1 REGULATORY DOCUMENT

1.3 WORKING AT HEIGHTS

FORWARD

1 The Qatar Construction Specifications (QCS) includes references and certain sections which address occupational health and safety. To ensure that the users of the RD/SAMAS are fully aware of where occupational health and safety issues are addressed in the QCS, the following table summarises where potential overlaps may occur. For consistency, it is recommended that in matters relating to occupational health and safety reference is made first to the RD/SAMAS. For the purpose of clarity, however, references are made in the relevant section of the RD/SAMAS to their comparable sections in the QCS and vice versa.

2 The purpose of QCS is to provide as a general technical guide for acceptable construction work practices in the State of Qatar, considering this, any technology or material or specification or standard that is not mentioned in this section, modification shall be subject to approval in the light of the introduction of QCS (00-02).

Sr. No	QCS Section No.	Part No.	Part Name	Item No.	Item Name
1	1	7	Submittals	7.5.2	Health and Safety Organization Chart
2	1	7	Submittals	7.6.1	Health and Safety Plan
3	1	8	Building Demolition and Waste Management	8.1.6	Safety
4	1	10	Welfare, Occupational Health and Safety	All	All
5	1	11	Engineer's Site Facilities	11.4.6	Safety Equipment and Clothing
6	1	14	Temporary Works and Equipment	14.4	Test Certificates for Cranes and Lifting Tackle
7	1	15	Temporary Controls	All	All
8	1	16	Traffic Diversions	16.1.3	Safety
9	3	1	General	1.4.12	Safety and Management
10	4	1	General Requirements for Piling Work	1.6	Safety
11	4	4	Deep Foundations	4.9.1.7	Safety Precautions
12	4	4	Deep Foundations	4.9.1.13	Protection of Testing Equipment
13	6	1	General	1.6	Temporary Fencing
14	6	7	Asphalt Plants	7.8.13	Safety Requirements
15	6	14	Works in Relation to Services	14.2.2	Safety
16	8	1	General	1.3.2	Health and Safety
17	8	8	Protective Coatings and Painting	8.1.9	Safety
18	8	9	Trenchless Pipeline Construction	9.2.5	Safety Requirements
19	8	10	Pipeline Cleaning and Inspection Survey	10.1.7	Safety Requirements
20	8	11	Sewer Rehabilitation	11.2.2	Safety
21	9	1	General	1.2.8	Safety Guards
22	9	1	General	1.2.16	Noise Levels and Vibration
23	19	5	Hot Water Storage	5.1.6	Safety
24	21	1	General Provisions for electrical Installation	1.1.11	Fire and Safety Precautions
25	21	1	General Provisions for electrical Installation	1.1.23	Safety Interlocks
26	24	1	General	1.1.4	Scaffolding
27	29	1	Design Related Issues Aspects	1.1.5	Fire Resistance Period
28	29	3	Geotechnical Specifications	2.3.1.5	Safety
29	29	4	Tunnel	4.5.8	Safety Regulations
30	29	4	Tunnel	4.5.9	Fire Prevention
31	29	4	Tunnel	4.6.4	Safety Measures and Systems
32	29	7	Concrete Structures	7.1.10	Safety Railing

Construction Site Safety

1.3.1 Work at Height

1.3.1.1 Key points

1 Falls from height are the main source of fatalities and injuries to construction workers.

2 Falls from 'low heights' (below 2 metres) are the cause of many deaths and injuries.

3 Working at height is defined as working at any height from which a fall from one level to another could cause personal injury.

4 Contractor shall ensure that work at height is:

(a) Properly planned;

(b) Appropriately supervised; and

(c) Carried out in a manner which is so far as is reasonably practicable safe, and that its planning includes the selection of work equipment

5 Work at height requires that such work is:

(a) avoided if it is reasonably practicable to do the job another way

(b) carried out using appropriate equipment to prevent falls

(c) organised so that the distance and possible consequence of any fall are minimised

(d) risk-assessment based

(e) properly planned and supervised by a competent person(s)

(f) carried out by competent operatives.

6 Accidents that occurred through working at height show that common factors include the failure of:

(a) all parties to recognise that there was a problem

(b) management to provide a safe system of work

(c) management to ensure that the safe system of work was followed

(d) management to provide adequate information, instruction, training or supervision

(e) the victim to use appropriate equipment

(f) management to provide safe plant and equipment.

Note: Section 14 of the QCS covers roofing and roof works and Section 24, Part 1 relates to scaffolding.

1.3.1.2 Introduction

1 The intent of these Regulations is to reduce the number of deaths and injuries resulting from falls, and so improve the safety performance of the industry.

2 They cover all circumstances where a person:

(a) is working at height or

(b) is gaining access to or egress from such a place of work, either above or below ground and

(c) 'could fall a distance liable to cause personal injury', that is, any distance whatsoever.

3 Common examples of tasks carried out within the construction industry classified as work at height include: working on a scaffold; working from a mobile elevated working platform; being

on the back of a lorry; using cradles or ropes to gain access; working close to an excavation or a cellar opening; painting at height; working on staging or trestles, and using ladders or stepladders for cleaning and maintenance tasks. Many other jobs in the construction industry also involve working at height and are covered by these Regulations.

Reference

1 Refer to Section 11 – Part 1 – 1.8.1 – Sources of Health and Safety Information

2 The Following standards are referred to in this part of the specification

BS 1129	Specification for portable timber ladders, steps, trestles and lightweight stagings; (BS 8630 Portable stagings and folding trestles. Specification; EN 131-1 Ladders - Terms, types, functional sizes; EN 131-2 Ladders - Requirements, testing, marking)
BS 1139	Metal scaffolding
BS 1139-6	Metal scaffolding - Prefabricated tower scaffolds outside the scope of BS EN 1004-1, but utilizing components from such systems. Specification
BS 2037	Specification for portable aluminium ladders, steps, trestles and lightweight stagings; (BS 8630 Portable stagings and folding trestles. Specification)
BS 2482	Specification for timber scaffold boards
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 5973	Code of practice for access and working scaffolds and special scaffold structures in steel; (EN 12811-1 Temporary works equipment - Part 1: Scaffolds - Performance requirements and general design)
BS 7883	Personal fall protection equipment. Anchor systems. System design, installation and inspection. Code of practiceRequirements of these Regulations
BS 8411	Safety nets on construction sites and other works. Code of practice
BS 8620	Low level work platform with one working platform with side protection for use by one person with a maximum working platform height no greater than 2.5 m. Specification
BS 8634	Portable roof ladders. Specification
EN 39	Loose steel tubes for tube and coupler scaffolds - Technical delivery conditions
EN 74	Couplers, spigot pins and baseplates for use in falsework and scaffolds - ; (EN 74-1 Couplers, spigot pins and baseplates for use in falsework and scaffolds - Part 1: Couplers for tubes - Requirements and test procedures; EN 74-2 Couplers, spigot pins and baseplates for use in falsework and scaffolds - Part 2: Special couplers - Requirements and test procedures; EN 74-3 Couplers, spigot pins and baseplates for use in falsework and scaffolds - Part 3: Plain base plates and spigot pins - Requirements and test procedures)
EN 131	Ladders; (EN 131-1 Ladders - Terms, types, functional sizes; EN 131-2 Ladders - Requirements, testing, marking)
EN 795	Personal fall protection equipment - Anchor devices
EN 1263-1	Temporary works equipment - Safety nets - Part 1: Safety requirements, test methods
EN 1263-2	Temporary works equipment - Safety nets - Part 2: Safety requirements for the positioning limits

EN 12811	Temporary works equipment -
EN 12811-1	Temporary works equipment - Part 1: Scaffolds - Performance requirements and general design
EN 13374	Temporary edge protection systems - Product specification - Test methods

1 The key provisions of these Regulations are that Contractors should:

(a) where it is reasonably practicable, avoid the need to carry out work at height

(b) where such work cannot be avoided, select the most appropriate equipment for the work and to prevent falls

(c) reduce the distance of, and potential consequences of, any fall

(d) ensure that the work is properly planned, risk assessment-based and that it is carried out safely.

(e) ensure the work is carried out by trained and competent persons who are adequately supervised.

2 The use of a ladder or stepladder is not prohibited by these Regulations; however, a greater degree of consideration must be given to using an alternative means of access before selecting a ladder or stepladder for use. A decision to use this type of access equipment must be justified by the findings of a risk assessment that clearly shows that, given all of the circumstances, it is reasonable to use such equipment rather than safer types of access equipment.

3 It is the intent that these Regulations will be a further stimulus to architects and designers to 'design out' work at height for the construction and ongoing maintenance of buildings, or at least make safe working at height easier to further contribute to safety in the Qatar construction industry.

1.3.1.3 Definitions

1 Below are the most important definitions from within these Regulations.

(a) **'Access and egress'** includes ascent and descent.

(b) **'Fragile surface'** means a surface which would be liable to fail if any reasonable foreseeable load were to be applied to it. This will obviously include the weight of a person or any work equipment or materials.

(c) **'Ladder'** includes any fixed ladder or stepladder.

(d) '**Personal**' fall protection system' means:

(e) a fall prevention, work restraint, work positioning, fall arrest or rescue system other than a system in which the only safeguards are collective safeguards, or

(f) rope access and positioning systems.

(g) **'Suitable'** means suitable in any respect which it is reasonably foreseeable will affect the safety of any person.

(h) **'Work at height'** means work in any place, including a place at or below ground level, along with access there to and egress there from (except by a staircase in a permanent workplace) where, if the measures required by these Regulations were not taken, a person could fall a distance liable to cause personal injury.

(i) **'Working platform'**:

(i) means any platform used as a place of work or as a means of access to or egress from a place of work

(ii) includes any scaffold, suspended scaffold, cradle, mobile platform, trestle, gangway, gantry and stairway which is so used.

1.3.1.4 Reasonably practicable

1 The term reasonably practicable is used in these Regulations. Therefore, a Contractor can look at what the risks in a task involving work at height actually are, and what it would cost to avoid them. If it would cost a great deal of money or use of other resources to avoid a very small risk, then it may not be 'reasonably practicable' to avoid it.

1.3.1.5 Contractors Duty

1 The requirements of these Regulations are:

(a) on a Contractor to apply to work carried out by their employees and by any other person(s) under the Contractor's control, to the extent of that control.

(b) to self-employed persons, together with persons under their control, to the extent of that control.

(c) to persons who are not self-employed, in relation to work being carried out for them and under their control, to the extent of their control.

1.3.1.6 Duty of employees

1 These Regulations also apply to employees in that they have duties.

2 Employees must:

(a) report any activity or defect relating to work at height which they know is likely to endanger the safety of themselves or that of any other person

(b) use any work equipment or safety device provided for work at height in accordance with any training and/or instructions which they have received.

3 Failure by an employee to comply with the above is an offence which could, in the appropriate circumstances, be dealt with by company discipline procedures.

1.3.1.7 Organisation and planning of work

1 It is the responsibility of every Contractor to ensure that all work at height is properly planned, appropriately supervised and carried out in a safe manner, taking into account adverse weather conditions that could jeopardise the health and safety of employees. Planning must include the selection of appropriate work equipment, and planning for any emergencies or any rescue.

2 A Contractor will probably meet most of the requirements of this regulation if they have carried out and properly implemented a suitable and sufficient risk assessment.

3 Every Contractor shall ensure that no person engages in any activity, including organisation, planning and supervision, in relation to work at height or work equipment for use in such work unless he is competent to do so or, if being trained, is being supervised by a competent person.

1.3.1.8 Competence

1 Contractors must ensure that no person engages in any activity concerning work at height (including the organisation and planning of the work, and selection of the work equipment), unless they are trained and competent to do so or, if they are being trained, it must be by a 3rd party accredited company, trainees must be supervised by a trained and competent person.

2 The level of supervision is important. The supervisor will need to be able to intervene, physically or by virtue of their authority, if an unsafe situation begins to develop and thereby rectify the situation or stop the work in progress. All persons working at height should be competent [experience and qualification].

Competence may be taken to mean:

3 A person who has practical and theoretical knowledge of the appropriate aspects of work at heights, together with actual experience of what they are to do, which will enable them to ensure that all necessary planning and assessments have been prepared, and safety precautions taken, so that the work may be carried out safely, or that they may work safely.

If they will be inspecting work equipment, then 'competence' may be taken to mean:

4 A person who has practical and theoretical knowledge together with actual experience of what they are to examine, which will enable them to detect errors, defects, faults or weaknesses that it is the purpose of the examination or inspection to discover; and to assess the importance of any such discovery.

5 Training is an element of the competence necessary to work at height. Similarly, those who deliver such training must also be competent to do so. To assist trainers in this respect British Standard BS 8454:2006 is to be used. The title of this standard is:

6 'Code of practice for the delivery of training and education for work at height and rescue.'

1.3.1.9 Avoidance of risks from work at height

1 Contractors to ensure that risk assessments are carried out.

2 In addition, these Regulations require that:

> *'every Contractor shall ensure that work is not carried out at height where it is reasonably practicable to carry out the work safely otherwise than at height.'*

3 This clearly requires the Contractor to carry out a detailed study or assessment of all the ways in which the work could be carried out. If a way can be found to carry out the work other than at height, then the Contractor should do so, provided that it is reasonably practicable.

4 A good example of how this can be achieved was demonstrated during the construction of an over-bridge. The bridge deck was completed on flat ground before the spoil was excavated from below it, thus virtually eliminating the need for working at height and reducing the height at which people had to work when constructing the upper parts of the structure.

5 Ground-level fabrication is another way of eliminating or at least reducing some tasks that have been traditionally carried out at height.

6 The fact that falls from height often result in fatal injuries should weigh heavily in any risk assessment and 'cost versus risk calculation' in deciding if an alternative to working at height is reasonably practicable.

7 Where work at height has to take place because there is no reasonably practicable alternative, these Regulations require the Contractor to take suitable and sufficient measures, so far as is reasonably practicable, to prevent any person falling a distance likely to cause injury.

8 The measures include, but are not limited to:

(a) ensuring that the work is carried out from an existing (safe) place of work

(b) ensuring that any means of access to or egress from a place of work using an existing means it is reasonably practicable to do so safely, and under appropriate ergonomic conditions.

9 Where these control measures do not eliminate the risk of a fall occurring, then the Contractor must:

(a) use suitable and sufficient measures, including the provision of work equipment, to minimise the distance and consequences of any fall

(b) or, if it is not reasonably practicable to minimise the distance of a fall, then to minimise the consequences of a fall

(c) provide additional training and instructions, or other suitable and sufficient measures, to prevent, so far as reasonably practicable, any person falling any distance likely to cause them personal injury.

10 In order to minimise the distance and/or consequences of any fall, suitable and sufficient measures may include the use of safety harnesses, safety nets, safety mats and air bags.

11 Where safety harnesses or safety nets are used, a plan must be developed to rescue anyone who has fallen and must allow for the fact that they may be injured or unconscious. This is particularly important if someone is suspended in a safety harness. Suspension trauma can occur very rapidly and result in severe discomfort or even death if the casualty is not rescued quickly.

12 Ideally, safety nets will be rigged immediately below the place of work and rescue should not be a problem. Anyone who has fallen into the net should be able to simply clamber out of it, or an injured/unconscious person easily rescued. However, if any recovery would prove to be unduly difficult, an alternative method of work which does not involve the use of a safety harness or nets would be more appropriate.

1.3.1.10 Selection of equipment for work at height

1 In selecting work equipment for use in work at height there is a requirement for the Contractor to select work equipment or other measures which will give collective protection to employees as a whole, rather than just individual personal protection for one person.

2 For example, a guard-rail will protect everyone, whereas a safety harness only protects the wearer.

3 These Regulations require that Contractors follow current best industry practice when selecting equipment for work at height. In particular, Contractors are required to take account of:

(a) working conditions and risks to the safety of the persons at work

(b) access and egress and distances to be negotiated

(c) distance and consequences of any potential fall

(d) duration and frequency of use of the work equipment

(e) need for and ease of evacuation and rescue in any emergency

(f) any additional risks posed by the installation, use, or removal of the work equipment, and any evacuation or rescue from it, and

(g) Any work equipment which is selected must:

(h) be appropriate for the work intended to be carried out

(i) have dimensions and load-bearing characteristics

(j) allow passage of persons and materials without risk

(k) be the most suitable equipment for avoiding risks while working at height.

Requirements for particular work equipment

4 These Regulations cover the provision of:

(a) guard-rails, toe-boards, barriers and similar means of protection

(b) working platforms such as scaffolds and trestles

(c) nets, airbags and other collective means of arresting falls

(d) personal fall protection systems

(e) work positioning systems

(f) rope access and positioning systems

(g) fall arrest systems

(h) work restraint systems

(i) ladders.

5 Guard-rails must be installed to at least 950 mm above the work surface or the edge from which a person may fall.

6 Although there is no statutory minimum height for toe-boards, both EN 13374 and TG20:08 recommend a minimum of 150 mm. They must be suitable and sufficient to prevent the fall of persons or materials. In line with current industry practice it is anticipated that scaffold boards on edges will continue to be used in most circumstances.

7 The maximum distance or gap between the top of a toe-board and the mid guard-rail, or between the mid guard-rail and the top guard-rail is 470 mm.

8 Where brick guards or similar items are used as a 'means of protection', then they must be:

(a) placed so as to prevent the fall of persons or materials

(b) of a suitable size and strength

(c) placed or secured so that they do not become accidentally displaced.

9 Guard-rails may be removed on a temporary basis for the movement of materials, provided that suitable and effective alternative fall protection measures are put in place for the duration of the work, and that the guard-rails are replaced as soon as possible after the work is completed.

1.3.1.11 The use of scaffolds

1 All scaffolding works must be conducted in accordance with EN 12811. Temporary work equipment. Part 1. Scaffold - Performance requirements and general design.

2 Additional guidance is produced by the UK National Access and Scaffolding Confederation (UK NASC), which sells TG20:08 A guide to good practice for scaffolding with tubes and fittings' 'SG4:05 Preventing falls in scaffolding and false work" and NASC User Guide SG4: You. Preventing Falls in Scaffolding & false work 2006. The use of fall arrest equipment whilst erecting, altering and dismantling scaffolding.

1.3.1.12 The use of ladders, stepladders, lightweight stagings and trestles

1 Ladders may be used for access to and egress from the place of work Stepladders should not be used to access another level, unless they have been specifically designed for that purpose

(Ref HSE INDG 455). Ladders, stepladders, lightweight stagings and trestles may be used to work from, provided that all of the requirements of this document are properly complied with.

2 The primary objective of these Regulations is to eliminate work at height (and so the possibility of falls) and where that is not possible, to ensure that all work at height is carried out safely and that the work equipment being used, such as ladder or stepladder, is appropriate, suitable and safe for the work. In the case of ladders, it is critical that users have been appropriately trained and are competent to select and use a ladder e.g. trained to a recognised training scheme such as Ladder Association training.

3 In deciding to use a ladder for access or egress, or a ladder, stepladder, lightweight staging or trestle for work at height, the Contractor must have carried out an assessment and found that it is not reasonably practicable to use any safer means, and that a risk assessment has shown that the risks from using the ladder, stepladder, lightweight staging or trestle are low and that the persons using the ladder are adequality trained and competent. The importance of competence in the selection, and use of ladders should be highlighted as it is critical to a user's ability to use a ladder safely.

4 Portable ladders should be used in accordance with manufacturers' instructions. They must be the right ladder for the job, positioned at the correct angle, placed on a firm level surface. They should be secured by tying the ladder to a suitable point, making sure both stiles are secured to prevent them from slipping or moving. Where this is not practical, secure the with an effective ladder stability device. If this is not possible, then securely wedge the ladder, e.g. wedge the stiles against a wall. If you can't achieve any of these options, foot the ladder. Footing is the last resort - avoid it where reasonably practicable by using other access equipment (Ref HSE INDG 455).

5 Users should face the ladder at all times when climbing up or down, have both hands free to maintain a firm handhold, and not carry anything that would interfere with their safety or balance.

6 Ladders may be used as a place of work, subject to the above, and if it is both low risk AND short duration (Ref HSE INDG 455). Users should be trained in how to work safely on ladders, for example not to overreach.

7 When stepladders are to be used to carry out work they should be of a suitable size and type. Generally, stepladders should be placed facing the work. They should not be used side-on to the work in any situation where a sideways load could be applied. Again, the work should be both low risk AND short duration (Ref HSE INDG 455).

8 Trestles and lightweight stagings should be of sound construction, stable and properly set up on a surface which will bear their weight as well as any loading of persons or materials. If trestles are adjustable using telescopic adjustment, they should have high tensile pins in the adjusters.

9 If trestles they are fitted with wheels or castors, they should have brakes or other suitable devices on the wheels or castors.

10 Lightweight stagings should be fitted with guard-rails and toe-boards, where appropriate.

1.3.1.13 Fragile surfaces

1 Contractors must ensure that no person passes across or near, or works on, from or near, any fragile surface when it is reasonably practicable to carry out the work safely without their having to do so.

2 Where this requirement cannot be met, then the Contractor must:

(a) provide and ensure that there are suitable and sufficient platforms, coverings, guard-rails or other similar means of support or protection, which must be capable of supporting any foreseeable load or loading

(b) where the risk of a fall still remains, take suitable and sufficient steps to minimise the distance and consequences of any fall should it occur

(c) place prominent warning notices at the approach(es) to any fragile material

(d) where such notices cannot be used, ensure that employees (and others as appropriate) are made aware of the fragile materials by other means.

1.3.1.14 Falling objects

1 Contractors must take suitable and sufficient steps (including prohibiting the throwing down of materials) to prevent, so far as is reasonably practicable, the fall of any materials or objects which are likely to cause any injury to any person. 'Suitable steps' will include the use of such items as brick guards, toe-boards and debris nets.

2 Where such falls cannot be prevented, or in the interests of safety, suitable and sufficient measures must be taken to prevent persons from being hit by falling objects or materials. This will cover the use of protective fans, boarded or roofed walkways and 'exclusion zones' at ground level.

3 Materials on scaffolds and working platforms must be stored so that they cannot fall or pose a risk of injury to anyone by their collapse, overturning or unintended movement.

1.3.1.15 Danger areas

1 In any workplace where there is a risk of any person falling or of persons being struck by falling objects, then Contractors must take all reasonably practicable steps to prevent any unauthorised access to that area, and appropriate warning signs must display.

1.3.1.16 Inspection of work equipment

1 Where the safety of work equipment used for working at height, for example a scaffold, depends upon how it has been installed or assembled, then it must not be used in that place or elsewhere until after it has been inspected by a competent person. Throughout these Regulations, 'inspection' means any visual or more rigorous inspection, and any appropriate testing that a competent person decides is necessary.

2 All work equipment exposed to conditions causing deterioration that may result in dangerous situations must be inspected. This will ensure that it remains safe and that any deterioration can be detected and remedied.

Inspections must take place:

3 at suitable intervals

4 after each time that exceptional circumstances have occurred that are liable to have jeopardised the safety of the work equipment.

5 In addition to these requirements, any working platform that is used for construction work, and from which a person could fall more than 2 metres, must not be used unless it has been inspected in that position within the previous seven days. A mobile working platform (such as a mobile scaffold tower or a mobile elevating work platform) must have been inspected within the previous seven days.

6 Contractors must ensure that no work equipment is used unless they have evidence that the last inspection required by these Regulations was carried out.

7 If there is no evidence of the last inspection, then the work equipment cannot be used on site until an inspection is carried out.

8 These formal inspection(s) should not be regarded as a substitute for any routine pre-use checks that should be carried out by the user.

9 What is a 'suitable interval' should be decided by a competent person, based on the results of risk assessments, and then be reviewed in the light of experience.

10 The purpose of an inspection is to identify if the work equipment is safe to use, and that any defect or deterioration is detected and repaired. If this is not possible, the work equipment

should be removed from service and its re-use prevented before it becomes an unacceptable risk.

11 The results of every inspection must be recorded and kept on site until the construction work is completed, and after that they must be kept at one of the company offices for three months.

12 Any computer-based system should be secure and cannot be interfered with. Systems may also be in the form of a 'register'.

1.3.1.17 Inspection of places of work at height

1 So far as is reasonably practicable, every Contractor must ensure that the surface of every place of work at height, every parapet and any permanent rail or other such fall prevention measure be inspected visually prior to each use. While there is no requirement to record such inspections, a simple record would provide evidence that they have been carried out.

1.3.1.18 Schedules

1 Much of the information contained in the schedules detailed below is virtually identical to current requirements and/or guidance so if Contractors are actively working to current standards and guidance then there is little extra for them to do.

Schedule 1

2 The requirement in this schedule is for existing places of work at height and means of access or egress to and from such places to be stable, of sufficient size and strength and with edge protection as necessary. Ladders in particular must rest on stable, strong surfaces.

3 A place of work is to be properly constructed, used and maintained so as to prevent the risk of tripping, slipping or being trapped between it and adjacent surfaces. It should have no gaps through which materials could fall and injure someone.

Schedule 2

4 This covers the requirements for guard-rails, toe-boards, barriers and similar means of protection. The top guard-rail must be at least 950 mm above the edge from which any person might fall.

Schedule 3

5 This covers the requirements for working platforms. Part 1 deals with requirements for all working platforms, and Part 2 covers the additional requirements for scaffolding.

6 **Part 1** Working platforms must be erected and used so that components cannot become displaced and cause danger to anyone. They must be suitable for the work, and of sufficient strength and rigidity. If they are altered or modified (by a competent person) they must remain safe and stable.

7 Any supporting structure for a working platform must itself be suitable and of sufficient strength and stable while being erected, used or dismantled. It must be prevented from slipping or moving, and if it has wheels or castors, they must be capable of being locked or similar. Working platforms and supporting structures must not be overloaded.

8 **Part 2** As regards the additional requirements for scaffolding, strength and stability, calculations must be carried out unless it is being assembled in conformity with generally recognised standard configurations. If prefabricated scaffolding equipment is being used, then following the manufacturers' assembly, use and dismantling instructions will normally be considered as conforming to ‘generally recognised standard configurations'.

9 Depending on the complexity of the scaffold, detailed plans may be needed for its assembly, use and dismantling. This may be a standard or generic plan, supplemented with specific

details as appropriate. A copy of the plan must be kept for the use of any persons concerned with the assembly, use or dismantling of the scaffold.

10 The size and layout of the scaffold must be appropriate and suitable for the work to be performed, and it must also permit the work and passage of persons to happen safely (although no explicit dimensions or requirements are given in these Regulations). It is suggested that following the industry guidance on the size and width of working platforms and the provisions of TG20:08, together with any future guidance produced by the UK NASC, should be sufficient to demonstrate compliance.

Schedule 4

11 This schedule covers the requirements for collective safeguards for arresting falls. Collective safeguards include safety nets, airbags, landing mats and any similar devices or arrangements. All must be suitable and of sufficient strength to be able to safely arrest or cushion a fall.

12 These safeguards may only be used:

(a) where a risk assessment has shown that the work which is to be done can be carried out safely while the safeguard is being used, and without influencing its effectiveness

(b) where the use of safer work equipment is not reasonably practicable

(c) if a sufficient number of employees (or others) have received adequate training specific to the safeguard, including rescue procedures.

13 A key requirement is that if the safeguard is designed to be attached to a building or a structure then the safeguard, the structure and all anchorages must be suitable and of sufficient strength for any foreseeable load that a fall might impose on it.

14 Airbags and landing mats must be suitable for the purpose intended, and they must be stable.

15 If a safeguard is designed to distort when arresting a fall, it must give sufficient clearance from the ground or adjacent structures to avoid injury to a person whose fall is being arrested.

Schedule 5

16 This schedule covers the requirements for personal fall protection systems (Part 1), work positioning systems (Part 2), rope access and positioning techniques (Part 3), fall arrest systems (Part 4), and work restraint systems (Part 5).

17 ***Important note.*** *Much of the information in this schedule is quite technical and it is of paramount importance that employees are, or have been, fully trained on and are competent in the use of any of the fall protection systems available to them. There is not sufficient detail within this brief explanation of the schedule to train a person on the requirements, or for them to gain sufficient knowledge to be regarded as competent.*

18 All safety harnesses, lanyards and other fall prevention or fall arrest equipment must comply with the appropriate British or International Standard.

19 **Part 1** deals with the requirements for all personal fall protection systems. See Interpretation of these Regulations on page 2 of this module for the definition of 'personal fall protection systems'.

20 Regulations apply to all rope-based activities for work at height, including industrial rope systems and any other similar activity when carried out as a work activity.

21 The schedule requires that:

(a) a personal fall protection system shall only be used if a risk assessment has shown that the work can be done safely while it is being used, and that the use of other, safer work equipment is not reasonably practicable

(b) the user and a sufficient number of others have been trained in its use and in rescue procedures

(c) it shall be suitable and of sufficient strength for the purpose for which it is to be used and will withstand any foreseeable loading

(d) it fits the wearer and is correctly fitted or worn

(e) it is designed to minimise injury to the user in the event of a fall, and is such that the user will not fall or slip out of it should they fall

(f) it is designed, installed and used so as to prevent unplanned or uncontrolled movement of the user.

22 Any anchorage point must be suitable and of sufficient strength to support any foreseeable loading. If designed to do so, the equipment must be securely attached to at least one such anchorage point when in use.

23 **Part 2** deals with the additional requirements for work positioning systems, which may only be used if:

(a) the system includes a suitable backup system for preventing or arresting a fall, or

(b) the system includes a line as a backup system and the user is connected to it, or

(c) where it is not reasonably practicable to do either of the above, then other suitable measures are taken to prevent or arrest a fall.

24 **Part 3** deals with the additional requirements for rope access and positioning techniques, which may only be used if:

(a) it has two separate lines: the working line and a safety line

(b) the user has a safety harness which is connected to both the working line and the safety line

(c) the working line has safe means of ascent and descent, and a self-locking device to prevent falling

(d) the safety line has a mobile fall protection system which is connected to and travels with the user

(e) subject to the type and length of work, and the findings of a risk assessment, it has a seat with appropriate accessories.

25 However, if a risk assessment has demonstrated that a second line would entail a higher risk to the user, then, provided that appropriate safety measures have been taken, a single rope may be used.

26 **Part 4** deals with the additional requirements for fall arrest systems. It requires that they must have a suitable energy absorber (often called a shock absorber and which is usually either a folded metal strip that deforms, or 'tear away' stitched webbing), or other suitable means of limiting the force applied to the user's body if they fall. In addition, a fall arrest system must not be used if there is any risk of a line (a rope or a lanyard) being cut, or where there is no safety zone or clear zone to allow for any swinging or pendulum effect after a fall, or in a way which hinders the system's safety performance or makes its use unsafe.

27 **Part 5** deals with the additional requirements for work restraint systems (often a safety harness with a very short lanyard), and requires that they are designed so that they are used correctly to prevent the user from getting into a position where they could fall.

Schedule 6 Requirements for portable ladders

28 Contractors must ensure that a ladder or stepladder is only used for work at height if a risk

assessment has shown that the use of more suitable work equipment is not justified because of the low risk and the short duration of the work, or because of existing features on site that cannot be altered.

29 The remainder of the schedule is in line with current industry best practice and does not contain any further new or changed requirements.

30 The requirements are:

(a) the surface on which a ladder rests to be stable and of sufficient strength
(b) the ladder to be strong enough for loads which may be put on it
(c) the ladder to be placed so that it is stable during use
(d) the suspended ladder to be attached in a secure manner so that it does not swing
(e) portable ladders to be prevented from slipping by being secured at or near their top or bottom, or with anti-slip or stability devices, or other effective means
(f) access ladders to be long enough to provide a handhold when getting off at the top, unless other handholds have been provided
(g) sections on interlocking or extension ladders to be prevented from movement while in use
(h) mobile ladders to be prevented from moving before being stepped on
(i) where reasonably practicable, rest platforms to be provided where a run of ladders rises a vertical distance of more than 9 meters
(j) ladders to be used in such a way that a secure handhold and secure support are always available to the user
(k) the user can maintain a safe handhold while carrying a load.
(l) the user is competent and has received appropriate training in the selection and use of ladders

31 This last point is qualified for stepladders in that:

'in the case of a stepladder the maintenance of a handhold is not practical when a load is carried, and a risk assessment has demonstrated that the use of a stepladder is justified because of the low risk and the short duration of the work.'

Schedule 7

32 This schedule states the details to be recorded.

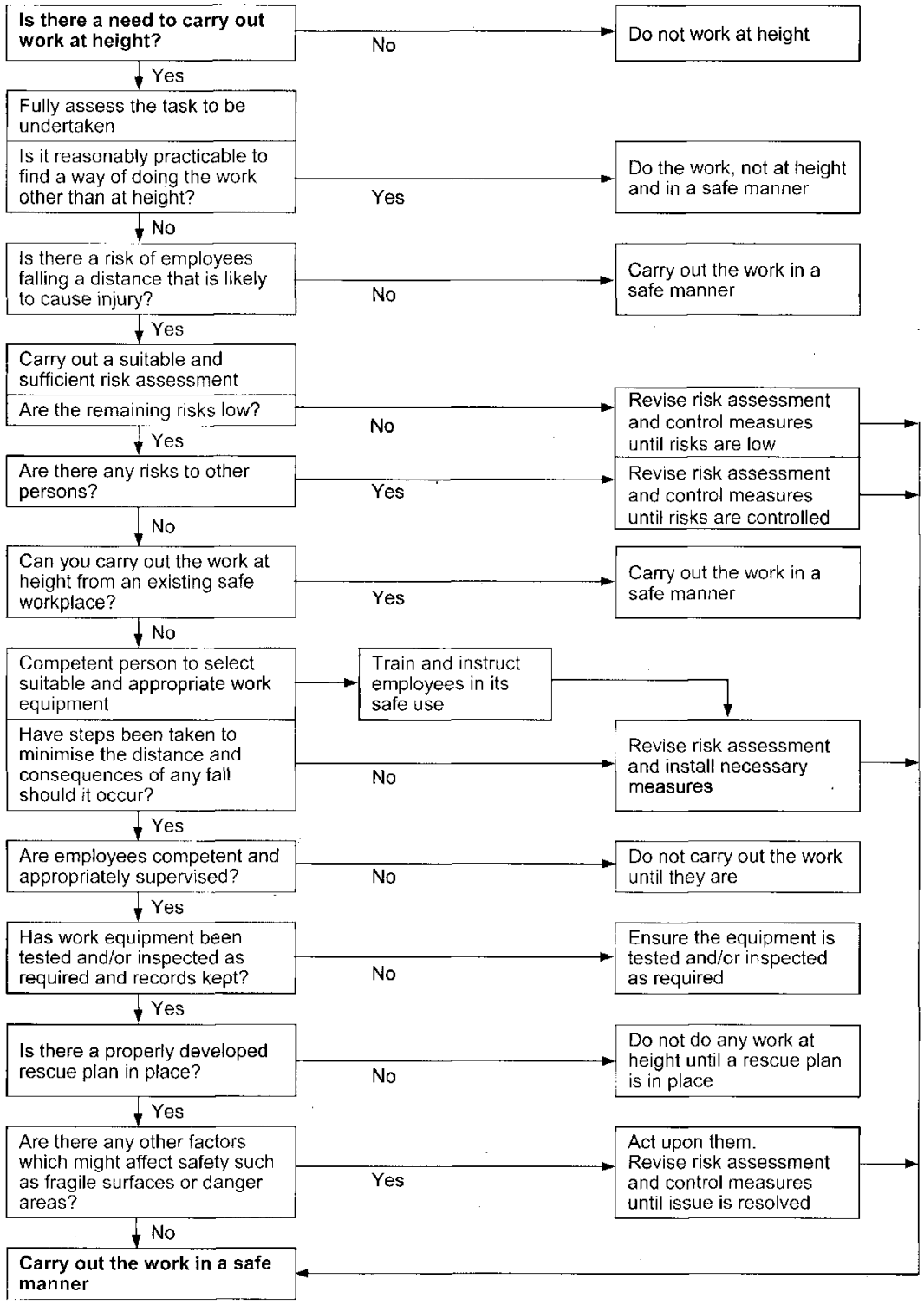
33 The details are:

(a) The name and address of the person for whom the inspection was carried out.
(b) The location of the work equipment inspected.
(c) A description of the work equipment inspected.
(d) The date and time of the inspection.
(e) Details of any matter identified that could give rise to a risk to the health or safety of any person.
(f) Details of any action taken as a result of any matter identified in 5.
(g) Details of any further actions considered necessary.
(h) The name and position of the person making the report.

34 Reports of inspection have to be kept on site until construction work is completed and then at the Contractor's offices for three months.

Construction Site Safety
1.3.1 Appendix

Work at height flowchart



Construction Site Safety

1.3.2 Ladders, Steps and Lightweight Staging

1.3.2.1 Key points

1 Ladders, stepladders, trestles and lightweight staging are all easily transported means of access to work at height. They can all be used safely in certain conditions.

2 The danger comes when any of them is used for a job for which it is not suitable; this particularly applies to ladders and stepladders.

3 Although newer and safer equipment is available, these still present serious risks if not used correctly.

4 The nature and duration of the job will be significant factors in determining the most appropriate type of access equipment to use.

5 Falls from low heights,that is from a height below 2 metres, are the cause of many fatalities and major injuries.

6 All work at height must be subjected to a risk assessment.

1.3.2.2 Introduction

1 Portable ladders, stepladders and trestles and lightweight staging are among the most commonly used pieces of access equipment on site and, perhaps, the most misused. Many construction workers have used them at some time and it is essential that safe working practices should be followed if accidents are to be avoided.

2 Most portable ladder accidents occur because the ladder has not been secured correctly at the top or bottom and then slips. A person climbing the ladder while carrying a load or overreaching and overbalancing often makes an unsecured ladder unstable. Ladders that are badly placed, or set on an uneven or unstable base, are also a contributory cause of accidents.

3 There are many proprietary devices designed to stabilise the top or bottom of a ladder and uneven ground can be accommodated with adjusters bolted to the stiles.

4 Contractors are to provide safe access and a safe system of work. In certain circumstances - particularly where work at height is prolonged, difficult or requires freedom of movement and the use of both hands - mobile towers or other forms of scaffolding which provide collective protection, as opposed to ladders or stepladders should be used. At the same time it must provide both safe access and a safe workplace.

5 All ladders, stepladders and trestles are 'work equipment' for the purposes of these Regulations and, as such must be safe, suitable for the job and well-maintained. Before any work at height is carried out, a risk assessment should be made.

6 Guard-rails and toe-boards are required on all working platforms where a risk assessment indicates that any person would be injured as a result of the fall.

1.3.2.3 Work at Height

1 These Regulations require that Contractors should:

(a) where it is reasonably practicable, avoid the need to carry out work at height

(b) where such work cannot be avoided, select the most appropriate equipment for the work and to prevent falls

(c) reduce the distance of, and potential consequences of, any fall

(d) ensure that the work is properly planned, risk assessment-based and that it is carried out safely

(e) ensure the work is carried out by trained and competent persons who are adequately supervised.

1.3.2.4 The Management of Health and Safety at Work

1 These Regulations place a requirement on every Contractor to make a suitable and sufficient assessment of every work activity so as to identify any risks which might be encountered during the work, and which might affect the health and safety of employees or of any other persons.

2 When hazards are identified, it is the Contractor's duty to either eliminate the hazard or to put control measures into place to reduce the risks to health and safety arising out of the hazards, as far as is reasonably practicable.

3 The Contractor must provide employees with clear and understandable information on any risks that exist in carrying out the work and on any control measures that are in place to reduce those risks.

4 An employee, in turn, has a duty under these Regulations to follow any instructions or training given and to tell their Contractor of any work situation that presents a risk to themselves or others, or of any matter which affects the health and safety of themselves or any others.

5 If carrying out work at height cannot be avoided, the risk assessment must determine the most appropriate type of access equipment for the job to be carried out.

6 Factors that will enable this decision to be made include:

(a) the nature of the work to be carried out

(b) the time that it will take to complete the work

(c) keeping the risk of anyone falling low.

1.3.2.5 The Provision and Use of Work Equipment

1 These Regulations require that Contractors supply work equipment that is safe and suitable for the job, ensures that the equipment is maintained and kept in good order, and that employees are properly trained in its use.

2 Where the use of the equipment involves a specific risk to the health and safety of employees, the use of the equipment must be restricted to specified, trained and competent workers.

