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Personal equipment for protection against falls — Rope access systems —

Part 1: Fundamental principles for a system of work

Équipement individuel de protection contre les chutes — Systèmes d'accès par corde —

Partie 1: Principes fondamentaux pour un système de travail

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Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 22846-1 was prepared by Technical Committee ISO/TC 94, *Personal safety — Protective clothing and equipment*, Subcommittee SC 4, *Personal equipment for protection against falls*.

ISO 22846 consists of the following parts, under the general title *Personal equipment for protection against falls — Rope access systems*:

— *Part 1: Fundamental principles for a system of work*

— *Part 2: Code of practice* (in the early stages of preparation)

Introduction

Rope access is a system that provides a user with the means, typically using synthetic fibre kernmantel ropes and associated equipment, to gain access to, be supported at, and then as a means of egress from, a place of work for the purpose of carrying out a work task.

Rope access has its background in mountaineering and particularly in caving, where it has been well proven, although it relies on only a single rope. For adaptation to the work environment, the techniques and some of the equipment have been modified. The most significant change is the inclusion of a second rope to provide additional safety. These modifications allow the system to offer a level of protection to the operatives equal to, or better than, other similar forms of access.

In a typical system, one rope (the working line) is used for access and egress (usually ascent and descent) and for support at the workplace. A harness is attached to the user and specially designed devices are attached to the working line and to the harness. The other rope (the safety line) is connected to the user via a safety device, which travels along the safety line as the user ascends or descends the working line. In the event of a failure of the working line or any of its components, the safety line protects against a fall and limits the load to the equipment and operative. This is one example of a system. However, the need to provide a basic access system and a back-up system may also be accomplished in other ways. The techniques and equipment used for this purpose may be extended to encompass traversing and aid climbing.

The safe use of rope access systems requires competence, normally acquired by training, and confirmed with independent assessment and certification, not only in the use of the system itself, but also in workmate rescue/retrieval.

While this part of ISO 22846 provides the generalized framework for the specification and the operation of rope access, individual countries, states and localities may have particular requirements. These local requirements should be followed in addition to those of this part of ISO 22846.

Personal equipment for protection against falls — Rope access systems —

Part 1: Fundamental principles for a system of work

1 Scope

This part of ISO 22846 gives the fundamental principles for the use of rope-access methods for work at height. It is intended for use by employers, employees and self-employed persons who use rope-access methods, by those commissioning rope-access work and by rope-access associations. This part of ISO 22846 is applicable to the use of rope-access methods on buildings, other structures (on- or offshore) or natural features (such as cliff faces), during which ropes are suspended from or connected to a structure or natural feature. It is applicable to situations where ropes are used as the primary means of access, egress or support and as the primary means of protection against a fall.

This part of ISO 22846 is not intended to apply to the use of rope-access methods for leisure activities, arboriculture, general steeplejack methods or emergency personal-evacuation systems, or to the use of rope-access (line rescue) techniques by the fire brigade and other emergency services for rescue work or for rescue training. Nevertheless, those engaged in other similar activities are likely to benefit from the advice given in this part of ISO 22846, as many of the principles do apply to, and offer good practice for, activities outside this formally defined scope.

NOTE This is the first of a planned multi-part series of International Standards for rope access.

2 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

2.1
aid climbing
method of progression in suspension, either by moving from one fixed anchor to another or by the use of moveable anchors or anchor points

2.2
anchor
fixture or place for the attachment of lines or persons

2.3
ascender
rope adjustment device which, when attached to a line of appropriate type and diameter, locks under load in one direction and slides freely in the opposite direction

NOTE Normally used for ascending the working line or positioning the operative on it.

2.4
back-up device
rope adjustment device for a safety line of appropriate type and diameter, which accompanies the user during changes of position or allows adjustment of the length of the safety line, and which locks automatically to the safety line, or only allows gradual movement along it, when a sudden load is applied in one direction, e.g., in the event of a fall

2.5
belay
system incorporating a device to control, by friction, a running rope which acts as a brake should the user experience sudden movement or fall

2.6
competent
suitably trained or qualified by knowledge and practical experience to enable the required task or tasks to be carried out properly

2.7
descender
manually operated, friction-inducing rope-adjustment device, which, when attached to a line of appropriate type and diameter, allows the user to achieve a controlled descent

NOTE Normally used for descending the working line or positioning the operative on it.

2.8
exclusion zone
zone designated to exclude the public from a hazardous area and from the rope-access equipment, or to exclude the operatives from a hazardous area unless suitably protected

2.9
lead climbing
method of progression, not in suspension, in which the operative is supported by the structure and is protected by a safety line which is passed through intermediate anchors and which is fed out or pulled in by a second operative as the first operative progresses

NOTE The safety line is incorporated into an independently anchored fall protection/belay system, by which a fall can be arrested with a limited force.

2.10
line
length of textile rope or webbing, metallic wire rope or chain, connected at at least one end to a reliable anchor to provide a means of support, restraint or other safeguard for a person wearing a harness in combination with other devices

NOTE A line may be a working line or a safety line.

2.11
rope access
technique using ropes, normally incorporating two separately secured systems, one as a means of access and the other as back-up security, used with a harness in combination with other devices, for getting to and from the place of work and for work positioning

2.12
safety line
line provided as a safeguard to protect against a fall if the user slips or if the primary support (e.g., the working line), anchor or positioning mechanism fails

NOTE Also known as a “back-up rope” or “back-up line”.

