

SAFE PRACTICES FOR ROPE ACCESS WORK



Society of Professional Rope Access Technicians

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Notes for Usage:

Terminology from SPRAT's *Defined Terms* used in this document is shown in ***bold, italic*** type unless written in a primary section heading.

Usage of the word 'shall' denotes a mandatory requirement.

Usage of the word 'should' denotes a recommendation. The word 'should' does not connote indifference or ambivalence regarding a statement.

1. Purpose, Scope, Exceptions

1.1. Purpose

- 1.1.1. The purpose of this document is to provide accepted practices for rope access work.
- 1.1.2. This document is to be used in conjunction with SPRAT's *Certification Requirements for Rope Access Work* and SPRAT's *Defined Terms*.

1.2. Scope

- 1.2.1. This document provides practices and procedures to protect persons from the hazards associated with rope access work.
- 1.2.2. This document provides requirements and recommendations for establishing, administering, and operating within a comprehensive rope access program.
- 1.2.3. This document is written for all persons involved with rope access work, including clients, **employers**, **rope access technicians**, and regulatory authorities.

1.3. Exceptions

- 1.3.1. This document does not address the use of single **main systems** without **backup systems** in the course of planned work.
- 1.3.2. This document does not apply to technical rescue, emergency response, or emergency response training, except as provided in Section 16.

2. Rope Access Program Management

- 2.1. The **employer** has the overall responsibility for its rope access program.
- 2.2. The **employer** shall provide the resources that are necessary for the development, implementation, and operation of its rope access program.
- 2.3. The **employer** shall appoint a **Rope Access Program Administrator** to manage and direct the rope access program.
 - 2.3.1. The **Rope Access Program Administrator** should, at a minimum, have the knowledge and experience of a **Level III Technician**.
 - 2.3.2. The **Rope Access Program Administrator** shall have a working knowledge of relevant regulations that apply to rope access and working at height, and ensure implementation of all such requirements.
 - 2.3.3. The **Rope Access Program Administrator** should be knowledgeable about and experienced in supervising fall protection programs and in particular fall protection systems for rope access work.
- 2.4. The **Rope Access Program Administrator** is responsible for the development, implementation, and management of the **employer's** rope access program in accordance with Section 3.
- 2.5. The **Rope Access Program Administrator** shall be the main contact point for matters relating to the safety, training, and regulatory aspects of the rope access program.
- 2.6. When the **Rope Access Program Administrator** delegates a requirement of the rope access program to another **rope access technician** or appropriate personnel, the **Rope Access Program Administrator** remains responsible to verify the effective completion of the requirement.

3. Rope Access Program Requirements

3.1. General

- 3.1.1. A policy statement shall be developed and implemented that provides general goals and guidance for a rope access program that emphasizes the **employer's** commitment to providing a safe workplace for personnel engaged in rope access work.
- 3.1.2. Rope access program policies and procedures shall be documented and available to all affected personnel.
- 3.1.3. Policies and procedures shall be consistent with requirements of the **presiding regulatory authority** related to the work environment to ensure that such requirements are followed by all **rope access technicians** when conducting work.
- 3.1.4. Where a **presiding regulatory authority** has requirements that are stricter than this standard, those requirements shall be followed.

- 3.1.5. The program shall ensure communication and coordination with clients and their safety representatives regarding rope access safety and rescue procedures.
- 3.2. Training, Certification, Experience
 - 3.2.1. The program shall provide for or verify provision of, and ensure the maintenance of all *rope access technician* training and certification in accordance with Section 6.
 - 3.2.2. Rope access experience and training hours shall be recorded in accordance with Section 7.
- 3.3. Work Site Requirements
 - 3.3.1. Currently certified *rope access technicians* shall be used to conduct all rope access operations.
 - 3.3.2. *Rope access technicians* shall be informed of foreseeable hazards that they may encounter during the performance of their responsibilities.
 - 3.3.3. Rope access work shall be supervised in accordance with Section 7.3.
 - 3.3.4. The program shall ensure that *rope access technicians* have the knowledge, training, skills, and experience necessary to safely perform their responsibilities and the rope access work to which they are assigned in accordance with Section 4 and Section 4.6.1.
 - 3.3.5. The program shall recognize the limitations of the *rope access technicians* to perform rope access work and ensure that no work is undertaken that exceeds those limitations.
 - 3.3.6. Prior to the commencement of rope access work, the *access work plan* shall be completed in accordance with Section 9.
 - 3.3.7. Work zones shall be identified and marked in accordance with Section 10.
- 3.4. *Rope Access Systems* and Equipment
 - 3.4.1. *Rope access systems* shall be constructed and utilized in accordance with Section 12.
 - 3.4.2. The program shall provide, or verify provision of all appropriate rope access equipment in accordance with Section 13.
 - 3.4.3. Rope access equipment shall be inspected and maintained in accordance with Section 13.3.
 - 3.4.4. The program shall provide, or verify provision of all appropriate tools, work equipment, materials, and personal protective equipment in accordance with Section 14.
- 3.5. Rescue
 - 3.5.1. Prompt *rescue* shall be possible for any access or work location of a member of the work team in accordance with Section 16.
- 3.6. Post-Job Debriefs and Accident Reporting
 - 3.6.1. Post-job debriefs should be conducted in accordance with Section 17.
 - 3.6.2. An accident reporting system shall be established in accordance with Section 17.