1.3.2.6 Manual Handling Operations

1 These Regulations require that Contractors, as far as reasonably practicable, avoid the need for employees to carry out any manual handling operations which involve a risk of their being injured. Where this is not possible, the Contractor must make an assessment of the work to be carried out and take appropriate steps to reduce the risk of injury to employees.

2 All employees must follow any safe system of work, including using any work equipment (or personal protective equipment) that is provided by the Contractor.

1.3.2.7 General

1 Contractor must provide employees with adequate information, instruction, training and supervision so that they can carry out their work safely and without risk to their health,

1.3.2.8 General guidelines for the safe use of ladders

1 A ladder must not be used as an access to, or egress from, a workplace unless it is reasonable to do so taking into account the work being carried out, its duration, and the risks to the safety of any person arising from the use of the ladder.

2 Schedule 6 requires that a ladder should only be used in a low risk situation when a risk assessment has shown that the use of alternative equipment is not justified. This is when:

(a) the ladder is to be used for a very short time, or

(b) the work is of a light nature and low risk

(c) there are aspects of the site that cannot be changed.

3 A ladder must be of the correct class for the intended use, of sufficient strength, suitable for the job that is to be done, and be so erected that it does not become displaced.

(a) Ladders should be set on a firm, level base, strong enough to support the ladder and any load that may be placed upon it.

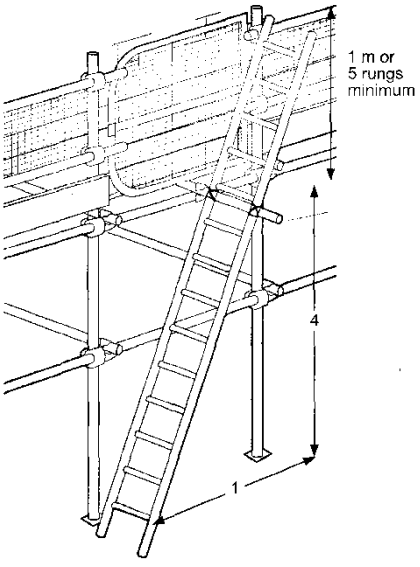
(b) There should be no makeshift use of bricks, blocks or timber packing, etc. to gain extra height or to level up the stiles.

(c) Ladders should be sited clear of any excavation, and in such a position that they are not causing a hazard, or placed anywhere they may be struck or dislodged. Barriers should be placed around the foot as added protection where necessary.

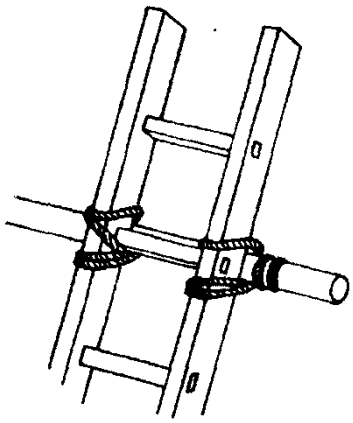
(d) Ladders should not be placed on or leant against any fragile surface or fitting.

(e) Proprietary stand-off devices should be used where the point of rest would otherwise be unsuitable, for example, against plastic gutters.

(f) Ladders should be set, as near as possible, at an angle of 75° (a ratio of 1 unit of length out to 4 units of length up).



(g) Ladders must not be secured by their rungs; lashings should be around the stiles, or proprietary ladder ties should be used.



(h) Lashing or clamping, at the mid-point of a ladder, will make it safer and help to prevent sway, particularly with ladders that are over 6 meters in height.

(i) A ladder must not be placed in such a position that any adjacent scaffold tubes interfere with the footing of the person on the ladder.

(j) If the vertical height of a ladder is over 6 metres, safe landing areas or rest platforms should be provided at suitable intervals.

(k) Only one person should be climbing a ladder at any one time.

(l) Always face the ladder when climbing or descending it.

(m) Footwear worn by persons using a ladder must be suitable for maintaining a satisfactory grip.

(n) When climbing or descending a ladder, both hands must be kept free for holding onto the ladder and free of any other items.

(o) Tools and materials required for work can be carried in a shoulder bag, on a special belt, or be hoisted up or lowered afterwards.

(p) When using a ladder, secure handholds and secure support must always be available.

(q) Tools not in use should be prevented from falling e.g. by the use of lanyards or tool belts.

(r) The top of the ladder must not be repositioned, by jumping, while standing on the rungs.

(s) When a ladder must be left standing after working hours, measures should be taken to prevent unauthorized access such as lashing a board between the rungs but ideally, the ladder should be removed.

(t) Ladders must extend at least 1 meter (approximately 5 rungs) above the landing place, unless an alternative, secure handhold is available.

(u) As far as possible, ladders must be placed so that there is adequate space behind each rung for a proper foothold.

(v) Overreaching leads to overbalancing. The most satisfactory method for working safely on a ladder is for both thighs and hips to be kept between the stiles, and one hand always holding the ladder. The working position should be not less than five rungs from the top of the ladder.

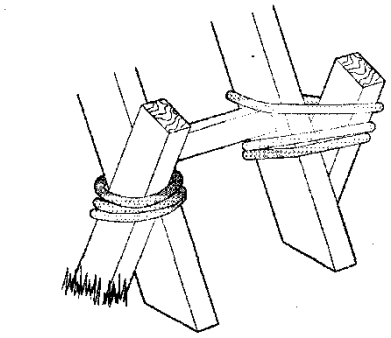
(w) Ladders must be properly maintained, of sound construction and materials, free from any defects and kept in good repair. If a rung is missing or damaged, the ladder must not be used.

(x) Ladders must be supported on each stile and prevented from sagging or swaying.

(y) All ladders should, be securely fixed or lashed to prevent slipping, either near the top or, if this is not possible, at the bottom.

(z) Ladders must not be painted or otherwise treated in any way that would hide or conceal any defects. Timber ladder should be treated with a transparent permeable coating . It should be remembered that some timber preservatives might not be compatible with aluminium fittings.

(aa) Ropes or lashings which are used to secure a ladder must be in good condition.



Bottom tie

(bb) Ladders should only be used as a working place for low risk light work, e.g. maintenance or painting for short periods. Where longer periods of work are anticipated, other access equipment, such as trestles or scaffolds, should be used.

(cc) No part of a building should be used to support a ladder unless it is safe to do so and strong enough for the purpose.

(dd) *EN 12811-1 Scaffolds. Performance requirements and general design (Schedule 6) and good practice*

'Footing' portable ladders:

(ee) is generally ineffective in preventing most types of ladder incidents

(ff) must only be used as a last resort, for example when initially climbing a ladder to tie it off, and only if a risk assessment shows a low risk of a fall

(gg) is only effective on short ladders.

4 The person on the ladder must keep their weight between the stiles (no over-reaching or straddling onto adjacent structures).

5 Depending upon circumstances, it may be possible to improve ladder stability by using anti-slip, stand-off devices towards the top and/or anti-slip feet under the stiles.

6 If possible, seek manufacturer's guidance with regard to extra loading imposed by the weight of two persons on the ladder.

1.3.2.9 Types of Portable Ladder

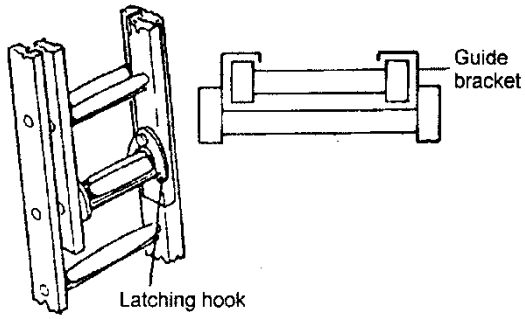
1 **Note:** Whichever of the following types of ladder is to be used, it should be suitable for professional use in the workplace.

2 **Standing ladders:** Ladders which ladder which has its own support e.g. a step ladder.

3 **Leaning ladders:** Ladders which get their support from the upper surface against which they rest.

4 **Extension ladders**: A leaning ladder consisting of two or three sections coupled together and extended by sliding over or inside each other.

5 Note: Longer extension ladders are extended by means of a rope and pulley. A three-section ladder, fully extended, may reach over 16 metres.



6 **Stepladders:** Standing ladders with treads and with or without a platform.

7 **Combination ladders:** Ladders which may be used either as a standing ladder or a combination ladder.

8 **Roof ladders (for pitched roofs):** Ladders with a hook on the top end of it for securing over the ridge of a pitched roof.

1.3.2.10 Classes of ladder, trestles and lightweight stagings (EN 131)

1 Portable ladders are specified in EN 131. They are classified as either “non-professional use” or “professional use”. Both classes have the same maximum working load of 150kg.

2 Portable roof ladders are specified in BS 8634. They are classified for “professional use” and have a maximum working load of 150kg.

3 Trestles and lightweight stagings are specified in BS 2037 (aluminium) and BS 1129 (timber).

4 Portable ladders previously specified in BS 2037 (aluminium) and BS 1129 (timber) were classified as either:

5 **Class 1: Industrial.** Suitable for heavy duty for use on site. They had a duty rating (equivalent to a maximum total load) of 130kg.

6 **Class 2:** Class 2 was withdrawn, that it is no longer relevant to mention it.

7 **Class 3: Domestic.** Light duty - suitable only for domestic and household use, they had a duty rating (equivalent to a maximum total load) of 95kg.

8 All ladders should be marked with a unique identification number, the standard to which they have been produced, their class and their maximum total load (duty rating).

1.3.2.11 Inspection of ladders

1 Every ladder should be checked before use each day by the competent user to ensure they are still fit for purpose and in good condition. Ladders should also be thoroughly inspected by a competent person on a regular basis and should carry an identification mark, as detailed above. A dated written record should be kept of all thorough inspections which notes any defects and if they require repair or replacement.

2 Ladders should not be used if defective in any way and, if damaged beyond repair, they should be destroyed.

3 During the checks of ladders, attention should be paid to the following points.

4 Check the stiles – make sure they are not bent or damaged, as the ladder could buckle or collapse.

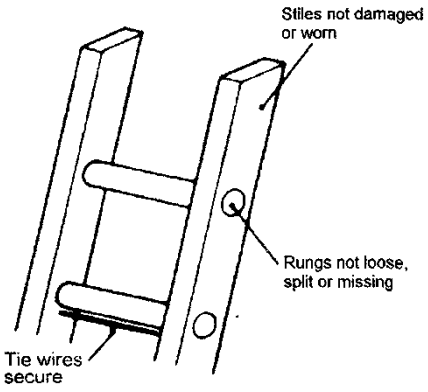
5 Check the feet – if they are missing, worn or damaged the ladder could slip. Also check ladder feet when moving from soft/dirty ground (e.g. dug soil, loose sand/ stone, a dirty workshop) to a smooth, solid surface (eg paving slabs), to make sure the foot material and not the dirt (eg soil, chippings or embedded stones) is making contact with the ground.

6 Check the rungs or treads – if they are bent, worn, missing or loose the ladder could fail. If they are contaminated they could be slippery;

7 Check any locking mechanisms – if they are bent or the fixings are worn or damaged the ladder could collapse. Ensure any locking bars are secure and properly engaged.

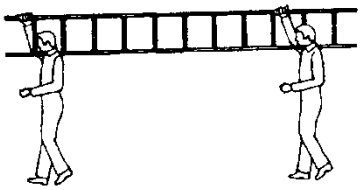
8 Check the stepladder platform – if it is split or buckled the ladder could become unstable or collapse.

9 If you spot any of the above defects, don't use the ladder



1.3.2.12 Carrying a ladder

1 A short ladder may be carried comfortably by having it vertical against the shoulder and holding one of the lower rungs, using the other hand to hold the stile. Longer ladders should be carried horizontally by two people. Care should be taken in negotiating comers and obstacles.



2 Ladders must not be taken into the vicinity of overhead power lines unless a permit to work has been issued. Even then, extreme care should be taken with the head of the ladder so that it is not allowed to get close to the overhead power lines.

3 Timber ladders generally do not conduct electricity (unless wet) but aluminium ladders are extremely conductive, and are dangerous to use in close proximity to overhead lines.

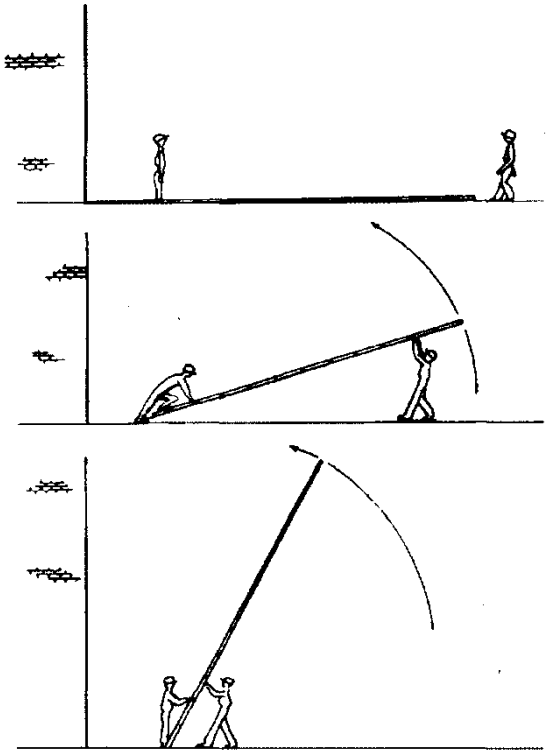
1.3.2.13 Erecting and lowering ladders

1 The procedure for erecting a ladder, when the ladder is flat on the ground, is as follows.

2 One person stands on the bottom rung while the other takes position at the head of the ladder and takes hold of the top rung, raising the ladder off the ground.

3 Then, rung by rung, that person moves towards the foot of the ladder, lifting as they go. The person at the foot grasps the lower rungs as soon as possible and draws the ladder towards them, steadying it at the same time.

4 The sequence is reversed when lowering.



5 Short ladders may be raised by one person placing the foot of the ladder against a wall or fixture and pushing the ladder upwards starting at the top, walking, under-running and raising the ladder as they go.

1.3.2.14 Extension ladders

1 Extension ladders are raised one section at a time.

2 Latching hooks must be properly engaged.

3 **Ordinary ladders must never be lashed, tied or spliced together in an attempt to make an extension ladder.**

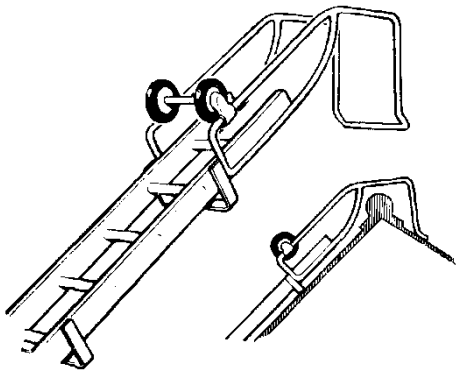
1.3.2.15 Roof ladders

1 Roof ladders (shown below) should be erected as follows.

2 First, a standing ladder is erected for access to the eaves of the roof. It should extend at least 1 metre or five rungs above the eaves of the roof and be properly secured, but not to the guttering, downpipes or any other plastic or fragile material.

3 The roof ladder should then be brought up and pushed up the roof on its wheels, with the anchor hook or ridge hook uppermost.

4 Once over the ridge, the ladder is turned over and the hook engaged. It may be necessary to secure the ladder with a rope if ridge tiles are unsound.



1.3.2.16 Storage of ladders

1 Ladders, especially if made of wood, deteriorate when exposed to the weather for prolonged periods. Where indoor storage is not available, they should be covered or stored in a protected, well ventilated position. They should not be exposed to steam pipes, boilers or other sources of radiant heat.

2 Ladders should be stored on racks, supported on the stiles only, with sufficient supports to prevent them from sagging. They must not be hung from the rungs or stiles.

3 Aluminum and steel ladders should be kept away from wet lime or cement, which may corrode them.

4 Pulleys and hinges should be lubricated and the condition of ropes and cords checked.

5 Any damage or deterioration should be noted and the ladders repaired before further use or replaced.

1.3.2.17 Stepladders and alternatives

Stepladders

1 Many of the general rules for the safe use of ladders also apply to Stepladders. In addition, the following points should be considered.

(a) Stepladders are not to be used if a fall from one would cause the user to be injured (based upon a risk assessment).

(b) The treads (or steps), hinges, bolts, screws and fixings must all be sound and secure.

(c) Retaining cords or hinges should be of equal length and in good condition.

(d) The stepladder must be stable when open and standing on a level base.

(e) The legs of Stepladders should be positioned as far apart as the retaining cord or hinges allow, with all four legs firmly and squarely on the ground.

(f) Wherever possible, the stepladder should be positioned so that the person climbing it is facing the work to avoid twisting and possible instability.

(g) Unless the design permits, the knees of the person using the stepladder should be kept below the top step.

(h) The user should not work from the top third of a stepladder unless it has been designed for this purpose.

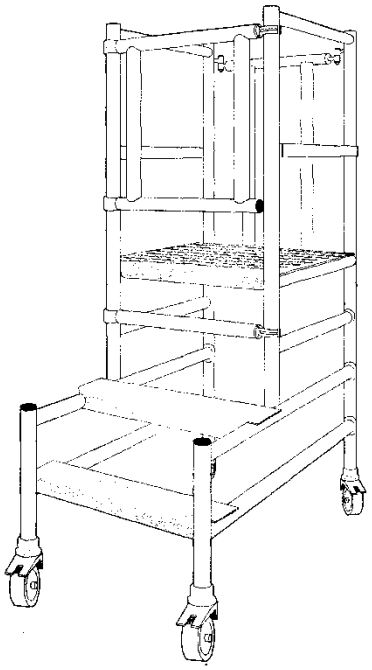
2 If it is not practicable to maintain a handhold when a load is being carried, a risk assessment must demonstrate that the use of the stepladder is justified because of:

(a) the low risk, and

(b) the short time the stepladder is to be in use.

Podium steps/low level mobile towers

1 The use of this type of equipment is preferred to Stepladders in most circumstances as it provides a small but stable working platform, complete with guard-rails. This type of access equipment has the advantage over a stepladder in that it allows the user to work in a safer manner facing any side of the working platform without it becoming unstable.



2 Podium steps are specified in BS 8620 and have a maximum total load of 150kg

3 Low level mobile towers (towers under 2.5m platform height) are specified in BS 1139 Part 6)

4 Podium steps and low level mobile towers are lightweight in construction and some types will fold flat for transportation and are designed to be wheeled through a standard-sized door. Some types are fitted with outriggers to increase stability.

5 Whilst providing a high degree of safety in most situations, there are a number of specific hazards with the use of this type of equipment and the Contractor should ensure the following precautions are considered in selecting and using podium steps.

(a) There are many differing types of podium steps with different arrangements of use. Some are just wheeled platforms and others have specific installation requirements. The instructions for each individual podium must be available and understood by the user.

(b) The height of the working platform should be assessed: too low and the user will not reach; too high and the user may be inclined to work from the steps of podiums rather than the platform.

(c) Where adjustable height platforms are in use, ensure that the user is trained in how to adjust the platform and handrails to ensure protection.

(d) Brakes on wheels must be engaged whilst the platform is in use and users must not be permitted to pull themselves along from the top of the podium.

(e) Podium steps, like any other access equipment, must have an individual identifying mark and be subject to frequent inspection.

1.3.2.18 Split head trestle scaffolds

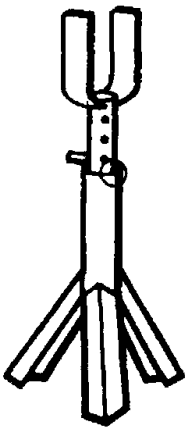
1 These older type of trestle either consisted of two or more support-trestles supporting scaffold boards to form a working platform, or were made up using four split head trestles with the forks of the split head trestle taking a bearing timber (or two scaffold boards on edge) with scaffold boards or a lightweight staging laid on top.

2 This type of trestle system is now unacceptable in most circumstances because of the inability to fix guard-rails or toe-boards to the 'working platform' and the tripping hazard caused by

boards that overlap. There may be rare circumstances where they can still be used safely, for example:

(a) where a fall is not possible because the working platform is completely and tightly enclosed by the walls of a room or other solid structure

(b) the working height and the surrounding floor surface are such that a fall could not result in a personal injury



3 Split head trestles need a sound, level base.

4 Where a trestle system is used in which the positioning of the split head trestle is variable, they should comply with the following criteria:

(a) Split head trestle supports must be spaced at the following distances apart:

(i) 1 metre when using 32 mm thick boards

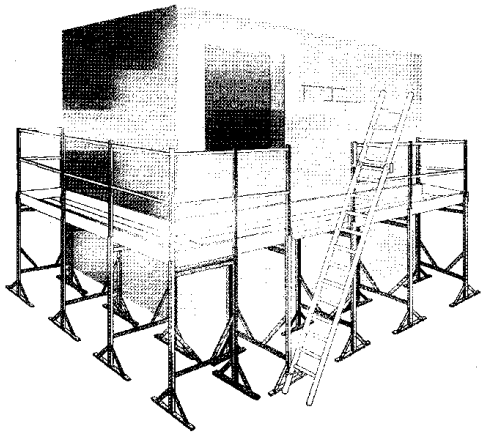
(ii) 1.5 metres when using 38 mm thick boards

(iii) 2.6 metres when using 50 mm thick boards.

(b) The amount that the end of any board may overhang any trestle should not exceed four times (4 x) the thickness of the board used for the working platform, unless it is effectively secured to prevent it from tipping.

Modern trestle systems

5 More modern trestles are similar in many ways to system scaffolding, including the fact that guard-rails and toe-boards are an integral part of the working platform. The spacing of the supports is fixed by the system design which enables platform boards to fit snugly without overhang or overlapping.



6 All lightweight staging should be marked with the maximum permitted uniformly distributed loading. This can be done by either specifying the maximum number of persons, allowing for their tools and equipment, or by specifying the maximum safe weight.

7 Guidelines are as follows:

(a) trestles must be stable and set on a firm, level base

(b) only one working platform is installed

(c) guard-rails, barriers and toe-boards are required where a fall would cause a personal injury, as indicated by a risk assessment

(d) where fitted, guard-rails should conform to the standard outlined and dimensions specified in these Regulations

(e) if a guard-rail is removed, for example to allow materials to be stacked on the working platform, it should be removed only for the time necessary to complete that task and the guard-rail must be replaced as soon as practicable

(f) scaffold boards used on trestles to form a working platform must be of a consistent length and of equal thickness

(g) the trestle and working platform assembly must be completely stable when in use

(h) a safe means of access to the working platform must be provided, for example a ladder that is of sufficient length, properly positioned and securely lashed

(i) where locating pins are used, they should be of the correct size and type and not rebar off-cuts or other makeshift items.

Construction Site Safety
1.3.2 Appendix

Safety checklist

Ladders

7 Is a ladder the right piece of access equipment to be using?

8 Are ladders only used for very light work of short duration, or access?

9 Are all ladders properly stored and inspected regularly?

10 Are the ladders that are being used suited to the purpose or use to which they are being put?

11 Are there any damaged, lose or missing parts?

12 Are the rungs of ladders clean and free of mud or grease?

13 Are sufficient persons available to handle and place ladders properly and safely?

14 Are ladders set on firm and level ground?

15 Are ladders properly erected and secured?

16 If there is not an alternative suitable hand-hold, does the ladder project sufficiently above the landing place?

17 Is there the correct overlap on extension ladders?

18 Are the methods for raising tools or materials safe?

19 Are ladders placed so that the work does not involve overreaching?

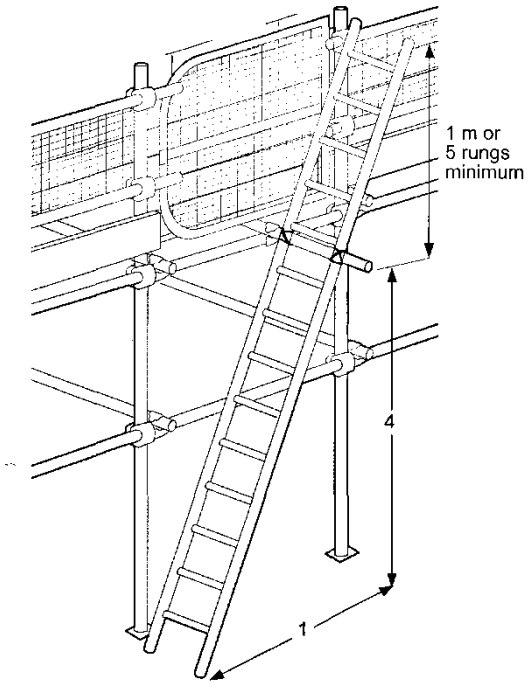
20 Is suitable footwear that will give a satisfactory grip and prevent slipping being worn?

21 Are ladders set at the correct angle of 75°?

22 Are ladders clear of excavations or other potential hazards?

23 Are ladders being leant against or secured to any fragile material?

24 Are all lashings used of sound material, and made properly secure?



Stepladders

25 Is the stepladder level and stable?

26 Is it open to the full extent of the retaining cords or hinges?

27 Are steps set at right angles to the workface wherever possible?

28 Are the user's knees below the top step?

29 Could the person using the stepladder fall a distance that would cause an injury?

30 Is the person using the ladder not using the top third?

Trestles and stagings

31 Are trestles, and any boards that are being used with the trestles, safe, undamaged and of adequate strength?

32 Are the trestles and working platforms stable and set on a firm and level base?

33 Is the working platform of a sufficient width for the job in hand?

34 Are guard-rails and toe-boards fitted to platforms if indicated as being necessary by a risk assessment?

35 Where indicated as necessary by a risk assessment, is the trestle tied to the adjacent structure?

36 Is a safe ladder access provided?

37 Is the maximum permitted uniformly distributed load indicated and complied with?

Podium steps

38 Are the podium steps of sufficient size and the correct type for the task?

39 Have the operators been supplied with and fully understood the supplier's instructions for use?

40 Are all of the components available and in good condition?

41 Is the floor surface sound and of a level construction?

42 Are brakes provided, in working order and used?

43 Do all podium steps carry unique identifying marks and are they subjected to frequent inspection?

Management responsibilities

Management should:

44 Understand these Regulations and guidance on work at height that is appropriate to ladders, stepladders, podium steps, trestles and other access equipment

45 consider whether any safer system of work or access can be provided

46 know how and where access equipment is being used by employees

47 install permanently fixed ladders wherever possible

48 provide any necessary safety equipment

49 provide adequate storage for ladders and access equipment

50 institute a system of proper inspection and the keeping of records for all ladders and access equipment

51 ensure that all ladders, stepladders, podium steps, trestles and boards are of sound design and manufacture, and kept in good condition

52 ensure that all users have been properly instructed and trained, and are competent to use the equipment safely and without risk to themselves or others

53 provide proper supervision of all employees who are using any form of access equipment.

Construction Site Safety

1.3.3 Working Over or Near to Water including Liquid Bodies

1.3.3.1 Key points

1 Working over water will often, although not always, involve working at height. The potential risks arising from both hazards will have to be managed.

2 Ideally, work will be carried out from a stable working platform that may prevent an unplanned fall into the water.

3 Where there is a risk of someone accidentally entering the water, appropriate rescue equipment and people who are competent to use it must be available.

4 Working over water may result in a greater emphasis on the wearing of PPE than other types of work at height.

5 Suddenly falling fully clothed into water may induce shock and an increased risk of drowning if appropriate PPE is not worn.

6 Rescue drills should be planned and practiced.

7 If the use of a rescue boat is not appropriate, an established hierarchy of rescue methods should be followed; if a (powered) rescue boat is appropriate, it must only be operated by someone trained in rescue procedures.

8 Working near to deep water, for example adjacent to Mariner Quays can be as dangerous as working over water if appropriate control measures are not put in place.

9 Working over or near water can pose risks to health as well as safety.

1.3.3.2 Introduction

1 If employees have to work over or in the vicinity of water, a safe system of work must be developed, usually formalised in a method statement, and all those involved must be made aware of the risks and informed of the protective measures that have been put in place.

2 Equally important is the provision of proper rescue equipment and suitable emergency procedures, together with the information and training necessary to use the equipment and respond effectively in an emergency. While every possible effort must be made to prevent people falling into the water, it is essential to make sure that anyone who does fall in can swim or at least is sufficiently confident in water to float (assisted by a buoyancy aid) without panicking. Recovery of the person from the water must take place as quickly as possible.

1.3.3.3 Health and Safety at Work (Construction Sites)

1 Contractors must do everything that is reasonably practicable to provide information, instruction, training and supervision; must provide a safe place and safe systems of work with safe access and egress; and must ensure provision is made for safe use and handling of materials, etc.

1.3.3.4 The Management of Health and Safety at Work

1 Every Contractor must make a suitable and sufficient assessment of risks to the health and safety of employees (and others) arising out of work activities and introduce risk control measures as are appropriate to reduce the risks to health and/or safety to an acceptable level.

2 In the context of working over or near water, the risk control measures should include:

(a) ideally, ensuring that it is not possible for anyone to fall into water, by preventing falls

(b) where that is not reasonably practicable, arresting any falls that do occur, providing

there is sufficient clearance height for fall arrest measures to be effective or, where that is not reasonably practicable

(c) ensuring that anyone who does enter the water is rescued in the shortest possible time

(d) issuing appropriate PPE such as immersion suits and life jackets

(e) making sure that appropriate rescue equipment and trained staff are available

(f) providing information, instruction and training to those persons who have to work over or near water.

1.3.3.5 Construction (Design and Management) CDM

1 The following summary of these Regulations is limited to their requirements as far as they apply to working over or near to water.

All construction projects

2 These Regulations require that when, during construction work, a person is liable to fall into liquid (with a risk of drowning) appropriate measures are taken to:

(a) prevent falls and to minimise the chance of drowning should a fall occur

(b) ensure that rescue equipment is provided, maintained and used when necessary, to enable a prompt rescue

(c) ensure the safe transportation of anyone to and from the place of work, when they are transported by water

(d) ensure that vessel used to convey people to and from a place of work is not overcrowded or overloaded.

3 The Regulations also place duties on:

(a) all contractors to ensure the competence of anyone working under their control

(b) the client to provide adequate pre-construction information on site conditions that might adversely affect health and safety, including in the context of this section, any known hazards arising out of the presence of water

(c) designers, by way of their designs, to eliminate the hazards or reduce the risks arising out of construction activities, so *far as is reasonably practicable,* including in the context of this section, working adjacent to, or over water.

All Projects

4 Duty holders must:

(a) ensure that the Engineer promptly provides the Contractor and all other sub-contractors with health and safety information relevant to the site

(b) take the information supplied by the Engineer and incorporate it into the construction phase health and safety plan

(c) must take reasonable steps to ensure that everyone engaged in construction work is provided with a suitable site induction and adequate other training that is relevant to what they are required to do.

1.3.3.6 Work at Height

1 On many occasions, working over water will also involve working at height.

2 Contractors are required to:

(a) avoid the need for working at height, where reasonably practicable

(b) when it cannot be avoided, select the most appropriate equipment to prevent falls

(c) reduce the distance and consequences of any falls that do occur

(d) ensure that all work at height is properly planned, based upon a risk assessment and carried out safely by competent persons

(e) ensure that equipment used for working at height is appropriately selected and inspected as specified

(f) ensure that measures are taken to prevent anyone being injured by falling objects.

1.3.3.7 Personal Protective Equipment

1 In the context of these Regulations, common-use personal protective equipment (PPE) will include such items as life jackets, safety harnesses, lanyards and immersion suits.

2 Where risks to health and safety cannot be adequately controlled by other means, Contractors must:

(a) identify appropriate and suitable PPE that will control the risks to an acceptable level

(b) provide the PPE free of charge to those who are at risk

(c) provide the users of the PPE with adequate instruction and training with regard to:

(i) the risks that the PPE will protect against

(ii) the purpose for which it has been issued and the manner in which it is to be used

(iii) maintaining the PPE in good working order.

3 The Contractor must take all reasonable steps to ensure that employees use the PPE provided as directed.

4 *Employees* for their part must:

(a) use any PPE that has been issued as instructed and in accordance with any training received

(b) return the PPE to any storage area that has been assigned to it, after use

(c) report any loss or defect in the PPE to the Contractor.

Risk areas

5 Hazardous areas include docks, locks, canals, wharves, lakes, ponds (natural and artificial), reservoirs, water-filled pits, sewage ponds, slurry ponds, rivers, streams, swimming pools, water-holding tanks (if of sufficient size) and the sea. Working alongside or near the water's edge can be as hazardous as working over the water. Extra care is needed in the vicinity of culverts, outfalls and other discharge points, and at coastal sites, where drag or undertow due to tidal conditions may be encountered.

Leptospirosis (Weil's disease)

6 When working over water, consideration must be given to the health implications arising from the accidental entry into contaminated water.

7 The possibility of contracting leptospirosis whilst working over or near to rivers or streams must be considered.

Accidental entry into water

8 Every effort must be made to eliminate the risk of accidental entry into water. This will involve protecting employees against:

(a) falls from heights (including a failure to use the fall prevention or arrest measures provided)

(b) trips and slips from low level

(c) persons being knocked over by moving objects, e.g. crane loads

(d) loss of balance, e.g. caused by high winds, particularly when handling sheet materials

(e) failure or absence of barriers

(f) failure of ropes or lines

(g) rising swell or swell from passing waterborne traffic

(h) horseplay

(i) being under the influence of prescribed drugs.

Hazards of falling into the water

9 The most immediate danger is of drowning. Causes or contributory factors include:

(a) shock of sudden immersion in cold water

(b) weight of waterlogged clothing

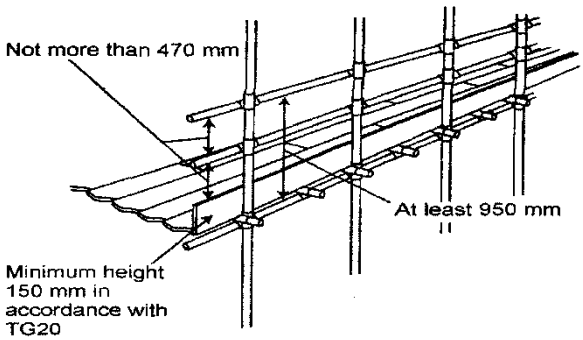
(c) incapacity following injury after striking an object during the fall or in the water

(d) fatigue or hypothermia where rescue is not immediate.

1.3.3.8 Prevention of falls

Scaffolds and platforms

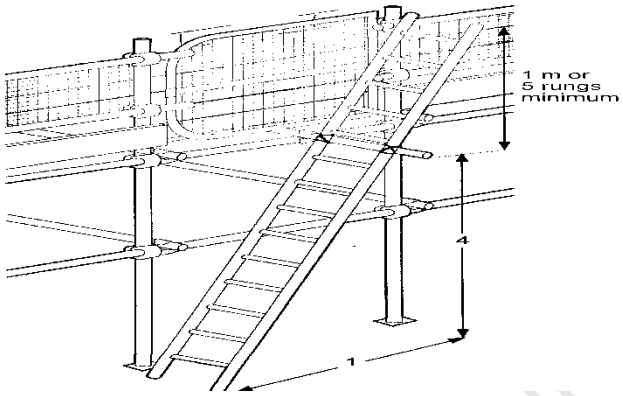
1 Where reasonably practicable, a stable working platform such as a scaffold is the best method of ensuring safe working over water. It should be designed for the task so that it is stable and of sufficient size for the proposed work.



2 Guard-rails and toe-boards should be fitted to prevent falls of persons or materials and it may be advisable to fit double height toe-boards, double guard-rails and brick guards or nets. Boards should be lashed to prevent high winds causing displacement.

3 If a ladder is used for access to the scaffold or platform, it should be of sufficient length, extend at least five rungs above the stepping off point, be properly secured (preferably at the top) and set at the correct angle. If it is necessary for a long access ladder to be used, landing places

should be provided every 9 metres. There should be a proper system for the inspection of ladders.



Safety nets

4 If safety nets are to be used, they should be erected as close as possible below the working level and, if cantilevered nets are erected on the outside of the structure, the outermost edge should be higher than at the inner edge.

5 Nets are intended to save lives and prevent injury; they are not a substitute for the effective prevention of falls.

6 The manufacturer or supplier of a safety net must supply an instruction manual in accordance with EN 1263-1:2002. This guidance should contain:

(a) the required anchorage forces

(b) maximum falling height

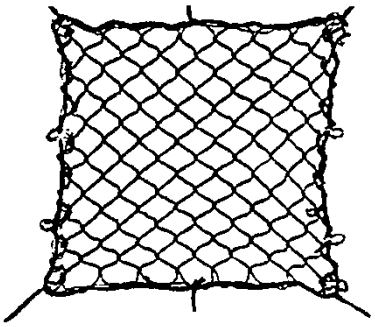
(c) minimum catching width

(d) safety net linkage

(e) minimum distance below the safety net

(f) storage requirements

(g) inspection and replacement requirements.



7 These instructions may need to be supplemented by special installation instructions, depending on the specific application of the net. Reference should be made to EN 1263-2:2002.

8 There are two main types of safety net:

(a) Personnel nets: 100 mm mesh. Intended to catch a person falling from above.

(b) Material or debris protection nets: smaller mesh 12 mm-19 mm. Intended to protect those below from falling objects.

9 The size and siting of the nets are of critical importance; the further a person may fall, the larger the net needs to be.

10 The maximum recommended distance a person should fall before contact with the net is 6 metres.

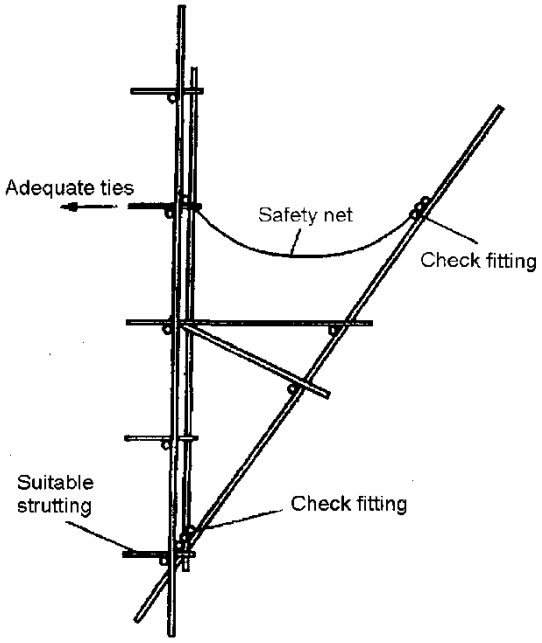
11 For a fall of 1 metre, an out rigged net must have a horizontal projection beyond the outermost

working point of 2.6 metres, while for a fall of 6 metres a projection of 4.4 metres is necessary.

12 Erection of safety nets should be carried out by competent and qualified persons who should ensure that any supporting framework can withstand impact or shock loadings and that the framework itself does not present a hazard to personnel who may fall into the net.

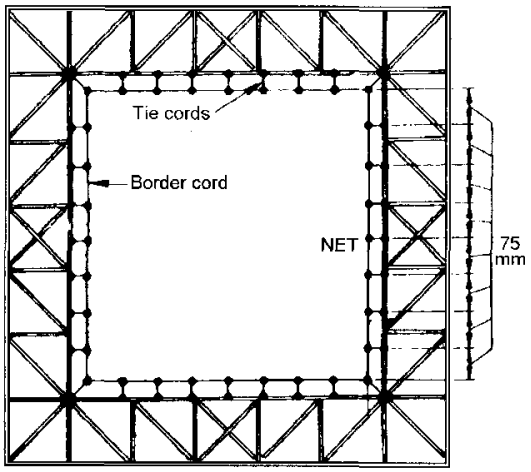
13 Nets should be securely attached to support framework with tie cords, hooks, rings or thimbles spaced at a maximum of 750 mm. The actual tie should be at least double the strength of the net and, if hooks are used, they must have positive locking of some description. See diagram below.

Typical arrangement of outrigged or perimeter nets attached to scaffolding



14 Nets can be out rigged on scaffolding provided that the scaffolding is securely tied into the structure and has been designed to take shock loading.

15 The risk assessment must take into account the rescue of anyone who has fallen into a safety net, including what to do if they are injured or unconscious. Where the safety net has been rigged immediately below the place of work, someone who is uninjured should be able to simply climb out of it.