2.13
supervisor
competent person responsible for implementing and supervising a safe system of rope-access work at a particular worksite

2.14
traversing
broadly horizontal progression, generally using lead-climbing or aid-climbing techniques or transverse ropes or pulley systems

2.15
working line
line used primarily for suspension, work positioning or restraint for both descending and ascending

2.16
workmate rescue/retrieval
care and removal by one or more operatives of an incapacitated member of the rope-access work team from a place of danger to a place of safety

2.17
work positioning
technique that enables a person to work supported in tension or suspension by personal protective equipment in such a way that a fall from a height is prevented or restricted

2.18
workseat
suspended seat, positioned on the working line and not forming part of the back-up/fall-protection system, provided for the comfort of a rope-access operative

3 Principles

NOTE The principles listed should not be taken to be exhaustive.

3.1 The main goal of rope-access operations is to ensure that a safe system of work is maintained at all times. The principles described in this clause are some of the key elements for such a safe system of work. There may be other requirements, depending on the work situation and the work task being performed.

Key elements of a safe system of work include, but are not limited to, the following:

— proper management and planning;

— use of trained, competent persons with proper levels of supervision;

— selection, maintenance and care of appropriate equipment;

— proper control of working methods, including the following:

  — arrangements for the use of work equipment,

  — provision for emergency procedures,

  — protection of third parties.

3.2 All rope-access work should be planned by a designated person who is responsible for maintaining a safe system of work.

3.3 Before rope-access work commences, hazards identification and risk assessment should be carried out to establish the appropriateness of using rope-access techniques and to address any hazard issues.

3.4 Of primary importance is the principle of double protection. It is essential to include the provision of at least one alternative means of support to prevent an operative falling, for example, a working line plus a safety line. This means that, should any one item fail within the suspension system, there is an adequate back-up to prevent an accident. When an operative is in tension or suspension, there should be at least two independently anchored lines, one primarily as a means of access, egress and support (the working line) and the other as additional back-up security (the safety line).

NOTE Where appropriate, the safety line may be replaced by other forms of back-up security, which should be equal to or better than the performance of the one it replaces.

3.5 Connection of an operative to the rope-access system should be made in an area where there is no risk of a fall from height, unless there are other means of protection.

3.6 Exclusion zones should be established as appropriate. This might necessitate establishing exclusion zones at locations other than at the top and the bottom of the rope-access work site.

3.7 The operative should be connected to both the working line and the safety line via an appropriate harness. The two lines may be connected to the same point on the harness.

3.8 The harness should be an appropriate sit harness or an appropriate full-body harness.

3.9 The primary connection to the operative of both the working line and the safety line should always be via the harness, even if a workseat is being used.

3.10 The back-up device (on the safety line) should be capable of withstanding any foreseeable forces resulting from the rope access activity, without catastrophic damage to the safety line or the device.

NOTE These forces can be minimized by keeping the backup device high to prevent or limit a fall.

3.11 Descender devices or systems should allow a controlled descent bearing in mind the mass of the user, length of descent, consideration for safety (e.g. fail to safe features), adjustable friction, heat dissipation and for stopping along the line for the purpose of hands-free work. In general, descenders with hands-free “auto stop” capabilities are desirable.

3.12 Measures should be taken to avoid the operative being able to inadvertently descend off the end of the working line or safety line.

3.13 All equipment should be appropriate to its application. It should be inspected before each use (pre-use inspection) and more thoroughly at regular intervals. Details of all thorough inspections should be recorded.

3.14 Equipment should be properly maintained and stored, and should be traceable back to the manufacturer or supplier.

3.15 Operatives should be sufficiently physically capable and free from any impairment that might prevent them from working safely.

3.16 Operatives should work in teams of no fewer than two, one of whom should have the responsibility, and should be competent, to supervise.

3.17 Operatives should be trained and competent to carry out any access tasks that they are to undertake, including workmate rescue/retrieval. Operatives should only be allocated tasks appropriate to their level of training.

3.18 Operatives should be competent in the pre-use inspection of their equipment, including an understanding of when equipment should be withdrawn from service.

3.19 Operatives should have clothing and equipment appropriate to the work situation and conditions.

3.20 There should be a specific workmate rescue/retrieval plan in place for each worksite.

3.21 An operative should always be in a position to recover him/herself, or to be recovered quickly and efficiently as part of the normal work technique by the immediate work team or by a dedicated on-site rescue team.

3.22 An efficient team communication system should be established.

3.23 There should be proper supervision of the workplace.

3.24 Supervisors should be competent in rope-access techniques appropriate to the workplace, should know and understand the limitation of those techniques and should be responsible for hazard identification and risk assessment (see 3.1). They should be competent in advanced workmate rescue/retrieval techniques and in organizing or effecting a workmate rescue/retrieval appropriate to the worksite.

3.25 The impact force on an operative in any potential fall should never be greater than 6 kN.

3.26 No potential fall should cause the operative to impact the ground. All practicable measures should be taken to avoid injurious impact with structures or obstructions.

3.27 Rope-access techniques can be extended from activities in tension or suspension to include traversing, some types of aid climbing (arguably, aid climbing is a form of suspension) and lead climbing. As some of these techniques could result in a fall, they should be used only after a specific hazard identification and risk assessment, and the appropriate choice of fall protection/access equipment. Only specifically trained and qualified operatives should engage in these types of rope-access work.

3.28 There should always be at least two attachments to the structure when aid climbing.

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