4. Responsibilities of the Rope Access Supervisor

- 4.1. General
 - 4.1.1. A *Rope Access Supervisor* is responsible for the implementation and oversight of the *employer's* rope access program at the work site.
 - 4.1.2. When the *Rope Access Supervisor* delegates a task that is their responsibility to another *rope access technician* or appropriate personnel, the *Rope Access Supervisor* remains responsible to verify the effective completion of the task.
 - 4.1.3. The *Rope Access Supervisor* has the responsibilities of a *rope access technician* in accordance with Section 4.6.1 to the extent that they do not prevent the effective performance of the responsibilities required by this section.
 - 4.1.4. The *Rope Access Supervisor* shall perform any other responsibilities designated in the *employer's* rope access program or identified by the *Rope Access Program Administrator*.
 - 4.1.4.1. Such responsibilities shall remain within that *Rope Access Supervisor's* training, skills, experience, and qualifications for conducting safe rope access operations and maintaining a safe rope access work site.

- 4.1.4.2. The **Rope Access Supervisor** shall notify the **Rope Access Program Administrator** if assigned a task or responsibility beyond the **Rope Access Supervisor's** training, skills, qualifications, or experience.
- 4.2. Training, Certification, Experience
 - 4.2.1. The **Rope Access Supervisor** shall verify training and certification required by **rope access technicians** at the work site in accordance with Section 6.
 - 4.2.2. The **Rope Access Supervisor** shall validate rope access hours of **rope access technicians** at the work site in accordance with Section 7.
- 4.3. Work Site Requirements
 - 4.3.1. The **Rope Access Supervisor** shall communicate and coordinate with clients and their safety representatives, and other personnel.
 - 4.3.2. The **Rope Access Supervisor** shall complete or verify the completion of the **access work plan** in accordance with Section 9 prior to the commencement of rope access work.
 - 4.3.3. The **Rope Access Supervisor** shall direct **rope access technicians** to ensure safety and compliance with the rope access program and **access work plan**.
 - 4.3.4. The **Rope Access Supervisor** shall have sufficient knowledge of current regulations that apply to rope access and working at height, so as to verify compliance by the **rope access technicians** being supervised.
 - 4.3.5. The **Rope Access Supervisor** shall verify that work zones are identified and marked appropriately in accordance with Section 10.
 - 4.3.5.1. The **Rope Access Supervisor** shall verify that adequate measures are taken to keep unauthorized persons out of the work zones.
 - 4.3.6. The **Rope Access Supervisor** shall direct **rope access technicians** to identify hazards and take corrective measures to eliminate or control the risks associated with hazards at the work site.
- 4.4. **Rope Access Systems** and Equipment
 - 4.4.1. The **Rope Access Supervisor** shall specify and verify the selection and installation of **rope access systems** in accordance with Section 12.
 - 4.4.2. The **Rope Access Supervisor** shall verify the construction of **anchorage systems** in accordance with Section 12.1.
 - 4.4.3. The **Rope Access Supervisor** shall verify the proper use and maintenance of rope access equipment in accordance with Section 13, removing equipment from service when appropriate.
 - 4.4.4. The **Rope Access Supervisor** shall verify proper use and maintenance of tools, work equipment, materials, and personal protective equipment in accordance with Section 14.
- 4.5. Rescue
 - 4.5.1. The **Rope Access Supervisor** shall ensure that prompt rescue can be performed for any access or work location of a member of the work team in accordance with Section 16.
 - 4.5.2. The **Rope Access Supervisor** shall verify that the necessary emergency services are available and that the means to summon them are functioning.
 - 4.5.3. The **Rope Access Supervisor** shall manage and or perform any rescue required during rope access work.
- 4.6. Post-Job Debriefs and Accident Reporting
 - 4.6.1. The **Rope Access Supervisor** shall participate in any relevant post-job debriefs or investigations of incidents in accordance with Section 17.