Periodic testing

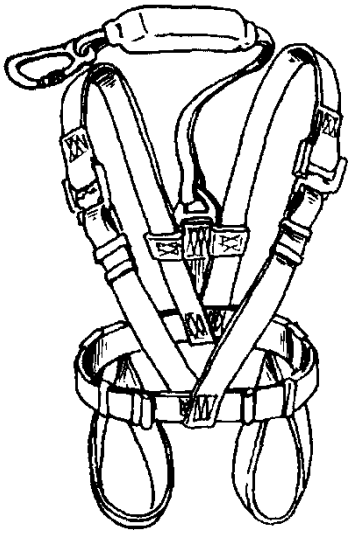
16 Safety nets are provided with short lengths of test cord attached, normally eight. They must not be used as tie cords. At intervals not exceeding three months, one cord should be removed and tested (see EN 1263) and a record kept. For nets which have been in continuous use for two years (i.e. eight times three months) or if there is any visible deterioration, advice should be sought from the manufacturers. Nets should be inspected weekly for damage, loose ties, etc., together with the framework and anchorage points. A net should also be inspected for damage and replaced, if necessary, subsequent to a person or other significant load falling into it. All such inspections should be recorded.

Care of nets

17 Care should be taken to reduce to a minimum unnecessary wear and mechanical damage likely to weaken the net. Materials must not be stacked on it and deliberate jumping onto, or dropping of objects into, nets must be prohibited. Sources of damage or wear such as accumulations of debris in the net should be avoided as far as possible.

1.3.3.9 Safety belts, harnesses and lanyards

1 These Regulations permit the use of safety harnesses and lanyards where it is not possible to provide a standard working platform or safety net, provided that they are always worn and always secured to a safe anchorage.



Training

2 Training should refer to the manufacturer's instructions and the importance of following them. It should cover fitting, adjustment and use of the belt or harness and the choice of suitable anchorage points. Personnel should not be permitted to use the equipment before instruction has been received.

Selection and use of equipment

3 The selection of the correct type of harness for the work planned is essential. If any doubt exists concerning the suitability for a particular task or type of work, further information and advice should be sought from manufacturers or suppliers.

4 Whatever type is chosen it should give a high degree of safety, allied to mobility and wearer comfort.

5 Contractors should consider:

(a) the selection of anchorage points

(b) the selection, attachment and inspection of lanyards

(c) the selection of alternative fall-arrest devices

(d) the implications of suspension trauma

(e) the selection of alternative types of access equipment.

1.3.3.10 Rescue equipment and procedures

1 Although every effort should be made to prevent people falling into the water, the risk of this happening remains. In the event of there being a casualty, two things are of paramount importance:

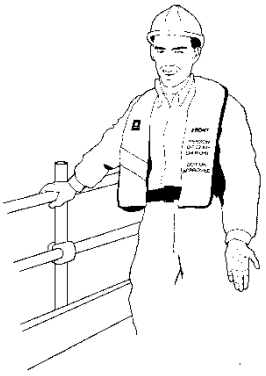
(a) the person must be kept afloat

(b) location and rescue must be achieved as quickly as possible.

2 Both of these aims should be kept in view when selecting rescue equipment and establishing rescue procedures. In addition, the effective use of the equipment and the speed and effectiveness of emergency procedures and rescue operations will depend on the training, instruction and information given.

Life jackets and buoyancy aids

3 All employees working over or near water, and at risk of falling in, should wear some form of life jacket or buoyancy aid. Both life jackets and buoyancy aids are designed to keep the wearer afloat. There are, however, important differences. It is recommended that life jackets are used in preference to buoyancy aids.



4 **Life jackets** to the relevant British Standards are designed to support an unconscious person in the water and turn them face upwards, by inflation when in the water. Inflation is by means of a CO2 cartridge, activated manually or automatically.

5 Selection of suitable life jackets must be made by the Contractor, having taken advice from the manufacturer or supplier, if necessary.

6 Refer to Appendix 2 for advice on the selection of life jackets and buoyancy aids.

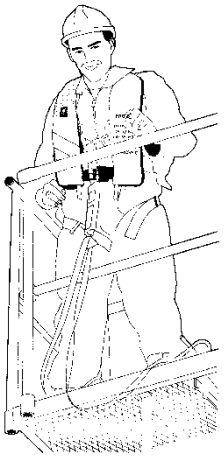
7 **Buoyancy aids** are intended to provide a conscious person with enough extra buoyancy to stay afloat and achieve a reasonable flotation position. A basic buoyancy aid may not turn an unconscious person over from face-down. Buoyancy is usually incorporated in the form of closed cell foam.

8 Buoyancy aids are bulky and, in some people's view, hinder movement and may slow the progress of work, whereas life jackets are less bulky. Manually inflated life jackets, which are inflated by mouth after entry into the water, should not be used. Automatically inflated life jackets offer a high degree of freedom of movement and do not depend upon the wearer being conscious for them to inflate.

9 Decisions on the type of equipment needed for specific types of work should be based on an assessment of the factors involved. These may include, for example, whether a person is a competent swimmer, the length of time a casualty may be in the water, the risks of injury, water temperature, current and the proximity of assistance.

10 Specialist advice can be obtained from manufacturers on the suitability of equipment for a particular purpose, e.g. type of water, type of environment.

11 Where **safety harnesses** are to be worn in addition to **flotation equipment**, it is important to ensure each of these items functions effectively and will not interfere with the other.



12 Safety harness and buoyancy aid combinations are available from some manufacturers, though it is necessary to make sure that the harness is not merely a restraint for use in small boats, or a rescue harness, neither of which may be satisfactory for use in construction and similar work.

13 The provision of whistles and lights as aids to the location of people in the water may be advisable in some circumstances.

14 Wearers should be fully trained in the use of safety harnesses, life jackets and buoyancy aids. The functions of the equipment and, where appropriate, its limitations should be clearly understood by users.

Management

15 A clear policy needs to be in place on the use, inspection and storage of automatically inflated life jackets. This policy also needs to address the training needs of the life jacket users.

16 Life jackets, if used regularly, should be allocated to individual users. Each individual, having been adequately trained, can then be responsible for carrying out pre-wear checks and inspections, and report defects according to company procedures. This will help ensure correct inflation of the life jackets is not jeopardised by the carelessness of others.

17 Management needs to enforce its policy on life jackets. This can be achieved by spot checks of both the condition of the life jackets in use and the records of inspection and servicing.

Training

18 All workers who use automatically inflated life jackets need to be trained and competent in their care and use, including pre-wear checks and inspection procedures. Training should cover:

(a) an explanation of the risks present and the need for life jackets

(b) operation, performance and limitations of the equipment provided

(c) instruction and practice on the selection, pre-wear checks, inspection, use and storage of the life jackets, including the use of the manual override lever and oral inflation tube

(d) factors which can affect the correct operation of the life jackets, such as the working conditions, inadequate fitting, defects, damage and wear (recognising defects in life jackets and arrangements for reporting loss or damage).

19 Extra or refresher training may need to be given, for example, if a new type of life jacket or automatic inflation mechanism is introduced.

Pre-wear checks

20 A pre-wear check needs to be carried out each day the life jacket is used. This should be carried out in accordance with the manufacturer's instructions and will normally include visual checks to ensure:

(a) the firing mechanism has not been activated. This is usually made obvious by the fact

that the life jacket is found inflated

(b) the automatic firing capsule and gas cylinder are correctly screwed in place

(c) there are no signs of corrosion, cracks or dents in the gas cylinder or automatic firing capsule

(d) unwanted movement within the firing mechanism (creepage) has not occurred.

21 Some automatic inflation mechanisms have colour-coded indicators to show when compression in the spring has been lost. Those that do not have such indicators will require careful inspection to judge whether the spring has lost any compression. Examination of the piston or other visible component may also show whether creepage has happened. Make sure:

(a) the whistle and light (when fitted) is in position

(b) the oral inflation tube is capped

(c) the straps and main body of the jacket are not worn or damaged

(d) the jacket is correctly packed in accordance with the manufacturer's instructions (ensuring that any Velcro is correctly fastened and the manual inflation lanyard is accessible).

Inspection and maintenance

22 As well as pre-wear checks, a more thorough inspection and testing programme needs to be carried out in accordance with the manufacturer's instructions. Where life jackets are used heavily, for example, off-shore, the periods between inspections may need to be shorter than the quarterly inspection recommended by some manufacturers.

23 As a general guide, where life jackets are used daily, inspections on at least a monthly basis may be necessary.

24 Inspection and testing need to be carried out by those competent in recognising defects and the remedial action to be taken. Records need to be kept of all inspections and repairs made.

25 Testing the air-tightness of the life jacket will involve orally inflating the life jacket and leaving it overnight (or submerging it in water) to check for leaks. The automatic inflation mechanism will need to be dismantled to make a detailed examination of its condition. Make sure:

(a) all screw threads are examined for signs of rust. Rust can lead to problems in locating the cocking cap or the gas cylinder in the correct position

(b) the gas cylinder is examined for corrosion, cracks, dents and other defects. Particular attention will need to be paid to the cylinder cap as any indentations found could mean that the automatic firing mechanism has fired but failed to pierce the cylinder. If this is the case, the reason for activation and the cause of failure needs to be identified

(c) the cylinder fitting and groove of the firing pin are checked so that they are free from dirt

(d) the automatic inflation mechanism is operated manually (with the gas cylinder removed) to ensure that it operates smoothly, and that there is no obstruction to the movement of the pin which prevents it piercing the cylinder. The pin also needs to be checked to ensure that it is sharp

(e) the 'salt' or 'paper ring' is inspected for any cracking, dissolving or tearing which has taken place since the last inspection

(f) where fitted, the rubber '0' ring is inspected for damage and that it is correctly seated

(g) the mechanism is checked for signs of 'creepage'.

26 Once the inspection is complete, the life jacket should be reassembled according to the manufacturer's instructions.

27 Manufacturers generally recommend life jackets to be serviced every two years by their appointed agents. However, where life jackets are used very regularly, an annual or more frequent service may be needed.

28 If any defects are found with either the gas cylinder or the automatic inflation mechanism, these parts must be replaced. If the life jacket is in need of repair, return it to the manufacturer. Repairs should only be carried out by people approved by the manufacturer.

Storage

29 **Exposure to damp, humid conditions can lead to deterioration in the automatic inflation mechanism,** known as 'creepage'. This has the potential to lead to failure of the pin to pierce the carbon dioxide gas cylinder. Life jackets need to be stored in suitable dry conditions. The following advice should be observed when storing life jackets:

(a) do not hang life jackets with wet oilskins or other damp clothing

(b) if the life jacket is wet, unpack it and leave it to dry out on a hanger

(c) do not store life jackets close to or directly above heat sources, such as convection heaters

(d) to prevent water getting into the automatic inflation mechanism, do not store wet life jackets upside down or lying flat

(e) make sure there is enough space around the life jacket, when it is stored, to allow the air to circulate.

Lifebuoys

30 Lifebuoys should be available wherever people are working on, over or near water. Standard 760 mm diameter lifebuoys with rope or cord lifelines (usually 30 metres) attached should be placed in conspicuous positions near the water's edge.

31 A lifebuoy can be thrown only a short distance, perhaps 6-8 metres and then with little accuracy.

32 Handling 30 metres of rope may also present problems to the inexperienced person, although lifebuoys are available with the rope packed into plastic containers, from which it reels out when the lifebuoy is thrown.

33 Lifebuoys should be suspended from a suitable hook or bracket, with the lifeline coiled ready for use.

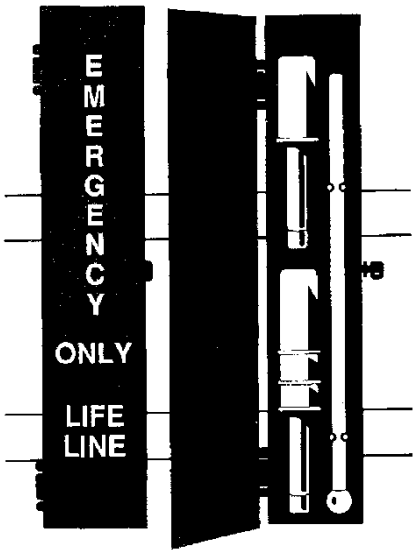
Rescue lines

34 Various types of rescue line are available. One type employs 25 metres of line in a canvas bag with a small flotation chamber. The free end of the line is held, while the bag is thrown underarm towards the casualty. The line can be delivered accurately up to its full length, but underarm throwing may be hindered by guard-rails and other forms of edge protection.

35 Another method of delivering the line is the capsule emergency lifeline. A light but strong line, 40 metres in length, is packed into a small plastic capsule. The free end of the line is secured to a cord grip which is held while the capsule is thrown, the line paying out as it goes.

36 The capsule may be thrown or flicked to the full distance of 40 metres using an extension rod which fits into the handle. Both line and capsule will float, allowing the casualty to grab the line and be hauled to safety. If the first throw misses, it can be very quickly used again. The ability to deliver the line up to 40 metres may avoid the need to launch a boat or for somebody to enter the water.

37 The capsules are small enough to be carried in a belt or, alternatively, can be mounted in cabinets (with the extension rod) at convenient locations.



The majority of drownings occur close to the bank or water's edge; safety provision should take account of this, where it is the dominant risk. Lightweight throwing lines or similar equipment should be provided to supplement lifebuoys, especially if workers are moving from place to place, adjacent to the water. The mere provision of a standard lifebuoy may not be regarded as doing all that is reasonably practicable to secure the safety of employees.

Rescue packs

38 This method requires the rescuer to swim out on a lifeline with a buoyancy aid for the casualty or, alternatively, wearing a deflated rescue life jacket which is inflated when the casualty is reached. Both are then pulled in on the lifeline.

39 The 100 or 200 metre floating line supplied in the pack ensures the rescuer is secured to the shore or edge at all times. In rough or tidal waters, this is an important consideration. If using this method, account must be taken of the fact that the person who has fallen may be panicking and, therefore, the rescuer must be trained in rescue techniques.

Rescue boats

40 A rescue boat should be provided whenever work is being undertaken over or adjacent to deep, tidal or fast flowing water; it may also be advisable to provide a boat in some areas of still water, dependent upon the findings of a risk assessment.

41 The craft may be rigid (wooden or fibreglass) or inflatable. It must have a reliable engine and carry oars and possibly a first aid kit. The operator should be experienced and competent at handling small craft on flowing water, particularly in rescue situations that involve special boat-

handling and skills.

42 **Note** Where there is a possibility that a rescue might have to be carried out using a powered rescue boat, it is strongly recommended that the operator is trained to a minimum standard. Rescuing a person from the water in a power boat with a rotating propeller demands skill and experience, particularly if there is a current flowing. Ideally, there will be two people in the boat, the driver and a 'rescuer'.

43 Whether the rescue boat is to be permanently manned and constantly afloat, or not, will depend on the circumstances, as will its size and the equipment to be carried. If any work is to be done during the hours of darkness, the rescue boat will require high efficiency lighting.

44 Two-way radio communication between boat and shore may be necessary on large areas of water. Grab lines should be provided for persons in the water and a boat hook should be carried. Practice rescue drills should be held, so that the best method of rescuing, securing and landing a potential casualty is known in advance.

Stop nets or lines

45 Given the right circumstances, including still or gently flowing water and no waterborne traffic, nets may be suspended just into the water or lines trailed across or in the water to allow a conscious person to hold on while awaiting rescue, or to pull themselves to the bank. These cannot be totally relied upon, because a casualty may be unconscious or otherwise unable to help themselves.

46 If there is a weir or sluice, nets should not be relied upon unless they can be positioned well upstream of it.

Rescue techniques

47 Methods of rescuing a casualty, other than by using a rescue boat, may be summarised as follows:

(a) involve the emergency services

(b) reach out from the bank or edge

(c) throw out a means of flotation or recovery

(d) wade out

(e) go out.

48 **Emergency services.** In many cases, the Civil Defence (Fire Department) or Qatar Coastguard service in appropriate circumstances will have the expertise and equipment to carry out rescue procedures. A judgement will have to be made as to whether it is advisable or practical to await their arrival. This must be balanced against the risks involved in attempting the following means of rescue.

49 **Reach out.** If the casualty is near enough to the bank or edge, it may be possible to grab their hand, or use a sturdy stick, boat-hook, oar, broom handle, or anything they can seize to pull them in to safety. The rescuer should ensure that they have a secure foothold and sufficient grip and balance to counteract the weight of the casualty in the water.

50 **Throw out.** When the casualty is some way out in the water, a lifebuoy and rescue line or any buoyancy aid with line attached should be thrown to them. This technique is preferable to entering the water to reach the casualty, especially if the depth of water and state of currents is not known.

51 **Wade out.** A shelving bed or shore may enable a rescuer to reach the person in the water while keeping their feet on the bottom. Care is needed, since currents, underwater obstacles

and sudden changes in the depth of water may put the rescuer at risk.

52 **Go out.** Assistance should be summoned first when possible. Individuals should only act alone if they really have to. A boat should preferably be used to reach the casualty. If not, the rescuer should swim out with a lifeline secured to the shore or edge and a buoyancy aid.

53 **Avoid becoming a casualty.** People who cannot swim should not enter the water, but must raise the alarm and wait for assistance.

1.3.3.11 Onshore facilities and procedures

1 **First aid.** Almost irrespective of the size of the operation, first aid facilities should be provided, and trained and qualified first-aiders should be present at the site of all work adjacent to water.

2 Facilities should include provision for transferring casualties from boat to shore and ambulance access.

3 **Alarms.** Some effective means of raising an alarm must exist. Gongs, bells, whistles, pressurised canister fog horns, klaxons or similar items of equipment should be provided. All people on site should be instructed in the correct use of the alarm and the actions to be taken when the alarm sounds.

4 **Lighting.** Water surfaces should be illuminated at night so that victims of falls can be seen and constantly watched while awaiting rescue.

5 **Communications.** The telephone number for the ambulance, coastguard and lifeboat services should be stressed to operatives and adequate provision should be made for effective on-site communications.

6 **Rescue equipment.** Rescue equipment is for use in an emergency. It must be properly maintained, not misused and never relied upon as a primary safeguard against accidents.

7 **Clothing.** High visibility vests or jackets should be worn. These will assist in keeping the casualty in view while the rescue operation is being mounted. High visibility immersion suits will be appropriate in some circumstances.

8 **Checking personnel.** Periodic checks should be made to ensure nobody is missing. Personnel should work in pairs or in sight of each other to enable one person to raise the alarm in the event of an emergency.

9 **Weather and tides.** Details of weather and, where appropriate, tides should be obtained before each shift.

10 **Recovery of equipment from the water.** In the event of tools, equipment or small plant falling into the water, no attempt should be made to recover those using amateur divers or improvised techniques.

Training

11 A clearly defined and documented rescue procedure should be devised. All personnel should be familiar with the procedure and understand the actions they must take in an emergency.

12 The location of emergency equipment should be known and any special training in its use given to the personnel involved. Responsibility for co-ordinating and supervising rescue operations must be allocated to identify individuals, trained and competent to discharge it. Practices in rescue procedures should be held where appropriate.

13 Locally employed site-based staff and the employees of subcontractors should receive instruction in emergency procedures and the use of life-preserving equipment, and must be given such information as is necessary to enable them to act effectively in an emergency.

Construction Site Safety
1.3.3 Appendix 1

Safety checklist: working over or near to water

Management and planning

1 Risk assessment carried out.
2 Safe system of work, usually specified in a method statement.
3 Permit to work system implemented where necessary.
4 Frequent accounting for all staff.
5 Lone working prohibited.
6 Regular auditing that safety rules are being adhered to.
7 Competence of all staff confirmed.
8 Site induction and relevant toolbox talks for all.
9 Other training provided where necessary.
10 Serviceability and suitability of all rescue equipment periodically checked.
11 Lighting available, if necessary.
12 Weather forecast monitored where the state of the weather could be an issue.
13 Tide-tables checked where the state of the tide is an issue.
14 Preparedness to suspend work, where appropriate.

Keeping out of the water

1 Scaffolds: guard-rails, toe-boards fitted; inspections made.
2 Safety nets: secure mountings, correct size of net, at the right place.
3 Safety harness: right type, properly worn, good anchorage, attached constantly.
4 Effective rescue procedures developed, for example, from a safety net.

Keeping afloat

1 Life jackets: right size and type, always worn.
2 Buoyancy aids: suitable for purpose.
3 Prompt response by rescue craft.

Rescue procedures

1 Lifebelt: correctly positioned, ready for action.
2 Rescue lines: available, personnel trained in use.
3 Rescue pack: requires a good swimmer.
4 Rescue boat: properly equipped, experienced crew.
5 Stop nets or lines, just in or on water.
6 Rescue hierarchy:
   (a) emergency services
   (b) reach out
   (c) throw out

(d) wade out

(e) go out.

7 Avoid becoming a casualty.

Onshore emergency procedure

8 Audible alarm.

9 Good communications: telephone, radio.

10 Emergency services: phone numbers displayed, clear directions to accident location.

11 Site access for emergency vehicles.

12 Trained first aiders/rescue team.

Construction Site Safety
1.3.3 Appendix 2

Classes of life jacket

1 Life jackets are divided into different buoyancy classes. The criterion of each class is the support (buoyancy) provided by each class, which is expressed in Newton's (N).

2 The EU standards which cover life jackets also require a level of protection for the unconscious person in the water. This means that life jackets must distribute the weight of the wearer in such a manner that the person is turned face-up. The standards require that automatic life jackets must self-inflate within 10 seconds of contact with water.

3 The buoyancy level in the standards relate to a person weighing 70 Kg, thus the amount of actual buoyancy provided by any life jacket will depend upon the weight of the wearer.

4 Consider the following situations:

(a) wearing a life jacket with too little buoyancy poses obvious problems as there may be too little support for a heavy person to keep their face out of the water or possibly even turn them face-up if unconscious

(b) conversely, wearing a life jacket with too much buoyancy could also pose problems; wearers who are not particularly heavy will be more buoyant and, for example, could find it difficult to escape from an air pocket if they have to fully immerse themselves and their life jacket to 'duck under' an obstruction.

5 The selection of the most appropriate life jacket is therefore essential and the following text provides a guide.

50 N buoyancy aid

6 For use by good swimmers in safe water only as long as assistance is at hand. Not safe for unconscious persons.

100 N life jacket

7 Suitable for adults who are swimmers and for use in inland waters and safe areas, providing limited protection for unconscious persons depending upon the clothing worn.

150 N life jacket

8 Suitable for swimmers and non-swimmers in all waters. Only limited protection for unconscious persons wearing heavy waterproof clothing or in heavy seas.

275 N life jacket

9 For offshore use and extreme conditions. Immediate protection for unconscious persons, with turnover guaranteed in 5 seconds. Adequate buoyancy even in heavy clothing.

10 Buoyancy aids incorporate closed-cell foam inserts sewn into the material of the device.

11 Life jackets incorporate a gas cartridge which inflates a bladder within the life jacket. Actuation can be either manual (usually by pulling a toggle on an actuating chord), or automatic (when an inbuilt 'trigger' device comes into contact with water). If operated, either in an emergency or by accident, the bladder can be deflated and repacked and the life jacket can be fitted with a rearming kit so that it can be reused if undamaged.

Construction Site Safety

1.3.4 System Scaffolds and Mobile Towers

1.3.4.1 Key points

1 Scaffold of any type must only be erected, altered or dismantled by operatives who have been trained, or are under the direct supervision of someone who is competent to do so.

2 The modular construction of system and tower scaffolds could increase the temptation for unqualified persons to tamper with them. Site managers must be aware of this and monitor the situation.

3 Scaffolds must be subjected to statutory inspections with reports raised where appropriate.

4 All scaffolds must be properly erected, stable, tied to the structure as appropriate, suitable for their purpose and equipped with toe-boards and guard-rails on all working platforms.

5 EN 12811 series of standards highlights requirement for additional ties and bracing.

1.3.4.2 System Scaffolds

1.3.4.3 Introduction

1 System scaffolds and the components of mobile scaffold towers are generally of a modular layout. They comprise standards with welded node connectors to which ledgers and transoms are fastened, usually with proprietary wedges or rings (rather than loose coupler connections) or frames with both standards and transoms welded into one unit.

2 The safety requirements of system scaffolds are broadly similar to traditional scaffolds, but there are some significant differences.

Work at Height

3 The height at which guard-rails and toe-boards must be fitted is determined solely by the findings of a risk assessment. The requirement now is that a Contractor must:

4 take suitable and sufficient measures to prevent, so far as it is reasonably practicable, any person falling a distance liable to cause personal injury.'

5 Experience has shown that falls from less than 2 metres can cause serious and fatal injuries.

6 Contractors must consider:

(a) the organisation and planning of work at height

(b) avoidance of risks from working at height

(c) the competence of those who work at height and are involved with work equipment used for working at height

(d) the general principles for the selection of work equipment for working at height

(e) the requirements for particular work equipment

(f) work on or near fragile surfaces

(g) danger areas

(h) the inspection of work equipment used for working at height

(i) the inspection of places of work at height

(j) the duties of persons at work in relation to work at height.

7 Of relevance to this section, these Regulations refer to applicable Schedules in section C1, these include:

(a) the requirements for working platforms, guard-rails and toe-boards

(b) additional requirements for scaffolding

(c) additional requirements for fall-arrest systems

(d) additional requirements for work restraint systems

(e) the requirements for ladders

(f) the particulars to be included in a report of inspection.

1.3.4.4 The Provision and Use of Work Equipment

1 System scaffolds, including individual components and associated equipment, are classified as 'work equipment'. As such, all equipment must be suitable for its intended purpose, well maintained and inspected as necessary.

1.3.4.5 Manual Handling Operations

1 Manual handling will be an activity linked to the assembly, alteration and dismantling of scaffolds. It is also likely that those who work from scaffolds will be involved in manual handling activities during the course of their work.

1.3.4.6 Basic system scaffolding considerations

1 Before undertaking the assembly of a system scaffold, the following points must be clearly defined:

The management of risk

2 A risk assessment should be carried out.

3 The scaffold, so far as it is reasonably practicable, should be the safest and most suitable 'work equipment' for the task it is intended to carry out.

4 The purpose of the scaffold is usually to provide a safe place of work, primarily at height and the configuration of a system scaffold may vary depending on its intended use. For example, scaffolds for bricklaying, masonry, refurbishment, glazing or painting may differ in their design and construction.

Who will erect the scaffold?

5 Scaffolds must only be erected, altered or dismantled by, or under the direct supervision of, a competent person, the erection team should be able to demonstrate that they are trained and competent for the job.

Where will it be erected?

6 Care will be required in the initial setting out of the system scaffold as far as leg or jack adjustment and the positioning of fixed length ledgers are concerned.

7 Measuring the length of the building and then positioning the first frames or standards and ledgers in relation to door openings will be important.

Are the ground conditions suitable?

8 Bay lengths may often differ from those associated with tube and fitting scaffolding, which can cause loads to be concentrated in particular spots. Initial ground inspection and levelling is essential to reduce the amount of jack levelling and adjustment required during scaffold erection. As with tube and fittings scaffolds, care should be taken with regards to manholes, slopes and the general load-bearing capabilities of the area on which the system scaffold is to be placed.

What materials are to be used?

9 The availability of space for the standards and the width of the working area are prime considerations in deciding which type of scaffold should be used. An allowance must be made for the fact that heavy or bulky materials may be deposited on the scaffold.

Stability of the scaffold structure

10 The scaffold structure must be of sufficient strength and rigidity when erected and, if appropriate, secured or 'tied-in' to the structure against which it is built to ensure stability.

11 If the scaffold is later adapted or altered, this must be done in such a way as to ensure that the scaffold structure remains stable.

12 A requirement of EN 12811 -1:2003 is that all but 'standard scaffolds' must be properly designed.

Can safe access to the working place be provided?

13 System scaffolds provide a variety of options for safe access to the working place, such as pole ladders, internal ladder systems or staircase towers. A decision must be made at an early stage in order that provision may be made for the particular type of access required.

How many working platforms will there be?

14 Platforms may have to be installed at every level, whether or not they are working places. This is a feature of some types of system scaffold. However, it is often the case that only one or two may be used as working places, and in such cases the manufacturer's recommendations must be followed as to whether or not platforms can be omitted.

How and where will the scaffold be tied in?

15 The principle of tying a system scaffold to the supporting structure is the same as for a tube and fitting scaffold. The pattern of ties and the frequency of their use will vary between manufacturers, and the different types of system scaffold will often incorporate their own proprietary ties instead of the conventional through ties or Hilti rings that are used on tube and fitting scaffolds.

16 It may be necessary to tie-in the scaffold at different places compared to the tying-in of tube and fitting scaffolds, and so consideration should be given to the exact locations available.

17 Note that EN 12811-1:2003 recommends the installation of additional ties in some circumstances, when compared to the requirement previously required under BS 5973.

What bracing will be required?

18 Ledger bracing is not generally required in system scaffolds. This has the benefit of providing a clear walk-through at platform level. However, the frequency of facade bracing will vary from

product to product, and plan bracing may be required if tie or anchor positions are not readily achievable or, if deemed necessary, under EN 12811-1:2003.

Unauthorised alteration

19 Due to their design features, most types of system scaffold are generally easier to alter than is a tube and fitting scaffold. This makes unauthorised alteration, for example the removal of a guard-rail or the repositioning of a working platform, that much easier.

20 Unauthorised alteration can make a scaffold an unsafe place of work for the unwary and possibly breach the scaffold design criteria from a stability point of view.

21 It is for site management to make clear to anyone who has to work on a system scaffold that unauthorised alteration must not be carried out and that appropriate actions will be taken against individuals who do so.

1.3.4.7 System scaffold specifications

Materials

1 Components should be free from any weld defects, bends, distortion or corrosion that may affect the safe functioning of the items. Many scaffold systems are galvanised, so the risks from corrosion are reduced.

2 Fittings employed for tying and adaptations to the scaffold should be free from worn threads and damaged bolts.

Foundations and levelling

3 The requirement for any supplementary support or load-spreading capability will depend upon:

(a) the nature of the surface on which a system scaffold is to be erected

(b) the weight of the scaffold itself

(c) loading that will be imposed upon the completed scaffold by materials, people and equipment.

4 In most cases, the installation of either base plates alone, or base plates plus sole boards, will be sufficient.

5 On system scaffolds, the ledgers and transoms connect to the standards at fixed points so there is not the degree of vertical adjustment that there is with tube and fitting scaffolds.

6 Because of the difficulty of levelling a system scaffold as erection progresses, all such scaffolds should be properly levelled and located at the first level. If this is done correctly, components should be vertically self-aligning, but great care must be taken to check the initial vertical alignment at the base.

Platform decking

7 As the scaffold frames and components have been designed by the manufacturer to meet the requirements then, if used in accordance with the manufacturer's assembly instructions, platform span and thickness requirements will be met.

Types of platform

8 There are several different types of platform available for use with system scaffolds:

(a) conventional scaffold boards (225 mm x 38 mm x 3.9 m) (plus steel and aluminium versions of similar dimensions)

(b) timber battens (typically 225 mm x 60 mm x 2.5 m)

(c) decking platforms of plywood and aluminium (650 mm x 50 mm x 2.5 m or 3.0 m or 3.5 m)

(d) steel decking platforms (330 mm x 50 mm x 2.5 m or 3.0 m)

9 Only scaffold boards, whether timber, steel or aluminium, require supporting at 1.2 m or 1.5 m centres. Other decking products have been generally designed to span distances of up to 3.0 m or 3.5 m. The manufacturers of the various types of decking will provide specific guidance.

Requirements for scaffold boards

10 Any scaffold boards used should comply with BS 2482:2009 Scaffold boards should not be warped, twisted, split or badly worn. They should be banded or nail plated.

Reaction to windspeed

11 All scaffold boards or decking platforms should be secured against the possibility of wind uplift. There are several types of fitting and straps available to achieve this. Design features such as locking devices to prevent wind uplift are increasingly built into proprietary platforms.

Platform widths

12 There is a requirement for a minimum width of a working platform, 600 mm, as specified in EN 12811-1 is 'standard' minimum.

13 The actual width chosen will depend largely upon the nature of the application, for example, bricklaying will not be suitable on a 750 mm-wide scaffold, but painting and cladding may be well suited to this width.

Ledger bracing

14 Additional ledger bracing is not generally required within system scaffolds due to the inherent stiffness of the joints. However, if the system scaffold is to exceed the design boundaries of a 'standard scaffold', the layout should be specified by a competent scaffold designer.

Longitudinal or facade bracing

15 The requirement for longitudinal or facade bracing will be specified by the manufacturer or scaffold designer, and will vary from product to product.

Ties

16 The need for ties on a system scaffold is the same, in principle, as on a traditional scaffold.

17 However, a system scaffold has different characteristics (for example, its components are shorter and lighter) so the tie pattern will need to be specified by the manufacturer, or a competent scaffold designer. Requirements for ties may vary from product to product.

18 Increasingly, new methods of tying are being used to replace conventional through ties or Hilti rings. Eyebolt and plastic plug type ties are now used on some systems.

Sheeting of scaffolds

19 Caution must always be exercised before a decision is taken to sheet any scaffold. The

sheeting of any scaffold increases the wind-loading on it. The requirement for additional ties will be determined by the manufacturer or a competent scaffold designer.

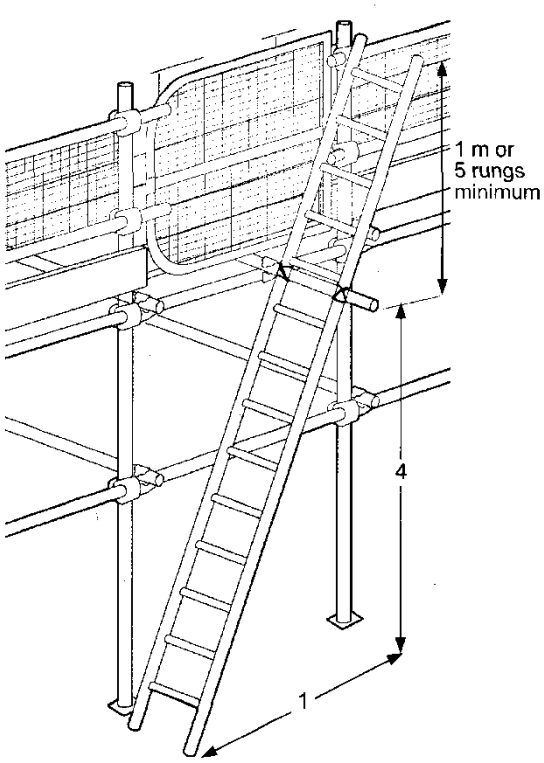
1.3.4.8 Access

Requirements for ladders

1 Any ladder (including those used in conjunction with a system scaffold) must be in good condition, and of sufficient strength.

2 It must be prevented from slipping during use either by securing it at the top or bottom or by an effective anti-slip device or other equally effective means. However, industry best practice is that all ladders, irrespective of length, should be properly secured at all times.

3 The top of the ladder should extend to a sufficient height above the platform level unless alternative means are used to provide a safe handhold. (It is suggested that 1 metre or five rungs is a suitable height.)



4 If a ladder, or a series of ladders, rises a vertical distance of 9 metres or more, rest platforms or safe landing areas must be provided.

5 Pole ladders and steel ladders are still used for access to system scaffolds even though they have been a contributory factor in many falls from height.

6 Staircase towers or built in ladder sections for access onto the working platform are now widely available and used as an alternative to conventional ladders.

7 Staircase towers may be more appropriate for the movement of higher numbers of people and particularly for heights in excess of 10 metres.

1.3.4.9 Concentrated loads

1 Where concentrated loads, e.g. pallets of bricks or tiles, are to be placed on the scaffold, loading towers may be required. These specially designed and braced scaffolds provide support for concentrated loads, the weight of which would be excessive on standard scaffold working platforms.

1.3.4.10 Incomplete scaffolds

1 Where a loading tower constructed in a system scaffold is erected adjacent to the working scaffold, the two structures should be securely tied both to each other and to the building.

1.3.4.11 Safe places of work, and stability of working platforms

1 Any working platform on a scaffold must:

(a) have safe access to it and egress from it

(b) be of suitable and sufficient strength and rigidity for the purpose for which it is to be used

(c) be so erected and used so that none of the components can come loose or be displaced and endanger anyone

(d) be stable when being erected, used and dismantled

(e) be of sufficient dimensions to permit safe passage of persons and materials, and provide a safe working area for the work that is to be done there

(f) have a suitable (non-slip) surface so as to prevent slipping or tripping

(g) not have any gaps through which a person or materials could fall

(h) be used and maintained so that persons cannot be caught between the working platform and any adjacent structure

(i) be dismantled in such a way as to prevent accident displacement.

1.3.4.12 Plant and equipment

1 Each item of plant and equipment used in conjunction with any scaffold must be of sound construction and materials, and must be sufficiently strong and suitable for the job it has been designed to do. It must be maintained in such a condition.

1.3.4.13 Requirements for guard-rails and toe-boards

1 Where the proper erection of a scaffold has not been completed, it should not be left unattended without the display of a notice stating:

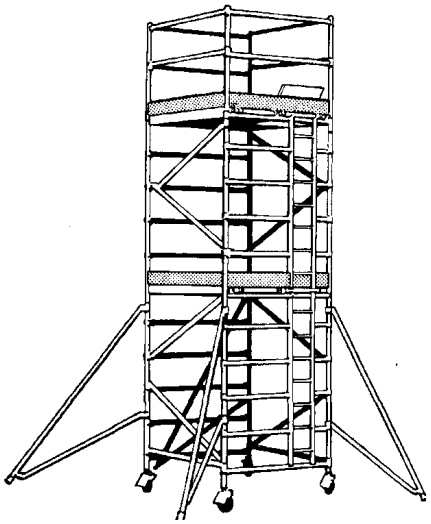
Scaffolding incomplete - do not use

2 It is also a good idea to remove and secure access ladders.

3 For **Mobile Towers,** please see the next page.

1.3.4.14 Mobile Towers

1 The use of lightweight aluminium mobile towers on construction sites is a popular alternative to the use of traditional tube and fitting towers. However, these systems have some limitations and should only be used when they can satisfy both legislative and general site requirements.



2 Five different items make up a basic mobile aluminium tower:

(a) frames

(b) braces

(c) platforms

(d) legs

(e) wheels or castors.

General conditions and provisions

3 The UK Prefabricated Access Suppliers' and Manufacturers' Association (PASMA) has developed two methods of installing and dismantling guard-rails that do not require the erector to stand on a working platform until the guard-rail frames have been installed:

(a) advanced guard-rail system

(b) through-the-trap (3T method)

4 These methods should be adopted by Contractors as best industry practice in Qatar.

5 The advanced guard-rail system involves the use of specially manufactured, hinged guardrail frames that can be raised and slotted into position in advance from a safe position on the already protected platform below.

6 The 3T method involves the erector being within a protected position within the platform trap-door from where they may safely install and dismantle the guardrails without standing on an unprotected platform.

7 Mobile towers are not designed to be used in conjunction with personal fall protection (such as a harness and lanyard) as they already have preventive collective protection (the guardrails) built in by design. There are no connection points on a tower suitable for connection of personal fall protection either as work positing or fall arrest. Connection of personal fall protection may result in collapse or overturning of the tower in the event of a fall arrest occurring.

Materials

8 Mobile towers may be constructed from steel, but are principally of aluminium.

9 All components must be free from any welding defects, dents, bends or distortion, or any

corrosion that could prevent their safe use. Platform boards must be free from holes, cracks, splits or any delamination would affect their safe use.

Competence

10 Any person erecting a mobile tower must be competent to do so, having received adequate training or, if not fully competent, be under the supervision of an experienced and competent person. The training provides the required levels of competence for both the person assembling and dismantling towers and the managers responsible for that work.

Maintenance

11 All mobile towers are work equipment.

12 As such, mobile towers (including individual components) must be suitable for the job in hand and properly maintained.

Preparation and planning

13 A risk assessment should be carried out to determine if a mobile aluminium tower scaffold is a suitable item of work equipment for the type of work that is to be carried out and the environment in which it is intended to be used.

14 Factors that should be considered when deciding if it is safe to use a mobile tower are:

(a) The ground surface (1) - is the surface sufficiently level to use a mobile tower if there is no adjustment on the legs for levelling the tower? A tower scaffold should not be erected if it cannot be levelled to make it stable.

