

BS 7985:2009



BSI Standards Publication

Code of practice for the use of rope access methods for industrial purposes

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ISBN 978 0 580 61276 3

ICS 13.110; 13.340.40

The following BSI references relate to the work on this standard:

Committee reference PH/5

Draft for comment 09/30174849 DC

Publication history

First published February 2002

Second (present) edition, October 2009

Amendments issued since publication

Date	Text affected
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Summary of pages

This document comprises a front cover, an inside front cover,
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Foreword

Publishing information

This British Standard is published by BSI and came into effect on 31 October 2009. It was prepared by Technical Committee PH/5, *Personal fall protection*. A list of organizations represented on this committee can be obtained on request to its secretary.

Supersession

This British Standard supersedes BS 7985:2002, which is withdrawn.

Information about this document

This new edition of BS 7985 incorporates technical changes only, to bring the standard up to date. It does not represent a full review or revision of the standard, which will be undertaken in due course. The principle changes in this new edition are as follows.

- a) Clause 4 on legislation has been updated.
- b) Figure 4 has been modified.
- c) A new 8.3.1.2 has been added regarding the risks to textile components of UV degradation and abrasion.
- d) The text of 8.3.15 on lanyards and “cow’s tails” has been updated.
- e) The text of 12.3.5 on anchors, and Figure 6, have been revised.
- f) The original Annex A on the application of the Lifting Operations and Lifting Equipment Regulations to rope access has been deleted. Reference is made instead to a new HSE document covering this subject.
- g) A new annex (Annex C) has been added giving an example of a harness comfort and adjustability test, as given in BS 8437:2005, Annex B.
- h) Annex D has been updated to reflect the latest HSE guidance on suspension intolerance (formerly known as suspension trauma).
- i) A new annex (Annex E) has been added on anchors for use in rope access, based on BS 7883:2005, Annex C.

This standard gives practical advice on the duties placed on employers, employees and self-employed people who use specialist rope access methods for work at height, and gives recommendations for good practice. It is based on the Industrial Rope Access Trade Association (IRATA) *Guidelines on the use of rope access methods for industrial purposes* [1], which represent a number of years of close co-operation with the Health and Safety Executive (HSE). It includes contributions from the Federation of Master Steeplejacks and Lightning Conductor Engineers (since renamed the Association of Technical Lightning and Access Specialists). The recommendations include the type of equipment that should be used, the level of competence of the operatives, and the setting of overall objectives for the work.

The standard applies to industrial rope access work only, where the prime activity is the work itself. It is not intended to cover, for example, leisure activities or emergency evacuation systems and their procedures. Nevertheless, those engaged in other similar activities would probably benefit from the advice given in this standard, as many of the principles do apply and offer good practice.

In addition to onshore work, the advice in this document is relevant to work carried out on all offshore installations where that installation is subject to the relevant sections of the Health and Safety at Work etc. Act 1974.

The Health and Safety Executive (HSE) commends the use of this British Standard to those who have duties under the Health and Safety at Work etc. Act 1974. This standard was drawn up with the participation of HSE representatives and it will be referred to in the relevant HSE publications.

NOTE Copyright is claimed in Figure 4 and Figure 6. The copyright holder is Lyon Equipment Ltd., Dent, Sedbergh, Cumbria, LA10 5QL.

Use of this document

As a code of practice, this British Standard takes the form of guidance and recommendations. It should not be quoted as if it were a specification and particular care should be taken to ensure that claims of compliance are not misleading.

Any user claiming compliance with this British Standard is expected to be able to justify any course of action that deviates from its recommendations.

It has been assumed in the preparation of this British Standard that the execution of its provisions will be entrusted to appropriately qualified and experienced people, for whose use it has been produced.

Presentational conventions

The provisions in this standard are presented in roman (i.e. upright) type. Its recommendations are expressed in sentences in which the principal auxiliary verb is “should”.

Commentary, explanation and general informative material is presented in smaller italic type, and does not constitute a normative element.

Contractual and legal considerations

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

In particular, attention is drawn to the statutory regulations listed in Clause 4.

1 Scope

This British Standard gives recommendations and guidance on 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, and those who commission rope access work, e.g. building owners and contractors. This British Standard is applicable to the use of rope access methods for access to buildings, other structures (on or offshore) or natural features (such as cliff faces), in which the ropes are suspended from, or connected to, the 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 standard 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 training.

NOTE For building owners and contractors, the information and guidance given in Clause 4 and Clause 5 and in 7.4 and 12.1 is of particular relevance.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

BS 2830, *Specification for suspended access equipment (suspended chairs, traditional steeplejack's seats, work cages, cradles and platforms) for use in the building, engineering construction, steeplejack and cleaning industries*

BS 5974, *Code of practice for the planning, design, setting up and use of temporarily installed suspended access equipment*

BS 6037-1, *Code of practice for the planning, design, installation and use of permanently installed access equipment – Part 1: Suspended access equipment*

BS 6037-2, *Code of practice for the planning, design, installation and use of permanently installed access equipment – Part 2: Travelling ladders and gantries*

BS 7883:2005, *Code of practice for the design, selection, installation, use and maintenance of anchor devices conforming to BS EN 795*

BS EN 136, *Respiratory protective devices – Full face masks – Requirements, testing, marking*

BS EN 140, *Respiratory protective devices – Half masks and quarter masks – Requirements, testing, marking*

BS EN 143, *Respiratory protective devices – Particle filters – Requirements, testing, marking*

BS EN 149, *Respiratory protective devices – Filtering half masks to protect against particles – Requirements, testing, marking*

BS EN 166, *Personal eye-protection – Specifications*

BS EN 352 (all parts), *Hearing protectors – Safety requirements and testing*

BS EN 355, *Personal protective equipment against falls from a height – Energy absorbers*