5. Responsibilities of the Rope Access Technician

- 5.1. General
 - 5.1.1. The rope access technician is responsible for the completion of the rope access work under the direction of the **Rope Access Supervisor**.
 - 5.1.2. The **rope access technician** shall have a working knowledge and understanding of the **employer's** rope access program and all applicable policies and procedures.

5.1.3. The **rope access technician** shall perform any other responsibilities designated in the **employer's** rope access program or identified by the **Rope Access Program Administrator** or **Rope Access Supervisor**.

5.1.3.1. Such responsibilities shall remain within that **rope access technician's** training, skills, qualifications, and experience.

5.1.3.2. The **rope access technician** shall notify the **Rope Access Program Administrator** or **Rope Access Supervisor** if assigned a task or responsibility beyond their training, skills, qualifications, or experience.

5.2. Training, Certification, Experience

5.2.1. The **rope access technician** shall have the appropriate training and certifications to conduct assigned rope access work in accordance with Section 6.

5.2.2. The **rope access technician** shall document their training, qualifications, and experience in accordance with Section 7.

5.3. Work Site Requirements

5.3.1. The **rope access technician** shall follow requirements of the rope access program and the **access work plan** in accordance with Section 9.

5.3.2. The **rope access technician** shall follow requirements of the **presiding regulatory authority** on the work site.

5.3.3. The **rope access technician** shall be capable of identifying work zones and complying with their requirements in accordance with Section 10.

5.3.4. Under the direction of the **Rope Access Supervisor**, the **rope access technician** shall identify hazards and take corrective measures to eliminate or control the risks associated with hazards at the work site.

5.3.5. The **rope access technician** shall have the authority to stop work immediately if it is unsafe to proceed.

5.4. Rope Access Systems and Equipment

5.4.1. The **rope access technician** shall construct, inspect, and analyze **rope access systems** in accordance with Section 12.

5.4.2. The **rope access technician** shall properly use, inspect, and maintain rope access equipment in accordance with Section 13.

5.4.3. The **rope access technician** shall properly use and maintain tools, work equipment, materials, and personal protective equipment in accordance with Section 14.

5.5. Rescue

5.5.1. The **rope access technician** shall perform and/or assist rescue under the direction of a **Rope Access Supervisor** in accordance with Section 16.

5.6. Post-Job Debriefs and Accident Reporting

5.6.1. **Rope access technicians** should participate in any relevant investigations of incidents in accordance with Section 17.

6. Training and Certification

6.1. Rope Access Training

6.1.1. Rope access training shall, at a minimum, be provided to all **rope access technicians** and prospective personnel in a manner consistent with *Certification Requirements for Rope Access Work*.

6.1.2. Additional rope access training for specific work environments shall be provided as appropriate.

6.1.2.1. Additional rope access training may be provided at the work site.

6.1.3. Refresher training should be provided on an annual basis.

6.1.3.1. Refresher training may be provided at the work site.

6.1.4. **Rope access technicians** who have not been engaged in rope access work for six months or more should receive suitable training before returning to work.

6.2. Rope Access Certification

6.2.1. Rope access certifications should be maintained in accordance with *Certification Requirements for Rope Access Work*.

6.3. Additional Training and Certifications

6.3.1. **Rope access technicians** shall have training in conventional fall protection.

6.3.1.1. Conventional fall protection training shall meet the requirements of the **presiding regulatory authority** where work is undertaken.

6.3.2. **Rope access technicians** shall have first aid training appropriate to the environment where work is undertaken.

6.3.3. Additional training and certifications for specific work environments shall be provided as required by the **presiding regulatory authority**, industry, client, or **employer**.

