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ARAB ENGINEERING BUREAU

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 addition for technology, material, specification, standard that are not mentioned in this section or their modification, shall be subject to approval as stated in 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

1.4.1 Abrasive Wheels

1.4.1.1 Key Points

- 1 Abrasive wheel machines of all types have the potential to cause severe injury if they are not used with care.
- 2 Anyone who uses an abrasive wheel machine must be trained and competent to do so.
- 3 Many accidents are caused by the abrasive wheel being rotated faster than it was designed to go, which results in it breaking up ('bursting') at high speed.
- 4 The abrasive wheel or cutting disc must be compatible with the equipment that it has been fitted to. If unsure manufacturers guidelines must be consulted.
- 5 The fitting of any abrasive wheel or cutting-off disc to a machine ('mounting') must only be carried out by a trained and competent person.
- 6 The person who is trained and competent to mount abrasive wheels or cutting-off discs need not be the same person who is competent to operate the machines.
- 7 Using an abrasive wheel machine has the potential to cause occupational health problems and wearing of appropriate PPE will be required.

1.4.1.2 Introduction

- 1 Abrasive wheels are potentially dangerous if not used correctly. Most accidents result from selecting the wrong type of wheel or from over-speeding and from incorrect fitting of the rotating disc (over / under tightening). Using an incorrect wheel for the task is also dangerous (for example using a grinding disc to cut and vice versa). It is essential that the right abrasive wheel for the job is chosen; that it is correctly mounted by a competent person; that it is run at the correct speed and that guards and eye protection are used.
- 2 In most circumstances abrasive wheels rotate at very high speeds and contact with the revolving wheel can cause serious injury. When using a grinding wheel, a stream of hot abrasive particles is thrown off, which can cause injury, particularly to the eyes. Finally, there is always a risk of the wheel disintegrating or 'bursting' as it revolves. Fragments of the wheel can be projected a great distance, at high velocity, in every direction.

Reference

- 1 Refer to Section 11 – Part 1 – 1.8.1 – Sources of Health and Safety Information.
- 2 The following Standard are referred to in this part of specification
 - BS 4078 Specification for cartridge-operated fixing tools: (Powder actuated fixing systems -);
 - BS 4078-1 Powder actuated fixing systems - Code of practice for safe use
 - BS 4078-2 Powder actuated fixing systems - Specification for tools
 - BS 4278 Specification for eyebolts for lifting purposes; (ISO 3266 Forged steel eyebolts grade 4 for general lifting purposes)
 - BS 4481- Bonded abrasive products -
 - BS 4481-1 Bonded abrasive products - Specification for general features of abrasive wheels, segments, bricks and sticks; (ISO 525 Bonded abrasive products. Shape types, designation and marking)
 - BS 4481-2 Bonded abrasive products - Specification for dimensions of grinding wheels and segments
 - BS 6912-1 Safety of earth-moving machinery - Specification for hydraulic excavator and backhoe loader boom lowering control device; (ISO 8643 Earth-moving

- machinery. Hydraulic excavator and backhoe loader lowering control device.
(Requirements and tests)
- BS 7121- Code of practice for safe use of cranes -
BS 7121-1 Code of practice for safe use of cranes - General
BS 7121-5 Code of practice for safe use of cranes - Tower cranes
BS 7212 Code of practice for the safe use of construction hoists
- EN 166 Personal eye-protection – Specifications; (ISO 16321-1 Eye and face protection for occupational use — Part 1: General requirements; ISO 16321-3 Eye and face protection for occupational use — Part 3: Additional requirements for mesh protectors)
- EN 280 Mobile elevating work platforms - Design calculations - Stability criteria - Construction - Safety - Examinations and tests; (EN 280-1 Mobile elevating work platforms - Part 1: Design calculations - Stability criteria - Construction - Safety - Examinations and tests; EN 280-2 Mobile elevating work platforms - Part 2: Additional safety requirements for load lifting appliances on the extending lifting structure and work platform)
- EN 379.....Personal eye-protection - Automatic welding filters
- EN 698.....Fibre ropes for general service - Manila and sisal; (ISO 1181 Fibre ropes — Manila and sisal — 3-, 4- and 8-strand ropes)
- EN 699.....Fibre ropes for general service – Polypropylene; (ISO 1346 Fibre ropes — Polypropylene split film, monofilament and multifilament (PP2) and polypropylene high-tenacity multifilament (PP3) — 3-, 4-, 8- and 12-strand ropes)
- EN 700 Fibre ropes for general service – Polyethylene; (ISO 1969 Fibre ropes — Polyethylene — 3- and 4-strand ropes)
- EN 701.....Fibre ropes for general service - General specification; (ISO 9554 Fibre ropes — General specifications)
- EN 792.....Hand-held non-electric power tools - Safety requirements; (ISO 11148 Hand-held non-electric power tools - Safety requirements -)
- EN 792-1 Hand-held non-electric power tools - Safety requirements - Part 1: Assembly power tools for non-threaded mechanical fasteners; (ISO 11148-1 Hand-held non-electric power tools — Safety requirements — Part 1: Assembly power tools for non-threaded mechanical fasteners)
- EN 1261 Fibre ropes for general service - Hemp
- EN 12413... Safety requirements for bonded abrasive products
- EN 13411 Terminations for steel wire ropes - Safety –
- ISO 525 Bonded abrasive products — Shape types, designation and marking
- ISO 18878 Mobile elevating work platforms — Operator (driver) training

1.4.1.3 Types of abrasive wheel

- 1 An abrasive wheel is generally defined as a wheel, cylinder, disc or point having abrasive particles, and intended to be power driven. It may consist entirely of abrasive particles, or be of metal, wood, cloth, felt, rubber or paper, with a surface covered with abrasive material. It may also be formed of a ring or segments of abrasive materials. These types of abrasive wheels are used for shaping material via grinding operations.

- 2 Other types of abrasive wheel are those used for cutting rather than grinding operations. These are circular metal blades, usually with diamond impregnated tips, used for cutting through concrete, steel, etc.

1.4.1.4 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 to identify any hazard that employees or other people might encounter as a result of the work being carried out.
- 2 When hazards are identified, it is the Contractors 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 it is reasonably practicable to do so.
- 3 The Contractor must provide employees with:
- (a) **comprehensible and relevant information on any risks that exist out of the work activity and of any control** measures that are in place to reduce those risks
- (b) adequate training to enable employees to work safely.
- 4 The employee, in turn, has a duty to tell their Contractor of any work situation which presents a risk to their health and safety or to the health and safety of any other person who may be affected.

1.4.1.5 Personal Protective Equipment

- 1 PPE shall include some or all of:
- (a) high-impact eye or face protection (a full-face visor) to EN 166
- (b) hearing protection
- (c) hand/forearm protection, depending upon the material that is being cut
- (d) respiratory protection,
- (e) depending upon what is being cut and whether the machine is fitted with a particle collection/extraction system.
- 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.

1.4.1.6 Control of Vibration

- 1 The use of most types of abrasive wheel machine has the potential of subjecting the person doing the job to hand/arm vibration.
- 2 These Regulations place various requirements on Contractors including:
 - (a) establishing if there is a risk from exposure to vibration
 - (b) eliminating the risk at source or reducing it to as low as is reasonably practicable
 - (c) implementing appropriate control measures if the exposure action value is reached
 - (d) taking appropriate actions if the exposure limit value is reached
 - (e) providing health surveillance to any employee when the risk assessment indicates that there is a risk to health
 - (f) providing at-risk employees with adequate information, instruction and training.

1.4.1.7 Choosing the correct wheel

- 1 BS 4481 Part 2:1983 includes a system of marking for abrasive wheels. This specifies the type and nature of the abrasive, grain size, grade and structure, as well as the nature of the bond.
- 2 Many types and grades of abrasive wheel are available, and the correct selection is important. As a general rule, soft grade wheels are most suitable for use on hard materials, and hard grade wheels on soft materials. Coarse grains are for the rapid removal of material, and fine grains for polishing.
- 3 The two common British markings in this class are:
 - (a) A.30.R.BF Suitable for general use on ferrous metals.
 - (b) C.24.R.BF Suitable for general use on stone, brickwork, concrete, plastic and non-ferrous metals.
- 4 The use of an unsuitable wheel may result in the wheel face becoming loaded as the pores are clogged by the material being removed. If the wheel is too hard or too fine it may become glazed or polished. The consequence, in both cases, may be that the operative will press too hard, in an attempt to get the work done, and cause the wheel to break.
- 5 It is important that only reinforced resin-bonded abrasive wheels should be used with portable grinding machines.

British Standard system for the marking of abrasive wheels (BS 4481)

Order of marking	0	1	2	3	4	5	6
	Type of abrasive*	Nature of abrasive	Grain size	Grade	Structure*	Nature of bond	Type of bond, etc.*
Example	51	A	3 36	L	5	V	23
Aluminium abrasives	A						
Silicon carbides	C						
Additional number for grain size mixtures (optional)	1 2 3 etc.						
coarse	medium	fine	very fine				
8	30	70	220				
10	36	80	240				
12	46	90	280				
14	54	100	320				
16	60	120	400				
20		150	500				
24		180	600				
Soft		Medium					Hard
A B C D E F G H I J K	L	M N O P Q R S T U	V W X Y Z				

* Optional symbols The symbols 0 and 6 are the manufacturer's own

1.4.1.8 Wheels 'bursting'

- The two main causes of abrasive wheels bursting are:
 - over-speeding
 - the incorrect mounting of wheels.

1.4.1.9 Over-speeding

- Abrasive wheels must not be run in excess of the maximum permissible speed recommended by the manufacturer. This should be clearly marked in rpm on all wheels over 80 mm in diameter.
- The maximum permissible speed in revolutions per minute (rpm) and metres per second (m/s) specified by manufacturers should be marked on every abrasive wheel larger than 80 mm in diameter, or on the blotter or identification label which is sometimes attached to it. Since it is not practicable to mark smaller wheels, the maximum permissible speed in rpm of wheels 80 mm in diameter or less should be stated in a notice posted in a position where it can easily be read. For speeds of 50 m/s and above, colour-coded stripes will appear on the wheel.
- For smaller wheels, a notice stating the maximum speed permissible should be displayed on or adjacent to where the machine is being operated. Any type of record may be kept, from computer database to a written record. The only restrictions are that a hard copy of the information must be available on request.

1.4.1.10 Speed of spindle

- Every power-driven machine for use with abrasive wheels should have a notice fixed to it,

specifying the maximum and minimum spindle speeds.

- 2 Machines that are not marked with their spindle speed must not be used.
- 3 Sometimes these markings are very small. If this is the case, consideration should be given to painting or engraving the spindle speed clearly on the machine.
- 4 Always keep the markings clean and in good condition so that they are easy to read.
- 5 Care must be taken to see that the maximum speeds are never exceeded. Governors, or other devices to control or limit speed, must be properly maintained and in good working order.
- 6 The speeds of wheels may be checked using stroboscopic timing lights.

1.4.1.11 Peripheral speeds

- 1 As an abrasive wheel wears down, its peripheral speed is reduced and this, in turn, reduces its efficiency.
- 2 A wheel operated at too low a speed will not cut properly and there will be a tendency to press the workpiece hard against the wheel. This may damage the wheel and cause it to burst.
- 3 Care must be taken to operate the wheel at the optimum speed recommended by the manufacturer.

1.4.1.12 Mounting of wheels

- 1 In order to be able to demonstrate compliance with legislation, abrasive wheels should only be mounted by a trained and competent person authorized by the Contractor.

1.4.1.13 Maintenance

- 1 In addition to checks immediately before and after each use, every machine should be regularly and frequently serviced by a competent person in accordance with the manufacturer's instructions. A record of this maintenance shall be kept.
- 2 It is good practice to record the type and serial number of all abrasive wheel machines in a maintenance log, together with the date each machine is due for service. When servicing has been carried out, ensure that details of any work done are entered in the log, together with the date that the next service is due.
- 3 All records should be kept up to date.

1.4.1.14 Appointment of a competent person

- 1 It is strongly recommended that each appointment to mount abrasive wheels is recorded as a signed, dated entry in a register or by a certificate attached to that register. Records may be kept in an electronic format, providing a hard copy can be printed on request. Particulars of the class and description of the abrasive wheels for which the person is competent should be stated. A copy of the entry (or certificate) should be given to the person appointed.
- 2 **Note:** The suggested layout for a Register of Appointment is attached at Appendix 1. A copy of a suggested Certificate of Appointment is attached as Appendix 2.
- 3 A Contractor may revoke the appointment at any time, with a signed and dated entry in the register.

1.4.1.15 Training

- 1 Training for the **mounting** of abrasive wheels shall only be given by a competent person,

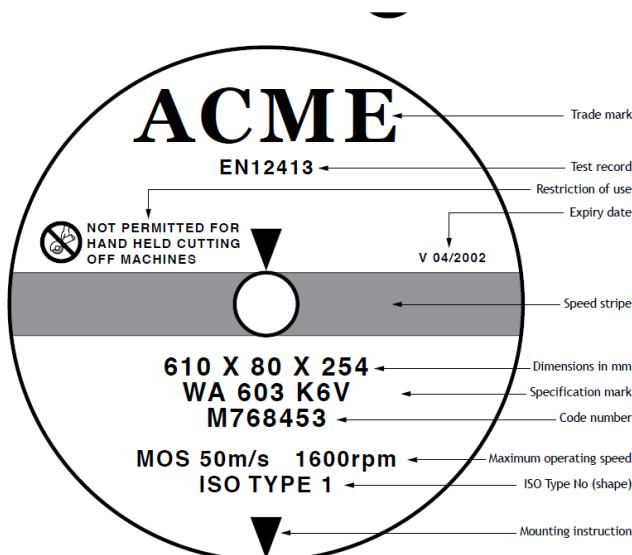
which often involves attending an external course not suppliers awareness sessions. As a minimum it must cover the grades, types and marking, and changing of wheels; the use, hazards, speeds, storage, handling, inspection, testing, dressing, adjustments; and the functions of associated components such as flanges, blotters, bushes and locking nuts.

- 2 Employees who are being trained in the **use** of abrasive wheels must be provided with appropriate information, instruction and supervision.

1.4.1.16 Mounting the wheel

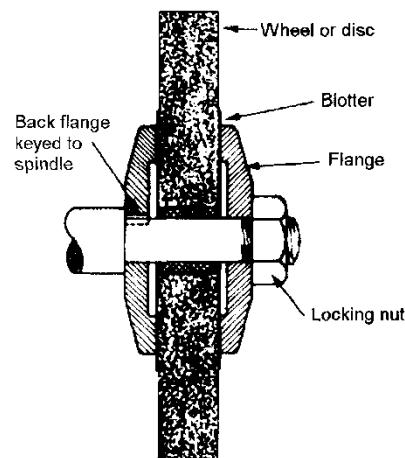
Procedure

- 1 Abrasive wheel marking system should conform to Annex A of EN 12413 (see below Figure).

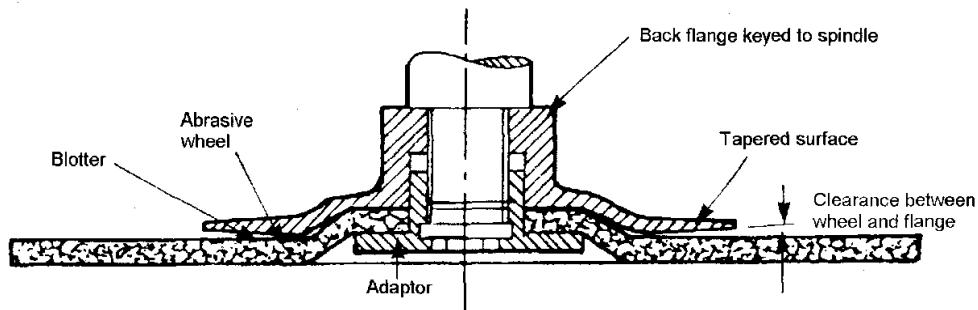


- 2 The following procedure should be followed when mounting an abrasive wheel:

- (a) ensure the power to the tool is 'OFF' and unplugged from the power source.
- (b) clean the abrasive wheel with a brush and check for any signs of damage. **In no circumstances should a damaged wheel be used**
- (c) check that the spindle bearing is not worn
- (d) check that the maximum wheel speed is greater than the maximum spindle speed
- (e) check that the wheel fits easily and snugly onto the spindle. The correct brushes should be used if required
- (f) check that straight-sided wheels are mounted between the flanges, with a diameter of not less than one-third that of the wheel. The flanges should be recessed on the side which is next to the wheel, to ensure that the clamping pressure is not exerted near to the hole
- (g) ensure that the driving flange is secured to the spindle
- (h) check that washers or blotters of paper, or other compressible material, are fitted one either side (one only on a wheel with a depressed centre). Blotters ensure that the clamping pressure is distributed evenly over the wheel, and will reduce wear on the flanges



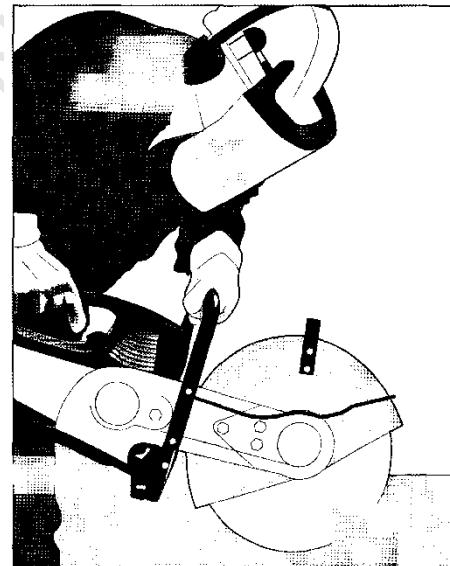
- (i) when tightening the nut on the spindle, use the correct size of spanner. Use hand pressure only. This will ensure that the flanges drive the wheel and prevent slip
- (j) use only the correct locking nuts.



Flange assembly for a depressed-centre wheel

1.4.1.17 Diamond blades

- 1 As with bonded abrasive wheels, people working with diamond blades must be properly trained and competent. Most of the safe procedures and precautions for using bonded abrasive wheels on hand-held machines apply to diamond blades. Additional advice and information can be obtained from the suppliers and manufacturers.
- 2 Diamond blades are directional and must be mounted so that they rotate in the direction marked on the blade.
- 3 Diamond blades can be used on hand-held machines at peripheral speeds of up to 100 m/s, provided that the machine is designed for this speed and the marked maximum permissible operating speed of the blade is not exceeded.
- 4 Under no circumstances must the blade be allowed to overheat.
- 5 Periodically, it may be necessary to redress the blade by making cuts in a special dressing block or abrasive block.
- 6 These wheels can last a comparatively long time. Before use and with the power disconnected, make a special point of checking the condition of the spindle bearings as these can deteriorate considerably during the lifetime of a diamond-cutting wheel.



1.4.1.18 In-use considerations

Guards - fixed and hand-held machines

- 1 The guard should be so designed, and sufficiently robust, to contain any fragments in the event of the wheel bursting.
- 2 The guard must be securely attached to the body of the machine, properly adjusted and maintained.

- 3 The guard or shield supplied by the manufacturer must be adjusted to permit exposure of the minimum amount of wheel or disk to enable the job to be carried out. It must not be left off or altered in any way.

Defects

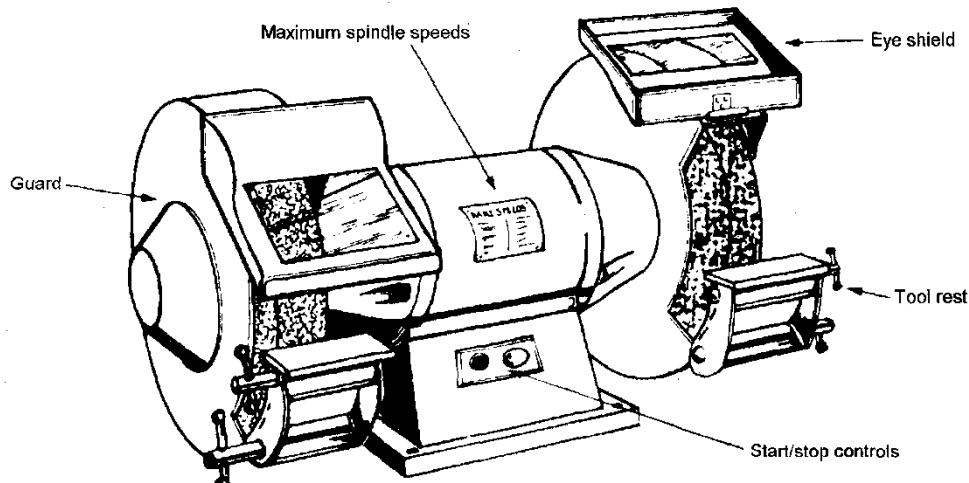
- 4 Employees are responsible for reporting any defects in work equipment, including abrasive wheels, guards or tool rests, to their Contractor.

Tool rests

- 5 Rests should be secured and adjusted so that they are as close as practicable to the wheel, i.e. no more than 3 mm away. If the gap between the wheel and the rest is too great, the workpiece may become trapped and an accident may result.

Notices

- 6 It is good practice to continue to display cautionary notices concerning the dangers of abrasive wheels, wherever abrasive wheels are used or changed.



Restrictions of use

- 7 Annex A of EN 12413 and ISO 525 specify how wheels should be marked to indicate specific restrictions for use. These are:

- RE1: Not permitted for hand-held and manually guided grinding;
- RE2: Not permitted for hand-held cutting-off machines;
- RE3: Not suitable for wet grinding;
- RE4: Only permitted for totally enclosed working area;
- RE6: Not permitted for face grinding.

1.4.1.19 Health considerations

Protection of eyes

- 1 During cutting or grinding processes, a stream of dust or abrasive particles and hot sparks is thrown off. These can cause serious injury to the eyes.

- 2 Because there is an obvious risk of eye injuries when an abrasive wheel is being used, eye protection should be provided in accordance with either goggles or a face shield or visor, to EN 166.

Respiratory protection

- 3 Depending upon what material is being cut, it is possible that the user of an abrasive wheel may be exposed to inhaling hazardous dust. With fixed machinery such as bench grinders or fixed concrete saws, it may be possible to reduce airborne dust to a safe level by such measures as:

- (a) installing a fixed local exhaust ventilation system, for example in workshops

- 4 This would also serve as a useful reminder to employees of the training they have received.

- (a) purchasing abrasive wheel machines which incorporate a facility for wet cutting or the attachment of a stand-alone dust extraction/collection unit

- 5 If such dust suppression measures are not practical, it will be for the Contractor, or the person to whom the responsibility is delegated, must assess the hazardous nature of the dust and provide suitable respiratory protective equipment (RPE), consulting a supplier of PPE if necessary to establish what is needed

Vibration

- 6 The very nature of carrying out grinding or cutting activities using abrasive wheels is likely to subject the person doing the job to a degree of hand-arm vibration. In extreme cases, hand-arm vibration can lead to permanent and disabling injuries. Contractors must assess the risk to employees who carry out such work and put preventative and protective measures in place to ensure that the health of employees who carry out this type of work is not adversely affected.

Noise

- 7 Grinding and cutting operations using abrasive wheel machines will inevitably result in an increased level of noise, both from the machine itself, for example a petrol-driven disc-cutter, and from contact between the cutting disc or grinding wheel and the material being worked upon. In many cases the level of noise generated will exceed the lower exposure action value, meaning that unless other control measures can be put in place, personal hearing protection must be made available and worn. Depending upon the level of noise and the proximity of other people, it may be necessary for them also to wear the hearing protection.

1.4.1.20 Other safety considerations

- 1 The machine must have an efficient starting and stopping device that is easily accessible and which can be readily operated.
- 2 The floor area of the workplace must be kept in good condition, free of loose material, and should not be slippery.
- 3 Abrasive wheels should be properly stored, flat and preferably in their boxes and in accordance with the manufacturer's guidance. Care must be taken to see that any labels are retained, and not soiled or defaced so as to make them illegible.

Construction Site Safety**1.4.1 Appendix 1****Specimen Sheet for a Register of Appointment****Appointment of persons to mount abrasive wheels**

Appointment

Revocation

Name of person appointed	Class or description of abrasive wheels for which appointment is made	Date of appointment	Signature of occupier or his agent	Date of revocation of appointment	Signature of occupier or his agent
(1)	(2)	(3)	(4)	(5)	(6)

Construction Site Safety

1.4.1 Appendix 2

Abrasives Wheels

Certificate of Appointment to mount abrasive wheels

Name

Is hereby appointed to mount the following classes or descriptions of abrasive wheels

Signature of occupier or occupier's agent:

Date

The above is hereby revoked

Signature of occupier or occupier's agent:

Date

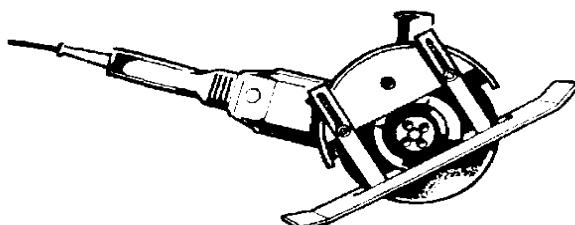
Construction Site Safety

1.4.1 Appendix 3

Abrasives wheels

Safety checklist

- 1 Who is responsible for the selection and the supervision of equipment using abrasive wheels; are they competent?
- 2 Have operatives received suitable instruction and training in the use of abrasive wheels equipment, and are they competent to use it?
- 3 Are the manufacturer's recommendations and company rules relating to the control and use of abrasive wheels being observed?
- 4 Are safety signs and notices displayed where cutting or grinding operations take place?
- 5 Are the abrasive wheels that are being used suitable for the type of work being carried out?
- 6 Have all abrasive wheels been mounted by a competent person?
- 7 Was the competent person appointed by the Contractor in writing, and has an entry been made in an appropriate register?
- 8 What types and classes of abrasive wheel or disc is the appointed person entitled to fit and mount?
- 9 Have two blotters been supplied with all flat wheels and discs? (Some wheels may not require blotters, therefore refer to the manufacturer's guidance for the specific wheel to be mounted.)
- 10 Are wheels of more than 55 mm in diameter marked with the maximum rotational speeds in rpm?
- 11 Are smaller wheels accompanied by details of their maximum rotational speed?
- 12 Is the maximum permissible spindle speed clearly marked on the machines in rpm?
- 13 Are checks made to ensure that abrasive wheels are not operated in excess of the maximum permissible speeds?
- 14 Are the correct flanges being used?
- 15 Is the guard fitted compatible with the machine?
- 16 Is the guard of the correct size, and not been exchanged or altered?
- 17 Are only reinforced discs used on portable hand-held machines?
- 18 Are the correct locking nuts used?
- 19 Are grinding machines complete with guards of the correct size and with tool rests?



- 20 Angle grinder with cutting disc and adjustable guard and depth gauge
- 21 Are guards and tool rests correctly adjusted and secured?
- 22 Are machines properly maintained?
- 23 Is local exhaust ventilation required and, if so, is it available?

- 24 Are other dust suppression measures necessary and, if so, have they been taken?
- 25 What facilities exist to have the spindle or wheel speed checked?
- 26 Has EN 166 eye and other necessary PPE protection been provided for the operator?
- 27 Is the PPE properly used?
- 28 Is RPE necessary and, if so, is it provided and used?
- 29 Have precautions been taken to safeguard other persons who may be affected by grinding operations?
- 30 What precautions are taken to ensure that the floor area is free from loose materials and maintained in a safe condition without risk?
- 31 Are the storage facilities for abrasive wheels and machines adequate?
- 32 To whom should operatives report defects?
- 33 Are all defects reported to the proper person?
- 34 What action is taken when defects are reported?
- 35 Has the problem of noise been considered?
- 36 Is a noise assessment necessary?
- 37 Are persons who are being trained, properly supervised?

Construction Site Safety

1.4.2 Portable Fixing Tools

1.4.2.1 Key points

- 1 Portable fixing tools are used to drive fixing devices into a base material using either cartridges or a gas canister providing the propellant.
- 2 They can be extremely dangerous if used incorrectly. Operatives of such equipment must be trained and competent and be of a sufficiently mature and responsible disposition.
- 3 Poor technique, or the use of incorrect equipment, will result in poor or defective fixing.
- 4 The tool, type of cartridge or fuel cell, type of fixing and the base material must all be compatible.
- 5 In most cases, items of additional PPE, in addition to helmet, boots and hi-viz, will have to be worn.
- 6 At the end of the job all unused cartridges must be accounted for by the supervisor in charge.

1.4.2.2 Introduction

- 1 Portable fixing tools use the power of an explosive charge or a gas propellant to drive a fixing device into position. They are particularly useful if there is a large number of repetitive fixings to be made, where a portable fixing tool reduces the time and labour expended in this area. However, the resemblance of the tools to the shape and action of a gun can lead to their misuse, especially by young and inexperienced workers.
- 2 It should always be remembered that portable fixing tools are potentially lethal if they are used recklessly or incompetently.

1.4.2.3 The Management of Health and Safety at Work

- 1 every Contractor must make a suitable and sufficient assessment of every work activity to identify any hazard that employees or other people might encounter as a result of the work being carried out.
- 2 When hazards are identified, it is the Contractors 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 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 the Contractor must provide the employees with adequate information, instruction, training and supervision to be able to carry out any work safely and without risk to their health.
- 5 Employees, for their part, have a duty to inform the Contractor of any work situation which presents a risk to the health and safety of themselves or any others who may be affected.

1.4.2.4 The Provision and Use of Work Equipment

- 1 the Contractor shall only supply work equipment that is correct and suitable for the job and must ensure that the equipment is maintained and kept in good working order.
- 2 Contractors must ensure that work equipment it is inspected as necessary.
- 3 where the use of any equipment involves a specific risk to the health and safety of employees, its use must be restricted to competent and specified workers. This is of particular relevance

to the user of portable fixing tools.

- 4 Employees must be provided with information, instruction and training in the use of work equipment, where necessary for their health and safety.
- 5 Proper training and continual care in their issue and use is therefore essential.
- 6 Before portable fixing tools can be used, a risk assessment must be carried out and suitable control measures put in place.

1.4.2.5 The Control of Vibration at Work

- 1 The use of any percussive tool, such as one repeatedly operated by firing a cartridge or fuel cell, has the potential to subject the person doing the job to hand/arm vibration.
- 2 These Regulations place various requirements on Contractors including:
 - (a) establishing if there is a risk from exposure to vibration
 - (b) eliminating the risk at source or reducing it to be as low as is reasonably practicable
 - (c) implementing appropriate control measures if the exposure action value is reached
 - (d) taking appropriate actions if the exposure limit value is reached
 - (e) providing health surveillance to any employee when the risk assessment indicates that there is a risk to health
 - (f) providing at-risk employees with adequate information, instruction and training.

1.4.2.6 Personal Protective Equipment

- 1 PPE will be needed including:
 - (a) high-impact eye protection (possibly a full-face visor) to EN 166-B
 - (b) hearing protection.
- 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.
 - (d) 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.

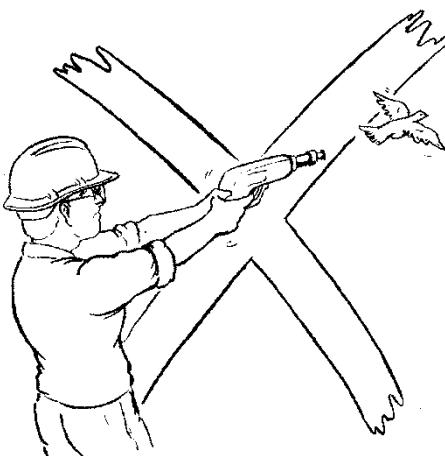
1.4.2.7 The safe use of cartridge-operated tools

- 1 A cartridge-operated tool works by using a firing cap or cartridge to provide propellant to drive

a fixing home. The primary factors which will ensure the proper and safe use of cartridge tools are:

- (a) adequate information, instruction, training and supervision
- (b) competent and responsible users
- (c) the compatibility of the base material, the type of fixing and the cartridge strength
- (d) restricting access to the work area during fixing activities
- (e) the provision and use of appropriate PPE
- (f) carrying out activities in accordance with BS 4078-1, Code of practice for safe use
- (g) using cartridge-operated tools that comply with BS 4078-2.

2 **Note:** Cartridge tools must not be used in areas where a flammable atmosphere or risk of dust explosion may exist.



Don't 'fool about' with cartridge-operated tools

1.4.2.8 Types of tool

- 3 There are two main types of cartridge-operated tool.
- (a) **Indirect-acting.** The driving force is transmitted to the fixing by means of the expanding explosive gas acting on a piston.
 - (b) **Direct-acting.** The explosive force of the cartridge acts directly on the fixing, driving it along the barrel into the wall or material.

1.4.2.9 Power level of tools

- 1 Cartridge tools are generally classed as high power and low power.
- 2 **Low power** is defined as giving the pin a kinetic energy not greater than 3.5 m/kg/f and a velocity not greater than 98.5 m per sec.
- 3 **High power** applies to any values greater than those above. Using high power tools can result in dangerous through-shoots. This is where the fixing is fired right through the material.
- 4 Most of the commonly available tools are low power and indirect-acting. These are by far the safest. There are high power tools for special applications, and some old high power (direct-acting) tools are still in use.

- 5 Hammer-activated tools are nearly always low power.
- 6 Some modern tools have provision for varying the power level (within the low power range) by means of an adjustment which changes the size of the gas expansion chamber. There are also interchangeable pistons for different fixings or depths of penetration. Tools incorporating these features require a smaller range of cartridges.

1.4.2.10 Safety devices

- 1 All tools shall incorporate a contact pressure safety device, which prevents them being fired unless the muzzle is pressed hard against the workface. They should always incorporate a drop-firing safety device which prevents the tool from firing when it is dropped onto a hard surface.
- 2 In addition, some tools are equipped with an unintentional firing safety device. This prevents the tool from firing if the trigger is pulled before the tool is pressed against the work surface.
- 3 It should only be possible to fire the tool when it is correctly pressed against the work surface.

1.4.2.11 Cartridges

- 1 Cartridges are designed for specific brands or types of tool and are not interchangeable, even if they are of a similar type or appearance.
- 2 Cartridges are available in different strengths. It is preferable to start with a lower strength cartridge for a test fixing and then change to a more powerful cartridge if the depth of penetration is not sufficient.
- 3 BS 4078 requires the strength of the cartridges to be marked on the packaging and each cartridge to be colour-coded to indicate its strength.
- 4 The colour codes set out in BS 4078 are as follows:

Cartridge strength	Colour
Extra Low (XL)	Brown
Low (L)	Green
Low/Medium (LM)	Yellow
Medium (M)	Blue
Medium/High (MH)	Red
High (H)	White
Extra High (XH)	Black

- 5 It should be noted that the code is not universally followed, and that colour-coding alone must never be relied on as an indicator of the cartridge strength. Cartridges should be retained in the packaging (which identifies their strength) and not carried loose. Both cartridges and fixing nails are now available on plastic strips.
- 6 Proper controls must be put in place to account for all dispensed and unused cartridges.
- 7 Unused, or unserviceable cartridges which cannot be fired, are hazardous and in no circumstances should be exposed to fire or heat or be subject to mechanical impact.
- 8 The supplier should be contacted to discuss suitable arrangements for the return/disposal of any unused or unserviceable cartridges. Cartridges should be returned to their original packaging so that they can be properly identified.

1.4.2.12 Fixings

- 1 Fixings are generally either drive nails, eyelet nails or threaded studs. Designed to penetrate

wood, steel and concrete, they have special characteristics of strength, hardness, shape and size which make them suitable for the purpose to which they are to be put. Ordinary nails and screws must never be used as substitutes.

1.4.2.13 Suitability of base materials

- Attempting to fix into unsuitable materials with cartridge tools is dangerous. Before firing the first fixing, a simple test should be made by driving a fixing of the intended type into the base material with a hammer. The result will show whether the material is suitable. No attempt should be made to fix into unsuitable materials. The table below provides general guidance.

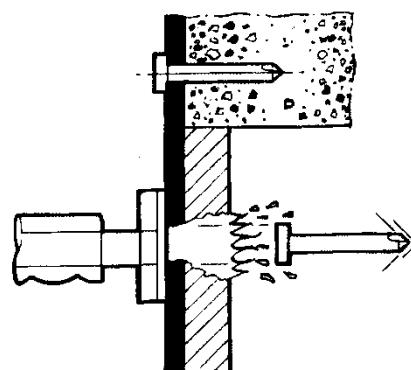
Material	Result	Conclusion
Plaster, plywood, lightweight blocks	Sinks in easily	Too soft
Marble, some rock, hardened steel, weld metal	Fixing blunted	Too hard
Glass, glazed tiles, slates, some cast-iron	Material cracks or shatters	Too brittle
Sound wood, concrete, mild steel	Clear impression of fastener point	Suitable

1.4.2.14 Hazards in use

- Hazards from the use of cartridge tools generally arise from one or more of the following three factors:
 - lack of competence, knowledge or training
 - misuse, whether this be deliberate or due to ignorance of proper use
 - poor maintenance, rendering the equipment defective or unsafe.
- Two conditions which specially need to be guarded against are **through penetration**, where the fixing goes through the material emerging in free flight on the other side, and **ricochet**, possibly towards the operator, where the fixing is deflected after firing.

1.4.2.15 Causes of through penetration:

- cartridge too powerful for the job being undertaken
- fixing into voids in the structure
- the material being fixed into is too thin
- changes in the type or consistency of the material being penetrated
- not establishing the density of the material being fixed into.



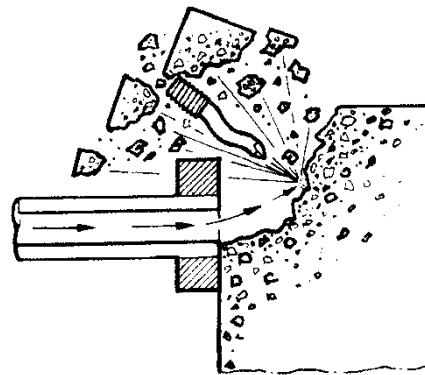
Penetration due to a change in the type of material

To avoid these hazards:

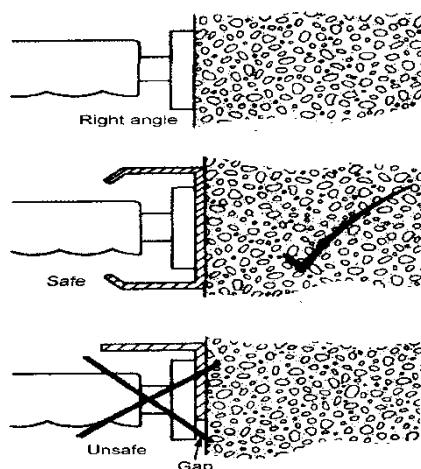
- 6 check the suitability of the material for cartridge-fired fixing
- 7 if necessary, make a trial fixing using a low-powered cartridge
- 8 check the area behind the material or structure into which the fixing is being fired, and guard the area so as to prevent the access of unauthorised persons
- 9 use an indirect acting tool.

1.4.2.16 Causes of ricochet:

- 1 firing into a hole of a previously attempted fixing
- 2 attempting to fix into excessively hard materials, such as hardened steel or welded areas
- 3 cartridge tools not held square onto the work surface, causing the pin to strike at an angle and then be deflected
- 4 attempting to fix too near to an edge
- 5 hitting a reinforcing rod or dense aggregate hidden just under the surface
- 6 ricochet due to firing too near to edge

**To avoid ricochets:**

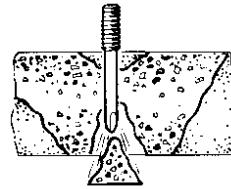
- (a) fixings should be at the recommended distance (or greater) from failed attempts
- (b) do not fix into unfamiliar materials without first checking their suitability for cartridge fixing
- (c) tools should be at right angles to the work surface. The whole rim of the splinter guard should be firmly placed against the workface so as to stabilise the tool and not leave gaps. (See diagrams below.)



- 7 The risk of ricochetting is reduced by the use of low-powered, indirect-acting tools. If high-powered tools are used, there is a risk that the fixing can be deflected and come back towards the operator.

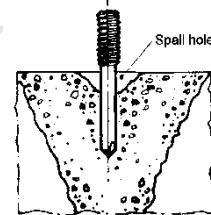
1.4.2.17 Fixing into concrete

- 1 The advice of cartridge tool manufacturers should be sought before attempting to fix into concrete which is over two years old or any other special type of concrete.
- 2 **Depth of material.** Generally, concrete should be at least 100 mm thick or three times the depth of the fixing penetration, to avoid fixings breaking through the back surface.



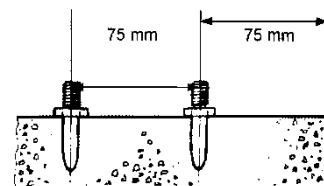
Fixing breaking through

- 3 **Penetration.** Concrete varies in hardness, and trial fixings may be necessary to establish the optimum penetration.
- 4 **Spalling in concrete** is caused by the initial compressive impact of the tool and results in a crater being formed around the fixing. It may be due to the fixing being too large or through using a cartridge that is too powerful. Spalling can reduce holding strength of the fixing by up to 20%.



Spalling of concrete

- 5 **Edge failure** is the result of attempting to fix too near to the edge of the material, causing it to break away. The minimum distances given below should be observed.
- 6 **Fixing distances.** Always leave at least 75 mm between the edge of the material and the nearest fixing, or from a failed attempt.

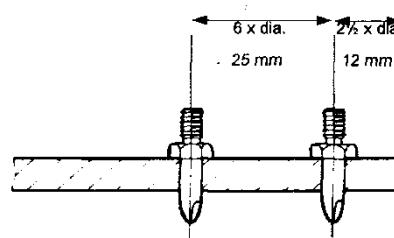


Minimum distances between fixings into concrete

- 7 Fixing into **masonry** requires greater penetration. Fixings should not be made into mortar joints unless no other choice exists, and then only after seeking advice from the cartridge tool manufacturer.

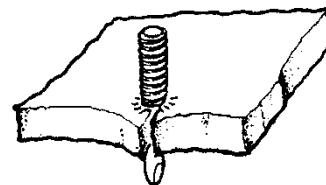
1.4.2.18 Fixing into steel

- 1 **Fixing distances.** The minimum fixing distances are 12 mm from an edge of the material being fixed into and 25 mm from any other fixing or failed fixing, or 2.5 times the fixing shank diameter from an edge and 6 times the shank diameter from another fixing respectively (where this is greater than the distance detailed above).



