

# **SAFE PRACTICES FOR ROPE ACCESS WORK**



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## 1 SCOPE AND PURPOSE

### 1.1 Scope

This document sets forth accepted practices for rope access work. This document does not apply to emergency response or emergency response training, except as provided in Section 14.

### 1.2 Purpose

The purpose of this document is to provide information and guidance on acceptable practices and procedures to protect employees from the hazards associated with rope access work methods when working at height. This document is written for all persons concerned with rope access work, but especially for those primarily responsible for establishing and administering rope access work methods. This document contains requirements recommended for use by enforcement authorities in establishing regulations or codes on rope access work methods.

### 1.3 "Shall" and "Should"

The provisions are mandatory in nature where the word "Shall" is used and advisory in nature where the word "should" is used.

### 1.4 Exceptions

Regulatory agencies may have requirements that are different from this standard.

## 2 DEFINITIONS

**Access Permit:** A written statement prepared by the employer describing how a particular job (or types of jobs where these will be essentially identical) should be undertaken to ensure any risks to health and safety of the workers, or others who may be affected, are minimized.

**Access Zone:** The area in which people are at risk of falling such as on-line or near a working edge. This area requires protective measures such as verbal warnings, signs, barriers, safety lines, or other devices designed to prevent or arrest a fall.

**Anchor, Anchorage:** A place, fixing or fixture that supports and to which the various ropes and rope systems are attached.

**Approved Equipment:** Equipment deemed appropriate for use with rope access techniques. Approved equipment shall meet the specifications set forth herein, or other specifications set forth in the access permit, if more stringent.

**Ascender:** A type of rope grab that is used primarily for climbing rope by gripping the rope when loaded in one direction and sliding freely in the opposite direction. Note that many ascender type rope grabs are not sufficient for fall arrest.

**Attendant:** An individual stationed at the site of the rope access work who monitors the rope access workers and who performs all Rope Access Attendant duties assigned in the employer's rope access work program.

**Belay:** An active system operated by another employee for the purpose of arresting the fall of a rope access worker.

**Carabiner:** A type of connector, formed as a complete loop with a spring-loaded entry gate.

**Carabiner, Locking\*:** 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.

**Descender:** A device that acts as a friction brake on a rope. It is normally attached to the operator and enables the operator to control the rate of descent.

**Dynamic Rope:** A rope that is specifically designed to absorb the energy of a fall by extending in length thereby minimizing the shock load.

**Employer:** A corporation, partnership, proprietorship, government agency, or other organization that authorizes its employees to perform rope access work.

**Fall Arrest:** Equipment, system, or structure that catches a falling employee.

**Fall Factor:** The maximum distance a person could fall, divided by the length of the rope attaching the person to the anchorage point.

**Fall Prevention:** Equipment, system, or structure that prevents a fall from occurring.

**Hazard Zone:** Any area where a person may be at risk as a result of the work being performed.

**Kernmantle Rope:** A rope consisting of an internal load-bearing core enclosed within a separate woven sheath.

**Low Stretch Rope:** Rope that has an elongation of 6% to 10% at 10% of minimum breaking strength. See also Static Rope.

**Main Line:** The primary rope used for descending, ascending or positioning.

**Minimum Breaking Strength:** Manufacturers' rating used by the employer to calculate safe working loads.

**On Line:** The condition of being suspended from or attached to a rope.

**Proof Load:** A test load applied to verify that an item of equipment will not exhibit permanent deformation under that load, at that particular time.

**Rescuer:** An individual who is designated by the employer to perform rescue of personnel as a member of the rescue service.

**Rescue Service:** Organization determined by the employer to be capable of safe and effective rescue of rope access workers.

**Retrieval:** Procedure for rescuing rope access workers without placing a rescuer on-line.

**Retrieval System:** The equipment (including a retrieval line, harness, lifting device, and anchor) used for rescue of rope access workers without placing a rescuer on-line. The safety line may be used as the retrieval line in a retrieval system.

**Rope Access:** Techniques by which access is gained to buildings, other structures (on or offshore), geological features (such as cliff faces), or manmade features (such as dams) by means of ropes. It applies to all cases where ropes are used as:

- the primary means of support.
- as means of primary protection or

positioning, and

- where people descend or ascend on a rope or traverse along horizontal rope.

**Rope Access Program Manager:** A person authorized by their employer to be responsible for managing the employer's rope access program, who is suitably knowledgeable, experienced, and qualified to manage the rope access program, including matters relating to safety, training, regulations, staffing, equipment selection and management, and other program responsibilities as designated by the employer.