7. Experience Documentation

7.1. **Rope access technicians** shall document their experience, including:

7.1.1. Rope access work experience

7.1.2. Rope access certification

7.1.3. Rope access training

7.2. Experience documentation shall provide the following information:

7.2.1. Date(s) of work

7.2.1.1. The date range of an entry shall not exceed two weeks.

7.2.2. **Employer** name

7.2.3. Work details

7.2.3.1. These details should include the industry, structure, location, and description of the work undertaken.

7.2.4. Rope access tasks and application

7.2.4.1. These details should include the type of rope access skills used.

7.2.5. Rope access hours worked

7.2.5.1. These hours shall be the time spent carrying out rope access tasks including establishing **rope access systems**, training, working **on-rope**, and work site safety management.

7.2.6. Signature of individual verifying rope access hours worked.

7.2.6.1. This signature should be obtained from the **Rope Access Supervisor**, **employer**, **competent trainer**, Evaluator, or client.

7.2.6.2. **Rope access technicians** working together may verify each other's rope access hours.

7.2.6.3. **Rope access technicians** shall not self-certify their own hours.

7.3. Additional relevant experience should be documented as required by the **presiding regulatory authority** or **employer**.

8. Work Teams and Supervision

8.1. Work Teams

8.1.1. Currently certified **rope access technicians** shall be used to conduct all rope access operations.

8.1.2. Work teams shall consist of, at a minimum, the number of members required to ensure prompt **rescue**.

8.1.2.1. To meet the above requirement, a work team **shall** consist of a minimum of two **rope access technicians**.

8.2. Worksite Supervision

8.2.1. At least one member of the work team shall be designated as the **Rope Access Supervisor**, fulfilling their responsibilities in accordance with Section 4.

8.2.2. A **Rope Access Supervisor** should be a **Level III Technician**.

8.2.3. A **Level II Technician** may be designated as the **Rope Access Supervisor** if the following criteria are met:

8.2.3.1. Work does not require special permits as described in Section 9.10.

8.2.3.2. Adjacent work does not foreseeably compromise the safety of the rope access work being conducted.

- 8.2.3.3. Only ascent and descent are required for completing the work.
- 8.2.3.4. **Deviations** are no greater than 20 degrees.
- 8.2.3.5. No rope-to-rope transfers, knot passing, or negotiating intermediate, **fixed anchorage systems** is required during planned work.
- 8.2.3.6. Prompt **rescue** must be effective directly down the **fall line** to the ground or platform level.
- 8.2.4. If a **presiding regulatory authority**, specific industry, and/or client requires a **Level III Technician** to be the designated **Rope Access Supervisor**, this requirement shall be followed.

9. Access Work Plan

- 9.1. An **access work plan** shall be completed prior to beginning all rope access work.
- 9.2. The **access work plan** shall be maintained at the work site and available to all affected persons.
- 9.3. The **access work plan** shall be updated as necessary during the course of rope access work.
- 9.4. A documented review of the **access work plan by rope access technicians** shall be conducted prior to each work shift and after any updates.
- 9.5. The **access work plan** should be reviewed by any person affected by the rope access work.
- 9.6. For new work, a site survey should be conducted to help determine:
 - 9.6.1. The nature of the work environment.
 - 9.6.2. Feasibility of the means of access.
 - 9.6.3. Foreseeable hazards to **rope access technicians** and others.
- 9.7. The **access work plan** shall, at a minimum, consist of the following:
 - 9.7.1. Work method
 - 9.7.2. Job safety analysis
 - 9.7.3. Special permits
 - 9.7.4. Rescue plan
- 9.8. Work Method
 - 9.8.1. The work method, shall, at a minimum, provide:
 - 9.8.1.1. Members of the work team by name and identify their roles and level of training.
 - 9.8.1.2. **The hazard and fall zones in accordance with Section 10.**
 - 9.8.1.3. **The communication plan in accordance with Section 11.**
 - 9.8.1.4. Required **rope access systems** in accordance with Section 12.
 - 9.8.1.5. Required rope access equipment in accordance with Section 13.
 - 9.8.1.6. Required tools and other materials in accordance with Section 14.
 - 9.8.1.7. Required personal protective equipment (PPE).
- 9.9. **Job Safety Analysis**
 - 9.9.1. The **job safety analysis** shall review the work method and work environment to identify all hazards that rope access technicians or other work team members may be exposed to during the course of work.
 - 9.9.2. Modifications to the work method and/or controls shall be identified to either eliminate these hazards, or to mitigate the associated risks to an acceptable level.
 - 9.9.3. If new hazards arise during the course of work, work shall be stopped until appropriate controls have been identified, documented, and implemented.
 - 9.9.4. The review of the work method, shall consider, at a minimum:
 - 9.9.4.1. The time required for the work at any one location.
 - 9.9.4.2. Whether adjacent work may affect the planned work.
 - 9.9.4.3. Whether providing security to the **anchorage** location is warranted.
 - 9.9.4.4. Whether any public safety provisions are required.