Minimum distance between fixings into steel

- 2 The **shank diameter** of a fixing should always be less than the thickness of the steel being fired into.



Shank diameter less than thickness of steel

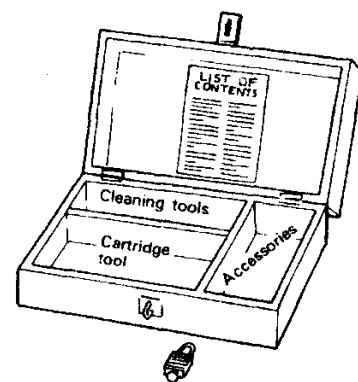
- 3 **Penetration.** For maximum holding strength, fixings (whenever possible) should penetrate just through the steel being fixed into.

1.4.2.19 General precautions

- 1 **Recoil** of a cartridge tool can lead to loss of balance if working from an unstable workplace. In this instance, only low-power tools should be used. Operators not familiar with cartridge tools, or with the type of tool to be used, should test the tool for recoil before use. In all circumstances, an adequate and safe footing is a necessity. Makeshift platforms should not be used.
- 2 **Misfires.** In the event of a misfire, the cartridge tool should be kept pressed in position against the workface for at least 30 seconds, to allow for any delayed detonation. Following this time period, the cartridge must then be removed strictly in accordance with the manufacturer's instructions. Cartridges which have misfired should be stored in a metal box and returned to the supplier.
- 3 **Note:** Misfired cartridges should not be removed from the tool by levering under the rim. Some types are rim detonated and could be fired by this action. Only the proper extraction tool as supplied by the manufacturer should be used.
- 4 **Loading of tools** should be carried out immediately prior to use. Once the tool is loaded, it must never be pointed towards other people or at any part of the operator's body. Unused cartridges must be removed from the tool as soon as possible.

1.4.2.20 Storage and issue of tools

- 1 Only responsible and competent persons should supervise and check the acquisition, issue, use, return and maintenance of cartridge-operated tools.
- 2 Cartridge-operated tools and cartridges should be stored in a place which is secure, dry and cool. The issue of such tools and cartridges should be strictly controlled, and licensed if necessary.
- 3 The following points should be clearly noted and understood:
 - (a) cartridge tools should only be stored in an unloaded state
 - (b) different strengths of cartridge should be clearly identified and kept separate
 - (c) the use of different makes of equipment on one site should be limited as far as possible
 - (d) the manufacturer's instructions on the safe use of the cartridge tool should be available.



Storage box

1.4.2.21 Gas powered tools

- 1 Lighter duty gas powered tools can be used for the fixing of timber and other low density materials. These fixing tools are generally lighter in weight and use a battery and fuel cell, either propane or other gas, to act as a propellant rather than a cartridge. The fuel cell, typically

a small aerosol canister, is mounted within the tool. The safety issues that need to be considered when using a gas powered tool are:

- (a) operators must be trained. Usually this can be provided by the supplier of the equipment. Operators must also be in possession of the relevant equipment instructions with which they must be familiar
- (b) the tool and the fuel cells must not be exposed to extremes of heat nor used within a flammable atmosphere
- (c) during use, harmful fumes are expelled and therefore the tool should be used in a well ventilated area
- (d) when firing, the operator must be in a stable position and holding the tool at right angles to the work
- (e) firing must not take place when others are behind the work. As with cartridge tools, through-penetration can occur
- (f) if a malfunction occurs, unlike when using a cartridge tool, the tool can usually be fired again. However, the manufacturer's instruction manual should be consulted
- (g) because of the mode of operation and speed of use, the tool can become hot (reference should be made to warnings of hot areas on the tool).

1.4.2.22 Personal protective equipment

- 1 Personal protective equipment, complying with the relevant British Standards, should be used by operatives using cartridge-operated and gas-operated tools, as follows:
 - (a) eye protection to EN 166-B must be provided and worn at all times when handling cartridge-operated tools, their cartridges or gas-operated tools
 - (b) noise levels will vary with the make of tool but all tools create a high intensity, short duration noise. Suitable hearing protection should be worn
 - (c) safety helmets to EN 379 should be worn while cartridge tools are in use.
- 2 The safety of other persons in the vicinity of where cartridge-operated or gas-operated tools are being used, must be covered in the risk assessment, and all necessary precautions taken.

1.4.2.23 Selection, training and supervision

- 1 The selection and training of personnel should take the following points into consideration:
 - (a) operatives should be properly and adequately trained and be competent in the use of the equipment and aware of the hazards which may arise
 - (b) they should be tested for colour blindness (cartridge-operated tools only)
 - (c) it is recommended that only persons over 18 years of age are allowed to use portable fixing tools
 - (d) operatives selected to use these tools should be of a mature and responsible disposition
 - (e) adequate close supervision must be provided where necessary, for example when the operator of a portable tool is inexperienced.
- 2 Training can usually be sourced from the supplier or manufacturer of the equipment.

Construction Site Safety**1.4.2 Appendix****Portable fixing tools****Safety checklist**

- 1 Has a suitable and sufficient risk assessment been carried out?
- 2 Has adequate information, instruction, training and supervision been provided?
- 3 Is the activity carried out in accordance with BS 4078-1?
- 4 Does all cartridge-operated tool equipment comply with BS 4078-2, (EN 792 for gas-powered fasteners) including the provision of splinter guards?
- 5 Are the operatives selected for training in the use of portable fixing tools of a mature and responsible disposition?
- 6 Who is responsible for the maintenance, issue and return of equipment including any unused cartridges?
- 7 Are operatives properly trained and aware of hazards associated with portable fixing tools, especially penetration, ricochets, misfiring, and the misuse of tools?
- 8 Are safe systems of work in operation? Do they cover the above hazards?
- 9 Are checks made to ensure that procedures are being observed and especially to ensure that loaded tools are not left lying about?
- 10 Are all cartridges and fuel cells kept in a cool, dry place, under lock and key?
- 11 Are cartridges clearly marked to indicate their strength?
- 12 Is the correct PPE available as required and is it being worn correctly?
- 13 Is the place where the work with fixing tools is being carried out safe for the tool user and for any other people who may be in the vicinity?
- 14 Is there a need to create an 'exclusion zone' around the work area?
- 15 Where will cartridge-operated tools and their associated cartridges be securely stored on site?
- 16 Will fixing tools and their cartridges and fuel cells be stored in accordance with the manufacturer's instructions?
- 17 Is the tool correct and suitable for the job?
- 18 Are tools equipped with suitable safety devices?
- 19 Are operatives fully aware of cartridge colour codes?
- 20 Are operatives aware of the different types of fixings?

Construction Site Safety

1.4.3 Lifting Operations, Equipment and Accessories

1.4.3.1 Key points

- 1 Many accidents occur during lifting operations because they were not properly planned in advance.
- 2 All lifting operations must be carried out by, and under the control of, trained and competent persons.
- 3 The safe working load (SWL) of any item of lifting equipment or lifting accessory must never be exceeded.
- 4 All equipment and accessories used for lifting operations must be subjected to a schedule of inspections and thorough examinations.
- 5 In addition to the equipment and accessories used, attention must also be paid to site features such as overhead cables, unstable ground conditions and adjacent properties.

Note: Section 1, Part 14.4 of the QCS covers the certification of lifting equipment and Section 9, Part 7 of the QCS covers lifting equipment.

1.4.3.2 Introduction

- 1 Experience has shown that lifting operations can be hazardous work activities if not properly planned and carried out. Safe lifting operations will depend upon:
 - (a) The availability of suitable lifting equipment, that is properly maintained, inspected and fit for purpose.
 - (b) the provision of adequate information, instruction, training or supervision for everyone involved
 - (c) thorough pre-planning of each lifting operation
 - (d) compliance with safe systems of work as detailed in risk assessments and method statements (lifting plan).
- 2 These Regulations require that safe systems of work are developed for each lifting activity.
- 3 Unsafe working and accidents result from:
 - (a) a lack of training or knowledge of the equipment
 - (b) poor maintenance of the equipment
 - (c) the correct (or recommended) plant or equipment not being available
 - (d) the misuse of plant and equipment
 - (e) insufficient or inaccurate information on the load
 - (f) insufficient or inaccurate information on underground hazards, such as buried services
 - (g) unstable ground collapsing under the weight of the crane and its load
 - (h) failure to take account of adverse weather conditions
 - (i) poor slinging of the load
 - (j) rushing to get the job done.
 - (k) Standing directly underneath suspended loads.
- 4 **Note:** BS 7121-1 General gives advice on the safe use of cranes but excludes manually-operated cranes and those mounted on waterborne vessels, except where a land-based crane is temporarily fixed to such a vessel.

5 It details safe systems of work and the control of lifting operations, which include site preparation, along with the rigging and de-rigging of cranes.

6 The Code of Practice to BS 7121 also introduces the term 'signaller' in place of 'banksman'. Throughout the following text any reference to a banksman has been replaced with **signaller**.

1.4.3.3 The Management of Health and Safety at Work

1 Contractor must make a suitable and sufficient assessment of every work activity to identify any hazard that employees or other persons might encounter as a result of the work being carried out.

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 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, for their part, have a duty to tell inform the 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 the Contractor must provide employees with adequate information, instruction, training and supervision to be able to carry out any work safely and without risks to their health.

1.4.3.4 Risk Assessment and Method Statement

1 Before any lift is carried out, a suitable and sufficient risk assessment must be carried out where lifting activities are repetitive with broadly the same hazards and levels of risk, a single risk assessment to cover all the lifts may be satisfactory in some situations.

2 Having decided on the type and size of crane to be used, the Appointed Person is required to plan the lift and complete a risk assessment which will normally form part of the Lifting Plan for the lifting activity. Where the lift forms part of another operation, the Appointed Person must ensure that a risk assessment has been completed for the other activities that will be affected by the lift.

3 In some cases, for example if there are related activities which cannot conveniently be detailed in a Lifting Plan, it may also be necessary to prepare a method statement. Such as Safety Critical method statement for lifts in excess of 10 tonnes Tandem, Complex, Floating Lifts etc. Additional advice must be sought from the Contractors SHE team during the planning of such lifting operations.

4 Complex lifts may be common and repetitive during piling operation ie. Tandem Lifts, Diaphragm this is the case, the Appointed Person shall be in attendance for the duration of the first lift. Once Walls, Topping and Tailing Loads etc. Where it has been identified by the Appointed Person that satisfied the Lifting Operation, Risk Assessment and Method Statement are correct they may delegate their supervisory duties to the Crane/Lift Supervisor for the remainder of the operation.

5 Thereafter the Appointed Person will be required to monitor the lifting operation at intervals agreed with the Project Manager. Where changes to lifting operation, Risk Assessment/Method Statement are required, the Appointed Persons must be notified immediately and shall review and revise the lifting operation, Risk Assessment/Method Statement for the duration of the lift.

6 Once satisfied, the Appointed Person can once again delegate the supervisory duties back to the Crane/Supervisor.

7 Method statements shall be submitted for review and approval by the Engineer where required as per CDM.

1.4.3.5 Lifting Operations and Lifting Equipment

- 1 The main requirements are:
 - (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) lifting equipment must be positioned or installed so as to prevent the lifting equipment or the load striking a person, or the load otherwise becoming out of control
 - (d) the load must be under full and proper control at all times
 - (e) lifting equipment must be equipped with suitable devices to prevent any person falling down a shaft or hoistway
 - (f) lifting equipment and accessories must be clearly marked with their safe working load and other markings if designed for lifting persons
 - (g) every lift must be properly planned by a competent person, the loads calculated and slinging method determined by a competent slinger, properly supervised and carried out safely.
 - (h) lifting equipment must be subjected to a programme of inspections and thorough examination as appropriate
 - (i) reports of thorough examination must be made and retained, with all defects notified to the Contractor who must take appropriate actions.

1.4.3.6 The Provision and Use of Work Equipment

- 1 All lifting equipment and accessories for lifting are classified as work equipment and must therefore also comply with these Regulations.
- 2 Contractors must 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 all work equipment 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 Dangerous parts of machinery must be adequately guarded, preferably by fixed guards that cannot be defeated or removed.
- 6 Employees must be provided with information, instruction and training in the use of work equipment, where necessary for their health and safety.

1.4.3.7 General requirements:

- 1 Where lifting equipment is used for carrying or lifting personnel, there are additional measures that must be considered. Equipment that can be used may include:
 - (a) Cranes;
 - (b) Fork lift trucks (although their use to lift personnel should be avoided where practicable);
 - (c) Telescopic material handlers;
 - (d) Cherry pickers;
 - (e) Scissor lifts and mobile elevated work platforms;
 - (f) Hoists;
 - (g) Bosun's chairs.

- 2 If a crane is used, the crane must be operated in power-lowering mode only. The free-fall facilities on some crawler cranes must be disengaged. Where there is a key mechanism which is used to switch power from lowering to free-fall, the crane must be switched to power-lowering and the key given to the man in the basket.
- 3 The crane should be fitted with an automatic braking ‘mechanism, formerly referred to as a dead man’s handle’.
- 4 A rescue plan must be included within the risk assessment or method statement.
- 5 All man-riding lifting equipment and accessories are required to have a thorough examination every six months.

1.4.3.8 Man riding baskets

- 1 If a man-riding basket is used, the Safe Working Load must be clearly marked on the basket. Checks should be made to ensure that:
 - (a) The door-locking mechanism operates correctly;
 - (b) The floor is free from rust or bad repairs;
 - (c) The shackle-attachment points are in good condition.
 - (d) All personnel who are in the basket must clip their safety harnesses to a secure anchorage point within the basket or onto the hook of the crane before any lifting movement takes place.

1.4.3.9 Work at Height

- 1 The use of some lifting equipment, for example tower cranes, will inevitably involve employees having to work at height, the legal definition of which includes getting up to the high-level work place and getting down again. Even standing on the tracks of a crawler crane would be classified as working at height if a fall from that place could result in personal injury.
- 2 The key provisions of these Regulations are (briefly) that Contractors shall:
 - (a) where it is reasonably practicable, avoid the need to carry out work at height
 - (b) where such work cannot be avoided, 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 properly planned, risk-assessment based and carried out safely by competent persons
 - (e) equipment used for working at height is appropriately selected and inspected as specified
 - (f) establish danger areas from which people must be excluded, when there is a danger of them falling or being struck by falling objects
 - (g) measures are taken to prevent anyone being injured by falling objects.

1.4.3.10 Construction (Design and Management) CDM

- 1 CDM has implications for the way in which lifting operations are carried out:
 - (a) designers must ensure the health and safety of anyone engaged in lifting operations, for example by designing-in lifting points on components that will have to be craned into place
 - (b) designers must provide sufficient information regarding their designs, such as notifying the weight of any component that has to be craned into place

- (c) there must be safe places of work, including getting to and from the place of work
- (d) traffic routes must be suitable for the vehicles that will have to pass over them, for example, mobile cranes must be used and moved in a way that pedestrians are not put at risk
- (e) there must be suitable and sufficient lighting for every place of work and traffic route

1.4.3.11 Definitions

- 2 **Appointed person:** A person who has the competence, adequate training, authority and experience to take overall responsibility and control of a lifting operation, having been appointed by the management of the organisation or organisations that require the load to be moved. The Appointed person must produce the lifting plan.
- 1 **Competent person** (for the purposes of inspection and examination): A person who has the practical and theoretical knowledge together with actual experience of what they are to examine so as to enable them to detect errors, defects, faults or weaknesses, which it is the purpose of the examination or inspection to discover; and to assess the importance of any such discovery.
- 2 **Crane co-ordinator:** A person who plans and directs the sequence of operations of cranes to ensure that they do not collide with other cranes, loads and other equipment (for example, concrete placing booms, tele handlers and piling rigs). Where multiple lift plans are in place the Crane Co-ordinator must be briefed on each plan and an agreed communication plan must be in place.
- 3 **Crane supervisor:** A person who controls the lifting operation and ensures that it is carried out in accordance with the appointed person's safe system of work.
- 4 **Crane operator:** A person who operates the crane for the purpose of moving and positioning loads or erection of the crane.
- 5 **Lifting accessory:** A lifting beam or frame, chain sling, rope sling or similar gear, a ring, link, hook, interlocks, plate clamp, shackle, swivel or eyebolt, and any loose equipment used with lifting gear.
- 6 **Lifting equipment:** A piece of work equipment for lifting or lowering loads including a crab, winch, pulley block or gin wheel (for raising or lowering), a hoist, crane, shearlegs, excavator, dragline, piling frame, aerial cable way, aerial ropeway or overhead runway, goods hoists, mobile elevated work platforms, scissor lifts, vehicle hoists, ropes used for access, forklift trucks, lorry loaders (hiabs) and passenger lifts.
- 7 **Mobile crane:** A crane capable of travelling under its own power, but does not include a crane that travels on a line of rails.
- 8 **Plant and equipment:** Any plant, equipment, gear, machinery, apparatus or appliance, or part thereof.
- 9 **Safe working load (SWL):** The maximum load that can be safely lifted by any item of lifting equipment, such as a crane or hoist, or any accessory for lifting.
- 10 **Note 1:** *The safe working load includes the weight of the hook block and all the lifting gear. The weight of these should be deducted from the declared safe working load of the lifting equipment to obtain the net load that can be safely lifted.*
- 11 **Thorough examination:** An examination by a competent person in such depth and detail as the competent person considers necessary to enable them to determine whether the equipment being examined is safe to continue in use.

1.4.3.12 Safe systems of work

- 1 A safe system of work should be devised and effectively communicated to all those involved in a lifting operation. It must include:
 - (a) thorough planning of the operation, along with the selection, provision and use of suitable cranes and equipment
 - (b) any necessary preparation of the site and erection and dismantling of the crane(s)
 - (c) ensuring that all equipment has been maintained, tested and examined as necessary
 - (d) operation of all equipment by trained and competent people
 - (e) supervision of the lift by trained and competent people, with the authority to progress or stop a job as necessary
 - (f) safe slinging of the load by a trained and competent person
 - (g) the provision of all test certificates and other documentation relevant to the equipment being used
 - (h) the prevention of unauthorised use or movement of equipment, both by workers or members of the public who may be trespassing
 - (i) an effective means of communication between all members of the team during lifting operations
 - (j) the safety of all persons, both those involved in the lift as well as those not involved in the lift but who may be affected by the lifting operation.

1.4.3.13 Construction and support

- 1 Every crane and item of lifting equipment must be properly made and strong enough to carry out the work for which it is intended.
- 2 Foundations, stages, scaffolds, derrick masts and anchorages that have to carry a load must be of good construction and adequate strength. All temporary support structures should be certified by a competent temporary works engineer and a 'Permit to Load' issued before any support is loaded.
- 3 Winch frames must be made of metal. Separate crane jibs must be clearly marked to identify which crane they are part of.

1.4.3.14 Platforms

- 1 Platforms for crane drivers and signallers must be large enough to allow the person to do their work properly, close boarded or plated and fitted with access ladders or steps.
- 2 Where a risk assessment indicates that there is a possibility of injury resulting from a person falling from the platform of a crane, suitable guard-rails and toe-boards should be provided to prevent such an occurrence. Guard-rails should be at least 950 mm above the working platform. The gap between the guard-rails and between the mid-rail and toe-board must not exceed 470 mm. Guard-rails and toe-boards may be removed for temporary access providing other fall protection measures are in place.

1.4.3.15 Cabin

- 1 Generally speaking, a crane should be provided with a cabin to give the driver protection from the weather. The cabin should afford an unrestricted view of the work in hand and permit access to any machinery contained within the cab, for maintenance, etc. Where practicable, it should be cooled in hot weather and heated in cool weather.
- 2 In some circumstances Cabins are not required. For example, when the plant is indoors or otherwise protected (unless it is mobile) and will not lift more than 1 tonne or where, in the case of a hoist, it can be operated from a landing platform or inside the cage.

1.4.3.16 Drums and pulleys

- 1 The size of a drum or pulley must match the size of the rope or chain being used. The rope or chain must be anchored to the drum and there should be never less than two 'dead' turns remaining on the drum.

1.4.3.17 Brakes, controls, etc.

- 1 Cranes, winches, etc. must be fitted with brakes capable of holding and controlling the maximum load. Controls on all lifting devices must be clearly marked and designed so that they cannot be operated accidentally.
- 2 For Cranes with derrick jibs
- 3 If the derrick motion of a crane is driven by the hoist motor through a clutch, and can only be controlled by the hoist brake, then an interlock must be fitted to prevent dual operation.

1.4.3.18 Access

- 1 Ladders, platforms or handholds must be provided to give safe access to all parts of the crane or lifting appliance that need inspection or regular maintenance, and from which a person may fall from height.

1.4.3.19 Hired cranes

- 1 Where a crane is hired, the responsibility for ensuring compliance with these Regulations lies with:
 - (a) the hire company to ensure work equipment is maintained, inspected and tested as appropriate, and to provide information to the hirer
 - (b) the person hiring the crane to ensure they have selected suitable work equipment and that it complies with all relevant legislation.
- 2 Where the hirer arranges for the crane hire company to carry out a 'contract lift', the crane hire company takes on the total responsibility for all aspects of the safety of the lifting operations.
- 3 The responsibilities for hired and contract lifts are clarified below:
- 4 **Hired crane (hired and managed).** The employing organisation should:
 - (a) carry out all work in accordance with BS 7121
 - (b) supply the appointed person
 - (c) plan the lift and operate a safe system of work
 - (d) ensure that the crane hired is of a suitable type and capacity
 - (e) check the credentials of the crane company and certification supplied.
- 5 The crane owner has a duty to:
 - (a) provide a crane that is properly maintained, tested and certified
 - (b) provide a competent driver.
 - (c) Provide a planned preventative maintenance and service history of the crane for a period covering minimum of 1 year.
- 6 Contract lift (fully contracted). The employing organisation should specify:
 - (a) that all work is to be undertaken in accordance with BS 7121
 - (b) that the lifting contractor is to supply the appointed person

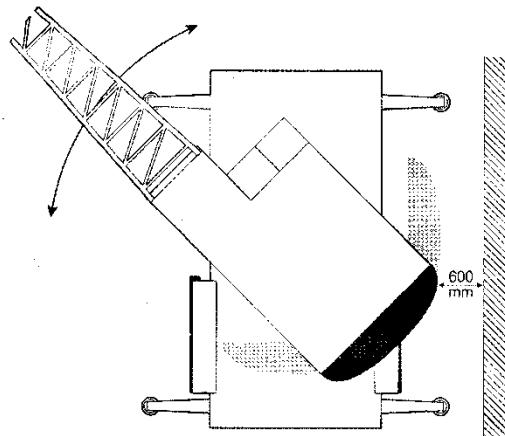
- (c) what information and/or services will be provided to the lifting contractor by the employing organisation.

7 The lifting contractor is responsible for:

- (a) supplying the appointed person
- (b) planning the lift, and operation of a safe system of work
- (c) organisation and control of the lifting operation.

1.4.3.20 Siting

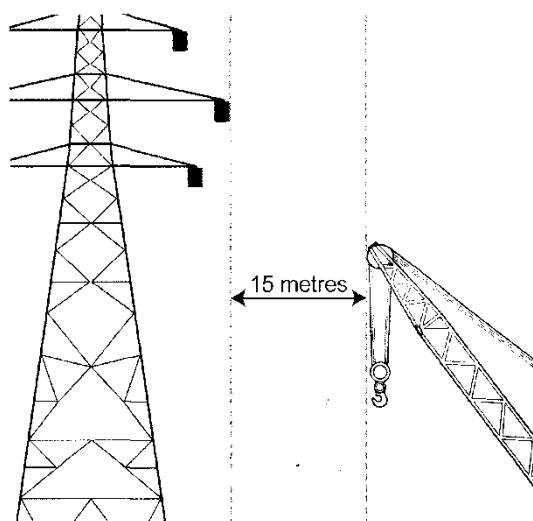
- 1 The site engineer, in consultation with the appointed person, usually decides on the siting of cranes or other lifting appliances. In the case of mobile cranes, the operator is responsible for ensuring that the movement and position of the crane are both safe and suitable under the direction of the crane supervisor and in accordance with the appointed person's safe system of work.
- 2 The crane operator should check that any ramps, slopes, gates, archways, buildings, trees or overhead lines do not present an obstacle or danger, and that refuelling or other service vehicles can gain access without causing a hazard.



- 3 **A minimum** 600 mm-wide clearance between travelling or slewing cranes and any fixed object (guard-rail, adjacent building, etc.) must be maintained. Where this is not practical, any place where a person might be trapped must be blocked by enclosing it with barriers.

1.4.3.21 Overhead power cables

- 1 Particular care should be taken when siting cranes or other lifting appliances close to overhead power cables. The jib or boom does not necessarily need to touch a live power cable, for a 'flashover' to occur. Electricity can jump over some distance depending on the voltage carried by the overhead cables and the level of moisture in the air.
- 2 The **minimum** recommended safe working distance away from overhead cables is the length of the jib of the crane, plus 9 metres if the cable is slung on wooden or metal poles and 15 metres if the cable is slung on pylons. This is measured with the jib pointing towards the cable, even when the crane will be working in the opposite direction.
- 3 If the minimum safe working distance cannot be maintained, the electricity supply company should be consulted to enable a safe system of work to be devised.



- 4 The 'danger area' must be clearly marked off with stakes, flags, or similar indicators and, where it is necessary to pass below overhead power cables, 'goal posts' should be set up to indicate the maximum clearance height, as specified by the local electricity supply company.
- 5 Materials, including rubbish, should not be deposited in this area.

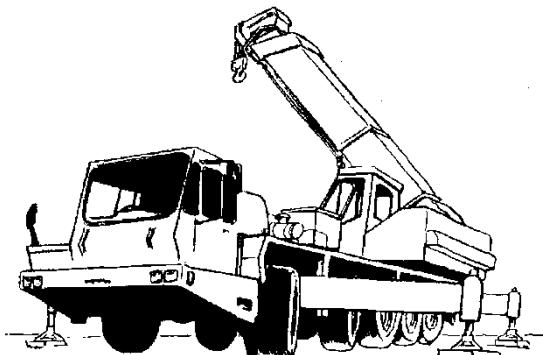
1.4.3.22 Stability

- 1 A crane must have a stable and level base. The stability and load-bearing capacity of the ground must be sufficient to carry the most severe static and dynamic loads, taking into account such factors as the slewing torques, wind stresses and shock loading, as well as the weight of the crane and its load.
- 2 Settlement during the lifting operation must be kept to a minimum — so as to ensure that the crane is kept level and within the manufacturer 's tolerances.
- 3 Excessive settlement is critical because, if the slewing axis of the crane is not vertical, the jib will not be in a vertical plane. This will cause side loads on the jib and may result in the capacity of the slewing gear being exceeded.
- 4 If excessive settlement occurs (or appears likely to occur), the crane may have to be re-positioned on stronger ground or the outrigger foundations may have to be increased in size. Where the instability is related to the local bearing pressure, it may be possible to rectify the situation by using mats or other means to spread the load over a larger area.
- 5 Care must be taken to see that the ground is firm and stable. Excavations which may not have been correctly filled in, as well as cellars, culverts, tunnels and shafts, may all reduce the stability of the ground and constitute a hazard to machinery and heavy loads.
- 6 The value of gross loading intensity for a particular foundation at which the resistance of the soil to displacement of the foundation is fully mobilised (that is, at failure).
- 7 The maximum allowable loading intensity at the base of the foundation, taking into account the ultimate bearing capacity, the amount and kind of settlement expected, and the ability of the structure to accommodate this settlement.
- 8 It is also important to identify underground services and to carry out any temporary protection measures that may be required. The failure of a water main due to overloading, for example, can dramatically reduce the load bearing capacity of the ground.

- 9 The same principles apply when a crane is sited on a street or roadway for the purpose of working into a site.
- 10 The Appointed Person should make an assessment of the ground bearing capacity at the planned location for the crane. This should allow a decision to be made on whether the ground will support the loadings that will be caused by the lifting operation and whether any mats or additional foundations will be required. This assessment should be made in consultation with temporary works or soil mechanics specialists and after reference to any available soil technical data and making use of initial site observations, local knowledge and any existing site investigation reports.
- 11 Before carrying out any lifting, the crane operator must conduct a test lift to determine whether there will be any settlement below the crane or under any outriggers. The crane operator can then determine whether the crane configuration and set-up is safe for the lift to proceed.
- 12 If changes are necessary to the position or configuration of the crane, the Lifting Plan will need to be amended by the Appointed Person and re-communicated to all personnel involved in the lift.
- 13 Adverse weather, such as rain (producing soft ground) and strong winds, can rapidly affect the stability of a crane, and no crane should be used without these factors first being considered.

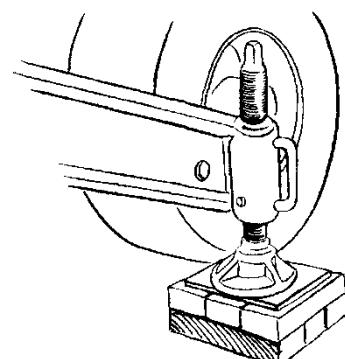
1.4.3.23 Outriggers

- 1 The majority of mobile cranes are fitted with outriggers to increase the area of the supporting base. Outriggers are effective only if they are deployed correctly.
- 2 The safe rule is to use outriggers for all lifting duties (except where 'free on wheels' duties are required). ALL the outriggers must be extended fully and equally, on both sides.
- 3 If the stability of the ground is in any way suspect, suitable grillage must be used under each outrigger to reduce the ground area loading.
- 4 Where operating on a slight slope cannot be avoided, the operating area should be built up to give a level base (see diagram below). A slope of as little as 1° can significantly affect the stability and capacity of a crane, particularly where long jibs are in use.



1.4.3.24 Ballast, anchorage, etc.

- 1 Cranes may need to be anchored to the ground or other foundations, or have counterweights or ballast to prevent them overturning. The anchorage or ballast should be checked by a competent person each time the crane is erected, and after bad weather.
- 2 Before a crane is put to work, any new anchorage or ballast must be checked by applying a load 25% greater than the maximum rated load. If this test shows the crane cannot be worked safely with its normal load, it may still be used, if it is sufficiently derated. Such tests may only be carried out by a competent person. A modified loading diagram should then be fixed to the crane where it can be seen by the operator. Other lifting control documentation,



such as the lift plan and method statement, should also be modified accordingly. A record of the test should be kept.

1.4.3.25 Rigging and de-rigging

Rigging

- 1 No crane or other lifting appliance may be erected unless under the supervision of a competent person, such as the operator or crane supervisor.

De-rigging

- 2 The de-rigging of a crane must also be carried out under the supervision of a competent person, normally the crane operator, plus any other persons as recommended by the manufacturer.
- 3 Care must be taken to see that nobody stands under any jib section while the connecting pins are being withdrawn. People have been killed through doing so.

1.4.3.26 Rated capacity indicators, etc.

- 1 Rated capacity indicators (previously known as automatic safe load indicators), radius load indicators and motion limit switches, together with their audio-visual warning systems, are fitted to cranes and other lifting appliances. Their purpose is to prevent any item of lifting equipment from operating outside its safe operating parameters. Under no circumstances should these devices be overridden or disabled.
- 2 During rigging (including the fitting of jib extensions and changes in reeving) it will be necessary to reset these warning indicators to take account of load conditions and operating radius. They must be tested by a competent person before use.
- 3 These requirements do not apply to guy derricks, small cranes (less than 1 tonne SWL), any hand-operated crane used in crane erection, and some hydraulic cranes.
- 4 They must be inspected by a competent person on a weekly basis, and inspections recorded.

1.4.3.27 Crane markings

- 1 All cranes and other lifting appliances must be clearly marked with their maximum safe working load (SWL). If the lifting radius can be varied, an indicator must be fitted which shows the safe load at each operating radius.
- 2 All cranes or lifting appliances which are designed for lifting persons should be identified as such. Cranes and lifting equipment that are not designed for lifting persons, and might be used in error for this purpose, should also be clearly marked to this effect.
- 3 All cranes and other lifting appliances must carry clear identification marks.

1.4.3.28 Lorry loader cranes - interlocks

- 1 Lorry loader cranes must be fitted with an interlocking system (or equivalent engineering solution) to prevent cranes from operating without their stabilisers extended.

1.4.3.29 Lifting operations

Control of lifting operations

- 1 A person, other than the crane operator, should be appointed to take responsibility for the organisation and control of any lifting operations on behalf of the management.
- 2 They should be adequately trained and have the necessary experience to be deemed

competent. The appointed person should be formally notified in writing of their appointment.

- 3 The appointed person must:
 - (a) assess the proposed lift to identify the hazards and corresponding risks, provide for planning, selection of equipment, instruction and supervision to enable the work to be carried out safely
 - (b) ensure that all tests, inspections, examinations and maintenance have been carried out, and that there is a procedure for reporting defects and taking any necessary corrective action
 - (c) ensure that the crane supervisor is fully briefed on the relevant sections of the lift plan and contents of method statements
 - (d) have the authority to carry out their duties and to stop the operations if they think there is a danger.
 - (e) The appointed person must have the relevant 3rd party training and experience to undertake this role.
- 4 The appointed person's duties, but not their responsibilities, may be delegated to another competent person.
- 5 Drivers of cranes and other lifting appliances, and others involved in lifting operations, including signallers, must be adequately trained, experienced and of a mature disposition. The recommended age is 18 years or over, unless under the direct supervision of a competent person for the purpose of training.

1.4.3.30 Signals

- 1 If a driver cannot see the load during the whole lifting operation, they must have one or more trained signallers or some other signalling system (e.g. radio) to enable them to handle the load safely.
- 2 Signallers must be in a safe position, have a clear view of the path of the load and have effective communication with the driver. Signals must be clear and distinct. Mechanical or electrical signals should be kept in good order and safeguarded against accidental operation.
- 3 It is very important that clear and precise words of command are given so that there can be no misunderstandings.
- 4 A positive decision is needed on the use of words; for example, which word you would use:
 - (a) up or raise or lift or hoist
 - (b) similarly,
 - (c) lower or down or rest, etc.
- 5 The use of hand signals should be equally clear and everyone involved in the lift must be made aware of whether the hand signals specified in:
 - (a) BS 7121 Safe use of cranes Part 1 (as shown in Appendix 7).

1.4.3.31 Restriction on use

- 1 A hoisting mechanism should be used for - raising and lowering loads vertically and for no other purpose, unless it is designed to do so, competently supervised and can be done without overstressing the crane structure or mechanism or endangering its stability.
- 2 Crane jibs must not be worked at a radius greater than that specified on the test certificate.

1.4.3.32 Safe working load

- 1 In no circumstances must the load on the lifting equipment exceed the safe working load (SWL), except when under test by an authorised competent person.
- 2 When lifting near to the SWL, the load should be raised a short distance only and the operation stopped to check stability and safety before continuing. Wind-loading will affect how near to the SWL a crane can operate. Care must also be taken when planning to lift loads out of water, as the load may suddenly increase beyond the SWL since the support previously given by the water no longer exists.
- 3 When two cranes or other lifting appliances have to be used for one load, each must work within its safe load, and must remain stable throughout the lift. Multiple or complex lifts of this type must be supervised by a specially appointed competent person (see tandem lifts on the next page).

1.4.3.33 Loads

Slinging loads

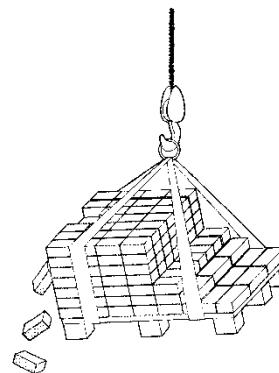
- 1 Many accidents associated with lifting operations are caused by faulty slinging (for example, overloading, use of the wrong type of sling, unbalanced or insecure loads). This results in the load falling or tipping out of control with damage to plant, machinery and to the load.
- 2 The crane operator will often have to rely on the slinger or signaller, who should be trained, competent and aware of the possible hazards arising from the use of lifting accessories.
- 3 Loads must be correctly slung and made secure to prevent any part of them slipping and falling. The slinging of loads must only be carried out by someone who has been trained and is competent to do so.
- 4 Many crane accidents feature loads that fall from height because they were not correctly slung.
- 5 Precautions must be taken to prevent the load striking, or becoming snagged on, any obstacle or causing other items to fall from height.
- 6 As far as possible, loose materials (bricks, slates, etc.) should be banded and on pallets when being lifted. If not, they should be lifted in a properly constructed box or other container.
- 7 If loose materials are carried on a hoist, side barriers should be fitted to prevent anything falling. Wheelbarrows and trucks must be prevented from moving and should not be overfilled.
- 8 Loads should not be suspended or carried over areas occupied by persons. However, where this is not practicable, a safe system of work should be developed to minimise any risks to those below the load.
- 9 The safe system of work should include, for example, the prevention of access to the danger area below a suspended or moving load, by barriers or other means, ensuring the load is adequately secured and that the operator is in control of the movement at all times.

Anchored loads

- 10 Cranes are not designed to pull loads free from their attachment to their surroundings. The additional loading stress cannot be accurately determined and, when a load does break free, the sudden shock can result in damage to the boom or crane machinery, failure of the sling, failure of the wire, whiplash and other dangers.

Unstable loads

- 11 In circumstances where the centre of gravity of a load is not known or where it is known to be off-centre, these factors must be allowed for when planning the lift. An example is the lifting of long columns from the vertical, where the load could become unstable and topple the crane. A written procedure setting out a safe system of work should be prepared to cover such operations.



1.4.3.34 Tandem lifts

- 1 Tandem lifts (lifting a load using two or more cranes simultaneously) is a specialist activity. This type of lift must only be planned and supervised by someone who has been trained and is competent in the techniques and calculations involved. The main factors to be considered when planning multiple lifts are the total weight and distribution of the load, its centre of gravity, the weight and capacity of any lifting accessories and synchronisation of the crane motions.

1.4.3.35 Demolition and dismantling work

- 1 Lifting loads from a place that is significantly above ground level demands the utmost care and, in particular, an accurate assessment of the weight of the load and its point of balance. Loads should be raised about 150 mm and held, while the stability is assessed, before proceeding.

1.4.3.36 Carriage of persons

- 1 Some items of lifting equipment, such as MEWPs or suspended cradles, are specifically designed for the lifting of persons and this type of equipment should be used wherever possible.
- 2 However, it is sometimes necessary to adapt equipment that is primarily designed for lifting materials to lift persons. An example of this is the fitting of a temporary working platform to the forks of a forklift truck. In such circumstances the working platform must:
- be fully compatible with the forklift truck to which it is fitted
 - conform to the requirements of working at height with regard to guard-rails and toe-boards
 - be securely fixed to the forks so that it cannot become detached or otherwise unstable
 - prevent access to otherwise exposed dangerous parts of the forklift truck
 - be protected against overhead hazards.
- 3 These Regulations require that all work equipment designed for carrying persons:
- be constructed to prevent a person using it from being crushed, trapped, or falling from the carrier, either whilst in transit or carrying out work from the carrier
 - be equipped with suitable devices to prevent the 'person carrier' falling
 - is such that a person trapped in a carrier is not exposed to danger and can be freed.
- 4 Furthermore, if a 'man-riding' cradle suspended from a crane is being used, BS 7172 Part 1 advises that the cradle:
- is prevented from spinning or tipping
 - is controlled as described in the section on tower cranes.

1.4.3.37 Maintenance

- 1 Contractors must ensure that work equipment (which includes lifting equipment and accessories) is adequately maintained, in good working order and are routinely inspected.
- 2 As far as lifting equipment and lifting accessories are concerned, maintenance must be carried out in accordance with the manufacturer's instructions, using 'check-sheets', lubrication charts, etc. Maintenance must be carried out by a competent person who is familiar with the equipment and has the knowledge and experience to detect existing or potential faults.

1.4.3.38 Thorough examination and inspection

Thorough examination

- 1 These Regulations place a duty on Contractors to ensure that all lifting equipment and lifting accessories are subjected to a schedule of thorough examinations by a competent person at intervals **not exceeding**:
 - (a) six months for lifting equipment used for lifting persons and all lifting accessories
 - (b) 12 months for other lifting equipment.
- 2 The competent person might decide, for a variety of reasons, that a schedule of more frequent examinations is appropriate.
- 3 A thorough examination must also be carried out after any other event likely to have affected the safety of any lifting equipment or accessories or where the equipment has been out of use for a long period.
- 4 Furthermore, where the safety of lifting equipment depends upon the way it has been installed (as for the many items of temporary lifting equipment used on construction sites, such as tower cranes), it must be thoroughly examined after assembly and before being put into service at a new site or a new location on the same site.
- 5 The competent person must have sufficient practical and theoretical knowledge and experience of the lifting equipment to enable defects and weaknesses to be detected, and their importance in relation to the safety of the equipment to be assessed.
- 6 The competent person must also be sufficiently independent of the operation to ensure that there is no fear or favour in any recommendations made as a result of the thorough examination.

1.4.3.39 Inspection

- 1 These Regulations also require that, where appropriate, as determined by a risk assessment, intermediate inspections of lifting equipment are carried out. Depending upon the complexity of the equipment it might be appropriate to put in place two levels of inspection: daily and weekly.
- 2 Again, these inspections must be carried out by someone who is competent to do so although, in most cases, the same depth of technical knowledge will not be required as for thorough examinations. In some cases, for example carrying out a daily pre-use inspection of a mobile crane, it would be reasonable to expect the operator to be able to carry out the inspection.
- 3 Some factors that will determine the frequency and 'depth' of any inspection are:
 - (a) if the equipment is being used in a hostile environment
 - (b) if failure becomes more likely due to repeated use

- (c) the critical nature of some components, such as the 'rated capacity indicator'
 - (d) the potential for the equipment to be tampered with, for example a mobile crane left overnight in a public place.
- 4 items covered by inspections include, but are not limited to:
- (a) the soundness of materials, attachments, fittings, outriggers, jibs, ropes and hooks
 - (b) the testing of the rated capacity indicator, the correct settings of cams, linkages and switches, and the correct working of audio-visual warning signals
 - (c) the mechanical condition of the lifting equipment
 - (d) routine maintenance (lubrication, tyre pressures and hydraulic fluid level).
- 5 In summary, any lifting equipment which is used in conditions commonly found in the building and construction industry should not be used unless it is:
- (a) mechanically sound and free from any defects affecting its safe operation
 - (b) properly maintained
 - (c) regularly inspected, either weekly or to an agreed programme, when in use, usually by the operator, or other authorised person
 - (d) thoroughly examined every 12 months (every six months when used for lifting people) by a competent person and after any exceptional circumstances likely to affect the safety of the lifting equipment
 - (e) tested and thoroughly examined
- 6 Following any repairs or alterations which may affect the strength or stability of the lifting equipment.