BS EN 361, *Personal protective equipment against falls from a height – Full body harnesses*

BS EN 362, *Personal protective equipment against falls from a height – Connectors*

BS EN 374-1, *Protective gloves against chemicals and micro-organisms – Part 1: Terminology and performance requirements*

BS EN 388, *Protective gloves against mechanical risks*

BS EN 407, *Protective gloves against thermal risks (heat and/or fire)*

BS EN 420, *Protective gloves – General requirements and test methods*

BS EN 795:1997, *Protection against falls from a height – Anchor devices – Requirements and testing*

BS EN 813, *Personal fall protection equipment – Sit harnesses*

BS EN 892, *Mountaineering equipment – Dynamic mountaineering ropes – Safety requirements and test methods*

BS EN 1263-1, *Safety nets – Part 1: Safety requirements, test methods*

BS EN 1263-2, *Safety nets – Part 2: Safety requirements for the positioning limits*

BS EN 1808, *Safety requirements on suspended access equipment – Design calculations, stability criteria, construction – Tests*

BS EN 1891:1998, *Personal protective equipment for the prevention of falls from a height – Low stretch kernmantel ropes*

BS EN 12275, *Mountaineering equipment – Connectors – Safety requirements and test methods*

BS EN 12277, *Mountaineering equipment – Harnesses – Safety requirements and test methods*

BS EN 12492, *Mountaineering equipment – Helmets for mountaineers – Safety requirements and test methods*

BS EN 14387, *Respiratory protective devices – Gas filter(s) and combined filter(s) – Requirements, testing, marking*

3 Terms and definitions

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

3.1 work types

3.1.1 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

3.1.2 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

3.1.3 work restraint

technique whereby a person is prevented by means of personal protective equipment from reaching zones where the risk of a fall from a height exists

3.1.4 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

3.1.5 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

NOTE The safety line is passed through an independently anchored fall protection device, which is operated by another person, and by which a fall can be arrested with a limited force.

3.1.6 traversing

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

3.1.7 workmate rescue

care and removal by one or more operatives of an incapacitated member of their rope access work team from a place of danger to a place of safety

3.2 equipment**3.2.1 lifting equipment**

work equipment that lifts or lowers loads and includes its attachments used for anchoring, fixing or supporting it

NOTE 1 Examples are chains, slings, eyebolts, and anchorage equipment which includes rigging and associated items used in rope access methods, including ropes, karabiners, harnesses and strops.

NOTE 2 The Lifting Operations and Lifting Equipment Regulations 1998 (LOLER) state that a load includes a person.

3.2.2 fall arrest system

personal fall protection system for work at height by which a fall is intended to be arrested to prevent the collision of the user with the ground or structure

3.2.3 anchorages**3.2.3.1 anchor**

fixing or fixture for the secure attachment of anchor lines or persons

NOTE Also known as a "belay".

3.2.3.2 anchor point

attachment point at an anchor for anchor lines or persons

3.2.4 lines and ropes**3.2.4.1 anchor line**

flexible line connected at least at 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 An anchor line may be a working line or a safety line.

3.2.4.2 working line

anchor line used primarily for suspension, work positioning and restraint including descending and ascending

3.2.4.3 safety line

anchor line provided as a safeguard to protect against falls 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".

3.2.4.4 dynamic rope

rope specifically designed to absorb energy in a fall by stretching, thereby minimizing the impact force

3.2.4.5 low-stretch rope

textile rope with lower stretch and, therefore, less energy absorption than dynamic rope

NOTE 1 Also known as a "semi-static rope".

NOTE 2 This used to be termed "static rope". However, the term "static rope" is now only applied to ropes with negligible stretch, e.g. wire or aramid, which show little extension at failure and hence have little ability to absorb shock loads.

3.2.4.6 kernmantel rope

textile rope consisting of a core enclosed by a sheath

NOTE The core is usually the main load-bearing element and typically consists of parallel elements which have been drawn and turned together in single or multiple layers, or of braided elements. The sheath is generally braided or woven and protects the core from, for example, external abrasion and ultraviolet degradation.

3.2.5 rope adjustment devices**3.2.5.1 ascender**

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

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

3.2.5.2 descender

manually operated, friction inducing, rope adjustment device, which when attached to an anchor line of appropriate type and diameter, allows the user to achieve a controlled descent and to stop with hands off anywhere on the anchor line

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

3.2.5.3 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

3.2.6 connectors**3.2.6.1 connector**

openable device used to connect components, which enables the user to link himself/herself directly or indirectly to an anchor

3.2.6.2 karabiner

connector, formed as a complete loop, with a spring loaded entry gate often safeguarded in the closed position by a screwed sleeve or automatic locking device

NOTE A karabiner in which the entry gate is safeguarded in the closed position by a screwed sleeve is known as a "screwgate karabiner".

3.2.6.3 screwlink connector

connector that is closed by a threaded sleeve which is a load-bearing part of the connector when fully screwed up

NOTE Also known as a "maillon rapide" (pronounced my-yon rapeed) or a "quicklink".

3.2.7 anchor sling

sling, strop or lanyard made from textiles, wire rope or chain, which is used to provide an anchor point for anchor lines, cow's tails etc. to anchors to which it is not possible to connect directly

3.2.8 energy absorber

component or components in a fall arrest system, designed to minimize the impact force generated in a fall

NOTE Also known as a "shock absorber".

3.2.9 workseat

suspended seat, not forming part of the fall protection system, provided for the comfort of a rope access operative

3.3 loads**3.3.1 working load limit****WLL**

maximum load that can be lifted by an item of equipment under conditions specified by the manufacturer

3.3.2 safe working load**SWL**

designated maximum working load of an item of equipment under specified conditions

NOTE See also 3.3.1 working load limit (WLL).