**Rope Access Technician:** A person who has the appropriate training and experience to use an industrial rope access system and perform the duties required according to the assigned level of responsibility. There are three levels of Rope Access Technician:

- **Rope Access Supervisor-** (Level III Technician) - A person with the training, skills, experience and qualifications necessary to assume responsibility for the entire rope access work site, including management and guidance of other Rope Access Technicians on the worksite, who is capable of designing, analyzing, evaluating and specifying rope access systems, and who has the knowledge and experience to direct rescue operations from rope access systems, as well as the skills necessary to perform advanced rescue from rope access systems.
- **Rope Access Lead Technician** (Level II Technician) - A person with the appropriate training, skills, experience, and qualifications to perform, under

the direction of a Rope Access Supervisor (Level III), all rope access rigging, work and, at a minimum, has the skills necessary to perform standard rescue from rope access systems.

- **Rope Access Worker** (Level I Technician) - A person with the appropriate training, skills, and qualifications for performing, under the direct supervision of a Rope Access Lead Technician (Level II) or Supervisor (Level III), standard rope access operations and, at a minimum, has the skills necessary to perform limited rescue from rope access systems

**Rope Grab:** A device used to grasp a life safety rope for the purpose of supporting a load.

**Safe Working Load (SWL):** The designated maximum working load of an item of equipment as calculated by the employer from the minimum breaking strength.

**Safe Zone:** Any area outside the Hazard Zone or the Access Zone.

#### **Safety, Secondary, Belay or Backup**

**Rope:** Rope used to protect against falls if the user slips or the primary support, anchor or positioning mechanism fails.

**Safety Factor:** The minimum strength of the system divided by the maximum anticipated load expressed as a ratio.

**Static Rope:** Rope that has an elongation of 6% or less at 10% of minimum breaking strength. See also Low Stretch Rope.

### 3 GENERAL REQUIREMENTS

3.1 \*The employer shall prepare an access permit before beginning rope access work. The access permit shall include, but not be limited to, the following safety objectives:

- list the rope access methods to be used for the proposed work,
- list the members of the work team by name and identify their duties. (Note: the Rope Access Supervisor shall assess the individual team member's suitability for the work to be performed.)
- list the rope access equipment to be used for the work to be performed,
- list the hazards associated with the work to be performed,
- list appropriate personal protective equipment (PPE) to be used,
- list provisions for providing security to the anchor,
- list public safety provisions,
- list the rescue service and the means to summon the rescue service.

3.2 \* Safety, Secondary, Belay or Backup line(s) or other appropriate fall arrest devices shall be used in addition to the main line unless the employer can demonstrate that the second line or other fall arrest devices would create a greater hazard or otherwise would not be feasible.

3.3 Where a safety line is used in conjunction with the main line, each line should have its own separate anchor and should be separately fixed to the worker's harness. This does not preclude both lines being attached to a single harness attachment point.

3.4 \*Employer shall insure that anchors have been evaluated in order to ensure that overall system safety factors can be met.

3.5 \*Before adopting rope access techniques for a particular job, the property owners, the main contractors and others responsible for commissioning the work shall do a risk assessment, which would include consideration of the various rope access alternatives available and their respective access advantages and hazards. In particular, attention shall be given to the following aspects:

- Ability of the suspended person to safely use materials, equipment or tools necessary for the work and whether the reaction from any tool may place the person at risk.
- Whether the work may loosen material which could become a hazard to the worker or others.
- Whether the time required for the work at any one location will be such that there may be

unacceptable levels of risk,

- Whether it would be possible to quickly rescue workers that are using rope access techniques from any position they could be expected to enter.

3.6 The employer shall designate a Rope Access Program Manager to be the main contact point for matters relating to the safety, training and regulatory aspects of rope access. The designated person should be suitably knowledgeable, experienced and qualified in rope access techniques.

3.7 Provision for prompt rescue or self rescue and for emergency services shall be the responsibility of the Host Employer.

#### 4 **EMPLOYEE SELECTION AND CAPABILITIES**

4.1 \*Employers should verify prior rope access training and/or experience.

4.2 Employer shall determine that personnel are sufficiently physically capable and free from any impairment that may prevent them from working safely. Employees should have a medical examination before employment in rope access work and at regular intervals.