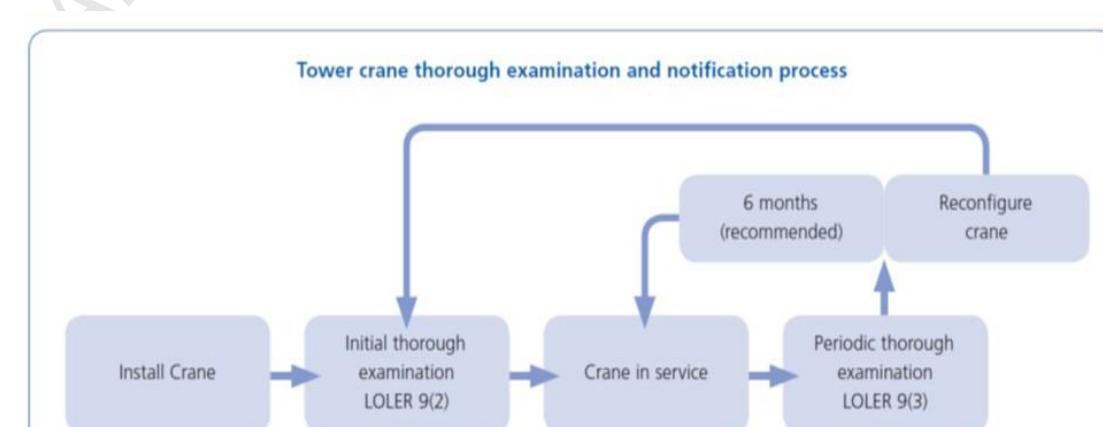
1.4.3.40 Reports

- 1 Contractor must establish a regime of good maintenance and record keeping, whilst allowing the competent person to determine the schedule of inspections and thorough examinations.
- 2 Evidence of inspections, thorough examinations and tests must accompany lifting equipment and accessories for lifting when they are hired, leased or loaned to other users and be available for scrutiny.
- 3 Where thorough examinations or tests are carried out by the user during the period of hire, lease or loan, the owner of the lifting equipment or accessory must be informed of the results of each thorough examination or test.
- 4 Reports of thorough examinations should contain the information in Appendix 6 of this section.
- 5 records can be held in electronic form, but must be readily available to the user of the lifting equipment or accessory for lifting providing the following safeguards are incorporated into the system.
 - (a) The records must be capable of being reproduced as hard copy when required.
 - (b) The information must be secure against loss or unauthorised interference.
 - (c) The information must be authenticated only by a person who is in a position to declare that the information is correct.

1.4.3.41 Tower cranes

- 1 Tower cranes can present particular safety considerations when used on site.
 - (a) Generally they are self-erecting and dismantling, or erected and dismantled using a large mobile crane for which provision has to be made in terms of space and stable ground conditions.
 - (b) Portable tower cranes, often controlled remotely from the ground, need to be treated the same as a mobile crane.
 - (c) They require detailed attention to the foundation (static crane) or rails (mobile crane); manufacturers or suppliers should be consulted.
 - (d) In many cases they have the capacity to over-sail adjacent properties and areas to which the public have access;
- 2 The following Arrangements will have to be made:
 - (a) Where the right to over-sail adjacent property is not given, it may be necessary to:
 - (iv) rearrange the siting of the tower crane(s)
 - (v) review the type of crane required, for example a luffing-jib crane might be the only solution.
 - (b) The required airspace must be confirmed with regard to the proximity of adjacent structures, overhead power lines or other obstructions.
 - (c) The requirement for airspace may need to be discussed with any local airport to establish that there will be no intrusion into, or unacceptably near to, aircraft flight paths.
 - (d) There may be a requirement for an aircraft warning light or beacon on the highest point of the crane; the colour intensity and whether it is on steady or flashes will depend upon the local rules for any flight path affected.
 - (e) On sites where more than one tower crane is erected, there may be overlapping arcs of operation when slewing; anti clash devices should be fitted.
 - (f) As a result of the above, the cranes should be erected with their jibs at different heights; crane slewing operations must be coordinated.
 - (g) Electrically powered cranes will require a heavy duty power supply and the crane must be effectively earthed to protect against electrical faults and lightning strikes, including earthing of the appropriate rails.
 - (h) High winds can temporarily stop tower crane operations; each crane should be fitted with an anemometer (wind-speed indicator).
 - (i) In high winds, tower cranes must be left in 'free slew' with their hooks raised.
 - (j) If used for lifting persons, a tower crane must:
 - (i) only be capable of lowering the load under power controlled conditions, i.e. not under 'free-fall'
 - (ii) be equipped with an automatic braking system, e.g. a 'dead-man's' handle type of control.
 - (k) A rescue plan must be in place in the event of an accident or incident, for example, the operator becoming ill. The emergency services have no obligation to carry out such rescues and are often not able to assist because of the height of the rescue and because of restricted access for large vehicles such as fire service turntable ladders.
 - (l) Tower cranes must be secured against unauthorised access, including climbing the tower and unauthorised use.
 - (m) A lifting plan approved by an appointed person must be in place.

- 3 The first step in the selection of tower cranes for a particular lifting operation is for the Contractors Site Manager and Appointed Person to carry out an assessment taking into account:
- (a) The maximum load that is to be lifted at the maximum radius.
 - (b) Whether over-sailing of adjacent land, roads or property will be necessary (and, if so, whether appropriate permissions can be obtained or whether a zoning switch will be needed);
 - (c) The prevailing wind speeds at the site (since this can restrict the use of tower cranes in certain locations);
 - (d) The principal features of the common crane types and their advantages and limitations.
- 4 Having determined the basic requirements, the Appointed Person should consult a tower crane supplier to obtain advice on the size and type of crane required and on the foundations that will be needed.
- 5 The contractors Site Manager and The Appointed Person should supply ground information, the tower crane details and any service locations to contractor's temporary works design team so that a suitable foundation for the crane can be designed.
- 6 The foundation design must be signed off by the Engineer Project Manager (or his representative)
- 7 If the site is within 6km of an airport or aerodrome, the Appointed Person should advise the crane supplier — since it may be necessary to fit a warning light to the mast or jib. Special arrangements may be needed for cranes in close proximity to flight paths.
- 8 Use of a tower crane in close proximity to railway lines or a major road may also give rise to the need for special consideration or approvals.
- 9 If a crane has to be used in close proximity to overhead power lines, the guidance given in HSE guidance note GS6 must be followed. In this context, ‘close proximity’ means within 15 meters plus the length of the jib from overhead lines on steel towers or 9 meters plus the length of the jib from concrete, wood or steel poles.
- 10 Section 8 of BS 7121: Part 5: 1997 Selection of tower cranes' gives further information about this subject.
- 11 Tower cranes must not be used for tandem lifts.



Preparation of Lifting Plans

- 12 Before the crane is delivered and erected, the Appointed Person should develop the overall Lifting Plan. This should contain a plan of the site showing the position(s) of the tower crane(s), the radius of each crane(s) and the maximum load capacity at the end of each jib configuration. It may be necessary to prepare separate, more detailed Lifting Plans for individual lifts or types of lift.

Tower cranes working in close proximity-Wind speeds

- 13 Where two or more tower cranes are on site and will be working in close proximity to one another, a Crane Co-ordinator will need to be appointed to plan and manage the sequence of the lifting operations to ensure that the cranes and associated components do not collide. The Crane Co-ordinator must have appropriate experience of working with and planning tower crane activities — as a minimum, the person undertaking this role must have received Crane Supervisor training.
- 14 It is Qatar Foundation policy that, when two or more tower cranes are working in close proximity to one another, a zoning-limit switch is to be fitted. It is recommended that a data logger be fitted to tower cranes
- 15 A small increase of wind speed can have a significant effect on the safe operation of the tower crane. The tower crane's manual will specify the maximum wind speed at which the tower crane must be taken out of service. This is normally 45 mph (20 m/s, 72kph) and is based on the requirements of the tower crane design standards. It is however, a maximum value and does not take into account the time required to take the crane out of service or the difficulty of lifting large area loads in high winds.
- 16 Following a review of in-service wind speeds by the CPA Tower Crane Interest Group, involving tower crane suppliers and the Health and Safety Executive (UK), the industry recommended maximum wind speed at which tower cranes operating in the UK must be taken out of service is 38 mph (16.5 m/s, 60 kph). Do you know what your tower crane's manual has specified the maximum wind speed at which the tower crane must be taken out of service? Is it more than the Industry recommendation?

Planning for erection and dismantling

- 17 A plan for the erection and subsequent dismantling of the crane should be drawn up by the crane erection supervisor. This plan should cover the following aspects:
- The configuration in which the crane will be transported to site;
 - The selection of the crane that will be required during the erection or dismantling process;
 - The availability of access to the site for the vehicles involved;
 - The ground conditions for the erecting crane;
 - Proximity hazards;
 - Any need for specialised lifting gear;
 - Liaison with the occupiers of neighbouring properties;
 - Contact with local authorities or other bodies requiring statutory notifications;
 - Arrangements for road closures;
 - The provision of a radio licence.

Erection and alteration of the crane

- 18 The erection of the tower crane must be under the continuous control of an erection supervisor and in accordance with manufacturer's instructions. The erection supervisor has authority to stop the operation if such action is considered to be necessary to prevent danger to personnel or property. The crane erection supervisor should be in close liaison with the CONTRACTORS site management at all times. This operation should be witnessed by the Engineer
- 19 Similar arrangements will apply to any subsequent modifications to the crane (such as changes in mast height).

Dismantling of a tower crane

- 20 When it becomes necessary to dismantle a lower crane, the crane supplier should be required to provide the following documentation to the Contractors site management, which should be reviewed by the Engineer:
- (a) Risk assessment and method statement for the operation;
 - (b) Dismantling plan and safe system of work;
 - (c) Crane specifications, requirements and resources;
 - (d) Programme of dismantling.
 - (e) The dismantling of the crane and its components must not begin until the system of work has been agreed.
 - (f) The dismantling operation must be under the continuous control of an erection supervisor and in accordance with manufacturer's instructions. The erection supervisor has authority to stop the operation if such action is considered to be necessary to prevent danger to personnel or property. The crane erection supervisor should be in close liaison with the Contractors site management and the Engineer at all times.

Tower crane equipment

- 21 Fire extinguishers
- (a) Tower cranes should be equipped with appropriate types and quantities of fire extinguishers — which must be easily accessible to the driver.
 - (b) The driver and other persons likely to sit in the cab should be adequately trained in the use of such fire extinguishers.
- 22 Crane safety equipment. As a minimum, tower cranes should be provided with the following:
- (a) Automatic safe-load indicator;
 - (b) Load-radius indicator;
 - (c) Motion-limiting devices;
 - (d) Overload cut-out devices;
 - (e) Level indicator;
 - (f) Anemometer;
 - (g) Guards to machinery (such as tail drum and slewing ring);
 - (h) Zoning devices.

Access and cab safety

- 23 The Appointed Person must ensure that ladders, rest platforms and other means of access are in accordance with regulations and standards.
- 24 The Crane Erection Supervisor must ensure that access equipment is correctly installed progressively as erection proceeds, so that the erection teams have the benefit of their use. Particular attention should be paid to:
- (a) ladder-joint bolts;
 - (b) guard rails, particularly on rest and inspection platforms;
 - (c) access from the ground to the foot of the lowest ladder or to the chassis of the crane;
 - (d) Access from levels of the construction to the crane.

Arrangements for rescue from a tower crane

- 25 The Contractor must ensure that suitable arrangements are put in place for emergency situations (rescue from tower crane, crane failure etc.). Any such arrangements shall be subject to liaison with emergency services and appropriate rescue practices carried out to test any agreed arrangements.
- 26 The Engineer is to ensure that these rescue drills have been implemented by the contractor prior to putting the tower crane into service
- 27 The crane operator should be:
- (a) Either over 18 years of age or under the direct supervision of a person competent for the purpose of training;
 - (b) Fit, with particular regard to eyesight, hearing and reflexes;
 - (c) Physically able to operate the crane safely;
 - (d) Able to judge distances, heights and clearances;
 - (e) Adequately trained for the type of crane being driven and have sufficient knowledge of the crane, its operating instructions and its safety devices;
 - (f) Fully conversant with the duties of the slinger and signaller, and have been instructed in the signal code that is to be used by the slinger or signaller;
 - (g) Trained in the use of any fire extinguishing or fighting equipment provided on the crane;
 - (h) Trained in the use of any means provided for escape in case of emergency;
 - (i) Authorised to operate the crane.
- 28 Evidence that the operator is medically fit to drive a crane should be obtained at not more than five- yearly intervals. The type of evidence obtained is dependent on the type of crane being operated and the risks to the operator and others involved in the operation.

1.4.3.42 Excavators used as cranes

- 1 Excavators, loaders and combined excavator loaders may be used as cranes in connection with work directly associated with an excavation, and any other application where this type of equipment can be used.
- 2 All work must be subject to a suitable and sufficient risk assessment, subsequent control measures and capabilities of the work equipment. For lifting operations this will also require a lift plan.

Planning and execution of a lift

- 3 Planning: The Lifting Plan should be prepared by a person holding the Appointed Person If an excavator is to be used for repetitive long-term lifting operations a simple Lifting Plan must be prepared for the operation.
- 4 The Lifting Plan should state the maximum weight of the load to be lifted at the maximum radius of the excavator for both lifting configurations (in-line and cross-tracked). These must not be exceeded — if the load is shown to be outside the capacity of the machine, an alternative-lifting device (such as a crane) will need to be used.
- 5 The Lifting Plan should be completed by a Competent Person, in conjunction with the development of the risk assessment and method statement for the operation. Examples of appropriate competencies for those preparing non-crane' Lifting Plans are:
 - (a) Someone who has received Appointed Person training;
 - (b) Someone who has received Crane Supervisor training;
 - (c) Someone who has attended and successfully passed the Site Management Safety Training Course.

Documentation checks:

- 6 The following documentation should be checked for this type of lift:
 - (a) 12-monthly thorough examination certificate for the excavator and 6 monthly certificate for the lifting accessories;
 - (b) Plant operator's 3rd. party certification and Qatari Driving License
 - (c) Weekly inspection register;
 - (d) Operator's manual;
 - (e) Simple Lifting Plan;
 - (f) Hirer's information on use, if additional equipment is to be used with the excavator.
- 7 Briefing of personnel: The method statement, risk assessment and Lifting Plan should be explained to all personnel involved in the operation (including the excavator operator and slinger / signaller).
- 8 Changes: If there are any subsequent changes to or deviations from the agreed method of work or if the circumstances of the lift are altered, the operation must stop until appropriate re-planning has been undertaken.
- 9 In the case of multiple lifts over a period of time, the Lifting Plan must be reviewed and, if necessary, updated regularly — at least weekly
- 10 The risk assessment should take account of the fact that when a machine is in the object handling mode (being used as a crane), it will be necessary for the slinger to approach the machine to hook the load on and off. This person will be in what is regarded as a hazardous area and much nearer to the machine than anyone would be in normal circumstances. The slinger is at risk of being struck by the load, bucket or excavator arm if the excavator moves or slews rapidly. Excavator operators and slingers must be made aware of these dangers; and effective communication and constant vigilance are essential.
- 11 The risk assessment must also establish whether the machine is suitable for the proposed task. The weight of the bucket (if still fitted) plus the quick hitch must be added to the weight of the load to establish if the machine will be working within its safe working load. Ideally, unless there are good reasons for not doing so, the bucket must be removed to improve the machine operator's visibility.

- 12 The risk assessment must also address:
- (a) the need for the lifting operation to be ideally segregated from other work activities taking place in the vicinity, particularly where it is necessary for the machine to travel with a raised load
 - (b) the ground conditions, particularly where a tracked excavator will carry out the lifting operation. Such machines have no means of levelling themselves and are therefore dependent upon the ground being sufficiently level to track across it and carry out the lifting operation safely.
- 13 The safe working load must be clearly marked on the machine and any lifting accessories, such as a quick hitch. A rated object handling capacity table must be available in the cab.
- 14 If the rated lifting capacity for an excavator (or the backhoe of a backhoe-loader) is greater than 1 tonne (or the overturning moment is greater than 40,000 Nm), the machine must be fitted with:
- (a) a boom lowering control device on the raising boom cylinder(s) (a safety check valve), which meets the requirements of BS 6912:1, and
 - (b) an acoustic or visual warning device, which indicates to the operator when the object handling capacity or corresponding load moment is reached.
 - (c) an acoustic or visual warning device ,a suitable lifting eye that has been tested and examined in accordance with the Lifting Operations and Lifting Equipment Regulations (LOLER) and the manufacturer's instructions;
 - (d) the operator has 360° vision available.
 - (e) Under no circumstances should excavators be used to lift people, since they are primarily designed for efficient excavation with a bucket and are capable of operating at speeds and accelerations that make them totally unsuitable for lifting personnel

Requirements for excavators of capacity under 1 tonne

- 15 Excavators with a rated lifting capacity of less than 1 tonne (regardless of the size or weight of the machine) or an overturning moment of less than 40 000Nm are not normally fitted with the following items:
- (a) Check valves on the boom cylinders;
 - (b) An acoustic or visual warning device;
 - (c) The supplier or hirer of the excavator must nevertheless supply the following features and documentation:
 - (d) A _duties' chart in the cab;
 - (e) A suitable lifting eye that has been tested and examined in accordance with LOLER and the manufacturer's instructions;
 - (f) A clear marking on the machine of the safe working load (SWL);
 - (g) A 12-month thorough examination certificate (which includes lifting duties)
 - (h) Weekly inspection log of the excavator.
- 16 The maximum load that such excavators can lift is 1000kg or 1 tonne, regardless of the weight or size of the machine. If the machine itself is marked with a SWL of less than 1 tonne, only loads up to the stated load may be lifted.
- 17 Excavators with extendible tracks must have their tracks fully extended when in use.
- 18 Duty Charts (rated object handling capacity tables)
- 19 If an excavator has been given a rating for lifting, a duty chart' must be displayed in the cab of

the machine. This chart shows the safe working load of the excavator when the load is at different distances from the machine axis (the lifting radius), different heights and depths, indicating (for tracked machines) whether the lift is being carried out in line with the tracks or cross-tracked.

- 20 The duty chart should give the following information:
- (a) Manufacturer's identification and excavator type;
 - (b) Boom length (in meters);
 - (c) Dipper arm length (in meters);
 - (d) Counterweight mass (in kilograms);
 - (e) Working pressure and working conditions of the excavator;
 - (f) The Safe Working Loads for various load positions;
 - (g) Optimum lifting conditions – in line with tracks;
 - (h) Worst-case scenario – cross track lifting.

Safe-Load Indicators (SLI)

- 21 The Safe-Load Indicator works by sensing the system pressure when the boom is in a raised position. It gives an audible and a visual warning when the pressure reaches pre-determined limits and the excavator may become unstable. This is usually 85% to 87% of the hydraulic fluid pressure.
- 22 If a lift is being undertaken with an excavator that is fitted with a safe-load indicator and this indicator reaches amber or red, the lift must stop and the operation must be re-assessed. On no account should the operator insist on continuing with the lift. The use of an over-ride switch to allow the indicator to be disregarded is strictly prohibited.

Use of Quick Hitches

- 23 Before a lifting operation with an excavator can begin, it will normally be necessary to remove the bucket. It is important that lift supervisors and excavator banksmen understand the various types of quick hitch that are used on excavators.
- 24 The excavator operator should be able to demonstrate the type of quick hitch that is fitted to the excavator.
- 25 There are three types of quick hitch in use:

Quick-hitch type	Method of engagement	Locking system
Manual	Manually-retained – such as a lever-operated sprung latch	Manually-inserted safety pin
Semi-automatic*	Hydraulically-operated retaining latch mechanism	Manually-inserted safety pin
Fully automatic	Hydraulically-operated retaining latch mechanism	Hydraulically-operated safety mechanism (which may include a hydraulic or sprung safety system)

- 26 The excavator operator must be able to demonstrate competence in operating the quick hitch that is fitted to the excavator in use.
- 27 A simple check after changing a bucket or attachment is to ask the operator to perform the

Shake, rattle and roll test.

28 Chains or slings for lifting must not be placed around or on the teeth of the bucket. Compatible Accessories for lifting may only be attached to a purpose-made point on the machine.

29 Whilst BS 7121 may not specifically refer to excavators used as cranes, compliance with all the appropriate parts of BS 7121 would be required.

1.4.3.43 Security when not in use

1 The manufacturer's handbook will contain recommendations for securing the crane when it is not in use, to minimise the chance of tampering, vandalism and damage.

2 The measures to be taken will vary for different types and makes of crane, and may also vary depending upon the length of time that a crane will be out of use.

3 However, in general:

- (a) **Do not** leave loads suspended
- (b) **Do** remove operating keys
- (c) **Do** lock cabs and, where appropriate, prevent unauthorised access using other means.

1.4.3.44 Strong wind conditions

1 Crane manufacturers' operating instructions will specify a maximum wind speed for safe operation.

2 This may be a single wind speed for all configurations of the crane or may vary, depending on the jib length, the radius, the load and other factors.

3 The manufacturers' instructions will also indicate the actions to be taken to leave the crane in a safe manner if the wind does exceed the maximum safe operating speed.

4 A copy of the Beaufort Scale, that outlines the visible signs of various wind strengths, is included in this section at Appendix 8.

1.4.3.45 Accessories for lifting

1 Ropes, chains, eye bolts and slings are all examples of accessories for lifting. They must be clearly marked with their safe working load.

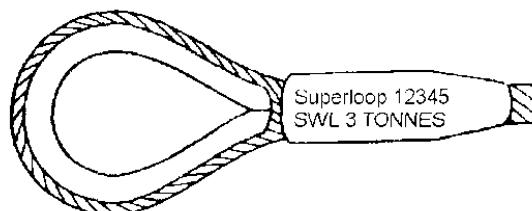
2 All lifting accessories must also be:

- (a) properly constructed and maintained
- (b) free of any defect or damage likely to affect their strength
- (c) regularly maintained and inspected
- (d) thoroughly examined
- (e) securely attached to the lifting equipment, for example the crane, and the load
- (f) used within their safe working load.

3 Accessories used for lifting must be inspected and thoroughly examined, with records kept as specified in Appendix 5.

1.4.3.46 Marking

- 1 Every rope, chain, etc. must be clearly marked with its SWL and carry an identifying mark. Where this is not possible then a coding system, such as a tag or colour code, should be used to allow the user to determine the safe working load. A lifting accessory may also be marked with its own weight which is a consideration when assessing the total load to be lifted.
- 2 Where the SWL depends on the configuration of a lifting accessory, such as a two leg chain, then the SWL for each configuration should be clearly marked on the equipment using a tag or by a chart available at the point of use.



1.4.3.47 Overloading

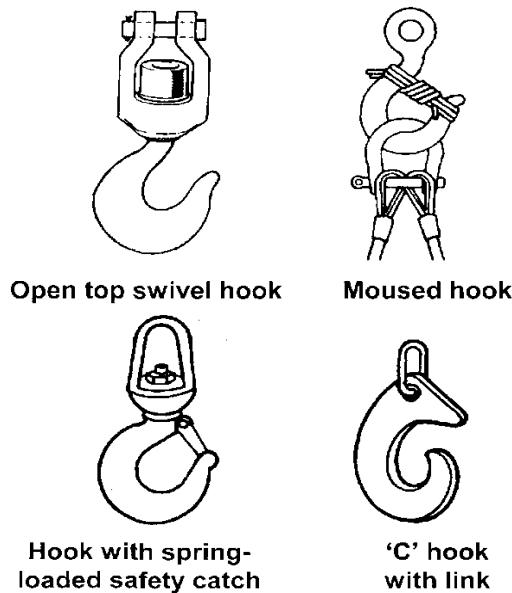
- 1 Ropes, chains, etc. must never be overloaded except under test and as authorised by an experienced and competent person.

1.4.3.48 Preventing damage

- 1 The edges and corners of a load should be packed to prevent sharp edges damaging lifting ropes, chains or slings.

1.4.3.49 Hooks

- 1 All hooks used for lifting must be fitted with a safety catch, or should be moused, or so shaped as to prevent the sling eye or load coming off the hook



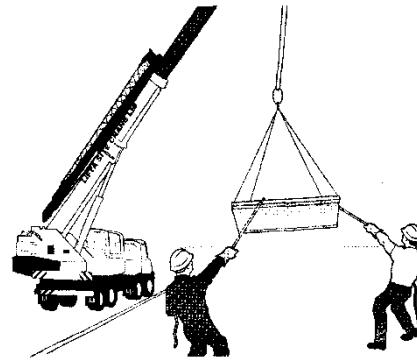
1.4.3.50 Slings

- 1 Slings must be attached correctly to the lifting equipment by an approved method, either by securing the ring directly onto the hook if size permits, or by use of a suitable shackle, fitted with the pin of the shackle on the hook and the load suspended from the bow.

2 The correct method of slinging will vary with the types of load, the different materials or items lifted. It is essential to see that the load is secure. Care must be taken to see that slings are not damaged, and suspect or defective slings must be discarded.

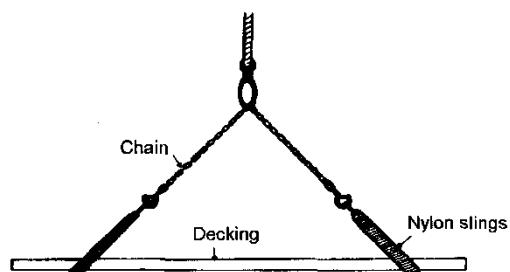
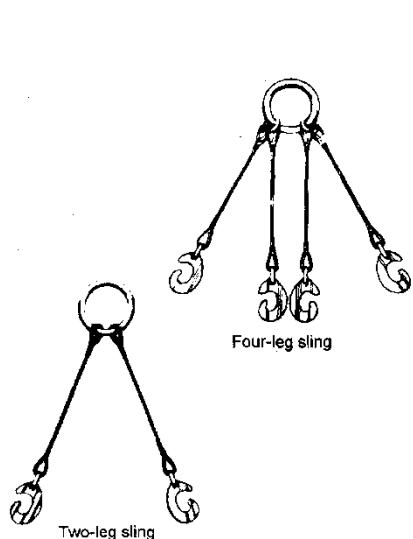
3 Dog ropes or tag lines, securely attached to the end of the load, should be used when handling long or large loads, to direct the load into position and prevent it spinning. Tag lines should be as short as possible.

*See the slinger and signaller safety checklist
In Appendix 4 to this section.*

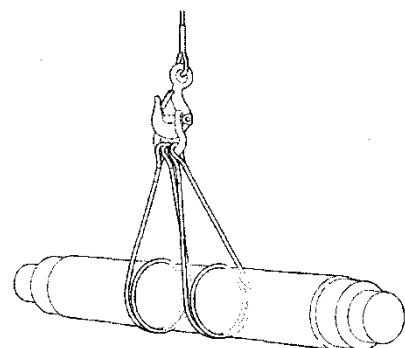


- 4 Multiple slings (two-legged, three-legged, etc.) must be connected by a ring or shackle and the load properly distributed so that no leg is overloaded.
- 5 When in use, the angles between sling legs should be less than 90°. At angles greater than this, the strain on each leg increases very rapidly to a point where they may break because of overloading.
- 6 With a simple two-legged parallel sling, the load on each leg is half the total load. As the angle between sling legs increases, the load on each sling leg increases to approximately double at an angle of 120°.

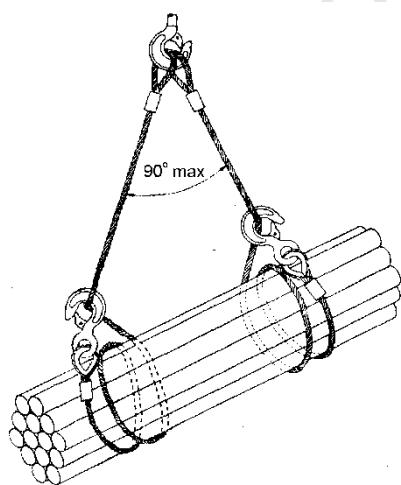
- 7 With a sling angle of 90°, the SWL of the sling should be at least 43% greater than the nominal weight of the load.



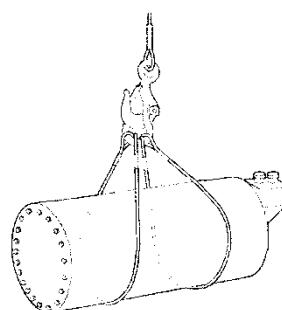
Nylon sling used to lift decking



Double wrap sling grips the load and helps prevent it from slipping sideways

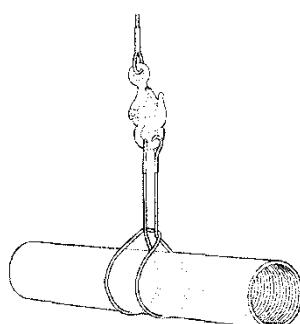


Double choker

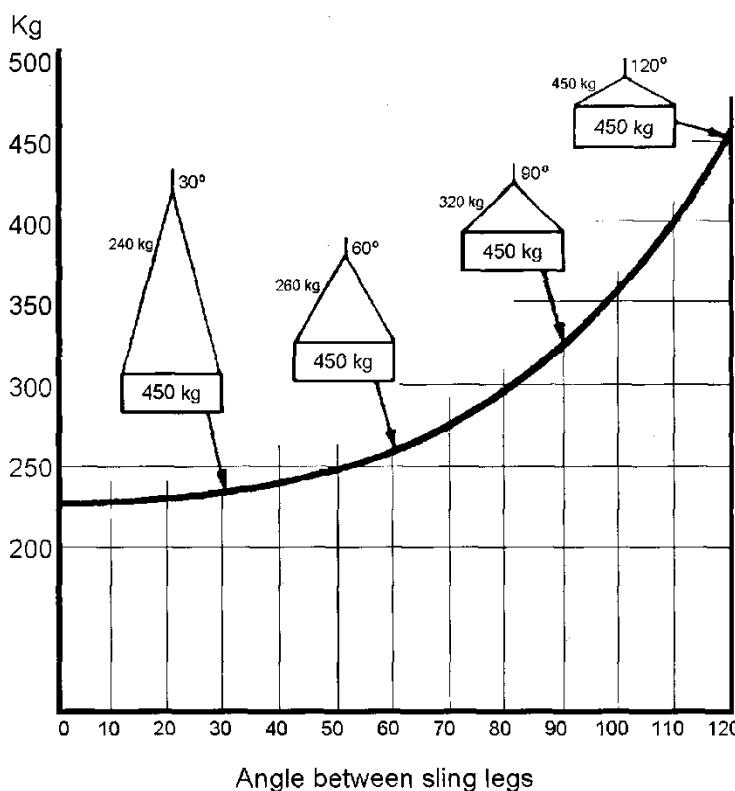


Cradle sling

Note: Care must be taken to prevent slings sliding in towards each other.



Choker sling



How the load in each sling leg increases as the angle between the sling legs is increased

(Refer to manufacturer's SWL tables)

1.4.3.51 Repaired ropes, chains, etc.

- 1 Any chain sling, etc. that has been altered or repaired by welding must be examined and re-tested, and an inspection or examination carried out before taking it back into use. The record should be kept until the next scheduled thorough examination.
- 2 Knotted ropes, chains or slings and those which have been shortened or joined by nuts and bolts through the links must not be used.
- 3 Any chain, sling or lifting equipment or accessory for lifting which is thought to have suffered a loss of strength or is otherwise defective should be withdrawn from use and quarantined. The equipment should be scrapped or re-examined by a competent person who will recommend that either it can be put back into service or must be disposed of.

1.4.3.52 Construction of slings

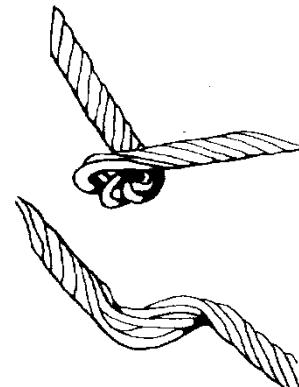
- 1 Slings are available in a wide range of styles made from many different materials to suit particular purposes.
- 2 **Chain slings** are made from various grades of steel. They can stretch and the links, rings or hooks may become distorted and fracture if subject to excess stress.
- 3 Chain slings should only be shortened by using the correct shortening clutches. Chains must not be knotted or joined by nuts and bolts. Hooks must be of the 'C' type or fitted with a safety latch.

- 4 **Wire rope slings** are made from drawn steel wire. Each leg of the sling will have an eye formed at either end. Wire rope slings may be damaged when 'kinked' sharply or if put under stress when twisted. Steel wire rope may be damaged by corrosion through poor care and storage.

- 5 Wire ropes should never be used if more than 5% (1 in 20) of the wires can be seen to be broken in any 10 x diameter, length.

- 6 Wire ropes should also not be used where they have been flattened such that there is a 10% reduction in rope diameter.

- 7 Wire rope slings must not be made up on site using bulldog grips.



Kinked wire rope

- 8 Wire ropes and slings are of many different types of construction, each having properties related to usage. It is therefore important, when ordering an item, to specify the intended use.

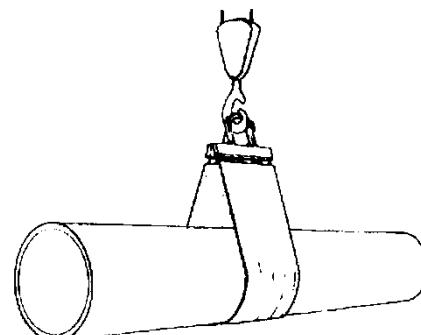
- 9 **Fibre rope slings** might be made from natural fibres (manila, sisal, hemp) or synthetic fibres. Slings made from natural fibres can be prone to rotting. Only purpose-made slings, clearly marked with their SWL, should be used on site.

- 10 On no account should slings be fabricated from lengths of rope found laying around site. Fibre rope slings are more easily cut or damaged, and should be visually examined by a competent person every time before use to ensure they are serviceable. Natural fibre ropes should not be used for making up slings on site.

- 11 Synthetic fibre ropes do not rot but can be affected by some chemicals. Care should be taken to avoid contamination with alkalis or acids. Suspect or contaminated synthetic fibre ropes and slings must not be used.

- 12 **Flat lifting slings** are used where special lifting operations are required and afford a certain amount of protection to the load.

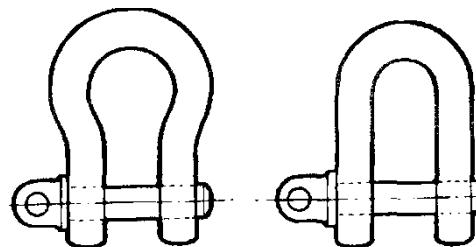
- 13 Flat and round slings may be made of woven synthetic materials (such as nylon, polyester, polypropylene and terylene) with 'eyes' sewn in, or plastic-coated wire mesh, or formed by a series of plaited wire ropes between two end fittings. These might also be covered with a plastic material. All woven materials are prone to damage and should be regularly checked for serviceability. Slings should be protected from sharp edges and placed evenly about the load, not twisted. Care must be taken to see that the SWL is not reduced by having a sling angle greater than 90°.



Flat lifting sling

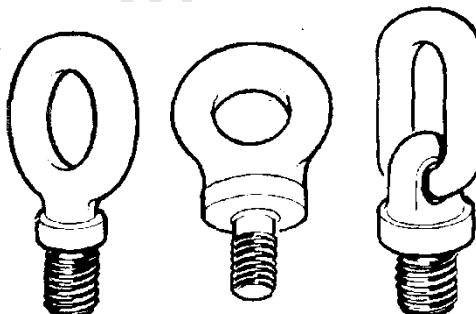
1.4.3.53 Shackles

- 1 Two types of shackle are commonly used in lifting operations. They are the Bow type shackle and Dee type shackle, both of which are available with threaded or plain pins.
- 2 Only bow type shackles may be used to suspend a load from a hook. The shackle must be positioned with the pin across the hook and the load suspended from the bow. If necessary, spacers should be fitted over the pin to centralise the shackle on the hook.
- 3 Overloading, out of balance loads and misuse can distort shackles; they should be checked regularly for shape and wear.



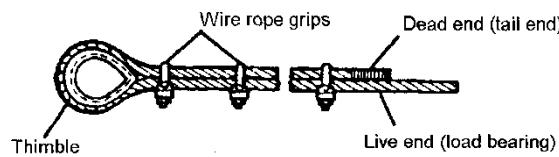
1.4.3.54 Eyebolts

- 1 Eyebolts are made to screw into or through a load and may be plain (dynamo) or have collars, with or without links. The plain eyebolt is good only for vertical loading. Even when a collared eyebolt is used, the safe working load is reduced if the load to which it is attached initially lifted at an angle.
- 2 Collared eyebolts with links may be used providing the angle of load to the axis of eyebolt thread does not exceed 15°. Over 15°, safe working loads must be derated in accordance with BS 4278: Specification for eyebolts for lifting purposes.
- 3 When installed, the collar must be at right angles to the hole, should be in full contact with the surface, and be properly tightened.
- 4 The load should always be applied in the plane of the eye, never in the other direction. If necessary, washers or shims should be inserted below the collar to ensure that the eye is correctly aligned when tight.
- 5 Extreme care must be taken to ensure that metric threaded eyebolts are not inserted in imperial threaded holes. Although these might appear to match, it is an interference fit only, and the mechanical strength may be almost nothing.



1.4.3.55 Bulldog grips (wire rope grips)

- 1 Bulldog grips, if used properly to make an eye with a thimble, provide a simple and effective means of securing the ends of wire ropes instead of splicing or socketing. The final SWL will be about 75% of that of the wire. It is essential that the correct size and type of grip is used, that the wire is clean and that the correct torque is applied when tightening the grips.
- 2 Bulldog grips must be fitted with the 'U' bolt on the dead or tail end of the line (non load-bearing end). There must be no deviation from this practice.



Correct method of fitting wire rope grips

Note: The number of wire rope grips shown in the above illustration is insufficient. The figure is schematic only.

- 3 Wire rope grips meeting the requirements of EN 13411 are efficient when correctly installed by a competent person. Generally, when using wire rope grips, the previous numbers of grips should be used and they should be tightened to the relevant torque. However, in all cases, the manufacturer's recommendations, in addition to the advice given in the standard, should be closely followed.

Maximum nominal rope diameter (mm)	Required number of wire rope grips	Tightening torque required (Nm)
5	3	2.0
6.5	3	3.5
8	4	6.0
10	4	9.0
12	4	20.0
14	4	33.0
16	4	49.0
19	4	68.0
22	5	107.0
26	5	147.0
30	6	212.0
34	6	296.0
40	6	363.0

- 4 The wire should be in good condition and all threads and nuts should be suitably greased.
- 5 The first bulldog grip should be fitted as close as possible to the thimble and, thereafter, at a spacing of no greater than six times the rope diameter.

- 6 Nuts must be tightened to the relevant torque:
- when the rope is assembled
 - when taken into use
 - on the application of the load
 - at periodic intervals when in continuous use.
- 7 If the above criteria are not followed, then the strength of the eye and thimble will be considerably reduced. If the criteria are neglected for an extended period, the eye and thimble may fail.
- 8 Wire rope grips must not be used to make lifting slings, long splices, or to join two wire ropes, other than with thimbles or eyes.
- 9 For intermediate diameters of rope, the next larger size wire rope grip should be used, except as follows:
- the size 5 mm grip should only be used on a nominal 5 mm diameter rope
 - for 11 mm diameter rope, use four 10 mm rope grips tightened to a torque of 14 n/m.

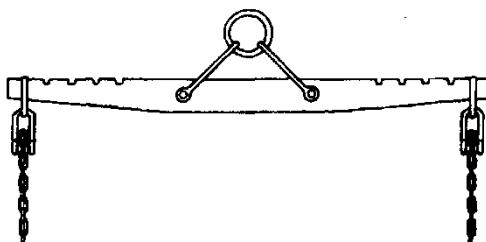
1.4.3.56 Spreader and equaliser beams

- 1 Spreader beams are used to support long or wide loads during lifts. They eliminate the hazard of a load tipping, as well as wide sling angles and any tendency of the sling to crush the load.



Spreader beam

- 2 Equaliser beams are used to equalise the load in sling legs and to keep equal loads when making multiple leg lifts.



Equaliser beam

- 3 Both types of beam are manufactured to suit a particular purpose. Care should be taken to see that the correct beam is used.
- 4 The capacity of a beam with multiple attachments will be specified by the manufacturer. Generally, it will depend on the distance between the attachment points, for example, if the distance between attachment points is doubled, the lifting capacity is halved. Care must be taken not to exceed safe working loads at the various slinging points.

Construction Site Safety

1.4.3 Appendix 1

General lifting operations

Safety checklist

Before starting work

- 1 Ensure that adequately trained, competent persons are available to plan, carry out and supervise the lift.
- 2 Ensure that a suitable and sufficient risk assessment has been carried out, which considers all aspects of the lift including environmental factors such as the proximity of obstructions, underground services, overhead cables and structures.
- 3 Ensure that lift plans and method statements for the lifting operation are developed as appropriate.
- 4 Ensure that appropriate protection measures are put in place.
- 5 Ensure that all temporary works supporting lifting equipment, such as foundations, have been certified by a competent temporary works engineer and a 'permit to load issued'.
- 6 Ensure that a current thorough examination and/or test record has been issued and is available for each item of lifting equipment and accessory.
- 7 Ensure that the SWL of the lifting equipment and accessories is adequate for the weight of the load.
- 8 Ensure that all lifting accessories are clearly marked with their safe working load.
- 9 Ensure that correct and up-to-date copies of the Sling Chart and Safe Working Load tables are available, when using multi-leg slings.
- 10 Ensure that the method of communication is agreed and understood by everyone involved in the lift.
- 11 Ensure that a suitable rack is available for storing slings, etc. when they are not in use. Wire ropes should be stored in a dry atmosphere.
- 12 Ensure that the weights of loads to be lifted are known in advance, and that load weights are clearly marked.
- 13 Ensure that the ground conditions are sufficiently stable to take the weight of the lifting equipment and any load.
- 14 Ensure that a trained and competent slinger is available.
- 15 Ensure that all personnel involved in the lifting operation have been briefed and understand the risks, methods or work and the equipment to be used including emergency arrangements.
- 16 Ensure that the appropriate permissions have been gained if it is necessary to position any crane on the public highway (or other public place) to carry out lifting operations.