(b) The ground surface (2) - mobile towers only have a small area of each wheel in contact with the ground and therefore each wheel imposes a high loading at each point of contact. Is the surface strong enough to take the loading? It may be possible to use sole boards on soft ground to effectively spread the load and allow a mobile tower to be used, providing that there is no chance of the tower sinking, tilting or otherwise becoming unstable.

(c) The ground surface (3) - are there any features such as drain covers or underground pipes that may not be able to take the direct or indirect loading imposed by one or more wheels?

(d) The weather (outdoor use) - aluminium tower scaffolds are lightweight structures which can become unstable in moderately high winds. Has a check of the weather been made for the period that the tower will be erected? Is it possible to tie-in the tower to the structure against which it is to be erected? If any doubt exists on the limitations of the tower in high winds, has the manufacturer or supplier been consulted?

(e) Overhead power lines or phone masts - are there any lines or masts that are close enough to render the use of a metal scaffold unsafe? Remember, it is not necessary to touch a high voltage cable to get a shock or be close to a mast for it to be dangerous. Many overhead power lines are not insulated and the electricity can 'arc' through the air to an adjacent metal object. Phone mast emit non ionizing radiation that can be dangerous when working at height in their vicinity**.**

Pre-assembly inspection

15 The competent person who is to erect / assemble a mobile tower should check that all the components are present and undamaged and ensure that they are all from the same manufacturer/supplier, and are for the same type of tower.

16 A check should be made that the castors and wheels rotate and swivel freely and that they

have a functioning locking device (brake).

Safety during use

Stability

17 The tower must start off and remain vertical as it is built and used.

18 Due to their lightweight nature, stability can be a problem with aluminium tower scaffolds, the more so the higher they are built.

19 Individual manufacturers carry out calculations and tests on their products to enable them to provide specific information on the size and installation of stabilisers/outriggers that will be necessary to achieve the required freestanding stability. Such information should be available to the competent person erecting assembling and using the tower.

20 As general guidance, it should be assumed that stabilisers will be required if a mobile tower is to have a working platform higher than 2 metres above ground level.

21 In addition to the dimensions of the assembled tower scaffold, there are several other factors that can affect its stability:

(a) Sheeting (out of doors) - will increase the wind-loading on a tower scaffold and generate loads that it is not designed to resist. Mobile towers are not suitable for sheeting.

(b) Overreaching - will cause the tower to overturn. It is far safer to move the tower scaffold.

(c) Work activity - that involves applying a sideways load to the tower, for example water-jetting, may overturn the tower.

(d) If heavy items are hoisted up the outside of the tower, it could become unstable and overturn.

(e) Climbing the tower - access to the working platform should be gained by using the built-in stair or ladder sections. If a vertical ladder is built into an end frame of the tower, the person climbing the ladder must do so on the *inside* of the tower. Climbing the outside could overturn the tower. Never gain access to the working platform by leaning a ladder against the tower.

Tying-in a tower scaffold

22 Care should be taken to avoid couplers causing damage to the aluminium tubing and, accordingly, only special couplers should be used. Advice on the horizontal and vertical frequency of ties will be supplied by the manufacturer or supplier or, in the case of substantial or 'linked' towers, the scaffold designer. Now tying in towers is considered to be a specialist practice and therefore not within the scope of normal mobile tower use.

The working platform

23 The access hatch to the working platform must be closed as soon as the user(s) working on the working platform.

24 The working platform must be fully boarded unless a design feature of the scaffold/tower enables safe access and egress and effective guard-rails and toe-boards to be installed around a partially boarded platform.

25 A working platform must be of sufficient dimensions for the safe passage of people, plant and materials with due regard to the type of work being carried out. However, EN 12811-1 recommends and 1004 specifies that platforms on all types of scaffold should not be less than 600 mm wide.

Gaining extra height

26 Placing stepladders and ladders on the working platform of a mobile tower to gain additional height is particularly dangerous and must be prohibited. Adjustable legs are only to be used for levelling, and not to gain additional height. If additional height is needed then a further lift should be added, providing this is within the manufacturer's height limitations.

The brakes

27 The wheel brakes must be locked in the 'ON' position at all times when the tower is not being moved. The lightweight nature of aluminium tower scaffolds presents the potential for unattended towers to be moved by the wind if the brakes are not applied, particularly where they are used on exposed floor slabs at height.

Moving a mobile tower scaffold

28 The tower must not be moved whilst anyone is on the working platform. All tools and materials should be removed from the tower whilst it is being moved. A mobile tower must only be moved by pushing or pulling at the base.

29 The tower must never be moved by:

(a) towing it with a vehicle

(b) a person who is on the platform pulling the tower along using an adjacent structure.

Avoiding collisions

30 Suitable barriers should be erected to prevent people or vehicles from accidentally colliding with a mobile tower, particularly where it is erected in a public place.

31 It may be necessary to create a safety zone around a tower simply because of the nature of the work being carried out above.

Loading capacity

32 The capacity of each platform and tower structure must be shown on labels attached to the frame of the mobile tower, and specified in the manufacturer's assembly guide / instruction manual. Never exceed the recommended loading levels as this may cause the tower to become unstable.

Incomplete towers

33 Where the proper assembly of a mobile tower has not been completed, it should not be left unattended without the display of a notice stating:

Inspection and reporting

34 Where the tower constitutes a working platform, it must be inspected:

(a) before being used for the first time

(b) after any substantial addition, dismantling or other alteration

(c) after any event which is likely to have affected its strength or stability

(d) at regular intervals not exceeding seven days since the last inspection.

35 An inspection report (scaff tag) is necessary, however, for any mobile tower, unless it has remained erected in the same place for a period of seven days or more to be re-inspected.

Wind strength

36 Aluminium structures / Mobile towers are very vulnerable to the strength of the wind. It is recommended by many manufacturers that if the wind reaches a speed of 17 miles per hour then all work should cease on the tower.

37 If the wind speed is likely to reach 40.23 km/h, the tower should be tied-in to a rigid structure. If there is a possibility of the wind reaching speeds approaching or in excess of 64.37 km/h, the tower should be dismantled.

38 Operators should be aware of the possibility of sudden high winds in exposed or gusty conditions.

39 It must be remembered that winds at high levels are often higher than at ground level. The wind speed can also increase as it funnels between buildings or other solid structures.

Construction Site Safety
1.3.4 Appendix

Wind strengths and effects (Beaufort Scale)

Windforce number	Description of wind	Wind effect locally	Speed Km/h	Speed m/sec
0	Calm	Calm, smoke rises vertically	**≤1**	**0-1**
1	Light air	Direction of wind shown by smoke drift, but not by wind or weather vanes.	**1.1-5.5**	**1-2**
2	Light breeze	Wind felt on face. Leaves rustle. Wind or weather vanes move.	**5.6-11**	**2-3**
3	Gentle breeze	Leaves and small twigs in constant motion. Wind extends light flags.	**12-19**	**3-5**
4	Moderate breeze	Wind raises dust and loose paper. Small branches move.	**20-28**	**5-8**
5	Fresh breeze	Small trees in leaf begin to sway. Little crested wavelets form on inland waters.	**29-38**	**8-11**
6	Strong breeze	Large branches in motion. Umbrellas used with some difficulty.	**39-49**	**11-14**
7	Near gale	Whole trees in motion. Becoming difficult to walk against the wind.	**50-61**	**14-17**
8	Gale	Twigs break off trees. Progress is generally impeded.	**62-74**	**17-21**
9	Strong gale	Chimney pots, slates and tiles may be blown off. Other slight structural damage may be caused.	**75-88**	**21-24**

Construction Site Safety

1.3.5 Tube and Fitting Scaffolds

1.3.5.1 Key points

1 Scaffolds must only be erected, altered or dismantled by operatives who have been trained to do so and are competent, or are under the direct supervision of someone who is.

2 Scaffolds are subject to statutory inspections, with reports of inspections raised where appropriate.

3 All scaffolds must be properly erected, stable, tied to the structure as appropriate, suitable for their purpose and equipped with toe-boards and guard-rails on all working platforms.

4 The EN 12811 series is supported by the UK National Access and Scaffolding Confederation's technical guidance note TG20 'Guide to good practice for scaffolding with tube and fittings'.

1.3.5.2 Introduction

1 The purpose these Regulations is to give readers an understanding of the safety issues that relate to the use of scaffolds, particularly where site managers or other readers have to manage scaffolding operations and assess the suitability of scaffolds which have been erected by others.

2 The majority of guidelines for good practice in scaffolding can be found in UK NASC safety and technical guidance notes.

3 The main British and European Standard for scaffolding is EN 12811 (Part 1) Scaffolds - Performance requirements and general design.

4 This latter standard, which focuses more on scaffold design, does not cover the same *range* of good practice as the old Code of Practice BS 5973 (now withdrawn) and readers are directed to the range of UK National Access and Scaffolding Confederation (UK NASC) particularly 'Guide to Good Practice for Scaffolding with Tubes and Fittings TG20.

5 They must also be used in accordance with the manufacturers' instructions or the scaffold should be designed by a competent engineer.

1.3.5.3 UK NASC Technical Guidance TG20:08

1 Wherever TG20' appears in the text, it refers to UK National Access and Scaffolding Confederation publication *Guide to Good Practice for Scaffolding with Tubes and Fittings (TG20:08).*

1.3.5.4 Competent persons

1 For the purposes of *scaffold inspection,* a competent person may be defined as:

2 A person who has practical and theoretical knowledge, scaffold inspection training and actual experience of what they are to examine, in respect of a scaffold, so as to enable them to detect errors, defects, faults or weaknesses that it is the purpose of the examination or inspection to discover; and to assess the importance of any such discovery.

3 As regards the competence of individuals in relation to the *erection of scaffolds,* 'competence' may be taken to mean:

4 A person who has practical and theoretical knowledge, together with actual experience of scaffolding, and has acquired, or who is being supervised while being trained to acquire, a

recognised qualification in scaffolding.

1.3.5.5 Work at Height

1 These Regulations are covered in detail in Section C1. The key provisions of these Regulations that can apply to scaffolding are:

(a) to ensure that the work is risk assessment based and that it is carried out safely

(b) the definition of 'work at height'

(c) fall prevention and protection

(d) falling object prevention and protection

(e) danger zones where people would be at risk of falling or being struck by falling objects

(f) fragile surfaces

(g) competence for planning, organising and working at height

(h) weather conditions

(i) emergencies and rescue

(j) requirements for guard-rails, toe-boards and similar barriers

(k) requirements for working platforms

(l) requirements for access and egress and the use of ladders.

(m) statutory scaffold inspections

(n) scaffolding design

(o) a scaffolding plan

(p) duties on employees to report hazards and work at height safely.

1.3.5.6 The Management of Health and Safety at Work

1 In general terms, these Regulations place a requirement on the Contractor to make a suitable and sufficient assessment of every work activity in order to identify any hazards to employees that might be encountered during their work, or to any other persons who might be affected by what employees are doing. This includes the work of those who erect, alter and dismantle scaffolds and also those who use scaffolds as a place of work.

2 When hazards are identified, it is the Contractor's duty to either eliminate the hazard or to put into effect control measures to reduce the risks to health and safety arising from the hazard, so far as it is reasonably practicable to do so.

3 The Contractor must provide employees with information on the risks which exist and the measures that are put in place to control them.

4 The employees then have a duty to comply with any instructions they have been given, and to tell the Contractor about any work situation, or any aspect of the work, which presents a risk to them or anyone else. These Regulations, therefore, cover the duty of the Contractor to carry out 'work at height' risk assessments.

5 These Regulations include a specific requirement to produce a scaffolding plan (or method statement) covering the assembly, use, alterations and dismantling, which is a form of risk assessment.

6 Contractors must consider the physical capabilities of employees who are required to erect, alter or dismantle scaffolding, due to the physical nature of the occupation.

1.3.5.7 Provision and Use of Work Equipment

1 Scaffolding, including individual components and associated equipment, are classified as 'work equipment'. As such, all equipment must be suitable for its intended purpose, well maintained and individual components inspected as necessary.

1.3.5.8 Manual Handling Operations

1 Manual handling will be an activity linked to the erection, alteration and dismantling of scaffolds. It is also likely that those who work from scaffolds will be involved in manual handling activities during the course of their work.

2 Contractors carrying out scaffolding activities must assess the risks arising out of manual handling. This is usually undertaken as part of the general risk assessment and method statement/scaffold plan.

1.3.5.9 Construction (Design and Management) CDM

1 Architects and designers have duties under these Regulations to consider the design of temporary works such as access scaffolding, falsework and formwork structures. Where these temporary structures would be required for construction or future maintenance, designers have a duty to carry out a 'design risk assessment' to design out risk and communicate any residual hazards that remain.

1.3.5.10 Planning for a scaffolding contract

1 When selecting a scaffolding contractor you must check that they are competent and consider:

(a) the competence of management and operatives for the type of work

(b) a proven track record for the type of work

(c) the past health and safety performance

(d) the allocation of sufficient physical and human resources to service the contract (e.g. scaffolding equipment, transport, qualified scaffolders and supervision)

2 Before engaging a specialist scaffolding contractor, it is a good idea to prepare information on the intended use of the scaffolds for the scaffolding contractor to take into account. For further information reference should be made to TG20 (Volume 1 clause 37.2.2) 'Client's brief.

1.3.5.11 Basic scaffolding considerations

1 Before the erection of any scaffold, the following points must be clearly defined.

(a) What is the scaffold for?

(b) Is it to be a 'standard scaffold' as defined in UK NASC guide TG20 Volume 1?

(c) Exactly where is it to be erected?

(d) What materials are to be used?

(e) Can safe access be provided for the erection and use of the scaffold?

(f) How many working platforms will there be?

(g) Is the ground condition where the scaffold is to be erected suitable?

(h) How and where can the scaffold be tied-in?

(i) What bracing will be required?

(j) What loadings will be imposed upon those working platforms, and on the scaffold as a

whole?

(k) Will it be sheeted?

1.3.5.12 Scaffold design

1 These Regulations require all scaffolds to be calculated unless constructed to a generally recognised standard configuration. This means for tube and fitting scaffolds they must be a 'standard scaffold' as defined in TG20 Volume 1 Section 2. Otherwise the scaffold **MUST** be designed and calculated by a competent engineer.

2 Further sections of Volume 1 and Volume 2 of TG20 provide information for engineers to design and calculate *'special scaffolds'* in tube and fittings.

3 Scaffolding contractors should have suitable arrangements in place to manage and control the erection, alteration and commissioning of special scaffolds (such as issuing drawings; managing variations to the design; inspection and handing over designed scaffolds).

4 Note that for all *standard scaffolds* erected, a simple procedure must be followed to determine the maximum safe height as required by TG20 (Volume 1 Section 2 Clause 4.4.3). This basic calculation is intended to be carried out by those planning and organising scaffolding and not necessarily an engineer.

1.3.5.13 Fall prevention and protection while scaffolding

1 While a scaffold structure is actually being built, the scaffolders do not always have the protection afforded by guard-rails and toe-boards until such time as they themselves have installed them. They rely upon the use of personal fall protection equipment (harnesses) to arrest a fall during this time.

2 In order to assist Contractors, the UK National Access and Scaffolding Confederation (UK NASC) has produced UK NASC Guidance Note SG4:05, Preventing Falls in Scaffolding and Falsework. This is the accepted industry standard to which all scaffolding contractors should be working.

3 Under the heading of 'Step 1 - Planning for work at height', the guidance states:

4 *'Scaffolding contractors should consider measures that prevent falls from height, such as providing adequate work platforms with suitable guard-rails or other collective measures, before resorting to fall arrest equipment (i.e. harnesses).'*

5 Devices and systems of work that provide collective fall protection, such as Advanced Guardrail Systems and Step-ups, are now available for certain scaffolding operations. These collective measures enable scaffolders to provide guard-rail protection in advance of erection and to maintain fall protection for alterations and dismantling. Such systems do not completely eliminate the risk of a fall in all circumstances and UK NASC still recommends the use of personal fall protection equipment. Most of the current industry guidance is based on the content of EN 13374.

6 Scaffolding plans must also consider the rescue and recovery of a scaffolder suspended by their personal fall protection equipment. For further information on rescue planning see UK NASC safety guidance note SG19.

7 Personal fall protection equipment used for scaffolding should be inspected:

(a) before use by the user

(b) thoroughly by a competent person every three months and recorded

(c) thoroughly at other intervals if the need is identified via a risk assessment.

8 For further information on the inspection of fall protection equipment see UK NASC safety guidance note SG16.

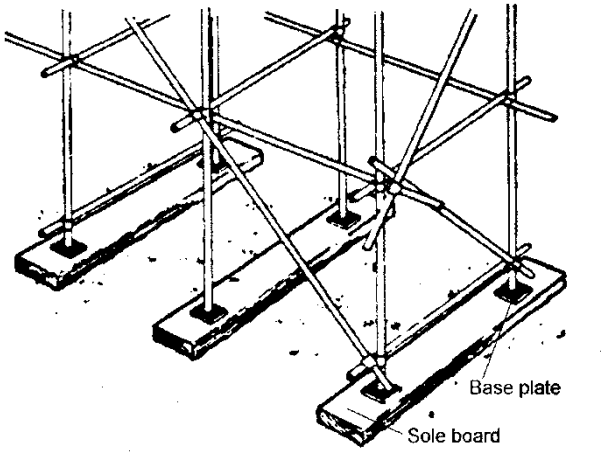
9 To ensure compliance with the above requirements:

(a) scaffolders and their supervision should be trained in the requirements of SG4:05 and the rescue plan

(b) site managers and others who run construction sites should check that the scaffold contractors coming on to their sites have been adequately trained in the requirements of SG4:05.

1.3.5.14 Scaffold features

Foundations



1 The foundations for all scaffolds must be of adequate strength to support and disperse the load. On hard surfaces, such as steel and concrete of sufficient strength and thickness, standards may be placed directly on the surface, although it is generally preferable to use a base plate which is 150 mm x 150 mm in size. Sheeting or proprietary plastic treaders can also be used to protect sensitive floors from damage or marking.

2 On other surfaces, the load should be spread by using base plates and sole boards (see above). The soil or ground beneath the sole board should be level and properly compacted.

3 When a sole board is used on hard ground, the area beneath any one standard should be at least 1,000 cm^2. If a timber sole board is used, it must be not less than 35 mm thick.

4 On soft or disturbed ground, the sole board area should not be less than 1,700 cm^2. Each sole board should support two standards.

Sole board minimum dimensions

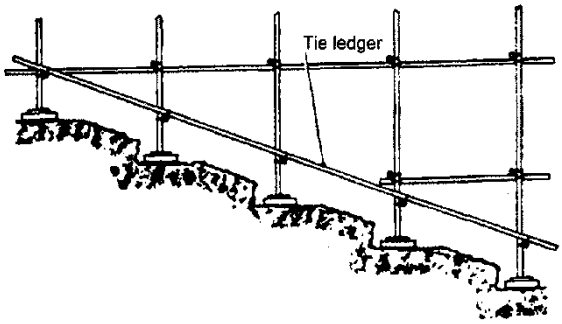
5 These should be:

on hard ground
450 mm x 225 mm x 35 mm

on soft ground
760 mm x 225 mm x 35 mm

6 Bricks, blocks and scraps of odd timber must not be used as sole boards.

7 On sloping ground, steps should be cut into the ground to accept base plates or sole boards (see below). If the slope exceeds 1:10, an engineer should check that the ground has sufficient stability.



8 Scaffolds founded on roofs or other suspended surfaces will need special consideration for the loads imposed. An assessment and calculations may need to be made by an engineer to ensure the loads can be supported, or whether temporary supports (shoring) will be required. Alternative scaffolding materials, such as aluminium, can also be used to reduce the loads imposed by the scaffolding.

Materials

9 Scaffold tubes and fittings must comply with EN 39:2001 (older tube to BS 1139). Ends should be cut square and clean, free from any bends or distortion, corrosion, lamination splits or surface flaws.

10 Fittings must comply with EN 74:3 2007 and BS 1139 Part 2.1. Fittings should not have worn threads or damaged bolts and excess surface oil which may reduce friction grip.

11 All scaffold boards should comply with BS 2482:2009 and should not be warped, twisted, split or badly worn, painted or otherwise treated so as to conceal any defects.

Standards

12 Standards should be:

(a) placed vertically

(b) spaced closely enough to provide an adequate support (see TG20 Table 1 Load classes)

(c) on a base plate and sole boards to prevent displacement

(d) near to ledgers

(e) positioned so that joints are staggered ensuring there are no more than three joints in any one bay.

Ledgers

13 Ledgers should be:

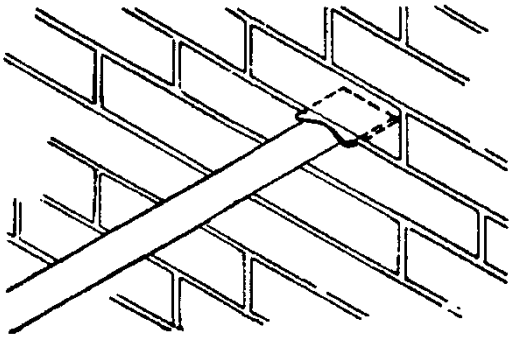
(a) horizontal and fixed securely to the inside of standards with right-angled, load-bearing couplers

(b) fitted so that joints are staggered, and not situated in the same bay

(c) positioned so that joints in ledgers are in the end thirds of the bay, adjacent to the standards.

Putlogs and transoms

14 The length of putlog tubes and transoms will vary to suit the width class of the scaffold in accordance with TG20 Table 7.



15 In order to avoid injury to site workers (and in some circumstances, the public), the outermost ends of the putlogs or transoms should not project an unnecessary distance beyond the face of the scaffold and/or be shielded by the use of purpose-made protective plastic cups or other suitable protection.

16 Where appropriate, transoms should be long enough to butt up against the supporting structure and enable the attachment of facade bracing tubes.

17 Putlogs should be:

(a) securely fixed to ledgers or standards with right-angled or putlog couplers

(b) supported with the blade placed in the mortar bed joint of the brickwork, and pushed right into the wall to provide a sufficient support (see above). The blade should be horizontal and bedded approximately 75 mm into the brickwork.

18 When putlogs are used on existing buildings for tasks such as refurbishment or repointing, each putlog blade can be installed either with the flattened end located in a vertical joint (pert) or the horizontal bed in the brickwork.

1.3.5.15 Boarded lifts

Width

1 The recommended minimum width in accordance with EN 12811-1 is 600 mm.

Lift height

2 EN12811-1 requires a minimum headroom height of 1.75 m on working lifts.

3 Under TG20, the maximum lift height is 2.0 m for standard putlog and independent tied scaffolds.

4 Where pedestrian access is required under the first lift, a 2.7 m base lift is permissible, provided that the scaffold is tied at the first level to alternate standards.

Transom (or putlog) spacing

5 The spacing of transoms or putlogs for boarded lifts will be determined by the standard or grade of scaffold board used and the load class of scaffold required.

6 The spacing between transoms or putlogs must not result in an unsupported length of board greater than that specified in Table 8 of TG20.

Loading

7 It is essential that scaffolds are not loaded beyond their maximum design load. Materials should be distributed as evenly as possible with heavy items, such as piles of bricks, positioned adjacent to standards. See Table 1 of TG20.

1.3.5.16 Non-boarded lifts

1 For scaffolds up to 15 metres high, transoms and putlogs used for non-boarded lifts should be fixed at every pair of standards, including the pair at each end of the scaffold, to either the standards with right-angled couplers, or to the ledgers with putlog couplers, and should be within 300 mm of the ledger and standard connection. For scaffolds higher than 15 metres, specialist guidance should be sought.

2 Note that SG4 requires all platform boards to be correctly supported as part of the safe system of work. Transoms provided as temporary board supports on non-boarded lifts must be left in place for alterations and dismantling.

1.3.5.17 Ledger bracing

1 Ledger bracing on *'standard scaffolds'* should usually be fixed to alternate pairs of standards to all lifts.

2 EN 12811-1 requires unimpeded access along the working lift. For this to be achieved in tube and fittings, reference needs to be made to TG20 Volume 2 and the structure classed as a *'special scaffold'.*

3 Ledger bracing should be fitted on alternate pairs of standards, except where the width of the bays is 1.5 m or less. Then they may be fitted on every third pair.

4 Ledger bracing should be fitted:

(a) to ledgers or standards using load-bearing fittings, which will have a minimum slip resistance of 5 Kn

(b) to the full height of the scaffold

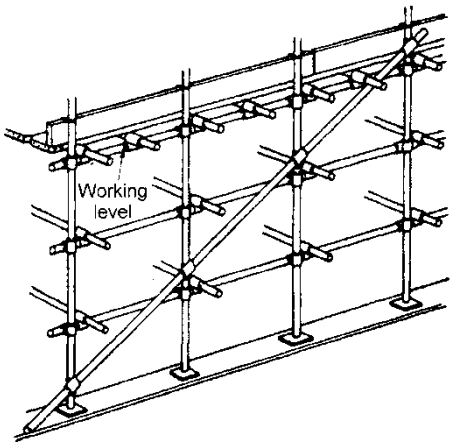
(c) to start at base plate level (unless a pavement lift is required).

1.3.5.18 Facade bracing

1 Facade bracing runs parallel to the face of the building or structure and is also known as longitudinal, face or sway bracing. It is fixed to the outside standards for independent tied scaffolds.

2 Facade braces can be attached to transoms with right angle couplers at every lift, or to every standard using swivel couplers.

3 Facade bracing must be fixed to every sixth bay and set at an angle between 35-55 degrees. All joints should be made with sleeve couplers. However, when joint pins are used, a splicing tube should overlap by a minimum of 300 mm and be fixed with two swivel couplers on either side of the joint.



4 There are three standard facade bracing patterns.

(a) Zigzag across two bays (ledger braced).

(b) Continuous for wider facades.

(c) Zigzag across one bay only*.

***Note that plan bracing is required for this form of facade bracing (see Plan bracing below).**

1.3.5.19 Plan bracing

1 Plan bracing is required horizontally across the scaffold on all standard scaffolds taller than 8 m where the facade bracing is fixed across one bay only (see Facade bracing above).

2 Plan braces are fixed to the standards with right angle couplers, except where headroom is critical, when it may be fixed with swivels to the ledgers.

3 Plan bracing should be fitted every 8 m (four lifts) vertically and every 12th bay to correspond with the facade bracing.

4 *Greater detail on the fitting of plan bracing can be found in UK NASC guide TG20.*

1.3.5.20 Scaffold ties

1 A tie secures the scaffold to the supporting structure and is provided to resist the inward and outward movement of the scaffold and also to give some additional longitudinal stability.

2 Ties are generally designated as 'moveable' or 'non-moveable', the terminology being self-explanatory. Where possible, ties should be left undisturbed until the scaffold is dismantled. Where it is necessary for ties to be removed, even for a short period, the scaffold will be less stable and the fitting of additional temporary ties will be necessary unless the initial tie-pattern was designed to allow for the temporary removal of some ties.

3 Ties must not be removed by anyone other than a competent scaffolder or someone who is under the direct supervision of one. The removal of scaffold ties must be carried out in compliance with a method statement.

4 Scaffolds fitted with debris netting, sheeting and tarpaulins will be subjected to extra loading due to wind pressure and will require the scaffold designer to increase the number and frequency of ties, or the tie capacity.

5 Ties often pass through openings into the building, although alternative methods of tying can be employed.

6 Generally, each tie must have a minimum tensile or compressive capacity of 6.1 kN, although designers can consider heavy duty ties at 12.2 kN and light duty ties at 3.5 kN.

1.3.5.21 Layout and frequency of ties

1 Ties should be evenly distributed over the scaffold, both horizontally and vertically with a vertical spacing of no more than 4 m.

2 TG20 offers alternative tie patterns. If these minimum tie patterns cannot be achieved, the pattern will need to be calculated by an engineer. At least 50% of ties must be fixed to ledger braced standards.

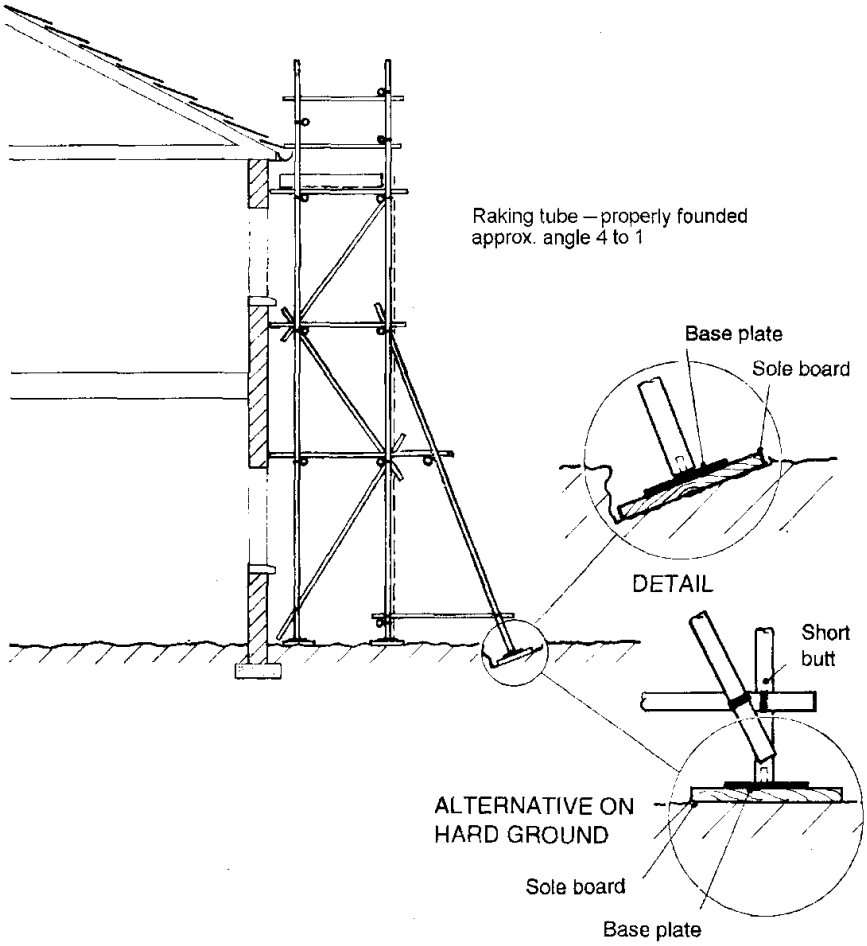
3 The density of ties will be decided by the scaffold designer based on all the factors that have the potential to affect the loading on the scaffold.

4 *Full details of tying scaffolds are included in UK NASC guide TG20.*

1.3.5.22 Rakers

1 For lower level and domestic scaffolds, where it is not possible to install normal ties, the stability of a scaffold can be achieved by the use of rakers. A single, unjointed raking tube not more than 6.4 m in length may be coupled at the top to the ledger at the second lift, extending

at an angle not greater than 75° to the horizontal (4:1). The foot of the raking tube must be well founded and must always be tied back to the main scaffold. This arrangement can be used in place of a single tie.



Components fitted during the erection of the scaffold to comply with the guidance given in NASC publication SG4:05, have been omitted for clarity.

1.3.5.23 Freestanding access scaffolds

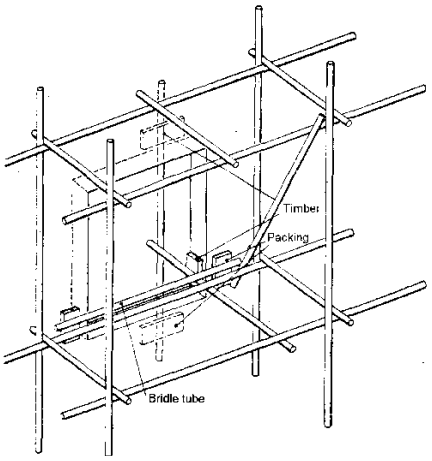
1 Freestanding access scaffolds for modern methods of construction, such as timber frame structures, require calculations to be made for stability. These scaffolds would therefore be classed as *special scaffolds.*

2 Engineers can utilise alternative methods of achieving stability, such as buttressing, kentledge (ballast or counterweights), guys and ground anchors. Returns around corners, access towers and loading bays can also be taken into account by engineers when calculating stability.

3 *For further information see UK NASC safety guidance SG28 Safe systems of work for scaffolding associated with timber frame construction.*

1.3.5.24 Types of tie

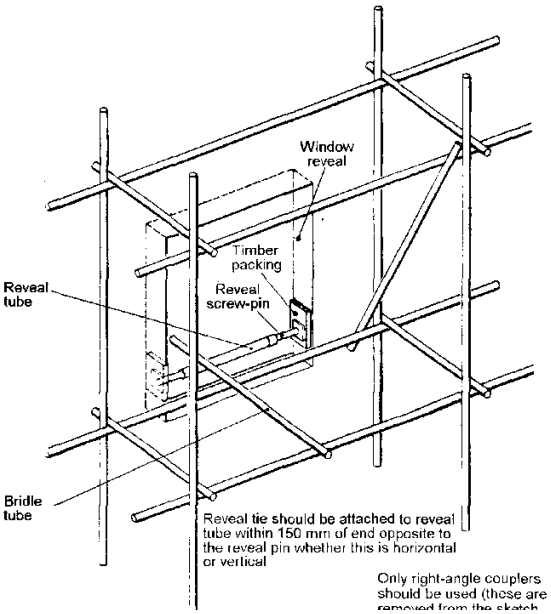
The following methods may be employed.



1 **Through tie:** This type of tie relies on a tube, usually placed vertically inside an opening or window in a building. The tie tube should preferably rest on the sill, as close to one edge of the opening as possible.

2 Through ties should be placed as close as possible to the window reveal and secured with right-angled couplers.

3 **Reveal tie:** In cases where it is not possible to open or leave windows open or where it is impractical to fit other types of tie, a reveal tube may be wedged or jacked tight between the opposing faces of the window opening. Timber packing should be thin (10 mm) to reduce the possibility of timber shrinkage and approximately 75 mm x 75 mm. It should be checked frequently for tightness.

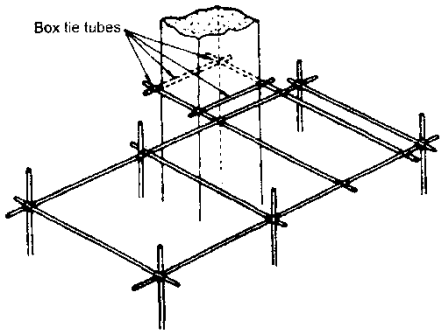


4 A bridle tube should then be attached to the reveal tube with a right-angle coupler, within 150 mm of end opposite to the reveal pin (whether this is horizontal or vertical). The bridle tube is usually fixed to the scaffold in two places with right-angle couplers although other satisfactory arrangement may be used.

5 It should be noted that reveal ties generally depend entirely upon friction for their integrity and therefore:

(a) they should be checked frequently for tightness

(b) their use is limited to a maximum of 50%. Refer to UK NASC guidance TG20.



Box tie

6 **Box tie:** This forms an assembly of tubes and couplers around columns or other parts of a building. It should preferably be at the level of the scaffold lift and joined to both inside and outside ledgers or uprights.

7 **Lip ties:** An alternative form of tie, where box ties cannot be used; these take the form of an 'L' shaped arrangement of tubes and couplers which hook the scaffold behind elements of the building, such as parapets. Lip ties do not resist inward or sway movement of the scaffold; adjacent butting and sway transoms should be used to prevent this.

1.3.5.25 Cast-in or drilled-in anchorages

1 A selection of screwed plates, eyes, sockets and nuts are available for setting into concrete during pouring. These may be used as anchorages.

2 There is a wide range of drilled-in anchorages available, also known as masonry anchors.

3 The accepted industry standard for the selection, use and testing of masonry anchors is UK NASC technical guidance TG4:04 'Anchorage Systems for Scaffolding'.

4 Masonry anchors must be used in accordance with the manufacturer's instructions. Scaffolders who install these anchors should be trained in accordance with those instructions.

5 TG4 requires two levels of testing.

(a) Preliminary testing, wherever there is doubt about the base materials to help select the correct type of anchor.

(b) Proof testing, to check the installation and that the required tensile loads can be achieved. A minimum of three ties must be tested and 5% (1 in 20) thereafter. Ties must be tested to 1.5 times the required tensile load e.g. 6.1 kN tie requires a 9.2 kN tensile test load.

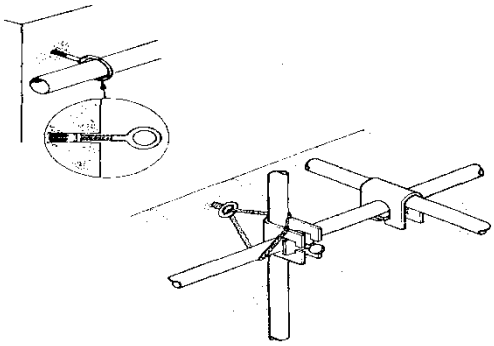
6 If any anchor fails the test the cause must be investigated and the test frequency increased to 10%. A test report should be provided with the test results as part of the handover process.

7 Ring bolts are produced in two sizes.

(a) A ring of 50-55 mm internal diameter, through which a scaffold tube could be passed.

(b) A smaller ring for use with wire or steel banding ties, which should be turned around a node point of the scaffold or otherwise prevented from slipping.

8 The strength and pull-out capabilities of all cast or drilled anchorages must be confirmed before use.



Ring bolts

1.3.5.26 Wire or steel banding ties

1 Scaffolding may be secured to the building using the small ring bolt described previously, with 6 mm wire rope threaded through the ring and around a scaffolding member with a minimum of three turns. Steel banding of the equivalent strength may be used for the same purpose.

2 This method does not prevent movement inwards; butting or sway transoms should be used to prevent this.

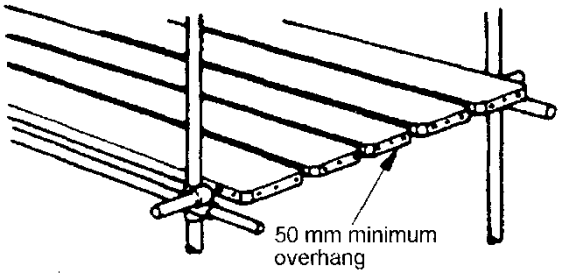
3 Some architectural features of a structure may be of sufficient strength for attaching wire or banding ties although they must not be used until their suitability has been verified, by testing if necessary. If there is any doubt, they must not be used and an alternative method of tying must be found. Rainwater guttering and soil pipes must never be used for the attachment of ties.

4 When viewed in plan, tie tubes or banding ties should be set at right-angles to the building.

5 *Information regarding design loads for ties can be obtained from UK NASC guidance TG4:04.*

1.3.5.27 Scaffold boards

1 The minimum amount by which any scaffold board should overhang any putlog or transom must be no less than 50 mm.



2 The maximum overhang varies with the thickness of the scaffold board used. For further information, see Table 8 of TG20.

3 All scaffold boards which comply with BS 2482:2009 should:

(a) be free from splits, shakes, excessive knots, paint, oil or concrete

(b) be usually 225 mm wide and not less than 220 mm

(c) not be painted or otherwise treated to conceal defects

(d) be banded or nail-plated at ends

(e) be supported by putlogs or transoms at the appropriate spacings

(f) overhang at least 50 mm but not more than four times the thickness of the board, unless secured from tipping

(g) be guarded against the wind causing the boards to lift

(h) be secured to prevent movement if short boards less than 2.13 m are used.

1.3.5.28 Working platforms and decking

1 All working platforms and decking should be closely boarded to their full width and free from tripping hazards. Where reasonably practicable, overlapping boards should be avoided. Where an overlap is unavoidable, the lapped board should be secured to prevent movement and, if necessary, bevelled pieces should be installed.

2 The platform should be of an adequate width for the work to be carried out and safe passage of people. The suggested widths as shown in Table 7 of TG20 may be taken as current industry guidance.

3 When material is deposited on a platform, a clear passage must be maintained for access.

4 The space between the inner edge of a working platform and the adjacent structure should be kept as small as possible to prevent falls. However, there can be circumstances in which this gap has to be left wider. This is usually due to the nature of the work being carried out, for example to enable the craning-in of sections of curtain wall between the scaffold and the building under construction or where there is only primary steelwork inside the scaffold.