4.3 The employer shall use a trained Rope Access Lead Technician for system setup and system safety checks.

4.4 The employer shall use trained Rope Access Workers and/or Lead Technicians to conduct all work on line.

**5 DUTIES AND RESPONSIBILITIES OF EMPLOYERS**

- 5.1 Employers shall develop and implement a policy statement that provides general goals and guidance for a rope access program that emphasizes management's commitment to providing a safe workplace for personnel engaged in rope access work.
- 5.2 Employers shall provide the resources that are necessary for the development, implementation and operation of their rope access program.
- 5.3 Employers shall appoint a Rope Access Program Manager who meets the requirements of this standard, and who has the authority to manage and direct the employer's rope access program.
- 5.4 Employers shall develop and maintain written rope access and rescue procedures for every location where its employees use rope access.
- 5.5 Employers shall ensure that employees are informed of foreseeable hazards that they may encounter during the performance of their duties.
- 5.6 Employers shall ensure that all employees have the knowledge and training necessary to safely perform the rope access work to which they are assigned.
- 5.7 Employers shall ensure that all personnel assigned to supervise or otherwise manage other personnel on the worksite are capable in terms of knowledge, training and experience, to provide such oversight.

**6 DUTIES AND RESPONSIBILITIES OF THE ROPE ACCESS PROGRAM MANAGER**

- 6.1 A Rope Access Program Manager is responsible for the development, implementation, monitoring, review, and revision of the employer's rope access program, and has overall responsibility for the program.
- 6.2 The Rope Access Program Manager shall:
  - 6.2.1 Recognize the limitations of its personnel (in terms of training, qualifications, experience, and expertise) to perform rope access work, and ensure that no work is undertaken that exceeds those limitations.
  - 6.2.2 Have a working knowledge of current applicable federal, state and local regulations that apply to rope access and working at height, directly or indirectly, and ensure implementation of all such requirements.
  - 6.2.3 Establish and implement procedures for ensuring and verifying that all employees have the necessary training, skills, and experience for each rope access project to which they are assigned, according to their duties and responsibilities as outlined in this standard.
  - 6.2.4 Establish and implement procedures for ensuring that all hazards to which employees may potentially be exposed on a rope access project are identified, and controlled or eliminated, prior to the commencement of the rope access project.

- 6.2.5 Ensure that all rope access projects are appropriately supervised.
  - 6.2.6 Ensure that the procurement, inspection, tracking, and replacement of equipment used on rope access projects is performed by a person (or persons) with the appropriate knowledge, training and experience to perform the assigned task as it relates to the Rope Access Employer's operations.
  - 6.2.7 Ensure communication and coordination with clients and their safety representatives regarding rope access safety and rescue procedures.
  - 6.2.8 Provide, or verify that personnel are provided with, all appropriate rope access, rescue and personal protective equipment for each rope access project
  - 6.2.9 Ensure that procedures are in place for establishing and marking work zones, and for keeping other personnel and the public out of affected work areas.
  - 6.2.10 Ensure that procedures are consistent with all applicable regulatory requirements and standards related to the work environment, and that such requirements are followed by all employees.
  - 6.2.11 Establish and implement procedures for ensuring that all required planning and documentation, including work permits, job safety analyses, and rescue plans, are completed prior to the commencement of rope access projects, and that all affected personnel are appropriately briefed.
  - 6.2.12 Verify that rope access personnel maintain all necessary training and certifications.
  - 6.2.13 Ensure that employee rope access and training hours are recorded properly.
  - 6.2.14 Provide, or verify provision of, all employee training required to meet the provisions of this standard and of the employer's rope access program.
  - 6.2.15 Participate in the investigation of all incidents related to injuries or near misses involving employees during rope access work or training, either personally or through a qualified individual designated to investigate the incident(s), and taking necessary corrective action to eliminate the causes of such incidents.
  - 6.2.16 Perform any other duties and responsibilities that are necessary for the development, implementation, and maintenance of a safe and effective rope access program, given the particular nature of the employer's operations and the environment in which rope access work is to be performed.
- 7 DUTIES AND RESPONSIBILITIES OF THE ROPE ACCESS SUPERVISOR (LEVEL III TECHNICIAN)**
- 7.1 A Rope Access Supervisor (Level III Technician Level) shall have overall responsibility for the rope access work site and the rope access personnel assigned to that work site.
  - 7.2 To the extent that other qualified personnel are assigned a duty or responsibility that is also designated as a duty or responsibility of the Rope

Access Supervisor, the Rope Access Supervisor shall retain primary responsibility to ensure and/or verify that the assigned task is accomplished.

7.3 Where appropriate, the Rope Access Supervisor may also perform duties and responsibilities of the Rope Access Lead Technician (Level II Technician) and the Rope Access Worker (Level I Technician), to the extent that it does not prevent the effective performance of the Rope Access Supervisor's duties and responsibilities required by this section.

7.4 The Rope Access Supervisor shall have the authority to stop the work immediately if it is unsafe to proceed.

7.5 The Rope Access Supervisor shall:

7.5.1 Be responsible for the immediate supervision, implementation, and oversight of the rope access program at the worksite.

7.5.2 Have sufficient knowledge of current regulations that apply, directly or indirectly, to rope access and working at height, so as to ensure compliance by the employees being supervised.

