple components.

### **Evaluator**

A current member of the organization who can conduct assessments of rope rescue candidates to Levels 1, 2, 3, and evaluate rope rescue instructor candidates.

### **Evaluation**

A judgment about values, numbers, or the performance of someone or something. Used to determine the degree to which goals are attained.

### **Exposure**

Being actively at risk of harm by a specific hazard.

### **Factor of Safety (FoS)**

See Safety Factor.

### **Fail**

Issued for a critical safety issue or accumulation of safety issues performed by a candidate while being evaluated. Further guidance can be found in the rope rescue safety and Standards and rope rescue sub-charter document.

### **Fall Arrest System**

A system used to arrest a person falling from height mid-fall.

### **Fall Factor**

The ratio of a fall distance to the length of rope or webbing arresting the fall.

### **Fall Line**

The route that leads straight down following gravity from a given point.

### **Fall Zone**

The area in which people are at risk of falling, such as on-rope or near a working edge.

### **Fixed Anchor System**

An anchor system where a rope or lanyard terminates with a knot or sewn termination.

### **Fixed Rope**

A rope secured to a fixed point. Used in Abseiling (German) or Rappelling (US English).

### **Focal Point**

A location where anchor components are consolidated and focused into a single attachment point for the rescue system. Descent control devices, mechanical advantage systems, and ropes are clipped into focal points. (See also **Master Point**)

## **Free Fall**

The act of falling before the application of forces to arrest the fall.

## **Friction Hitch (Knots)**

A type of hitch that is held in place through friction and is easily adjusted without the need to be re-tied. Common Friction Hitches include the Prusik Knot, Valdotaian Tresse (VT), Schwabisch, and Distel Hitch.

## **Haul System**

A mechanical advantage system used to raise loads vertically or at an incline. Includes systems such as 3:1 or 5:1 configurations.

## **High-Angle Rescue**

Rescue operations conducted in environments where the load is primarily or entirely supported by the rope system. (see also **Vertical Environment**)

## **Hands-off**

- Also known as a “whistle test”
- Rope rescue systems for travel restraint, ascending, descending, lowering and raising must have the ability to hold and maintain a load without the input or control of the technician operating any components.
- Components must limit the movement of a load without human intervention.

## **Hard Tie-Off**

Terminating the knot into the rope rescue system, such as onto the rope(s) that prevents a person(s) and/or load from traveling farther than the hard tie-off itself.

## **Hazard**

Any real or potential condition that can cause damage, loss, and/or harm to people, infrastructure, equipment, natural resources, systems, or property.

## **Hazard Zone**

Any area where a person may be at risk as a result of the work being performed. This includes the rope rescue technicians on-rope as well as anyone at a lower level who may be struck by a falling object.

## **Hitch (Knots)**

Attaches a rope to something. Common hitches include the Clove Hitch, Basket Hitch, Mule, Half Hitch, Girth Hitch, and Tensionless Hitch.

## **Inclined Slope**

For teaching and assessment purposes, an environment with an incline of approximately 30 to 60 degrees, where a load would otherwise rest on the ground without litter tenders, but ropes are required to prevent a fall.



**Instructor**

A current member of the organization who has achieved the ITRA Instructor qualification. They are able to conduct assessments for Level 1, 2, & 3 rope rescue candidates.

**ITRA Rope Rescue Professional**

An individual qualified at Levels 1, 2, or 3 and holding a current certification.

**Kernmantle**

A type of rope construction with a Kern (interior core) protected by a Mantle (woven exterior sheath) – a design that achieves abrasion resistance and strength.

**LMRS**

Last Minute Risk Analysis.

**Level 1**

A person that holds a current qualification to an ITRA Rope Rescue Level 1. This individual has passed a Level 1 assessment within the last 3 years and is able to function within a Rope Rescue Team as a Technician.

**Level 2**

A person that holds a current qualification to an ITRA Rope Rescue Level 2. This individual has passed a Level 2 assessment within the last 3 years and is able to function within a Rope Rescue Team as a Technician.

**Level 3**

A person that holds a current qualification to an ITRA Rope Rescue Level 3. This individual has passed a Level 3 assessment within the last 3 years and is able to function within a Rope Rescue Team as a Technician.

**Lifeline**

A rope that has a human life attached to it when risk from a hazard exists. This is common, but not limited to, the rope being in a horizontal orientation to an hazard zone.

**Life Safety Rope**

Rope used to protect or support human life, which is tested and certified to meet specific standards.