5 In such circumstances, suitable compensatory measures must be taken if there is a risk of people falling, or people being struck by falling objects. For example:

(a) use of inner guard-rails and toe-boards

(b) segregation of the areas below the scaffold and post warning signs

(c) areas of the scaffold designated as 'danger areas', where access is restricted by guard-rails and warning signs

(d) use of personal fall protection equipment (harnesses).

6 The space between scaffolding boards should be kept as small as possible and in any case should not exceed 25 mm.

7 Boards should be securely fixed and present no risk to any person below.

1.3.5.29 Gangways and runs

1 All gangways and runs should be:

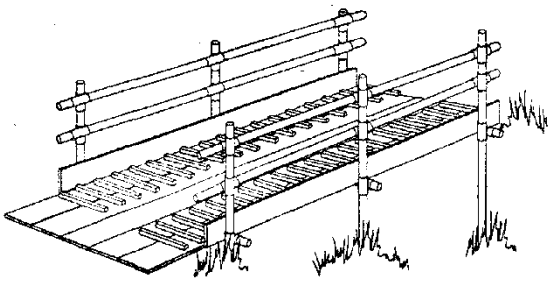
(a) 600 mm wide (3 boards) if used for harrowing and the passage of materials

(b) preferably horizontal, but where this is not possible they may slope up to a maximum gradient of 20% (1 unit vertical to 5 units horizontal) without the requirement for stepping laths.

2 If the gradient is unavoidably over 20%, or if the conditions are slippery, stepping laths must be provided. Whilst there is no recommended distance between stepping laths, a 300 mm separation is suggested. Stepping laths may incorporate a maximum central gap of 100 mm for barrow wheels.

1.3.5.30 Guard-rails

1 Guard-rails are just one of the options a Contractor may consider as a 'suitable and sufficient measure' or means of protection when a person could fall any distance liable to cause them personal injury. As guard-rails are generally a collective measure, by offering protection to everyone, they are to be preferred to other measures that only protect individuals, such as safety harnesses.



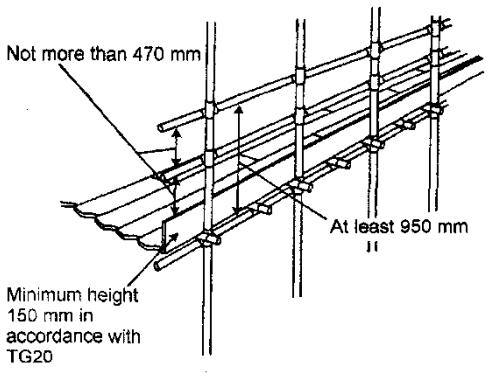
2 A guard-rail must be 950 mm above the edge (or above a working platform) from which any person is liable to fall.

3 A second guard-rail (or mid guard-rail) may be placed approximately halfway between the top edge of the toe-board and the top guard-rail, so that there is no gap larger than 470 mm between the guard-rails or between the mid guard-rail and the toe-board.

4 All guard-rails must be fixed inside the standards with right-angle couplers to each standard.

5 Brick guards should always be installed where there is a possibility of materials toppling from working platforms. If using the common type of brick guard, mid guard-rails should also be fitted.

6 There will be occasions when it is possible to fall from the working platform into the structure under construction. In these cases, it will be necessary to consider installing guard-rails to the inner edge of working platforms or using other fall prevention/arrest measures.



1.3.5.31 Temporary removal of guard-rails

1 Where it is necessary to load out scaffolds with bulk materials and so on, ideally there will be a purpose-built loading bay with a lifting safety gate or similar. Where this is not the case, it is permissible to temporarily remove guard-rails and toe-boards, provided that;

(a) unless other work is stopped, other equally effective fall prevention/arrest measures are put in place (such as safety harnesses) whilst there is an exposed edge

(b) once the loading has been completed, the guard-rails and toe-boards are replaced immediately.

2 The removal and refitting of guard-rails and toe-boards must only be carried out by a competent scaffolder or a trainee who is under the direct supervision of a competent scaffolder.

1.3.5.32 Toe-boards

1 Toe-boards must be:

(a) fitted in conjunction with all guard-rails

(b) a minimum height of 150 mm in accordance with TG20

(c) fixed inside the standard, at a minimum of two positions.

1.3.5.33 Access to scaffolds

1 Contractors are required to specify the use of existing structures as a means of access to height, for example lifts or a permanent staircase, in preference to temporary measures such as ladders.

2 Whilst ladders have been the commonly used means of access to scaffolds, the use of other, safer means of access, such as stair towers, should now be considered in preference.

3 EN 12811 recommends that where extensive work is carried out, stairways should be provided for access, and for taller scaffolds consideration should be given to the use of a passenger hoist.

4 ***Note:*** *Where passenger hoists are used, then additional non-mechanical access must also be provided in case of breakdown or emergencies.*

5 The UK NASC recommends the following hierarchy of access from TG20.

(a) Stairways.

(b) Ladder access bays with single lift ladders (to reduce the potential fall distance).

(c) Ladder access bays with multiple lift ladders.

(d) Internal ladder access with protected ladder traps.

(e) External ladder using a safety gate.

6 Where a ladder protrudes through a working platform (known as a ladder trap), the remaining width of the platform must be at least 450 mm (2 boards wide).

1.3.5.34 Ladder access

1 Straight ladders used for access to a scaffold must:

(a) be manufactured to EN 131

(b) not be defective in any way

(c) not be painted or treated in any way that might hide defects

(d) be placed on a firm footing, with each stile equally supported

(e) be so positioned that there is sufficient space at each rung to give an adequate foothold

(f) be positioned approximately at an angle of 75°, that is: 1 measure horizontal to 4 measures vertical

(g) be secured at the top using square lashings or a proprietary ladder clamp. For longer ladders, additional ladder supports (stays) can be used to prevent the ladder deflecting when used. The stay must not obstruct the rung of the ladder

(h) extend approximately 1 m above the working platform, unless there is another adequate handhold

(i) be provided with suitable rest platforms if rising more than 9 m

(j) be the 'right way up' (tie wires or bars positioned under the rungs).

Note: *Shorter/Ladders, which provide access to only one lift, are recommended.*

2 Where scaffolds are designed with internal ladders, working platforms must be provided with access holes for each ladder. Such access holes should be at least 450 mm wide (across the platform) and not less than 600 mm in the other direction. The access hole should be protected with a ladder trapdoor as good practice.

1.3.5.35 Landing platforms

1 Landing platforms should:

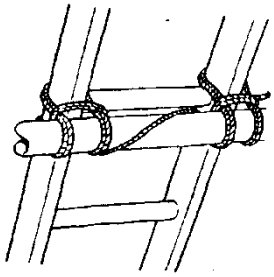
(a) be fitted with guard-rails and toe-boards, as previously detailed

(b) not be used for the storage of materials

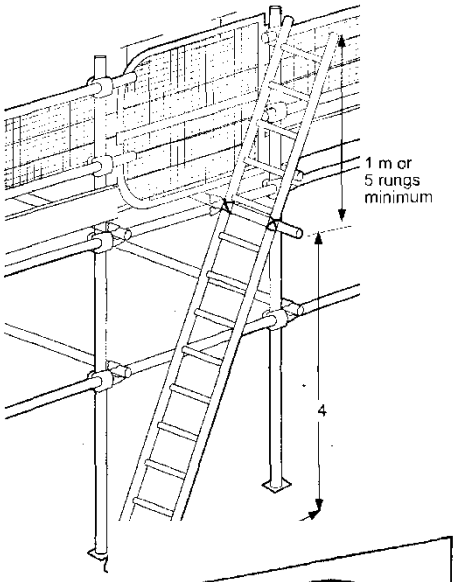
(c) be installed at a maximum vertical height of 9 metres and multiples thereof

(d) be equipped with access holes of similar dimensions to working platforms as detailed above.

2 Lateral gaps in guard-rails and toe-boards for access and egress must be kept to a minimum and protected with a ladder safety gate as good practice.



Square lashing



External

1.3.5.36 Incomplete scaffolds

1 Where the erection of a scaffold has not been completed, physical measures must be taken to restrict access to the scaffold, e.g. remove or board over the access ladder(s) and warn people of the fact that the scaffold is not safe to use. The method of warning will usually be 'scaffold incomplete' signs at each point of access.

2 On larger scaffolds that are substantially complete, it may only be necessary to deny access to the part of the scaffold that remains incomplete, providing:

(a) the part of the scaffold that is complete is safe to occupy

(b) all access points from the completed part of the scaffold, beyond which the scaffold is incomplete, are clearly defined by warning signs and access to the incomplete part of the scaffold is effectively prevented with guard-rails or other barriers.

1.3.5.37 Loading of scaffolds

1 Any working platform on a scaffold should not be so loaded that it gives rise to a danger of collapse or to any deformation which could affect its safe use.

2 Any scaffold, or part of, that is to be loaded by mechanical means (e.g. crane or fork lift truck), must be specially designed and calculated as a loading bay or tower.

3 The scaffold should be checked periodically to ensure that the loads are within the permissible limits. Refer to Table 7 of TG20.

1.3.5.38 Loads on scaffold fittings

1 EN 74 Part 1 contains specifications for scaffolding couplers, including the 'slip-load' of scaffold fittings. Load-bearing fittings such as right-angle and swivel couplers have much higher slip values than non-load-bearing items such as putlog clips.

2 Other considerations are:

(a) scaffold fittings must not be oily or greasy. This will cause reduced frictional resistance between the tube and the fitting

(b) the correct spanner or podger must be used, and used in the correct manner, otherwise

the screw threads may be overstressed

(c) scaffold fittings and tubes must be free from corrosion or other obvious defects.

1.3.5.39 Hoisting of materials

1 When working at heights, various items of lifting equipment or ancillary lifting equipment will usually be required. These may include block and tackle, motorised winches, wire ropes, chains or slings.

2 Goods and passenger hoists should not be tied to the scaffold unless specially designed and calculated for the purpose.

1.3.5.40 Inspection of scaffolds

1 All scaffolds and working platforms (together with all other protective measures) are 'work equipment' and so the inspection requirements of these Regulations apply:

2 *'Every Contractor shall ensure that where the safety of work equipment depends on how it is installed or assembled, it is not used after installation or assembly in any position unless it has been inspected in that position.'*

3 This clearly applies to all scaffolds including mobile and static tower scaffolds.

4 The inspection must be carried out by a competent person. A Contractor may wish to have a commercial arrangement with a scaffolding contractor in order to carry this out.

5 There is a further requirement in that every Contractor must ensure that work equipment exposed to conditions that may cause any deterioration liable to result in dangerous situations is inspected at suitable intervals, and also when any exceptional circumstances that are liable to jeopardise the safety of the work equipment have occurred.

6 In addition, Contractors must ensure that working platforms used for construction and from which a person could fall more than 2 metres are not used in any position unless they have been inspected in that position within the previous seven days.

1.3.5.41 Inspection of places of work at height

1 An additional requirement as regards inspection (or checking) is that every Contractor must ensure, so far as it is reasonably practicable, that every surface, parapet, permanent rail or other such fall protection measure of every place of work at height is checked before each use.

1.3.5.42 Reports

1 Where an inspection has been carried out, a written report of the findings of the inspection must be made before the end of the working period.

2 The person who prepares the written report must provide a copy within 24 hours to the person on whose behalf the inspection was carried out. The report, or a copy of it, must be kept on the site where the inspection was carried out until the construction work is completed, and then kept at the company offices for three months.

3 Contractors are free to design their own inspection report forms or purchase pads of them from commercial suppliers.

4 In either case the following details must be included:

(a) The name and address of the person for whom the inspection was carried out.

(b) The location of the work equipment inspected.

(c) A description of the work equipment inspected.

(d) The date and time of the inspection.

(e) Details of any matter identified that could give rise to a risk to the health or safety of any person.

(f) Details of any action taken as a result of any matter identified in 5.

(g) Details of any further actions considered necessary.

(h) The name and position of the person making the report.

5 Where someone has carried out an inspection of a scaffold and believes that it is not safe to use, they must inform the person for whom the inspection has been carried out that the scaffold is unsafe. The scaffold must not then be used until it has been made safe.

6 An example of an inspection report form is included in Appendix 7 of this module.

1.3.5.43 Use of scaffolds by other employees

1 Scaffolds erected for one Contractor may (provided that permission has been sought and given) be used by employees of another company, providing that the second Contractor is satisfied that the scaffold is safe for its intended use and conforms to these Regulations.

1.3.5.44 Protection of the public

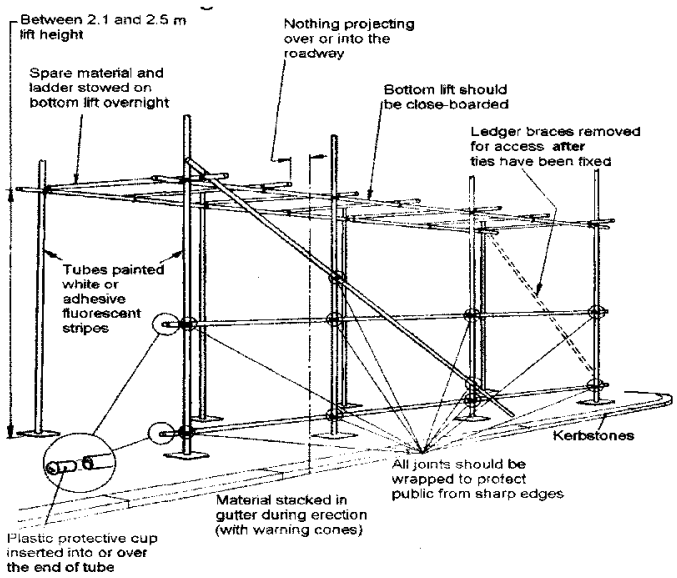
1 Protection of the public and other persons against falling materials should be provided by the use of nets, brick guards, toe-boards and protective fans, etc.

1.3.5.45 Scaffold in a public place

1 These can cause particular problems to people with physical and visual disabilities, unless adequate steps are taken to reduce 'contact' hazards with such items as tube ends and threads on fittings.

2 This can usually be achieved by cladding the run of standards or binding the scaffold poles and fittings with suitable padding and/or brightly coloured bunting and tape.

3 All joints should be wrapped to protect the public and other persons from sharp edges, and plastic protective cups should be placed in or over the ends of tubes.



4 In most cases the scaffold will need to be designed to allow for ledger braces to be omitted at ground level so that members of the public can pass under the scaffold.

5 The bottom or 'pavement' lift of the scaffold should be at a height no greater than 2.7 m. The lift above pavement gantries must be fully close boarded, with a double layer of scaffold boards and a layer of impervious sheeting.

6 It is not sufficient to warn the public of the hazard just by placing safety signs on the, scaffold. Contractors must have acted to reduce the hazard as far as reasonably practicable.

7 To ensure the scaffold is not struck by vehicles, no part of it should be allowed to project into the roadway, unless appropriate measures are taken, such as traffic control or a road closure. The provision of lighting at night may also be necessary.

8 Supplementary lights should be installed on the scaffold where it has been erected in a place to which the public has access (whether pedestrians or vehicles), unless the level of 'background' lighting after dark is thought to be sufficient.

1.3.5.46 Handover certificates

1 Contractors may, in their own interests, require that scaffold handover certificates are issued by the scaffolding contractor.

2 Such certificates usually specify:

(a) that the scaffold is complete and complies with the requirements of relevant standards or guidance

(b) the maximum distributed loads which are permitted on the working lifts

(c) the guarding of working platforms

(d) that the bracing and ties are complete

(e) that inspection is required every seven days or following exposure to adverse weather conditions

(f) that the findings of the inspection should be recorded

(g) that the Contractor is responsible for their employees working on the scaffold

(h) that sheeting or netting is not to be fixed to the scaffold structure unless the scaffold has been specifically designed for it

(i) that unauthorised modifications or alterations are not to be made to the scaffold.

A specimen handover certificate is shown in Appendix 9.

Construction Site Safety
1.3.5 Appendix 1

Widths of access scaffold platforms

Table 7 from TG20:08

Purpose (1)	Minimum clear width (4) mm	Minimum number of 225 mm nominal width boards mm	Effective width of boarded platform for loading calculations (2) mm
Working platforms for men without materials or only for the passage of materials	500	3 boards	705
For men and materials provided there is 430 mm left clear for the passage of men or 600 mm if barrows are used	800	4 boards 4+1 boards 4+2 boards	930 1205 1430
For carrying trestles or other similar higher platforms	1,050	5 boards 5+1 boards 5+2 boards	1,155 1,435 1,655
For use in dressing or roughly shaping stone (3)	1,300	6 boards 7 boards	1,350 1605

Notes:

1 Where internal ladders are incorporated the minimum width may be 430 mm, i.e. two boards

2 Effective width as defined in EN 12811-1 includes a 30 mm allowance for toe-board

3 These scaffolds should be specially designed

4 For hop-up platforms, a minimum width of 450 mm is required

Construction Site Safety
1.3.5 Appendix 2

Maximum and target span of scaffold boards

Table 8 from TG20:08

Board specification	Thickness		Transom spacing (span of board)			Board overhang	
			Target span		Maximum span		
	Nominal	Tolerance	Span	Tolerance		Minimum	Maximum
	mm	mm	mm	mm	mm	mm	mm
BS 2482							
38-1.2 m	38	±2	1,200	+100	ns	50	150
38-1.5m(1)	38	±2	1,500	+100	ns	50	150
BS 2482	50	±3	ns	ns	2,600	50	200
	63	±3	ns	ns	3,250	50	250

Notes:

(1) Board properties verified by machine stress grading

ns means 'not stated' as calculation indicates the stress exceeds the allowable limit on the scaffold

1.3.5 Appendix 3

Load classes for access and working scaffolds made from tube and fittings

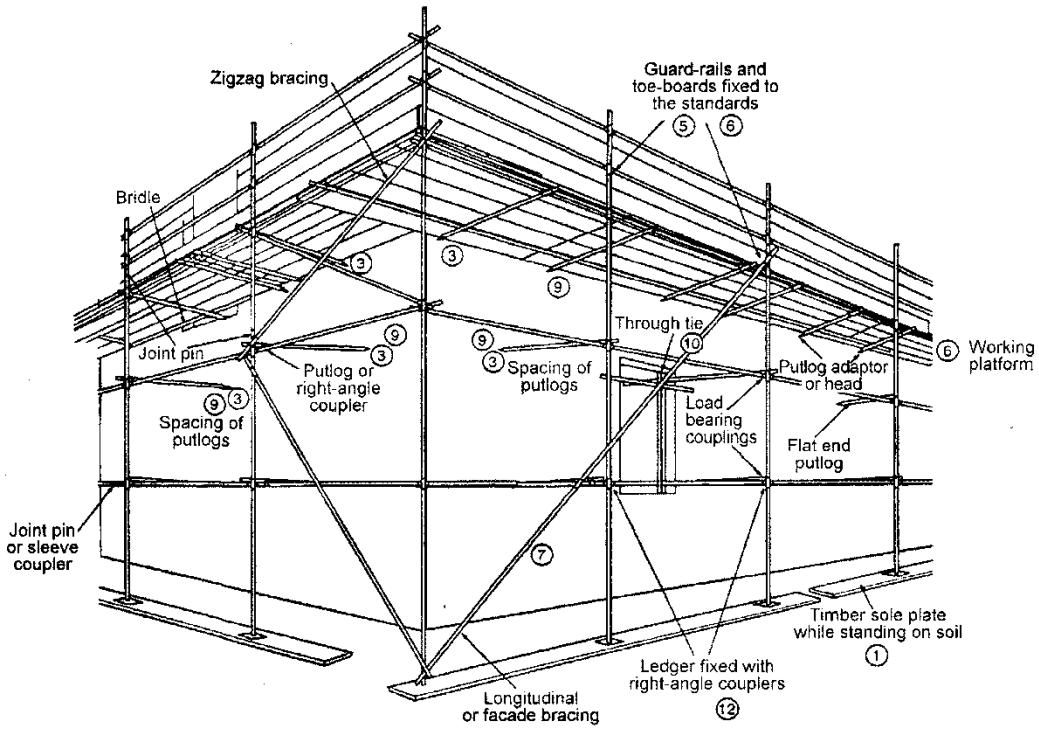
Table 1 from TG20:08 (Extract)

Load class	Duty	Likely use of platform	Max. bay length m	Max. spacing board transoms mm	Max. number of boards
1	Inspection and very light duty	Inspection, painting, stone cleaning, light cleaning and access	2.7	1,200	3
2	Light duty	Plastering, painting, stone cleaning, glazing and pointing	2.4	1,200	4
3	General purpose	General building work including brickwork, window and mullion fixing, rendering and plastering	2.1	1,200	5 4+1 4+2 5+1 5+2
4	Heavy duty	Masonry work, concrete block work, and very heavy cladding	1.8	900	54+1 4+2 5+1 5+2

1 The above table is an extract of Table 1 from UK NASC Guidance Notes TG20:08. It is reproduced only for the purpose of highlighting to readers the different load classes to which scaffolds may be erected and examples of work activities for which each class might be used.

Construction Site Safety
1.3.5 Appendix 4

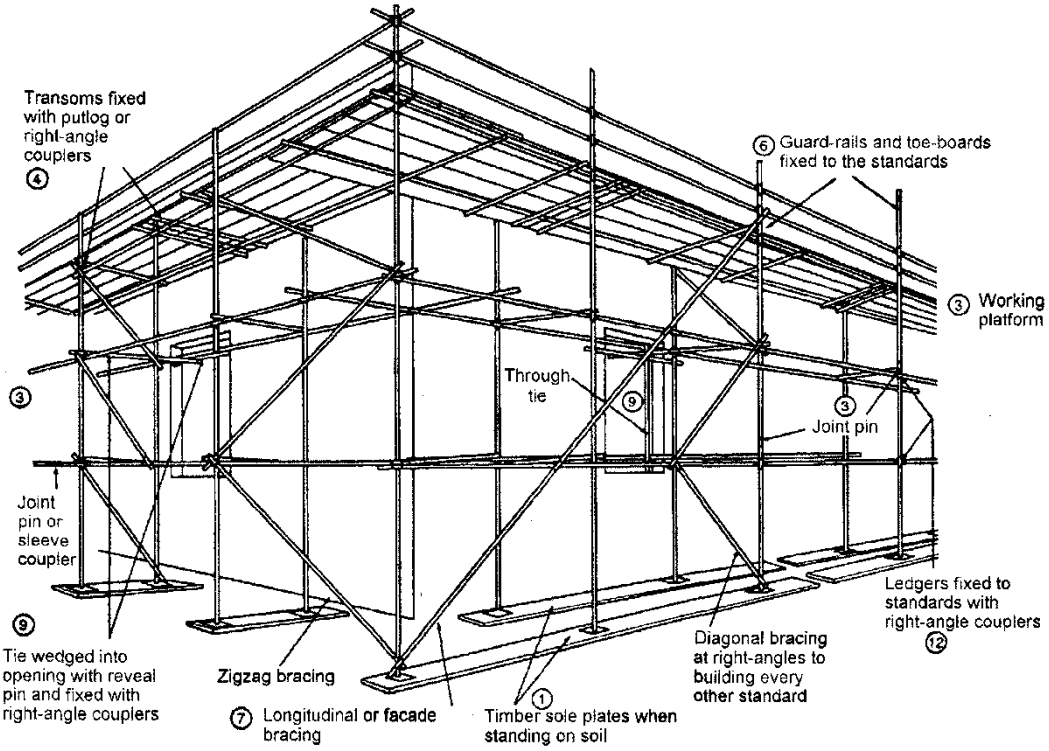
Putlog scaffold



Safety checklist	
Check from the ground:	***Check from inside building or on the scaffold:***
1. Base soundness; adequate spread of load; particularly as there is only one line of standards, avoidance of pavement lights, manhole covers, etc.; no nearby excavation	*9.* Spade end of putlog laid horizontally where possible, fully home (75 mm) in brickwork (bed joint)
2. Line of standards and ledgers. Standards vertical	10. Ties, particularly on lift below working platform or, in early stages, rakers on alternate standards. Special attention to 'through' ties on large flank ends without windows. Load-bearing couplers to be used
3. Spacing of putlogs	11. Platform loading (not overloaded)
4. Working platform. Check line and even support of boards; overhang; lapped boards and fillets	12. Security and correct use of all fittings (couplers), particularly on transoms and bracing
5. Guard-rails and toe-boards	13. Condition of tubes and fittings
6. Security of boards, toe-boards and guard-rails	14. Damage from falling material
7. Longitudinal bracing	15. Security of stacked materials
8. Means of access	

Construction Site Safety 1.3.5
Appendix 5

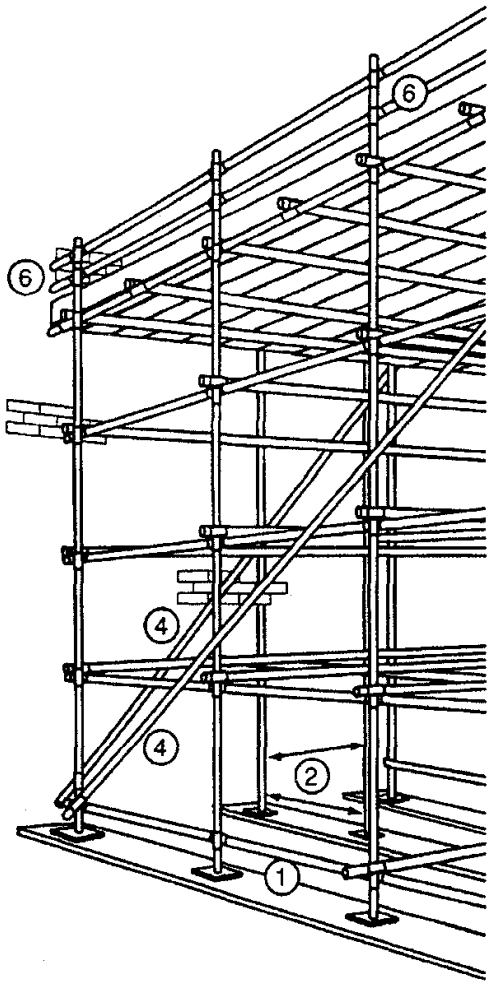
Independent tied scaffold



Safety checklist	
Check from the ground:	***Check from the scaffold:***
1. Base soundness; adequate spread of load; avoidance of pavement lights, manhole covers, etc.; no nearby excavation	*9.* Ties, particularly on lift below working platform or, in early stages, rakers on alternate standards. Special attention to 'through' ties on large flank ends without windows. Load-bearing couplers to be used
2. Line of standards and ledgers; standards vertical	10. Special loadings by protective fans, wind sails, etc.; anchorage and spread of load
3. Staggering of joints (vertical and horizontal)	11. Security of boards, toe-boards and guard-rails
4. Spacing of transoms	12. Security and correct use of all fittings (couplers), particularly on transoms and bracing
5. Working platform. Check line and even support of boards; overhang; lapped boards and fillets	13. Condition of tubes and fittings
6. Security of guard-rails and toe-boards	14. Damage by loads swinging from cranes or by falling material
7. Longitudinal, ledger and plan bracing	15. Overloading
8. Means of access	16. Security of stacked materials

Construction Site Safety
1.3.5 Appendix 6

Birdcage scaffold



Safety checklist	
1.	Base
2.	Line of standards and ledgers
3.	Line and spacing of transoms
4.	Diagonal bracing (in both directions)
5.	Plan bracing
6.	Security of boards, toe-boards and guardrails. Maximum gap at wall
7.	Security and correct use of couplers and fittings
8.	Condition of tube and fittings
9.	Even spread of load on platform
10	Means of access
11.	Overloading
12.	Security of stacked materials
With birdcage scaffolds, the floor of the building has to carry the full weight of the scaffold and its load. Sole plates are therefore necessary to help distribute the load as widely as possible - and they should always be set at right angles to the underlying floor beams or joists.	

Construction Site Safety 1.3.5
Appendix 7

Report of inspection on *scaffolding, *work equipment or working platform

*(*delete as appropriate)*

Inspection carried out on behalf of: .....

Inspection carried out by (name and position): .....

Address of site (or location of work equipment): .....

Date and time of inspection	Description of place of work, or part inspected	Details of any matter identified giving rise to the health and safety of any person	Details of any action taken as a result of any matter identified	Details of any further action required

Construction Site Safety
1.3.5 Appendix 8

Short checklist

Check at each inspection that your scaffold does not have these faults:

Footings	1	2	3	4
Soft and uneven				
No base plates				
No sole boards				
Undermined				

Bracing (facade and ledger)	1	2	3	4
Some missing				
Loose				
Wrong fittings				

Ties	1	2	3	4
Some missing				
Loose				

Standards	1	2	3	4
Not plumb				
Jointed at same height				
Wrong spacing				
Damaged				

Putlogs and transoms	1	2	3	4
Loose,				
Wrongly spaced				
Wrongly supported				

Boarding	1	2	3	4
Bad boards				
Trap boards				
Incomplete boarding				
Insufficient supports				

Ledgers	1	2	3	4
Loose				
Not level				
Joint in same bays				
Damaged				

Couplings	1	2	3	4
Wrong fitting				
No check couplers				
Loose				
Damaged				

Guard-rails and toe-boards	1	2	3	4
Loose				
Wrong height				
Some missing				

Bridles	1	2	3	4
Weak support				
Wrong spacing				
Wrong couplings				

Ladders	1	2	3	4
Not tied				
Damaged				
Insufficient length				

Key: 1 = good, 2 = average, 3 = poor, 4 = N/A

Construction Site Safety
1.3.5 Appendix 9

Specimen handover certificate

(This is a type of handing over certificate which could be used.)

SCAFFOLDING - HANDING OVER CERTIFICATE

To (Contractor): ..... Date: .....

Site: ..... Time: .....

Description of scaffold or section of scaffold handed over: .....

.....

.....

Drawing No: .....
(where applicable)

Scaffolding as described above has now been completed and complies with current standards. It is structurally sound and should only be used and loaded in accordance with our Quotation No:

(.....)

a) Use only for:.....

b) Loading to be: ..... working lifts with distributed

Load of: ....(**kN/m2** (**lb/ft2**) per lift)

The detailed requirements of the Regulations with regard to guard-rails - working platforms - toe-boards - bracing and ties have been complied with.

In order to comply with the Regulations, this scaffold must be inspected before being taken into use for the first time, at regular intervals not exceeding 7 days since the last inspection, after any event likely to have jeopardised the safety of the scaffold and after any substantial addition, dismantling or other alteration. Particulars of each inspection must be recorded in a Report of Inspection.

This scaffold has / has not (delete as appropriate) been designed to take tarpaulin sheets (or other windsails).

Scaffold Contractor: .....

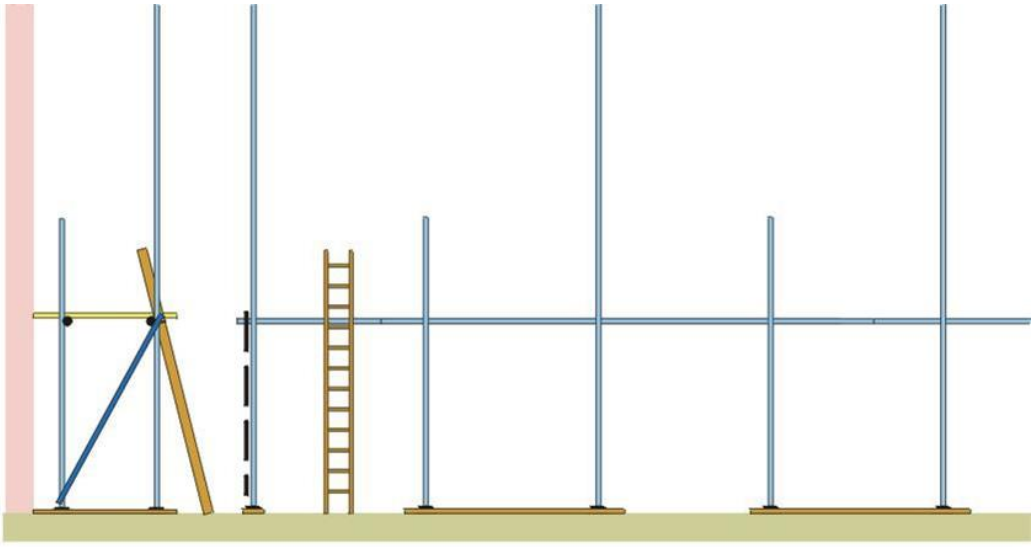
Depot: .....

Certificate received on behalf of the Contractor: .....

Construction Site Safety
1.3.5 Appendix 10

Safe Method of Erection:

1 Ladders should be incorporated as early as possible and removed as late as possible to avoid the need to climb the structure.



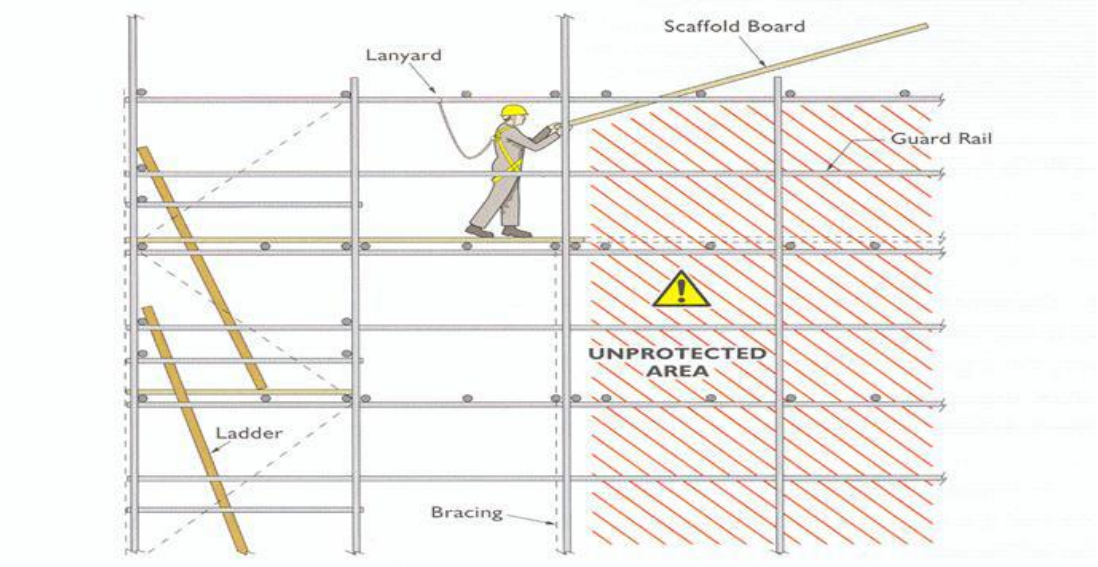
Scaffold constructed from ground level

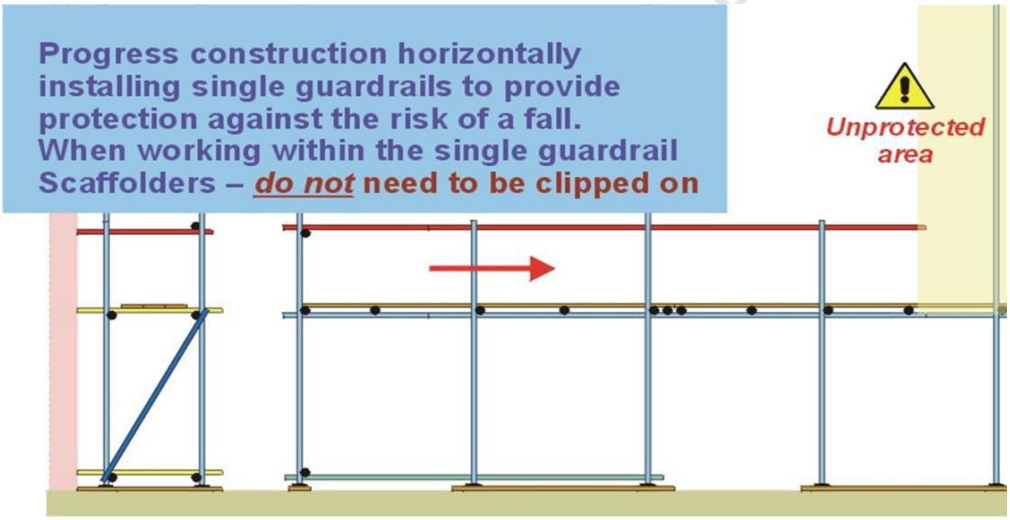
Note - Ladders must always be footed or tied before climbing

2 When accessing first lift, Scaffolder's must first install a single guardrail to all sides where there is a risk of a fall.

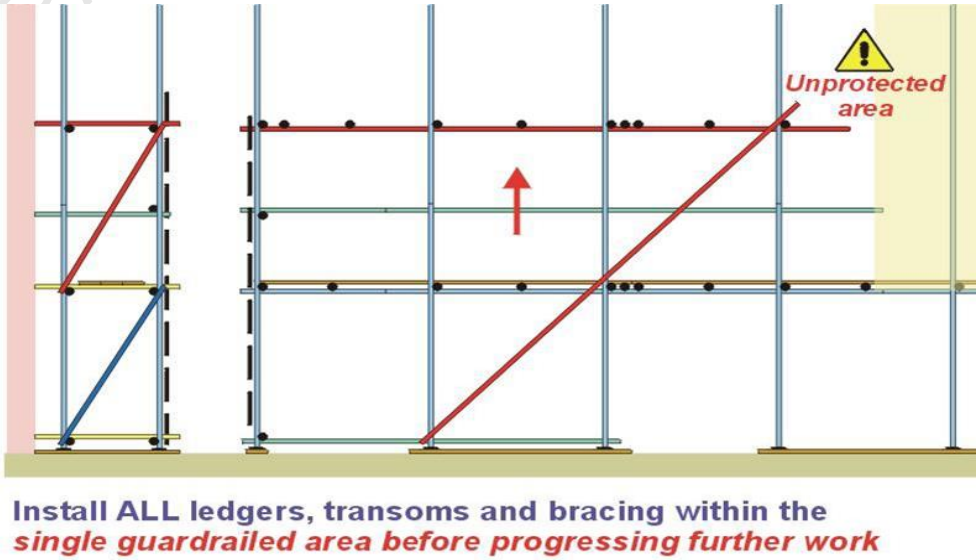
3 When erecting, work should always progress away from the ladder bay.

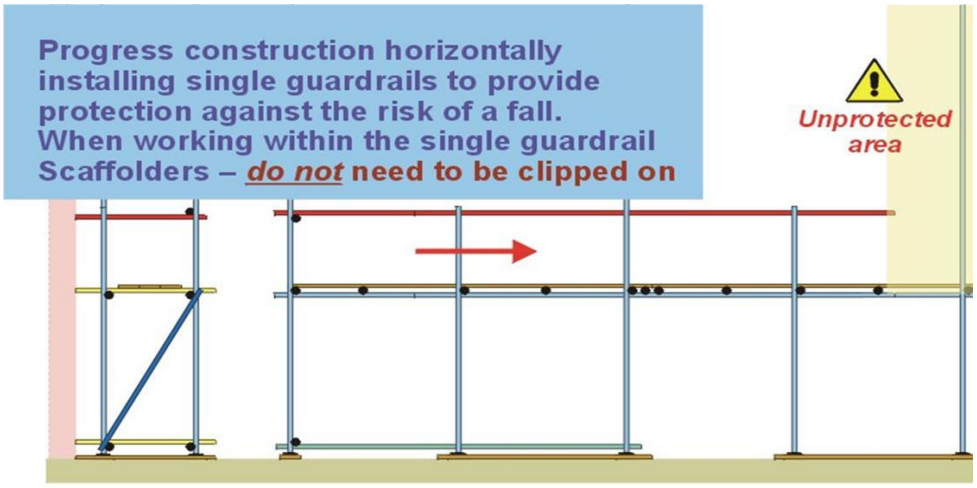
4 When dismantling, work should always progress back towards the ladder bay.