3.3.3 breaking load

minimum load at which an item of equipment breaks when it is tested, new, under specific conditions

3.3.4 proof load

test load applied to verify that an item of equipment does not exhibit permanent deformation under that load, at that particular time

NOTE This result can then be theoretically related to the performance of the equipment in its particular application.

3.3.5 maximum rated load **RL_{MAX}**

maximum mass of one or more persons, including tools and equipment carried, with which a component of a rope access system can be used, as specified by the manufacturer

NOTE The maximum rated load is expressed in kilograms.

3.3.6 minimum rated load**RL_{MIN}**

minimum mass of one or more persons, including tools and equipment carried, with which a component of a rope access system can be used, as specified by the manufacturer

NOTE The minimum rated load is expressed in kilograms.

3.4 persons**3.4.1 competent person**

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

3.4.2 sentry

person responsible for keeping watch to safeguard the anchorage areas and/or the area of ground below the operatives

3.4.3 supervisor

person responsible for all aspects of the rope access site

3.5 fall factor

length of a potential fall divided by the length of rope or lanyard available to arrest it

3.6 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

3.7 safety method statement

document prepared by an employer describing how a particular job (or type of job where several jobs are essentially identical) should be undertaken to ensure that any risks to the health and safety of the operatives, or others who might be affected, are minimized

3.8 certificate of conformity

documentation provided by a supplier of equipment at the time of purchase, stating performance specifications of the equipment or indicating conformity to known standards or compliance with relevant legislation

NOTE An example of relevant legislation is the Personal Protective Equipment at Work Regulations 1992 and amendments.

3.9 zero targeting

establishment of a system of working which aims to achieve no accidents, no waste and no defects

4 Legislation

4.1 Attention is drawn to the following acts and regulations, and HSE approved codes of practice (ACoP) and Guidance.

Confined Spaces Regulations 1997 SI 1997/1713 and ACoP and Guidance *Safe work in confined spaces* (HSE L101)

Construction (Design and Management) Regulations 2007 (CDM Regulations) SI 2007/320 and ACoP *Managing health and safety in construction* (HSE L144)

Construction (Head Protection) Regulations 1989 SI 1989/2209 and Guidance (HSE L102)

Control of Asbestos at Work Regulations 2006 SI 2006/2739 and ACoP *Work with materials containing asbestos* (HSE L143)

Control of Noise at Work Regulations 2005 SI 2005/1643 and Guidance (HSE L108)

Control of Substances Hazardous to Health Regulations 2002 (COSHH) SI 2002/2677 (as amended) and ACoP and Guidance *Control of substances hazardous to health* (fifth edition) (HSE L5) and Guidance *COSHH A brief guide to the regulations* (HSE INDG 136 REV 3), *A step by step guide to COSHH assessment* (HSG 97) and *Fumigation* (HSG 251)

Control of Vibration at Work Regulations 2005 SI 2005/1093 and Guidance *Hand-arm vibration* (HSE L140)

Electricity at Work Regulations 1989 SI 1989/635

Health and Safety at Work etc. Act 1974

Health and Safety (First Aid) Regulations 1981 SI 1981/917 and ACoP and Guidance *First aid at work* 1997 (HSE L74)

Health and Safety (Safety Signs and Signals) Regulations 1996 SI 1996/341 and Guidance *Safety signs and signals* (HSE L64)

Highways Act 1980

Lifting Operations and Lifting Equipment Regulations 1998 (LOLER) SI 1998/2307 and ACoP and Guidance *Safe use of lifting equipment* 1998 (HSE L113)

Management of Health and Safety at Work Regulations 1999 (MHSW Regulations) SI 1999/3242 and ACoP and Guidance *Management of health and safety at work* (HSE L21)

Manual Handling Operations Regulations 1992 SI 1992/2793 (as amended) and Guidance *Manual handling* (HSE L23 3rd edition)

Mineral Workings (Offshore Installations) Act 1971

NOTE Parts of this Act have been repealed. Sections 1, 4 and 5 have been repealed by SI 1995/738 Regulation 22(1). Schedule 1, Part 1, sections 2 and 6 have been repealed by SI 1993/1823, Regulation 3(1) (a) and Regulation 6. Section 3 has been repealed by SI 1996/913, Regulation 25.

Offshore Installations and Pipeline Works (Management and Administration) Regulations 1995 (MAR) SI 1995/738 and Guidance (HSE L70, 2nd edition)

Offshore Installations and Wells (Design and Construction) Regulations 1996 (DCR) SI 1996/913 and Guidance (HSE L83, L84 and L85)

Offshore Installations (Prevention of Fire and Explosion and Emergency Response) Regulations 1995 (PFEER) SI 1995/743 and ACoP and Guidance *Prevention of fire and explosion, and emergency response on offshore installations* (HSE L65)

Offshore Installations (Safety Case) Regulations 2005 (SCR) SI 2005/3117 and Guidance (HSE L30)

Personal Protective Equipment Regulations 2002 SI 2002/1144

Personal Protective Equipment at Work Regulations 1992 (PPE) SI 1992/2966 and Guidance (HSE L25 2nd edition 2005)

Provision and Use of Work Equipment Regulations 1998 (PUWER) SI 1998/2306 and ACoP *Safe use of work equipment* (HSE L22)

Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995 (RIDDOR) SI 1995/3163 and Guidance [HSE L73 and HSE 33 REV 1 (*RIDDOR Offshore*)]

Work at Height Regulations 2005 SI 2005/735 (WAHR), as amended by the Work at Height (Amendment) Regulations 2007 SI 2007/114, and Guidance (HSE INDG 401 REV 1).