7.5.3 Direct the efforts of other technicians to ensure safety and compliance with the rope access program.

7.5.4 Communicate and coordinate with clients and their safety representatives, and other contractors on the worksite where appropriate, regarding rope access safety and rescue procedures.

7.5.5 Identify all hazards to which employees may potentially be exposed on a rope access project,

specify the means by which such hazards are to be controlled or eliminated prior to the commencement of work, and ensure that such elimination or control has been accomplished.

7.5.6 Specify the appropriate personal protective equipment (PPE) to be used by employees, ensure employees are properly trained in the use of such PPE in the rope access environment, and ensure employees use the PPE as required.

7.5.7 Identify work zones, ensure that these zones are marked appropriately, and verify that adequate measures are taken to keep other personnel and the public out of any affected areas.

7.5.8 Complete all required planning and documentation, including work permits, job safety analyses, and rescue plans as directed by the Rope Access Program Manager, prior to the commencement of rope access projects.

7.5.9 Review all procedures prior to the commencement of work and as worksite activities change to determine if additional practices, procedures, or training is needed in order commence or continue work.

7.5.10 Conduct job site safety meetings with all affected personnel regarding applicable work permits, job safety analyses, rescue plans, or any other relevant information prior to commencement of the work.

7.5.11 Verify that the necessary emergency services are available, including emergency medical services and

ancillary rescue services (when applicable), and that the means to summon them are functioning.

- 7.5.12 Specify the appropriate rope access equipment, systems and system components, and supervise their installation, use, and inspection.
- 7.5.13 Except as provided in the section of this document addressing rescue:
  - 7.5.13.1 Ensure that a prompt rescue of rope access personnel can be accomplished.
  - 7.5.13.2 Manage rescue efforts that may be required during the work.
  - 7.5.13.3 Specify appropriate rescue procedures.
- 7.5.14 Remove from service any rope access equipment or other equipment (such as tools) that are used during rope access work that is damaged or has potentially sustained damage (such as from a significant shock load), until such time that it can be established that such equipment is safe for use.
- 7.5.15 Ensure that all equipment on the worksite is protected from damage and is maintained in a safe condition throughout the work.
- 7.5.16 Document and validate employee rope access hours in the manner prescribed by the Rope Access Program Manager.
- 7.5.17 Perform any other duties designated in the employer's Rope Access Program, or identified by the Rope Access Manager or Supervisor, for supervising, managing, or otherwise

maintaining a safe rope access worksite.

- 7.6 Where it is determined that the use of ancillary rescue capability is required in the event rescue is needed during rope access operations, the supervisor shall coordinate with the provider of the ancillary rescue capability as required in rescue section of this document.

## 8 DUTIES AND RESPONSIBILITIES OF THE ROPE ACCESS LEAD TECHNICIAN (LEVEL II TECHNICIAN)

- 8.1 A Rope Access Lead Technician (Technician Level II) shall have the appropriate training, experience, and qualifications to perform all rope access work, rigging and, at a minimum, standard rescue procedures under the direction on a Rope Access Supervisor (Technician Level III).
- 8.2 A Rope Access Lead Technician (Technician Level II) may perform limited supervision over Rope Access Workers (Technician Level I) and other Level II Technicians under the close direction of a Rope Access Supervisor. Such supervisory responsibilities may only be delegated to the Rope Access Lead Technician after:
  - 8.2.1 The Rope Access Supervisor determines that the Rope Access Lead Technician is capable of providing limited supervision given the circumstances of the rope access work being performed; and
  - 8.2.2 The Rope Access Supervisor determines that the Rope Access Lead Technician is prepared to handle all work variables and potential rescue requirements.

- 8.3 The Rope Access Lead Technician (Technician Level II) shall:
  - 8.3.1 Adjust, inspect, maintain, properly use, care for, and store all rope access equipment necessary to perform the rope access work.
  - 8.3.2 Utilize appropriate personal protective equipment as directed by the Rope Access Supervisor and the Employer's Rope Access Program.
  - 8.3.3 Recognize worksite hazards, take corrective measures to eliminate or control those hazards, and notify the Rope Access Supervisor of all such hazards and the corrective measures taken.
  - 8.3.4 Identify work zones (e.g. hazard zone).
  - 8.3.5 Understand and follow the requirements of all applicable work permits and job safety analyses.
  - 8.3.6 Have a working knowledge and understanding of the employer's rope access program and all applicable policy and procedures.
  - 8.3.7 Follow the Rope Access Supervisor's directions regarding the work to be performed.
  - 8.3.8 Notify the Rope Access Supervisor if assigned a task or responsibility beyond the Rope Access Lead Technician's training, skills, qualifications, or experience.
  - 8.3.9 Understand and communicate any written and verbal warnings.
  - 8.3.10 Construct, inspect, and analyze safe rope access systems.