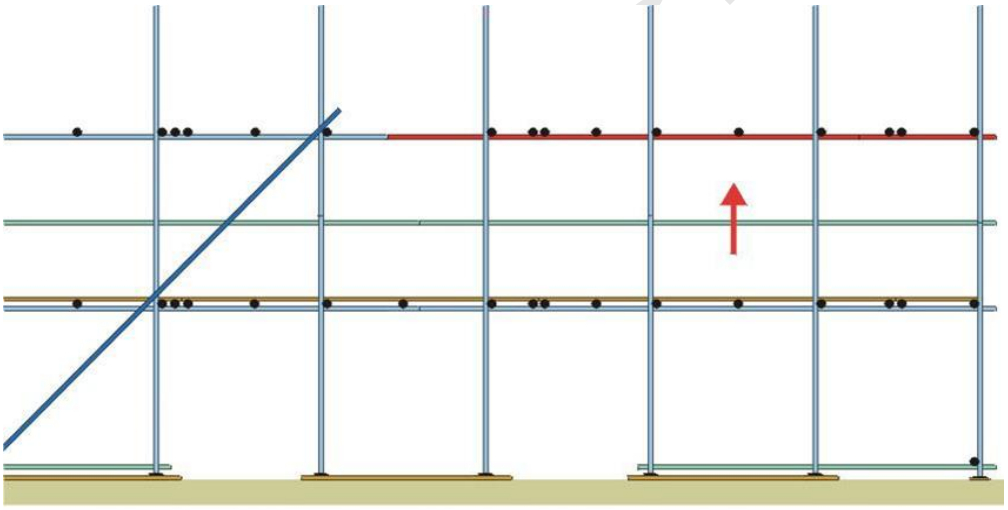


5 The next section of the lift above is then fixed from within the guard railed area.

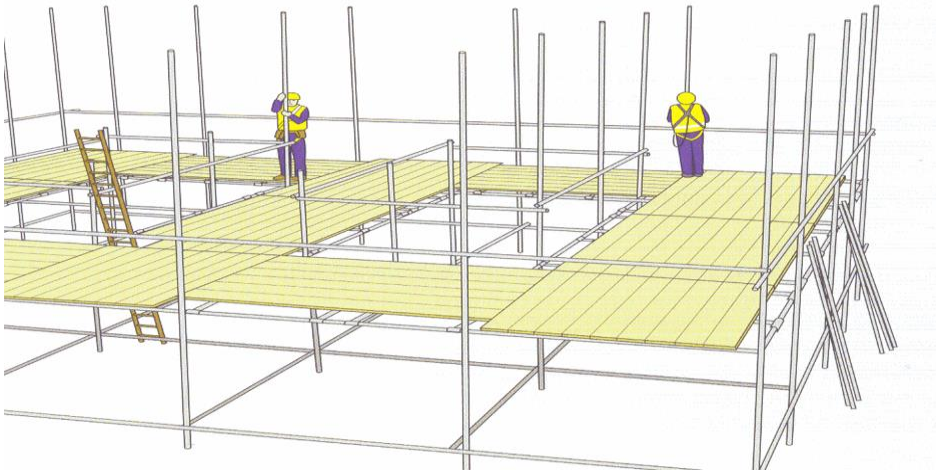




6 Alternatively the single guardrail may be installed to the full length of the scaffold before erecting the lift above.



7 Method of boarding and guard railing for the erection of birdcage scaffolds



Construction Site Safety

1.3.6 Safe Working on Roofs and at Heights

1.3.6.1 Key points

1 Gravity is the only rule that works every time! Those who work on roofs are, by the nature of their work, at risk of falling if appropriate measures are not taken.

2 Those who plan, supervise or carry out roof work must be competent to do so.

3 A risk assessment and, where considered necessary, a method statement, must be compiled for all such work.

4 Integral features of roofs such as a steep pitch, valleys, fragile cladding or roof lights can increase the risk of falling.

5 Falls through fragile roofing materials continue to be the cause of many deaths and injuries.

6 Bad weather can have a significant impact on the risk control measures that have to be taken.

7 Ideally work will be carried out from a stable working platform, fitted with guard-rails and toe-boards.

8 Where such fall prevention measures cannot be used, effective fall arrest measures must be put in place, ideally 'collective' measures such as safety nets or other soft landing systems.

9 Those who work on roofs must also take into consideration the safety of anyone passing below to protect them from falling materials or tools.

1.3.6.2 Introduction

1 Roof work, including work on fragile roofing materials, gives rise to a substantial number of fatal and serious accidents.

2 It needs to be emphasised, however, that there is not just the actual roof working to be considered, but the whole process - including planning the job, creating a safe access, the safe storage of equipment and materials etc.

3 There is no such thing as a 'safe height'; anyone who is off the ground is at risk of falling. The hazard exists on working platforms, scaffolds, ladders, flat and pitched roofs, open steelwork and any area in which work is being done in proximity to fragile materials, openings, holes and roof edges.

4 Most accidents could be avoided, given the provision of appropriate equipment and the adequate information, instruction, training and supervision of those who use it.

1.3.6.3 The Management of Health and Safety at Work

1 These Regulations require that a 'suitable and sufficient' risk assessment of all work activities is carried out and that significant risks are recorded. By its very nature, work carried out on roofs will entail a significant risk of falls from height unless appropriate control measures are put in place.

2 The risk assessment must:

(a) identify the hazards arising from working on roofs which will include working at height

(b) specify the control measures that will be put in place to reduce the risk of falls to an acceptable level.

3 These Regulations then require that the control measures identified are put in place.

1.3.6.4 Work at Height

1 The relevant requirements of these Regulations with regard to roof work are considered to be:

(a) Contractors to ensure that work at height is planned, supervised and carried out in a safe manner by competent persons

(b) work at height to be carried out using appropriate work equipment, particularly that which provides collective fall protection

(c) suitable and sufficient steps to be taken to prevent falling objects which are likely to cause injury to any person

(d) give consideration to the weather conditions

(e) where appropriate, the need to plan how the rescue of someone who has fallen but is suspended might be achieved

(f) where there is a risk of a person falling or being struck by a falling object, steps to be taken to prevent unauthorised access into that area.

2 The key areas are planning and competence to ensure that the control measures will be put in place and followed.

1.3.6.5 Provision and Use of Work Equipment

1 All equipment used in connection with work carried out at heights is classified as 'work equipment' for the purposes of these Regulations. This will include not only items such as scaffold components and ladders, but also the tools used such as slate rippers, screw guns and the like.

2 These Regulations require that whoever supplies work equipment must ensure that it is suitable for the job in hand, maintained in good working order and subjected to inspection as necessary.

3 Where the use of the equipment involves a specific risk to the health and safety of employees, the use of the equipment must be restricted to competent and specified workers.

1.3.6.6 Lifting Operations and Lifting Equipment

1 In the context of roof work, these Regulations apply to those items of work equipment that are used for mechanically lifting or lowering any load to or from a place of work at height, such as:

(a) mobile cranes

(b) mobile elevating work platforms

(c) passenger lifts

(d) inclined hoists

(e) tele-handlers

(f) powered hoists

(g) gin-wheels.

2 Also covered by these Regulations are the accessories that are used in conjunction with lifting equipment, such as:

(a) ropes

(b) hooks

(c) chains

(d) eye-bolts

(e) slings.

1.3.6.7 Personal Protective Equipment

1 Where a risk to health and safety has been identified by a risk assessment and cannot be adequately controlled by other means that are equally or more effective, the Contractor must provide suitable personal protective equipment (PPE) and ensure that it is used by employees. PPE should only be used as a last resort after other methods of controlling the risk have been considered and deemed not to be *reasonably practicable.*

2 In the context of roof work, the definition of PPE includes items of fall-arrest equipment such as safety harnesses and lanyards.

3 In deciding which type to issue, the Contractor must take into account the risk that the PPE is being used for, and also ensure that the PPE will fit the wearer and allow them to work comfortably.

4 The Contractor must ensure that employees have been given adequate and appropriate information, instruction and training to enable them to understand the risks being protected against, the purpose of the PPE and the manner in which it is to be used.

5 Whilst the Contractor must take reasonable steps to ensure that any personal protective equipment supplied is used, the employee in turn must ensure that they use the equipment provided in accordance with instruction and training given and know the procedures for reporting loss or defect to their Contractor.

1.3.6.8 Construction (Design and Management) CDM

1 These Regulations place legal duties on several categories of duty-holder, each of which has the potential to reduce the risks to health and safety during and after the construction phase.

Designers

2 The definition of designer under CDM is extremely wide and many contractors will also be designers. A common scenario would be where the client simply asks the contractor to sort out a leaking roof and the contractor designs the solution.

3 Whoever devises the specification for the work is likely to be considered a designer. This is very important as the designer has a legal duty to consider health and safety issues in relation to not only carrying out the work, but also the maintenance, cleaning and eventual removal (demolition) of the roof.

4 In common with all aspects of design, the person carrying out the design should be sufficiently knowledgeable of the construction process to specify how the work can be carried out safely.

5 Roofers working on industrial type buildings are commonly faced with the problem of fragility. This may be because the roof itself is made of a fragile material such as asbestos cement sheets or simply because the roof lights are not load bearing. As the standard specification for roof lights is 10% by area, this represents a significant amount of fragile roof surface.

6 When designing roofs, designers should also consider such things as ongoing maintenance activities, for example how roof lights and gutters can be cleaned safely and whether the safe access for this type of work can be designed-in at the design stage.

Clients

7 Under these Regulations the client must provide relevant pre-construction information to other parties such as the Contractor and Engineer to enable the job to be planned so that it can be carried out safely. The client, along with other duty-holders, must take reasonable steps to ensure that all parties involved are competent to do what is required of them.

8 The main type of information that would be relevant for roof work would be the presence of asbestos, areas of damage, loading limitations of the roofing material, the existence of fall-restraint systems, the location of safe access routes where known, as built drawings where available and so on.

9 It should be noted that the client may not be aware of such factors as damaged areas of the roof or the existence (or lack) of safe access routes. The client may well assume that the job will be carried out by a method that is neither practical nor safe. They commonly expect roofing contractors to be able to access places and do tasks that they would simply not allow their employees to do.

The stages of a roofing project

10 There are various stages to any roofing project:

(a) Design

(b) Selection of contractors/staff

(c) Planning

(d) Carrying out the work

(e) Post-completion information (at the end).

Selection of contractors/staff

11 Where a Contractor is using its own employees to carry out roof work, it is essential that several factors are taken into consideration. Both training and operational work on roofs can be hazardous, strenuous work, often involving:

(a) work at considerable heights for long periods of time

(b) work outdoors usually in hot, cold or wet weather and possibly high winds

(c) repetitive materials handling

(d) reaching, stretching, and maintaining balance in awkward postures whilst carrying loads on varying roof terrains.

12 This means that fitness to work is particularly important and needs to be considered by the Contractors.

13 It is vital that people working on roofs do not suffer from:

(a) any neurological condition likely to cause seizures

(b) weakness of limbs, loss of balance including vertigo (dizziness from being at height)

(c) any heart or lung condition likely to be aggravated by strenuous work

(d) any disability/impairment of limb function

(e) any other disease, disability, medication, alcohol, drugs or effects of toxic substances (lead etc.) likely to impair mental or physical activity, especially at a height

(f) temporary ailments such as influenza or other conditions that may affect judgment

(g) uncorrected sight problems

(h) a physique that would be unsuitable for the work.

14 It is very strongly suggested that Contractors should establish a policy on fitness for work.

Planning

15 Planning the work should include consideration of the progression of the work with regard to:

(a) site-specific risks

(b) weather conditions

(c) emergencies (including rescue)

(d) safe means of access and egress

(e) materials handling and storage.

Site-specific risks

16 The site-specific risks could include:

(a) working above public areas such as shopping malls or public streets

(b) the difficulties in delivering materials and transferring them to roof level

(c) the presence of site traffic or road traffic on a public road

(d) awkward working environments, such as occupied houses or factories

(e) emergency situations, such as rescuing someone who has fallen and is suspended at high level in a safety harness

(f) vent pipes that may suddenly shower unsuspecting roof workers with anything ranging from high pressure steam to noxious chemicals

(g) certain species of bird that will aggressively defend their territory

(h) the presence of accumulated bird droppings.

Weather conditions

17 It goes without saying that the weather can have a significant impact upon the intention to carry out roof work and may ultimately be the reason for the start of a job being delayed, or it being suspended part-way through.

18 Heavy rain, high winds, frost or snow might make it unsafe for operatives to work at height.

19 The only note of caution is that the forecast wind speed is given for 'ground level'. The wind speed can be considerably higher at height, for example, if installing a glass atrium roof on top of a multi-storey tower block.

20 If a roofing job has started and the weather is forecast to be changeable, with perhaps extremes of conditions, it will be essential to monitor the forecast so that work can be halted before it becomes unsafe to continue.

21 The wind speed could have an impact upon whether or not it is safe to handle or store certain types of materials, such as roofing sheets, at height.

22 Work involving the handling of sheeting and cladding requires extra care in windy conditions, when a sheet may act like a 'sail' causing the person holding it to lose their balance.

23 Working in gusty wind conditions can be particularly dangerous. Industry Guidance suggests that the following activities should cease when the average wind speeds shown are exceeded:

(a) **27.36 km/h** - handling lightweight materials and any materials over 5 metres long or rolls of felt

(b) **37.01 km/h**- general roofing activities.

Emergencies (including rescue)

24 Several types of emergency, such as a fire, could occur either at ground level or at height, which requires that an emergency evacuation of the whole site or the roof be carried out. For this reason the planning stage must ensure that safe access and egress will be available at all times. Depending upon the nature of the job it may be necessary to have more than one access/egress route.

25 If the site layout necessitates that the asphalt/bitumen boiler has to be sited on the roof, the question will have to be asked as to whether it is still possible to get off the roof safely if a fire occurs.

26 It may be necessary to deal with medical emergencies where someone becomes incapacitated at height through illness or injury and is unable to make their way back to ground level. In such circumstances, the local fire and rescue service may have to be involved to effect a safe rescue. It is not unknown for someone who has been incapacitated at height to be recovered to ground level in an empty skip suspended from a tower crane whilst being attended to by a paramedic.

27 Carrying out roof work will often involve the use of fall-arrest equipment such as safety nets or safety harness and lanyard. Anyone who falls will have to be rescued promptly, particularly if they are suspended in a harness.

Safe means of access and egress

28 The means of gaining access to height and safely working there will depend upon many factors such as the nature of the roof structure, whether there is room to erect a scaffold or bring in a MEWP and even the length of time that the job is expected to take.

29 Some common means of gaining access to height or actually working at height are:

(a) ladders

(b) mobile access equipment

(c) fixed or mobile towers

(d) stair towers

(e) independent scaffolds.

Materials handling and storage

30 Part of the planning process will involve taking decisions on:

(a) what roofing materials are required and quite possibly where they can be stored safely at ground level

(b) a safe means of transferring roofing materials to height and in what quantities

(c) avoiding the overloading of any part of the roof by stacking materials prior to installation

(d) the safe storage of sheet materials if they are to be stored for any length of time, particularly during windy weather

(e) the safe distribution of materials around the roof during installation

(f) the safe transfer of waste materials back to ground level.

1.3.6.9 Carrying out the work

1 To a large extent, the risks of doing the job, the risk-control measures that will be necessary and therefore the way in which the work is carried out will depend upon the type of roof.

Flat roofs

2 On flat roofs, falls most frequently occur from:

(a) the edge of a completed roof

(b) from the leading edge where work is being carried out

(c) through openings or gaps

(d) through fragile material.

3 A roof with a pitch of less than 10° is classed as a flat roof. Safe access to the roof, and to any working place on that roof, must be provided and maintained.

4 If there is no parapet or similar barrier to stop anyone from falling, edge protection must be provided. This may take the form of standard guard-rails and toe-boards or, providing nobody will approach the edge, a barrier set back from the edge.

5 Where works are to be undertaken which could result in materials or equipment falling onto people passing below, protective measures must be taken. This can range from adding netting, close boarding or debris fans to scaffolds or establishing exclusion zones. These could range from permanently fenced off areas to simply having someone stopping people from accessing the 'drop zone' at critical times.

6 There will be times when operatives need to work at exposed leading edges, but it is not reasonably practical to install guard-rails or other fall prevention measures. In these circumstances, it will be necessary to install or provide fall-arrest systems. The most suitable type of fall-arrest system will be indicated by a risk assessment. Where safety nets, air bags or other soft landing systems are used, they will provide collective safety for anyone working above them who falls.

7 Alternatively, it may be decided that operatives should wear a safety harness with a lanyard clipped to a strong anchor point or a horizontal 'running line'. The effectiveness of this system depends upon the training of operatives in the use of the equipment and the operatives actually 'clipping on'.

8 When a safety harness and lanyard is used, consideration must be given to the position of the anchor point, which ideally will be above the head-height of the user. Where the anchor point is at ankle level, for example, there will be more slack in the lanyard and the fall will be further before it is arrested. It has been calculated that in some circumstances a person could fall up to 5.5 metres before the fall is arrested. In this situation, where the person is working less than 5.5 metres above ground level, impact with the ground would occur before the fall could be arrested.

9 Sometimes, guard-rails have to be moved or removed to enable work to be undertaken. If this is to happen:

(a) an equally effective safe system of work must be in place and maintained, which will prevent falls of persons or materials

(b) the guard-rails must be replaced or re-erected as soon as practical.

10 Some flat roofing systems will involve the use of various chemicals or hot-works and the liberation of fumes or solvents may occur, Consideration to COSHH should be given as well as the significant possibility of fire, explosion or burns from hot bitumen.

Traditional pitched roofs

11 On traditional pitched roofs, most falls occur:

(a) from the eaves, by slipping down then falling from the roof

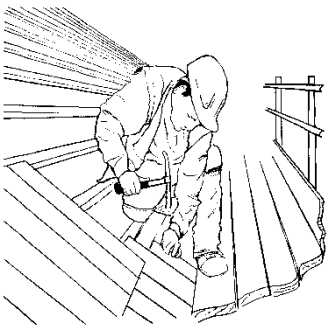
(b) into the structure during truss erection

(c) from gable ends during salvage prior to demolition

(d) through fragile roofing materials, particularly fragile roof lights

(e) when passing along valley gutters with fragile materials alongside the access way.

12 A sloping roof is defined as any roof having a pitch of more than 10°.

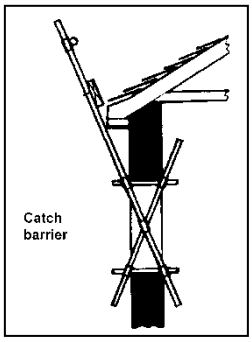


13 Work on pitched roofs should only be carried out:

(a) by persons who are physically capable and adequately trained

(b) using roof ladders or a temporary work platform equipped with guard-rails and toe-boards as necessary and securely fixed to prevent it slipping

(c) providing either a suitable catch barrier or a working platform with guard-rails is erected at the eaves of the building.



14 This requirement applies to any work on a sloping roof, including access to and egress from other workplaces.

15 If the steepness of the roof is such that it prevents a secure foothold, a working platform must be erected. Roofs pitched at over 50° should be regarded as 'steep', as should shallower slopes if they are slippery.

Curved roofs

16 When working on a curved roof such as a glass barrel-vault structure, providing:

(a) the roofing material is load-bearing, and

(b) there is a secure anchorage at the apex of the roof

17 it is usually necessary to employ rope access techniques such as work-positioning or abseiling. It is essential that any such system incorporates a self-locking device to prevent the uncontrolled descent of anyone who loses their footing.

18 Additionally, proprietary 'rubber steps' are available that follow the exact contour of a curved roof, with sections being joined to extend the overall length. These steps must be regarded as a foothold only as they are not equipped with a hand-rail. They must therefore only be used in conjunction with another form of fall protection, such as a fall-arrest block.

19 Where there is a risk of falling through a curved roof, consideration should be given to installing safety nets inside the roof.

Profiled roofs

20 These range from a single asbestos cement sheet on an outside toilet to the latest continuously extruded system formed in situ to cover large portal frame buildings. The systems will differ in complexity and range from single skin through to composite factory-produced units.

21 New build profiled installation will normally be carried out over a system of safety nets which provide fall protection.

22 There are other means of providing safe access for roofs. Traditionally for new build systems this was called leading edge protection and used working platforms in the form of lightweight staging. This system advances along the roof in line with, or previously, in advance of the installation of the roof sheets.

23 If a double skin roof system is being installed, the inner sheet or liner tray must be fixed by at least four fixings before it can be stood on.

24 Metal profile roof sheets are therefore still fragile until they have been fixed. Furthermore, many rooflight assemblies, which are often installed as part of a profiled roof system, are also fragile. This will necessitate proprietary work platforms such as 'Youngman' boards are used to enable safe access.

25 Any working platform must be a minimum of 600 mm wide with hand-rails on one or both sides, depending on whether a fall can occur. This does create practical difficulties in terms of moving them due to their bulk and weight. In a new build situation it can be possible to run the boards on a wheeled system referred to as purlin trolleys.

26 The only other option therefore is to physically step on the roof and lift the staging's. A 5 metre platform with guardrails weighs about 50 kg. Given that the platforms should be joined together, then physically moving them does offer challenges. Also, how the staging's are put in place to start with can often be an issue. It is not a safe system of work to simply carry the staging up the steelwork. They may need to be craned up and positioned at the same time as the packs of sheets.

Fragile roofs

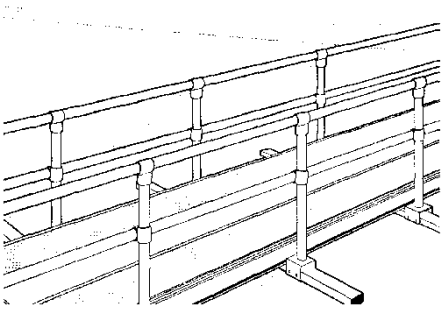
27 Fragile roofing materials include asbestos, glass, plastic, cement sheets and similar brittle surfaces.

28 Non-fragile roof lights should be fixed with a red coloured fixing to allow people to differentiate between them.

29 As far as the strength of the materials is concerned, the appearance of fragile roofs is often misleading. Surface coatings, dirt or moss may conceal the fragile nature of the material, thereby giving a false appearance of soundness to glass, plastic, asbestos, etc. Even if the roof is clad in a load-bearing material, roof lights are often fragile.

30 Asbestos and various plastic materials are particularly brittle and will shatter without warning.

31 Many deaths and serious injuries have occurred as a result of roof workers falling through fragile surfaces. Most of the falls could have been easily prevented had a risk assessment been carried out and a safe system of work developed. Even if the falls did occur, the deaths and injuries could have been prevented by the use of safety nets or another soft landing system.



Temporary working platform

32 Ideally, another way of carrying out the job would be found that does not require anyone to work on or near to fragile roofing materials. However, in many cases, this may not be practical.

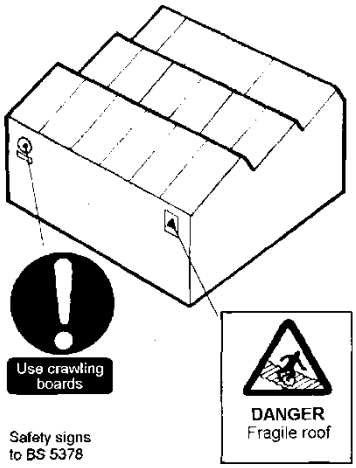
33 If it is necessary to pass across a fragile roof, a roof-board complete with a guard-rail should be used to spread the weight and provide a good handhold. Depending upon the job, it may be necessary to use more than one roof-board: one to support the person whilst the other is moved to a new position.

34 The practice of trying to 'walk the line of the bolts' or 'the line of the purlins' is very dangerous and must not be attempted. Where walkways with a hand-rail are not an integral part of the roof structure, a safe system of work must be devised.

35 **Walkways** near fragile surfaces (in valleys, parapets, gutters or channels) must be provided with suitable guard-rails or, if not, the fragile surface should be over-laid with a load-bearing material to prevent the possibility of anyone falling through.

36 **Warning signs** must be fixed at all approaches to roofs constructed with fragile materials…….

37 Where such signs are not fixed in place, it is essential that the presence of fragile material is identified in advance and those doing the job are made aware of it by other means.



Safety signs to BS 5378

1.3.6.10 Access arrangements

Ladders

1 All ladders used for access to elevated work positions, including working platforms or roofs, must comply with the following requirements.

(a) A risk assessment must be carried out before a ladder is used either for access or as a place of work.

(b) The risk assessment must show that it is not reasonably practicable to use an alternative, safer means of access.

(c) Ladders should only be used as a *place of work* for light work of short duration where the risk assessment shows the risk of falling to be low.

(d) 30 minutes is a guide to short duration. This is not 30 minutes in one place and then 30 minutes having moved the ladder 1 m along the wall.

(e) Such work could be an inspection or light maintenance work involving the use of one hand only. Removing cast iron gutters would obviously not fall under this definition.

(f) All ladders should be to the correct industrial specification and **not** domestic quality (Class 3).

(g) The ladder must be securely fixed near to the top of the stiles or, if this is not physically possible, footed near to the bottom to prevent undue swaying or displacement.

(h) 9 metres is the maximum height suggested for footing a ladder.

(i) The ladder must be set on a firm level footing (for example, not on loose bricks).

(j) Both stiles must be properly supported.

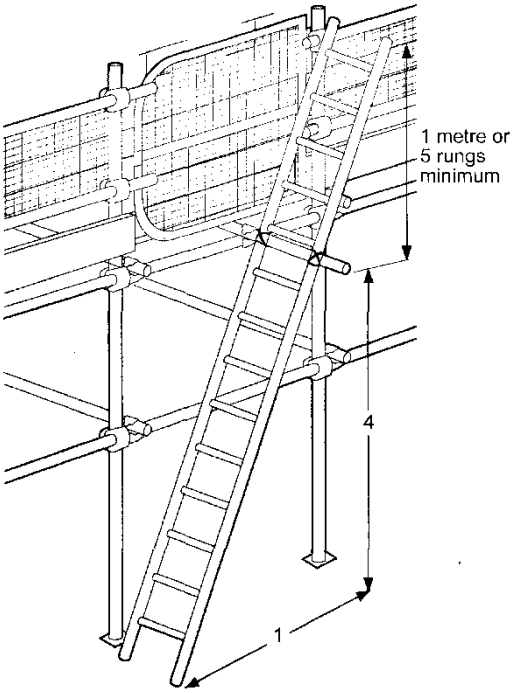
(k) The ladder must extend at least 1 metre (5 rungs) above the landing place, unless another suitable handhold is provided.

(l) There must be sufficient clear space at each rung to allow a safe foothold.

(m) The vertical run of the ladder should not exceed 9 metres, unless an intermediate landing has been provided, where practical.

(n) The ladder must be set at the correct angle, approximately 75° - one measure out for every four measures up.

(o) The ladder must not be lashed to any gutter or soil stack or similar item, which may be fragile or insecure.



2 Where two-handed operations are necessary, a risk assessment must be carried out to determine a safer method of working, e.g. a static or mobile tower erected by a competent person, scissor lift or cherry picker.

3 Independent or putlog scaffolds, which provide safe access to and around the roof edge, storage space and possibly a loading bay, are another solution.

Pitched Roof ladders

4 Ideally, where it is necessary to use a pitched roof ladder, access to the lower end of it will be from a working platform at the eaves.

5 Portable roof ladders for pitched roofs are specified in BS 8634 Portable roof ladders – Specification.

6 Pitched roof ladders must be:

(a) only used by persons who are competent to use them

(b) positioned to enable easy and safe transfer between:

(i) any other ladder used to get to the eaves and the roof ladder

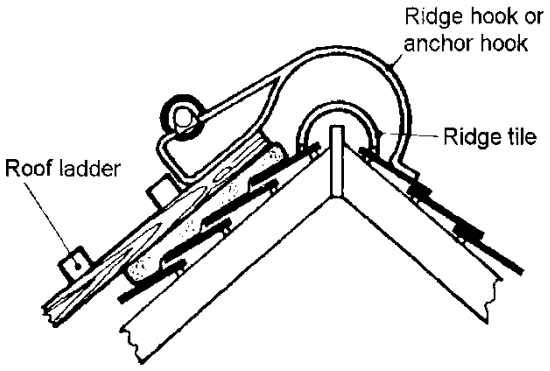
(ii) the roof ladder and the place of work

(c) designed for the purpose

(d) of good construction, strong enough to enable the planned work to be carried out and regularly inspected

(e) adequately supported to take the user's weight without damaging the roof

(f) securely fixed to the sloping part of the roof by means of a ridge hook placed over the ridge. Ridge hooks must not bear down on ridge tiles or capping tiles.



1.3.6.11 Landing places

1 All landing places must be of adequate dimensions.

2 If a person is liable to fall from a height that would result in injury, landing places must be provided with:

(a) a guard-rail at a height of not less than 950 mm

(b) an intermediate guard-rail

(c) a toe-board

(d) a gap not exceeding 470 mm between the toe-board and guard-rail, or between any two guard-rails

(e) an intermediate guard-rail if standard, light-gauge brick guards are used.

1.3.6.12 Openings, corners, breaks, edges and joisting in a floor

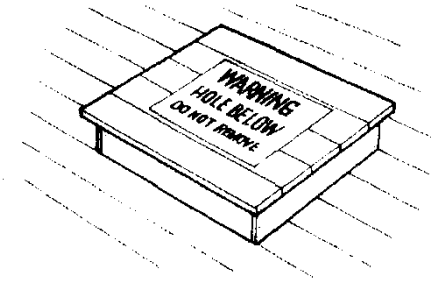
1 Where reasonably practicable, edge protection, in the form of guard-rails and toe-boards, must be provided if people have to work close to what would otherwise be an unprotected edge, where:

(a) a person who fell would be injured as a result of the fall

(b) material, tools or equipment could fall

(c) the work is over water, other liquid or dangerous materials.

2 All holes in floors, etc. must be similarly guarded or securely covered. The covering must be of a suitable material, securely fixed and clearly marked 'Hole below'.



3 Open joists through which a person could fall must be boarded over to provide safe access to a working place.

4 Guard-rails, toe-boards and covers may be removed to allow access for people and materials, but must be replaced as soon as possible. This does not apply to demolition work unless it is left unattended.

1.3.6.13 Mobile access platforms

1 Mobile access platforms are often used as an alternative to ladders, scaffolds and cradles.

2 The range of equipment includes mobile elevating work platforms (MEWPs), forklift trucks equipped with work platforms, and mast climbing work platforms (MCWPs). Each of these types of equipment can be suitable for carrying out particular types of roof work. For example, using a telescopic boom MEWP (cherry picker) might be a suitable and safe way of accessing a job that would otherwise require someone having to cross a fragile roof. This is particularly important for inspection work. Truck mounted cherry pickers now have sufficient reach to enable inspection of nearly all buildings to be made without having to directly access the roof.

3 Where people are working from these platforms, calculations of the real loads must be made. Typically an allowance for each person of 100 kg covers operative and tools. If materials are to be carried as well, then the weight must be estimated to ensure that the platform is not overloaded.

4 Finally, thought must be given to emergencies, and how aerial rescue could be carried out if necessary.

Mobile elevating work platform (MEWP)

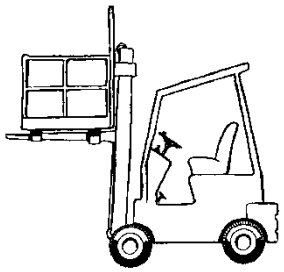
5 Easily moved from place to place, MEWPs are particularly suitable for short duration tasks requiring a work platform.

6 Work platforms may be towable units, lorry or trailer-mounted, or self-propelled.

7 Also, it must not be overlooked that MEWPs are classified as lifting equipment and as the task is so called 'man riding' the inspections must be at six-monthly intervals.

Working platforms on forklift trucks

8 Forklift trucks equipped with work platforms may be used for access to limited heights, usually for maintenance work. The platform or 'cage' must be designed for the purpose, fitted to the forklift truck in a manner that prevents it from becoming accidentally detached.



9 If the use of a forklift truck for this purpose becomes part of an established pattern of work, consideration should be given to introducing a purpose-built mobile platform.

10 The use of so-called 'non' integrated work platforms on forklift trucks is not seen as a particularly safe practice. They are very concerned on the use of rough terrain telescopic forklifts.

11 These are very commonly used on demolition sites when stripping roofs for salvage or removing asbestos cement sheets. To be able to use them, as a minimum the platform and forklift must have the following:

(a) tested under Lifting Operations Lifting Equipment (LOLER) every six months

(b) the basket must have a plate displaying information about loading etc.

(c) harness points identified

(d) dipper ram controls isolated

(e) signage on the forklift confirming that it is suitable for the use.

Crane and 'man riding basket'

12 One way to overcome the access difficulties associated with fragility is simply not to land on the roof at all. It is possible to use man riding baskets from a mobile crane. The crane itself would normally be expected to be fitted with a 'dead man's' handle so that the driver cannot inadvertently lower the basket to the ground, and must be on 'power lower' as opposed to 'free fall'. This may rule out some older crawler cranes.

13 All physical parts of the system will require thorough examination under LOLER every six months. It would be expected for the operatives to be harnessed in and typically the harnesses are attached to the hook block of the crane, which offers a second level of safety - so-called redundancy.

Mast climbing work platforms (MCWPs)

14 With this equipment, the platform or cradle rises up one or more static masts in a similar way to a hoist, providing a temporary work platform at height, usually on the side of a building. Some of the procedures to be observed in the erection and use include:

(a) they should be erected only by skilled and competent persons

(b) they should be used only by trained operatives

(c) they should be inspected daily before use, by the user

(d) they should be regularly inspected by a competent person and records maintained of the inspection

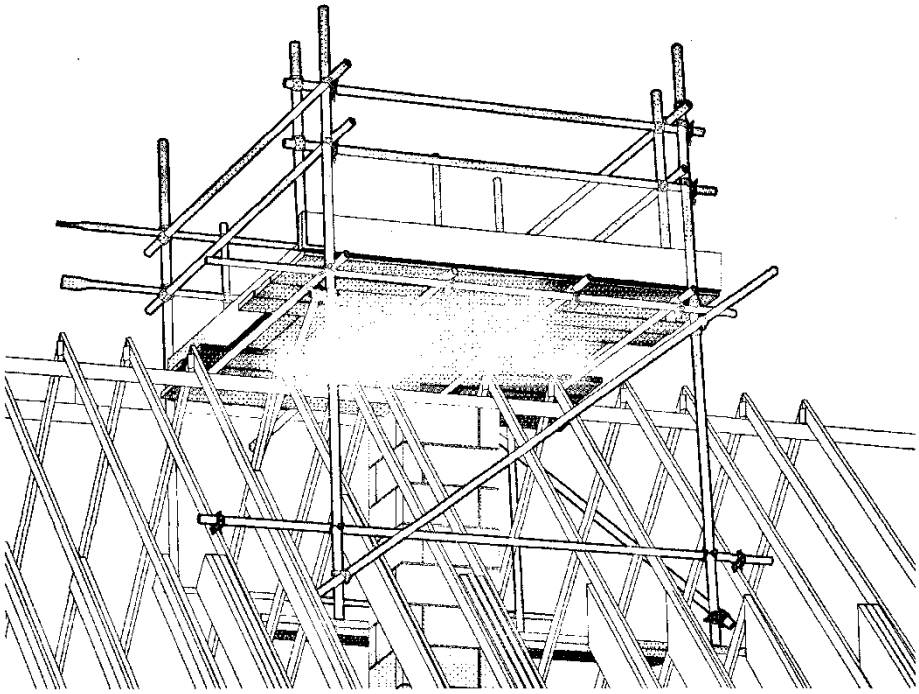
(e) they should be thoroughly examined every six months

(f) they should be clearly marked with the safe working load and permitted numbers of persons allowed on the platform at each configuration

(g) they should not be used as a substitute for using stairs or a passenger lift for travelling to higher levels.

Access to chimneys

15 Various purpose-designed lightweight staging's are available for work on or around chimneys. Alternatively, tube and fitting scaffolding should be erected or a MEWP used. In no circumstances should work be carried out on a chimney without the use of a properly constructed and stable working platform.



1.3.6.14 Other considerations

Stacking materials on roofs

1 Care must be taken at all times when stacking material on or at roof level. Attention should be given to the following:

(a) the size of the load involved

(b) the types of material involved

(c) the methods of raising the load, whether manually or mechanically

(d) the means of communication (signals) and the competence of the slinger or signaller

(e) the position authorised for stacking materials

(f) the distribution of the loads (loading plan)

(g) the maximum load or stack size

(h) the loading limitations of the roof

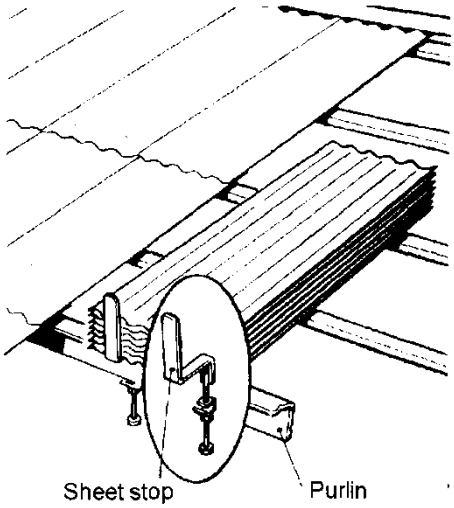
(i) adequate support or packing to the truss

(j) protecting the existing roof surface and any weather-proofing

(k) preventing the displacement of loads which should be:

(i) secured against the wind, especially split bundles and sheets

(ii) secured against sliding down sloping roofs (sheet stop).



Permission to load roofs

2 Permission to place a load on a roof structure must be obtained from:

(a) the owners or occupiers, or

(b) the architect or a consultant engineer, or

(c) the Contractor.

1.3.6.15 Danger areas

1 Contractors are to ensure:

(a) the safety of those working at height (from falls)

(b) the safety of others who may be working or passing below (from falling objects), by the creation of 'danger areas', either around the high-level workplace and/or below it.

2 This is achieved by preventing unauthorised access into any danger area, so far as is reasonably practicable, by the use of equipment such as barriers and appropriate signs.

3 Contractors may find in particular situations that it is not practical to create a permanent 'exclusion zone' beneath the work being carried out above. In these circumstances a solution would be to deploy 'safety marshals' at the lower level to enforce exclusion from the danger area as and when it is necessary.

4 In such circumstances it is essential that an effective means of communication be established between those working at height and the workers controlling the danger area.

Roof trusses

5 The placement and installation of roof trusses and their associated bracing has the potential to be a very hazardous activity and a safe system of access and protection must be planned and implemented. The risk assessment should have considered these and all other aspects of the work.

6 A safe working platform around the perimeter of the roof should be erected and, where access is required within the trusses, safe access provided. This can be achieved by boarding out the bottom chord of the trusses, so long as they are stable and capable of taking the imposed loads.

7 Safety nets can be used, provided a safe clearance distance can be achieved below the net. However, it is difficult to arrange a strong fixing for a net on a new build house. The most common fall protection systems in use in building are 'bean bags', air bags or crash decks.

8 There are a number of proprietary soft-landing systems available in which the fall-arrest bags simply interlock to provide a cushioned landing if someone falls.

9 Crash decks could be as simple as a tower scaffold under the place of work.

10 Roof trusses can be boarded out if access is needed or timber sheets

11 **Safe access within the trusses**

12 They do require moving periodically so that they remain under the place of work and of course they are nowhere as comfortable to land on as a soft-landing system.

Working over water

13 Where there is a risk of persons falling from a structure into water, a secure form of fencing, barrier or fall arrest equipment (preferably safety nets) must be provided. This can be briefly removed for access and the movement of materials, but must be replaced as soon as possible.

14 Other points to be considered include:

(a) ensuring that a risk assessment has been carried out

(b) if possible, providing a suitable working platform

(c) safety nets, if used, must be properly erected and periodically inspected

(d) warning notices must be placed near to all edges

(e) adequate lighting must be provided as necessary

(f) special care must be taken in inclement weather such as fog, frost, snow and rain

(g) special attention must be paid to the possibility of tides or storm surges changing water levels or flow rates

(h) life jackets must be provided, and worn by all operatives involved in working over water

(i) preferably only operatives who can swim should be used

(j) suitable rescue equipment must be provided, maintained and operated by trained and competent staff

(k) frequent checks must be carried out to ensure that the correct number of personnel can be accounted for

(l) all persons must work in pairs, or in larger groups, as necessary (no lone working)

(m) all persons must be trained in the procedures for raising alarms and in rescue drills.

The presence of birds

15 The accumulated droppings of birds, if disturbed into airborne dust and then inhaled, can cause severe respiratory problems. It is anticipated that this will mainly be a problem during refurbishment and repair work or demolition.

16 If during the early visits to site it is evident that pigeons have been, or are present, measures must be taken to clean up the droppings before work starts, using a safe system of work, and to discourage the return of the birds.