Workplace (Health, Safety and Welfare) Regulations 1992 SI 1992/3004 (as amended by the Quarries Regulations 1999 SI 1999/2024) and ACoP and Guidance *Workplace health, safety and welfare* (HSE L24).

4.2 The Health and Safety at Work etc. Act 1974 and the Mineral Workings (Offshore Installations) Act 1971 place general duties on employers, clients, contractors, owners, the self-employed and employees. Many regulations have been made under these acts, which expand on these duties, some dealing specifically with particular issues such as first aid and protection of eyes. Other regulations have been made under the acts, which bring into force the requirements of EC directives. These regulations, for example the Management of Health and Safety at Work Regulations 1999 (MHSW), require a risk assessment (see HSE document *Five steps to risk assessment* [2]). They highlight the duties of clients, owners and designers of structures to ensure that, so far as is reasonably practicable, any work to be carried out in the workplace can be performed safely. It is the duty of every employer to ensure that they comply with all legal safety requirements relating to the type of work being undertaken and to work in the particular location concerned.

4.3 Where work is classed as construction work, for example under the Construction (Design and Management) Regulations 2007 (CDM Regulations), then other regulations also apply, such as the Provision and Use of Work Equipment Regulations 1998 (PUWER) and the Lifting Operations and Lifting Equipment Regulations 1998 (LOLER) (see HSE document ACOLAR LOLER [3]). Even where these regulations do not apply, it is possible that their requirements could be regarded as “being a reasonably practicable safe system of work” under the Health and Safety at Work etc. Act 1974. Employers and those commissioning rope access work are therefore advised to consider the requirements of these regulations.

4.4 The CDM Regulations impose some legal responsibility on the client to ensure that those they employ have an appropriate level of experience in the work being undertaken and are able to meet the requirements to work safely.

4.5 The Work at Height Regulations 2005, as amended, (Regulation 4) require that work at height be properly planned, appropriately supervised and carried out in a manner which is safe. This includes planning for emergencies and rescue. In addition, employers have a duty to ensure that work at height is carried out only when the weather conditions do not jeopardize the health and safety of persons involved in the work.

4.6 The Work at Height Regulations 2005, as amended, (Regulation 6) require every employer to take account of a risk assessment under the MHSW Regulations (Regulation 3). There is a hierarchy of protection measures. For more details see BS 8437:2005, Table 1.

4.7 The Work at Height Regulations 2005, as amended, (Regulation 7) require collective protection measures to be given priority over personal protection measures. When selecting work equipment for use in work at height, the following have to be taken into account:

- the working conditions and the risks to the safety of persons at the place where the work equipment is to be used;
- in the case of work equipment for access and egress, the distance to be negotiated;
- the distance and consequences of a potential fall;
- the duration and frequency of use;
- the need for easy and timely evacuation and rescue in an emergency;
- any additional risk posed by the use, installation or removal of that work equipment or by evacuation and rescue from it.

4.8 The Work at Height Regulations 2005, as amended, (Regulation 9) require that that no person at work passes across or near (or works on, from or near) a fragile surface where it is reasonably practicable to carry out work safely, and under appropriate ergonomic conditions, without their doing so.

4.9 The Work at Height Regulations 2005, as amended, (Regulation 12) require that work equipment exposed to conditions causing deterioration which is liable to result in dangerous situations is inspected:

- a) at suitable intervals;
- b) each time that exceptional circumstances which are liable to jeopardise the safety of the work equipment have occurred.

For recommendations on inspection of equipment see Clause 11.

4.10 Where the work is offshore, several additional regulations apply. In general, the principles are similar to those of the construction regulations but there are certain conditions that have to be followed by those working or intending to work offshore. Attention is drawn to the Offshore Installations and Wells (Design and Construction) Regulations 1996 (DCR), the Offshore Installations and Pipeline Works (Management and Administration) Regulations 1995 (MAR) and the Offshore Installations (Prevention of Fire and Explosion and Emergency Response) Regulations, 1995 (PFEER). These regulations apply both generally to work offshore (survival certificates, proper work clothes, etc.) and specifically to worksites and the management of work.

4.11 Some regulations deal with specific types of hazard such as the Control of Substances Hazardous to Health Regulations 2002 (as amended) and the Control of Asbestos at Work Regulations 2006. See also the HSE approved code of practice (ACoP) *Work with materials containing asbestos* [HSE L143]. It is essential that employers fully understand the requirements of such regulations when they propose to undertake work that might involve their operatives coming into contact with hazardous materials. This applies equally to onshore and offshore working.

4.12 Two documents in the HSE's revised series of health and safety guidance for the construction industry, *Health and safety in construction* [4] and *Health and safety in roof work* [5], provide valuable information in a simple but comprehensive form. The

guidance covers such topics as organizing the site, the essentials of health and safety, and health and safety management and the law. Following the guidance is not a statutory requirement. However, the guidance provides sufficient information to enable the user to ensure that they comply with the law.

4.13 Where the CDM Regulations apply, there is a requirement for a health and safety plan. This is required to contain information concerning the safety aspects of the construction work, and some or all of the plan should be made available to those planning rope access work. When construction work has been completed, there is a requirement for a health and safety file. The file is required to contain information about the completed construction work which could be relevant to health and safety associated with cleaning and maintenance and any future construction work including alteration, refurbishment and demolition. The file should be made available to those planning rope access work. When subsequent alterations are made there might be a need to update the health and safety file. Similar requirements apply offshore, under the Offshore Installations (Safety Case) Regulations 2005 (SCR).

4.14 Reporting accidents and ill health at work is a legal requirement under the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995 (RIDDOR). The regulations require any accident where the time lost by the injured person is over three days, or where a serious incident (dangerous occurrence) has occurred, to be recorded and information included on the time lost by the injured person and others in the work team. A free leaflet, *RIDDOR Offshore* (HSE 33 REV 1) [6], explains what incidents are reportable, and by whom and to whom they have to be reported, and HSE guidance document *A guide to the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995* [7] gives details of what is required.