Whilst work is in progress

- 17 Ensure that copies of the Sling Chart and Safe Working Load tables are being used where necessary.
- 18 Ensure that the correct techniques are being used for the attachment to the appliance and slinging.
- 19 Ensure, wherever possible, that the angles of slings are no more than 90°.
- 20 Ensure that regular inspections, thorough examinations and tests of the equipment are carried out, as appropriate, and records maintained (see Appendix 5).

- 21 Limit the use of endless wire rope slings.
- 22 Ensure that slings are protected from sharp corners of loads by suitable packings.
- 23 Ensure that slingers understand that 'doubling up' slings does NOT 'double up' the safe working load; avoid this practice if possible.
- 24 Prevent strops, slings and ropes from being dragged along the ground.
- 25 Ensure that hooks used for lifting are NOT also carrying unused slings.
- 26 Ensure that any unused leg of a multi-sling is correctly hooked back. The correct sling only should be used.
- 27 Ensure that unfit slings are removed from the site, and a responsible person informed.
- 28 Ensure that the crane hook is positioned above the load's centre of gravity.
- 29 Ensure that the load is free before lifting and that all legs have a direct load.
- 30 Ensure that 'snatch' loading does NOT take place.
- 31 Ensure that NO ONE rides on a load which has been slung and is being lifted.
- 32 Use tag lines to stabilise long or large loads.
- 33 Ensure that the load is landed onto battens to prevent any damage to slings, and to assist their easy removal.
- 34 Ensure that NO ONE is under a load which is being lifted.

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1.4.3 Appendix 2

Mobile cranes

Safety checklist

Before starting work

Carry out the checks detailed in Appendix 1, plus:

- 1 Consider whether a 'contract lift' is the best and safest option.
- 2 Check that the selected crane has been supplied. Check that the correct operating information and a competent operator have been supplied along with it.
- 3 Check that the ground is capable of taking the loads of the outriggers, crane, load or wind. If in doubt, get ADVICE from specialist companies.
- 4 Ensure that the approach and working areas are as level as possible.
- 5 Ensure that there is adequate protection from live electrical cables.
- 6 Ensure that the area is kept free of obstructions, and is adequately lit.
- 7 Ensure that the weights of the loads are known, and that the correct lifting gear has been ordered and is available.
- 8 Ensure that no 'crush zone' exists between the crane and any fixed object; if there is, erect barriers.
- 9 Check there are no restrictions on the access, i.e. check size(s) of vehicles.
- 10 Check that the company has provided enough information about the safe use of the crane.
- 11 Check that there is an up-to-date record and that inspections, thorough examinations and tests have been carried out as necessary.

Whilst work is in progress

Carry out the checks detailed in Appendix 1, plus:

- 12 Check that daily and weekly inspections are being carried out.
- 13 Ensure the crane is operating from planned and approved positions only in accordance with lift plans and method statements.
- 14 Ensure that the signaller is available for each lift.
- 15 If outriggers are being used (blocked duties), ensure that they are fully extended, locked and adequately supported.
- 16 Check that tyres are at the correct pressure and in good, clean condition and that tracks are properly maintained.
- 17 Check that the crane is kept at a safe, predetermined distance from any open excavations or live overhead electricity cables.
- 18 Check, when travelling, that the load is secured and carried as near to the ground as possible and that tag lines are used.
- 19 Check that the rated capacity and radius indicators are in working order.
- 20 Check that loads are not being slewed over any persons and that persons are not standing or walking under the load.
- 21 Check, when travelling on sloping ground, that the driver changes the radius to accommodate the movement of the load.

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1.4.3 Appendix 3

Tower cranes

Safety checklist

Before starting work

Carry out the checks detailed in Appendix 1, plus:

- 1 Check that the appointed person has put in place a lift plan.
- 2 Check that the selected crane has been competent engineer supplied. Check that the correct operating information has been supplied along with it.
- 3 Ensure that the crane will be capable of lifting the required loads at the maximum required radius of operation.
- 4 Check that the ground is capable of taking the weight of the crane, the load and wind load. **If in doubt, get ADVICE.**
- 5 Ensure that any foundations have been designed and certified by a and a 'permit to load' issued.
- 6 Ensure that adequate ballast or counterweight units are in position and are correctly secured.
- 7 Check that a diagram or notice indicating the position and weight of removable ballast is prominently displayed.
- 8 Ensure that the approach and the base are as level as possible.
- 9 Check that the limit switch and other devices are installed to limit the travel of the bogie. Ensure that limit switches have also been installed to limit the crane travel on rails.
- 10 Ensure that the work area is kept free of obstructions, particularly where the crane operates on rails.
- 11 Ensure that there is an adequate power supply properly installed, earthed and tested. Where the crane operates on rails, ensure that they are also earthed.
- 12 Ensure that the weight of each load is known, and that the correct lifting accessories are available.
- 13 Ensure that a competent operator, who is sufficiently fit and has good eyesight, is available.
- 14 Ensure that a competent, trained signaller is available, and that the method of communication is understood by all involved in the lift.
- 15 Check that there are no restrictions on the access, i.e. check size(s) of vehicles for rigging/de-rigging.
- 16 Ensure that all necessary precautions with regards to live overhead electric cables have been taken.
- 17 Where necessary, ensure that all work areas are adequately lit.
- 18 Where appropriate check that any building or temporary works to which the crane is tied can support the loading.
- 19 What is the crane's free standing height? Check that the supplier has provided information with reference to the crane, etc.
- 20 Where appropriate, check that over-sailing and airspace rights have been agreed.
- 21 Check that warning has been given of the slewing activities and that property has been protected, as necessary.
- 22 Check that there is an up-to-date record of inspection, thorough examination and test.

- 23 Check that there is a rescue plan in place and that it is acceptable in terms of practicality.
- 24 Check the competency, including training and qualifications, of the competent persons involved in lifting operations.

Whilst work is in progress

- 25 Ensure that the works are being carried out in accordance with the lift plan.
- 26 Check that the daily and weekly inspections are being carried out and recorded.
- 27 Check that the rails, if used, are level, in line and being guarded.
- 28 Check the position and condition of the sleepers, etc. (Look for washouts.)
- 29 Check that the buffers are in place and that they are secure (if on rails).
- 30 Check that the bogie is blocked and chocked when not in use (if on rails).
- 31 Check that no nuts or bolts are missing or loose.
- 32 Check that crane ties, if used, are securely fixed in position.
- 33 Check that the wind speed indicator is in working order. What wind speed is allowed for safe working?
- 34 Check that, when not in use, the crane jib is free to slew with the wind. Check that power supplies are off; loads lowered, hooks raised and doors locked.
- 35 Check the slewing movements in relation to people or adjacent property, etc.
- 36 Check that earth bonding strips are in place.
- 37 Where more than one tower crane is in operation with overlapping arcs of operation, ensure that crane activities are co-ordinated.
- 38 Ensure that the load rating chart is in place and being complied with.
- 39 Ensure that the rated capacity indicator is in working order.
- 40 Check that the SWL is plainly marked at different operating radii along the jib.
- 41 Ensure that all lifts are within the jib radius.
- 42 Ensure that operators know the weight of loads being lifted.
- 43 Ensure that loads are being lifted and not dragged, and that they are not swinging and creating a hazard.
- 44 Ensure that the operator is at the controls whenever a load is suspended.

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1.4.3 Appendix 4

Slinger and signaller safety checklist

Inspect to ensure that:

- 1 slings and other chains are not shortened by tying knots in them or by wrapping them round the crane hook
- 2 fibre or rope slings are not damaged
- 3 chains are not joined by means of bolts or wire
- 4 wire ropes are not sharply bent or flattened at any point
- 5 wire ropes are never in contact with hot metal or acids that will damage them
- 6 wire ropes are never used singly when hooked by a spliced eye. (The cable is liable to untwist, allowing the splices to open and slip)
- 7 the proper pin is used in all shackles and the correct type of shackle is being used
- 8 all end links, rings or shackles ride freely on any hook on which they are used
- 9 the wind strength is safe for lifting operations to start.

Reject:

- 10 any slings of insufficient length which create a wide angle between legs
- 11 extra-long slings which seriously reduce the headroom
- 12 any wire ropes that have become damaged or rusty
- 13 any fibre or rope slings that are damaged or frayed.

When loading

- 14 Ensure the slings are protected from sharp-edged loads by packing soft wood or other suitable material between the load and the sling. (Bricks are not suitable packaging material.)
- 15 Ensure the load is evenly distributed to avoid excessive stress on one side of the sling.
- 16 DO NOT let any load rest on a wire rope; it may crush the strands and render the rope unsafe.

Before lifting

- 17 Ensure that the load is securely slung.
- 18 Always see that the crane hook is centrally placed over the load to prevent it swinging when the load is being raised, and that the load is in balance.
- 19 Position the hands well away from any chains or ropes before the crane takes the load.
- 20 Check that the load is free for lifting.
- 21 Give warning to all persons to keep clear of the load.

During lifting

- 22 Use only British Standard 7121 signals.
- 23 Always lift slightly, then pause to see that the load is safe and balanced.
- 24 Ensure signals are given by the person responsible for the lift, and nobody else.
- 25 Ensure hooks and slings not in use are carried on the carrying hook, since they may cause the sling carrying the load to ride on the nose of the hook.

- 26 Never ride on a crane load, or allow any other person to do so.
- 27 Whenever possible, keep the load clear of people.
- 28 Ensure chains, slings, hooks or loads are never dragged along the ground.

When unloading

- 29 Make sure there is a firm foundation for the load, and make provision for the removal of all slings.
- 30 Stack material securely and provide a safe access for subsequent removal.

Construction Site Safety

1.4.3 Appendix 5

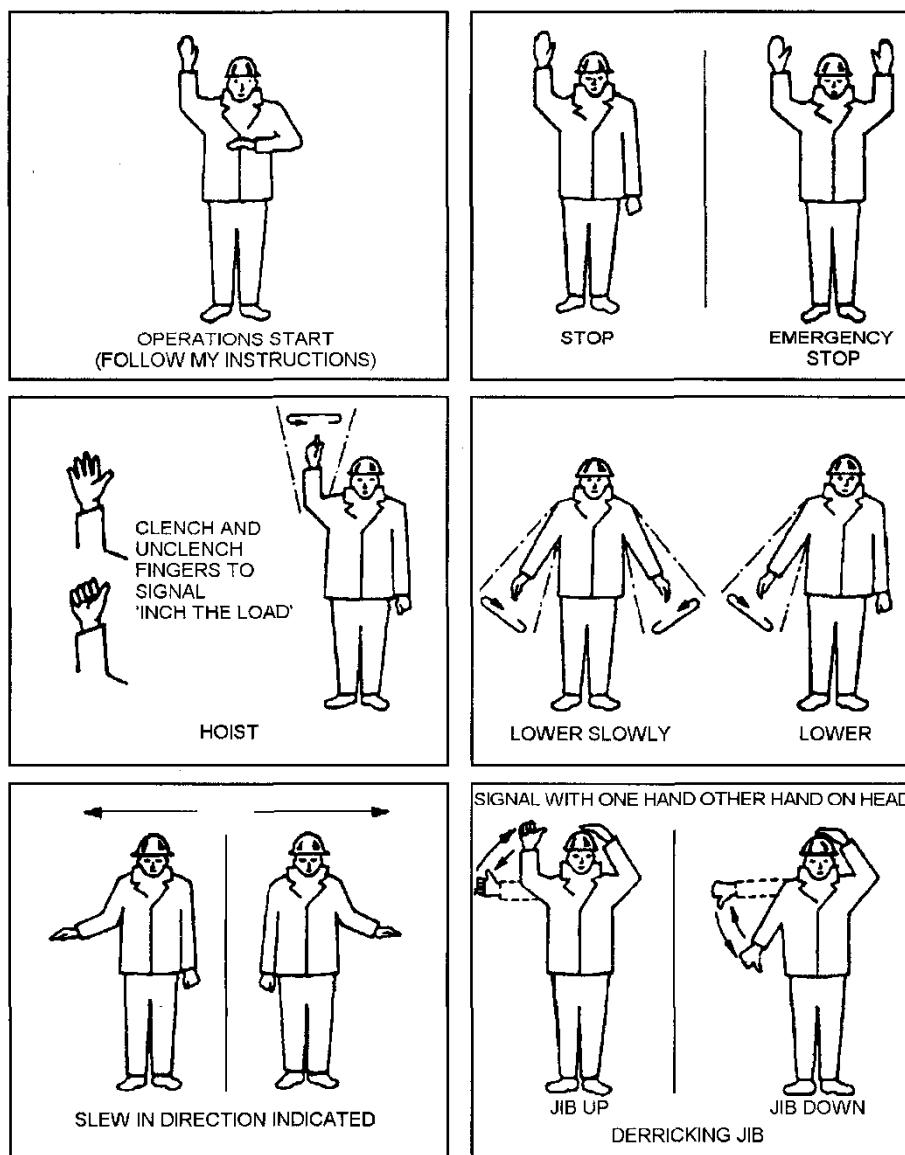
Lifting equipment and accessories for lifting	Inspection and thorough examination		Reports		
	Inspection	Thorough examination	Lifting equipment and accessories for lifting	User or owner	Health and Safety Executive
Lifting equipment	If appropriate and at suitable intervals between thorough examinations. (Suitable intervals, unless otherwise laid down, would be every week.) Carried out by a competent person.	Before first use, unless a record accompanies the lifting equipment. Installation conditions require assurance that it is safe to use: <ul style="list-style-type: none"> • after installation • after assembly. When exposed to conditions causing deterioration: • lifting persons - every six months • other lifting equipment - every 12 months. In accordance with an examination scheme drawn up by a competent person. Carried out by a competent person.	Lifting equipment	Follows the thorough examination. Report authenticated. Format - register or certificate, electronic form (easily retrievable). Provided to the user, and to the person from whom the equipment has been hired or leased in writing. Kept available for inspection. Kept available until next examination carried out or for two years, whichever is the longer.	Following thorough examination identifying an imminent risk of serious personal injury. Report in writing.
Accessory for lifting	If appropriate and at intervals between thorough examinations. Carried out by a competent person.	Before first use. When exposed to conditions causing deterioration: <ul style="list-style-type: none"> • every six months, in accordance with an examination scheme drawn up by a competent person. Carried out by a competent person. 	Accessory for lifting	Report kept available until next inspection report made. Made in writing and provided to user. Thorough examination record for two years after report made.	

Construction Site Safety**1.4.3 Appendix 6****SCHEDULE 1****INFORMATION TO BE CONTAINED IN A REPORT OF A THOROUGH EXAMINATION**

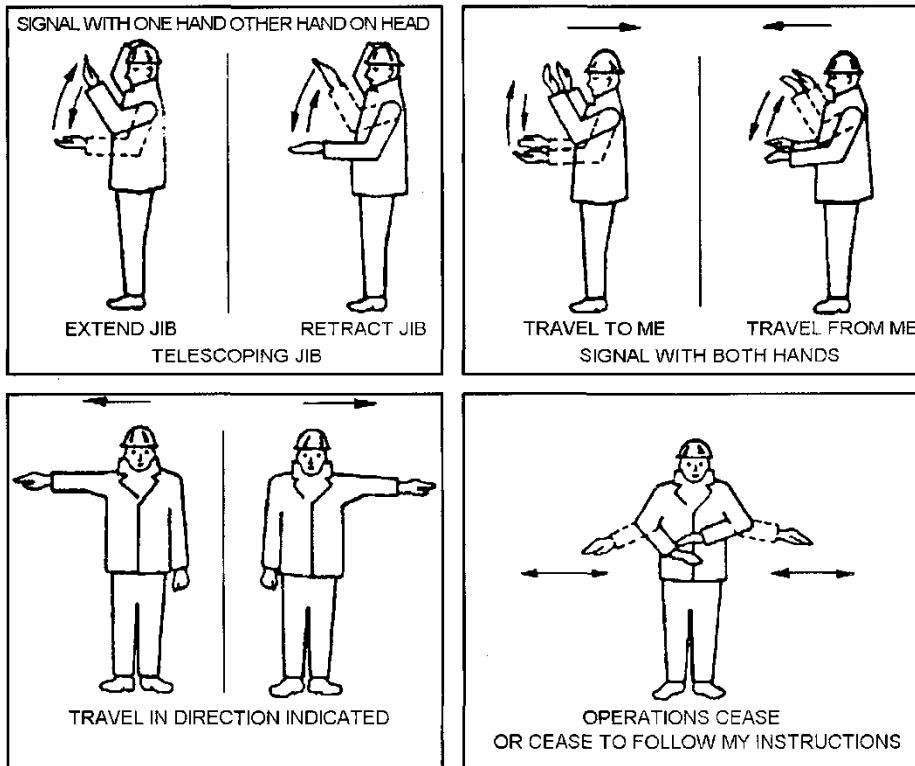
- 1 The name and address of the Contractor for whom the thorough examination was made.
- 2 The address of the premises at which the thorough examination was made.
- 3 Particulars sufficient to identify the lifting equipment including where known its date of manufacture.
- 4 The date of the last thorough examination.
- 5 The safe working load of the lifting equipment or (where its safe working load depends on the configuration of the lifting equipment) its safe working load for the last configuration in which it was thoroughly examined.
- 6 In relation to the first thorough examination of lifting equipment after installation or after assembly at a new site or in a new location-
 - (a) that it is such a thorough examination;
 - (b) (if such be the case) that it has been installed correctly and would be safe to operate.
- 7 In relation to a thorough examination of lifting equipment other than a thorough examination to which paragraph 6 relates-
 - (a) whether it is a thorough examination-
 - (i) within an interval of 6 months
 - (ii) within an interval of 12 months
 - (iii) after the occurrence of exceptional circumstances.
 - (b) (if such be the case) that the lifting equipment would be safe to operate.
- 8 In relation to every thorough examination of lifting equipment-
 - (a) identification of any part found to have a defect which is or could become a danger to persons, and a description of the defect;
 - (b) particulars of any repair, renewal or alteration required to remedy a defect found to be a danger to persons;
 - (c) in the case of a defect which is not yet but could become a danger to persons-
 - (i) the time by which it could become such a danger;
 - (ii) particulars of any repair, renewal or alteration required to remedy it;
 - (d) the latest date by which the next thorough examination must be carried out;
 - (e) where the thorough examination included testing, particulars of any test;
 - (f) the date of the thorough examination.
- 9 The name, address and qualifications of the person making the report including the Contractor they are employed by.
- 10 The name and address of a person signing or authenticating the report on behalf of its author.
- 11 The date of the report.

Construction Site Safety**D3. Appendix 7****Recommended crane signals**

Reproduced from BS 7121 Safe Use of Cranes Part 1



Note: The signaller should stand in a secure position, where they can see the load and can be seen clearly by the crane driver, and they should face the crane driver if possible. Each signal should be distinct and clear.



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1.4.3 Appendix 8

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

1.4.4 Mobile Elevating Work Platforms

1.4.4.1 Foreword

- 1 Every year, the construction industry is responsible for causing deaths and serious injury. The industry has done much to improve its performance which I welcome, but there is still room for improvement. Our industry is innovative and equipment is constantly evolving and developing so that construction processes can become increasingly efficient. This has consequences for site management who must ensure that operators are competent, capable of operating equipment safely and are following safe working procedures.
- 2 A mobile elevating work platform (often referred to as a MEWP) saves time and makes work at height efficient, effective and safer than using traditional methods of access. When used safely, MEWPs significantly reduce the risk of injuries through falling from height. Unfortunately, over the past few years a significant number of accidents involving the use of MEWPs have occurred, including tragically fatalities. Some of these incidents have involved the operator or other persons being crushed against fixtures or other obstacles while accessing their work area, or while working at height. The incidents could have been prevented by correct planning and preparation, selection of appropriate machinery and proper use.
- 3 In addition to the terrible cost in human suffering, accidents have a financial cost. There is a very strong business case for improving safety performance. This guidance has been prepared by the industry to provide clarity about the safe use of MEWPs including planning, equipment selection, and training, provision of information, familiarization, safe use, supervision and rehearsal of rescue procedures, together with monitoring of the whole process.

1.4.4.2 Introduction

- 1 The use of Mobile Elevating Work Platforms (MEWPs) is increasing as the benefits for productivity and safety are recognised. They are acknowledged by many to be the safest and most efficient means of providing temporary access to height for many work activities.
- 2 The increased use of MEWPs in construction, maintenance and other applications where trapping risks are present has led to accidents in which people on the platform have been trapped between the platform (often referred to as a cage or basket) and objects in the work area. In some cases, these accidents involved fatality. Managers must take a lead in identifying when trapping risks are present in the work activities they control. Where trapping risks are present extra care is needed and all involved must understand what they need to do to avoid or reduce the risks involved.
- 3 Accidents can be avoided if good practice is encouraged and followed. The basis of preventing trapping accidents must be task, site and equipment specific risk assessment. All involved in the management and operation of MEWPs need to understand how to minimise the risks of someone being trapped in the basket and the importance of having effective rescue procedures should such an entrapment occur.



1.4.4.3 Planning

- 1 Method of work
- 2 Consideration should be given: the need for carrying out the work at height, e.g. whether or not the work could be carried out at ground level,
- 3 Sequencing activities to avoid the presence of obstructions that could cause trapping risks, and adopting alternative working methods that avoid or reduce trapping risks when using a MEWP.
 - (a) Factors that need to be taken into account when planning work at height that involves trapping risks, e.g. identifying the range of work and selecting equipment to minimise the chances of trapping occurring.

Important Factors in Planning

Note that this section assumes that risk assessment has identified that work at height cannot be avoided and that a MEWP is the most suitable way of doing it.

- 1 Identify the range of work which is to be done from MEWPs and the means by which they will reach the work position. Plan to remove hazards as far as possible to limit reliance on methods of work and operator actions to control risk. In other words, design out hazards as far as possible.
- 2 Consider for all activities what the potential might be for operators becoming trapped against objects. You will need to consider carefully the presence of objects against which someone could become trapped at all stages of the work. For example, working in a roof space with many existing obstructions (structural supports/services etc.) may present a high possibility of an operator becoming trapped.
- 3 Select equipment to minimise the chances of trapping occurring. In particular, consider any relevant dimensional constraints to, from and at the work position and choose equipment appropriately – not too small or too big and with the most appropriate manoeuvring characteristics (scissor/telescoping/articulated). The aim should be to select a machine in which it is as difficult as possible for the operator to get himself trapped.
- 4 Consider the layout and characteristics of the machine control panel and the potential for the operator to be trapped against the controls in the specific work situation for which it has been selected. The aim should be to select a machine in which it is as difficult as possible for the operator to get himself trapped.
- 5 Consider what tools and materials will be needed and plan how they will be carried/stored on/within the MEWP.
- 6 Ensure the ground is properly prepared and maintained on routes to and at working positions
- 7 Liaise with all relevant parties as part of your planning including others on site who will be affected by or will themselves affect MEWP activities.
- 8 Identify and specify the levels of competence/qualification which will be required of those doing the work.
- 9 Make detailed rescue/emergency plans



1.4.4.4 Risk Assessment

- 1 Risk assessment should cover:-
 - (a) travelling to and from the work area,
 - (b) accessing the work area, and
 - (c) working at height,
- 2 Particular attentions should be given to lighting levels – additional task or personal lighting may be necessary but it needs careful design.
- 3 The risk assessment should be recorded. It should also be reviewed and revised, as necessary, while work is carried out. For further advice on risk assessment.
- 4 See Appendix 1 and 2 : Hazards, Causal Factors and Control Measures.

1.4.4.5 MEWP Selection

- 1 Selecting a MEWP with the right operating characteristics can substantially reduce the risk of entrapment. When selecting a MEWP, account should be taken of the manufacturer's instructions and, in particular the operating parameters and limits specified.
- 2 Vertical lift, articulated boom and telescopic boom MEWPs allow a wide variety and different sequences of platform movements to be performed. The information provided by the risk

assessment (See Appendix 1 and 2) on the nature of trapping risks and when the risks occur will aid decisions on the type and model of MEWP best suited to avoid trapping risks.

- 3 Many MEWPs have an up-stand above the platform control panel to prevent the operator's hands being trapped against overhead objects, as required by European Standard EN 280:2001 +A2:2009(3). On some MEWPs, this up-stand may prevent the operator's upper body being pushed downwards onto the controls but it can create a trapping risk if the operator leans over it while moving the platform. A stand-off bar is fitted on some MEWPs in front of the control panel which prevents the operator's lower body being pushed horizontally against the controls. Control panels may have the controls sunk into the top of them and they may have features that prevent objects placed on the panel contacting the controls. There is no one feature that prevents the operator contacting the controls but a combination of the above can reduce the risk.
- 4 Important factors that need to be taken into account when selecting a MEWP for use, e.g. use on rough terrain or indoor/outdoor use.
- 5 Wherever planners/managers are uncertain about the best MEWP for the work they should seek further expert advice, e.g. from a hire company or manufacturer.
- 6 When selecting a MEWP for use, the circumstances in which it will be used must be taken into account. If this assessment indicates that the fitment of additional equipment or devices may overall improve the safe use of the MEWP during the task, then before fitment, the process in section 1.4.4.14 should be followed. This will help ensure that full consideration is given to both the positive and negative health and safety effects of fitting the device and legal considerations.
- 7 See Appendix 3 and 4: MEWP Categories and Selection.

1.4.4.6 Safe System of Work

- 1 A safe system of work (SSW) should be devised to ensure that work tasks can be carried out safely. Key elements of the SSW should be written down. This could take the form of a safety method statement as commonly used in the construction industry or any other appropriate record.
 - (a) The SSW should be based on risk assessment and identify the:
 - (i) type of MEWPs to be used,
 - (ii) Hazards that need to be taken into account, when travelling to,
 - (iii) accessing or working in the work area,
 - (iv) control measures to be adopted,
 - (v) competence and training requirements (see section 1.4.4.11 & 1.4.4.12 for Those involved in the work, and emergency arrangements section 1.4.4.7),
 - (b) The SSW should be communicated to all persons involved in the planning and management of the work tasks.
 - (C) The hazards identified and control measures to be adopted should be communicated to those who supervise and carry out the work tasks.
- 2 Inspecting a MEWP is vital to ensure that it is safe, complete, that it works properly and that it is clean. You must inspect the entire machine both before and after use. That is, the power source, all working parts, the structure and the vehicle mounting (where applicable) in conjunction with the manufacturer's manual.

Pre-use Inspections

Document All Inspections:

- 1 Inspect the platform before and after use and keep a written record of inspections
- 2 Do not attempt repairs or adjustments which you are not authorised to carry out. If you discover any defects you should:
 - 3 ISOLATE the machine, TAG the machine 'Do Not Use' and REPORT the machine as defective. When carrying out your inspection, NEVER work under a raised boom or platform unless movement has first been prevented by means of blocks, or special locking devices fitted for the purpose.
 - 4 Power unit considerations: Certain simple precautions need to be observed depending on the type of power unit fitted.
 - 5 Internal Combustion Engines: when an engine is used inside a building or in a confined space, adequate ventilation must be provided to extract the dangerous exhaust fumes.
 - 6 Liquefied Petroleum Gas (LPG): is used as a fuel for certain types of internal combustion engines. When it is necessary to fit a replacement gas bottle this may be carried out within a building, but at least 8 metres from any source of ignition.
 - 7 There must be no smoking when refuelling or changing a gas bottle. LPG is heavier than air and will sink to the lowest part of the worksite. When changing cylinders, the appropriate Personal Protective Equipment (PPE) must be worn. LPG in its liquid state is a refrigerant and can cause severe cold burns.
 - 8 Electric Power Units: batteries used on electrically powered MEWPs produce explosive hydrogen gas when they are being charged. Charging must only be carried out in a well-ventilated area. You must not smoke in this area at any time. Battery acid is highly corrosive. Ensure that adequate precautions are taken when topping up a battery or in the event of a spillage. The appropriate PPE must be worn.

Ground Conditions

- 9 During use it is important that operators use the level indicators on platforms and take notice of any warnings provided. If the level indicator shows that the operating limits are being exceeded, the operator should lower the platform or the machine and then reset the machine in a level position. If it is suspected that the outriggers could sink for any reason, regular checks should be made of machine level and adjustments made to outriggers, spreaders, mats, etc.

Ground Assessment

- 10 The assessment of ground strength can vary from a visual inspection of the ground surface to a full geotechnical survey. In the case of MEWPs, a visual inspection is often adequate as outrigger loads are relatively low compared to machines such as mobile cranes. However, it is essential that the assessment is made by someone with adequate knowledge and the experience to know when further expert advice and assessment is required.

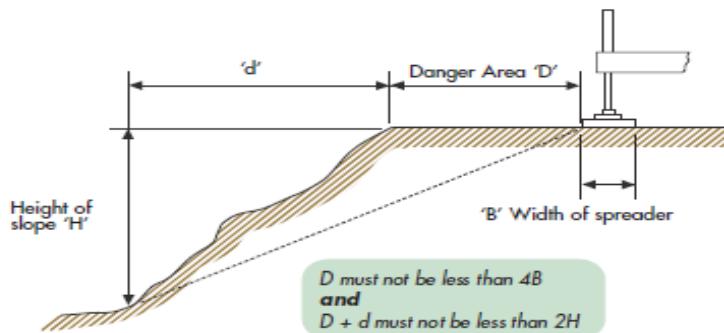
Site Categories

- 11 Sites can be split into a number of categories to highlight the most likely hazards that need to be considered:
- 12 **Greenfield Sites** - No previous construction activity. Particular problems may be encountered adjacent to rivers, estuaries and flood plains where soft alluvial deposits and high groundwater tables can be expected.
- 13 Beaches - Low sand density and/or high or variable water table create difficult conditions.

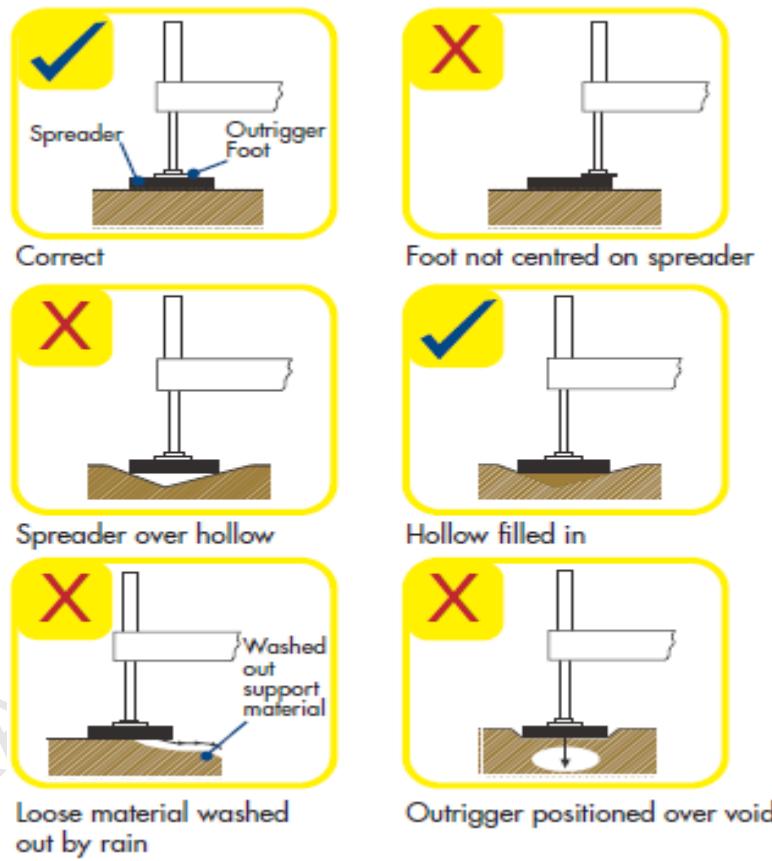
- 14 Filled Construction Sites (Brownfield Sites) - Previous conditions are unknown and there may be basements, poorly filled open pits, storage tanks or variably compacted fill.
- 15 Paved Areas - Roads, pavements, paths and car parks can look deceptively strong but may have been laid on weak ground. If a road is regularly used by heavy commercial vehicles and shows no sign of distress, then it will be less of a concern than a lightly trafficked car park or estate road. Footpaths always demand further investigation as there may be weaker material or shallow services underneath a thin surface layer. Edges of paved areas are usually weak.
- 16 Town Centre Sites - Expect underground hazards such as basements, sewers, tunnels, live services, poor backfilling.
- 17 Close to an Airport - When intending to work within 6km of an airport boundary and 10m or more above ground level, prior permission will need to be sought from the airport operator.

Typical Ground Condition Hazards:

- 18 Uncompact Fill: Soil or other fill material might be piled along the line of a backfilled trench without being compacted. Cracking of the ground along the line of the trench is an indication of uncompact fill.
- 19 Proximity to Excavations: MEWPs should not be positioned near to the edge of trenches and other excavations as these are likely to collapse without warning. If the machine needs to be used close to the edge of a slope or excavation, with the outriggers or wheels in the 'Danger Area', an engineering assessment must be by a competent geotechnical engineer before the MEWP is set up and operated.
- 20 Floors, Cellars and Basements: Many floors, cellars and basements are incapable of bearing the weight of a MEWP and could collapse without warning. The strength of floors and location of cellars and basements must be taken into account when siting MEWPs.
- 21 Paved Areas: Paved areas can look deceptively strong but might have been laid on weak ground underneath. Footpaths should be considered to be suspect as there could be weaker material or services just underneath the surface.
- 22 Roads: If a road is used regularly by heavy commercial vehicles and does not show any signs of distress it is of less concern than a lightly-trafficked car park or estate road. Underground services: Sewers, drains, manholes, gas and water mains, etc. might be damaged by the weight of a MEWP or could even collapse and cause the MEWP to become unstable or overturn.
- 23 Weather Conditions: Heavy or prolonged rain can alter ground conditions and cause sinking of outriggers or wheels. If it is suspected that the ground supporting a MEWP is getting softer, regular checks should be made on machine level and the appropriate adjustments made to outriggers, packing mats etc.
- 24 Outrigger Foundations: The area of the foot attached to the outrigger of a MEWP is relatively small and consequently generates high pressures on the ground. Most soils, unmade ground and some paved and tarmac covered areas are not capable of supporting these pressures and some form of foundation or spreader plate is often required to reduce the pressure to an acceptable level.
- 25 It is therefore strongly recommended that suitable spreader plates should always be used under the outrigger feet irrespective of the apparent ground conditions.
- 26 In addition, very poor ground conditions may require the advance preparation of additional foundations, such as timber mats, proprietary mats, steel grillages or concrete pads, before the MEWP outriggers are deployed. If timbers are used these must be in good condition and of adequate thickness (not scaffold boards).



Examples of Good and Bad Practice



Movement by Road

- 27 The driving of MEWPs on the public highway is subject to country specific regulations which must be adhered to. For example, you must be in possession of a current driving licence for that class of vehicle.
- 28 Before travelling on a Public Highway make sure you have the appropriate authority. Before travelling on the road with a vehicle mounted MEWP, make sure that you know the clearance height and width of the machine, which should be marked in the cab.
- 29 If the machine is equipped with outriggers, or extending axles, check that these are fully retracted and locked in place. Where appropriate, check that the slewing lock has been applied. When loading or unloading MEWPs from a transporter, adequate ramps should be used and correctly positioned. The use of the vehicle winch is recommended on certain vehicle types of MEWP.

- 30 A self-propelled MEWP should not be towed or used for towing unless it is specifically designed and equipped for this purpose. Otherwise this can cause serious mechanical damage to the machine or injury to people on site. When negotiating ramps or slopes with a MEWP it is important to apply the brakes regularly to prevent the machine picking up too much speed and running out of control. This should be done in accordance with the manufacturer's instructions, which must be followed.

Travel to the Workplace

- 31 Travelling with the platform of a MEWP occupied and raised should only be undertaken on machines specifically designed to be used in this way. The jolting caused by an uneven surface will be magnified considerably at the platform and may cause instability and danger to any occupants.
- 32 Do not travel the machine up or down slopes unless it is specifically designed to do so.

Before travelling, a check should be made to ensure:

- (a) the stabilisers or outriggers are not extended
 - (b) no ramps, trenches, holes or other dangerous conditions lie in the path of travel
 - (c) no overhead cables, building projections or other overhead hazards will obstruct the machine's path
 - (d) adequate warning has been given to everyone on the ground
- 33 On slopes apply the brakes regularly to prevent the machine picking up too much speed and running out of control - nothing has been left unsecured and liable to fall off the work platform; hoses, cables, wires etc. have not been left hanging or trailing from the machine.
- (a) Reduce speed and sound horn near doorways.

Positioning and Terrain

- 34 When working in an area used by other vehicles or pedestrians, for your own and other people's safety, you must make sure that the whole of your operating area is cordoned off using cones, warning notices, flashing yellow beacons, etc. Consult the site supervisor.
- 35 Under no circumstances should you allow any part of a MEWP to extend or swing into a line of traffic.
- 36 If arrangements need to be made to divert traffic using temporary barriers, cones, traffic lights and/or signs, consult the site supervisor who carries the legal responsibility for this 'only suitably trained persons may carry out this task'.
- 37 Use of outriggers (stabilisers)
- 38 Certain types of MEWPs are fitted with outriggers and/or stabilisers, which should be used as recommended by the manufacturer.
- 39 Before raising the platform or cage you should ensure that the machine is levelled within the manufacturer's limits and located on a firm surface. The use of suitable packing should always be considered when it is necessary to spread the load under the outriggers to prevent them from either sinking into the ground or damaging the supporting surface.
- 40 You should check that each outrigger and its packing is in full contact with the ground, both

before starting work and regularly thereafter. If you are in doubt about the ground conditions at any time, you must consult the site management.

Operation in Conjunction with Other Equipment

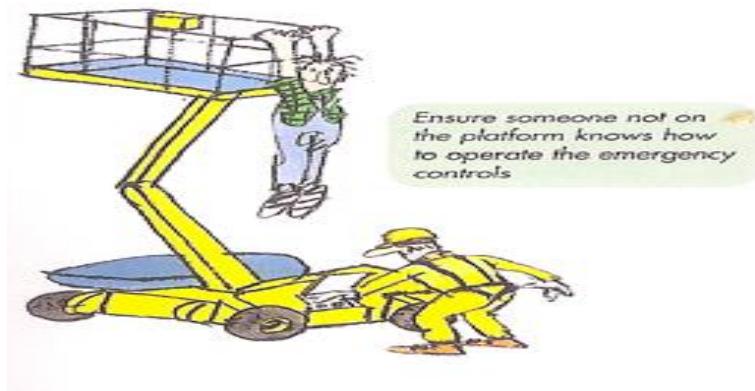
- 41 When a MEWP is to be operated in conjunction with a crane or some other appliance, the work must be properly planned and a safe system of work developed which must be clearly understood by everyone involved.
- (a) Everyone must also know how to deal with any foreseeable emergencies.
 - (b) Arrangements should be made for operators to be able to communicate clearly with each other.
 - (c) Don't attach unapproved attachments
 - (d) Don't use a MEWP as a crane by suspending a load beneath the platform using slings or any other type of lifting gear
 - (e) Don't ever use the machine as a jack, prop or a tie to support other structures or machines, etc.
 - (f) Don't ever use the MEWP for the electrical earth when welding structures alongside it, unless it incorporates the necessary provisions for doing so
 - (g) Don't leave cables or hoses attached to equipment you are using hanging free; they should be properly supported
- 42 Don't put side force on a platform as this can cause instability, overturning and damage to the MEWP when the loads are greater than specified by the manufacturer

Ensure Good Visibility at Height

- 43 When working inside the building, and at times of low light (e.g. in winter months or in poor weather), adequate lighting should be provided or work suspended.

Minimise Distractions

- 44 **Distractions in the Platform/Basket**, such as mobile phones and trailing cables should be strongly discouraged. Loose materials on the MEWP handrails or in the basket of the MEWP should be prohibited and should be carried in approved containers and/or using approved materials handling attachments.
- 45 Distractions on the ground (people or objects near the MEWP base) should be removed before operating and exclusion zones complied with.



Do not Obstruct MEWP Controls

- 46 **Basket Controls:** basket/platform hand and foot controls should not be obstructed. Tools and materials which could obstruct the controls should not be placed on the MEWP control panel but stored in approved containers and and/or using approved materials handling attachments.
- 47 Once in position, consider isolating the power until you need to re-position to reduce the risks of accidental operation.

Safe Working Load (SWL)

- 48 The Safe Working Load (SWL) is the maximum load that the MEWP will safely carry. This SWL includes the weight of all people, tools and equipment being carried.
- 49 Overloading by exceeding the SWL is extremely hazardous and should never take place. Not only may it cause the machine to overturn but it may also damage the machine.

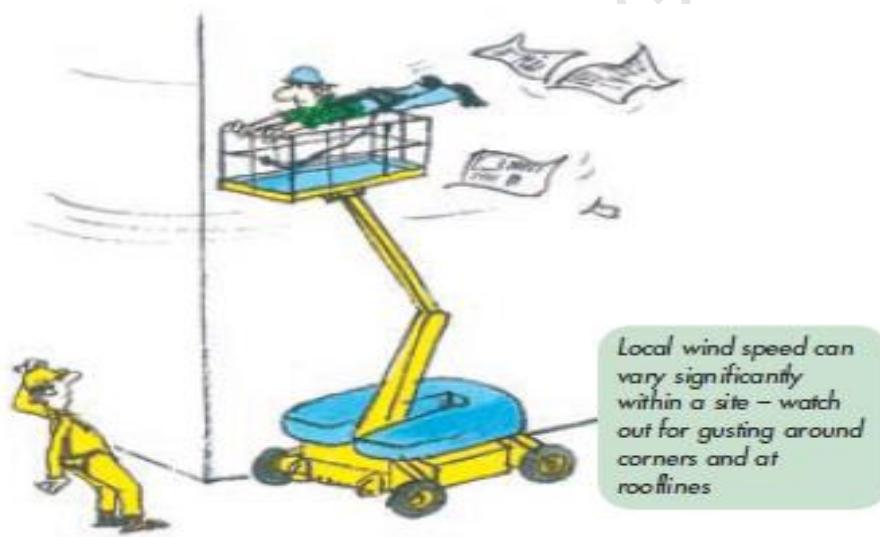


- 50 Shock loading a machine by the sudden increase or decrease in weight is also extremely hazardous as it might overturn or damage the machine.
- 51 It should be noted that some manufacturers allow varying SWLs for particular machines. Consult the manufacturer's load chart and manual.
- 52 SWLs should always be marked on the machine in a prominent position and shown in kilograms (and lbs) and by diagrams indicating the maximum number of people that can be carried.
- 53 Uneven distribution of the load on the work platform and sudden impact (shock) loads from

falling objects, or dismantling of structures etc. could destabilise the machine.