**Load**

The mass or weight being carried by the rope rescue system.

**Load-Releasing Hitch**

A hitch used to safely transfer a load between systems or relieve tension in a rope system, commonly used in tandem with mechanical advantage systems.

**Low-Angle Rescue**

Rescue operations conducted in environments where technicians are primarily supported by the ground, but ropes are used for safety and assistance. (see also **Inclined slope**)

**Litter**

A transfer device designed to support and protect a patient during movement.

**Litter Tender**

A person who accompanies and physically manages a litter.

**Load Test**

Preloading a rope system to ensure all components are properly rigged and able to sustain an expected load.

**Locking carabiner**

A carabiner with a mechanism that reduces the possibility of a gate being opened inadvertently. A locking mechanism requires at least two different consecutive manual actions to open the gate.

**Lowering System**

A rope rescue system used to lower a load in a controlled manner.

**Must**

Compliance with the listed guidance is mandatory.

**Margin of Safety**

The difference between the breaking strength and the force applied.

**Main Rope (Main Line)**

The primary life safety rope used in a rope rescue system for descending, ascending, raising, lowering, or positioning.

**Major Discrepancy**

Critical safety issue caused by a Candidate during Assessment, which puts themselves or others at risk

**Minor Discrepancy**

Non-critical safety issue caused by a Candidate during an assessment, which compromises their safety or the safety of others but which is not considered to be a Major Discrepancy

**Minimum breaking strength (MBS)**

The minimum force at which a new component may fail. Tests for determining the minimum breaking strength are based on the standard the component is being certified to.

**Master Point**

The rigging point where rope(s), components, and equipment are connected. (see also **Focal Point**)

**Mechanical Advantage (MA)**

A system of pulleys and ropes that allows lifting or moving heavy loads more easily by distributing the load.

**Minimum Breaking Strength (MBS)**

The minimum force required to break a rope or component under standard test conditions.

**Mountain criteria**

For assessment purposes, in order to obtain recognition of qualification performed in a mountain environment the PSC must be completed with the following guidance: Must be assessed in a natural/outdoor, non-manmade environment such as a cliff/rock face/ice wall in the mountains/wilderness. Anchors and materials may include the use of such things as trees/rocks/boulders/human anchors/deadman anchors/snow pickets/pickets/cams/nuts/ice screws. No manmade objects/structures such as poles, beams, or railings may be used for anchors during this task.

**Midloop (knots)**

A knot used to create a loop in the middle of a rope

**Off Label Use**

Use of equipment in a way that is not certified for or not approved by the manufacturer.

**On-rope**

The condition of being suspended from or attached to a rope.

**Packaging**

The process of securing a patient into a transfer device, with regard to existing and potential injuries or illness, so as to prevent further harm during movement.

**Positioning System**

A rope system used to allow a person to be at a certain work point. The person could be suspended or semi-suspended.

**PMP**

Prusik minding pulley

## PPE

Personal protective equipment

## Proven

In reference to devices and components tested and functioning properly.

## Protocol

A protocol refers to a system of rules that guide procedures or behavior in specific situations. In the context of Search and Rescue (SAR) and rope rescue, protocols define the guidelines and procedures to follow during a rescue operation to ensure consistency, safety, and effectiveness.

## Personal Protective Equipment (PPE)

The gear worn by rescuers to ensure safety, including helmets, harnesses, gloves, and appropriate footwear.

## Progress Capture Device (PCD)

A device or knot that allows rope to move in one direction and locks off to prevent slippage in the opposite direction, used in hauling systems.