5 Principles for a safe and effective system of work using rope access methods

5.1 General and legal

5.1.1 The primary objective is to so organize, plan and manage the work that there will be an adequate margin of safety to minimize risk, with a goal of no accidents (zero targeting). See Clause 12 for further advice.

5.1.2 The Management of Health and Safety at Work Regulations 1999 require that, before rope access techniques are adopted for a particular job, employers carry out a risk assessment (see 5.2.1 and 12.1) and set out clear requirements for all aspects of the work. In addition, the work should be carefully assessed to ensure that the method of access is appropriate to the quality of the work required.

In planning the work, the following statutory requirements apply.

- a) The Work at Height Regulations 2005, as amended, and the Construction (Design and Management) Regulations 2007 require a safe place of work.
- b) The Lifting Operations and Lifting Equipment Regulations 1998 require that rope access be properly planned, appropriately supervised and carried out in a safe manner (see Clause 7 and Clause 12).

- c) The Personal Protective Equipment at Work Regulations 1992 require employers to provide suitable personal protective equipment, which includes some protective clothing (see Clause 8).
- d) The Personal Protective Equipment at Work Regulations 1992 require operatives to have suitable personal protective equipment (see Clause 8).
- e) The Work at Height Regulations 2005, as amended, require personal suspension equipment to be suitable and of sufficient strength (see Clause 8).
- f) The Work at Height Regulations 2005, as amended, require operatives to have training, knowledge or experience in safe rope access methods (see Clause 7 and Clause 12).
- g) The Management of Health and Safety at Work Regulations 1999 require employers, in entrusting tasks to employees, to take into account their capabilities as regards health and safety (see Clause 7 and Clause 12).
- h) The Work at Height Regulations 2005, as amended, require that the planning of work includes planning for emergencies and rescue (see Clause 12).

In addition, it is necessary to ensure that:

- 1) the operatives chosen to carry out the work have a suitable attitude for working at height (see Clause 6);
- 2) any tools and equipment used in the work do not endanger the operatives' health and safety (see 12.4).

5.2 Summary of principles for a safe and effective system

NOTE 1 The principles listed should not be taken to be exhaustive.

NOTE 2 For details of a typical method of descending and ascending using rope access techniques, see Annex A.

5.2.1 Before rope access work commences, a hazard identification and risk assessment has to be carried out to establish the appropriateness of using rope access techniques and to address any hazard issues. See 5.1.2 and 12.1.

5.2.2 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 to be in tension or suspension, there should be at least two independent anchor 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). See 12.3.1.

5.2.3 Connection of an operative to the rope access system should be made in an area where there is no risk of a fall from a height, unless there is protection by other means. See 12.3.4.1 and 12.3.4.2.

5.2.4 Exclusion zones should be established as appropriate. This might necessitate establishing exclusion zones at locations other than the top and bottom of the rope access work site. See 12.3.4.1, 12.3.4.2, 12.6 and also 12.3.2.3.

5.2.5 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 harness. See also **5.2.25** and **5.2.26**.

5.2.6 The harness should be an appropriate sit harness or an appropriate full body harness. See **8.3.6**.

5.2.7 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. See **8.3.7**.

5.2.8 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. See **8.3.10**.

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

5.2.9 Descender devices or systems (on the working line) should be of a type such that if the operative loses control they will stop or only allow a slow automatically controlled descent in the hands-off position. See **8.3.9**.

5.2.10 Measures should be taken to avoid the operative being able to descend inadvertently off the end of the working line or safety line. See **12.3.1.4**.

5.2.11 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. See Clause **10**, Clause **11**, **12.3.3**, Annex B and HSE document ACOLAR LOLER [3].

5.2.12 Equipment should be properly maintained and stored, and should be traceable back to the manufacturer or supplier. See Clause **9** and Clause **11**.

5.2.13 Operatives should be sufficiently physically capable and free from any impairment that might prevent them from working safely. See **6.1**.

5.2.14 Operatives should work in teams of not less than two, one of whom is competent to supervise. See **12.3.2**.

5.2.15 Operatives should be trained and competent to carry out any rope access tasks that they are to undertake, including workmate rescue. Operatives should only be allocated tasks appropriate to their level of training. See **7.1**, **7.2**, **12.3.7** and **12.4.1.1**.

5.2.16 Operatives should be competent in the pre-use inspection of their equipment, including an understanding of when equipment should be withdrawn from service. See Clause **10** and **12.3.3.4**.

5.2.17 Operatives should have clothing and equipment appropriate to the work situation and conditions. See **8.2**.

5.2.18 There should be a specific workmate rescue plan in place for each worksite. See **12.3.7**.

5.2.19 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. See **7.2.4**, **12.3.2.1**, **12.3.2.2** and **12.3.7**.

5.2.20 An efficient team communication system should be established. See **12.5**.

5.2.21 There should be proper supervision of the workplace. See **7.4.1**, **7.4.2** and **12.3.2.1**.

5.2.22 Supervisors should be competent in all rope access techniques appropriate to the workplace and should know and understand the limitations of those techniques. They should be competent in advanced workmate rescue techniques and to organize or effect a workmate rescue appropriate to the worksite. See **7.2**, **7.4.1**, and **7.4.2**.

5.2.23 The impact force on an operative in any potential fall should never be greater than 6 kN. See **8.3.3** and **8.3.10**.

5.2.24 No potential fall should cause the operative to impact with the ground. All practicable measures should be taken to avoid injurious impact with the structure or obstructions. See Note to **8.3.12.6**.