- 9.9.4.5. Hazards associated with the use of tools, work equipment, and materials required for the work.
- 9.9.5. The review of the work environment shall consider, at a minimum:
 - 9.9.5.1. Adverse weather.
 - 9.9.5.2. The effects of wind on **rope access systems**, positioning, and work environment.
 - 9.9.5.3. Lock out tag out (LOTO) requirements.
 - 9.9.5.4. Potential loose material.
- 9.10. Special permits
 - 9.10.1. Special permits shall be determined by the work being conducted.
 - 9.10.2. Special permits include:
 - 9.10.2.1. Confined space
 - 9.10.2.2. Hot work
 - 9.10.2.3. Live electrical work
- 9.11. Rescue Plan
 - 9.11.1. The rescue plan shall review the work method and job safety analysis to identify where rescue could be required.
 - 9.11.2. The rescue plan shall provide procedures for prompt **rescue** from these foreseeable scenarios in accordance with Section 16.

10. Work Zones

- 10.1. **Hazard Zone**
 - 10.1.1. A **hazard zone** shall be identified, established, and maintained.
 - 10.1.2. A **hazard zone** should be marked or blockaded to warn **rope access technicians** and others, including the public, of hazards associated with the work being performed.
 - 10.1.3. Appropriate personal protective equipment, including helmets, shall be used by anyone in the **hazard zone**.
- 10.2. **Fall Zone**
 - 10.2.1. **Fall zones** shall be identified and established.
 - 10.2.2. A **fall zone** should be marked or blockaded to warn **rope access technicians** and others, including the public, of the risk of a fall.
 - 10.2.3. The **fall zone** extends a minimum distance of 2 m (6.6 ft) from any unprotected edge.
 - 10.2.4. No one may enter the **fall zone** without appropriate fall protection.
 - 10.2.4.1. Conventional fall protection shall be used in a **fall zone** when not **on-rope**.
 - 10.2.4.2. Conventional fall protection shall meet the requirements of any **presiding regulatory authority** where work is conducted.
 - 10.2.4.3. **Anchorage systems** should be established outside the **fall zone** so that the **rope access technicians** can establish their **rope access systems** before entering the **fall zone**.

11. Communication Plan

- 11.1. An effective communication plan shall be established prior to beginning work and shall remain effective for all the time that work is actively taking place.
- 11.2. Electronic communication systems should be utilized.
 - 11.2.1. These communication systems shall be compatible with the work environment.
- 11.3. Hand or whistle signals shall be reviewed prior to beginning work to ensure understanding by all members of the work team.

12. Rope Access Systems

12.1. Anchorage Systems

- 12.1.1. **Anchorage systems** used as the primary support within a **main** or **backup system** shall have a minimum strength of either 12 kN (2700 lbf), or two times the maximum arrest force of the **backup system** when used in accordance with manufacturer specifications, whichever is greater.
- 12.1.2. A minimum of two **anchorage systems** shall be used to establish the **main** and **backup systems**.
 - 12.1.2.1. One **anchorage** may be used to establish multiple **anchorage systems**.
 - 12.1.2.2. **Main** and **backup systems** should utilize independent **anchorage systems**.
- 12.1.3. **Anchorage systems** shall be installed to accommodate the range of direction of pull.
- 12.1.4. **Anchorage systems** shall be protected appropriately.
- 12.1.5. Load-sharing **Anchorage Systems**
 - 12.1.5.1. Load-sharing **anchorage systems** may be used to:
 - 12.1.5.1.1. Utilize multiple anchorages to achieve the required anchorage system strength.
 - 12.1.5.1.2. Achieve a desired direction of pull or **fall line**.
 - 12.1.5.2. Load-sharing **anchorage systems** should be established to distribute forces appropriately between the anchorages.
 - 12.1.5.3. A table of loads applied to **anchorage systems** where the forces are distributed equally based on the interior angle is provided in [Table 1](#).
- 12.1.6. **Directional Anchorage Systems**
 - 12.1.6.1. The minimum strength of a **directional anchorage system** is determined by:
 - 12.1.6.1.1. The interior angle created by the rope passing through the **directional anchorage system**.
 - 12.1.6.1.2. The anticipated load.
 - 12.1.6.2. A table of loads applied to a directional anchorage system based on the interior angle is provided in [Table 2](#).