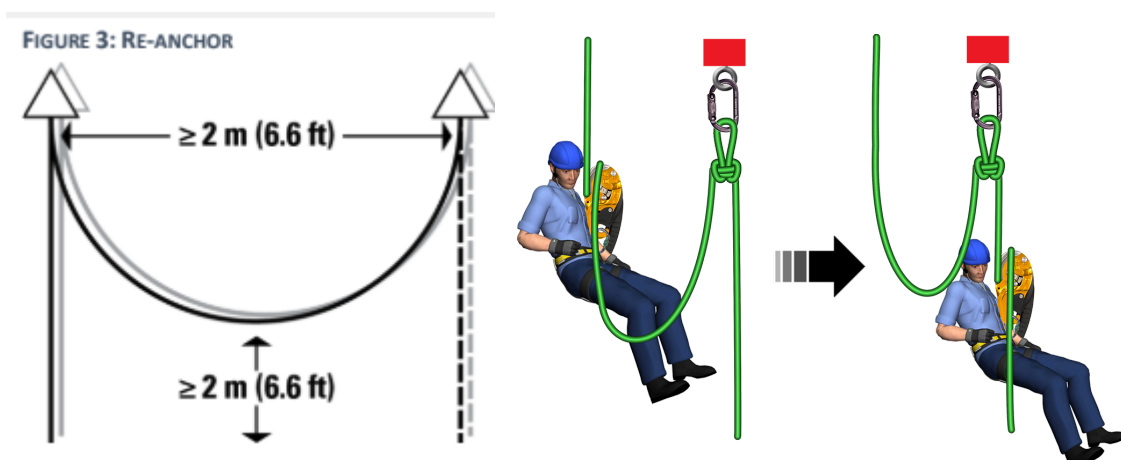
## Raising

A rope rescue system used to lift a load.

## Re-belay

See re-anchor

## Re-Anchor



An intermediate fixed anchor set above or below a primary anchor connected with a rope system through the use of a knot or other attachment hardware. A re-anchor's and primary anchors must meet ITRA RR [safety standards](#).

Anchor systems at either side of a re-anchor may be located at similar or different heights but within 1 m. Re-anchors should have a sag at least as deep as half the horizontal span, but not less than 1 m. The lowest point of the re-anchor should be more than 2 m above the next lower level.

### **Re-Direct**

An intermediate anchor set above or below a primary anchor with an opening attachment point where a rope can be inserted to adjust the path of the rope. A rope passing through a re-direct is not directly attached to it. Forces on a re-direct are dependent on the angle of the rope entering and exiting the attachment point.

### **Regulation**

A regulation is a rule or directive made and maintained by an authority that must be followed. Regulations in rope rescue may relate to safety protocols, training requirements, and equipment specifications, among others.

### **Rescue Load**

A load representing a rescuer, patient, and associated rescue equipment. A rescue load may be represented by an actual rescuer and patient or simulated through a load with a total weight of at least 150 kg but no more than 250kg.

### **Rescuer**

A person who is responsible for the safe extrication of another individual in the case of an emergency.

### **Risk**

Likelihood and consequence of a hazard

### **Risk Analysis**

A decision made based on hazard identification and situation assessment that weighs risks taken against the benefits gained for taking those risks.

### **Rope**

Appropriate flexible line used to support, restrain or safeguard a person in combination with other equipment

\*\*Depending on the context, a Rope is also referred to as an anchor line, working line or safety line.

**Rope access**

Direct attachment points to rope(s) and use of techniques that allow descent, ascent, and lateral movement of a technician to get to and from a desired working locations.

**Rope grab**

A device used to grasp a rope for the purpose of supporting a load and/or input force.

**Rope Rescue System**

The entire system including anchor systems, ropes, and any other additional components that control suspended mass in inclined slope and vertical environments. This system has the ability to raise and lower that mass.

**Redundant**

Having more than one component or system in place to ensure safety in case of a failure.

**Rescue Rope**

A rope specifically designed and certified for use in rescue operations.

**Safe Working Load (SWL)**

See **Working Load Limit (WLL)**

**Safe Zone**

Any area outside the hazard zone or the fall zone that is safe to work without the need of PPE. Sometimes called a "green zone".

**Safety check**

A systematic process to mitigate hazards and potential points of failures.

**Safety Factor**

Also known as a Factor of Safety.

The ratio of the breaking strength to the force (static or dynamic) applied

See also: System Safety Factor, Dynamic Safety Factor & Static Safety Factor

**Safety Knot**

A knot tied to back up another knot in order to minimize the chance of that knot unintentionally coming untied.

**Self Rescue**

Escaping from a hazardous situation without external assistance.

**Standard Load**

A load representing a single individual. A standard load may be represented by an actual person or simulated through a load with a total weight of at least 75 kg but no more than a **rescue load** no more than 150 kg.

### **Standard Operating Procedure (SOP)**

A set of detailed, written instructions designed to achieve uniformity in the performance of specific functions. SOPs offer a structured approach outlining the best way to perform tasks.

### **Stopper Knot**

A knot tied at the end of a rope to prevent the tail of the rope from passing completely through a component or other knot.

### **Standard**

A standard is an established model or example used as a comparative benchmark in measuring quality or performance. Standards in rope rescue include technical requirements for equipment, such as ropes, harnesses, and carabiners, and personnel competencies.