5.2.25 Rope access techniques can be extended from activities in tension or suspension to include traversing, aid climbing 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. See **12.3.1.5**.

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

5.3 Continuous improvement of working methods

In addition to the legal requirements outlined in **4.14**, it is recommended that a record of all accidents, incidents or near misses is kept, in order to provide accurate statistics and to assist in achieving the aim of continuous improvement of working methods. To ensure accuracy, the details should be recorded immediately after the accident, incident or near miss.

6 Selection of operatives

6.1 General

6.1.1 The modern industrial environment requires that, to work at height safely, competently and productively, those engaged in such work have an appropriate attitude, aptitude, physical capability and training.

6.1.2 These operatives frequently work in remote places or are out of sight of their supervisors. It is, therefore, especially important that the operatives can be always relied upon to behave in a sensible and responsible manner.

6.1.3 Candidates should be physically fit and free from any disability that might prevent them from working safely at height. Contra-indications include:

- heart disease/chest pain;
- high or low blood pressure;
- epilepsy, fits, blackouts;
- fear of heights/vertigo;
- giddiness/difficulty with balance;

- impaired limb function;
- alcohol or drug dependence;
- psychiatric illness;
- obesity;
- diabetes.

It is the responsibility of operatives and their employers to establish that the operatives are physically and medically fit to undertake rope access work.

6.2 Aptitude and experience

6.2.1 Assessing a person's suitability for rope access work requires detailed consideration of their previous experience. Where candidates claim to have experience in rope access work, prospective employers should check their personal records and other references (see **7.2.5** and **7.2.6**). Employers should also consider relevant trade experience and skills to ensure safe use of tools and equipment.

6.2.2 Other suitable experience could include caving, mountaineering and working at height using other means of access. Service with the fire brigade and possibly the armed forces might also be relevant, if a person has been regularly engaged in the use of methods that involve being exposed at a height.

6.2.3 An assessment of the candidate's aptitude should be carried out before they are given training or offered rope access work. Unless the employer has the relevant expertise to do this, assistance from a competent outside organization should be sought (e.g. a recognized provider of training in rope access work).

7 Training, welfare and supervision of operatives

7.1 General

Rope access work can only be carried out in a reliably safe manner when operatives are competent. Different organizations and countries have their own requirements for the assessment of competence. In order to be considered competent, an operative needs to have sufficient professional or technical training, knowledge and actual experience to enable them to:

- carry out their assigned duties at the level of responsibility allocated to them, including inspection of their own equipment;
- understand potential hazards related to the work under consideration, and be able to carry out appropriate workmate rescue procedures;
- detect technical defects or omissions in their work, recognize implications for health and safety caused by such defects or omissions, and be able to specify a remedial action.

The person responsible for the site should ensure appropriate levels of supervision and only allow rope access work to be carried out by competent operatives. Exceptions may be made in the case of inspection of the work, in which case additional precautions are essential. (See **7.5**.)

7.2 Training

7.2.1 Training should be provided or monitored by a competent outside organization or person, to ensure that the standard is to an externally certificated level. All candidates should be trained to a formal programme, formalized in both time and performance, and be assessed independently. Training routes should be clearly defined.

7.2.2 In addition to rope access techniques, training should include general and job-specific health and safety issues, the safe use of tools and other work equipment during rope access activities, and the handling of materials.

7.2.3 All operatives are in the learning process for some time after completing their basic training. The newly qualified operative should at first be under the direct supervision of the supervisor and then gradually be allowed to progress to working under the close supervision of an experienced operative, at the supervisor's discretion. At this stage, the experienced operative should be required to check that all items of the inexperienced operative's suspension equipment are correctly secured before they are allowed to start work. They should, thus, be continuously monitored and not allowed to work without close supervision until the supervisor is satisfied that the operative has achieved a suitable level of competence. This should be when they have demonstrated suitable knowledge and experience to carry out the full range of jobs that they are likely to encounter, in a safe and effective manner, and are capable of acting properly within the limits of their level of competence and in any emergency that might conceivably arise.

7.2.4 It is essential that operatives are skilled in workmate rescue techniques and emergency procedures, and these should form part of their basic and ongoing training. In addition to this, workmate rescue techniques should be practised at regular intervals and before the start of any work in a situation that is unfamiliar to any of the work team (see 12.3.7).

7.2.5 Operatives should have a personal record showing the training received and describing their work experience. This is to assist employers in the verification and monitoring of an operative's experience. Employers taking on new operatives should assess these records. (See 6.2.)

7.2.6 It is essential that employers maintain their employees' level of ability. This requires a re-assessment at regular defined intervals and further training where necessary. Retraining is appropriate for operatives who have had a significant break from rope access work (e.g. 6 months or more). This could be either a refresher course or a full course at the appropriate level. All refresher courses should include all the techniques covered at the basic level. For experienced operatives and supervisors, the refresher course should concentrate on rigging and workmate rescue procedures.

7.3 Welfare

Periodic health checks or medical examinations are recommended for all operatives (see 6.1.3).

7.4 Supervision

7.4.1 The level of supervision should be appropriate to the work situation and the number and skills of the operatives in the work team (see **12.3.2**). The supervisor's role is to ensure that all work is carried out safely in accordance with the aim of no accidents, no waste and no defects.

7.4.2 Before an experienced operative can become a supervisor, a period of further varied work using rope access techniques should be undertaken, preferably with some further training and assessment. This is particularly to ensure that the person has the wider experience and necessary skills to be competent to supervise others and assess their abilities to work safely. The training should include the teaching of supervisory skills, as rope access technical skills alone do not assure a competent supervisor. Supervisors should be familiar with their work environment, the working conditions and practices, and particularly the liaison required with other workplace personnel.