Construction Site Safety

1.3.7 Fall-arrest and Suspension Equipment

1.3.7.1 Key points

1 In situations where the prevention of falls from height cannot be guaranteed, it is essential that measures are put in place to ensure that any fall that does occur is arrested, without injury to the person who has suffered the fall.

2 In many cases safety nets are the preferred method of arresting falls because:

(a) they provide what is termed 'collective' fall protection

(b) if rigged immediately below the work area, they limit the height of the fall to the minimum and recovery of the 'faller' should not be a problem

(c) they are a 'soft landing system' that should cause no injury to the person who has fallen.

3 Safety nets can suffer wear and damage and must be inspected periodically.

4 Other forms of soft-landing systems, such as air-bags or bean-bags, also offer collective protection and are more appropriate for some types of work.

5 If fall-arrest is to be achieved using a safety harness and lanyard, the wearer must be trained in fitting and adjusting the harness and selecting the appropriate lanyard and a secure anchorage.

6 Harness and lanyard offer personal fall-arrest protection only.

7 Some items may need a regime of inspections and thorough examinations.

8 Personal suspension equipment, such as rope-access equipment and a boatswain's chair must only be used by people who have been trained and are competent.

1.3.7.2 Introduction

1 Where a risk assessment has identified that the risk of falls from height cannot be eliminated by the installation of barriers, guard-rails or other similar measures, the use of fall-arrest equipment may then be the best option.

2 Safety nets or the use of other soft landing systems are preferred to the use of safety harnesses and lines, as they protect the whole area and all persons working above them. They do not rely on individual workers wearing a safety harness and lanyard connected to a secure anchorage point.

3 In situations where people and traffic pass below others working at height, a safety net used in conjunction with a fine mesh debris net will protect those below from falling tools and materials, as well as providing fall-arrest for the people working at height.

4 Where safety nets cannot be rigged for any reason, and it is not practical to use another form of soft-landing system, it may be necessary to resort to the use of a safety harness and lanyard, providing:

(a) operatives have been trained in the use and care of the equipment and wear it correctly

(b) the work environment enables falls to be arrested without injury to the person who has fallen

(c) a secure anchor point is available

(d) the person working at height actually 'clips-on'.

5 Whichever system is used for minimising injury from falling, whether it be safety nets, another soft-landing system or harness and lanyard, the system must be:

(a) designed to provide a safe system of work

(b) installed by competent persons

(c) maintained, inspected and supervised to ensure it is used correctly.

1.3.7.3 The Management of Health and Safety at Work

1 These Regulations place a requirement on every Contractor to make a suitable and sufficient assessment of every work activity to identify the hazards arising out of that work and the persons or groups who might be affected.

2 When hazards are identified, it is then the Contractor's duty to either remove the hazard or to put control measures in place to reduce the risks to health and safety arising out of the hazards, as far as is reasonably practicable.

3 The Contractor must provide employees with comprehensible and relevant information on any risks that exist in the workplace and on any control measures that are in place to reduce those risks.

4 Employees, in turn, have a duty under these Regulations to tell their Contractor of any work situation which presents a risk to the health and safety of themselves or any other persons who may be affected.

5 These Regulations require that, additionally, the Contractor provides employees with adequate information, instruction, training and supervision to be able to carry out any work safely and without risks to their health.

1.3.7.4 Provision and Use of Work Equipment

1 Safety nets, equipment used in other soft landing systems, and harnesses/lanyards are all classified as work equipment and must therefore comply with these Regulations.

2 These Regulations require that Contractors only provide work equipment that is suitable for the job and ensure that it is maintained and kept in good working order.

3 Contractors must ensure that where the safety of work equipment depends upon the way it is installed, it is inspected as necessary.

4 Where the use of the equipment involves a specific risk to the health and safety of employees, the use of the equipment must be restricted to competent and specified workers.

5 Employees must be provided with information, instruction and training in the use of work equipment, where necessary for their health and safety.

1.3.7.5 Personal Protective Equipment

1 These Regulations require that where a risk has been identified by a risk assessment, and it cannot be adequately controlled by other means which are equally or more effective, then the Contractor must provide and ensure that suitable personal protective equipment (PPE) is used by employees.

2 In essence, PPE may only be used as a last resort after all other means of eliminating or controlling the risk have been considered.

3 In deciding which type to issue, the Contractor must take into account the hazard that the PPE is being used to protect against, and that the PPE must fit the wearer and allow them to work comfortably.

4 The idea of comfort is important and needs to take account of other items of equipment and other PPE that will also be worn.

5 Whilst the Contractor must take 'reasonable steps' to ensure that any PPE supplied is worn, employees in turn must ensure that they wear the equipment provided and know the procedures for reporting any loss or defect to their Contractor.

1.3.7.6 Work at Height

1 The fact that some form of fall-arrest equipment is to be used is indicative that work at height is to be carried out. These Regulations place duties on Contractors, the self-employed and employees to ensure that such work is carried out safely.

2 The key provisions of these Regulations are that Contractors should:

(a) where it is reasonably practicable, avoid the need to carry out work at height

(b) where such work cannot be avoided, make sure to select the most appropriate work equipment for the work and to prevent falls

(c) reduce the distance, and potential consequences, of any fall

(d) ensure that the work is risk assessment based and that it is carried out safely by competent persons

(e) ensure that equipment used for working at height is appropriately selected and inspected as specified

(f) ensure that measures are taken to prevent anyone being injured by falling objects.

1.3.7.7 Lifting Operations and Lifting Equipment

1 The definition of 'load' within these Regulations includes a person. This means that if it is foreseeable that the equipment may be used for lifting a person, then these Regulations will apply. So inertia reels, harnesses, strops and other equipment are likely to be covered.

2 The main requirements of these Regulations are that:

(a) lifting equipment and accessories must be of adequate strength and the lifting equipment stable, for each lift undertaken

(b) lifting equipment used for lifting persons is constructed and used so as to protect the safety of the person(s) being carried

(c) the load must be under full and proper control at all times

(d) lifting equipment and accessories must be clearly marked with their safe working load and other markings if designed for lifting persons

(e) every lift must be properly planned by a competent person, properly supervised and carried out safely

(f) generally lifting equipment must be subjected to a programme of inspections and thorough examination as is appropriate.

1.3.7.8 Inspection and thorough examination

1 The frequency and type of inspections and thorough examinations should be determined by a competent person. This is quite simply because the risk of damage will depend on the work activity and environment. For example, a harness worn by a demolition burner will probably require more frequent checks than that of a utility engineer inspecting street lighting columns.

1.3.7.9 Safety nets

1 Nets are an area where complying with best practice means testing, inspection record keeping and storage facilities are required to ensure that the net itself is fit for use. It is important that the end users appreciate that a safe net is not simply about whether the net erectors have a training records card, but also look deeper to check that the net itself has been checked and inspected.

2 There are a number of British Standards which relate to safety nets. They should be manufactured to the requirements of EN 1263-1 and erected in accordance with EN 1263-2. This latter standard gives information on the installation and use of safety nets.

3 A further standard, BS 8411, contains construction-specific information and more importantly a list of duties for the parties usually involved in construction projects.

4 This standard specifies that anyone who is planning the installation of a safety net system should take into account the:

(a) experience and competence of the net erectors

(b) sequence and type of work being carried out during installation and removal

(c) sequence of construction work to be carried out whilst the nets are in position

(d) provision of effective anchorages

(e) means of access for erecting and removal

(f) access for inspection, debris removal and temporary repair

(g) clearance distances below the net

(h) protection of anyone below

(i) recovery of anyone who has fallen into the net.

5 Modern safety nets are efficient at saving lives and preventing injury. They are an energy-absorbing system designed to minimise the consequences to the person who has fallen. Safety nets should be erected as close as possible to the working level to minimise the height of any fall that may occur.

6 There are two types of net manufacture.

(a) **Knotless.** These provide energy absorption by permanent plastic deformation (stretching) of the net material.

(b) **Knotted.** This, generally heavier and older type of net, provides energy absorption by tightening at the knots and permanently deforming.

7 Safety nets are manufactured in square or diamond mesh, with two mesh sizes: 60 mm and 100 mm. The 100 mm is the normal mesh size used in the UK.

8 All safety nets should carry an identification label. This includes the date of manufacture; the net type, class and size; and reference to the British Standard EN 1263-1. It should also carry a unique serial number for record purposes and traceability.

Fall heights

9 The positioning of a safety net system is critical to minimise the height of falls that may occur. Although safety nets are designed for a maximum fall height of 6 m, the maximum fall, if installed directly under the workplace, should be under 1 m.

10 When nets are installed, the maximum amount of sag in the net should be no more than 10% of the bay width.

11 When a load or person falls into a correctly erected net, the net material will deform as it absorbs the energy from the fall.

12 It is therefore critical to provide adequate clearance below the net, to allow the deformation to occur without the load or person striking the ground or some other object.

13 If a person were to fall 2 m into a net between 5 m and 9 m wide, the total deformation, including the erection sag, may be between 2.6 m and 3.5 m, depending on the width of net. It is essential to check the manufacturer's specification to ensure that there is adequate clearance below the planned net position.

Competence

14 The way in which safety net systems are installed is critical. Not only must those installing the net system be trained and competent, so must the people who carry out the routine inspection of safety nets.

15 The issue of competence is important, as a handover certificate should be issued. Always receive a handover certificate from the riggers for each section of netting as it is completed.

16 There are industry agreed standards and qualifications for training in the rigging and inspection of safety nets. The training of inspectors is aimed at site management staff as well as professionals within the industry.

Periodic testing

17 Safety nets are provided with short lengths of test cord attached to the net. These cords carry the net's unique serial number and are so fitted that they receive the same environmental exposure as the net material. At yearly intervals, a test cord should be detached from the net and sent back to the manufacturer so that it may undergo a tensile failure test, to monitor the degradation of the net material through exposure to sunlight. Typically a net is made with three so called 'test diamonds'. The presence or absence of these gives the site manager a clear indication as to whether the basic testing regime is in place.

Inspection

18 Where safety net systems are erected, they should be inspected on a weekly basis by a competent person to ensure that they are still in a safe condition, fixed correctly and will provide the fall-arrest capability if required.

19 Inspections should be carried out more frequently if circumstances indicate that the integrity of the net system is in doubt.

20 A net should also be inspected after a person or substantial load has fallen into it, to determine whether it should remain in service or be replaced. In some cases, it may be necessary to seek specialist advice.

21 Findings of all inspections need to be recorded.

Care of nets

22 Care should be taken to reduce to a minimum unnecessary wear and mechanical damage likely to weaken the net. Materials must not be stacked on it and the deliberate jumping into, or dropping of objects on to nets must be prohibited, as permanent deformation may occur.

23 The following sources of damage or wear should be avoided as far as possible:

(a) dragging the net over rough surfaces

(b) contact between the net and sharp edges

(c) an accumulation of debris in the net

(d) any sparks from hot work, welding, grinding, burning operations, hot gases from blowlamps, or hot ash from chimneys or furnaces

(e) chemical attack

(f) any form of radiation.

24 Special care should be exercised and precautions taken to prevent the net and any supporting framework from being struck by loads on moving vehicles or by the vehicles themselves.

25 Regular inspection is necessary to ensure that the nets remain serviceable. The net manufacturer should be consulted when there is any doubt about the suitability of nets for use in hazardous conditions, after any known contamination or when deformation has occurred.

26 When erecting nets in the vicinity of electricity lines or overhead power cables, the appropriate authority should be consulted before work starts.

Maintenance

27 Nets must always be inspected after use and before storing to identify any damaged areas. Glass, metal, grit and other debris should be removed to prevent abrasion.

28 If contaminated by acids or alkalis, nets should be thoroughly washed, preferably by hosing, and allowed to dry naturally away from heat.

29 If areas of damage are found or chemical damage is suspected, contact the manufacturer to obtain a list of competent people able to repair or clean the nets.

Storage

30 Nets should be stored away from heat, chemicals and solar radiation.

31 Nets should be stored in dry conditions.

32 Nets should be stored to minimise vermin attack.

33 Wet nets should be dried naturally.

34 Storage cupboards should be well ventilated.

35 Nets should be turned periodically to allow air circulation.

36 If stacked, nets should be packed up clear of the ground.

Rescue from a net system

37 Where the net is erected as close as possible below the work area, many of the situations where persons enter a net will be minor 'step-ins', with the person able to climb out unaided.

38 On other occasions, a person may fall a considerable height into a net. They may fall onto materials lying in the net, or strike their head or body on, for example, structural steelwork during the fall.

39 When such accidents occur, extreme care must be taken during the rescue of the person lying injured in the net. Due to the 'stretching' nature of the net, it is possible that any rescuer entering it could inadvertently and unavoidably cause further injury to the victim.

40 It is therefore essential that Contractors using safety net systems have, as part of their risk assessment process, emergency procedures written for:

(a) treating first aid needs whilst the injured person is in the net

(b) emergency recovery from a rigged net system.

1.3.7.10 Other soft landing systems

1 Alternative soft landing systems are an effective alternative to safety nets in some circumstances.

2 Designed to be used in buildings with a storey height of up to 2.5 m, one type of system comprises large polypropylene bags (typically 2.5 m long x 0.55 m wide x 0.55 m deep) that are packed with polystyrene chippings or another energy-absorbing material. The depth of the bags both cushions a fall and reduces the distance of that fall (by the depth of the bag).

3 The bags are linked together with plastic snap-clips to completely fill the area over which protection is required. They can also be used on the first or subsequent floors while trusses are being installed or in the roof space when fixing bracings.

4 An alternative system that may be considered in appropriate circumstances is the use of air-filled bags. Similar to the above, bags of varying sizes may be clipped together to completely fill the area over which fall-arrest protection is required. Air bags require an air compressor running all the time that fall-arrest is required, to maintain the pressure in the air bag system. These devices work on the principle of a controlled rate of constant inflation and leakage so that the air bags will absorb the energy of someone falling on to them without bouncing.

5 Whilst soft landing systems do not prevent falls, they are very effective in eliminating injuries in falls of less than 2 m.

1.3.7.11 Safety belts, harnesses and lanyards

1 If fall prevention measures (for example, working platforms, barriers, guard-rails) or collective fall-arrest measures (safety nets or other soft landing systems) are not practical, an alternative safe system of work must be employed. This safe system may require the use of safety harnesses and lanyards, but it should be a last resort. Whereas safety nets and other soft landing systems are 'collective measures', i.e. they automatically provide protection for everyone working above them, safety harness systems only protect the user, and only then if the equipment is used correctly.

2 Care must be taken when planning to use a safety harness, lanyard and energy-absorbing system since, depending on where the lanyard is anchored, a falling person may fall around 4 m before the fall is arrested.

3 One of the limitations of using such fall-arrest equipment is that it only protects a person if they adjust and wear the harness properly and connect the lanyard to an appropriate and secure point. The use of any such system requires a high degree of training, competence and supervision.

Training

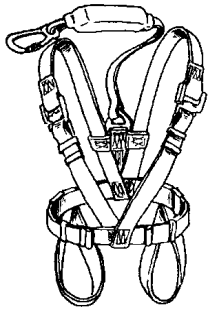
4 Training should only be carried out by competent accredited third party trainers / companies, following industry guidelines. Training should refer to the manufacturer's instructions and should emphasise the importance of following those instructions.

5 It should cover the selection, fitting, adjustment, maintenance and use of the safety belt or harness, and explain the choice and use of suitable anchorage points. Employees should not be permitted to use the equipment before adequate instruction has been received, and they

have been judged to be competent in its use.

6 Safety belts and harnesses are wrongly regarded by some workers as an encumbrance and a restriction on their freedom of movement. The fact that a safety belt or harness can prevent serious injury or even save a life is often ignored.

7 The problems arising from such attitudes can and must be solved by applying the principles of good health and safety management. These include educating employees in the need for the equipment, training them in its use, ensuring it is provided and, through adequate supervision, ensuring it is always used.



General purpose safety harness

Types of belt or harness

8 While the British Standard which defined the various types of belt and harness has been replaced by a European Standard, the common construction industry terminology for these pieces of equipment is as shown on the next page.

(a) A - Pole belt

(b) B - Chest harness

(c) C - General purpose safety harness

(d) D - Safety rescue harness.

Selection of equipment

9 The correct selection of a safety harness or safety belt is important. If a person falls more than 600 mm when using a safety belt, serious injury can be sustained due to a heavy load being exerted on the spine and internal organs. Safety belts should only be used for pole access or other similar specialist access needs.

10 If any doubt exists concerning the suitability of a piece of equipment for a particular task or type of work, further information and advice should be sought from the manufacturer.

11 Whatever type is chosen, it should give a high degree of safety allied to mobility and wearer comfort.

12 The main characteristics of the types of appliance, together with an indication of their uses, are given below.

13 **A - Pole belt.** A simple waist belt for use by pole linesmen and for other similar tasks. They are not intended for situations where a drop may exceed 600 mm.

14 **B - Chest harness.** A safety belt with shoulder straps, for use where a lanyard and anchorage point limit the drop to a maximum of 600 mm. It must be worn quite tightly to prevent any slippage after a fall.

15 Both A and B above are for very specific and for restricted use only.

16 **C - General purpose safety harness.** A full harness with thigh and shoulder straps. In the event of a fall, a person is suspended in a reasonably upright position from the attachment point. If the harness is of the right size and properly adjusted, the wearer cannot fall out.

17 **D - Safety rescue harness.** Designed to be worn by anyone in a confined space or location where they may be overcome or incapacitated and need to be rescued. A safety rescue harness looks similar to Type C, but will support a person almost upright for rescue purposes. It is intended for a maximum drop of 600 mm.

18 A competent person should draw up a schedule for testing and examination, which is likely to also include a requirement for thorough examinations at six-monthly intervals and user-checks each time the equipment is used. The six-monthly examination is a detailed visual examination, typically following cleaning where the harness is checked for contamination by oils and other solvents as well as abrasion and damage. The user check is simply to make sure that 'all the bits' are still there and there are no obvious defects.

1.3.7.12 Type of lanyard

1 There are several types of lanyard, each intended for a particular purpose.

2 **Fall-arrest** lanyards incorporate an energy-absorbing feature to reduce the shock loading on the body of the person who has fallen when the fall is arrested.

3 **Twin tailed lanyards** are a type of fall-arrest lanyard that allows greater mobility at height by enabling the repositioning of one tail at a time so that the user is constantly 'clipped on'.

4 However, this type of lanyard can pose additional risks to safety if it is not used correctly. If only one tail is clipped to a secure anchorage and the second tail is not located correctly, then during a fall the second tail could loop over a fixed object and arrest the fall before the energy-absorber has deployed, which may cause severe personal injury.

5 The second tail must never be clipped back on to the user's harness unless it is fitted with purpose-fitted 'parking points' that will break away from the harness if the second tail comes under tension. Alternatively, the second tail can be either left to hang free or **(on this type of lanyard only)** be simultaneously clipped to the same secure anchorage. If there is any doubt about these lanyards' safe use, the supplier or manufacturer should be consulted.

6 **Restraint lanyards** are shorter and used as a means of limiting the range of movement of the wearer to stop them entering an area of danger, for example to prevent a cherry picker operator from being thrown out of the basket. These lanyards are not designed to arrest falls and have no energy-absorbing feature. Sometimes two of these may be worn at the same time, with each lanyard fixed to a clip on either side of the harness to make the harness what is termed a 'work positioning harness'.

7 Irrespective of the type of lanyard used, they are only effective if the free end is securely anchored to a suitable anchorage point.

8 Manufacturers and suppliers will advise on the appropriate type of lanyard for particular work situations.

Selecting the anchorage point

9 In order to limit the drop, the anchorage points should always be as high as possible above the person and as near to vertical as possible in order to avoid 'the pendulum effect'.

10 Anchorage points must be capable of withstanding the anticipated shock loading.

11 Consideration should also be given to how persons would be rescued following an arrested fall, particularly when work is from high structures. Some harness manufacturers also produce rescue systems that enable a single rescuer to raise a suspended person back to the working platform or safely lower them to ground level.

Markings on belts and harnesses

12 Safety belts and harnesses must be clearly and indelibly marked or permanently labelled with the following information:

(a) the British Standard, or International Standard, to which it conforms

(b) the name, trademark or other means of identification of the manufacturer

(c) the year in which the harness or belt was manufactured

(d) the type of belt or harness

(e) the manufacturer's serial number

(f) the company serial number, or other recognition system, for recording maintenance and inspections.

13 Under these Regulations the safe working load would also be required, and it would be common to see some form of marking that indicates that the harness has been tested.

Markings on lanyards

14 Lanyards which are not permanently attached to belts or harnesses must be clearly and indelibly marked or permanently labelled with the following information:

(a) the British Standard, or International Standard, to which it conforms

(b) the name, trademark or other means of identification of the manufacturer

(c) the year of manufacture

(d) the manufacturer's model number and the type of belt or harness with which the lanyard is designed to be used

(e) the company serial number, or other recognition system, for recording maintenance and inspections.

15 Ideally, lanyards will have a label with the words (or similar):

> *'For maximum safety attach the free end to a point as high as possible above you and avoid looping the lanyard around small joists and angles with narrow edges.'*

16 Lanyards should preferably be permanently attached to belts so that 'longer' lanyards cannot be substituted.

Shock absorbers

17 If a person wearing a harness and lanyard falls, there is a considerable shock loading to the body. The further the fall, the greater the shock. Generally speaking, the maximum distance a person should fall before a fall is arrested is 2m.

18 Shock absorbers in the form of tear-away stitching, stretch springs or a deforming metal strip are built into fall-arrest lanyards as a means of reducing the shock loading. Once a lanyard has been used to arrest a fall and the energy-absorber has been deployed, it must be discarded.

Arrester devices

19 These devices are similar in operation to the 'inertia reel' safety seat-belts fitted in cars.

20 The safety harness is attached to a self-reeling cable which is securely anchored. The wearer is free to move normally but, in the event of a sudden movement (i.e. a fall), the locking device is brought into operation.

21 Most 'inertia reel' type arresters are only designed to safely arrest someone who has fallen from a position directly below, or very close to, the anchorage point (which should be above

the head-height of the user). They are not designed to compensate for the 'pendulum effect', which will occur when the faller is a significant horizontal distance from the suspension point.

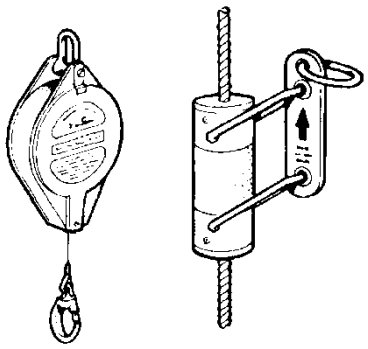
22 A typical misuse would be to see a line rigged along the ridge of an industrial roof with inertia reels fixed to it by carabiners. The work being carried out is not actually on the roof but on a lower level, resulting in the safety lines being stretched, and possibly abraded, across the lower edge (eaves) of the pitched roof.

23 The issue is that most examples of this type of device are not tested for 'over the edge' type falls in which the retractable lanyard is pulled tight across the edge of a surface, for example a roof sheet or floor slab, by the weight of the fallen person. In these circumstances it has been reported that the lanyard could snap or fail to limit the height of the fall to a safe distance.

24 If this is the proposed work method, then advice needs to be taken from the manufacturer that their equipment will work satisfactorily in this manner.

25 Various other types of fall-arrester are often incorporated as a permanent fixture into the structure being built, such as a traveller on a pre-tensioned vertical cable. There are also proprietary systems where the lanyard is attached to a traveller which moves along a pre-positioned and tensioned horizontal or vertical steel cable. This permits movement around corners and past obstacles without the need to unclip.

26 Where the client provides this equipment as is common in many cases, care still needs to be taken that it has been inspected and checked as required and that the users understand how it works.



Self-reeling cable and secure anchor

Storage

27 While not being worn, appliances should be stored in a cool dry place and not subjected to direct **sunlight**. The use of purpose-designed cabinets which allow ventilation is recommended. If the appliances get wet, they should not be dried by direct heat.

28 The equipment should not be subjected to unnecessary strain or pressure and must be kept free from contact with sharp implements, corrosives and other possible causes of damage.

29 Recommended cleaning instructions should be followed.

Inspection

30 The wearer must make a visual inspection of safety equipment before use. The equipment should be examined by a 'competent person' at least once every six months and a record kept of this inspection.

31 Safety belts, harnesses and lanyards should be examined by a 'competent person' after a fall

or other circumstances in which the equipment has been deployed, before it is reissued for use.

32 Safety belts, harnesses and lanyards should be taken out of use if found to be damaged or defective.

33 Under most circumstances, knots in lanyards would be considered to be a significant problem. Typically, a knot is presumed to reduce the strength of the rope or strop by 50%.

34 Particular attention should be directed to the points below.

35 **Webbing and leather.** Examine for cuts, cracks, tears or abrasions, stretching and distortion, damage due to deterioration, contact with heat, acids or other corrosives and rot.

36 **Snap hooks.** Examine for damaged or distorted hooks, faulty springs and strained jaws.

37 **Buckles.** Carefully examine the shoulders of buckles; inspect for open or distorted rollers, and undue wear.

38 **Sewing.** Examine for broken, cut or worn threads, open seams and failed stitching.

39 **Lanyards, ropes and chains.** Examine for damage or signs of wear and, in the case of ropes, inter-strand wear, unravelling extension and fusion.

40 For webbing lanyards, specific attention should be given to:

(a) cuts to the edge of the webbing (as a result of being choke-hitched around steelwork)

(b) surface abrasions to surface or edges

(c) damaged stitching

(d) a knot in the lanyard other than the manufacturer's

(e) results of chemical attack.

41 **Unauthorised modifications.** Examine equipment for 'home-made' attachments or adaptations. It should be impressed upon the wearers that their lives could depend upon the continued efficiency and durability of their safety equipment and that, by frequent personal inspections, the possibility of equipment failure will be reduced to a minimum.

Records

42 A card or history sheet should be kept for each harness and lanyard, and particulars of all examinations and other details of interest recorded. Each harness and lanyard should be marked with an individual serial number for identification purposes.

Dead weight anchor devices

43 The use of dead weight anchors in accordance with International and British Standards EN 795 and BS 7883 (Class E) has become an acceptable means of providing a safe fall-arrest anchor device on flat roof surfaces, particularly where it is not possible to penetrate the roof surface.

44 However, the increased usage and range of devices developed over recent years has revealed a number of factors not previously considered.

45 To ensure the safety of users, Contractors should consider the following points:

(a) Have the EN 795 and BS 7883 tests been carried out in accordance with the latest version of BS 7883?

46 While many dead weight anchor devices have been tested for use on single-ply membrane roofs, it has recently been found that the performance of some (and, possibly all) is far less satisfactory on embossed membranes rather than on plain, smooth membranes. This is thought to result from the reduced contact surface area between the anchor device and the roof surface. This effectively reduces the amount of friction,

47 Anyone who wishes to use a dead weight anchor device on an embossed membrane surface or a surface that is not smooth should seek advice from the anchor device manufacturer before proceeding.

48 The attention of users is drawn to the fact that no standard, at present, specifies tests for fall-arrest systems in the following circumstances.

(a) When a full body harness is connected via a retractable fall-arrestor to a dead weight anchor device using a connector.

(b) When a full body harness is connected via an energy-absorbing lanyard to a dead weight anchor device using connectors.

49 Users who wish to connect such a system to a dead weight anchor device are advised to seek confirmation from the manufacturer of the retractable fall-arrestor or energy-absorbing lanyard that their products are safe to use in this way.

Suspension trauma

50 One of the effects of being suspended in a harness is a tightening of the leg straps that bear the body weight of the suspended person. This can affect the blood circulation in the legs and cause the suspended person considerable discomfort, possible kidney failure and eventually unconsciousness and death. This is known as suspension trauma. It is essential that someone suspended in a harness is recovered in the shortest possible time.

51 Fall victims may be able to slow the onset of suspension trauma by relieving the pressure on their legs by pushing down vigorously with the legs, by positioning their body in a horizontal or slight leg-high position, or if there is something nearby upon which the feet can be rested, by standing up. However, the design of the harness and injuries sustained during the fall may prevent these actions being taken.

52 Some harnesses are fitted with stirrups that are secured out of the way by Velcro during normal use but can be lowered after a fall to enable the person to effectively 'stand up' in the harness.

53 The person must be placed in a horizontal position, preferably the standard 'recovery' position. It is essential that the emergency services are summoned immediately if it becomes apparent that there could be a medical emergency situation.

1.3.7.13 Rope access (abseiling)

1 This technique is only to be carried out by 3rd party accredited fully trained and competent persons. It is generally suitable for inspection and other similar activities but not for general construction work except in exceptional circumstances. An example might be the rigging of safety nets where it is not reasonably practicable to do it by using other means of access such as a MEWP or another form of working platform.

2 Generally anyone carrying out roped access uses a system that incorporates two separately anchored lines: the 'working line', which is the means of access, and a 'safety line', which prevents a fall if the working line fails.

3 This requirement may be ignored in exceptional circumstances where:

(a) the risk assessment shows that the use of a second line would increase the risk to the person

(b) effective alternative safety measures are taken.

4 The person must be connected to both lines by automatic locking devices that prevent an uncontrolled descent should the person lose control of their actions.

5 The ropes, harnesses and other equipment are covered by the six-monthly thorough examination and inspection requirements.

6 Protection must be installed if there is a danger of materials or equipment falling onto persons below.

7 It is essential that only persons trained and competent in the use of rope access equipment, to current industry standards, are allowed to carry out such activities.

1.3.7.14 Boatswain's chairs

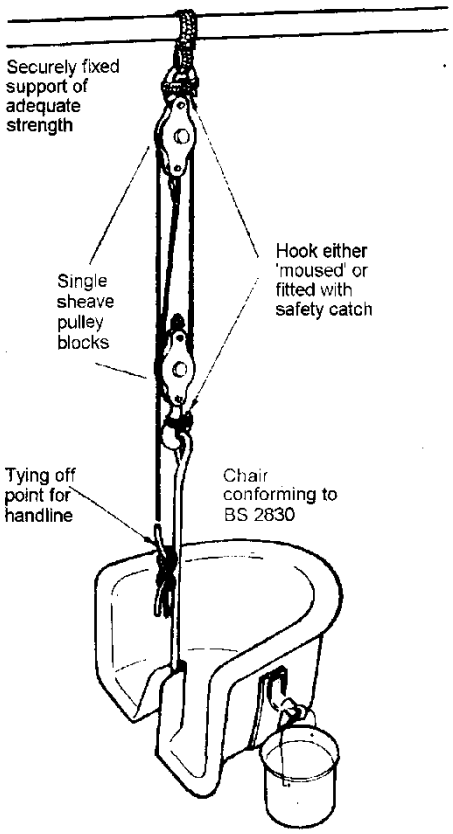
1 Boatswain's (or bosun's) chairs should only be used where the work is of a relatively short duration and where no other means of access or working, such as a suspended scaffold, is practicable.

2 Note: Independently anchored safety line and safety harness not shown

3 A person in a boatswain's chair is extremely vulnerable. They are suspended high above the ground and, if anything goes wrong, the chances are that they are beyond rapid or immediate help. The risk assessment should cover rescue procedures should an emergency occur.

4 The installation and use of a boatswain's chair must be supervised by an experienced and competent person. Only properly trained and competent operatives should be permitted to use them. These Regulations must be strictly observed.

5 The traditional non-British Standard boatswain's chair is still used by specialist trades such as steeplejacks and lightning conductor engineers. Operatives need to be fully trained and competent before being permitted to use and work from it.



Boatswain's chair

6 Where possible, consideration should be given to the provision of a second safety line connected to a harness being worn by the operative. In this way, should there be a problem with the Boatswain's chair, this safe system of working will prevent a fall. It may not always be possible and if this is the case, then the reason for this should be recorded as part of the work at height risk assessment.

Rigging

7 A boatswain's chair should always be rigged with a pair of single sheave pulley blocks, having a safe working load of at least 225 kg. Outriggers and other supports must be strong enough, and be securely fastened down. Where weights are used, a safety factor of four is required.

8 A boatswain's chair is classified as a 'roped access system', therefore, the system should be rigged with a separately anchored safety line complete with an automatic locking device

attached to the user of the seat that prevents or limits a fall should the primary suspension system fail.

Chair

9 A boatswain's chair should meet the following requirements:

(a) compliance with BS 2830. A certificate of compliance should be available from the manufacturer

(b) be of a recommended size:

(i) between 450 mm and 610 mm wide

(ii) not less than 225 mm deep

(iii) have a back not less than 250 mm high

(c) if the chair has a single central leg or suspension member, this should be without sharp bends and be securely fixed to the seat as far back as practicable, so that the user sits with one leg at either side

(d) be provided with a safety harness to prevent the occupant falling out

(e) the back and the suspension member should be placed so that no one can fall out

(f) the suspension point must be at least 500 mm above the seat, with provisions for suspension. No part should be able to become detached

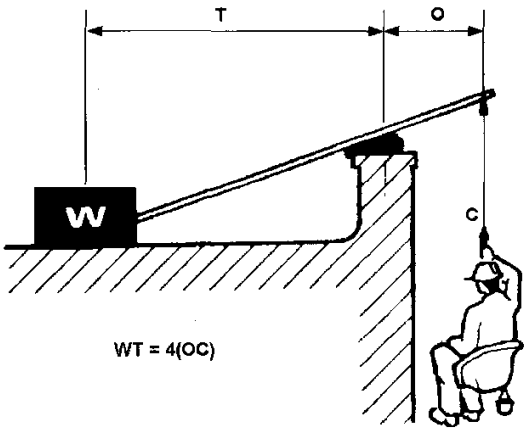
(g) be made for a safe working load of 115 kg. A proof test of 150 kg is recommended.

Protection of the public

10 When the risk assessment identifies that work from a boatswain's chair will take place above areas where people may be present, adequate protection must be installed to prevent them being injured from falling equipment or materials.

Safety factor

11 The counterweight (W) x tail length (T) should be at least four times the projection length (0) x weight of the person, the chair and any tools or equipment being carried (C).



Calculation of safety factor

12 Note: Independently anchored safety line and safety harness not shown

Lifting equipment

13 All ropes and chains used should be thoroughly examined before their first use for any sign of chafing or wear, and then every six months. They must be securely attached to the chair and to the anchor. Swivel connections should be used to prevent spinning.

14 Fall ropes should not be less than 18 mm in diameter. They should be tied off correctly in the working position. The rope must not be removed from the cleat while the chair is in use; a controlled descent is achieved by removing the locking-hitch from the rope in the 'tied-off' position and easing it around the cleat.

Hooks

15 Hooks should be 'moused', 'C' shaped, or fitted with a spring-loaded device to prevent the displacement of the load.

Cradles

16 Cradles, which come within the category of suspended access equipment, may be used for window cleaning, painting, exterior maintenance and inspection.

17 They may be permanently rigged and attached to the roof, or be a temporary installation which can be dismantled. Safe access to the cradle must be provided, either at ground or roof level. Cradles, as 'man riding' equipment must be inspected at appropriate intervals and subjected to six-monthly thorough examinations.

18 Two main types of cradle in use within the construction industry are:

(a) those 3.2 m or less in length, suspended on pulley blocks with natural or synthetic fibre ropes
(b) those more than 3.2 m in length, suspended on wire ropes controlled by hand-operated or power winches which are mounted on the cradle.

19 Both types can be installed as:

(a) **Fixed cradle -** Rise and fall only
(b) **Travelling -** Capable of moving horizontally across the workface as well as rising and falling.

Rigging

20 The erection of a cradle must be carried out and supervised by an experienced, competent person who is familiar with the type of equipment being erected.

Outrigger

21 Timber poles, roller steel section or specially stiffened scaffold tube may be used. The framework must be secured at intersections to prevent displacement and the counterweight must be sufficient to give a resisting moment at least three times the overturning moment,

$$\text{i.e. } W = \frac{3 \times O \times C}{T}$$

Where: W = Counterweight

0 = Overhang

C = Total weight of fully loaded cradle

T = Tail length

22 Where a traversing track is required, this should be an alloy or steel section, properly joined or shackled to the outriggers. If the track is joined to provide a continuous run, this must be

with both the load-bearing connectors and the join supported by an outrigger. End stops must be in place at either end of the track, to prevent the trolley from running off.

23 When installing temporary cradles, a check must be made that nothing on the face of the structure, for example, satellite dishes, will obstruct its range of travel.

24 Care must be taken not to damage the roof or structure, and adequate packing should be used on copings.

Markings

25 To identify compliance with BS 2830, markings should clearly show the safe working load and maximum number of persons held.

Working platform

26 Should be not less than 600 mm wide.

27 Should be closely boarded (except for drainage).

28 There must be no gaps in platforms through which materials may fall and injure people below.

29 Timber boards should overhang the stirrups by at least 100 mm but not by more than 200 mm.

30 Should be supplied with a non-slip surface, if possible.

Toe-boards

31 Ideally will not be less than 150 mm high.

Guard-rails

32 Should be at least 950 mm above the working platform.

33 There should be an intermediate guard-rail or other substantial barrier.

34 The space between guard-rails and toe-board should be not more than 470 mm.

Suspension points

35 Should be positioned centrally in the width of the platform.

36 Heights should be not less than 1.67 times the clear width of the platform.

Safe working distributed load

37 225 kg when there is a 2 m clear working length.

38 295 kg when there is 2-3.2 m of clear working length.

39 The maximum number of persons allowed on a platform should be displayed. (This does not take into account the weight of any materials.)

1.3.7.15 Stirrups

1 Stirrups should pass under the platform and be secured.

2 If hinged for operational purposes:

(a) the pivot point should be non-detachable

(b) the stirrup should be able to be locked in the vertical position.

3 The stirrup should be hinged to a metal strip of the same strength as the stirrup which is fixed under the platform.

Demountable stirrup

4 Should be designed so that it cannot become accidentally detached.

5 Guard-rails required for hinged and demountable stirrups should be secured with captive devices.

Suspension

6 Ropes should be not less than 18 mm in diameter and should be either natural fibre or synthetic fibre, conforming to EN standards, as appropriate.

7 Wire ropes used to suspend cradles should have a safety factor of at least eight.

8 The proper inspection of wires and ropes is essential to safety, with renewal as soon as necessary.

9 Suitable devices should be fitted or other steps taken, where practicable, to prevent the carrier falling if the main support fails.

Pulley blocks

10 Must be suitable for the ropes which are to reeve through them.

11 The safe working loads for cradles are:

(a) 250 kg for cradles with 2 m clear working lengths

(b) 380 kg for cradles with 2 - 3.2 m clear working lengths.

Winches or similar

12 The safe working loads for winches are:

(a) 225 kg for cradles up to 2 m in length

(b) 295 kg for cradles up to 3.2 m in length.

Hooks

13 As for boatswain's chairs

Protection of the public

14 When working above areas where people may be present, adequate protection must be installed to prevent people being injured from falling equipment or materials.

Fall-arrest devices

15 These are provided to avoid the consequences of a suspension rope failure. They must be installed in accordance with the manufacturer's instructions.

16 If such a device is not used, operatives must wear a safety harness attached via a self-locking device to an independently anchored safety line.

