



International Technical Rescue Association

P.O. Box 213

Victor ID 83455 USA

<https://itra.international/>

info@itra.international

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 used within the ITRA rope rescue discipline documentation. Although there are many substitutes for words used to refer to the same topics, ITRA has chosen these terms to ensure consistency and transparency in 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 materials rigged to a **master** or **focal point** to create a secure point for attaching rope rescue systems.

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.

Basket Hitch

Example: w/ 1" tubular webbing

Basket Hitch w/ an overhand

Example: w/ 1" tubular webbing

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**)

BFK

Big freaking knot. See also (**Frost Knot**)

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.

Choker Hitch

See **Girth Hitch**

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).

Dual Capability Two-Tensioned Rope Systems (DCTTRS)

A rope rescue system capable of functioning with independently tensioned ropes or a twin-tensioned setup.

Deadleg

A segment of anchor material within an anchor system that is not actively bearing weight or load. These segments provide no direct support or functional role in the active load-bearing elements.

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 Rope

A rope designed to stretch under load to absorb energy from a fall, minimizing impact forces.

Dynamic System Safety Factor

A measure used in rope rescue to assess the strength of a rigging system under dynamic loads, which are forces that can change rapidly during events like falls. It is calculated by comparing the minimum breaking strength of the equipment to the maximum anticipated load in conjunction with the maximum arresting force, ensuring that the system can handle unexpected forces effectively.

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)

The Factor of Safety for a roping system is a ratio that describes the margin of safety between the operating load and the load at which the system will fail. The system is assumed to be under foreseeable loadings.

$$\text{Factor of Safety} = \frac{\text{Weakest link in the system}}{\text{Maximum anticipated force}}$$

See also 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.

Fail safe

Incorporating a feature for automatically counteracting the effect of an anticipated possible source of failure. Also referred to as a backup.

See also **Redundancy**

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

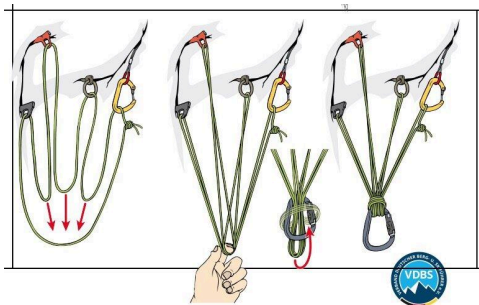
The area in which people are at risk of falling, such as on-rope or near a working edge.

Fixed Anchor System

An anchor technique where a terminating knot is used to create a **master point**.



Example: Fixed multipoint anchor



Example: Fixed multipoint anchor w/ a girth hitch masterpoint.



Example: Fixed single-point anchor using cordage.

Fixed Rope

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

Focal Point

A term used to describe the location or “gathering spot” where the force of a load will be applied to anchor components.

Free Fall

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

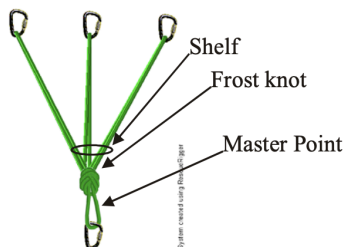
Friction Hitch (Knots)

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, Valdota Tresse (VT), Schwabisch, and Distel Hitch.

Frost Knot

Often, an overhand or figure 8 knot is used to terminate anchor legs for a **Master Point**. See also **BFK**



Girth Hitch

Also known as a **Choker 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

- 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) 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 Profesional

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

Joining Knot

See **Bend**

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.

Load-Distributing Anchor System (LDA)

Testing has determined that an actual equal load on each leg(s) is not achievable. See **Fixed Anchor System** or **Self-Adjusting Anchor System**

Load-Sharing Anchor System (LSA)

Testing has determined that an actual equal load on each leg(s) is not achievable. See **Fixed Anchor System** or **Self-Adjusting Anchor System**

Lock Out Tag Out (LOTO)

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

Master Point

The rigging point where rope(s), components, and equipment are connected. Descent control devices, mechanical advantage systems, carabiners, and ropes are clipped into these points.

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 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 illnesses, 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

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 includes 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.

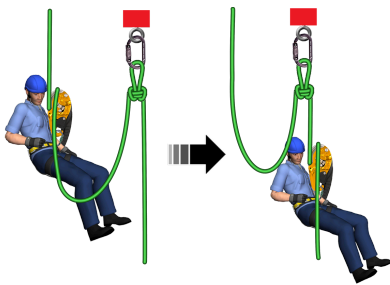
Raising

A rope rescue system is 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 and primary anchors must meet ITRA RR [safety standards](#).

Anchor systems on 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 is 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 redirect is not directly attached to it. Forces on a redirect are dependent on the angle of the rope entering and exiting the attachment point.

Redundant

Serving as a duplicate to prevent the failure of an entire system upon the failure of a single component

See also **Fail Safe**

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.

Regulatory Authority

An official organization or government agency with the power to create, enforce, and monitor rules, regulations, and standards

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

An 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 location.

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.

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 failure.

Safety Factor (SF)

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

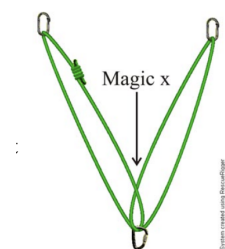
See also: Dynamic System Safety Factor & Static System Safety Factor

Safety Knot

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

Self-Adjusting Anchor System

An anchor technique that allows for the anchor materials to move when the load moves in between the two anchor points or force-limiting knots without deadlegging an anchor leg.



Example: Magic X - Self-Adjusting Multipoint Anchor



Example: Quad Anchor - Self-Adjusting Multipoint Anchor w/ force limiting knots

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

Sub Anchor

An anchor point in a vertical environment located below another anchor.

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](#).

Safe Working Load

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

Self-Rescue: Escaping from a hazardous situation without external assistance.

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 have minimal elongation under load, providing reliable performance for lowering and hauling applications.

Static System Safety Factor (SSSF)

The ratio of the minimum breaking strength of a component in a rigging system to the maximum static load it will support. It helps ensure that the system can safely handle the expected loads without failure.

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.

Wrap 2 pull 1



Wrap 3 pull 2



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.