- 54 **Wind and weather Wind** - All MEWPs (except those specifically for indoor use) have a maximum design wind speed which should be marked on the machine. Operation in wind speeds above this maximum may cause instability.
- 55 **Design wind speed** - is based on a three second gust; more prolonged exposure can cause instability. The maximum set by the manufacturer is given in the Operators' Manual, on decals or data plates. It is important to measure wind speed at working height – an anemometer should be used for reliable measurement. It is very important to realise that wind speed increases with height and may be 50% greater at a height of 20 metres above ground level.
- 56 **Funnelling** - possible around buildings or objects. Caution is necessary around rooflines and corners.



- 57 **Sheeting** - using large sheets of material or anything with a large surface area in a platform will adversely affect stability.
- 58 **Wind-Chill** - will cause the operator to get cold and affect ability.
- 59 NEVER attach the platform to a structure.
- 60 Other sources of local high wind speed to consider are aircraft slipstreams at airports and high sided vehicles on highways.

Electrical Hazards

- 61 In emergency: Do not approach machine – keep others away, do not climb down, do not jump – call emergency services.

Antennae/Bus Bars

- 62 Risk Assessment should check if antenna is receiving or transmit – switch off for duration of work if transmit type.

Overhead High Voltage Lines

- 63 Most overhead electric lines are un-insulated and usually carry high voltage electricity.
- 64 Working from or moving a MEWP in the vicinity of overhead high voltage lines can be extremely dangerous, and essential precautions must be taken. There may also be special rules established for particular sites.
- 65 On controlled sites, where MEWPs have to pass under overhead electric lines, ground level barriers should be positioned and 'goal posts' erected at the place where your machine may pass under the overhead lines.
- 66 If there is no need to pass under the overhead lines, both ground level barrier and high-level markers, (usually bunting) will be placed to keep you at a safe distance.
- 67 Not all sites are controlled and the operator must always be aware of the dangers of overhead electric lines.
- 68 Many fatal accidents have occurred due to some part of a machine touching or even coming close to overhead lines.
- 69 A minimum safe distance must always be kept between the overhead lines and the closest point of the MEWP when fully extended. This distance is 15m with overhead lines mounted on steel towers and 9m with lines mounted on poles of wood, concrete or steel. These distances are measured horizontally at ground level from a position vertically below the outermost conductor at the tower or pole position (see Figures 1 and 2).

Fig.1
Minimum safe
distance from power
lines mounted on
steel towers

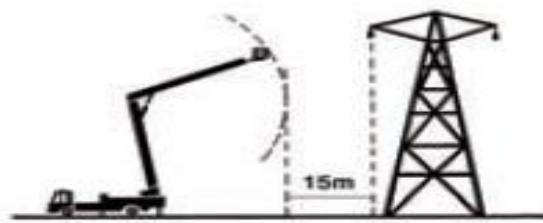
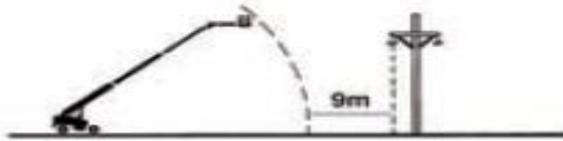


Fig.2
Minimum safe
distance from power
lines mounted on
poles



- (a) Strong winds may cause overhead electric lines to sway and thus reduce the distance to a point where you are in danger
- (b) The recommended minimum safe working distance must be rechecked and confirmed if the work platform is moved from the original location
- (c) You must observe barriers and markers where these are erected to mark safe working distances

- (d) When moving your machine under or near overhead electric lines, always be guided by an experienced signaller
- (e) Do not raise any part of the machine when travelling under overhead lines or between two sets of goal posts
- (f) If in doubt at any time seek further advice.

- 70 Emergency drill on contact with a live electric line
- 71 If the MEWP makes contact with a live electric line, observe the following precautions in order to minimise the risk of electrocution: Remain on the platform or in the cage
- 72 Warn all other personnel to keep away from the machine and not to touch any part of it
- 73 Try, unaided, and without anything approaching the machine, to move the machine until it is clear of the power line and/or lower the platform to the ground
- 74 If the machine cannot be moved away, or lowered, remain inside the cage. If possible, get someone to inform the electricity supply authority at once. Take no action until it has been confirmed that conditions are safe.



- 75 Do not touch the machine and the ground at the same time.
- 76 Get someone to inform the site management of the situation immediately and, until assistance is received, ensure that someone stands guard by the machine to warn of the danger.

Personal Protective Equipment (PPE)

- 77 You should always wear appropriate PPE. This might include: steel toe capped boots, hard hat, harness, high visibility vest, warm clothing etc; this will be determined by your risk assessment,
- 78 The use of PPE should be viewed as the final step in a hierarchy of preventative measures, since the potential risks mentioned above can be reduced by good operating practice, well-trained operators and a regime of thorough maintenance.

79 In assessing the risk, the employer should consider the following general factors which, although extensive, are not exhaustive, since there may be particular factors involved in the work to be undertaken which ought to be considered:

- (a) Are the operators trained in the use of a harness and lanyard?
- (b) What type of MEWP is most suitable for the work to be undertaken?
- (c) Does the selected MEWP have identified anchorage points?
- (d) What is the type of work to be undertaken?
- (e) What does the manufacturer of the MEWP recommend?
- (f) Do you have a rescue plan?

80 Having determined the appropriate equipment, the harness and lanyard combination should be inspected by a competent person, and an inspection regime established to ensure they are regularly inspected and replaced if there is evidence of wear. The operators using the harness and lanyard must also have been trained in their use.

81 Safety harness/lanyard combinations must only be attached to the anchorage provided by the manufacturer. Lanyards must never be attached to any other object or a structure outside the platform.



Boom type platforms: When working from a boom type Mobile Elevating Work Platform (MEWP), it is strongly recommended that a full body harness with an adjustable lanyard be used to provide work restraint. The lanyard should be adjusted to be as short as possible and may contain an energy absorbing device.

This would include: Static Booms (1b) and Mobile Booms (3b).

Vertical lifts: It is not normally necessary for personnel working from a vertical lift to wear fall protection equipment, other than in exceptional circumstances.

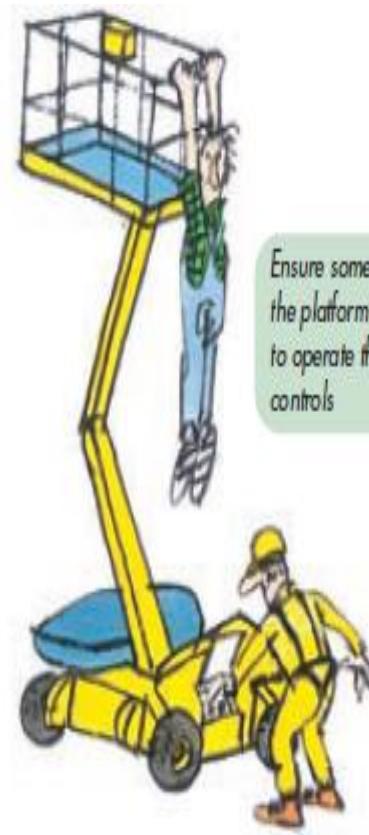
This would include: Static Verticals (1a), Mobile Verticals (3a) and Push Around Verticals (PAV).

When to use a Harness

82 THE NEED FOR A FALL PROTECTION SYSTEM WILL BE THE OUTCOME OF A JOB SPECIFIC RISK ASSESSMENT, UNDERTAKEN PRIOR TO WORK COMMENCING and taking into consideration the manufacturer's operators' manual.

DOs and DON'Ts**Do**

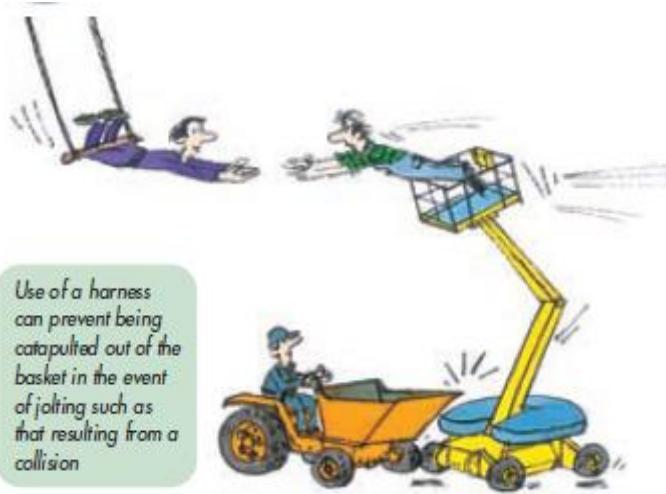
- 83 Telescope last and first and avoid coarse movements near the workface
- 84 Always enter and leave the work platform when it is in a fully lowered position, using the steps or walkways designed for that purpose
- 85 Before operating the controls of a MEWP make sure that you know the position function and correct operation of the emergency (auxiliary) lowering controls and the emergency stop switches
- 86 Ensure that another responsible person on the site (who is not working on the platform) knows how to use the emergency controls
- 87 Always engage the controls gently and smoothly as the proportional controls will respond to your input
- 88 Continually observe – before and during the raising or lowering of the platform – always checking for the possibility of hitting obstructions above and below, or people
- 89 Always be particularly careful to prevent objects or equipment striking or interfering with the controls of the machine.

**Don't**

- 90 Don't exit the machine at height (unless there is no safer way of doing the job and a full risk assessment and method statement has been conducted)
- 91 Don't ever allow an unauthorised person to operate or interfere with the controls – operation of the platform or cage is your responsibility
- 92 Don't ever interfere with, wedge or override hydraulic, electrical or mechanical safety devices or controls
- 93 Don't ever use the guard railings, ladders, staging or similar items to extend your reach or height for any purpose. Your feet must be kept firmly on the deck of the cage or platform at all times
- 94 Don't ever use the emergency controls for purposes other than lowering the platform in an emergency or function testing
- 95 Don't ever attempt to climb up or down the boom or lattice of a MEWP.

Parking

- 96 When leaving the machine parked:
- 97 Fuel/ charge the machine
- 98 Perform a post-use check of machine
- 99 Ensure it is safe and secure
- 100 Check it is correctly stowed
- 101 Isolate against unauthorised use.
- 102 Accidents, near misses and dangerous occurrences



Use of a harness can prevent being catapulted out of the basket in the event of jolting such as that resulting from a collision

Accidents

- 103 An accident is defined in the regulations as: 'any unwanted, unscheduled or unplanned event or occurrence that causes an injury or death to any person or damage to any property'.

Near Misses

- 104 A near miss is an accident which almost happens and could have had severe consequences. Your company should have procedures for reporting such events.

Dangerous Occurrences

- 105 The Regulations list a number of dangerous occurrences one of which is: 'the collapse of, the overturning of, or the failure of any load-bearing part of: any lift, hoist, crane, derrick or mobile powered access platform... etc.'
- 106 Procedures in the event of an accident, near miss or dangerous occurrence
- 107 Your company may have procedures that you must follow but the following general points should also be observed:
- 108 All accidents, near misses or dangerous occurrences must be reported to your company (employer) immediately
- 109 Following an accident or dangerous occurrence, do not move anything, especially your machine, until authorised to do so by your company
- 110 Follow company procedure and/or site procedure for informing site management
- 111 Report all cases of severe shock loading of your machine to your company

1.4.4.7 Emergency Plan and Drills

Rescue Plans

- 1 It is a legal requirement to plan for emergencies and rescue when anyone is working at height. Rescuing quickly someone who has become trapped can make a very significant difference to the injuries sustained – it may be the difference between life and death. There must always

be someone at ground level who is able to take action in the event of an emergency while a MEWP is in use and trapping risks are present.

- 2 A suitable rescue plan must be developed to ensure that emergency recovery can be carried out safely and quickly in the event of an operator or anyone else becoming trapped between the platform and an adjacent object.
- 3 MEWP operators, supervisors and others involved should be briefed on and practice the emergency procedures to follow if someone becomes trapped.

Locating Emergency Controls

- 4 The location of the operator's instruction manual should be identified in the emergency plan so those people who are authorised to operate the ground and emergency controls can refer to it,
- 5 This can be used in conjunction with existing manufacturer's symbols on the MEWP to aid location of the emergency controls.

Periodic Drills

- 6 The emergency descent controls and systems are often specific to individual machines. As such, periodic drills should be required for those who have on-site responsibility for the rescue of a trapped person. These drills must include practising the use of the ground controls and emergency controls for each machine in use.

Incapacitated Operator

- 7 If an operator is trapped and cannot be communicated with, the emergency services should be called immediately

Rescue Procedure

Emergency rescue should be attempted using the following sequence: -

- 8 If the operator cannot take control of the situation, e.g. because they are incapacitated, then people in the platform who are authorised by their employer and have been trained and familiarised as an operator may take control of the MEWP using the platform controls.
- 9 If the above is not possible then a person at ground level can lower the MEWP **provided** they have been:
 - (a) familiarized with the use of the emergency lowering systems and ground controls on the MEWP,
 - (b) instructed through appropriate emergency drills and in the procedures to follow under the emergency plan, and
 - (c) authorised to carry out rescue at ground level by their employer.

Lowering the Platform

- 10 Scan the travel path of the platform and check for any obstruction that could prevent the platform from being lowered or that the platform could contact while it is being lowered. Take into account the position of any platform extension deck.
- 11 Ground controls may not have the same sensitivity and overrun characteristics as the platform controls. Use the controls that provide the best control of movements and take special care when the platform is close to any obstruction. Follow the sequence telescope, elevate/slew

drive so far as possible when using controls.

Ground Control Key

- 12 It is important to ensure that the keys remain in the base unit during normal operation. This is necessary because the ground controls normally provide a much quicker way of bringing the platform to ground level than using the emergency controls.
- 13 In situations where keeping the key in the base is not ideal, e.g. when working on or adjacent to public highways, additional control measures should be implemented. These may include the provision of a second key to be held by the designated person who is authorised to act in the event of an emergency.

References

European standard, EN 280:2009 + A2:2009 Mobile elevating work platforms – Design calculations – Stability criteria - Construction - Safety – Examinations and test

Emergency Descent Decal



1.4.4.8 Co-Ordination with Other Activities and Preparation of Work Areas

- 1 MEWPs will rarely be used in isolation from other work activities and preparations are likely to be required to enable them to be used safely in work areas where trapping risks are present. The work should be planned taking these issues into account. The people responsible for the following activities should be identified and their responsibilities defined in the safe system of work:
 - (a) maintaining overhead objects on any designated travel route that MEWPs are expected to use,
 - (b) preparing and maintaining the ground that MEWPs are expected to work on,
 - (c) managing the areas below and around the work at height, and
 - (d) taking control of emergency operations

1.4.4.9 Supervision and Monitoring

- 1 Supervisors should be instructed in and supplied with SSWs for the work they are expected to control.
- 2 Supervisors should monitor the work and provide advice for the review and revision of the risk assessments and SSWs as the work progresses.

1.4.4.10 MEWP Handover and Familiarisation

- 1 It is mandatory a supplier of MEWP type equipment must carry out a demonstration to the trained operator when delivering the machine to site. The demonstration does not qualify for training please refer to section 1.4.4.11 & 1.4.4.12.

- 2 This is the demonstration of the control functions, safety devices and specific features of a particular model of MEWP to a trained operator.
- 3 If you intend to use any machine with characteristics of weight, height, length or complexity which differ significantly from the machines on which you have been trained, you must ensure you receive familiarisation to cover the difference.
- 4 It is the responsibility of the employer to ensure that all operators using equipment hired to them are adequately trained and familiarised to comply with current health and safety legislation.
- 5 Machine specific familiarisation should follow on from basic training and cover: manufacturer's instructions and warnings, features of the specific model, control functions, safety devices and emergency information supplied with the machine.

1.4.4.11 Competency and Training

Competency

- 1 All involved in: -
 - (a) risk assessment,
 - (b) planning,
 - (c) managing,
 - (d) supervising, and
 - (e) carrying out the work tasks, including rescue operations,
- 2 should have sufficient:
 - (a) training,
 - (b) knowledge,
 - (c) experience, and
 - (d) delegated authority from their employer to enable them to identify trapping risks and carry out their duties safely at the level of responsibility assigned to them.
- 3 the person who formulates the SSW should:-
 - (a) understand the MEWP characteristics and the nature of the work to be carried out; be capable of identifying site hazards that could lead to trapping accidents,
 - (b) have the ability to communicate the results of their findings to those responsible for managing MEWP activities. This can be on-site management, contractor's staff and/or principal
 - (c) contractor's staff depending on the arrangements that are in place to ensure that the risk assessment is understood and implemented.

1.4.4.12 Training

Site Management

- 1 Managers with responsibility for work where people on the platform may be trapped between

the platform and objects in the work area should have knowledge of the factors that should be considered before selecting a MEWP for use.

- 2 A “MEWPs for Managers” training course is recommended for people who manage work activities involving MEWPs.

Supervisors

- 3 Supervisors should be instructed in the hazards, causal factors, and control measures identified in the task, specific risk assessments for the work to be carried out. They should be familiar with the plans for the work to be carried out and take part in regular on-site emergency lowering drills.

MEWP Operators

- 4 Operators must:
- (a) be competent to operate the MEWP in the working conditions to which they are exposed,
 - (b) be competent to operate the MEWP in the working conditions to which they are exposed,
 - (c) be instructed in local hazards and site rules,
 - (d) have attended a recognised basic training course, and
 - (e) be familiar with the make and model of MEWP they are authorised to operate.
 - (f) Those who use mobile elevating work platforms must be competent and trained to an internationally recognised standard, such as ISO 18878.
- 5 It is important to ensure that the operator has received basic training in the correct category of MEWP that they will use (section 1.4.4.5).
- 6 In addition to basic training, operators should be familiarised with the controls, characteristics, safety devices, decals and emergency rescue systems on the MEWPs they are authorised to operate. Before operating a particular make and model of MEWP, the operator should be able to prove that they have received familiarisation on that type of machine, for example through entries in his/her log book (or similar). If this cannot be demonstrated then the operator should undergo familiarisation, or if they are authorised to do so by their employer, self-familiarise themselves using the manufacturer’s instructions.

Rescuers

- 7 Rescuers must:
- (a) be competent to lower the MEWP platform using the ground/emergency controls in the work situations to which they are exposed;
 - (b) be instructed in local hazards and site rules;
 - (c) be familiar with the rescue procedures for the type of MEWP they are authorised to operate;
 - (d) be aware of what to do if the load control has tripped and/or the emergency control has been activated in the platform,

- 8 Rescuers at ground level do not need to be trained as MEWP operators but they must be trained by their employer and be competent to carry out rescue operations. They should be familiarised with the safety devices on the MEWP in use, its emergency lowering systems and ground controls. They should check the emergency lowering functions with the operator during the daily pre-use checks.
- 9 Rescuers should be trained in the procedures to follow when rescuing people (see 1.4.4.7) and take part in on site emergency lowering drills

1.4.4.13 Training Providers

- 1 Those who provide training on mobile elevating work platforms, should be able to demonstrate that their training activity – facilities, equipment, instructor qualifications and CPD, instructor / trainee ration and course content are subject to independent assessment and ongoing audits by international standard ISO: 18878.
- 2 Records should be kept of the training received.

1.4.4.14 Fitting Additional Devices or Equipment or MEWPs

- 1 Task specific risk assessment may indicate that fitting additional equipment or device(s) to a MEWP may provide additional safety in particular types of work. If you wish to fit additional equipment or devices then you should obtain advice from a person or body who is competent to assess whether or not such a change to the MEWP will compromise its safety. You may consult the MEWP manufacturer but should note that health and safety law does not oblige manufacturers to give advice on the fitting of additional equipment or devices on their products.
- 2 There are specific legal requirements which need to be understood and followed by anyone who fits additional equipment or device(s) on a MEWP.
- 3 Before putting MEWPs into use for the first time the user must satisfy himself that the MEWP complies with essential health and safety requirements.
- 4 Whilst work equipment may be adapted, for example, for the specific operations and conditions in which it is used. The adaptations must not increase the overall risks associated with its use

Supply of Machinery

- 5 before placing machinery, such as a MEWP, on the market and/or putting it into service, the manufacturer or his authorised representative shall:
 - (a) ensure that it satisfies the relevant essential health and safety requirements
 - (b) ensure that the technical file is available;
 - (c) provide, in particular, the necessary information, such as instructions;
 - (d) carry out the appropriate procedures for assessing conformity;
 - (e) draw up the EC declaration of conformity and ensure that it accompanies the MEWP;
 - (f) affix the CE marking to the MEWP,
- 6 If you substantially modify a MEWP then you become the new MEWP manufacturer and are responsible for complying with manufacturer standards. There is no definition of what is a substantial modification.
- 7 Whilst it is possible for manufacturers to self-certify their designs by demonstrating full compliance to design standards (e.g. EN 280); to assist them to comply with either design

standards or Essential Health and Safety Requirements (EHSR) manufacturers normally choose to have their designs examined and certified by Notified Bodies.

- 8 Additional equipment or device(s) may be classed as safety components. Safety components have to comply in the same way as machinery. Compliance with means only that the safety component meets the EHSRs relevant to the safety component. Before fitting any safety component to a MEWP you should follow the procedure given in "Additional devices or equipment" to ensure that the device is suitable for use with the MEWP.

Additional Devices or Equipment

- 9 If additional devices or equipment are proposed to be fitted to a MEWP then further risk assessment is required before such a change is made. You will need to have available all relevant technical details of the MEWP and for the additional devices or equipment that you intend to fit. Risk assessment must show that the proposed change protects against the trapping risks identified and that, at least, it does not:
- (a) increase the consequences of injury in a trapping accident create new or additional risks that outweigh the trapping risks addressed (taking account of all the ways in which the MEWP is used including areas where trapping risks are not present)
 - (b) adversely affect the:
 - (i) operation of controls and any MEWP movements
 - (ii) performance and reliability of control systems
 - (iii) reliability of components
 - (c) cause ergonomic hazards for the MEWP operator or anyone else in the platform
 - (d) cause distractions to the operator that could affect safe operation of the MEWP
 - (e) encourage bad operating practices that could affect the safety of the MEWP in use
 - (f) restrict access to the platform controls, particularly in an emergency
 - (g) prevent the MEWP from being used for applications in which it is acknowledged to be safe

Responsibility

- 10 The responsibility for any adaptation, addition or modification and the associated risk assessment lies with the person who modifies the MEWP. The safety of the adaptation, addition or modification and the safety of any parts of the MEWP that it may affect must be ensured. Under these circumstances the original manufacturer is not liable for the adaptation, addition or modification or any effects it has on the safety and performance of the MEWP. The person carrying out the adaptation, addition or modification takes on these responsibilities and may become liable for the safety of the complete MEWP.

Consultation with the Manufacturer and your Insurers

- 11 Advice provided by the MEWP manufacturer on the adaptation, addition modification you propose or the additional devices or equipment that you wish to fit should be taken into account.

- 12 It is recommended that you discuss the fitting of the additional devices or equipment with your insurer if you think that they could be classed as modifications that could affect your insurance.

1.4.4.15 Fall Protection

- 1 All persons that wish to use a MEWP must be wearing the appropriate full body harness with adjustable lanyard and personal.
- 2 The intended operation of this PPE is to provide work restraint inside the basket / platform.
- 3 All operators of MEWPs will have undertaken training of ISO: 18878 where guidance on harness use and how falls from height can occur. All persons wearing harness inside a working platform must be trained and competent.

Boom Type Platforms

- 4 When working from a boom type Mobile Elevating Work Platform (MEWP), it is strongly recommended that a full body harness with an adjustable lanyard be used to provide work restraint. The lanyard should be adjusted to be as short as possible and may contain an energy absorbing device.
- 5 This includes Static Booms (1b) and Mobile Booms (3b).

Vertical Lifts

- 6 It is not normally necessary for personnel working from a vertical lift to wear fall protection equipment, other than in exceptional circumstances. This includes Static Verticals (1a), Mobile Verticals (3a), Push Around Verticals (PAV) and Mast Climbing Work Platforms (MCWP). The need for a fall protection system will be the outcome of a job specific risk assessment undertaken prior to work commencing and taking into consideration the manufacturer's operators' manual.

1.4.4.16 MEWP Inspections and Through Examinations

- 1 The maintenance of MEWPs is an essential feature in ensuring their safety when in use. These Regulations require a competent person to draw up a schedule for maintenance, taking into account the machine's mode of use, its frequency of use and the conditions under which it is used.
- 2 These Regulations require the minimum of a thorough examination before being used for the first time and, thereafter, every six months or when exposed to conditions that may cause deterioration.
- 3 Records of such inspections should be kept until the next thorough examination or for a period of two years.
- 4 The purpose of thorough examinations and, if appropriate, inspections at suitable intervals between is 'to ensure that health and safety conditions are maintained and that any deterioration can be detected and remedied in good time'. The 'competence culture' approach also goes a long way towards answering the examination thoroughness question. It goes further than examining a fixed list of items on a specific platform. As the legislation recognises, this changes with circumstances such as incidents, accidents and usage. It must also be influenced by what is discovered during the inspection. An apparently simple defect may suggest in depth examination of components that would otherwise not have needed such thorough investigation.
- 5 They involve detailed examination of components and systems, carried out by visual inspection and testing and, where necessary, dismantling, stripping of paint, measurement and non-destructive testing.
- 6 Many parts and systems of a platform will require examination at every thorough examination. However, there may be parts and systems which, in addition, require even more thorough examination (e.g. by dismantling or NDT) at longer intervals.
- 7 For a 'once-off' thorough examination of an unfamiliar platform and for which records may be incomplete or missing entirely, a detailed examination (including dismantling, uncovering

- measuring and non-destructive testing) of every component and system upon which safety is reliant.
- 8 No component or system should be assumed safe until inspection and testing have proved that it is.
- 9 However, the following inspections are recommended.
- 10 Daily inspections at start of work, usually carried out by the trained operator. They should check the following: tire pressures and wheel nuts brakes and steering
- (a) fuel, oil, water, hydraulic fluid and battery levels
 - (b) lights, warning devices and communications
 - (c) structure for visible defects
 - (d) all operating controls
 - (e) all hydraulic fluid lines for any leaks, however small.
- 11 **Weekly inspections** by a competent maintenance fitter or operator after a specific number of hours of use. They should be:
- (a) a check of all items covered under the daily inspection
 - (b) an operational check of all functions of the machine
 - (c) a close visual examination of the chassis and structure.
- 12 A record that **these** inspections have been carried out should be kept.

Intervals between Thorough Examinations

- 13 **At six-monthly intervals or after 1,000 operational hours**, or as recommended by the manufacturer, a thorough examination should be made by a competent person and a written report issued. A similar examination is recommended after an accident, major repair or modification.
- 14 Certificate of Conformity to the Machinery Directive 98/37/EC, which is delivered with a new platform, is equivalent to a Certificate of Thorough Examination for 6 months following its date of issue.
- 15 Thorough examinations should be carried out at least every 6 months OR in accordance with an examination scheme. It is recommending that, except in very unusual circumstances, **any** examination scheme should include thorough examinations at least every 6 months. A thorough examination must be performed each time that exceptional circumstances, which are liable to jeopardise the safety of the equipment, have occurred.

Maintenance Work on Scissor Lifts

- 16 Special care is needed in the care and maintenance of this type of MEWP. No work or inspection should take place within the stack of a scissor lift unless scotches or chocks are used to prevent any entrapment hazard arising from mechanical or hydraulic failure leading to movement of the elevating/lowering mechanism.

Planning for Thorough Examinations

Review Manufacturer's Recommendations

- (a) By reference to manuals
- (a) By consultation with manufacturer

Review Operating, Usage and Maintenance Records

Devise Logical Plan for Safe Examination

- (a) Structural integrity and safety
- (b) Operating system
- (c) Control system
- (d) Safety systems
- (e) Tests of safety systems
- (f) Functional tests
- (g) Proof test (not required by EN 280)

Draw Up Examination Check List

Safety Checklist

- (a) Has a risk assessment for the work been carried out?
- (b) Has the daily inspection been completed?
- (c) Are lanyards always clipped to an anchorage point on the machine?
- (d) Ensure that the wind speed is not excessive (check with the machine specification).
- (e) Are the correct signs and barriers erected?
- (f) Is the operative competent, authorized and fully fit?
- (g) Does the operator have access to a copy of the manufacturer's operating instructions?
- (h) Ensure that the safe working load will not be exceeded.
- (i) Ensure that it is all clear overhead.
- (j) Ensure that the ground conditions are satisfactory.
- (k) Ensure a current record of the last thorough examination is available prior to use.
- (l) Are all outriggers and stabilizers safely deployed?
- (m) Make sure that the machine is level.
- (n) Ensure as far as possible that there are no cellars, drains or other voids beneath the area where the will be working.
- (o) Make sure that all tools and materials are secure.
- (p) Is a work restraint system or fall-arrest system necessary and, if so, is it available and used?
- (q) Make sure that the platform is not slippery or obstructed.
- (r) Ensure that all work is within the specified reach of the unit.
- (s) If movement of the machine is planned, ensure that the route is clear and safe.
- (t) Ensure that there are no restricted or confined space hazards.
- (u) Ensure that no part of the machine will encroach into a traffic route.
- (v) Ensure that the machine operator is aware of the location of all fixed structures to avoid the risk of entrapment.

- 17 Everyone who owns or operates any form of powered access equipment – mobile elevating work platforms (MEWPs) or mast climbing work platforms (MCWPs) – needs to understand fully the concepts and implications of competent persons required to plan, manage and carry out thorough examinations.

- 18 It is against the law to use, or allow to be used, powered access equipment that does not have documented evidence of a thorough examination by a competent person.
- 19 The Competent Assessed Persons (CAP) Scheme focuses on another crucial aspect of safety – that of the machine itself. It is intended to provide guidance for platform engineers on compliance with regulatory requirements and to offer documented evidence that individuals can be regarded as competent persons to plan, manage or carry out thorough examinations of powered access equipment within the context of current legislation.
- 20 The CAP Scheme complements ISO: 18878 operator training courses by extending the promotion of a ‘safety culture’ to machine maintenance as well as operation. It uses experienced engineers to provide the orientation and guidance sessions as well as to carry out the assessment that forms a key element of the CAP Scheme.
- 21 Everyone involved, directly or indirectly, in the use of a platform, either a MEWP or an MCWP, carries a responsibility for ensuring that examinations have been carried out. This will include the owner or supplier, which may be hire company A; the cross-hirer, which may be hire company B; the user, who may be a contractor on a site and the site owner, operator or controller. All platforms must carry proof of examination.
- 22 This may be a sticker identifying the date of the previous examination, when the next one is due and a report reference, or a copy of the Inspection Certificate. If platforms are used without such confirmatory evidence of examination then everyone involved is liable to prosecution.
- (a) “How competent is ‘competent’?”
- (b) Interpretive guidance

A Competent Person must:

- (i) Have appropriate practical and theoretical knowledge and experience of the lifting equipment to be thoroughly examined.
 - (ii) Be sufficiently independent and impartial to allow objective decisions to be made, although this does not mean that they should be from an independent organization.
 - (iii) Examinations carried out by in-house staff are perfectly acceptable within the legislation.
 - (iv) Be able to carry out thorough examinations and interim inspections.
 - (v) Decide on the need for inspections between thorough examinations.
 - (vi) Carry out an ongoing review of the periods between thorough examinations.
 - (vii) Following a thorough examination, notify the employer forthwith of any defect in the lifting equipment, which in his opinion is or could become a danger to persons.
 - (viii) As soon as is practicable after a thorough examination (normally within 28 days) make an authenticated report in writing: In addition, they may be:
 - (ix) Required to draw up and authenticate an examination scheme and subsequently modify it in the light of changes.
- 23 It is their responsibility to be able to confirm that the equipment subject to their examination and report is (or is not) now safe to operate. Those maintenance engineers, for example, who really understand the platforms they work on, know their patterns of use and always look more carefully for a possible problem, certainly practise it. To them, a tight pin or shaft suggests the possibility of torsional fatigue rather than just wear. Tell-tale rust spots or stains on an apparently sound weld warn of possible internal corrosion.
- 24 Local accident damage is not just repaired but its effect on other components is carefully considered. It is not necessary for a competent person to know all the answers, but it is vital that they have a ‘what if?’ mentality and are prepared to seek further advice from manufacturers or experts whenever they are in doubt.
- Preparation of an Examination Scheme**
- 25 Such a scheme is a planned programme, to be updated and modified in the light of experience of thorough examinations and interim inspections. It has to be designed to ensure that a

platform is always in safe working condition and that defects and deterioration are identified and rectified before safety is compromised.

- 26 The first step is for the competent person* to draw up a complete list of all parts and systems which may require thorough examination during the projected life of the platform, say 10 years. This will rely upon study of the maintenance manual and consultation with the manufacturer.

27 In this context, competent person refers to competence to prepare such a schedule which is not necessarily the same as competent to carry out thorough examinations. However, we believe that those who can demonstrate the 'competence culture' referred to can certainly be expected to participate in the drawing up of an appropriate examination schedule.

Elements of a Recommended Safety Assurance Package

- (a) Pre-delivery inspection: should include a check that thorough examination evidence valid and delivered with the MEWP.
 - (b) Pre-use inspections by operator: should ensure that defects are reported and rectified.
 - (c) Regular maintenance: should include inspection and reporting/rectification of defects.
 - (d) Planned inspections by a competent person between thorough examinations: It is recommended that such inspections should be performed at least once during such periods, but severe use or abuse environments could require such inspection each week.

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Appendix 1 : Hazards, Causal Factors and Control Measures:

Travelling to And From The Work Area



Note: The Table does not imply any priority order for the hazards, causal factors and examples of control measures

Hazard	Typical causal factors	Examples of control measures
Overhead obstructions in the path of the MEWP	Overhead obstructions that come close to the top of the platform while the MEWP is travelling can cause an operator to become trapped between the platform and the obstruction	Choose an appropriate size of model and type of MEWP for the access route required where possible, choose a route that avoids overhead obstructions. Ensure sufficient clearance when travelling under or past overhead obstructions taking account of the platform movements that can occur when travelling. Do not use excessive speed when close to obstructions. On MEWPs with platforms controls that can be operated remote from the platform use the remote control rather than squeeze past obstructions and stand sufficiently clear of movement
Leaning over the platform guardrails or control panel	Leaning over the platform guardrails or control panel to view the MEWP base, wheels or tracks while travelling distracts the operator's view of overhead obstructions	Thoroughfares for MEWPs should be kept clear.
Losing control of the platform controls	Trapping of the operator against the platform controls while the MEWP is travelling prevents the operator from controlling MEWP movements and increases the likelihood of serious injury in a trapping incident	Do not lean over the platform controls while moving. Avoid distractions, e.g. use of mobile phone, while travelling or moving the platform. Don't put objects on the platform control panel that could move and activate the controls. Do not place materials on the guard rails that could move and distract the operator.

Lighting conditions making overhead obstructions in the path of the MEWP difficult to see	Poor/inadequate lighting of the vehicle route in areas where overhead obstructions exist can make it difficult for the MEWP operator to notice the obstructions	Provide adequate background and task lighting where necessary, taking into account weather, time of day, seasonal changes and the work environment. Additional lighting needs careful design.
Pedestrians or vehicles in the path of and around the MEWP	Pedestrians or other vehicles around or in the path of the MEWP can distract the MEWP operator while approaching an overhead obstruction	Segregate traffic routes so far as possible. Use a banksman (lookout) whenever necessary in areas where pedestrians will be present. Pedestrians should wear high visibility clothing.
Uneven ground, steps, trenches etc.	Travelling over uneven ground, steps, open trenches and objects on the ground causes vertical work platform movements that may trap operators against overhead obstructions	Ensure the ground conditions are suitable for the MEWP to travel on. When travelling on boom MEWPs, adjust the platform position to give adequate view of the MEWP base/wheels and to minimise vertical platform movements. Travel at a speed that ensures platform movements are controlled.
Objects on the ground in the path of the MEWP	Operators may lean over the platform guardrails or control panel to view objects on the ground while travelling thus distracting their view of overhead obstructions	Before gaining access walk the route and remove obstacles.

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Appendix 2 : Hazards, Causal Factors and Control Measures:

Accessing The Work Area and Working At Height



Note: The Table does not imply any priority order for the hazards, causal factors and examples of control measures

Hazard	Typical Causal Factors	Examples of Control Measures
Overhead Obstructions adjacent to the path that the platform needs to follow while being raised into the work area at height	Using the wrong type or size of MEWP for the nature of access Required Mistakes, rushing to get the job done and lack of concentration can cause the MEWP operator to drive the platform into overhead obstructions using the lift, slew and/or travel controls	Telescopic boom, articulated boom and vertical lift MEWPs have different access characteristics and the most suitable type should be chosen for the work tasks to be carried out and the environment in which it is used Plan/synchronise work tasks to avoid the presence of unnecessary obstructions
Overhead obstructions while working in the work area	Overhead objects close to the work platform can present immediate trapping risks when the platform or MEWP is moved using the lift/lower, slew or travel controls obstructions below head height can present immediate risks when starting to move the platform operator not moving the platform sufficiently clear of an obstruction before operating the MEWP travel or slew controls [NOTE: rapid platform movements can be created when the slew and main boom lift controls are operated]	When close to obstructions use the controls in the following general sequence: - - drive - elevate - slew - telescope - fine control Always ensure adequate vertical clearance between the highest point of the platform and any obstruction when driving or elevating/slewing the platform
Uneven ground, steps, trenches etc.	Manoeuvring and setting up the MEWP on uneven ground, steps, open trenches and objects on the ground can cause substantial platform movements at height that may trap people against overhead obstructions that are close to the platform	Provide and maintain ground in a condition suitable for the MEWP to operate on Do not raise the platform: - on soft ground, - adjacent to steps - over voids or service ducts and

		use spreaders as necessary
Leaning over or against the control panel while operating the MEWP	Leaning over the platform guardrails or control panel to view the MEWP base, wheels or tracks while manoeuvring distracts the operator's view of adjacent obstructions and can encourage the operator to squeeze past overhead objects	Leaning over guard rails to view the MEWP base, wheels or tracks while manoeuvring the MEWP and not looking for adjacent obstructions or squeezing past overhead objects are bad practices that should be prohibited.
Losing control of the platform controls	Trapping of the operator against the platform controls while the MEWP is travelling prevents the operator from controlling MEWP movements and increases the likelihood of serious injury in a trapping incident	<p>Do not lean over the platform controls while moving.</p> <p>Avoid distractions, e.g. use of mobile phone, while travelling or moving the platform.</p> <p>Don't put objects on the platform control panel that could move and activate the controls.</p> <p>Do not place materials on the guard rails that could move and distract the operator.</p>
Operating a boom type MEWP which is slewed at nominally 90 degrees to the MEWP forward and reverse travel directions	Operator can suffer disorientation with respect to the expected direction of movement of the MEWP when operating the platform travel controls	Always check the direction of movement of the MEWP with reference to the direction arrows on the MEWP base and platform controls before activating the control.
Poor/inadequate lighting	Lighting that makes objects adjacent to the platform that are positioned adjacent to and above the top of the platform guard rails difficult to see	Provide adequate background and task lighting where necessary, taking into account weather, time of day, seasonal changes and the work environment. Additional lighting needs careful design.
Pedestrians or other vehicles at ground level	Operator having to lean over the guard rails to view pedestrians or other vehicles at ground level when moving the MEWP	Cordon off the work area to prevent collisions and keep pedestrians at a safe distance
Objects on the ground in the area that the MEWP needs to manoeuvre	Leaning over the guard rails to view objects on the ground distracts the operator from watching out for overhead obstructions while the platform is being raised or the MEWP position manoeuvred	Before using the MEWP remove obstacles, as necessary, from the area in which you will manoeuvre
Operator error when using the MEWP platform controls	Mistakes, rushing to get the job done and lack of concentration of MEWP operator, distractions caused by others or work that the MEWP operator has to carry out	Take your time and don't be rushed unnecessarily

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Appendix 3 : MEWP Categories

Scissor



Mobile Vertical (3a)

Vertical



Static Vertical (1a)

Telescopic Boom



Mobile boom (3b)

Static boom (1b)

Articulated Boom



Pedestrian controlled tracked boom



Static boom (1b)

Trailer mounted boom



Static boom (1b)

Push around vertical



Static Vertical (PAV)

NOTE: MEWP is pedestrian powered while travelling

NOTE: Selection of the MEWP must be done by a competent person

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Appendix 4: MEWP Selection

Requirement	MEWP characteristic	Comment
Use on rough terrain or poor ground conditions	If the MEWP is to be used anywhere other than on prepared level surface or on a level and smooth floor, such as the concrete base or floors of the building under construction (that are strong enough to take the MEWP), then the MEWP should be a rough terrain type.	Non-rough terrain types should not be used on rough terrain.
Use outdoors or indoors (e.g. open walkways and loading areas) where wind or strong draughts could be present	If used in windy or draughty conditions, the MEWP should have and be marked with a specified maximum wind speed in which it can be used.	MEWPs intended only for use indoors are designed for zero wind conditions and should not be used outdoors or in strong draughts.
MEWP platform movement/boom flex should be minimised when the MEWP and its lifting structure are stationary.	The MEWP lifting structure should be sufficiently stiff to avoid excessive platform movements due to boom flexing that could cause trapping accidents while work is being carried out.	This can affect the decision on whether to use a vertical lift, telescopic boom or articulated boom MEWP and the amount of outreach required.
Avoidance of unsafe working practices while working in the work area	It is important to select MEWPs that have sufficient reach and flexibility of platform movements to allow all work positions to be accessed and allow the operators to carry out their necessary work tasks while standing on the platform floor	The variety of platform positions in the work area that are achievable using vertical lift MEWPs and telescopic and articulated booms with and without extension platforms will affect the decision on the type of MEWP required for the work
Separation distances from adjacent objects while accessing and working in the work area at height	Limited size platforms and pedestal, end or top mounted platforms can provide greater separation distances from adjacent objects while working in the work area at height	The physical size of the platform and nature of the mounting structure on some MEWPs can create obstacles to accessing and moving the platform in the work area at height
Separation distances from adjacent objects while raising the platform to access the work area at height	Boom MEWPs with fly jibs can decrease the risk of contracting objects while raising the platform to access the work area at height	Fly jibs allow a greater flexibility of platform positions when raising the platform to access the work area
Fine adjustments of platform position while working at height	Boom MEWPs with, for example, platform rotation features and scissor lifts with	Fine control can reduce the need to change the MEWP position or to use main boom

	extension platforms can provide fine control when adjusting the position of the platform at height	movement controls while working at height
Self-levelling and over-run characteristics	MEWPs can have self-levelling features and different over-run characteristics	Familiarisation is essential for operators and rescuers to understand the operational characteristics of different MEWPs
Completely open control panels with exposed controls	Some MEWPs may have completely open control panels with exposed controls	Exposed controls do not provide protection against the operator being pushed over them.
Preventing platform movements if the operator is pushed over the platform controls	Some MEWPs have a trip device that is fully integrated into the platform and control panel structure, which cuts power if the operator is pushed over the controls.	Trip devices cut out powered platform movements as the operator is pushed over the controls
Protecting platform controls from being activated by objects placed on the platform control panel	Storage trays may be fitted in platforms that are either a part of the platform or control panel structure or supplied as accessories by the manufacturer	Placing objects on the control panel is bad practice. Storage trays provide safe storage areas for tools and other small objects

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1.4.5 Hoists and Hoist Towers

1.4.5.1 Key points

- 1 Such equipment must only be designed (where appropriate), erected and operated by trained and competent persons.
- 2 Partially completed hoists used to move scaffolding during scaffold erection offer special challenges.
- 3 It is vital that the design of the hoist includes how the hoist will be supported or tied into existing or temporary structures.
- 4 Hoists that are designated for the carriage of goods only must not be used for carrying passengers.
- 5 Materials which are unhandled or otherwise loose must not be loaded onto inclined or other types of mobile hoist in such a way that they can fall off.
- 6 Under no circumstances should the safe working load of a hoist be exceeded.
- 7 The safe working load will be displayed on a notice attached to the hoist; this is usually expressed as a number of persons for passenger-carrying hoists.
- 8 Particular safety precautions apply to hoist towers to ensure the safety of passengers (where applicable) and others working nearby.