- 8.3.11 Perform standard rescue procedures used by the employer for the specific work environment.
- 8.3.12 Perform any other duties designated in the employer's rope access program, or identified by the Rope Access Manager or Supervisor, within that Rope Access Lead Technician's training, skills, experience and qualifications, for conducting safe rope access operations and maintaining a safe rope access worksite.

## 9 DUTIES OF THE ROPE ACCESS WORKER (LEVEL I TECHNICIAN)

- 9.1 The Rope Access Worker (Level I Technician) shall have the appropriate training and qualifications for conducting standard rope access operations under the direct supervision of a Rope Access Supervisor (Level III Technician) or Rope Access Lead Technician (Level II Technician) and, at a minimum, limited rescue from rope access systems.
- 9.2 The Rope Access Worker shall:
  - 9.2.1 Have a working understanding of the employer's rope access program and all applicable policy and procedures.
  - 9.2.2 Adjust, inspect, maintain, care for, and store personal rope access equipment.
  - 9.2.3 Inspect and verify the integrity of anchor systems and components.
  - 9.2.4 Recognize worksite hazards and notify the Rope Access Supervisor of any such hazards.
  - 9.2.5 Be capable of identifying work zones.

- 9.2.6 Understand applicable work permits and job safety analyses. the rope while a person is suspended from it.
- 9.2.7 Understand and communicate any written or verbal warnings.
- 9.2.8 Be familiar with rescue procedures and systems used by the employer, and assist in the performance of rescue from rope access systems.
- 9.2.9 Utilize appropriate personal protective equipment as designated by the Rope Access Supervisor.
- 9.2.10 Follow the Rope Access Supervisor's or, where appropriate pursuant to the requirements of the Safe Practices Document, the Rope Access Lead Technician's directions regarding the work to be performed.
- 9.2.11 Notify the Rope Access Supervisor if assigned a task or responsibility beyond the Rope Access Worker's training, skills, qualifications, or experience.
- 9.2.12 Perform any other duties designated in the employer's Rope Access Program, or identified by the Rope Access Manager or Supervisor, within the training, qualifications, and experience of the Rope Access Worker, for conducting safe rope access operations and maintaining a safe rope access worksite.
- 10 **\*ROPE ACCESS EQUIPMENT**
- 10.1 Components used in any system shall be compatible.
- 10.2 Any equipment chosen to support a person at height should be such that it cannot be accidentally removed, dislodged or become unfastened from
- 10.3 **\*Harnesses.**  
Harness performance and construction should comply with relevant, nationally recognized standards such as NFPA, UIAA, ANSI, ASTM.
- 10.4 **\*Carabiners.**  
Carabiners and similar connectors with screw-gates or self-locking methods of closure are the only types that can provide the required level of security for this type of work. If used to clip onto steel cable, shackles or eye bolts, they should be constructed of steel or other suitably hard metals. Those that are to clip to any anchorage (e.g., hanger, eye bolts, or shackles) should be of such a design and size that they can rotate freely in them without hindrance and without loosening the anchorage. Minimum strength: 22 kN (5,000 lbs).
- 10.5 **\*Descenders.**  
Descenders should give the user suitable control over the speed of descent and should not cause undue shock loads to the rope when braking. In addition they should not cause abrasion, plucking or stripping of the sheath under normal or expected use. They should be of a type that cannot become accidentally detached from the rope.
- 10.6 **\*Rope Grabs.**  
Rope grabs should be of a type that will not slip at a static load below 2.25 kN (550 lbs). Rope grabs should be of a type that cannot be accidentally detached from the rope. Ascenders should be chosen so as to minimize the risk of damage to the rope when in use.

## 10.7 Ropes

10.7.1 \*Ropes made from nylon or polyester will normally be the most suitable for rope access work. Ropes of other man-made materials might, however, be useful in specific situations. In such cases, great caution should be exercised in verifying their suitability for the work.

10.7.2 \*Static or Low Stretch Ropes shall normally be used for ascending and descending on rope. Static or Low Stretch Ropes shall be of a kernmantle construction compliant with Cordage Institute 1801 Low Stretch and Static Kernmantle Life Safety Rope, and have a minimum breaking strength sufficient to supply the users' desired calculated system safety factor. In no case shall the safety factor for a rope access system be less than 5:1.

10.7.3 Where a fall in excess of a factor .25 fall might occur, dynamic rope should normally be used in place of static or low stretch rope. Dynamic safety rope should be of a kernmantle construction compliant with UIAA/CE (or comparable) standards for single climbing ropes.