General

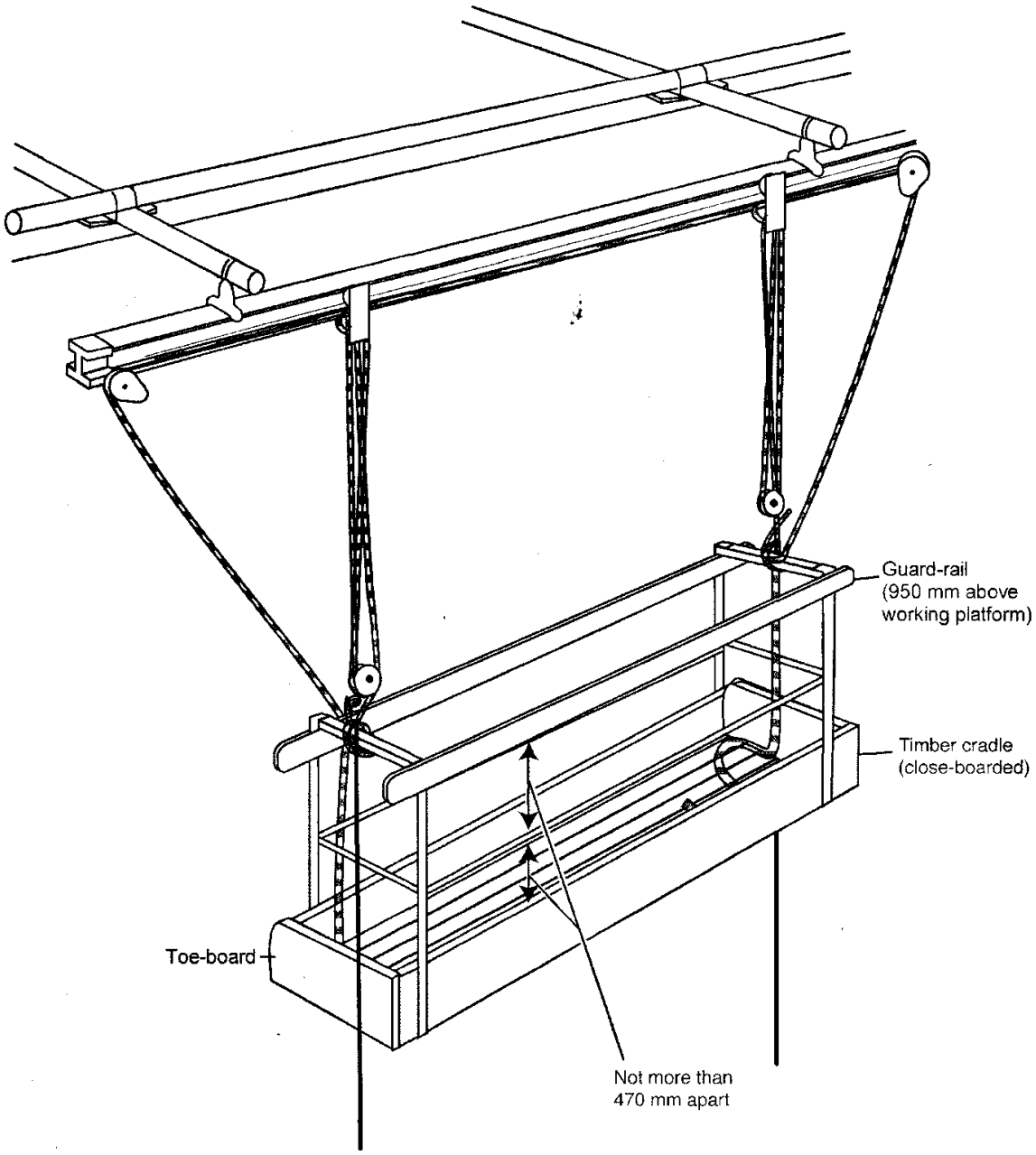
17 Care must be exercised when planning works at elevated positions, where the 'safe distance' from electric cables may be reduced. The risk assessment should specify appropriate distances and precautions.

18 Only competent and properly trained personnel should be employed in the erection and use of cradles.

19 All equipment must be thoroughly examined at six-monthly intervals and tested in compliance with the relevant legislation and standards, and proper records must be kept,

20 The public should be warned of operations.

Typical suspended cradle



Note: Secondary safety devices or independently anchored lines not shown

Construction Site Safety
1.3.7 Appendix 1

Safety nets

Safety checklist

Before use

1 Has a risk assessment been carried out?

2 Are the safety nets rigged to minimise the height of any fall such that an uninjured person can simply climb out?

3 If not, have emergency rescue procedures been established?

4 Have checks been made to ensure that free fall distances are not more than specified?

5 Have the safety nets been rigged by trained and competent persons?

6 Is the use of safety nets to be supervised by competent persons?

7 Have safety nets been inspected prior to current use?

8 Are complete and proper records kept of all inspections and examinations?

9 Has the safety net system been inspected within the previous week?

10 Are all anchors and supports secure?

11 Is the safety net clear of all debris?

12 Have checks been made to ensure that nothing is positioned under the net to reduce the minimum clearance distance required?

During use

1 Is the net being kept clear of debris?

2 Are the safety nets inspected:

(a) after a fall

(b) for the effects of contamination

(c) every seven days during use

3 to ensure that the safety net is not damaged and that the anchorage points and ties are sound.

After use

1 Are safety nets inspected for any damage following use and before being stowed away?

2 Are any defects reported promptly and correctly?

3 Are repairs only carried out by a competent person?

4 Are adequate records maintained as to the use and condition of safety nets?

5 Are safety nets dried and stored correctly?

6 Are the annual condition tests being undertaken?

Construction Site Safety
1.3.7 Appendix 2

Safety belts, harnesses and lanyards

Safety checklist

Before use

1 Has a risk assessment been carried out?

2 Have emergency rescue procedures been established?

3 Has the most suitable harness or belt been selected for the type of operation and hazard?

4 Are the operatives who are to use the equipment adequately trained in its inspection and use?

5 Is it all in good order and fit for purpose?

6 Is a secure and appropriately positioned anchorage point available?

7 Have checks been made to ensure that the weather conditions are such that an operative can work safely in the prevailing conditions?

8 Is there a schedule of detailed examination of the equipment?

9 Are records of the examinations kept?

10 Have steps been taken to see that adequate warning notices are displayed?

During use

1 Have safety lines been set by a competent person?

2 Are only authorised, trained and competent personnel allowed to use the equipment?

3 Is all equipment inspected before the start of work each day, following an established routine, particularly for damage to webbing lanyards?

4 Have set procedures been established and implemented?

5 Is horseplay strictly prohibited?

After use

1 Is the equipment inspected for damage?

2 Are defects reported promptly and correctly?

3 Is defective equipment quarantined (if it can be repaired) or discarded?

4 Is the equipment cleaned and stored correctly?

Construction Site Safety
1.3.7 Appendix 3

Boatswain's chair

Safety checklist

Before use

1 Has a risk assessment been carried out?

2 Have emergency rescue procedures been established?

3 Has a separately anchored safety line been installed?

4 Is the installation and use of a boatswain's chair supervised by trained, experienced and competent personnel?

5 Are the chair and associated equipment carefully examined for defects prior to use?

6 Is confirmation at hand that test and examination certificates are valid?

7 Has the safe working load been established?

8 Have checks been carried out to ensure that the user is both trained and competent in the use of the chair?

9 Are warning notices displayed and has notification of intention to carry out work been given?

During use

1 Is the chair free of materials or articles which could interfere with the user's control of the chair?

2 Has the fall rope been properly tied off whilst the chair is in use and always under or around a cleat to act as a brake?

3 Has a safe area been created below the work area or protection installed?

4 Is the safety line being properly used?

After use

1 Is the chair inspected for defects following its use?

2 Are chairs and ropes left in a safe condition, i.e.

(a) is the chair raised to the first floor level if possible, and the top rope secured?

(b) have the chair and rope been secured to prevent swing?

(c) have the ropes (and chair, if timber) been dried before storage?

Construction Site Safety
1.3.7 Appendix 4

Cradles Safety checklist

Before use

1 Has a risk assessment been carried out?

2 Have emergency rescue procedures been established?

3 Are cradles installed and supervised by a competent person?

4 Are cradles inspected and appropriate reports made?

5 Are current test certificates available for winches, wire ropes, blocks and so on?

6 Have users been properly trained?

7 Has adequate protection been installed and proper warning given to members of the public and other people who might be affected?

8 Have occupiers of the building been warned not to open windows?

9 Have steps been taken to erect the correct warning signs?

10 Have secondary safety ropes and harnesses been provided as necessary?

11 Is the safe working load of the cradle marked?

12 Has a check been carried out for obstructions on the face of the structure?

13 Have effective fall-arrest measures been installed?

During use

14 Is a competent person in charge of all operations when cradles are being used?

15 Are operations being carried out with authorised operatives only?

16 Are inspections carried out weekly?

17 Have checks been made to ensure that there are no knots or kinks in the ropes?

18 Are ropes correctly reeved on the drum with at least two turns left when the cradle has reached its maximum operating distance? (Power-operated cradles only.)

19 Have both power supplies and cables been checked before operating?

20 Have checks been carried out to the controls for correct function and to ensure that pendant controls are secured to the cradle?

21 Have all ropes been securely anchored?

22 Are the stops and over-runs operational?

23 Are secondary safety devices properly secured and anchored?

24 Has the cradle been tied-off to the building to prevent sway?

25 Have checks been made to ensure that the safe working load is not being exceeded?

26 Is the cradle kept clean and clear of rubbish?

27 Have all necessary precautions been taken to ensure that the platform is not slippery?

28 Are all tools carried in the cradle secured?

29 Is there adequate protection from above to stop any falling materials?

30 Are all necessary steps being taken to ensure that the proper access is being used?

31 Is the practice of climbing down ropes strictly prohibited?

32 Are all personnel aware that there must be no transferring between adjacent cradles?

33 Have all possible steps been taken to ensure that personnel do not allow ropes and cradles or connections to lie in gutters?

34 Are all operatives aware that use in high winds or adverse weather conditions is not safe and is prohibited?

After use

35 Are the cradle and all ropes, in a secure position to prevent unauthorised access or usage?

36 Are checks carried out to ensure that power supplies are isolated and control equipment is removed and secured?

37 Are defects and breakdowns reported promptly and correctly?

38 Are all warning signs removed after the completion of work?

Construction Site Safety

1.3.8 Safety with Steelwork

1.3.8.1 Key points

1 The majority of jobs that involve erecting steelwork will also involve working at height, and exposure to the associated potential hazards.

2 A schedule of erection should be in place to ensure the safe erection and stability of the structure until it is complete.

3 All steel erection must be the subject of a risk assessment and carried out in accordance with a method statement.

4 Ideally, the erection of steelwork will be carried out in such a way that those doing the job are on a stable working platform at all times, be that a scaffold or a mobile elevating work platform (MEWP). Operatives having to go onto the steelwork should be a last resort.

5 Ground conditions must be suitable to take the weight of MEWPs and their loads.

6 Designers have the potential to ensure that the erection of steelwork can be carried out safely, for example, designing-in lifting eye attachment points, or specifying ground-level fabrication.

7 The erection of steelwork will usually involve extended crane operations, the use of MEWPs in and around the new structure, lorry movements, steel laydown areas and possibly a lorry-park, all of which must be planned for when the site is first set up.

8 All lifting operations, including the use of cranes and MEWPs, must be carried out by, and under the control of, competent persons.

9 The presence of overhead power cables and the possible need to manually align steelwork components for connection are other potential hazards associated with the erection of steelwork.

1.3.8.2 Introduction

1 The majority of fatal accidents are as a result of falls from height. In addition, many serious accidents occur due to workers being struck by falling materials.

1.3.8.3 The Management of Health and Safety at Work

1 These Regulations place a requirement on every Contractor to make a suitable and sufficient assessment of every work activity to identify the hazards arising out of that work and the persons or groups who might be affected.

2 When hazards are identified, it is then the Contractor's duty to either eliminate the hazards or to put control measures into place to reduce the risks to health and safety arising out of the hazards, as far as is reasonably practicable.

3 The Contractor must provide all employees with comprehensible and relevant information on any risks that exist in the workplace and on any control measures that are in place to reduce those risks.

1.3.8.4 Work at Height

1 By its very nature, the erection of steelwork will usually involve a degree of working at height.

2 These Regulations require that Contractors:

(a) avoid the need to work at height where it is reasonably practicable to do so

(b) where this is not possible use work methods or equipment to prevent falls

(c) where this is not possible, use work equipment or other measures to minimise the distance or the consequences of falls

(d) ensure that all work at height is based on a risk assessment and is carried out safely by competent persons

(e) ensure that equipment used for working at height is appropriately selected and inspected as specified

(f) ensure that measures are taken to prevent anyone being injured by falling objects

(g) ensure that adequate emergency arrangements are in place in the event of an incident (rescue).

1.3.8.5 Provision and Use of Work Equipment

1 Any work equipment used in the handling or erection of steelwork, such as tirfor winches, wire rope slings, lifting gear, lifting tackle, MEWPs and even hand tools, must comply with these Regulations.

2 They require that a Contractor only supplies work equipment that is correct and suitable for the job and ensures that the equipment is maintained and kept in good working order.

3 The Contractor is also required to provide employees with all necessary information, instruction and training to ensure that they are competent to use any work equipment provided.

4 Where the use of the equipment involves a specific risk to the health and safety of employees, the use of the equipment must be restricted to competent and authorised workers only.

1.3.8.6 Lifting Operations and Lifting Equipment

1 Any lifting activity and the equipment used to carry it out must comply with the requirements of these Regulations. The term lifting equipment not only includes machinery such as cranes but also any device used to connect the machinery to the load, such as eye-bolts, hooks, slings. These are known as lifting accessories.

2 Briefly, these Regulations place legal duties on the Contractor to ensure that:

(a) all lifting equipment is stable in use and of adequate strength for the purpose for which it is being used - safe working loads

(b) lifting equipment used to lift persons, for example a passenger hoist, is designed for the purpose and is safe to use

(c) lifting equipment is positioned and

(d) installed so as to keep the load under full control

(e) lifting equipment is marked with its safe working load

(f) lifting activities are properly planned, appropriately supervised and carried out in a safe manner

(g) lifting equipment (including lifting accessories) is subjected to a scheme of periodic thorough examination for which reports are raised.

1.3.8.7 Construction (Design and Management) CDM

1 Many risks can be eliminated, avoided or reduced by careful attention to design and planning aspects before construction work starts. Any remaining risks can be controlled by the effective management of health and safety risks during the construction phase. Both planning and management are key requirements of these Regulations.

2 These regulations place duties on (amongst others) the client, the contractor and designers, and provide a framework for the management of risks, including those inherent in the handling and erection of steelwork.

3 These Regulations require that:

(a) everyone working on a project is competent to do what is required of them

(b) all parties involved in a project co-operate with each other in the interests of health and safety

(c) all parties involved in a project coordinate their activities in the interests of health and safety

(d) only authorised persons are allowed on to site.

4 In addition to the design and general health and safety management issues outlined above, in the context of steel erection, these Regulations cover:

(a) the stability of structures

(b) demolition and dismantling

(c) the presence of overhead cables (and in some instances, buried services)

(d) establishing traffic routes

(e) the safe use of vehicles

(f) temperature and weather protection

(g) lighting (if working in reduced level of light)

(h) are considered to be particularly relevant.

1.3.8.8 The stability of structures

1 Steel erection, by its very definition, involves creating structures, which these Regulations require to be stable at all times. In particular:

(a) all *practicable* steps must be taken to ensure that no person is put at risk by the collapse of any structure which may become unstable or weakened

(b) structures must not be loaded to an extent that they become unsafe

(c) any temporary means of supporting a permanent structure must be:

(i) designed and maintained to withstand any stresses and strains that are put on it

(ii) only used for the purpose for which it was designed, installed and maintained

(iii) not overloaded so as to render it unsafe.

1.3.8.9 Traffic routes and vehicles

1 Prior to and during steel erection, deliveries of steel on articulated lorries will be a feature of many jobs. In the context of this section, these Regulations place a legal duty on the person in charge of the site to ensure:

(a) that pedestrians and vehicles can move safely and without risks to health, so far as is *reasonably practicable*

(b) there are sufficient traffic routes, all of which must be suitable for the vehicles using them

(c) there is sufficient segregation between pedestrians and moving vehicles but where this is not *reasonably practicable:*

(i) other means of protection are provided, and

(ii) a means of warning pedestrians of the approach of vehicles, where the pedestrians would otherwise be at risk, is provided

(d) that (vehicle) loading bays have one exit for the exclusive use of pedestrians

(e) appropriate signs are erected in the interests of health and safety

(f) steps are taken to prevent the unintentional movement of any vehicle

(g) each vehicle must be operated in a safe manner with its load arranged safely

(h) every vehicle is fitted with means of warning persons who may be at risk when the vehicle is moving.

1.3.8.10 Manual Handling Operations

1 These Regulations require that where there is a risk of injury, Contractors must, so far as is practicable, avoid the need for employees to carry out any manual handling operations. Where this is not possible, the Contractor must make an assessment of the work to be carried out and take appropriate steps to reduce the risk of injury to employees.

2 Contractors must provide employees with adequate and suitable training in manual handling, and employees must follow any such information or instructions given and use the safe systems of work that have been put into place by their Contractor.

3 It is anticipated that the amount of manual handling involved in steel erection has been significantly reduced due to the improved standards of design and modem methods of access and working.

1.3.8.11 Design and planning

1 Design and planning considerations Contractors should follow:

Structural stability

2 The structure must be stable at all times from when the first piece of steelwork is put into position until it is completed.

3 Temporary supports, such as bracing, guys or stays, must be used during the erection of any structure which may be unstable or liable to collapse before it is completed. Additionally, where any work is carried out which is likely to adversely affect the foundations or stability of any existing building or structure (or one under construction), all practicable precautions, such as shoring, must be taken.

Temporary structures

4 Any temporary structure must be of good construction, adequate strength and stability, made of sound materials free from obvious defects and be properly maintained.

1.3.8.12 Safe means of assembly or making connections

1 Assembly of steelwork components or making connections should be planned so that erectors can do as much of the work as possible at ground level.

2 Where erectors have to work at a height, provision must be made for safe means of access to the connecting points and any other working places. Ideally, work will be carried out from MEWPs operating on a suitable floor surface. However, where this is not possible, design consideration should be given to:

(a) ensuring there is adequate working space and a suitable work platform for a crane

(b) connections between steelwork components that are simple to make off-site or ground-level assembly or fabrication to reduce work at height

(c) the provision of fixed work platforms and ladders

(d) the provision of anchorage points for safety nets and fall arrest devices.

Steelwork components

3 The size, weight and shape of individual steelwork components will influence safe handling and erecting. The designer should therefore consider the following steps:

(a) marking components as an aid to identification (also to prevent costly mistakes)

(b) optimising the length of structural members in an attempt to reduce the number of connections at height

(c) calculating the weights of components to assist in the estimation of safe crane capacities and the location of cranes

(d) identifying the positions where components should be lifted

(e) indicating centres of gravity where these are not readily evident

1.3.8.13 Site features

1 Potentially hazardous features should be identified that will conflict with health and safety.

2 Some typical examples include the following items.

Overhead electric cables

3 If there are any overhead power lines near the proposed erection site, the local electricity company should be consulted. Either the power lines should be made dead, temporarily rerouted or other suitable precautions taken to prevent any close approach to, or contact with, live overhead lines

Buried services

4 As well as a visual inspection for marker posts or obvious signs, a check should be made with the owner or occupier of the land and the various utility companies, including electricity, gas, water, telecommunication and cable TV companies.

Other site features which require attention

5 These features include:

(a) lack of space for the handling and storage of steelwork

(b) restricted (crane) oversailing rights and safety

(c) restricted area(s) for vehicle movements

(d) low resistance to ground bearing pressures

(e) poor access onto the site

(f) any buildings close to the site that may affect the erection process

(g) any rights of access that may bring members of the public close to the erection site

(h) ground contamination from previous use of the land.

Other contractors and their activities

6 Certain activities or processes on, or adjacent to, the site may have the potential to adversely affect the health and safety of workers on site. For example, noxious gases, vapours or dusts may be given off from chimneys, stacks, tank vents and ventilation ducts. These may not cause a problem at ground level but may affect steelwork erectors working at a height.

Managing the safe erection of steelwork

7 Following a detailed risk assessment of the work activity, the next step in ensuring safe work practices in erection is the preparation of a method statement.

8 This important document should detail the proposed erection scheme and should form part of the health and safety plan for the project.

Method statements

9 The amount of detail required in a method statement will depend on how big or complex the job is. However, method statements should be written for even small steel erection jobs. It is clear evidence that attention has been given to design and planning aspects, as well as being a plan to ensure that the project is completed without risks to health and safety.

10 A typical method statement should include the following points:

(a) details of how the project will be managed and health and safety risks eliminated, avoided or reduced

(b) information on the site, including any hazardous features, such as overhead electric power lines, and what effect these will have on the project

(c) details of plant requirements such as cranes, MEWPs and other lifting equipment, and the competencies required to operate them

(d) arrangements for the safe receipt, offloading, storage and handling of steelwork components on site

(e) details on where and how steelwork will be assembled prior to erection

(f) the sequential method of erecting the structure and how stability will be ensured at all times

(g) how activities such as slinging, lifting, unslinging and the initial and final connecting of steelwork components will be carried out safely

(h) the safety precautions to prevent falls from height. For example, arranging for as much assembling as possible to be done at ground level, minimising the number of connections to be made at a height

(i) the means of providing safe access and a safe place of work by methods such as mobile towers, temporary platforms and walkways

(j) details of the means of communication during lifting operations

(k) any requirement for safety nets, safety harnesses and fall arrester devices (provisions for design features should be specified, for example, attachment points for ladders, safety nets and fall-arrest devices)

(l) how people will be protected from falling objects. For example, use of screens, fans and debris nets, installation of barriers and warning notices at ground level

(m) a contingency plan for dealing with any problems that may arise.

Site access/egress

11 The Contractor should check that all of the vehicles associated with the erection or dismantling of steelwork can access and egress the site safely. It is envisaged that the vehicles will mainly be cranes and delivery lorries (delivering steel and MEWPs).

12 A safe location for lorries to park must be identified and communicated to employees. This area must not be immediately outside the site or on any access road if doing so would create an unacceptable obstruction or other hazards for passing traffic or pedestrians. On larger sites space should be allocated as a dedicated lorry or trailer park.

13 On sites where there is simply not space to park large vehicles, appropriate arrangements, such as a road or lane closure, must be made for delivery lorries (and possibly the mobile crane) to be parked on the public highway adjacent to the site boundary for the off-loading of the steel.

14 Where there is a loading/unloading bay for only a single lorry, a strict schedule of delivery times must be written, communicated to the steel delivery company and adhered to. In this instance it is highly advisable to identify a 'lorry holding area', to which lorries that 'miss their slot' can be sent pending the allocation of another unloading 'slot'.

15 Every effort should be made to avoid the need for vehicles to reverse, particularly out of the site gate and back on to a public road. Where this is not possible, suitable precautions must be taken, for example, the use of one or more signallers or an alternative traffic-control system.

16 Where it is considered unsafe for vehicles and pedestrians to use the same site entrance, one or more separate pedestrian entrances must be provided, clearly indicated and kept free of obstruction.

1.3.8.14 Housekeeping

1 Construction sites must, so *far as is reasonably practicable,* be kept in good order and a reasonable state of cleanliness.

2 Platforms, gangways, floors and other places must not be obstructed by loose materials.

3 Projecting nails or similar sharp objects in timber or other materials must be removed or knocked down to prevent injury.

4 Materials must be stacked safely.

1.3.8.15 Lighting

1 The following areas must be adequately and suitably lit:

(a) every working place

(b) access to working places

(c) where lifting operations are in progress

(d) all dangerous openings.

1.3.8.16 Protection from falling material

1 At any place where people work, steps must be taken to prevent them from being struck by any falling material or article.

2 Scaffold components, tools and other objects must not be thrown or tipped down from a height

where they are liable to cause injury, but should be properly lowered.

1.3.8.17 Lifting and slinging

1 Competent people must be used to operate lifting equipment and give signals in line with BS 7121.

2 All critical lifts, including tandem lifts, should be carefully planned and supervised.

3 *Reference - BS 7121:2006 Code of Practice for safe use of cranes*

4 Appropriate precautions must be taken to ensure the stability of lifting appliances when used on soft, uneven or sloping ground. These could include measures such as ground levelling, use of mats or hard standing.

1.3.8.18 Offloading, stacking and storage of steelwork

1 A safe means of access and a safe workplace must be provided when off-loading components from delivery lorries. Two examples of recently developed safety systems are:

(a) a tensioned steel wire running the length of the lorry trailer, at above head-height of anyone standing on the trailer. Each slinger wears a safety harness and a restraint-lanyard, the free end of which is clipped to the tension steel wire. In the event of a trip or stumble, the slinger is prevented from falling from the trailer

(b) a 'U' shaped inflatable air bag or a 'bean-bag' that fits around the back and sides of the trailer to act as a soft-landing system, should anyone fall off the trailer.

2 Many accidents have occurred during the off-loading of lorries when the load-securing mechanism was released. This is because the load was either not stable when loaded or because it moved and became unstable during the journey.

3 The stability of the load on the lorry, or in the stack, must be ensured at all times. Suitable timber wedges or packing pieces can be used as an aid to stability.

4 Precautions should be taken to prevent slingers being struck by the load. For example, taking up a safe position off the lorry before the load is lifted.

5 The stack must be constructed so that components can be removed without risk of someone being trapped or struck.

6 There may be an advantage in using a suitable transportable storage rack (stillage) for smaller components.

7 Anyone not directly involved in the off-loading activity should not be allowed into the area.

1.3.8.19 Safe means of access and safe place of work

1 To comply with these Regulations, consideration must be given to reducing the need to work at height. The following are a way of doing this:

(a) doing as much of the connecting work at ground level or from erected floor decks, as the work progresses

(b) use of a releasing device so that lifting gear can be released remotely

(c) ensuring that, wherever possible, inspection and testing is carried out at low level.

2 When people must work at height, consideration should be given to the following measures:

(a) installing permanent stairways, ladders, walkways and floor decking, so that these can

be used by erectors as the work progresses

(b) providing hard standings or floor slabs so that mobile access platforms can be used

(c) providing temporary access and working platforms, including scaffolds, lightweight staging, purpose-built platforms with safe means of access

(d) working from mobile elevating work platforms (MEWPs).

3 Whilst the increased use of MEWPs has brought about safer working at height, it has also created the need to ensure that:

(a) MEWP operators are adequately trained and competent

(b) ground conditions on the site are properly surveyed and prepared to enable the safe use of such heavy plant without risk of sinking or overturning.

4 Traditionally, scaffolding was the main form of edge protection, which could only be installed, modified or removed by trained scaffolders, after the steelwork was in place. However, the development of various types of 'system edge protection' has provided opportunities for pre-installing edge protection before work at height commences. The use of such systems can also eliminate the need for successive trades to install their own edge protection and then remove it when leaving site, only for it to be replaced by the next trade's edge protection. The elimination of such duplication has obvious safety benefits.

5 It may be appropriate in some circumstances to use other means of access to height, such as the use of roped access techniques, which must be carried out by trained and competent persons, alternatively, access may be achieved by using a 'man-riding' basket suspended from a crane.

6 There may be occasions when it is necessary to use fall arrest rather than fall prevention measures, with safety nets or other soft landing systems being the preferred method of fall arrest.

1.3.8.20 Beam 'straddling'

1 There may be occasions where the work cannot be done from a MEWP or other platform and erectors may have to work from the steel. This is known as beam 'straddling'. This form of access is only permissible for specific short-duration jobs where the beam is of I beam section.

2 A full body harness with a twin-tailed lanyard system may be used. However users must ensure that this system is used correctly and that the second leg is not attached to the user's harness as this may interfere with the operation of the energy absorber.

3 The erector can sit astride the flange with the sole and heel of each foot resting on the bottom flange and both hands able to grasp either side of the top flange.

4 Alternatively, proprietary 'beam gliding' devices are available to improve ease of mobility.

5 The risk assessment must consider how anyone carrying out this practice is going to be rescued following a fall.

6 The use of a safety harness or lanyard requires a minimum clearance below the high-level place of work to allow the lanyard to function properly in arresting a fall. Expert advice should be sought.

7 The safe system of work must also ensure the operative's safety:

(a) whilst getting up to the place of work and down again

(b) during the period of time at high level before the operative is able to 'clip on'.

8 If access has to be made inside a structural' steel box section, or any configuration of steelwork where ventilation is poor, it should be treated as a confined space and appropriate precautions taken. The atmosphere should be tested by a competent person, before entry is made, to ensure that there is sufficient oxygen present. Continuous monitoring for oxygen deficiency is strongly recommended. Tests for flammable or toxic gases or vapours and oxygen enrichment should be carried out as appropriate, depending on the proposed work activity. For example, oxy-propane cutting or burning may lead to a build up of toxic gases or toxic metal fumes, or there may be a leakage of propane or oxygen.

1.3.8.21 The weather

1 A regular weather forecast should be obtained by the manager in charge of the erection programme. Erection should not take place where weather conditions impose an adverse effect, such as:

(a) wind strengths

(b) rain or dew

(c) poor visibility (fog, mist or glare)

(d) Sand storms.

2 If erection work is stopped, measures should be taken to ensure that the structure remains stable.

3 After a stoppage due to the weather, stability of the structure should be checked before work is allowed to restart.

Construction Site Safety
1.3.8 Appendix

Safety checklist: steelwork

1 Is the contractor responsible for erection competent?

2 Has a risk assessment been undertaken for the project?

3 Does the contractor have a method statement?

4 Does it specify the sequence of erection and how the structure will be kept stable at all times?

5 What types of temporary support will be used?

6 Does everyone know the requirements for safe erection?

7 How will the structure components be erected and connected safely?

8 Will as many connections as possible be done at ground level?

9 Where work must be done at height, have safe means of access and safe places of work been planned?

10 Has the site been surveyed for hazardous features such as overhead power lines?

11 Is there sufficient access for off-loading lorries?

12 Is there a planned delivery sequence of components?

13 Are there plans to deal with lorries that have to reverse?

14 How will components be offloaded, stacked and de-stacked safely?

15 Are the weights of individual components known?

16 Does all lifting gear that is to be used have adequate safe working loads?

17 Have crane capacities been calculated?

18 Have steps been taken to eliminate the need for manual handling?

19 Are the steel erectors competent? Have they been adequately trained?

20 Will all lifts be supervised by a competent person?

21 If MEWPs are to be used, are all the operators trained and competent?

22 Is it necessary to survey and prepare the ground so that MEWPs can operate safely?

23 Will work at height be carried out other than from a MEWP?

24 What measures will be taken to prevent or arrest falls?

25 Are emergency rescue procedures in place?

26 Have any special risks been identified, for example, work in confined spaces?

27 Is there a plan to monitor the weather?

28 Is there a contingency plan?

Construction Site Safety

1.3.9 Roofing and Fragile Surface Practices

1.3.9.1 Roof work and fragile surfaces

1 The main causes of accidents are falling off the edges of roofs and falling through holes, roof lights and other fragile surfaces.

2 Compliance with well-established safety procedures could save lives and prevent injuries. All roof work requires a risk assessment and, if the work is extensive, a method statement that sets out a safe system of work. Most accidents could be avoided if the most suitable equipment was used and those carrying out the work were given adequate information, instruction, training and supervision.

3 If work is going to be done on any roof, the Contractor is to make sure there is:

(a) safe access onto the roof, e.g. a general access scaffold, tower scaffold (preferably of the stairway design) or mobile access equipment etc

(b) a safe means of moving across the roof, e.g. using proprietary staging or purpose-made roof ladders.

(c) a means of preventing falls when working on the roof, e.g. edge protection consisting of guard rails and toe boards, a proprietary access system or a MEWP.

(d) measures to prevent falls through fragile materials (e.g. barriers or covers) and mitigate the consequences should a fall occur (e.g. nets).

4 Independent scaffolds that provide safe access onto the roof, a safe working platform and the capacity for material storage (always check with the scaffold designer before stacking material at roof level) are the ideal solution.

5 However, it is not always possible to use a general access scaffold. In these circumstances, for a sloping roof, edge protection erected at eaves level, with or without a scaffold platform, or for a flat roof, edge protection erected around the edges provides an alternative fall prevention measure. Figure 23 shows some of the options for sloping-roof edge protection and Figure 24 shows examples of flat-roof edge protection.

Figure 23 - Typical sloping-roof edge protection

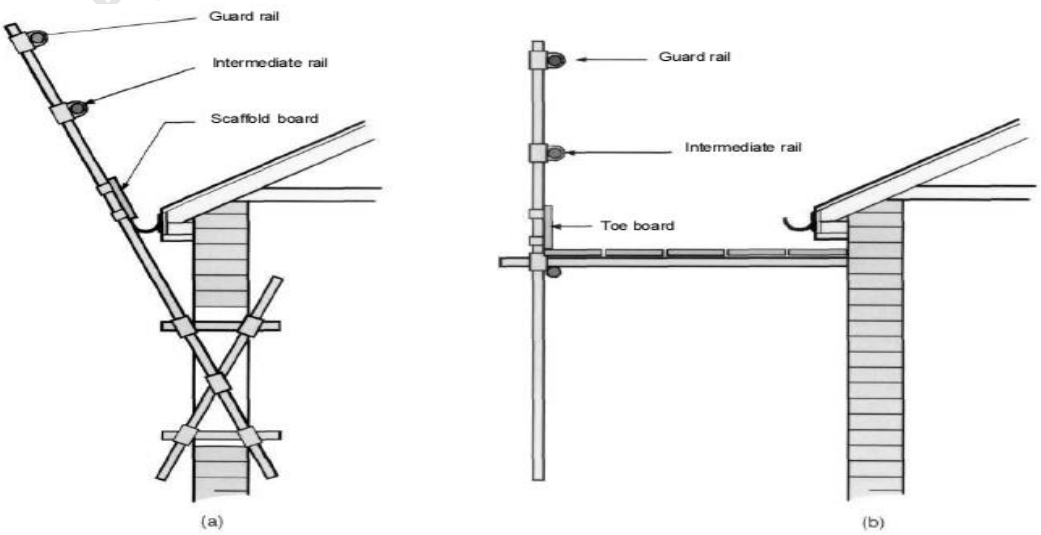
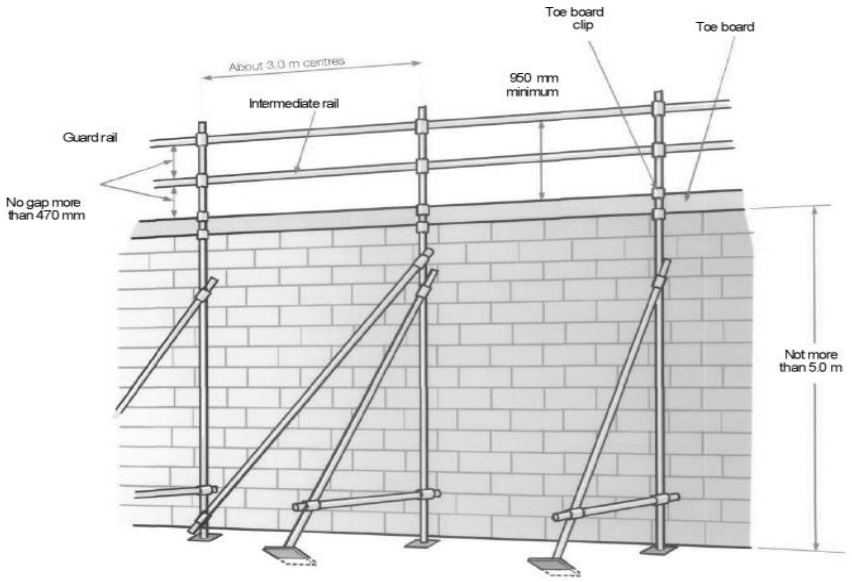


Figure 24 - Example of flat-roof edge protection



6 Irrespective of the type of edge protection used, safe access onto the roof and a safe way of lifting materials up to roof level must be provided and maintained.

7 Alternatively, mobile elevating work platforms or proprietary access systems (see Figure 25), which are easy to transport from site to site and quick to erect, provide good access and should be considered as an alternative to fixed edge protection.

Figure 25 - Proprietary access system for roof-work

8 On sloping roofs, roof workers should not work directly on the tiles or slates. Roof ladders and proprietary staging should be used to enable safe passage across a roof. They must be designed for the purpose, of good construction, properly supported and if used on a sloping roof, securely fixed by means of a ridge hook placed over the ridge. They should be used in addition to eaves-level edge protection and if the work requires access with 2 m of the gable ends, edge protection will be needed there as well. Portable Roof ladders are specified in the standard BS 8634.

9 Short-duration work means tasks that are measured in MINUTES rather than hours. It includes

such jobs as inspection, replacing a few tiles or adjusting a television aerial. Work on a roof is still dangerous even if it only lasts a short time and appropriate safety measures are essential.

10 For short-duration work it may not be reasonably practicable to provide full edge protection, but you will need to provide something in its place. The minimum requirements for short-duration work on a roof are:

(a) a safe means of access to roof level; and

(b) a safe means of working on the roof (e.g. on a sloping roof, a properly constructed roof ladder, or on a flat roof, a harness attached to a secure anchorage and fitted with as short a lanyard as possible).

11 Many roof assemblies are, or can become, fragile. Asbestos cement, fibreglass and plastic generally become more fragile with age. Steel sheets may rust. Sheets on poorly repaired roofs might not be properly supported by the purlins. Any of these materials could give way without warning. Do not trust any sheeted roof. Do not stand directly on any sheeted roof.

12 On fragile roofs, the work has to be carefully planned to prevent falls through the roof. All work should be carried out from beneath where practicable. Where this is not possible, consider using a mobile elevating work platform (MEWP), which allows the operatives to carry out the work from within the MEWP basket without standing on the roof itself (see Figure 26). NEVER try to walk along the line of the roof bolts above the purlins, or along the roof ridge, as the sheets can still crack and give way. The sheets are not designed to support your weight and you should therefore approach the roof as if the sheets were not in position.

Figure 26 - A mobile elevating work platform being used to replace a roof sheet

13 If access onto a fragile roof cannot be avoided, edge protection should be installed around the perimeter of the roof and staging should be used to spread the load. Unless all the work and access is on stagings or platforms that are fitted with guard rails, safety nets should be installed under the roof or a harness system should be used (see Figure 27).

Figure 27- Workmen wearing harnesses attached to a work positioning line, which is fitted to the staging

14 Roof openings and fragile roof lights are a particular hazard. Some roof lights are difficult to see in certain light conditions and others may be hidden by paint. Protection from falling through openings and fragile roof lights must be provided using either barriers or covers that are secured or labelled with a warning. If the work is the replacement of roof lights, nets slung close beneath the roof lights, or a harness attached to a work positioning line which is fixed to the staging, provides protection should a fall occur.

15 Do not throw materials such as old slates, tiles etc from the roof or scaffold - someone may be passing by.

16 Refer to Section 11 – Part 2 (SAMAS) – 2.2 (2.2.9)

1.3.9.2 Industrial roof work

1 Industrial roof work involves all the hazards already mentioned and in addition, falls from the 'leading edge' also need to be prevented. Leading edges are created as new roof sheets are laid or old ones are removed. Fragile and lightweight materials, such as liner trays which will buckle and give way under the weight of a person, can also be a problem and should be protected.

2 Work at the leading edge requires careful planning to develop a safe system of work, including measures to mitigate the distance and consequences of a fall. Work platforms or staging used in conjunction with nets is the preferred method, as nets provide protection to everyone on the roof. Nets should only be installed by trained and competent net riggers.

3 If this is not practicable, work platforms or staging (fitted with guard rails and toe boards) in advance of the leading edge can provide protection in some circumstances. However, these will need to be used in conjunction with harnesses attached to a work positioning line which is fixed to the work platform. If a harness is used, you must ensure that workers can attach themselves to the anchorage without putting themselves at risk of a fall. Using the harness in work-restraint mode is the preferred option, as this does not allow the operative to approach the leading edge and enter into a fall position. Close supervision of this system of work will be required as it is difficult for harnesses to remain clipped on at all times throughout the work activity.

4 When developing a safe system of work the Contractor needs to consider the following:

(a) how the first sheets will be laid - a separate platform may be required (a pack of roof sheets is not a safe working platform) - and how hip ends and other special details are to be fitted.

(b) how sheets will be raised to roof level - decide what type of lifting machinery, such as a crane or an inclined hoist, will be the preferred method. This will eliminate unnecessary risks when placing packs of sheets on the roof supports or when breaking open packs spread over the roof supports.

1.3.9.3 Roof truss installation

1 When installing roof trusses, their placement and associated bracing is a hazardous activity, which requires careful planning to ensure a safe system of access and protection against falls is implemented. You must provide a safe working platform around the perimeter of the roof together with measures to mitigate the distance and consequences of a fall should one occur. This can be achieved by providing a working platform or 'crash deck' immediately beneath the bottom members of trusses. Either conventional scaffolding or (if appropriate) proprietary plastic decking systems can be used for this. Alternatively, nets can be used providing a safe clearance distance can be achieved below the net and a suitable fixing point is available. Providing nets or soft landing systems is particularly important when installing temporary bracing or before boarding out along the bottom chord of the trusses, where access within them is required.

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