Note: Section 9, Part 7 of the QCS covers lifting equipment.

1.4.5.2 Introduction

- 1 Hoists of various types are widely used on construction sites. These range from complicated goods and passenger (tower) hoists, mobile hoists and inclined hoists, and still include the humble gin wheel. As pressure increases to become more efficient and reduce manual handling, hoists are an increasingly vital part of many construction operations. The smooth and rapid movement of persons and materials assists in efficient management of projects. Even where other methods of moving materials around site are to be used, for example by a tower crane, it is not unusual to find a hoist used solely to assist the scaffold" erection process.
- 2 The number and type of powered hoists available for hire has increased significantly and their use may require a lifting plan to be drawn up by a competent person. This would need to consider possible exclusion zones under the hoist in the event of the load dropping, safe slinging methods, the appropriate lifting accessories, and so on. These are a different set of risks compared with, for example, loads being carried within the enclosed cage of a goods hoist.
- 3 Risks can arise from a late decision to use a hoist to solve a previously unforeseen problem during the construction phase, for example, if planning to use a hoist attached to a scaffold system that is already in place but which was not originally designed to take the additional loadings. There is a need for careful planning and possibly discussions with the scaffold designer before simply allowing a hoist to be hired and fixed to the scaffold.
- 4 The installation of hoists requires good planning and co-ordination and must be undertaken by competent individuals. All hoists must be supplied and, where appropriate, erected, altered and dismantled by people who are aware of these Regulations and the relevant British and International Standards. Special attention must be given to ground conditions to ensure adequate support for the hoist. The forces imposed on the structure by the hoist, its loads and inclement weather, particularly high winds, must also be taken into account. Hoist operators must be adequately trained, competent and authorised; and should be specifically responsible for ensuring that the hoist is not overloaded or otherwise misused.

- 5 Except for manually operated hoists and any that have an independent power supply, the requirement for a dedicated power supply to the hoist must also be considered. Power requirements may also mean the need for generators, which introduces potential noise and fuel storage and spillage issues.

1.4.5.3 Health and Safety at Work (Construction Sites)

- 1 Contractors must provide and maintain plant and systems of work that are, so far as is reasonably practicable, safe and without risk to health.
- 2 Contractors have a duty to provide their employees with all necessary information, instruction, training and supervision which is necessary to ensure, so far as is reasonably practicable, the health and safety at work of the employees. This applies in respect of all systems of work and all work equipment. In the appropriate circumstances, this duty is also extended to cover subcontracted employees.
- 3 Employees have a duty to take reasonable care of their own health and safety and the health and safety of others who may be affected by what they do.

1.4.5.4 Construction (Design and Management) CDM

- 1 Where a hoist tower has to be attached to an existing structure, the must obtain information on the location and load-bearing capacity of secure anchorage points. Given the complexity, size and loading of many systems, this will mean providing detailed information on the existing structure, which may necessitate the commissioning of specialist reports. These would be passed on to the designers and contractors to form part of the pre-construction information. Hoists impact on designers in two ways:
 - (a) whoever designs the hoist installation must be a competent designer as defined within these Regulations and therefore will assume all of the designer's duties under CDM
 - (b) if the design concept is that the materials movement would be by hoist then it must be feasible to erect one. What will the hoist tie to? Are there additional security aspects that need to be considered? Have the attendant logistics for deliveries been considered, for example, can a road closure be obtained?
- 2 Whoever appoints a contractor to provide a hoist will have to consider their competence. CDM contains details of the type of questions to ask to verify organisational and individual competence.
- 3 When considering the competence of potential contractors, relevant points for consideration would be:
 - (a) to establish how they would check the installation has been designed and installed correctly
 - (b) the extent of the training they provide to users
 - (c) the handover and subsequent inspection arrangements.
- 4 Whilst many site managers are competent to carry out weekly inspections of, for example a simple scaffold hoist, more complex hoists will require additional expertise.

1.4.5.5 The Management of Health and Safety at Work

- 1 These Regulations formalise the need for risk assessments. Each assessment must be made by competent people and must consider all aspects of the work. A significant factor for consideration is where the works will be carried out on occupied premises and where there is the potential for interaction between the construction activities and other people such as the public or the occupier's employees.

1.4.5.6 The Provision and Use of Work Equipment

- 1 all work equipment supplied by the Contractor must be safe and without risk to health when properly used, it must be correct and suitable for the job, and maintained in good working order. In respect of this module, this applies to hoist towers, inclined and other types of mobile hoist, including hired machines and those purchased second-hand.
- 2 Contractors must provide employees with adequate and appropriate training so that they may use the work equipment safely and without risks to their health, and without risk to the health and safety of any other person who may be affected.
- 3 Generally, these Regulations require:
 - (a) work equipment to be suitable for the job
 - (b) proper maintenance of work equipment
 - (c) thorough examination after installation before first use and at further suitable intervals by competent persons
 - (d) proper recording of inspection results
 - (e) its use restricted to specified persons, where necessary
 - (f) adequate information to employees concerning risks
 - (g) suitable and adequate training on the work equipment
 - (h) the guarding of all dangerous parts
 - (i) protection against specific hazards
 - (j) effective controls, stop controls and emergency controls
 - (k) adequate lighting
 - (l) appropriate warnings.

1.4.5.7 Lifting Operations and Lifting Equipment

- 1 By definition, all types of construction hoist are classified as lifting equipment under these Regulations. 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) lifting equipment must be positioned or installed so as to prevent the lifting equipment or the load striking a person
 - (d) the load must be under full and proper control at all times
 - (e) lifting equipment must be equipped with suitable devices to prevent a person falling down a shaft or hoistway
 - (f) lifting equipment and accessories must be clearly marked with their safe working load and other markings if designed for lifting persons
 - (g) every lift must be properly planned by a competent person, properly supervised and carried out safely
 - (h) lifting equipment must be subjected to a programme of inspections and thorough examination as is appropriate.
- 2 Reports of thorough examination must be made and retained, with all defects notified to the Contractor who must take appropriate actions.

1.4.5.8 Work at Height

- 1 The use of any kind of hoist will inevitably involve either persons working at height or loads being raised to height. In almost all cases the erection, dismantling, servicing, loading or unloading of hoists will require that persons work at height.
- 2 The relevant requirements of these Regulations are:
 - (a) Contractors to ensure that work at height is planned, supervised and carried out in a safe manner by competent person
 - (b) work at height is carried out using appropriate work equipment, particularly that which provides collective fall protection
 - (c) suitable and sufficient steps are taken to prevent falling objects which are likely to cause injury to any person
 - (d) where there is a risk of a person being struck by a falling object, steps are taken to prevent unauthorised access into that area.

1.4.5.9 Pre-planning (hoist towers)

- 1 When it has been decided (possibly as early as the tender stage) that a construction (tower) hoist will be required on site, requirements must be quantified with regard to:
 - (a) consideration of the locations for siting the hoist
 - (b) the loads to be carried in terms of weight and whether goods only or passengers are to be carried
 - (c) the likely loading on the structure and whether any enabling work or structural changes are required
 - (d) any constraints in the position where the hoist can be erected and whether other features such as scaffolds must be modified to accommodate the hoist
 - (e) the loading on the hoist's foundations
- 2 At an appropriate point both the user of the hoist, for example the Contractor, and the supplier of the hoist should each assign an 'appointed person' who must liaise with each other to ensure that all aspects of the hoist selection, delivery, erection and use are carried out safely. The user's appointed person may need to rely upon the experience and competence of the supplier's appointed person in order to fulfil their responsibilities.
- 3 The detailed requirements of these roles, both of which require specific training and previous relevant experience, are considered to be outside the scope of this document. If necessary, readers should refer to BS 7212:2006.
- 4 A full and detailed risk assessment should be carried out before a hoist is positioned. A method statement can then be developed, which must then be agreed with the user.

1.4.5.10 Site survey

- 5 Prior to delivery of the hoist it will be necessary for both appointed persons to visit the site to establish the practicalities of installing it. During the site survey the supplier's appointed person will determine the appropriate type of hoist required, based upon criteria and information on the intended usage of hoist provided by the user's appointed person.
- 6 The findings of the survey will determine the optimum position for the hoist, based upon such factors as:
 - (a) co-location with materials storage areas
 - (b) avoidance of hazardous features such as overhead cables

- (c) the need for safe access at all levels
 - (d) safe access to the cage or platform at ground level
 - (e) the need for foundations and drainage.
- 7 In selecting the most appropriate hoist, the supplier's appointed person will have to take into account such factors as:
- (a) the space constraints of the area
 - (b) access implications relating to the size and weight of the hoist components
 - (c) ground conditions
 - (d) the proximity of site features such overhead power lines, railway tracks, adjacent public thoroughfares etc.
 - (e) other work that will take place whilst the hoist is in place and how the site might change during this period
 - (f) foreseeable extremes in weather conditions.

1.4.5.11 Erecting hoists

- 1 Hoists which rest on the ground must only be erected on a firm base, adequately supported and secured. All materials supporting the hoist must be strong enough to support the weight of the completed hoist structure and its maximum load, and be free from defects.
- 2 The erection of the hoist must be carried out in accordance with a method statement that has been discussed and approved by the user, as the proposed method and timing may impact upon other site activities.
- 3 In many ways, this is the most dangerous part of the work. Anyone not directly involved in erecting the hoist should keep clear of the area.
- 4 However, planning how the hoist will be erected and deciding 'who is responsible for what' is key to implementing a safe system of work. This is particularly important where the hoist will be built in conjunction with the erection of a scaffold. It is essential that the erection, and later modification and dismantling, of hoists are properly planned, adequately supervised and carried out in a safe manner by competent persons.
- 5 Where the hoist is attached to and supported by a scaffold, the scaffold must be designed to take account of the imposed loadings. This becomes more important where the use of a larger capacity hoist is being considered. These can lift weights of 1000 kg to heights of up to 60 m and can obviously exert significant loading on the hoist anchorages and scaffold ties.

1.4.5.12 Use of part-erected hoists

- 1 It is common practice for scaffolders to build three or four lifts of scaffold, raising the components by hand, followed by the hoist company erecting the hoist to the height of the scaffold. Further erection of the part-completed hoist is co-ordinated with the scaffold contractors so that it can be used for hoisting scaffold components, as it follows the scaffold up. In such circumstances, normal safe working practices may not be practical. For example, the rules regarding the interlocking of landing gates cannot be applied when some of the gates have not been installed. Detailed guidance is available and it is strongly recommended that anyone faced with this situation on their site obtains and reads it. The guidance is published jointly by the UK National Access and Scaffolding Federation.

1.4.5.13 Safety of hoistways, platforms and cages

- 1 Where necessary to prevent injury, hoistways and/or the hoisting machinery must be

segregated by a substantial enclosure at ground level. Suitable barriers must be installed at all other access points, over the full height of travel, and wherever persons could be struck by any moving part, to prevent injury and/or falls.

- 2 Consideration must be given to the area around the base of the hoist with regard to loading and unloading materials, and whether a ramp or pit is required to facilitate access to the platform.
- 3 The area between the cage or platform and the host structure (the threshold) must be suitably protected to prevent any person or material falling through the gap at each landing.

1.4.5.14 Landings

- 1 Where access to a hoist tower is required at several levels, consideration must be given to the space requirements at each landing with regard to loading and unloading the hoist. It is essential that each landing and threshold (the area between the platform and landing) can withstand the loads that will be imposed, with particular emphasis on items such as pallet trucks which can impose significant point-loading.
- 2 The mechanical or electrical features of the hoist should ensure that:
 - (a) the gates at any landing point cannot be opened unless the cage or platform is at that landing point
 - (b) the cage or platform cannot be set in motion unless all of the landing gates are closed and latched.

1.4.5.15 Winches

- 1 Winches for hoists must be constructed so that a brake is applied when the control lever or switch is not held in the operating position (the dead-man's handle concept), or if the power fails.

1.4.5.16 Handover

- 1 Once erected, the hoist will be subjected to a thorough examination, after which the supplier's appointed person should arrange to formally hand over the hoist to the user's appointed person.
- 2 The user's appointed person should arrange for all trained operators to be present at the handover of the hoist to receive:
 - (a) familiarisation training on the use of the hoist in normal operations
 - (b) instruction on what to do in emergency situations
 - (c) instruction on how to carry out the daily pre-use inspections and weekly inspections.
- 3 A handover report, containing details of the instruction given, should be passed to the user's appointed person.

1.4.5.17 Operation of hoists

- 1 It is essential that only operators who have been trained in the use of the hoist are allowed to operate it. The operator should:
 - (a) know the rated load of the hoist
 - (b) be able to accurately assess the weight and distribution of any load brought on to the hoist, and therefore identify if it is overloaded
 - (c) have access to accurate wind-speed figures and be aware of any limitations placed on

- the hoist
- (d) be able to lower the hoist to the next landing in the event of a power failure (passenger carrying hoists only)
- (e) carry out daily pre-use checks and weekly inspections, and take the appropriate follow-up action as necessary. On some complex hoists, it will be necessary for the weekly inspection will be carried out by an employee of the hoist company.
- 2 Each hoist should only be capable of being operated from one position at any one time. Where the operator is not carried on the platform or cage, they must have a clear view at all levels from the operating position or, if they have not, arrangements must be made for signals to be given to them at each level.
- 3 Whatever the system of signalling used, it must be distinct and clear to the person being signalled.
- 4 It is reasonable to expect that the hoist operator and the person(s) giving signals are at least 18 years of age. Irrespective of their age, hoist operators must be trained and competent unless under constant supervision by a competent person, for the purpose of training.

1.4.5.18 Safety notices

- 1 The platform of a goods hoist must carry a notice stating:
- (a) the safe working load
- (b) that passengers must not ride on the hoist.
- 2 Cages for passenger hoists must carry a notice stating:
- (a) the safe working load
- (b) the maximum number of passengers that can be carried

1.4.5.19 Carriage of persons in hoists

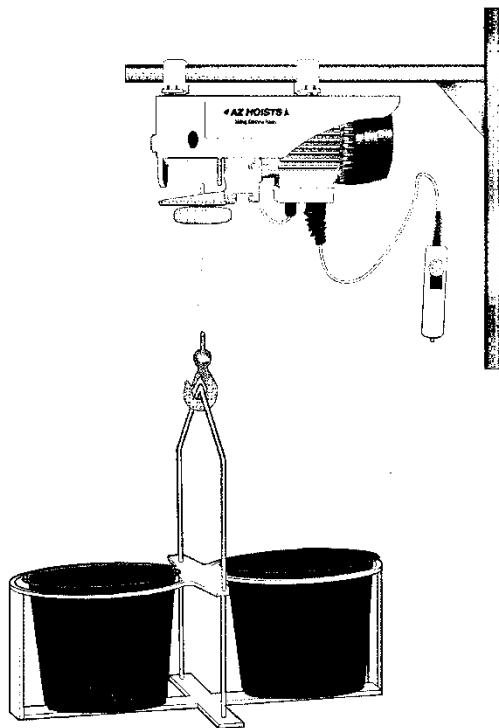
- 1 No person should be carried by a hoist, unless it is a designated passenger lift and it is provided with:
- (a) gates that shut to prevent persons falling out or being trapped between the cage and any other part
- (b) an efficient interlocking device which ensures that gates can only be operated when the cage is at the landing place, and that the cage cannot be moved until the gate is closed
- (c) an efficient automatic overrun device to ensure the cage will come to rest at its lowest point of travel.
- 2 The construction of the cage must be such as to protect passengers from falling objects.
- 3 No person should be allowed to travel in a hoist that is designated a 'goods only hoist'.

1.4.5.20 Security of loads

- 1 All loads must be secured to prevent any part slipping and falling.
- 2 Loose materials, for example, bricks and slates, must be lifted in a properly designed box, cage or other container. If loose materials are carried on the platform of a hoist, side boards must be fitted or other precautions taken to prevent anything falling. Wheelbarrows must be prevented from moving and must not be overfilled.
- 3 If hiring a powered scaffold hoist, consideration must be given as to how loads will be slung.

Hoisting a wheelbarrow full of render using fabric slings is not likely to be considered as an acceptable or safe solution. Some of these now have a lifting capacity of 1000 kg and are far removed from simple powered gin wheels. The use of the proper lifting accessories, which can be hired-in with the hoist, is strongly recommended.

- 4 The slinging of loads may become an issue and whilst the suppliers may call the equipment a hoist, some are more akin to cranes, and users may, depending upon the nature of the load, need to be trained in safe slinging techniques.



Bucket-hoisting attachment

1.4.5.21 Inspection and thorough examination of hoists

Inspection

- 1 These Regulations recommend that construction hoists are subjected to the following regime of checks and inspections, by a competent person who has been trained to the appropriate level.
 - (a) Daily pre-use checks, carried out by a person who has been trained to do it. This will often be the hoist operator who has been trained by the hire company.
 - (b) A more thorough weekly inspection, which, depending upon the complexity of the hoist, may be carried out by the trained hoist operator. A greater degree of competence is required than for carrying out daily checks.
- 2 In either case, any defect discovered should be reported to the user of the hoist and, where necessary, the hoist put out of use until rectified.
- 3 In addition, passenger or goods hoists must be tested each time:
 - (a) the height of the hoistway is altered or
 - (b) gates or ties are added or removed to check for safe operation of the hoist.
- 4 Hoists which are not in regular use may need a special programme of checks, carried out by

a competent person.

Thorough examination

- 5 All hoists must be thoroughly examined by a competent person:
 - (a) before first use on site
 - (b) after substantial alteration, modification or repair
 - (c) after any exceptional circumstance, such as accidental overloading, and
 - (d) at least every six months if used for carrying passengers, or
 - (e) at least every 12 months if used for carrying goods.
- 6 Accessories for lifting must be thoroughly examined at least every six months.
- 7 If, as a result of any thorough examination, a risk of imminent personal injury is identified, a copy of the report must be sent without delay to the Qatar Enforcing Authority.
- 8 **Note:** Where manufacturers recommend inspection at different intervals to the statutory periods, such recommendations should be followed and records kept.

1.4.5.22 Keeping of reports, records, etc.

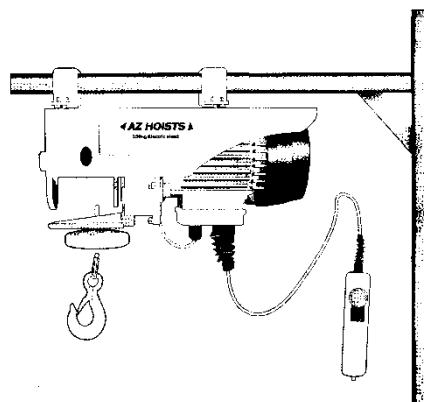
- 1 all testing, inspections and examinations must be carried out by a competent person, and records kept by ways or means best suited to the needs of the Contractor concerned.
- 2 This enables the keeping of records in an electronic format provided that:
 - (a) the correct information is kept as is required by these Regulations
 - (b) it is secure against loss or unauthorised interference
 - (c) it is capable of being provided as a printed copy
 - (d) it is authenticated by a competent person.
- 3 The reports or copies would normally be stored at the premises where the lifting equipment, in this case a hoist or hoists, is being used. Where this is not possible due to space constraints or for security reasons, then reports can be stored elsewhere, such as on a computer, provided that they are readily accessible.

1.4.5.23 Mobile hoists

- 1 Mobile hoists and conveyors are now commonly used throughout the construction industry. They can be easily transported to the site, are quickly erected and require little operating space. They may be fitted with buckets, skips, platforms or cages.
- 2 Different models allow for basic height variations of between 8 metres and 30 metres, although much greater heights can be reached with extensions. Load capacity varies with the model but lifting capacity of 500 kg is not untypical.

1.4.5.24 Scaffold cranes or barrow hoists

- 1 These are lifting appliances within the meaning of these Regulations
- 2 Care must be taken to see that they are not overloaded and are only attached to scaffolds in strict accordance with the manufacturer's recommendations and the scaffold design.



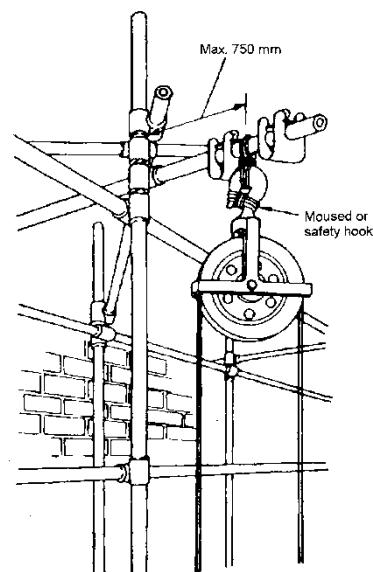
Scaffold hoist

1.4.5.25 Inclined hoists

- 1 These are lifting equipment within the meaning of these Regulations. They are particularly useful for trades such as bricklaying and traditional roofing, and indeed on a larger project they have the potential to eliminate a significant amount of manual handling.
- 2 Inclined hoists are also known as roof tile or brick carriers. New developments include telescopic and slewing functions. Load capacities go up to 200 kg and lateral extensions may be up to 35 metres.
- 3 Inclined hoists are specifically designed for use at angles between 10° and 85°, and they may also incorporate a hinged section to allow the hoist to follow the pitch of a roof.
- 4 They also provide flexible solutions to the problems of removing demolition waste in refurbishment situations. As they are in effect a conveyor belt system, care needs to be taken to ensure that the guards to the rollers are in place to ensure that fingers and/or clothing can not be dragged in. These are so called 'in running nips' and particularly where the motor driving the hoist is powerful the potential for serious injury is significant.

1.4.5.26 Gin wheels

- 1 In many cases provision has to be made to raise tools and light materials manually with a rope and gin wheel or single block. Whilst these are still in common use, modern variants are available, which incorporate an automatic locking mechanism to prevent the load from going into free-fall if the hoisting rope is accidentally released.
- 2 The following provisions and requirements apply to gin wheels connected to a scaffold:
 - (a) poles and hooks should be strong enough to take the load which is to be lifted and be properly secured to prevent movement
 - (b) all ropes should comply with the relevant British or International Standard and fit the wheel correctly. They should be marked with a tag confirming their safe working load
 - (c) preferably, the gin wheel should be suspended from a ring-type fitting passed over the end of the supporting tube and secured against lateral movement by scaffold fittings. If using a hook type, it should be properly lashed and moused (see diagram opposite)
 - (d) any joints in standards should be made with sleeve couplers



Gin wheel

- (e) gin wheels should be suspended not more than 750 mm from the outer support
- (f) hooks used for supporting materials should be safety hooks and spliced into the rope
- (g) the maximum loading should be no more than 50 kg at 750 mm from the outer support.

Inspection and thorough examination

- 3 Whilst of simple construction, gin wheels are categorised as lifting equipment so must be thoroughly examined before use and then at least every 12 months, with a test certificate issued.
- 4 Similarly, the lifting accessories used -such as the rope, hook and shackles -must be thoroughly examined before use and then at least every six months.
- 5 Given the scope for the harsh treatment of this type of equipment, all parts of a gin wheel assembly should be thoroughly examined at least every six months.
- 6 The extent of any thorough examination should reflect the risks that would arise from its failure.
- 7 Where scaffolds are not available, other suitable anchorages must be provided if necessary by using counterweights.
- 8 If the appliance to be attached is a gin wheel, a safety factor of not less than three must be allowed when calculating the weight of the counterweight.
- 9 If the load to be lifted is G (in kilograms), twice G must be allowed because of the downward pull on the tail rope when raising the load; to this 0.5 G is added for friction.
- 10 To calculate the counterweight required, the following formula should be used:

$$W = \frac{3(2.5 \times G \times O)}{T}$$

Where:

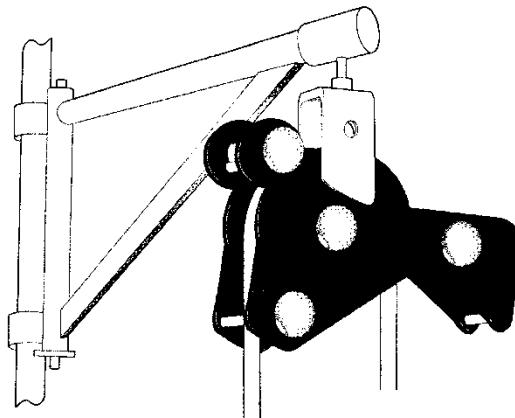
W = Counterweight

T = Tail length (metres)

G = Greatest load to be lifted

O = Overhang (metres)

Reference EN 1261, EN 698, EN 699, EN 700 and EN 701



Secure hand-operated hoist

Construction Site Safety

1.4.5 Appendix 1

Hoist towers safety checklist

Pre-planning

- 1 Have design calculations been obtained to ensure that the host structure can withstand the loads?
- 2 Have the risks associated with having the hoist delivered, erected, used, modified and dismantled been assessed?
- 3 Have relevant other parties been informed of how these activities will affect the work that they have to do?
- 4 Has a method statement been agreed between the hoist company and the user?
- 5 Have the hoist company and the user each selected an 'appointed person'?
- 6 Has there been sufficient liaison between both appointed persons?
- 7 Have arrangements been made for the installation and testing of an adequate and safe electrical power supply?
- 8 If the hoist is not electric, have arrangements been made for the safe storage and decanting of petrol?
- 9 Is a foundation necessary and if so:
 - (a) is a design necessary?
 - (b) is the extent of enabling work known?
 - (c) must arrangements be made for drainage?

Protection and access

- 1 Is the hoistway and any moving parts of its machinery protected by an enclosure?
- 2 Is the hoist tower completely enclosed on all four sides with wire mesh (except any landing)?
- 3 Have appropriate measures to taken to ensure safe access to the cage or platform at ground level?
- 4 Is it not possible to set the hoist in motion whilst any gate at ground level or at any landing is open?
- 5 Can the gates at any landing point only be opened if the cage is at that landing point?
- 6 Is any gap between the platform and tower (threshold) closely boarded?
- 7 Are landing stages kept free of plant or materials?
- 8 Is the hoist fitted with an overrun device at its highest point?
- 9 Is the hoist fitted with an efficient device capable of supporting the platform and load in the event of a failure of ropes or lifting gear?

Loadings

- 1 Are loadings placed on a hoist tower as recommended by the manufacturer?
- 2 Are all loads evenly distributed?
- 3 Are loads prevented from displacement?
- 4 Are all wheelbarrows chocked?
- 5 Is a safe working load notice displayed on the platform or cage and can it be clearly seen at all levels?
- 6 Is the safe working load strictly complied with?

7 Is the carriage of passengers on goods only hoists clearly prohibited and this communicated by appropriate signs?

8 Are special precautions put in place when the load will overhang the cage or platform?

Operation

1 Is it clearly understood that the hoist must not be operated from inside the hoist enclosure?

2 Are the hoist controls so arranged that the hoist can only be operated from one position at any one time?

3 Is the operator's position safe and adequately guarded with hand-rails and toe-boards?

4 Is the operator provided with a clear view of the platform at all times?

5 Are all operators trained, competent, and not under 18 years of age (unless under constant supervision of a competent person)?

6 Are all signals connected with the operation of the hoist clear and distinct?

7 Is adequate lighting provided at all loading places?

Testing and thorough examination

Hoist

1 All hoists should be tested and thoroughly examined before use and after any substantial alteration or repair.

2 All material (goods) hoists should have been subjected to a thorough examination within the preceding 12 months.

3 It is good safety practice for all hoists to be inspected weekly by a competent person.

Winch

1 All material (goods) hoist winches must be thoroughly examined every 12 months, or in accordance with an examination scheme of lesser intervals.

2 All hoist winches should be inspected weekly by a competent person.

3 All wire ropes used in conjunction with a material hoist winch must be thoroughly inspected every 12 months, or in accordance with an examination scheme of lesser intervals.

Major defects

1 Any report relating to a thorough examination of a hoist showing that there is a defect involving an existing or imminent risk of serious personal injury must be sent to the Qatar Enforcing Authority.

2 Any such report must also be given immediately to the Contractor. The hoist must not be used before the defect is rectified.

Recording requirements

Tests and examinations

1 Tests and examinations must be recorded before first use, after re-erection, alteration or repair and following alteration in height of travel.

2 The results of thorough examinations carried out before first use must be recorded in whatever manner the company requires and that record must be available for inspection.

3 It is good practice to ensure that a weekly inspection is carried out and recorded in whatever manner the company requires and kept available for inspection.

Construction Site Safety

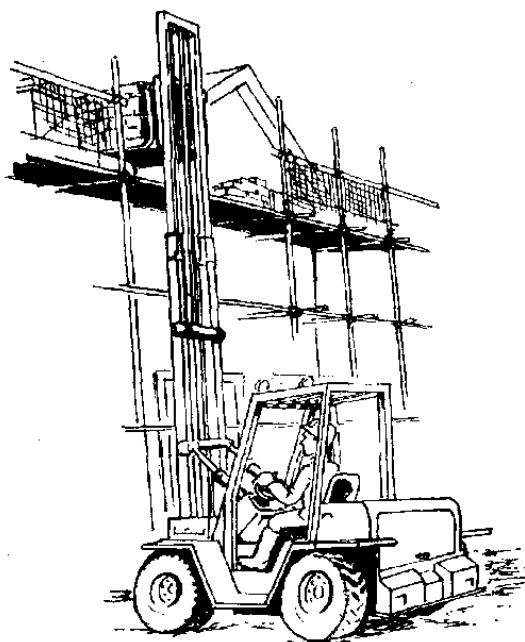
1.4.6 Plant and Work Equipment

1.4.6.1 Key points

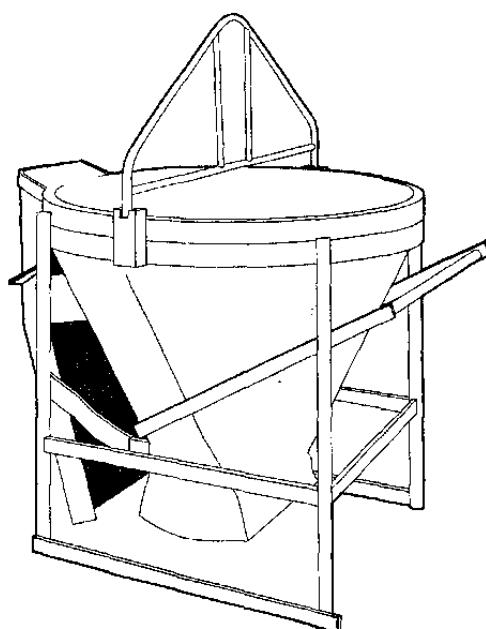
- 1 The term 'work equipment' is self-explanatory and very wide ranging; it refers to any item of equipment being 'used' to carry out work.
- 2 The word 'used' means any activity involving the work equipment, including: starting, stopping, repairing, modifying, maintaining, servicing or repairing.
- 3 Examples are an excavator, a hammer, a cement mixer and a hydraulic trench-support system.
- 4 Broadly speaking, the effort necessary to comply will depend upon the complexity of the equipment and its potential to cause harm; for example, a trowel will not require the same level of inspection as an electric goods hoist.
- 5 These Regulations also require anyone who uses an item of work equipment to be trained and competent to do so.
- 6 The effort and time needed to achieve the required level of competence will depend upon the complexity of the equipment and its potential to cause harm.
- 7 Work equipment must be inspected as necessary to ensure that it can continue to be used safely.
- 8 Certain work equipment must also be subjected to a schedule of thorough examinations.

1.4.6.2 Introduction

- 1 It is all referred to as 'work equipment' and includes all:
 - (a) toolbox tools, such as hammers and screwdrivers
 - (b) powered tools, including electric and pneumatic (such as hand drills and circular saws)
 - (c) testing and laboratory equipment, such as cube crushers
 - (d) complex structures and machines made up of other components and equipment are also covered, such as scaffolds.
- 2 Some types of powered hand tools, such as engine-powered cutting-off machines and chainsaws, have the potential to cause severe personal injury unless they are used by trained and competent persons in appropriate circumstances.
- 3 Another type of equipment commonly used in the construction industry that has the potential to cause harm if not properly used is mechanical equipment that operates through the application of leverage or torque. This includes jacks, winches and various cutting and bending tools that incorporate manually operated mechanisms.
- 4 Tools and equipment operated by air also cause significant injuries upon failure of the tools or the connections to the compressor.
- 5 All items of plant are classified as work equipment, including static and mobile equipment, pedestrian-controlled equipment, ride-on equipment and remote-controlled equipment.
- 6 Plant used in construction operations on site includes static plant used in the actual construction work, such as mixers and pumps.



Mobile plant



Static plant

1.4.6.3 Health and Safety at Work (Construction Sites)

- 1 all Contractors must provide safe plant and machinery for use at work. The self-employed worker is given similar duties regarding plant and machinery that they provide for their own use.
- 2 Additionally, these Regulations place a duty on Contractors to provide the information, instruction, training and supervision necessary for persons to be able to operate the plant and machinery safely. Employees, in turn, are required to use the equipment safely, in accordance with the training which they have been given.
- 3 A general duty is placed on any person who manufactures, designs, imports or supplies any article, materials or substance for use at work to ensure, so far as is reasonably practicable, that articles and substances are, by design and construction, safe and without risks to health when being used, set, cleaned or maintained by persons at work.
- 4 In addition, duties are placed on employees not to recklessly interfere or misuse anything provided for health and safety purposes. This could include the act of removing a guard or defeating a safety cut out switch.

1.4.6.4 The Management of Health and Safety at Work

- 1 every Contractor is required to make a suitable and sufficient assessment of every work activity to identify any hazard that employees or other people might encounter as a result of the work being carried out.
- 2 Once those hazards have been identified, it is then the Contractor's duty to put control measures into place, to either eliminate the hazards or, where this is not possible, reduce the risk of injury or ill health resulting from those hazards, as far as is reasonably practicable.
- 3 The Contractor must, through the risk assessment process, establish any risks to the health and safety of any employee (or anyone else) arising out of the use of any item of work equipment. They must take the necessary steps to ensure that the equipment can be used safely.
- 4 This will involve:
 - (a) providing employees with comprehensible and relevant information on any risks that exist with regard to the use of work equipment
 - (b) informing employees of any control measures that are in place to reduce those risks
 - (c) taking into account the capabilities of employees who are required to use work equipment
 - (d) providing adequate (health and safety) training in the use of potentially hazardous work equipment.
- 5 Employees, for their part, have a duty under these Regulations to tell their Contractor of any work situation that presents a risk to the health and safety of themselves or of any other person who may be affected.

1.4.6.5 Provision and Use of Work Equipment

- 1 These Regulations are fundamental to the health and safety aspects of how work equipment is selected, used and maintained.
- 2 These Regulations place legal duties on Contractors with regard to work equipment that they provide to employees and the self-employed for their own use, and those who otherwise have control of work equipment, such as those who hire in equipment.
- 3 These duties are to:
 - (a) only provide work equipment that is suitable for the job
 - (b) ensure that work equipment is maintained in an efficient state and kept in good working order by persons who are trained to do so
 - (c) ensure that maintenance logs are kept up to date where they exist
 - (d) ensure that where the safety of work equipment depends on the way it is installed, it is inspected as necessary and records of inspections made
 - (e) ensure that equipment subject to deterioration through exposed conditions, which could give rise to a dangerous situation, is maintained and inspected at appropriate intervals to allow remedy, or after each exceptional circumstance
 - (f) ensure that where the use of work equipment involves a specific risk to the health and safety of employees, the use, maintenance, repair, modification and service of the equipment is restricted to competent and specified workers
 - (g) provide employees with information, instruction and training in the use of work equipment, where necessary for their health and safety, including abnormal situations
 - (h) ensure that work equipment has been designed and constructed in compliance with any European Safety or International Safety Directives?
 - (i) ensure that dangerous parts of machinery are adequately guarded, where practical, by fixed guards that cannot be defeated or removed
 - (j) take measures to protect the health and safety of any person from exposure to:
 - (i) anything falling from or being ejected from any item of work equipment
 - (ii) rupture or disintegration of any parts of work equipment
 - (iii) work equipment overheating or catching fire
 - (iv) the unintended discharge of any article, dust or gas which is produced by or stored in the work equipment
 - (v) the unintended explosion of any item of work equipment or any article or substance produced, used or stored in it
 - (k) ensure that users of work equipment are adequately protected from any part of the work equipment that exposes them to very high or low temperatures
 - (l) ensure that all work equipment has adequate controls, emergency controls and, where necessary, a control system to enable it to be used safely
 - (m) ensure that where stop controls are fitted, they bring the machine to a safe condition. This may include bringing the machine to a complete stop and/or isolating it from energy sources
 - (n) ensure that where stop controls are provided, they are easily accessible and activated
 - (o) ensure that all controls for use are easily identifiable and that where reasonably practicable, the operator is in a position of safety when operating them
 - (p) ensure that failure of any equipment leads to a safe situation and that the function of stop controls are not affected, if reasonably practicable

- (q) ensure that each item of work equipment can be effectively isolated from all sources of energy
 - (r) ensure that work equipment is stable in use, if necessary by clamping
 - (s) ensure that suitable and sufficient levels of light are available for the safe operation of work equipment
 - (t) ensure where reasonably practicable, that servicing, maintaining and cleaning of equipment is carried out whilst it is shut down or with appropriate measures in place to safeguard employees
 - (u) ensure, where appropriate, that warnings are incorporated. These can range from signs and notices, to alarms and beacons.
- 4 Specific conditions apply to mobile and self-propelled work equipment that has the potential to cause injury to employees and third parties. These require the Contractor to:
- (a) ensure that no one is carried on mobile equipment unless provision is made for carrying passengers and provisions for their safety are made
 - (b) ensure where there is a risk of an operator being injured from plant turning over, that sufficient steps are taken to prevent the machine from overturning or the provision of a roll over protection system (ROPS) (see below for further detail)
 - (c) ensure that equipment has facilities to prevent unauthorised start-up, has appropriate controls, anti-collision measures (rail-mounted equipment) and, if required, has suitable lighting and adequate fire-fighting facilities
 - (d) ensure that the operator of such plant and equipment has suitable vision in all directions, with visibility aids if direct vision is blocked, so far as reasonably practicable
 - (e) ensure that remote controlled equipment stops automatically upon leaving its control range and incorporates anti crush and impact devices that are appropriate
 - (f) ensure that measures are taken to prevent drive shaft seizures and systems for safeguarding drive shafts.

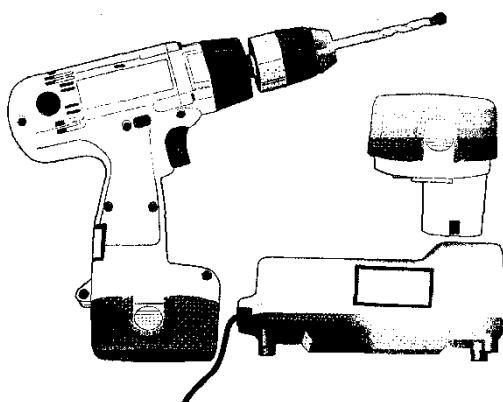
1.4.6.6 Lifting Operations and Lifting Equipment

- 1 These Regulations apply to all lifting equipment and accessories, such as cranes, shackles, hoists and slings that are used to carry out mechanical lifting operations.

1.4.6.7 General requirements applicable to all work equipment

Suitability for purpose

- 1 All equipment that is used to carry out a work activity must be suitable for the work to be carried out.



2 Improvisation is dangerous and can lead to serious accidents occurring. A hand-held circular saw being used instead of a router to cut grooves or rebates in timber, or a dumper being used to transport persons, both have the potential to create dangerous situations.

3 All work equipment must be regularly maintained in an efficient state, in efficient working order and in good repair (as described in the following section).

Maintenance

4 To be able to work as safely as possible, it is essential that work equipment is regularly maintained, again by a competent person. In practice, maintenance is usually divided into three types of activity:

- (a) daily basic maintenance can be as simple as regularly checking the oil and water levels of a petrol-driven cement mixer, and is sometimes referred to as 'pre-use checks'
- (b) periodic maintenance of equipment involves more detailed checks than carried out under 'daily maintenance' and is usually carried out by a fitter as part of a pre-planned programme of regular inspections, for example the replacement of engine oil or hydraulic oil filters
- (c) detailed inspection and servicing, which may involve a degree of dismantling of the equipment in a workshop and entail, for example, the measurement of wear of moving parts or the integrity of hydraulic hoses and connections. This type of inspection is carried out at specific intervals according to the manufacturer's instructions and is often based on the 'running hours' of the equipment.

5 In conjunction with manufacturers' guidance, the competent person should draw up a programme of the frequency of maintenance to be applied to work equipment.