7.4.3 As part of their duties to maintain a safe place of work, employers should monitor any tendency of employees to work in an undisciplined manner. If this occurs, employers should be prepared to take appropriate disciplinary action.

7.5 Access by non-rope access personnel

Occasions can arise where non-rope access personnel need to inspect the work (e.g. a client's representative). A system should be arranged to ensure that such persons are able to do this safely. This could be done, for example, by providing additional top-rope protection. In addition, it would be necessary for the supervisor to check personally that all items of such a person's suspension equipment were correctly secured and of a suitable standard and condition. They should then supervise them throughout the ascent or descent as though they were new trainees.

8 Selection of equipment

8.1 General

8.1.1 Risk assessment

Regulation 3 of the Management of Health and Safety at Work Regulations 1999 requires that before equipment is selected or used a risk assessment is carried out for each job for which that equipment is to be used. The risk assessment should pay specific attention to the probability and consequences of misuse.

8.1.2 CE marking

8.1.2.1 Under the Personal Protective Equipment Regulations 2002, which are based on the Personal Protective Equipment Directive (89/686/EEC) [8], equipment used in rope access work that is classified under the Directive as PPE is required to carry CE marking. This applies to most equipment used in rope access work.

8.1.2.2 If it is planned to use CE marking as a criterion for purchasing, it is essential to ensure that the marking is for goods appropriate to the intended use. CE marking is mandatory on many different types of product, not just personal protective equipment (PPE). For PPE, there are three different categories, ranging from simple items like protective work gloves (category I) to category III equipment for protection against mortal danger (e.g. harnesses). Most rope access equipment is category III.

8.1.2.3 For PPE category III, CE marking indicates that the product has been independently type tested and meets the basic health and safety requirements of the Personal Protective Equipment Directive (89/686/EEC) [8] and the Personal Protective Equipment Regulations 2002. A booklet entitled *Personal protective equipment: Guidance notes on UK Personal Protective Equipment Regulations* [9], provides all the details.

8.1.2.4 The prime function of CE marking is to protect against barriers to trade within the European Union. It is not meant to be taken as a mark of quality, although PPE category III is subject to such rigorous controls that this point could be argued otherwise.

8.1.3 Standards

8.1.3.1 Equipment should be selected that conforms to standards relevant to the intended use. Wherever possible, these should be appropriate BS EN standards. In the absence of these, equipment conforming to other standards, e.g. international (ISO), national or International Federation of Climbing and Mountaineering Associations (UIAA), may be chosen.

8.1.3.2 Manufacturers should not claim product conformity to draft standards. However, in cases where there is no appropriate standard of any kind, this is sometimes the only feasible option. Purchasers should be aware that a draft standard could change.

8.1.3.3 If there is doubt about whether or not a particular standard is relevant to the intended use, it is advisable to discuss it with the manufacturer of the equipment.

8.1.4 Compatibility

When selecting equipment, purchasers should ensure that components in any system are compatible and that the safe function of any one component is not adversely affected by, and does not interfere with, the safe function of another. Sometimes this is not obvious so it is important to check with the supplier or the manufacturer.

8.1.5 Knowledge of equipment

Under the Personal Protective Equipment at Work Regulations 1992, the manufacturer of the equipment is required to supply product information. This information should be read and understood by the user before using the equipment. This also applies to replacement equipment, because changes might have been made to the original specification or advice given. Knowledge of the strengths and weaknesses of equipment can help to avoid misuse. This knowledge can be enhanced by studying the information provided with the product and other technical brochures and catalogues.

8.2 Clothing and protective equipment

8.2.1 Operatives need to be appropriately dressed and equipped for the work situation and conditions. Attention is drawn to the Personal Protective Equipment at Work Regulations 1992 and other regulations covering equipment and health and safety of operatives as listed in 4.1.

8.2.2 Working at height can make it difficult for the operative to avoid exposure to harmful substances or climatic conditions. The employer needs to assess carefully what would be the most appropriate clothing to guard against such hazards. This protective clothing should be provided and appropriate measures taken to ensure that it is worn.

8.2.3 A useful guidance document on the Personal Protective Equipment at Work Regulations 1992, which includes the regulations themselves, is the HSE guidance document *Personal protective equipment at work* (HSE L25), published by the HSE. It should be noted that some equipment (e.g. ladders, lifting slings, drills, scaffolding, hoists) is subject to other regulations, such as the Provision and Use of Work Equipment Regulations 1998 (PUWER).

8.2.4 The Construction (Head Protection) Regulations 1989 require operatives to wear protective helmets. It is advisable to follow these regulations even if the workplace is not a "site of construction" as defined in the regulations. Operatives should wear protective helmets that are suitable for the type of work being undertaken. Helmets that conform to standards for either mountaineering (BS EN 12492) or industrial use (BS EN 14052 or BS EN 397) might be suitable. Users should check carefully the performance specification of industrial helmets conforming to BS EN 397:1995 as they might not always be suitable, because some of the performance requirements considered necessary for the safety of rope access operatives are:

- a) not specified in BS EN 397:1995, e.g. front, side and rear energy absorption capacity;
- b) not mandatory in BS EN 397:1995 (i.e. they are optional) e.g. the provision of a chinstrap and fastening arrangement, low temperature performance and ventilation.

8.2.5 Helmets utilizing expanded polystyrene shells (common in helmets conforming to BS EN 12492) are unlikely to withstand the rigours of industrial use and, therefore, are generally not recommended.

8.2.6 Chinstraps on helmets used in rope access work should be of a design such that when the strap is properly fastened, it prevents the helmet from coming off the head. This is typically achieved by the use of "Y" shaped straps where the two top points of the "Y" are attached to the shell of the helmet. Helmets should always be used with the chinstrap fastened. In some work situations, it might be desirable for helmets to be compatible with complementary personal protective equipment such as visors or ear defenders.