## 10.8 Webbing.

Webbing used shall have a minimum breaking strength of at least 17.5 kN (4,000 lbs) when new. High modulus fibers such as Spectra, Kevlar, Vectran and similar fibers with minimum elongation may break when subjected to shock loading and shall not be used where a shock load may be applied.

## 10.9 \*Certification.

It is recommended that only equipment that has a current certificate of the safe

working load or minimum breaking strength, or other certification as to reliability, should be used. A check should be made that all certificates are backed by either sample testing to failure, or proof testing on individual items, and a proven quality assurance program, in accordance with an appropriate standard. Equipment should be only used in the manner indicated by the manufacturer.

## 10.10 \*Care and Inspection of Equipment

10.10.1 Employer shall demonstrate that all equipment is used, inspected and maintained in accordance with manufacturer's instructions. Provisions shall be made for the retirement of equipment as necessary.

10.10.2 Employer shall establish and monitor a procedure to ensure all items of equipment are inspected before each use.

10.10.3 Employer shall ensure that equipment is protected from damage during the course of its use.

## 10.11 Access Zone

10.11.1 An Access Zone shall be established.

10.11.2 Anchorages should normally be established outside the Access Zone so that the workers can don their harnesses and helmets and attach themselves to the working line(s) before entering into the Access zone.

10.11.3 No one may enter the Access Zone for any purpose unless they are wearing a harness and are attached to an anchored safety rope.

## 10.12 Hazard Zone

10.12.1A Hazard Zone shall be established and marked, blockaded or identified to warn rope access personnel and passers-by of hazards associated with the work being performed.

10.12.2 No one may enter the Hazard Zone unless they are wearing appropriate Personal Protective Equipment.

## 11 \*COMMUNICATIONS SYSTEMS

11.1 An effective communications system shall be established prior to beginning work and should remain effective for all the time that work is actively taking place.

11.2 Radio systems or hardline communications equipment should be used for communication purposes unless the area of work is such that all those involved are always visible to each other and within audible range.

## 12 USE OF SUSPENDED WORK PLATFORMS IN CONJUNCTION WITH ROPE ACCESS

12.1 A suspended temporary work platform should be utilized if the work is such that the Rope Access Lead Technician may become overtired or suffer restriction to their blood flow.

12.2 When such platforms are used in conjunction with rope access methods the anchorages for the platform should be totally independent from those used by Rope Access personnel as main lines or safety lines.

12.3 Alternatively, support could be provided for the Rope Access Lead Technician by a comfort seat or strap

incorporated into the harness system. This should be fitted in a manner that it does not detract from the harness being the primary means of safety

## 13 TOOLS AND WORK EQUIPMENT

13.1 \*All tools and equipment must be suitable for the work intended and compatible with rope access work. In particular, they should not present a danger to the safe operation or integrity of the rope access system.

13.2 \*Where the workers carry tools and equipment, appropriate steps shall be taken to prevent them being dropped or falling onto people below.

13.3 \*All electrical equipment, plugs, sockets, couplers, leads, etc. should be suitable for the environment in which they will be used.

13.4 Power tools weighing more than 10 pounds should be fitted with a separate suspension system secured to an independent anchorage. Anchorages and suspension ropes used for equipment should be clearly identified to avoid confusion with those used to support persons.

13.5 Moving parts of tools should be kept clear of the operator, power leads and the suspension equipment.

13.6 Appropriate grounding shall be provided for as necessary.

13.7 Any power tools that could cause injury to the users or access equipment should be fitted with an automatic shut off switch that will cut off the power in the event of a mistake, accident, or emergency.

## 14 RESCUE AND EMERGENCY SERVICES

14.1 Provision for prompt rescue or self rescue as well as emergency services shall be the responsibility of the host employer.

14.2 Where the host employer elects for host employers' employees or rope access work contract employees to perform rescue and emergency services, the following requirement shall apply:

- The employer shall ensure that each member of the rescue service is provided with, and is trained to use properly, the personal protective equipment and rescue equipment necessary for making rescues from rope access situations.
- Each member of the rescue service shall be trained to perform the assigned rescue duties. Each member of the rescue service shall also receive the required training.
- Each member of the rescue service shall practice making rescues from rope access situations at least once every 90 days by means of simulated rescue operations in which they rescue dummies, mannequins or actual persons from rope access situations.
- Each member of the rescue service shall hold at least a current First Responder (or equivalent) certification and cardiopulmonary resuscitation (CPR) certification.