### **Shall**

Compliance with the listed guidance is mandatory.

### **Should**

Compliance with the listed guidance is recommended but not mandatory

### **Shockload**

When a mass falls on a rope rescue system during a dynamic event, involving slack in that system, that occurs on a part of the rigging system.

### **SMSB**

Separate Main, Separate Belay

### **SRT**

Single rope technique

### **Static Safety Factor**

Ratio of the breaking strength to the Static force applied

### **Static System Safety Factor**

The ratio of the breaking strength to the weakest component Static Safety Factor within a given system.

**Suitably Strong**

Meets the criteria listed in the [ITRA Safety and Standards document](#).

**Suitable**

Meets the criteria listed in the [ITRA Safety and Standards document](#).

**System Safety Factor**

A ratio describing the margin of safety between the operating load and the weakest part of the rope system including all components, anchors, and reduction in strength created through rigging decisions.

See also: **Margin of safety**

**Safe Working Load**

The ratio of the minimum breaking strength of a component divided by the safety factor.

**Safety Factor (FoS)**

The ratio of the breaking strength of equipment to the maximum load applied during use. For example, if the breaking strength of a rope is 10,000 pounds and the load applied is 2,000 pounds, the safety factor is 5.

**Self-Rescue:** Techniques employed by rescuers to extricate themselves from entanglements, suspended positions, or other hazardous situations using rope systems.

**Shock Load**

The sudden increase in load or force resulting from a sudden stop or jolt in a rope system.

**Soft Rope**

A rope with a softer core, often used for applications where greater flexibility and ease of handling are desired.

**Standby Safety System**

A secondary system used in the event that the primary safety system fails.

**Static Rope**

A rope designed to stretch minimally under load, providing reliable performance for lowering and hauling applications.

**Static System Safety Factor (SSSF)**

The ratio of the minimum breaking strength of the weakest piece of equipment in a static system divided by the safety factor.



**Stokes Basket**

A type of litter used for patient packaging during rope rescues, commonly rigged with multiple attachment points for lifting and lowering.

**Technical Rescue**

A rescue requiring the use of specialist knowledge and equipment.

**Terminating Knot**

A knot tied at the end of a rope which acts as an attachment point. Common termination knots include the Figure 8, Figure 8 Follow-Through, Scaffold Hitch, Poachers Knot, and Bowline.

**Theory Examination: (theoretical exam)**

A formal test of a Candidate's knowledge in rope rescue techniques

**Trainee**

Individual undergoing Training

**Training**

Organized program developed to impart the knowledge and skills necessary for qualification

**Tag Line**

A secondary rope used to control or stabilize a load during movement, typically in situations with high winds or when guiding loads around obstacles.

**Technician**

A Rope Rescue Technician is an individual trained and qualified to perform complex rescue operations involving the use of ropes and other technical equipment. Often operates as part of a team, collaborating with other rescue professionals to safely and efficiently rescue individuals from perilous situations.

**Tensionless Hitch**

A knot used to tie off a rope in a manner that maximizes friction and stability, often used to anchor the rope system.

**TTRS**

Twin-Tensioned Rope System

**Twin-Tensioned Rope System**

Both ropes in the system are actively tensioned and share the load equally.

Two ropes (main and backup) are typically rigged through the same or very similar paths and are equally tensioned using devices that allow for simultaneous control (e.g., progress capture devices, and lowering devices).

### **Two Tensioned Rope System**

Similar to a Twin-Tensioned Rope System, where both ropes are actively tensioned, but both ropes are independently controlled. While both ropes are tensioned, they may be controlled separately by different devices or teams, allowing for slight variations in load distribution.

Used where independent control of each rope is needed, such as in some technical rescue scenarios or when different anchors or load paths are involved.

### **Working Load Limit (WLL)**

The maximum load determined by the manufacturer that a rope or component is designed to support during normal use taking into account the lifespan of the product.

### **Undesired Event**

Failure of a rope(s), component(s), a slip, fall, and/or unexpected movement of person(s) or rope(s).

### **Variable Friction Hitch**

A specialized friction hitch, such as a Munter/Italian Hitch, which allows the amount of friction produced to be adjusted while in use by varying the tension on the rope.

### **Vulnerability**

The state of people, infrastructure, equipment, natural resources, systems, or property when exposed to the hazard(s).

### **Vertical**

For teaching and assessment purposes, a very steep environment with terrain of approximately 70+ degrees or free hanging. Where a load is suspended and reliant on a rope system to prevent a fall.