8.2.7 Operatives should wear the following:

- a) protective clothing (e.g. overalls) that have no loose flaps or attachments which might be caught in any moving equipment. Pockets should be fitted with zip or touch-and-close type fastenings rather than buttons. Waterproof and/or windproof clothing should be provided for work in wet and/or windy conditions;
- b) suitable footwear, which fits well, provides a good grip and gives an adequate level of protection for the task being undertaken.

8.2.8 If equipment is to be fitted to the user (e.g. a harness), it is important that it is comfortable to wear and fits the wearer properly when correctly adjusted. This should be ascertained in a safe place, before work commences. It is also important that such equipment does not significantly hinder the wearer from carrying out their duties or from properly manipulating the rope adjustment devices.

8.2.9 The following protective items might also be required. The HSE guidance document referred to in **8.2.3** gives advice on the selection, use and maintenance of most of these.

- a) *Gloves*, to protect against cold weather or where the equipment or materials used might cause injury to, or have harmful effects on, the skin. Gloves conforming to BS EN 420 and to BS EN 374-1, BS EN 388 or BS EN 407 should be used as appropriate.
- b) *Eye protection*, where debris is being cleared or material is being chipped away, or where drilling, blasting or percussion operations are being undertaken. Eye protection is usually also required if chemicals are being sprayed or painted which could cause irritation or damage to the eyes. Eye protection conforming to BS EN 166 should be used.
- c) *Respiratory protective equipment*, where there is a risk of inhalation of harmful chemicals or dusts. Many building chemicals are liable to be harmful, particularly in a situation where an operative is unable to get quickly to a source of fresh water to dilute or wash the chemical away. Respiratory protective equipment conforming to BS EN 136, BS EN 140, BS EN 143, BS EN 149, or BS EN 14387 should be used as appropriate. Guidance on use of respiratory protective equipment is given in BS EN 529.
- d) *Hearing protectors*, when the noise levels in the vicinity could cause a risk of hearing loss to operatives. The Control of Noise at Work Regulations 2005 require employers to provide operatives with hearing protectors. Hearing protectors conforming to BS EN 352 should be used.
- e) *Buoyancy or life jackets*, when working over water. These should be of a type capable of being secured to the wearer so that they cannot accidentally come loose in the event of a fall. In addition, they should not obstruct the wearer or prevent the efficient operation of the rope ascent/descent devices.
- f) *Protection against sunburn*, for example, by the use of a sunscreen.

8.2.10 Any intention to depart from the worksite "standard" PPE (e.g. lifejackets, eye protection, safety footwear, helmet), for whatever reason, should first be cleared with the site management.

8.3 Equipment used in the rope access system and for personal protection against falls from a height

8.3.1 General

8.3.1.1 All equipment used in the access system requires adequate static and dynamic strength to withstand any loads or forces that might be imposed on it, with an adequate safety margin in addition. Such equipment should only be loaded in accordance with the manufacturer's user instructions. Most personal protective equipment used in rope access work, such as low-stretch ropes, harnesses and

ascenders, is tested using the minimum breaking loads specified in the relevant standards. Some equipment is supplied with a safe working load (SWL), a working load limit (WLL) or a rated load, which can be a minimum rated load (RL_{MIN}) or a maximum rated load (RL_{MAX}). These are sometimes in addition to the minimum breaking load and sometimes in place of it. Dynamic rope is supplied with a statement of the number of dynamic falls held during type testing.

8.3.1.2 There is irrefutable evidence that ultraviolet light (UV) weakens many man-made fibres. Purchasers and users are recommended to check with equipment suppliers that equipment made from textiles, e.g. polyamide, polyester, polyethylene, polypropylene, aramid, is protected from the adverse effects of UV. UV is emitted not only in sunlight, but also in fluorescent light and by all types of electric-arc welding. The normal way to provide protection is by the inclusion of UV inhibitors at the fibre production stage but there are other possibilities, such as the selection of a suitable type and colour of any dye used or the use of a protective covering.

NOTE European Standards for personal fall protection equipment do not address explicitly the potential for degradation by UV and abrasion during use of the product, relying instead on its strength including a safety factor when new. There is no guarantee that this approach will give adequate protection against UV and abrasion.

8.3.1.3 The behaviour under load of components in the system, such as dynamic cow's tails, load-limiting back-up devices and the extension of the low-stretch rope, can help to absorb any forces generated, should there be a limited fall. However, the system generally should be designed to avoid this, i.e. it should be a work positioning system. Normally, low-stretch equipment is used because it is the most effective in use. Where rope access is extended to climbing and traversing, limited falls can be possible and appropriate equipment should be chosen and precautions taken (see 12.3.1.5). When choosing equipment for a particular application, account should be taken of weakening factors, such as the loss of strength at knots.

8.3.1.4 Any equipment chosen to support a person at a height should be such that it cannot be accidentally removed, dislodged or become unfastened from the rope while a person is suspended from it. This applies particularly to connectors, rope adjustment devices and harnesses.

8.3.1.5 All equipment should carry marking to allow traceability to, for example, a test, inspection, thorough examination or certificate of conformity. If the manufacturer or supplier has not already provided such marking, care should be taken not to mark the equipment in a manner that impairs its integrity (see 9.4).

8.3.2 Work positioning equipment

If the planned method of work is for the operative to be in a partly or entirely supported position, as is the normal case for rope access work, then work positioning equipment may be chosen [see Figure 1c)]. In addition to its primary function of providing support, this equipment is designed to be strong enough to arrest a free fall of limited distance and force, but does not conform to the other essential requirements for a fall arrest system, unless combined with appropriate additional components. Work positioning body supports for rope access work may be a sit harness or full body harness, depending upon the precise