14.3 When the host employer elects to have persons other than the host employers employees or Rope Access Work contract employees perform rescue and emergency services, the host employer shall ensure that the outside rescue service:

- can effectively respond in a timely manner to a rescue summons
- is equipped, trained and capable of functioning appropriately to perform rescue of rope access workers at the employer's facility.
- is aware of the hazards they may confront when called on to perform rescue at the host employer's facility.
- is provided in advance with access to areas that require rope access work so that the outside rescuer can develop appropriate rescue plans and practice rescue operations.
- provide documentation that the outside rescue service complies with 14.2 of this standard.

14.4 Retrieval systems or methods shall be available on site whenever a rope access worker is on line, unless use of the retrieval equipment would increase the overall risk of the rope access work, or would not contribute to the rescue of the rope access worker.

14.5 Retrieval procedures using retrieval systems should be practiced at regular intervals and before the start of any work at situations that are unfamiliar to the work team.

## APPENDIX

A2 **Carabiner, Locking.** This may include the standard “screw-gate” style carabiner in which screwing the gate open/closed would be considered one action, and the other action may be pushing the gate open.

A3.1 Before starting a particular job the employer shall carefully assess the work to be undertaken and ensure that all the potential hazards are identified. A site survey is required to determine the means of access, risks to people other than the employees and the nature of the working environment. From this assessment, employers can then prepare a suitable work plan, with necessary separate work plans being prepared for each particular aspect of the job. This statement should set out the general principles and working procedures for each particular situation which are to be followed by their employees and self employed people contracted to work for them. In many cases where types of jobs are similar, sections of the rope Access Permit could be identical and might therefore be in the form of a general document.

A3.2 In planning to meet these objectives, it should be noted that experience has shown significant safety benefits may be obtained if the system of work always includes the provision of at least one alternative means of support to prevent a person from falling. This means that should any one item fail within the suspension system, then there will be an adequate back-up to prevent a catastrophic accident. However, in

some situations such additional measures may cause greater hazard than they mitigate. These situations should be thoroughly documented in the access permit.

A3.4 Employer shall insure that anchors have been taken into consideration to insure that overall system safety factors can be met. Properly planned anchorages should be used. In some cases, anchorages must be installed prior to use. In such cases, a qualified person with experience in Rope Access Anchoring Systems should design an anchor point to be installed. In other cases, there will be a need to devise an anchor point from existing structures. Possible appropriate anchor points include but are not limited to steel members, I-beams, healthy trees of good size and mass, large boulders, heavy equipment and specially designed anchor points.

A3.5 Those permitting, planning, supervising and carrying out the work should ensure that the safety objectives given in the following paragraphs are met.

- a) The primary objective is to organize, plan and manage rope access work so that there will be an adequate safety margin to minimize any risks.
- b) Where the work takes place in a particularly hazardous or restricted area, such as could give rise to poisoning, asphyxiation, etc., then the training, abilities, experience, competence and size of the work team should be of a level that is suitable to deal with any emergency arising out of undertaking the work.
- c) In circumstances where wet synthetic ropes may become a

tracking path for electrical discharges, suitable precautions should be taken.

- d) Except where work is laid out to allow horizontal traversing, work shall be planned such that workers can descend vertically, with the minimum amount of pendulum to minimize the risk of chafing the rope or overloading the rope or anchors.
- e) Work should start from properly protected safe areas or areas made safe by the installation of temporary barriers or scaffolding. Such areas should also have a safe means of access.
- f) Anchors should have safety factors that meet or exceed those required for the ropes. The attachment to the anchorage should at least equal the strength of the system attached to it. Re-direction of ropes from an anchor should not exceed 120 degrees unless the side loads produced at the redirection point are considered. Similarly, where the included angle at the attachment is high and produces a 'multiplier' effect, the extra forces produced should be considered.
- g) All rope access workers should be properly supervised and self-supportive. Work teams should consist of at least the minimum number of members required to ensure that should anyone require help they can quickly perform retrieval. To meet the above requirement, a work team should consist of at least two members. One member of the work team should be qualified as a Rope Access Supervisor or Lead Technician. The Rope Access Supervisor should ensure that the provisions for rescue are adequate. Sufficient personnel should be readily available to provide

assistance in the event of an emergency.

- A4.1 People chosen for the work should have a suitable attitude for working at height. To work safely at height requires those engaged in the work to have special characteristics. Prospective employees should have both aptitude and attitude that would not result in panic, cause them to make mistakes in a crisis, or work in a foolish or undisciplined manner. Aptitude and attitude may vary according to height and environment of work to be performed.

Frequently those who work at height will be remote or out of sight from their Rope Access Supervisor. It is, therefore, especially important that the workers can be always relied upon to behave in a sensible and responsible manner.

To assess whether a person is capable of performing this type of work requires detailed consideration of their previous experience. Employers should verify prior rope access training experience.