12.2. Two-Rope Systems

- 12.2.1. **Two-rope systems** should be installed to minimize lateral movement along sharp and/or abrasive surfaces.
- 12.2.2. **Two-rope systems** shall be established in a manner that if a component of one system were to fail, there would be minimum pendulum swing.
- 12.2.3. Rope and/or edge protection shall be used when appropriate.
 - 12.2.3.1. Consideration should be made to protect each rope individually from any potential damage.

12.3. Backup Systems

- 12.3.1. **Backup systems** shall be used with any **main system**, with the exception of dual **main systems**, discussed in [Section 12](#).
- 12.3.2. **Backup systems** shall be designed and implemented to:
 - 12.3.2.1. Minimize free fall distance and total clearance.
 - 12.3.2.1.1. Free fall distance refers to the distance fallen before the engagement of the **backup system**.
 - 12.3.2.1.2. Clearance requirements are determined from the total fall distance including free fall, deceleration distance of the **backup system**, rope stretch, and harness stretch.
 - 12.3.2.2. Limit the arrest force on the user.
 - 12.3.2.2.1. Both maximum and average arrest force should be considered.
- 12.3.3. **Backup systems** shall be separately fixed to an appropriate harness attachment point.
- 12.3.4. The **backup system** may be attached to the same harness attachment point as the **main system**.
- 12.3.5. **Fixed backup systems** shall be attached to **anchorages** meeting the requirements of [Section 12.1](#).

12.4. Dual *Main Systems*

- 12.4.1. Utilizing dual *main systems*, where two systems are used to share the load, is an acceptable technique when the *anchorage systems* for each *main system* are separated horizontally by no more than 1 m (3.3 ft), and the interior angle from the load to the *anchorage systems* is less than 90 degrees.
- 12.4.2. Dual main systems are typically used in:
 - 12.4.2.1. Aid climbing
 - 12.4.2.2. Interchanging the ropes within a *two-rope system* as *main* and *backup systems*
 - 12.4.2.3. Long descents
 - 12.4.2.4. Long lowering or raising applications
- 12.4.3. If a single piece of equipment is used to support the load in this scenario, a *backup system* shall be incorporated within the *two-rope system*.

13. Rope Access Equipment

13.1. General:

- 13.1.1. Rope access equipment used in any system *shall* be compatible.
- 13.1.2. Rope access equipment should be utilized according to the manufacturer's instructions and recommendations.
- 13.1.3. Rope access equipment shall not be utilized in ways that are expressly prohibited by the manufacturer.
- 13.1.4. Rope access equipment *shall* be suitable and functional in the environment in which it is used.
- 13.1.5. Rope access equipment *shall* prevent inadvertent detachment or removal from the rope under normal use.
- 13.1.6. Rope access equipment *shall* minimize damage to the rope under normal use.

13.2. Standards:

- 13.2.1. *Rope access* equipment *shall* satisfy the requirements of the *presiding regulatory authority* where work is conducted.
- 13.2.2. If *rope access* is not directly regulated by an authority having jurisdiction at the location of the work, *rope access* equipment *should* conform to standards relevant to the intended use.

13.3. Rope Access Equipment Management:

- 13.3.1. Documentation provided with rope access equipment by a manufacturer should be retained.
- 13.3.2. Rope access equipment shall be inspected, maintained, and retired in accordance with manufacturer's specifications.
- 13.3.3. Rope access equipment inspection history should be documented from purchase to retirement.
- 13.3.4. Inspection of rope access equipment in service shall be documented, at a minimum, annually.
- 13.3.5. A functional inspection of rope access equipment shall be performed before each use to confirm serviceability.
- 13.3.6. Rope access equipment on the work site shall be protected from damage and maintained in a safe condition throughout the course of work.
- 13.3.7. Rope access equipment that does not pass inspection, or has potentially sustained damage, shall be removed from service until it can be established that such equipment is safe for use or is retired.

13.4. Backup Devices:

- 13.4.1. Backup devices shall be intended for rope access use.
- 13.4.2. A backup device shall be maintained in a position as high as practical.
- 13.4.3. A backup device should be maintained in a position of *limited free fall potential*.
- 13.4.4. A backup device should be suitable for use in rescue.