6 In drawing up the programme, there will be a need to take certain factors into consideration.

- (a) The type, class and complexity of equipment.
- (b) Some types require weekly maintenance, others less frequent maintenance.
- (c) The frequency that work equipment is used.
- (d) The equipment's potential to cause serious harm. Powered machinery with the potential to cause serious harm, for example a circular saw, will require more regular attention than a hammer.
- (e) The likely deterioration of work equipment when not in use.
- (f) The environment that the equipment is used in.

7 There is no specific requirement to keep a maintenance log for work equipment, but where there is one, it must be kept up to date.



Inspection

- 8 All work equipment must be inspected at suitable intervals and records of inspections made.
- 9 As with maintenance, a competent person must set up an inspection regime, in accordance with legal requirements and manufacturers' guidance. The frequency of inspection is not specified.
- 10 The level of inspection will depend on the complexity of the equipment and vary from a visual inspection to a comprehensive inspection that might include some dismantling and testing.
- 11 A visual check of low risk items before use will suffice for items such as hand tools, to check they are in good order. These inspections are not usually formally recorded inspections. In addition, equipment that poses a high risk, such as some plant, or is used in a high risk environment, such as a confined space, should undergo a visual check every time before use -usually an operator inspection, provided they are competent to do so.
- 12 More complex equipment and equipment used in higher risk areas should also undergo a formal inspection, after which the details of the inspection are recorded.
- 13 Normal practice for most plant is to undergo a weekly formal inspection, in addition to the driver's daily inspection. The frequency of inspections may be adjusted after considering the above factors.

Work at Height

- 14 These Regulations specifically require the inspection of work equipment used for working at height, such as scaffolds, and the recording of those inspections as detailed in these Regulations.

Construction (Design and Management) CDM

- 15 These Regulations require that:
 - (a) excavations which are supported are inspected at specific intervals
 - (b) energy distribution systems are checked as necessary to prevent danger
- 16 both of which will involve the inspection of the associated work equipment.
- 17 Furthermore, these Regulations place duties on those people in charge of sites with regard to the safe use of vehicles on site.

Records of inspection

- 18 These Regulations require that systems must be put in place for recording the results of inspections, Unlike in the past when prescribed registers had to be used, Contractors can produce their own records in paper form or electronically, providing that they can produce hard copy if requested.
- 19 Inspection records should include the following:
 - (a) information on the type and model of the equipment
 - (b) any identification mark or number
 - (c) its normal storage or use location
 - (d) the date that the inspection was carried out
 - (e) the name of the person who carried out the inspection
 - (f) any faults found

- (g) any corrective action which was necessary
 - (h) to whom the faults were reported and details of the action taken
 - (i) the date when repairs or other necessary action were carried out and by whom.
- 20 When hiring equipment, the records and results of the last inspection should be supplied, by the hire company, with the equipment.
- 21 There is no specified format for records of inspection, providing the necessary details are recorded.

Conformity with EU requirements or equivalent standards

- 22 Contractors should ensure that any work equipment that is in use or acquired, either new or second-hand, has a 'CE' or equivalent mark. This indicates that there is a relevant European product directive equipment and that it has been manufactured to known standards.

Training

- 23 Many accidents involving plant and equipment occur because the operator, through lack of training, is not competent. It is therefore essential that persons are adequately trained in the safe and correct use of the type of equipment they are required to operate.
- 24 The level and complexity of the training required should be such that an operative can operate the plant or equipment safely, without risk to themselves or others who may be affected by their actions or omissions. In addition, adequate training should be given to supervisors and managers to allow them to understand the equipment and methods used.

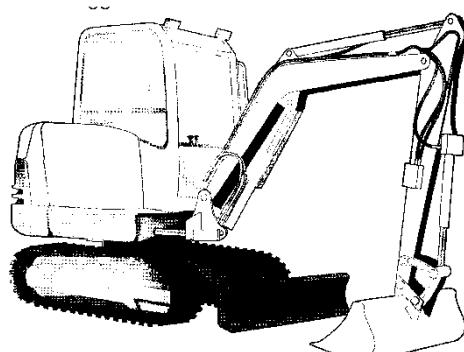
Quick-hitches

- 25 The operatives selected for training should be both physically and mentally able to cope with any situation the use of the item of plant or equipment demands. For example:
- (a) a person with a fear of heights would not be suitable for training as a tower crane driver
 - (b) a person who suffers from claustrophobia would be unsuitable as an operator of a tunnel-boring machine.
 - (c) The intellect of the person to be trained should also be judged, to ensure that they can assimilate the information they will be expected to retain in order to carry out their tasks safely.

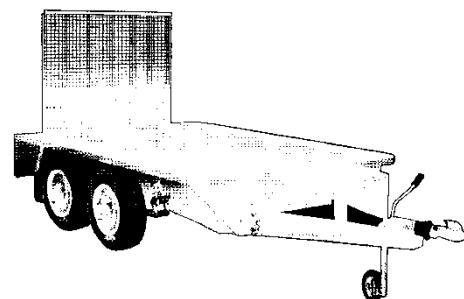
1.4.6.8 Types of plant and equipment -specific requirements and risks

Mobile work equipment

- 1 Mobile work equipment is any work equipment that carries out work while it is travelling, or which travels between different locations where it is used to carry out work. Mobile work equipment may be self-propelled, towed or remotely controlled, and may be fitted with attachments.
- 2 Examples of the types of equipment falling within these definitions include:

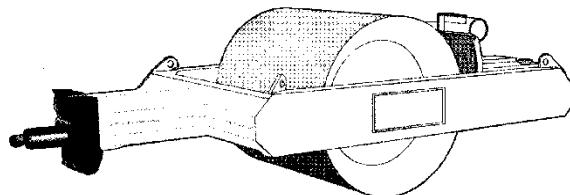


- (a) trucks
- (b) diggers
- (c) loaders
- (d) forklift trucks
- (e) compressors
- (f) site transport
- (g) remote controlled rollers etc.
- (h) trailers.

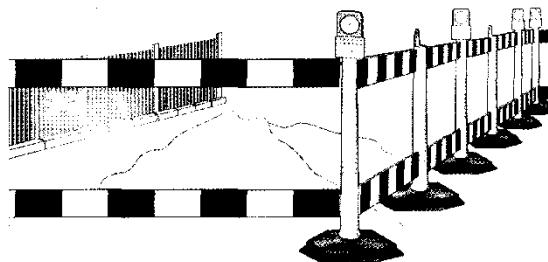


General considerations

- 3 The movement of mobile work equipment, whether over site roads or within specific areas, involves different and continually changing hazards. These have the potential to cause harm, such as:
- (a) persons being struck or run over
 - (b) persons being thrown from moving plant or equipment
 - (c) persons being crushed by moving plant or equipment.



- 4 Practical measures which should be considered to ensure that mobile plant and equipment can be used safely on site are:
- (a) traffic routes should be planned in order to minimise congestion and risk of collision, as well as separating people from moving equipment.
 - (b) these routes should be kept free of obstructions and properly maintained, with access points restricted and clearly marked
 - (c) appropriate speed limits should be introduced
 - (d) one-way traffic systems should be implemented if possible and appropriate parking places should be designated for delivery vehicles and those left temporarily on site
 - (e) the operating area should be clear, as far as possible, on all sides
 - (f) where excavation is taking place, operators must know the location of any overhead power lines, underground cables, sewers, ducts or services before digging operations commence
 - (g) trenches and excavations should be fenced or otherwise guarded



- (h) ground conditions should be stable and sufficiently level for the operations being carried out and the equipment used
 - (i) where equipment fitted with outriggers or stabilisers is used, the load-bearing capacity of the ground should be assessed so that the imposed loads do not exceed this capacity
 - (j) where site vehicles are employed in tipping material into excavations, baulks of timber or other effective blocks should be provided to prevent the vehicle over-running the edge
 - (k) excavations may have to be provided with extra support or shoring to prevent the weight of adjacent vehicles causing a collapse (surcharging).
- 5 Vehicles and plant designed for specific operations must only be used for those operations, and the design limitations and permitted modes of operation specified by the manufacturer must be complied with.
- 6 The overloading or overstressing of plant is particularly dangerous and must be prohibited. Manufacturers' and suppliers' instruction and information manuals should be made available for all who may need them.

Forward-tipping dump trucks

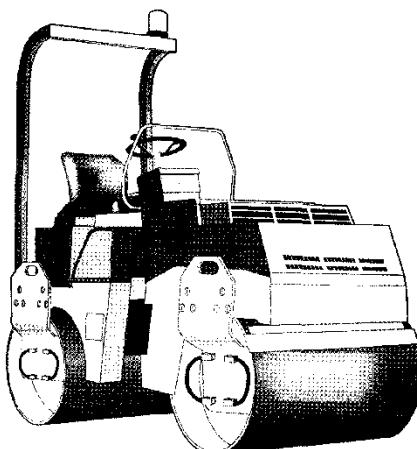
- 7 Amongst mobile plant, forward-tipping site dumper trucks are worthy of special note because they are involved in a disproportionately high number of plant-related accidents. This applies to both rigid-frame and articulated dumpers. The common causes of these accidents are:
- (a) overturning on slopes, rough ground and at the edges of excavations
 - (b) travelling with a high-lift skip in the raised position
 - (c) the driver failing to observe pedestrians who are then run over by the front wheels
 - (d) the driver being thrown from the vehicle whilst travelling over rough ground
 - (e) driver error due to lack of experience and training, including accidental operation of the controls.
- 8 Efforts to reduce dumper accidents must focus on:
- (a) effective site management and control of how dumpers are operated generally
 - (b) selecting the correct machine for the job
 - (c) ensuring that machines are routinely inspected, serviced and withdrawn from use if unsafe
 - (d) ensuring that only trained, competent drivers are allowed to operate dumpers, which includes removing the key when not in use
 - (e) ensuring that site roads are suitable and safe for the use of dumpers.

Material unloading and loading

- 9 Materials that are unloaded or tipped from plant should be deposited in planned locations where they will not cause an obstruction or hazard.
- 10 A signaller should assist the driver during any tipping operation to ensure that it is safe to tip and that there are no other hazards to be encountered during the operation.
- 11 Operatives must not remain on vehicles that are being loaded unless the vehicle is equipped with a reinforced cab or falling object protection system (FOPS).
- 12 Operatives working with plant or vehicles, or on sites where there are regular vehicle movements, should be provided with the appropriate personal protective equipment which should include high visibility clothing.

Roll-over protection systems (ROPS)

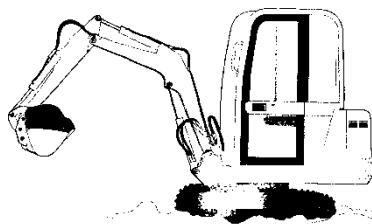
- 13 Where there is the risk of mobile work equipment rolling over, Contractors have a duty to ensure that protective measures, such as reinforced cabs or a roll-cage, are fitted to stop mobile equipment doing anything more than falling onto its side, thereby minimising the risk of a person being crushed. The cabs or roll-cages should give adequate clearance for operatives to escape if the equipment does completely overturn.
- 14 Where there is a risk of an operator being thrown then crushed by equipment rolling over, a suitable restraining system (such as a seat belt) should be fitted.
- 15 This requirement may also apply to equipment fitted with a fully enclosed cab if there is a risk that a person being thrown from their seat could be injured by coming into contact with the inside of the cab's structure.
- 16 Restraining systems must be fixed to a strong anchorage point on the main structure of the equipment.
- 17 In areas of limited access, ROPS may be removed only if a suitable and sufficient risk assessment has been carried out and there is no risk of overturning.

**Roll-over of forklift trucks**

- 18 There is no requirement for forklift trucks fitted with a vertical mast to be provided with specific roll-over protection where the mast acts as an anti-roll device. There is, however, no exemption from forklifts having to be fitted with restraining systems.

Falling object protection system (FOPS)

- 19 Where there is the risk to persons operating mobile work equipment of being struck by falling material, overhead protection or reinforced cabs must be fitted which stop any falling material striking the operator.

**Prevention of unauthorised start-up**

- 20 It must not be possible for self-propelled mobile work equipment to be started by unauthorised persons when the vehicle is parked. Additionally, it must be possible to isolate the drive mechanism. This can be achieved by the removal of ignition keys or starting handles.

Lighting and warnings

- 21 When self-propelled mobile work equipment is used in the dark or in reduced visibility, lights must be fitted and used to enable the work area to be adequately illuminated. In addition, amber flashing beacons that give warning of the presence of the vehicle should be fitted and used. It is required that some types of construction vehicles be fitted with audible reversing warning devices or similar devices, such as CCTV.

Ride-on plant

- 22 Ride-on plant refers to equipment that is operated or used with persons 'riding on' the piece of plant as opposed to riding in it. Some trucks, excavators and planers are among the types of equipment within this category.
- 23 Plant that is not designed to carry passengers should be provided with a notice clearly stating 'No Passengers'.
- 24 People can only be carried if the vehicle has been designed for such a purpose. Passengers and drivers must not be carried unless proper seating, strongly and correctly connected to the main structure of the vehicle, is provided.
- 25 Where passengers are permitted to be carried, additional restraining devices must be provided.
- 26 Where on-board work activities have to be carried out, seating should be provided, if possible, with work platforms fitted with suitable barriers or guard-rails to stop operatives falling from the equipment whilst it is in motion.

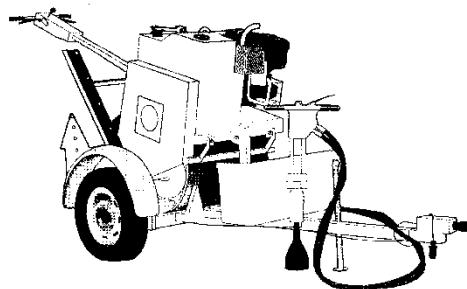
All-round visibility

- 27 To ensure safe operation of plant, a standard is being accepted whereby the operator of the plant or vehicle has all-round vision from the operating position. It is generally accepted that the operator should be able to see, at all times, an object positioned 1 metre above ground level and 1 metre away from the plant through 360° visibility.

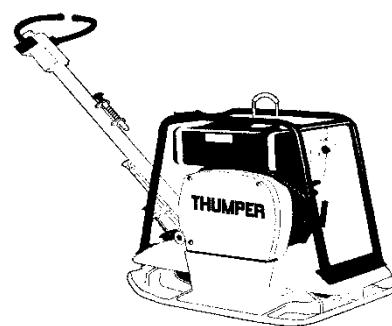
- 28 This can usually be achieved by the use of additional mirrors, convex mirrors or by CCTV.
- 29 Where this is not possible, consideration should be given to providing a competent, qualified signaller working exclusively with the plant operator.
- 30 Contractors meeting the above criteria would be seen to be doing what is reasonably practicable to provide a safe place of work and a safe system of work in respect of that item of plant.
- 31 Every Contractor must ensure that the work equipment is so constructed or adapted as to be suitable for the purpose for which it was provided.
- 32 In selecting the work equipment, every Contractor shall take account of the working conditions and to the risks to the health and safety of persons who are in the vicinity of where the work equipment is to be used.

1.4.6.9 Pedestrian-controlled work equipment

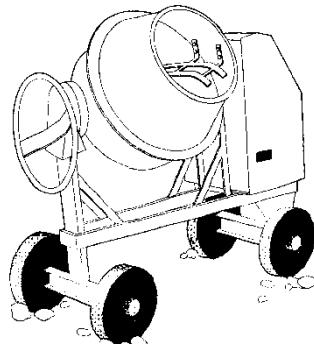
- 1 This type of equipment relies heavily on the experience and competence of the operative for its safe operation. Small pedestrian-operated rollers, vibrating or 'whacker' plates and surface grinders are among the types of equipment within this category.



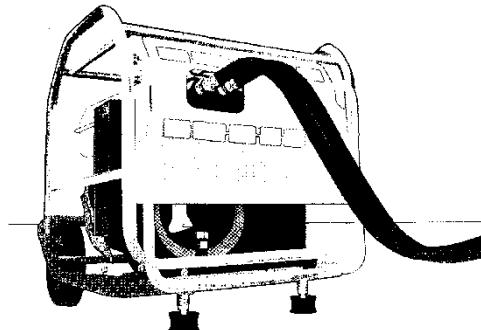
- 2 Common accidents involving pedestrian-controlled equipment occur when operators of small vibrating rollers are crushed between the machine and adjacent obstructions. This is one reason why these Regulations require efficient stop controls to be fitted.
- 3 It is also essential that operators be provided with, and wear, strong protective footwear to prevent their feet from being injured.



1.4.6.10 Static work equipment



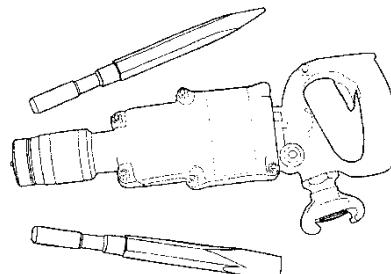
- 1 This type of small plant should be sited on firm, level ground with the brakes applied and wheel chocks in position, as necessary.
- 2 Cement or concrete mixers, compressors and pumps are examples of static equipment.
- 3 Plant should be sited clear of personnel with allowance for safe access by authorised persons.



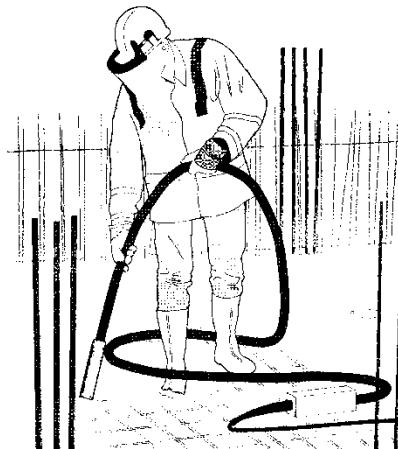
- 4 The correct procedures for starting, operating and shutting down should be correct and strictly complied with.
- 5 All gauges, valves, connections and guards should be checked for tightness and proper attachment as a matter of routine.
- 6 Other points to be considered are:
 - (a) appropriate personal protective equipment must be provided by Contractors and used by operatives
 - (b) access to all dangerous or moving parts of the equipment must be provided with guards which are securely fixed and in position
 - (c) adequate ventilation is essential when using equipment in confined places, with harmful fumes being extracted to the open air
 - (d) any air lines, spray guns or blasting nozzles, used as an accessory to the equipment, must never be pointed towards other persons or at any part of the body
 - (e) hoses, pipes or cables should be kept clear of traffic and pedestrian routes. Simple ramps and barriers can be used to protect cables etc., and to provide safe access
 - (f) air hoses should be fitted with whip-checks at every connection to prevent the hose connections from blowing apart
 - (g) electrical and mechanical plant and equipment, unless specifically designed to eliminate the risk, must be switched off or stopped before adjustments are made and before any accessories are connected or disconnected.

1.4.6.11 Manually operated hand-held plant and mechanical equipment

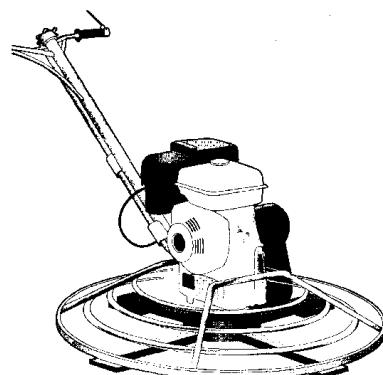
- 1 Selection of the correct equipment for the job in hand is vitally important. Choosing modern equipment that reduces the risk of injury or ill health is fundamental to creating safer working environments.



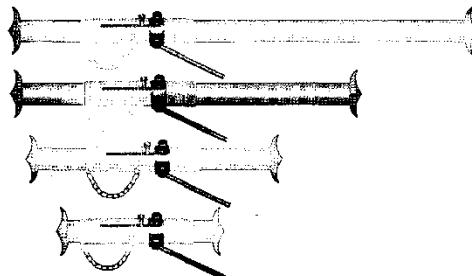
- 2 The environment in which the equipment is used also has a bearing on the safety of the operative. It may be safe to use a hand saw from a pair of builders' steps, but to use the modern electric equivalent from them could have fatal results.



- 3 Hand-held power tools, whether powered electrically, by internal combustion engine, hydraulically, by cartridge or compressed air, are covered by the definition.
- 4 As the use of these types of tool has increased, so has the potential for serious injury. Old type hand-operated smoothing planes could cause nasty cuts if wrongly used, but those injuries bear no comparison with the injuries that could occur when wrongly using their modern electrical equivalent.
- 5 Cutting chases in a wall using an older type cutting disc produces unacceptable amounts of dust. Modern equipment that is fitted with a dust suppression mechanism is safer and much healthier.



- 6 Also included within this category is the type of equipment that requires human effort in its operation, such as jacks, bar-bending machines, pipe-threaders and other machines where the principles of leverage or torque are utilised.



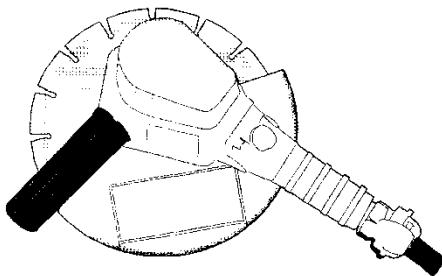
- 7 Many jobs, such as nailing tiling battens on a roof, that traditionally would have been achieved by using a hammer, are now carried out by using nail guns powered by gas canisters. Equipment of this type is open to abuse, which can result in horrific consequences. It is possible to propel a nail in free flight from a nail gun giving it the lethal potential of a firearm.

1.4.6.12 Non-mechanical plant and equipment

- 1 Included in this category are hand tools, ladders scaffolding, etc. Also included are huts and other temporary structures used for welfare accommodation or fuel and materials stores.

Hand tools

- 2 Unfortunately, many persons working in the construction industry do not appreciate that simple hand tools have the potential to cause serious harm.
- 3 In many cases where hand tools are used, persons react when things go wrong, instead of proactively checking to ensure that things do not go wrong in the first place.



- 4 Cold chisels with burried-over mushroom heads can result in a person losing an eye when a burr breaks off during use. A hammer head becoming detached from its shaft can cause a serious injury and not necessarily to the user.
- 5 In both examples, the potential to cause harm can be drastically reduced if a system of regular inspection and maintenance, as required by these Regulations, is in place.

1.4.6.13 Access equipment

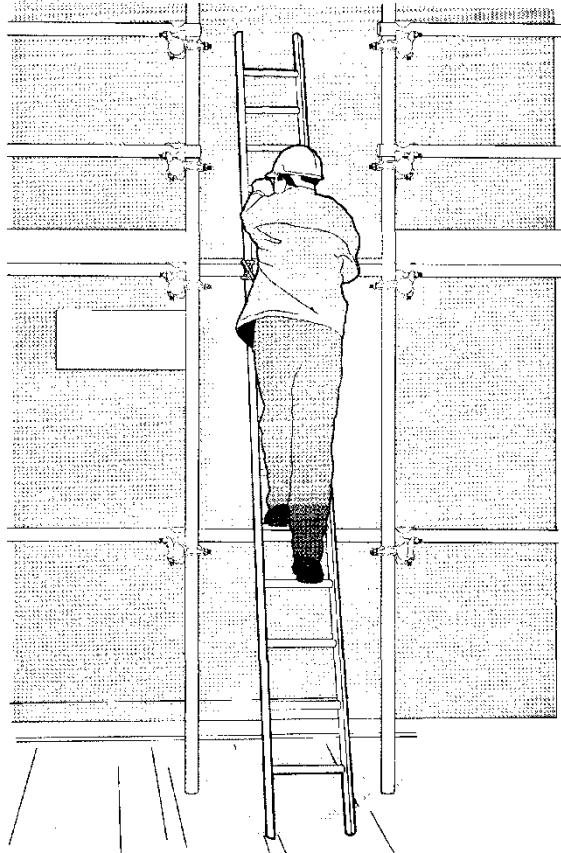
Scaffolds

- 1 Scaffolds, if incorrectly erected or exposed to misuse, can also be the cause of accidents.
- 2 Such equipment must:
- (a) comprise suitable components that have been inspected prior to use

- (b) be regularly inspected every 7 days or after alteration, damage or high winds, the results of the inspection recorded, and proactive maintenance regimes put into place
 - (c) not be interfered with or altered by untrained individuals.
- 3 Many accidents have occurred due to installation of scaffold with damaged equipment such as split boards and bent tubes.

Ladders and other wooden access equipment

- 4 Work equipment made from wood will not last for ever. It will deteriorate with age and use. Regular inspection of the equipment is essential for safety and will prolong its useful life, giving early indication of deterioration. It is commonplace for inspections of ladders and steps to be formally recorded, with each ladder or step being given a specific identifying number.
- 5 A key issue with wooden ladders and steps is that they must not be painted or treated with anything that would hide any faults or defects.
- 6 The regular inspection of wooden builders' steps must include the hinges that connect the support stays and the restraining rope that controls the opening of the steps as well as the condition of the timber.
- 7 Wooden extension ladders have ropes, pulley blocks, and clips that fit over rungs. These are vital to the safe use of these ladders and therefore must again be regularly inspected.
- 8 The simple wooden pole ladder must be checked to ensure that the wire ties the rungs are in place and tight. Rungs must be checked to ensure they are not damaged, still firm and do not twist, and the stiles checked to ensure they are not split.
- 9 Management systems for the training and instruction of operators, and the inspection of equipment, must be in place and complied with.



Construction Site Safety

1.4.6 Appendix 1

Plant and work equipment

Safety checklist

- 1 When was the plant or equipment last checked or tested?
- 2 Are statutory records being kept up to date?
- 3 Is the item of plant or work equipment the most suitable for the job in hand?
- 4 Is a risk assessment necessary to determine the most suitable item of plant or work equipment?
- 5 Have any faults developed through misuse or neglect?
- 6 Have faults or defects been correctly and promptly reported?
- 7 Are those faults reported being remedied promptly and effectively?
- 8 Does all plant or equipment comply with the relevant standards?
- 9 Are spot checks made on the condition of hand tools and other minor items of equipment?
- 10 Is there a procedure for the inspection of and repairing or replacing of such equipment and tools?
- 11 Are drivers and operators trained on specific plant or equipment aware of the hazards that are associated with its operation?
- 12 Is safety training included in any instruction which is given to operatives?
- 13 Is personal protective equipment available and issued to all who need it?
- 14 Have lists of authorised drivers and operators been kept up to date?
- 15 Is equipment issued to and used only by authorised persons?
- 16 What information is available in relation to specific items of plant? Where is it kept and by whom?
- 17 Do checks show that plant is being used safely?
- 18 Do operatives know the requirements of these Regulations and those which have a bearing on their activities, and are they aware of their own responsibilities?
- 19 Are rules observed by site vehicles?
- 20 Has any instance of overloading or over-stressing of plant come to light?
- 21 Are ROPS, FOPS and driver restraint systems fitted if appropriate?
- 22 Does the operator of mobile or self-propelled plant have adequate visibility in all directions and are all visibility aids in good order?
- 23 Are there any signs of the unplanned or dangerous location of any plant?
- 24 Are the locations of supply cables, pipes, services, etc. identified before any plant or other equipment is brought into the vicinity?
- 25 Where appropriate, are communications adequate between:
 - (a) the teams doing different work within the same area?
 - (b) the different shifts using the same plant?
 - (c) the workers engaged in a co-ordinated operation?
- 26 Has all work equipment been identified?
- 27 Have inspection regimes appropriate to the equipment been instigated?
- 28 Are the records of the inspections and tests being kept up to date?

Construction Site Safety

1.4.7 Woodworking Machines

1.4.7.1 Key points

- 1 Woodworking machines are classified as 'work equipment' and must therefore comply with certain legal requirements.
- 2 Many items of woodworking equipment, with their partially exposed blades or cutters, have the potential to cause serious personal injury if they are not properly used and maintained.
- 3 Users of woodworking machinery must be trained on each type of machine that they are required to operate and be judged as competent by their Contractor.
- 4 Hand-held, bench-mounted and free-standing woodworking machines can all be found on sites; all types present particular hazards to the operator and, in some cases, other people.
- 5 The use of woodworking machines also has the potential to cause occupational health problems if appropriate preventative measures are not taken.
- 6 Section 18 of the QCS covers carpentry, joinery and ironmongery.

1.4.7.2 Introduction

- 1 Woodworking machine cutters can inflict very serious injuries and it is essential that these Regulations for guarding them are strictly observed. Neglect or ignorance of these Regulations governing the use of such machinery creates the conditions in which accidents occur.
- 2 Furthermore, the following all have the potential to cause occupational health problems:
 - (a) the use of woodworking machines
 - (b) contact with some hardwoods used
 - (c) contact with the dust produced
- 3 Within these Regulations, particular reference is made to circular saws and planing machines, since these are most commonly in the construction industry.

1.4.7.3 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 any hazard that employees or other people might encounter as a result of the work being carried out.
- 2 When hazards are identified, it is then 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 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 Compliance with these Regulations mainly involves Contractors pro-actively managing:
 - (a) personal injury risks resulting from contact with moving blades and cutters
 - (b) personal injury risks resulting from the maintenance of the machines
 - (c) occupational health risks resulting from the use and maintenance of the machines.
- 5 Employees, for their part, 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 person

who may be affected.

1.4.7.4 Provision and Use of Work Equipment

- 1 These Regulations stipulate the requirements for the safe operation and maintenance of all 'work equipment', which includes woodworking machines.
- 2 In the context of this section, the parts of these Regulations that are particularly relevant cover such factors as:
 - (a) work equipment being suitable for the job, and kept in good working order by persons who are trained to do so
 - (b) the guarding of dangerous parts of machines and provisions relating to working space, floors, lighting, noise and temperature. They apply to all places where woodworking machinery is used
 - (c) the requirements relating to the instruction and training of persons operating work equipment, including those employed in 'taking-off' and maintenance, and specify the duties of operatives
 - (d) work equipment being fitted with suitable controls, emergency controls and where necessary, a control system, to enable it to be used safely
 - (e) ensuring that each item of work equipment can be effectively isolated from all sources of energy
 - (f) the requirements for maintenance and inspection.

1.4.7.5 Personal Protective Equipment

- 1 Contractors and employees have a duty with regards to the provision, use and care of personal protective equipment (PPE). Where the risks to health and safety cannot be controlled by other means, PPE may be issued and used; as a method of controlling risk it is the last resort.
- 2 However, when using woodworking machinery on site, PPE will often be the only practical method of controlling risk, particularly health risks
- 3 These Regulations place legal duties on Contractors to:
 - (a) provide suitable PPE for their employees and make sure that it is used properly
 - (b) make sure that items of PPE are compatible when more than one item is worn at the same time. For example, if wearing safety spectacles, it is possible that the side-arms would interfere with the seal of a half-face respirator
 - (c) make an assessment of the most suitable PPE to protect against the identified risks
 - (d) make sure that PPE is properly maintained where this is necessary
 - (e) replace PPE that is damaged or lost
 - (f) provide suitable storage facilities where necessary for PPE that is not in use
 - (g) provide employees with adequate information, instruction and training on:
 - (i) the risks that the PPE will avoid or limit
 - (ii) why the PPE has to be worn and how it should be used
 - (iii) how to maintain the PPE in efficient working order and good repair.
- 4 These Regulations place legal duties on *employees* to:
 - (a) use any PPE provided in accordance with the instruction and training provided
 - (b) report to the Contractor the loss of or defect in any PPE provided.

1.4.7.6 Construction (Design and Management) CDM

- 1 In the context of this section, the relevant requirements are that the Contractor or person in control of the site must ensure:
- (a) the competence of everyone who has to use or supervise the use of a woodworking machine
 - (b) a safe place of work with safe access and egress and sufficient working space is provided
 - (c) the prevention of risks of fire or explosion
 - (d) the provision of adequate fire detection methods and fire-fighting equipment
 - (e) adequate levels of lighting, taking into account the nature of the work being carried out
 - (f) an acceptable level of site tidiness and cleanliness
 - (g) suitable information, instruction, supervision and training where necessary for work to be carried out safely and without a risk to health.

1.4.7.7 Types of machine

- 1 The following list gives examples of different types of woodworking machine. It should not be taken as exhaustive.
- (a) Circular saws
 - (b) Sanding machines
 - (c) Bandsaws
 - (d) Routing machines
 - (e) Planing/thicknessing machines
 - (f) Chainsaws
 - (g) Mortising machines
 - (h) Tenoning machines
 - (i) Vertical spindle moulding machines, including high-speed routing machines
 - (j) Multi-cutter moulding machines having two or more cutter spindles
 - (k) Trenching machines
 - (l) Boring machines
 - (m) Automatic and semi-automatic lathes.

1.4.7.8 Training

- 1 No person should be required to operate any type of woodworking machine unless they have been trained and instructed in its operation. They must either be competent or under the direct supervision of someone who is.
- 2 Training should include instruction on all machines the person is likely to operate and the types of work to be undertaken on the completion of training. Instruction on the provisions of these Regulations and the methods of using guards, devices and appliances required by these Regulations must be included. Training should emphasise the dangers connected with the use of such machines.
- 3 Contractors will need to make sure that they do not employ young people in work situations where:
- (a) the work is beyond their physical or psychological capacity

- (b) it involves harmful exposure to hazardous substances
- (c) it involves a risk of accidents which the young person, by reason of a lack of experience etc., would not recognise
- (d) there is extreme heat, cold, noise or vibration.

1.4.7.9 Duties of employees

- 1 Employees using woodworking machines must use and keep properly adjusted all guards and other safety devices, and use push sticks, spikes, push blocks, jigs, holders, backstops, and any other safety devices provided.
- 2 They must report to responsible persons any defects in machinery, guards, devices or appliances and any damage or defects in the surface or ground around the machine.

1.4.7.10 Occupational health Hearing protection

- 1 Woodworking machines can be particularly noisy when in use and the noise generated will be a significant hazard to health unless adequately controlled.
- 2 Ideally, the level of noise will be controlled by means other than issuing personal protective equipment (PPE), although in practice this will often not be possible on construction sites.
- 3 Where work activities are liable to expose employees to certain levels, Contractors must carry out an assessment of the risk and implement the necessary control actions, which will often translate into:
 - (a) identifying suitable hearing protection (PPE)
 - (b) issuing it to those persons who are at risk
 - (c) ensuring that it is worn in certain circumstances
 - (d) providing adequate information, instruction and training on the risk to health arising from noise and the correct use of hearing protection.
- 4 There are three action levels at which particular actions should be taken:
 - (a) The lower exposure action value (80 dB(A)), at which an employee may request the provision of hearing protection from the Contractor, should he or she so wish.
 - (b) The upper exposure action value (85 dB(A)) at which the Contractor is required to provide hearing protection for employees and ensure that it is worn by all employees who are at risk.
 - (c) The exposure limit value (87 dB(A)) above which no employee may be exposed.
- 5 In work areas where the noise is at or above the upper exposure action value, the Contractor is required to create hearing protection zones, designated by appropriate signs, within which everyone must wear the hearing protection provided.

1.4.7.11 Vibration protection

- 1 Contractors are required to control the level of vibration experienced by employees whilst at work.
- 2 In the context of using woodworking machines, the predominant problem is considered to be hand-arm vibration. Whilst several manufacturers have produced 'anti-vibration' gloves, laboratory testing has shown these to be largely ineffective against vibration at the most damaging frequencies. In some circumstances, the fact that such gloves will keep the hands warm may offer limited benefit against hand-arm vibration. The control of hand-arm vibration will have to be achieved by other means.

1.4.7.12 Respiratory protection

- 1 Contractors must control substances hazardous to health and to control occupational health risks arising out of the use of hazardous substances.
- 2 As noted earlier, hardwood dust is known to be a cause of nasal cancer. Ideally, airborne dust will be controlled by the fitting of effective extraction systems or dust-collection bags to woodworking machines and hand-held tools that generate either softwood or hardwood dust.
- 3 However, if for any reason the control of dust is not possible in this way, operators must be provided with, and wear, suitable respiratory protective equipment.

1.4.7.13 Eye protection

- 1 Depending on the machine being used and the nature of the work being carried out, it may be necessary for machine operators (and possibly anyone assisting them) to wear eye protection, such as goggles or a full-face shield of a suitable impact-resistant grade.

1.4.7.14 Skin protection

- 1 It may be necessary to provide operatives with suitable gloves to protect against skin damage whilst handling timber, particularly unplaned timber. Furthermore, the skin of a small number of persons is adversely affected by the natural oils that occur in some woods, notably cedar.

1.4.7.15 Working environment

- 1 Sufficient clear and unobstructed space must be provided around machines to allow persons to work without the risk of injury.
- 2 Floors should be level, in good condition, free of loose material (wood chips, wood shavings and sawdust) and must not be slippery.
- 3 Where woodworking machines are being used on site, the temperature of any indoor workplace must be reasonable, having regard to the purpose for which the place is being used.
- 4 Adequate natural or artificial lighting must be provided so that the work being carried out on each machine can be done safely. Artificial light must be positioned or shaded to prevent any glare affecting the operator.

1.4.7.16 Maintenance

- 1 Saw blades must not be cleaned while they are in motion or with the power supply to the machine switched on.
- 2 All machines must be of good construction, manufactured with sound material and properly maintained. Unless a machine is hand-held, it must be level, and fixed securely to a substantial structure which ensures its stability.

1.4.7.17 Controls

- 1 Every machine must be fitted with start and stop controls which can be quickly and easily operated by the machinist.

1.4.7.18 Braking

- 1 An essential safety feature of most woodworking machinery is the provision of an automatic brake.

- 2 This is to ensure that, if there is a risk of an employee coming into contact with tooling during the rundown period, the machine stops within 10 seconds or less, as defined by European Committee for Standardization (CEN) standards.

1.4.7.19 Retrofitting of brakes

- 1 All work equipment shall be provided with the necessary controls which bring the equipment to a safe condition in a safe manner. To achieve this, a risk assessment shall be carried out to determine whether the rundown time should be reduced and the retrofitting of brakes to a machine is necessary.
- 2 If the risk assessment shows that there would be no added safety benefit, then braking does not have to be provided.
- 3 Examples include machines fitted with interlocking guards that enclose the cutters and cannot be opened until the cutters have come to rest. Some machines might be totally enclosed by a noise hood, but the same interlocking requirements will apply.
- 4 In these situations, the machine rundown time is immaterial since an acceptable standard of safety has been achieved by guarding alone and subsequently there is no risk of contact in the rundown period.
- 5 Another example is where the blade, tool or cutter returns automatically to a safe position, such as a cross-cut saw fitted with a spring return which retracts the blade into a protective housing at the end of the cutting operation. However, if a risk assessment shows that the machine has a long rundown period and is in regular use by more than one person, consideration should be given to fitting a brake. This is because the machine could still be running down after use by one person when a second person pulls the saw carriage out of the protective housing, unaware that the blade is still rotating.
- 6 As well as enhanced safety, braking can improve productivity since more rapid stopping will allow quicker setting, adjustment and unjamming of a machine.

1.4.7.20 Guarding cutters - general

- 1 'Cutters' include saw blades, chain cutters, knives, boring tools, detachable cutters and solid cutters. Cutters must be guarded to the greatest practicable extent, having regard to the work being done.
- 2 Guards must be of substantial construction, properly secured and adjusted, and maintained constantly in position while cutters are in motion.
- 3 Adjustments must not be made to any guard whilst the cutters are in motion, unless safe means (i.e. mechanical adjusters) are provided for those adjustments to be made.
- 4 The shape and size of guards may change as technology develops alternative safeguards, if these are at least as effective as before.
- 5 Every dangerous part of any woodworking machine must be securely fenced, unless it is in such a position or of such construction that it is as safe to every person on the site as it would be if it were fenced.

1.4.7.21 Portable electrically-powered saws

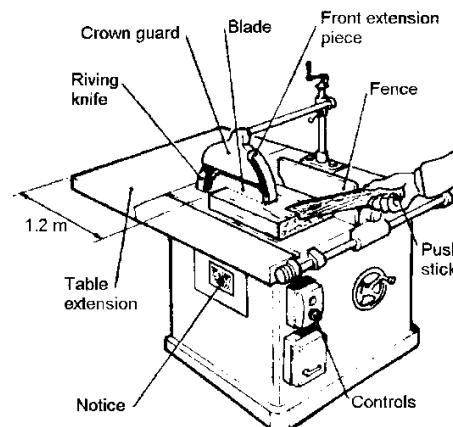
- 1 Portable electrically-powered saws should always be disconnected from the electrical supply before any adjustments, repairs, cleaning or any type of maintenance is carried out.
- 2 Whenever possible, to reduce the risk from electric shock, all portable electric tools should

operate from a 110 volt supply and be earthed or double insulated. The mains input to the 110 volt transformer should be protected by a residual current device (RCD), commonly known as a 'power breaker'.

- 3 Portable electrically-powered saws must never be carried by their supply cable. Furthermore:
 - (a) when operating, the supply cable must always be kept clear of the saw blade
 - (b) the power plug must be examined each time, prior to use, for damage and security of the cable
 - (c) all electrically-powered saws should be examined regularly by a competent electrician.
- 4 Care should be taken to ensure that the spring-loaded, lower blade guard returns to cover the blade after every cut. This guard, also known as the swivel guard, is designed to uncover the saw teeth when material is being cut then automatically covers the saw teeth when the saw is withdrawn. This guard must never be wired in the open position.

1.4.7.22 Riving knife (also called splitter or spreader)

- 1 The riving knife must be securely fixed below the table level, be of the correct radius, behind and in line with the saw blade.
- 2 It must be strong, rigid, smooth and easily adjustable.
- 3 The radius of the knife must not exceed the radius of the largest saw blade for which the machine has been designed.
- 4 It must be adjusted as close as practicable to the saw blade. Any gap between the riving knife and the blade must not exceed 8 mm at table level.
- 5 In the case of a parallel plate saw blade, the knife must be thicker (usually about 10%) than the parallel plate of the saw blade to form a wedge in the saw cut, thereby preventing the timber 'ripping' the saw blade.
- 6 Where the diameter of the saw blade is less than 600 mm, the top of the knife should not be more than 25 mm below the top of the blade.
- 7 Where the diameter of the blade is 600 mm or more, the knife must extend at least 225 mm above the machine table.



Hand-fed circular rip saw

1.4.7.23 Top guard (crown guard)

- 1 The guard must be strong and easily adjustable.
- 2 It must be adjusted to extend from the top of the riving knife to a point as close as practicable to the surface of the material being cut; or to a point not more than 8 mm above the material being cut where squared stock is being hand fed.
- 3 The guard should have flanges on either side of the blade and be adjusted so that these extend beyond the roots of saw blade teeth. Where the guard has an adjustable front extension piece, it must be flanged on the side remote from the fence, and adjusted to extend beyond the roots of saw blade teeth above the saw table.