Other suitable experience could include mountaineering, caving and working at heights using other means of access. Experience with the fire service or Military Forces may also be relevant if a person has been regularly engaged in the use of methods that involve being exposed at heights. Where practicable, references should be obtained to verify claimed experience and levels of competence.

Employers will be assisted in their verification and monitoring of a worker's experience when their

workers or applicants have a personal record log showing the training received and describing their work experience.

As part of their duties to maintain a safe place of work, employers should control any tendency of employees to work in an undisciplined manner by recording this in their personal log books. An amending note canceling any adverse comments would not then be made until the employer is completely satisfied that there would be no recurrence.

Employees must ensure that the employees maintain their level of ability. Refresher training should be provided for workers who have not been continuously engaged in this work. Due to the aptitude and mental conditioning for height 'exposure', workers who have not been engaged on rope access for six months or more should attend a suitable refresher course before being allowed to work in this manner. This may be either a refresher course or a full course at the appropriate level.

- A10 All items of equipment that may be used to support a person (i.e., ropes, harnesses, descenders, and other attachments) should be strong enough to provide an adequate safety factor over the most severe combination of loads that it is reasonable to predict. The choice of suitable safety factors will vary depending on whether the equipment will be subjected to dynamic or static loads. It will also vary depending on whether or not it's being subjected to severe mechanical abrasion or chemical contamination or other significant deterioration. Devices should be marked with the

manufacturer's mark and a unique number to allow traceability to their test, inspection or certificates of conformity.

- A10.3 Where the harness is to be used as the primary support, webbing on the leg loops should be of sufficient width and design to support the wearer in a comfortable and safe working position while allowing unhindered operation of other equipment and tools.

- A10.4 Strengths listed are for single person loads. Higher strengths may be required to achieve similar safety factors for two person or rescue loads.

- A10.5 For long descents, consideration should be given to the effect of rope-weight on descender performance. Consideration should also be given to reducing cumulative twisting of the rope.

- A10.6 Rope grabs may be used to ascend a rope or to attach the operator to a safety line. In the event of a failure of the main line or loss of control by the operator, rope grabs are intended to grip the safety rope without causing damage to the rope and also help absorb any shock load which may occur.

- A10.7.1 Ropes made from high modulus polyethylene, high tenacity polypropylene and "Kevlar" are types of ropes which may be considered in exceptional circumstances when the appropriate descent devices have been developed. These might be useful where there is severe chemical pollution or where the self weight of the ropes could be a problem. However, H.M. polyethylene and H.T. polypropylene have much lower

melting temperatures than nylon or polyester and may be affected by frictional heat from the descenders. Dangerous softening of polypropylene occurs at temperatures as low as 27 degrees C (80 degrees F). Kevlar has a very high melting point but poor resistance to abrasion, UV light (including sunlight) and repeated bending.

A10.7.2 Life Safety 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. In most cases, this rope will be low stretch rope.

An example of calculating system safety factors is as follows: a 68 kg (150-pound) worker, to achieve a 5:1 safety factor, must work on a system where the weakest link of the system is calculated to be capable of sustaining at least 340 kg (750 pounds).

A10.9 Part of the permitting process for rope access work is the evaluation and determination of which standards apply to equipment being used for the type of work being done. Conventional "fall protection" equipment rated to ANSI A10.14 or Z359.1 may not be sufficient for rope access work due to different construction and performance requirements. Most equipment will meet a CE, ASTM, Cordage Institute or NFPA standard. The most critical element is to ensure that the equipment being used is appropriate for the job at hand.

A10.10 Records listing all equipment issued, referring to the original test or certificates of conformity should be

kept. In some cases it will be helpful if they also have relevant comments noting where the equipment was used, its storage conditions, and any incidents which could affect its life (e.g., unusual loadings, use in chemical or gritty atmosphere, exposure to salt-air, etc.). The records shall note when each piece of equipment was inspected, by whom and any remarks concerning its condition at that time.

A11 Hand or audible signals to be used for regular or emergency communications should be agreed upon and rehearsed before work begins.

A13.1 Work using rope access techniques is generally more exposed than most other work methods due to factors including the inability of the worker to move from close proximity to the work itself and to any power source or tools being used. As a result certain tools, which can be used safely from the ground, platforms, or other work surfaces, could cause risks to the worker or their suspension equipment unless great care is taken.

A13.2 Small tools may be securely attached to the worker's harness by lanyards, carried in a bucket or bag securely attached to the worker's harness, or otherwise secured. Safety factor calculations always take into consideration the weight of any tools.

A13.3 In some cases power leads might need to be adequately supported or secured at their upper suspension point to carry their own self weight, or secured at intermediate points. Care should be taken to ensure that any such systems do not impair the rope access system or its backup.

## **14. CONTACT INFORMATION**

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