13.5. Harnesses:

- 13.5.1. Harnesses shall be of the full body type.
 - 13.5.1.1. If a two-piece full body harness is used, it should be certified as a full body harness.

- 13.5.2. Harness attachment points should have a **minimum breaking strength** of at least 16 kN (3,600 lbf).
- 13.5.3. Rope access harnesses should have, at a minimum, two attachment points:
 - 13.5.3.1. Sternal: Upper frontal attachment point typically used for establishing a **backup system**.
 - 13.5.3.2. Ventral: Lower frontal attachment point typically used for establishing a **main system**.
- 13.5.4. Harnesses should be intended for prolonged suspension use while allowing unhindered operation of other equipment and tools.
- 13.5.5. Harnesses should be compatible with a work seat.

13.6. Connectors:

- 13.6.1. **Carabiners** used to support human loads shall be of a locking type (e.g. screw-gate or auto-locking gate).
- 13.6.2. Connectors should have a **minimum breaking strength** in the designed direction of loading of at least 22.2 kN (5,000 lbf).

13.7. **Descenders**:

- 13.7.1. **Descenders** shall allow for controlled descent and braking.
- 13.7.2. **Descenders** should be appropriate for the length of the descent.
- 13.7.3. **Descenders** should enable the user to stop and work hands-free.
- 13.7.4. For long descents, consideration should be given to the effects of rope-weight and heat dissipation on **descender** performance.
- 13.7.5. Consideration should also be given to reducing cumulative twisting of the rope.

13.8. **Ascenders**:

- 13.8.1. **Ascenders** shall require two or more deliberate actions by the user to be removed from the rope.
- 13.8.2. **Ascenders** shall not slip under normal use.
- 13.8.3. **Ascenders** should be easily adjustable when moving up and down the **main rope**.
- 13.8.4. **Ascenders** should be suitable for specific use (e.g. mounted sternally).
- 13.8.5. **Ascenders** should have attachment points for device lanyards and other devices.

13.9. Ropes:

- 13.9.1. Ropes shall be made from synthetic fibers.
 - 13.9.1.1. Examples of synthetic fibers include nylon, polyester, and aramid fibers.
- 13.9.2. Rope should have a **minimum breaking strength** of 22.2 kN (5000 lbf).
- 13.9.3. Ropes should be selected which have an outer sheath that resists undue wear from edges and system components and tight enough to resist the ingress of dirt and grit.
- 13.9.4. Ropes should be **Static** or **Low Stretch**.
 - 13.9.4.1. In special circumstances, **dynamic rope** may be appropriate to be used in place of **static** or **low stretch rope**.

13.10. Lanyards:

- 13.10.1. Lanyards should have sewn terminations or be terminated with an appropriate knot.
- 13.10.2. Lanyards should be as short as practical in order to minimize free fall potential.
 - 13.10.2.1. The length of a lanyard used within a **backup system** should be no longer than 1.0 m (39.4 in).
- 13.10.3. The **minimum breaking strength** of a lanyard should be at least 18 kN (4046 lbf).
 - 13.10.3.1. If knots are used in a lanyard, the **minimum breaking strength** of 18 kN (4046 lbf) should be obtained after knots are tied.

13.11. Helmets:

- 13.11.1. Helmets shall have a chinstrap or other retention system to prevent the helmet from coming off the head, whether the user is upright or inverted.
- 13.11.2. Helmets shall properly fit the user.

13.11.3. Helmets should allow unrestricted vision.

13.11.4. Helmets should have the ability to mount accessories such as a visor or headlamp.

13.12. Pulleys.

13.12.1. Pulleys should be specifically intended for use within *rope access systems*.

14. Tools, Work Equipment

14.1. All tools and work equipment shall be suitable for the rope access work intended and compatible with the *rope access systems*.

14.2. Tools and work equipment attached to the *rope access technician* or *rope systems* shall not impair the function of the *main* or *backup systems*.

14.3. Appropriate steps shall be taken to prevent tools and work equipment from being dropped or falling.

14.3.1. Tool tethers shall be used when possible.

14.4. Tools and equipment more than 10 kg (~22 lb) in mass should be suspended with a separate *rope system* secured to an independent *anchorage system*.

14.4.1. *Anchorage* and *rope systems* used for equipment should be clearly identified to avoid confusion with those used to support persons.