- 4 **Note:** Some saws have adjustable extensions to the front of the guard.

1.4.7.24 Bottom Guard

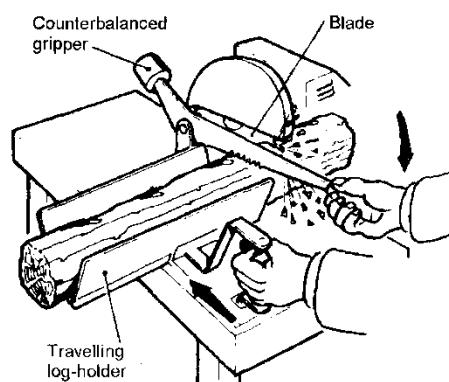
- 1 The part of the blade below the table must be guarded to the greatest extent practicable.

1.4.7.25 Size of saw blade

- 1 Saw benches with a one-speed spindle must not use a saw blade less than 60% of the diameter of the largest saw blade which the bench is designed to use. In the case of saw benches with more than one spindle speed, the blade must not be less than 60% of the diameter of the largest blade which the machine is designed to use at the fastest spindle speed.
- 2 A notice should be displayed on the machine specifying the smallest diameter saw blade that may be used.

1.4.7.26 Limitations on use

- 1 No circular saw may be used for cutting rebates, tenons, mouldings or grooves unless the cutter above the table is effectively guarded.
- 2 The saw blade teeth must project right through the upper surface of the timber at all times in any ripping operation.
- 3 A circular saw must not be used for cross-cutting logs unless the material is firmly held by a gripping device, secured to a travelling table.



1.4.7.27 Push sticks

- 1 Push sticks must be available for use on every table-mounted circular saw, and used to:
- keep hands away from the saw blade
 - feed material throughout any cut of 300 mm or less
 - feed material during the last 300 mm of any cut more than 300 mm in length
 - remove cut material from between the saw blade and the fence.

1.4.7.28 Removal of material

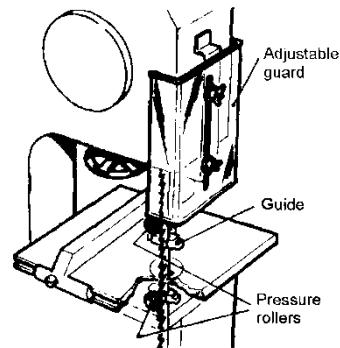
- 1 Assistants employed to 'take-off' cut material may only stand at the delivery end of the machine.
- 2 Where this operation must be performed, the delivery end of the machine table must extend (over its whole width) at least 1.2 m from the up-running part of the saw blade.
- 3 *This requirement is not applicable to machines which have a roller table, or a travelling table, or to portable machines with a maximum blade diameter of less than 450 mm.*

1.4.7.29 Bench-mounted portable hand circular saws

- 1 Mounting a hand-held circular saw onto a support for use as a bench circular saw, requires:
 - (a) a suitable top guard, riving knife and ripping fence to be fitted
 - (b) that the fixed guards should be of adequate strength and construction to withstand normal operational use
 - (c) the fitting of a suitable switch attachment to enable the operator to control the saw at the bench.
- 2 **Note:** Some manufacturers have designed a saw bench complete with a top guard, riving knife assembly and fence for use with their hand-held circular saws.

1.4.7.30 Narrow bandsaw

- 1 A narrow bandsaw is defined as a machine with a blade not exceeding 50 mm in width, running vertically.
- 2 The saw wheels and the whole of the blade, except the part which runs downward, between the top wheel and the machine table must be enclosed by guards.
- 3 The part of the blade between the top wheel and the friction disc or roller must be guarded by a front plate, as close as practicable to the blade, and having a flange at right angles to the plate extending behind the saw blade.
- 4 The friction disc or rollers must be adjusted as close to the surface of the machine table as practicable.

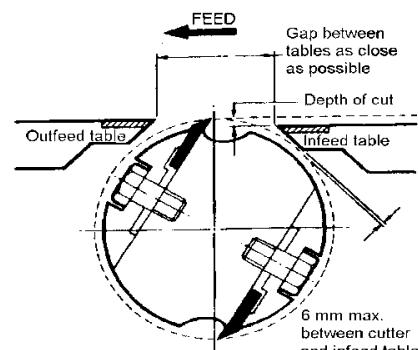


1.4.7.31 Planing machines

- 1 (See illustration in Appendix 3)

1.4.7.32 Limitations on use

- 1 A planing machine must not be used for cutting any rebate recess, tenon or mould unless the cutter is effectively guarded.
- 2 If the machine is not mechanically fed and is used for surfacing work, it must be fitted with a cylindrical cutter block.
- 3 Table gap
- 4 If the planer is hand fed, the gap between the cutter block and the front edge of the infeed or delivery table must not exceed 6 mm, measured radially from the centre of the cutter block.



1.4.7.33 Bridge guard

- 1 Planing machines not mechanically fed must have a bridge guard over the cutter block, mounted approximately centrally and not liable to accidental displacement.
- 2 The guard must be strong, rigid and easily adjustable, vertically and horizontally, to allow work to be carried out without the risk of injury.
- 3 The guard must cover the full length and diameter of the cutter block, be mounted centrally over it and be securely fixed.
- 4 When 'flattening' squared stock:
 - (a) the gap between the end of the guard and the fence should not exceed 10 mm
 - (b) the gap between the upper surface of the wood and the underside of the guard should not exceed 10 mm.
 - (c) When 'edging' (i.e. planing the narrow surface of a squared stock):
 - (d) the gap between the end of the guard and the surface of the wood should not exceed 10 mm
 - (e) the gap between the underside of the guard and the surface of the feed table should not exceed 10 mm.
- 5 When 'flattening' and 'edging' are carried out successively, the clearances between the bridge guard and the material for each operation must be no greater than 10 mm.
- 6 When the planing of adjacent surfaces of stock of square cross-section is carried out as successive operations, the bridge guard must be adjusted so that the clearance between the material and the guard, or the fence and the guard, never exceeds 10 mm.
- 7 Where the above adjustment of the bridge guard is not practicable because of the shortness of the material, a suitable push block with handholds must be provided and used.

1.4.7.34 Cutter block guards

- 1 In addition to the bridge guard, hand-fed overhand planers must be provided with an effective, easily adjustable guard over the part of the cutter block which is behind the fence.

1.4.7.35 Combined machines used for thicknessing

- 1 The part of the cutter block exposed in the table gap must be effectively guarded.

1.4.7.36 General safety procedures

- 1 The following general procedures should be observed to ensure the safety of operators and anyone else who may be affected by wood machining activities:
 - (a) knives, saws and cutters should be properly sharpened and correctly set
 - (b) circular saw blades should be checked for cracks, particularly near the gullet at the root of the teeth. Defective items should not be used
 - (c) before a machine is started, a check should be made to see that the cutters, saws or knives are of the correct type and are securely fixed; and that guards are properly adjusted and secure
 - (d) the area around the machine should be cleared of waste material and there should be sufficient space to stack work safely before and after machining
 - (e) the floor must be clean and free from oil, grease or anything else which might cause the

- operator to slip or trip
- (f) multi-speed machines must be started at their lowest speed
 - (g) guards should be set to give the minimum clearance necessary for the material being worked. They must always be in position
 - (h) the operator should not wear loose clothing, and should wear goggles, masks or ear protectors, if necessary
 - (i) workplaces should have adequate heating and be well lit
 - (j) adjustments must never be made to a machine while it is in motion, unless safe provision is made to do so
 - (k) push sticks and jigs should be available and in use whenever necessary
 - (l) offcuts, chips and sawdust should not be removed from the machine table with the hands while machine is in motion
 - (m) material should not be forced through the machine
 - (n) any fault should be promptly reported to responsible persons. If a fault develops, the machine must be switched off immediately
 - (o) machines must be switched off when left, even for a short period. They should also be switched off when the operator is speaking to somebody
 - (p) operators should never allow their attention to be distracted while operating a machine, neither should anybody seek to distract them
 - (q) at the end of a work operation, the machine must be switched off and isolated.

1.4.7.37 Operational safety - circular saws

- 1 Low peripheral speeds result in inefficient cutting as do dull, badly set or badly ground saw teeth. The extra effort applied to feed the wood increases the accident risk.
- 2 Deposits of sap, gum or resin on the blade tend to cause the saw to jam, or stall, or the timber to stick. Such deposits must never be cleaned whilst the blade is moving or with the power supply to the machine switched on. The saw should be stopped, electrically isolated and the proper tool used.

1.4.7.38 Chainsaws

- 1 Due to their high potential to cause injury, the use of chainsaws on building and construction sites is not generally recommended.
- 2 Where chainsaws are used on site, they must be used only by operatives who are fully competent, have received specific and nationally approved training, and who are certificated to carry out the intended operation.
- 3 A specific risk assessment should be carried out for the operation and a written method statement produced covering the operation, including the need for full personal protective equipment, safe working at heights and, if necessary, a workplace safely away from other workers,

Construction Site Safety**1.4.7 Appendix 1****Safety checklist - general****Operatives**

- 1 Is a list kept of operatives who are authorised and competent to operate woodworking machines?
- 2 Are operators only required to operate machines on which they have been trained and are competent?
- 3 Are operatives properly supervised, particularly those under 18?
- 4 Is adequate training given on the types of machine to be used and the kinds of work to be done?
- 5 Are operatives provided with all necessary personal protective equipment, including goggles, ear protectors, face masks and other protective equipment, where required?
- 6 Is the wearing of loose-fitting clothing prohibited at those machines where entanglement could be a problem?

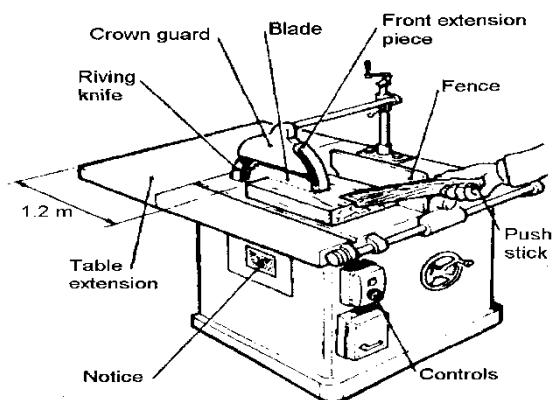
Machines and surrounding area

- 7 Is a programme of planned preventative maintenance in place for all woodworking machines?
- 8 Are the start and stop controls so situated that they can be easily reached and operated?
- 9 Are all cutters guarded to the greatest extent practicable?
- 10 Are all machines level and securely fixed to ensure their stability?
- 11 Are all machines of sound construction and properly maintained?
- 12 Is sufficient space provided around a machine for safe working?
- 13 Are floors level, in good repair, free of loose material and not slippery?
- 14 Is adequate natural or artificial light provided in the workplace without glare being caused?
- 15 Is the temperature of the workplace satisfactory?
- 16 Is respiratory protection required?
- 17 Are noise levels reduced as far as practicable?
- 18 Is ear protection available where required?
- 19 Is eye protection required?
- 20 Is skin protection required?
- 21 Is extraction equipment provided for chips and particles as is required on specified machines?
- 22 Has provision for the extraction of fumes been made where necessary?
- 23 Are fire extinguishers of the correct type immediately available?
- 24 Are suitable personnel fully trained in the use of fire-fighting equipment?
- 25 Do machines, as far as possible, run off a 110 volt supply with mains-powered equipment protected by a residual current device (RCD)?

Construction Site Safety

1.4.7 Appendix 2

Circular Saw



Safety checklist

Riving knife

- 1 Is the riving knife secure, in a sound condition, and easily adjustable?
- 2 Is the radius correct and in line with the saw blade?
- 3 Is the gap between the riving knife and the saw blade correct?
- 4 Is the riving knife of the correct thickness?
- 5 Is the height of the riving knife correct for the saw blade fitted?

Saw blade

- 6 Is the saw blade in good condition -sharp with no cracks, and not less than the smallest diameter permitted?
- 7 Is a notice fixed to machines, specifying the smallest permitted blade diameter?
- 8 Does the saw blade project through the upper surface of the timber when ripping?
- 9 Is the saw blade above the table effectively guarded, when the machine is rebating, tenoning, moulding or grooving?

Fence

- 10 Is the fence correctly adjusted and secured?

Top guard

- 11 Is the top guard sound and easily adjustable?
- 12 Is it adjusted correctly for the work being done?
- 13 Do the flanges at either side of the blade extend below the roots of the saw teeth?

Front extension guard

- 14 Is the front extension guard adjusted to give maximum protection, and does it cover the saw teeth?

Bottom guard

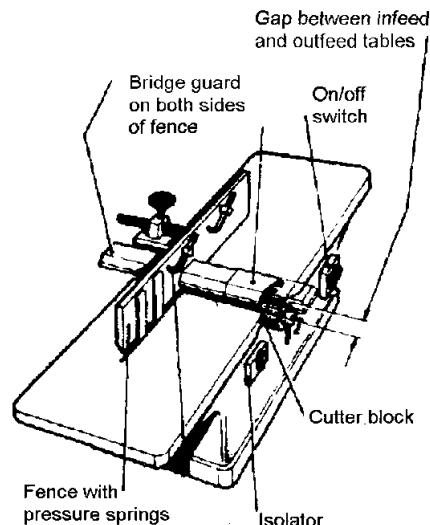
- 15 Is the blade guarded below the table (open frame machines)?

Feeding work

- 16 Is a gripping device in use when cross-cutting?
- 17 Is there a push stick or are push blocks available and in use?

Taking off

- 18 Does the delivery table extend at least 1.2 m from the up-running part of the saw blade?
- 19 Is the assistant, if present, correctly positioned?

Construction Site Safety**1.4.7 Appendix 3****Planing machine****Safety checklist****Table**

- 1 Is the gap between the table and the cutter not more than 6 mm?
- 2 Is the table gap as small as possible?

Bridge guard

- 3 Is the bridge guard rigid, strong, securely fixed and easily adjustable?
- 4 Is the bridge guard centrally mounted over the cutter block?
- 5 Does the bridge guard cover the full length and diameter of the cutter block?
- 6 Is the bridge guard adjusted to exclude the risk of injury, as far as is practicable?

Cutter block

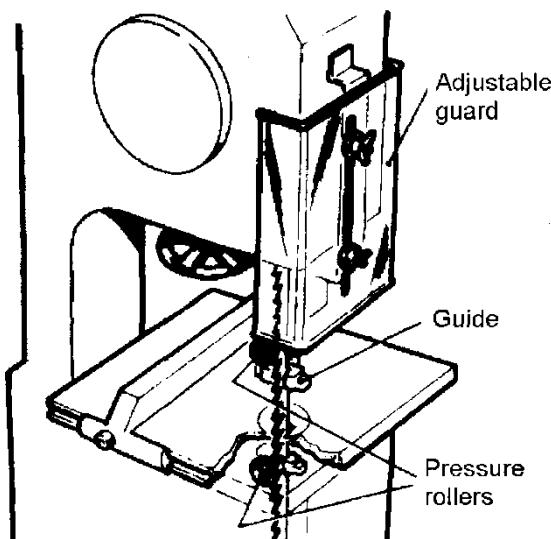
- 7 Is the cutter block guarded, on the side of the fence, remote from the bridge guard?

Limitations on use

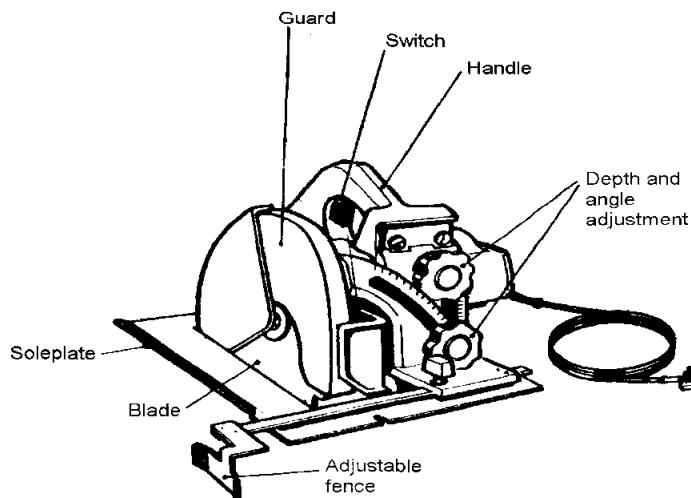
- 8 Is the cutter effectively guarded when rebating, recessing, tenoning and moulding are taking place?
- 9 Is the machine fitted with a cylindrical cutter block if it is being used for surfacing?
- 10 Is the bridge guard correctly adjusted when 'flatting' or 'edging' is taking place?
- 11 Are push sticks available and in use?

Combined machine used for thicknessing

- 12 Is the cutter block exposed in the table gap effectively guarded?
- 13 When thicknessing, is an anti-kickback device fitted, or notice displayed specifying one piece only?
- 14 Is an extraction system provided to remove and collect any wood chips?

Construction Site Safety**1.4.7 Appendix 4****Narrow bandsaw****Safety checklist**

- 1 Are saw wheels and saw blades guarded correctly?
- 2 Is the saw blade between the top wheel and disc or roller guarded by a frontal plate as closely as possible, and does the flange extend behind the saw blade?
- 3 Are rollers or discs correctly adjusted?
- 4 Is the saw blade tension correct?
- 5 Is the saw blade in good condition and sharp?

Construction Site Safety**1.4.7 Appendix 5****Hand-held circular saw****Safety checklist****Operative**

- 1 Is the operative suitably trained in the correct use of the machine?
- 2 Does the operative understand that there should be no loose clothing, ties or scarves, etc.?
- 3 Is the operative aware of the relevant Regulations?

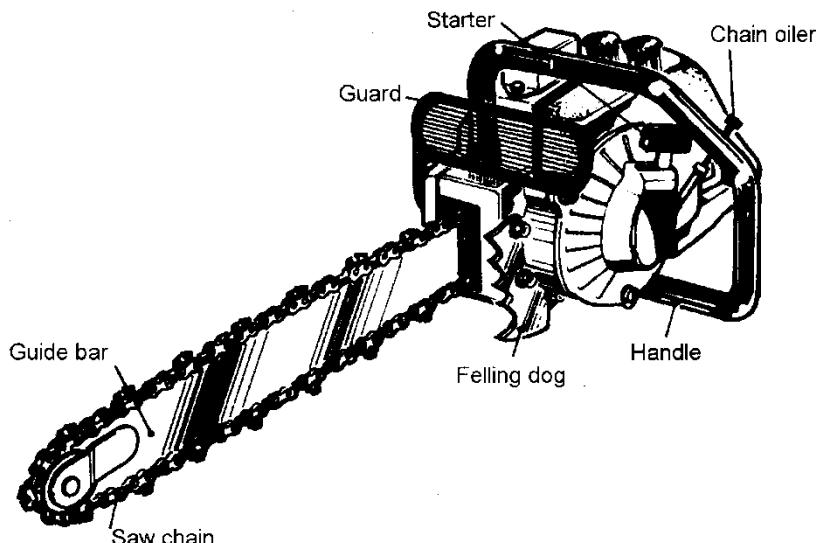
Prior to use

Ensure the electrical power plug is removed from the supply socket before carrying out prior-to-use checks.

- 4 Are the machine and plug compatible with the electrical supply?
- 5 Are all leads, plugs and switches undamaged?
- 6 Does the on/off trigger and safety interlock operate freely?
- 7 Is the correct type of saw blade fitted for the work which is to be carried out?
- 8 Is the saw blade in good condition, sharp and not cracked?
- 9 Is the saw blade effectively guarded, above and below the soleplate?
- 10 Is the condition and the function of the spring-loaded bottom guard checked before use?
- 11 Does the spring-loaded bottom guard return to cover the saw blade after every cut?
- 12 Is the saw blade securely fitted to rotate in the correct direction? (Teeth should point upwards at the front end of the saw towards the soleplate.)
- 13 Has the fence (if used) been adjusted to the correct dimension?
- 14 Has the saw been adjusted to the correct depth and angle before use, with the teeth projecting just through the underside of the material?
- 15 Are all locking nuts and securing devices properly tightened and fastened?

In use

- 16 Is the saw being held correctly with two hands using the main and front hand grips?
- 17 Is the material being cut adequately supported?
- 18 Is the fence or a straight edge being used as a guide as necessary?
- 19 Has a check been made to ensure that the clamps do not impede any movements of the saw?
- 20 Is there sufficient free cable on the saw?
- 21 Is the correct stance being taken behind and in line with the saw?
- 22 Is the work area clear and free of obstructions?
- 23 Is the correct protective equipment in use?
- 24 Do all other personnel on site know that the operator must not be distracted whilst he or she is operating a saw?

Construction Site Safety**1.4.7 Appendix 6****Chainsaw****Safety checklist****Operative**

- 1 Is the operative competent, adequately and properly trained and supervised?
- 2 Is the operative familiar with the type of machine they are using and with the manufacturer's operating instructions?
- 3 Is the correct personal protective equipment being worn?
- 4 Is the operative aware that whilst using a chainsaw there must be no loose clothing, ties, belts, etc.?

Prior to use

- 5 Is the ignition switched off?
- 6 Are new chains soaked in oil prior to use?
- 7 Is the chain sharp and in good condition?
- 8 Is the guide bar excessively worn? If so, it should be changed.
- 9 Does the chain brake function correctly?
- 10 Is the tension of the chain correct?
- 11 Is the lubrication reservoir functioning?
- 12 Are all handles and guards firm and secure?
- 13 Are all switches and controls effective?
- 14 Are wood or plastic wedges available to free the saw if it jams?

In use

- 15 Is the correct starting procedure (i.e. on the ground) undertaken?
- 16 Is the stance of the operator correct?
- 17 Does the operator keep both hands on the machine when it is in use?
- 18 Is there a safe system of work in place for cutting, avoiding kickback?
- 19 Is the chainsaw correctly adjusted so that the chain does not rotate when the engine is idling with the chain brake released?
- 20 Is the operator aware that the nose of the guide bar should not be used to cut?
- 21 Are all bystanders kept well clear of any cutting operations?
- 22 Do all other personnel on site know that the operator must not be distracted whilst he or she is operating a saw?
- 23 Is the work area kept clear and free from obstruction?

After use

- 24 Are all parts checked for damage and soundness?
- 25 Are the cutting components protected from damage?
- 26 Are any defects found reported to the supervisor?
- 27 Is the chainsaw stored safely?

Refueling

- 28 Is the correct type and grade of fuel used, from a properly marked, leak-proof, securely capped container?
- 29 Is all refueling carried out in a well-ventilated area outdoors?
- 30 Is there any leakage of fuel or spillage during refueling?
- 31 Are fuel and lubrication systems leak-free and functioning correctly?
- 32 Are fuel and lubrication system fluid levels correct?
- 33 Has clothing (which may have been contaminated during refueling) been changed prior to the saw being operated?
- 34 Is any spilt fuel removed from the saw or work area prior to saw operation?
- 35 Is the saw always started at least 3 metres away from the refueling area?
- 36 Is care taken to ensure that refueling is never carried out near to fires, sparks or other sources of ignition?

Transportation

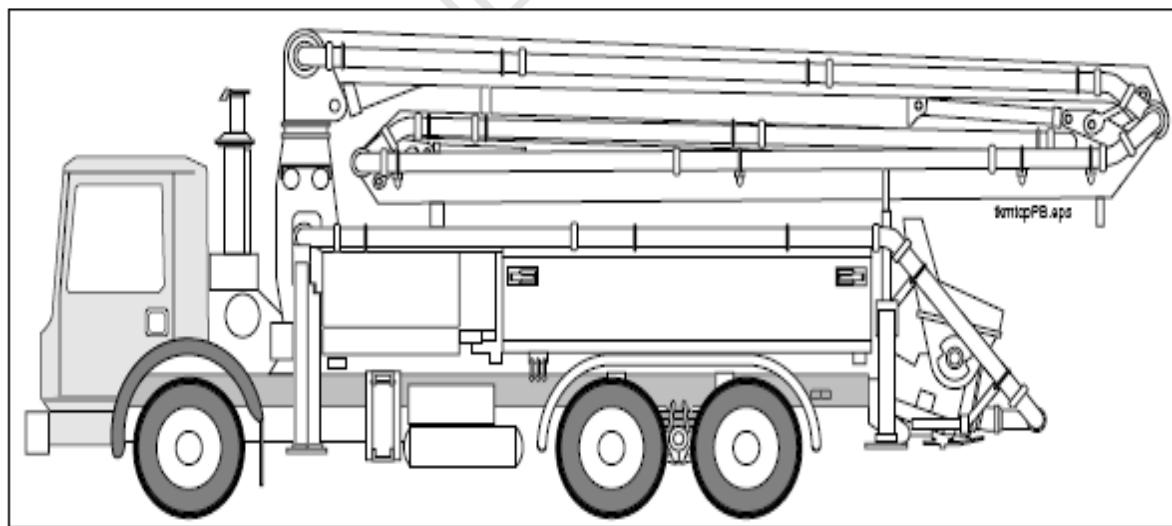
- 37 Is the chainsaw switched off when being transported, even if it is only a few paces?
- 38 Is the chainsaw always carried by the front handle?
- 39 Is the chainsaw always carried with the engine muffler away from the body, to prevent burns?
- 40 Has the chain guard (scabbard) been fitted?
- 41 If the chainsaw is being transported in a vehicle, has it been secured to prevent overturning and damage?

Construction Site Safety

1.4.8 Mobile Concrete Pumping Operations

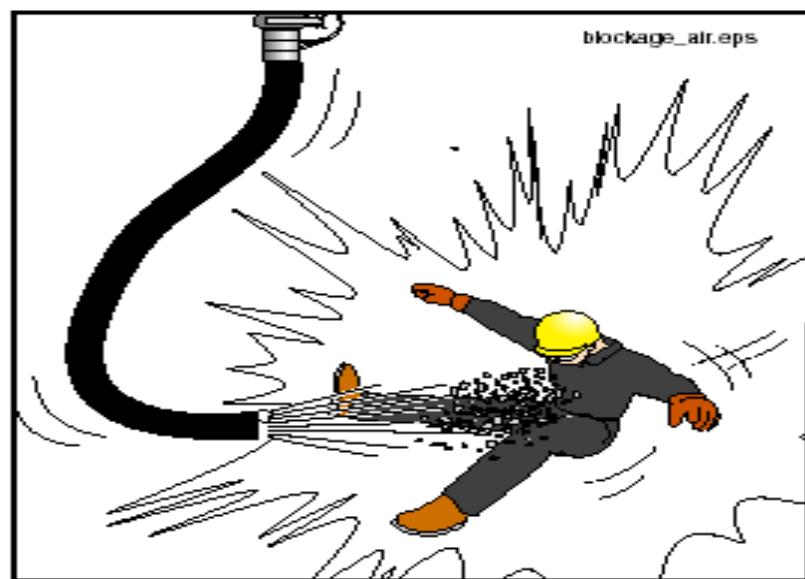
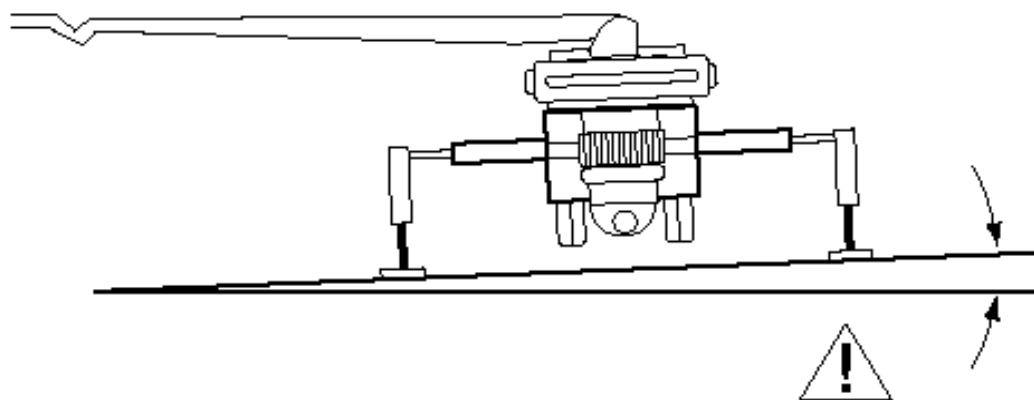
1.4.8.1 Introduction

- 1 Ready-mix concrete is a key raw material in construction and experience has shown that concrete pumping operations are hazardous work activities.
- 2 Safe pumping operations will depend upon:
 - (a) Providing enough workers to pump concrete safely, including a competent worker to operate the emergency shut down system if necessary.
 - (b) Determining the best method for pumping concrete to the delivery point on site.
 - (c) The capacity and type of pump to be used and where to place the pump for best access by concrete delivery trucks.
 - (d) Ensuring electrical safety including safeguards from nearby power lines.
 - (e) Removing risks to health and safety from manual handling, slip, trip, and fall hazards.
 - (f) Providing safety equipment including personal protective equipment.
 - (g) The pump operator should be trained and competent and knowledgeable of construction site hazards and safety, as well as site concrete pumping operations.
 - (h) Instruction manuals and maintenance log books should accompany the pump unit and/or boom.



- 3 These Regulations require that all pumping operations are carefully planned and risk assessed. Unsafe working and accidents typically result from:
 - (a) a lack of training or knowledge of the equipment
 - (b) poor maintenance of the equipment
 - (c) incorrect plant or equipment being used
 - (d) the misuse of plant and equipment
 - (e) contact with overhead hazards such as power lines
 - (f) not correctly leveling the pump when setting up
 - (g) unstable ground collapsing under the weight of the pump causing the boom to overturn

- (h) failure to take account of adverse weather conditions
- (i) failure to deploy the outriggers correctly
- (j) falling concrete debris from the elevated boom placer delivery hose
- (k) whipping of the concrete delivery hose during pumping striking nearby persons
- (l) pipes bursting under pressure
- (m) reversing vehicles
- (n) falls from height (knocked to the ground by the moving delivery hose)
- (o) crushed by the retracting out riggers



1.4.8.2 The Management of Health and Safety at Work

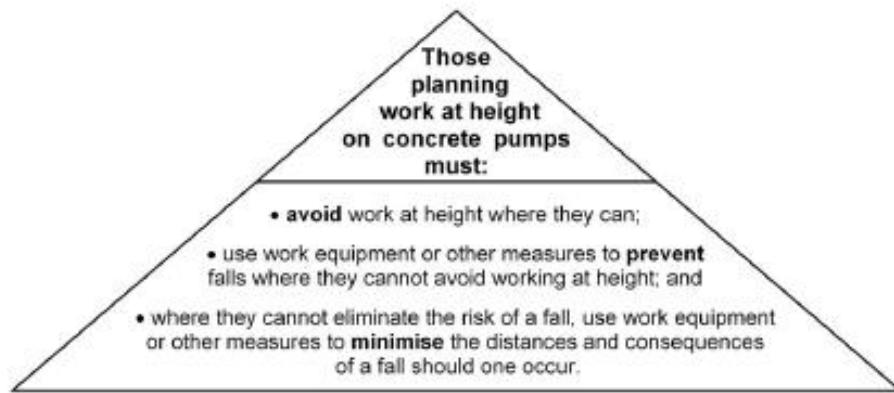
1 Every Contractor is required to make a suitable and sufficient assessment of every work

activity to identify any hazard that employees or other people might encounter as a result of the work being carried out.

- 2 Once those hazards have been identified, it is then the Contractor's duty to put control measures into place, to either eliminate the hazards or, where this is not possible, reduce the risk of injury or ill health resulting from those hazards, as far as is reasonably practicable.
- 3 The Contractor must, through the risk assessment process, establish any risks to the health and safety of any employee (or anyone else) arising out of the use of any item of work equipment. They must take the necessary steps to ensure that the equipment can be used safely.
- 4 This will involve:
 - (a) providing employees with comprehensible and relevant information on any risks that exist with regard to the use of work equipment and hazardous substances such as wet cement
 - (b) informing employees of any control measures that are in place to reduce those risks taking into account the capabilities of employees who are required to use work equipment
 - (c) providing adequate (health and safety) training in the use of potentially hazardous work equipment.
- 5 Employees, for their part, have a duty under these Regulations to tell their Contractor of any work situation that presents a risk to the health and safety of themselves or of any other person who may be affected.

1.4.8.3 Planning by the contractor

- 1 Planning by the contractor should ensure that the site provides clear, level area of ground with firm base to support the pump unit; clear access for the boom placer to move into position away from any overhead hazards such as power lines or crane operations; clear access to the pump unit for concrete delivery trucks; and safe, unobstructed access for the general public if the pump unit is positioned on a side street.
- 2 Additional planning includes the following points:
 - (a) Ensure concrete pump is allocated the best position to pump concrete allowing the pump operator an unobstructed view of the pump and the pour area.
 - 1
 - 2
 - (b) Provide safe access to elevated areas for the pump operator to stand on.
 - (c) A time schedule for a major concrete pour and planning for:
 - (i) weather
 - (ii) volume of concrete
 - (iii) site limitations
 - (iv) space for concrete delivery trucks for parking / holding pattern
 - (v) traffic management measures including provisions for banksman / traffic marshal's
 - (vi) equipment backs up and capacity
 - (vii) wash down areas for concrete delivery trucks.



1.4.8.4 Planning by the Concrete Pumper

- 1 The concrete pump operator should consult with the contractor or responsible person about the plan for pumping concrete on site.
- 2 In addition, before starting pumping the concrete pump operator should:
 - (a) Undergo a site safety induction
 - (b) Contact the concrete delivery plant to discuss the measures in place for preventing line blow-outs and for handling multiple truck reversals to the concrete pump
 - (c) Inform the concrete delivery truck drivers the importance of:
 - (i) following the directions from traffic controllers or spotters
 - (ii) the arrangements for multiple trucks reversing to the concrete pump
 - (iii) standing in a safe place during concrete pumping.

1.4.8.5 Where to place plant and equipment

- 1 Risks with setting-up concrete pumping equipment include concrete pumping booms tipping over and workers being crushed or run over by the mobile pump or concrete truck. When setting up a concrete pump, the area should be level, capable of supporting the load and free of obstructions by:
 - (a) Keeping the concrete pump, a safe distance away from the edge of excavations
 - (b) Not placing the pump over or near back-filled ground, holes, excavations or trenches, cellars, basements or pits or soft ground
 - (c) Setting the pump up as level as possible and consulting the manufacturer's instructions if the pump is placed on an angle or incline.
- 2 If outriggers are required:
 - (a) Supply adequate sole plates to pack the outrigger pads
 - (b) Outriggers pads must be clear of excavations, soft ground or other obstacles which could prevent the safe operation of the machine
 - (c) The sole plate material must be of sufficient bearing area to support the machine and the outriggers must be regularly checked to prevent subsiding.
- 3 If the ground is not firm or is close to an excavation the principal contractor should allocate a more stable location.
- 4 Care should be taken if the concrete pump is used near an excavation since the weight of the pump and load can cause slippage and accidents
- 5 Concrete pumping exclusion zone should be clearly signed or demarcated with hazard warning tape, require people working in the area to wear high visibility vests and prevent access to

unauthorised people.

- 6 Once the site has been selected and set-up, basic safety requirements are:
- (a) Clearly defined entry and exit points and good lighting at the site if night operations are required
 - (b) Post a sign stating "Danger – Concrete Pump Area – Authorised persons only" and keep other traffic from entering the vicinity of the pumping operation.

1.4.8.6 Operating Near/Above power lines

- 1 Working above power lines is not permitted if the power lines are live or energized. The Principal contractor must ensure that power lines are isolated and de-energized before any work may commence above power lines.
- 2 The Principal contractor must obtain an isolation/clearance permit from client stating that the power lines have been turned off and it is safe to commence work.

1.4.8.7 Concrete delivery risks

- 1 Concrete delivery involves the delivery of concrete from the delivery truck to the concrete pump hopper. In this operation one or more concrete trucks are reversed up to the concrete hopper to deliver concrete. This activity poses risks to the concrete delivery truck driver, the concrete pump operator, the allocated traffic spotter, other workers working in and around the concrete pumping exclusion zone and members of the public.
- 2 When concrete trucks deliver concrete to a concrete pump, the following risks must be controlled:
 - (a) Reversing trucks hitting or entrapping people between truck and concrete hopper
 - (b) Being struck by concrete debris when delivering concrete into the hopper due to blockages or equipment failure such as burst lines
 - (c) Being struck by ejected pipes from the concrete pump due to clamp failures, while discharging concrete into the hopper
 - (d) Entanglement, crushing and amputation from the concrete hopper.

1.4.8.8 Using the pump and boom

- 1 Concrete pump and boom operators should be trained, experienced, supervised and competent to safely operate the equipment.
- 2 Concrete pump operators should:
 - (a) Be familiar with and operate the plant and equipment in line with advice and information from the manufacturer
 - (b) Undertake daily inspection and maintenance before pumping starts
 - (c) Always attend to the equipment or make sure that a competent person is in attendance if working away from the equipment
 - (d) Pump concrete only when the grill is in the closed position
 - (e) Make sure that pump flow rates match discharge rates of concrete delivery trucks
 - (f) Be based at the pump and have a clear view of both the delivery end hose and the hopper, if using remote control
 - (g) If a clear view is not possible, then another competent person, other than the delivery truck driver, should be based at the hopper to be responsible for stopping the pump
 - (h) Follow the directions of and maintain communications with the concrete placing foreman.

1.4.8.9 Concrete pouring

- 1 The concrete pour involves the pouring of concrete through the delivery hose connected to the concrete pump to the concrete pump area. In doing this there are a number of risks including:
 - (a) Concrete lines bursting
 - (b) End hose whipping and striking nearby persons
 - (c) Lines becoming unrestrained
 - (d) Boom collapsing
 - (e) Pipe clamps being dislodged.

1.4.8.10 Delivery hose

- 1 Ensure good quality of hose and avoid damage by:
 - (a) Checking hose for damage before being fitted
 - (b) Fitting a suitable stop device at the outlet end of the hose to prevent concrete spillage whilst the boom is moved above a working or public area
 - (c) Fixing the flexible delivery end hose to the boom with a safety chain, sling or other retaining device
 - (d) Using a 'anti whip' delivery end hose able to handle the pumping concrete pressure
 - (e) Using reducers to avoid overload of the hose or other parts of the unit

1.4.8.11 Boom section

- 1 Concrete boom sections are not designed to be lifting devices and should be protected from structural failure by:
 - (a) Avoiding the connection of additional hoses to the end of the concrete placement boom outside the parameters of the manufacturer's specifications
 - (b) Avoiding the connection of the end hose directly to a tremmie pipe
 - (c) Avoiding the connection of the boom or end hose directly or indirectly to another lifting device such as a crane.

1.4.8.12 Maintenance

- 1 Before starting work each day all concrete pumping/placing equipment is to be given a visual inspection and functional test - in accordance with the manufacturer's instructions and recommendations.
- 2 Any repairs or replacements should only be carried out by trained and competent personnel in accordance with the manufacturer's instructions.
- 3 Written records of maintenance and repair work performed on concrete pumping/placing equipment should be kept.

1.4.8.13 Routine maintenance inspections

- 1 The owner should establish:
 - (a) A program of weekly, monthly and quarterly preventative maintenance inspections of all equipment in accordance with the manufacturers recommendations
 - (b) Details of these inspections are to be kept in the appropriate log book, and a copy kept on the unit.

1.4.8.14 Annual inspections

- 1 All concrete placing booms, pumps and related equipment are to be inspected once a year by a competent assessor to confirm that the equipment is suitable for continued service, in accordance with the manufacturer's specifications.
- 2 Inspections should include but is not limited to:
 - (a) The structural integrity of all sections of the boom including the welds
 - (b) The turntable fixing bolts
 - (c) The structural integrity of the outriggers

1.4.8.15 Log books and inspection record sheets

- 1 Instruction, maintenance and repair manuals should be kept in a safe place at the registered premises, and should include a parts catalogue.
- 2 The operator should be familiar with the contents of the instruction manual which should be available at the site of operation.
- 3 All log books and inspection record sheets must show complete details of all inspections, tests, repairs, replacements and modifications carried out on equipment
- 4 Evidence that the pump and other equipment has been inspected and certified to be 'suitable for continued service' (i.e. in a safe working condition), should be made available to the principal contractor or person in control of the workplace for inspection (on request), before the unit is allowed to operate on site.

1.4.8.16 Provision of personal protective equipment (PPE)

- 1 The following items of PPE are likely to be required when pumping concrete:
 - (a) Safety helmets
 - (b) Eye protection
 - (c) Hearing protection
 - (d) Gloves
 - (e) Reflective safety vest
 - (f) Safety boots
 - (g) Rubber boots
 - (h) Waterproof clothing.
- 2 PPE is the least effective method for controlling risks, however in many circumstances related to concrete pumping it provides the most practical option.

Construction Site Safety**Appendix 1****Concrete Pumping Operations Safety Checklist Reminders**

- 1 Entry and exit points – Make sure that the entry and exits into and out of a site are adequate enough to navigate. Ensure that there are no building material lying around that could damage the vehicle and/or tyres.
- 2 Establishment – Be certain that the area in which you will be establishing your pump is flat and stable; the outriggers must be fully extended and evenly proportioned to ensure a solid base to stabilize the pump.
- 3 Overhead obstacles – After establishing the pump the next step will be to check if there are not any overhead barriers to contend with, beams and trees must be avoided unless there is a SAFE way to unfold the boom.
- 4 Power lines must be avoided, no one must try and pump over a power line, electricity can jump several meters.
- 5 It is a standard safe site practice to establish 2m away from any excavation, although, the deeper the excavation the further away you should establish.
- 6 The baseplates must be well secured under the legs of the outriggers.
- 7 The hopper worker must stay at his position at all times to guide the mixers into position.
- 8 Take care when reversing concrete delivery trucks onto the pump.
- 9 Do routine visual checks on the outriggers to ensure that they have not moved whilst pumping.
- 10 Avoid pumping at high speeds, it creates unnecessary strain on the pump and is also unsafe.
- 11 Do visual checks on the concrete of each mixer before pumping, check for workability and abrasiveness.
- 12 After a break in pumping or blockage ensure the end delivery hose is well clear of people before resuming as it could suddenly whip violently.
- 13 Take care when closing the outriggers by ensuring that nobody is within the trap point.
- 14 Never wash the hopper put next to the road, prior arrangement must be made on site or alternatively, drive to the nearest plant.

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