14.4.2. When significant risk of harm to personnel or property from component failure of a *rope system* suspending or transporting tools, work equipment, and/or materials exists, a *backup system* should be considered.

14.5. Moving parts of tools should be kept clear of the *rope access technician*, the *rope access systems*, and power cables.

14.6. Power tools that could cause injury to the *rope access technician* or *rope access systems* shall be fitted with an automatic shut off switch.

14.7. Appropriate grounding and ground fault circuit interruption shall be provided for as necessary.

14.8. Power cables shall be adequately supported and secured.

15. Use of Suspended Work Platforms in Conjunction with Rope Access

15.1. A suspended temporary work platform should be utilized if *rope access technician* may be suspended at work for an extended period of time.

15.2. When such platforms are used in conjunction with rope access methods, the *anchorage systems* for the platform should be independent of those used for the *main* or *backup systems*.

15.3. If a work seat is used, it shall be fitted in a manner that it does not detract from the harness' connections to the *main* or *backup systems*.

16. Rescue and Emergency Services

16.1. Rescue procedures shall include the information required to contact the appropriate emergency services.

16.2. Rescues should be performed by *rope access technicians*.

16.2.1. While an ancillary *rescue service* may be utilized, *rope access technicians* at the work site are best suited for ensuring prompt *rescue*.

16.3. Rescue procedures shall consider the level and experience of members of the work team.

16.4. Rescue procedures, including self-rescue, should be practiced at regular intervals and before the start of any work in situations that are unfamiliar to the work team.

16.5. Rescue procedures shall utilize *remote rescue systems* when possible.

16.6. Rescue procedures should utilize *rope systems* with an appropriate *backup system*.

16.6.1. In extenuating circumstances where a *backup system* impedes the ability to perform prompt *rescue*, single *main systems* may be utilized.

16.7. Work team members shall perform or manage initial emergency care within the scope of their training.

17. Post-Job Debriefs and Accident Reporting

17.1. Post-Job Debriefs

17.1.1. A documented post-job debrief should be conducted to retain any efficiencies or deficiencies from a rope access job.

17.2. Accident Reporting

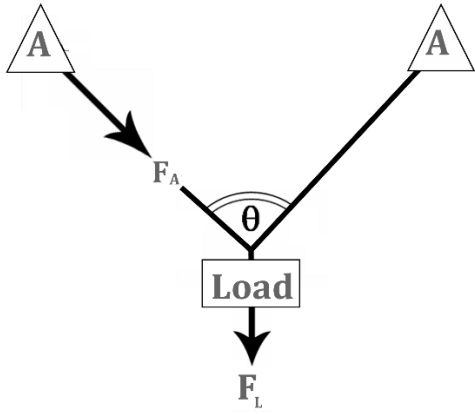
17.2.1. All incidents related to significant injuries to *rope access technicians* or damage to property shall be investigated and documented.

17.2.2. Corrective action shall be taken to eliminate the causes of such incidents.

17.2.3. All affected persons shall be informed of the root cause of the incident and of corrective actions taken.

TABLE 1

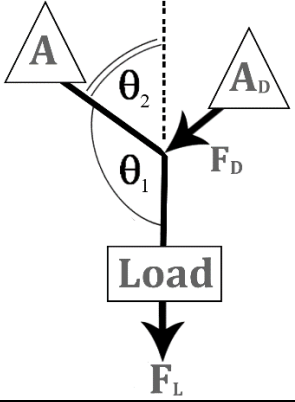
Forces on a single anchorage in an equally distributed, load-sharing *anchorage system* as a function of the applied load.

	θ	$\%F_A/F_L$
	0	50%
	30	52%
	60	58%
	65	59%
	90	71%
	120	100%
	150	193%
	170	574%

θ : Interior angle at *anchorage connector*
 F_A : Force at *anchorage*
 F_L : Force from applied load

TABLE 2

Forces on a *directional anchorage system* as a function of the applied load.

	θ_1	θ_2	$\%F_D/F_L$
	0	180	200%
	30	150	193%
	60	120	173%
	90	90	141%
	120	60	100%
	150	30	52%
	160	20	35%
	165	15	26%
180	0	0%	

θ_1 : Interior angle at *anchorage connector*
 θ_2 : Angle of *fall line* displacement
 F_D : Force at *anchorage*
 F_L : Force from applied load