

USE OF WORK EQUIPMENT

20.1 Introduction

20.1.1 The Merchant Shipping and Fishing Vessels (Provision and Use of Work Equipment) Regulations 2006 introduce measures intended to protect workers from risks arising from the provision and use of work equipment. Full guidance on the requirements of those regulations is given in Marine Guidance Note MGN 331 (M+F). Chapter 7 deals with the provision and care of work equipment whilst this chapter deals with its usage.

20.1.2 Based on the findings of the risk assessment required by the Merchant Shipping and Fishing Vessels (Health and Safety at Work) Regulations 1997, appropriate control measures should be put into place to protect those who may be at risk whilst using work equipment. This chapter highlights some areas which may require attention in respect of use of work equipment.

20.2 Use of tools and equipment

20.2.1 This section gives general advice on the use of work equipment which is applicable to all kinds of equipment including both powered and hand tools. Some types of equipment which pose particular risks are covered by later sections. Lifting equipment, because of the serious hazards it presents, is dealt with in more detail in Chapter 21.

20.2.2 Tools should be used only for the purpose for which they were designed. Personnel should ensure that they use the correct tools or equipment for a task. Use of unsuitable tools or equipment may lead to accidents.

20.2.3 Loose clothing or jewellery should never be worn while using machinery, as there is a risk that it may become caught in moving parts. For the same reason, long hair should always be tied back and covered with a hair net or safety cap. Personal protective equipment should be provided and worn as required by the Merchant Shipping and Fishing Vessels (Personal Protective Equipment) Regulations 1999 and Merchant Shipping Notice MSN 1731 (M+F).

20.2.4 Only those competent to use equipment should do so. New recruits should always be trained in the proper use of any equipment they are required to use.

20.2.5 Incorrect use of tools and equipment can cause accidents, as well as damage to the equipment in question. Instructions for use should always be consulted and followed, where they are available.

20.2.6 When not in use equipment should be stowed in a tidy and correct manner. Any cutting edges should be protected.

20.3 Hand tools

20.3.1 Damaged or worn tools should not be used, and cutting edges should be kept sharp and clean. Repair and dressing of tools should be carried out by a competent person.

20.3.2 Wherever practicable, a tool in use should be directed away from the body, so that if it slips it does not cause injury. However when using a spanner more control is gained by pulling towards the body. When using a tool with a cutting edge, both hands should be kept behind the blade.

20.3.3 A chisel is best held between thumb and base of index finger with thumb and fingers straight, palm of hand facing towards the hammer blow.

20.3.4 A saw should not be forced through the material being cut, it should be pushed with a light, even movement.

20.4 Portable power operated tools and equipment

20.4.1 Power operated equipment may be dangerous unless properly maintained, handled and used and should only be used by competent persons. The flexible cables of electric tools should comply with the relevant British or International Standard. Before work begins, personnel should ensure that power supply leads and hoses are in good condition, laid safely clear of all potentially damaging obstructions and do not obstruct safe passage. Where they pass through doorways, the doors should be secured open.

20.4.2 The risk of electric shock is increased by perspiration and locations which are damp, humid or have large conductive surfaces. In such conditions power tools should be operated from low voltage supplies - i.e. no more than 50 volts AC with a maximum of 30 volts to earth or 50 volts DC.

20.4.3 Where it is not practicable to use low voltages, other precautions such as a local isolating transformer supplying one appliance only or a high sensitivity earth leakage circuit breaker (also known as a residual current device) should be used.

20.4.4 The risk associated with portable electric tools also applies to portable electric lamps. The supply to these should not exceed 24 volts.

20.4.5 Double insulated tools are not recommended for use on ships because water can provide a contact between live parts and the casing, increasing the risk of a fatal shock. An earth leakage circuit breaker may also fail to operate when used with such tools as there may be no earth wire in the power supply cable fitted to the tool

20.4.6 Chain linkages or similar devices should be fitted between sections of pneumatic hose to prevent whip-lash in the event of breakage. Alternatively, safety valves can be used which close off the lines.

20.4.7 Accessories and tool pieces (drill bit, chisel etc) should be absolutely secure in the tool. In particular, retaining springs, clamps, locking levers and other built-in safety devices on pneumatic tools should be replaced after the toolpiece is changed. Accessories and tool pieces should not be changed while the tool is connected to a source of power.

20.4.8 Correct safety guards should be securely fixed to appliances requiring them and should be checked for security before starting any operation. Such guards should only be removed when the equipment is not operating. If removal whilst operating is essential for maintenance or examination of the equipment, the following precautions should be taken:

- removal should be authorised by a responsible person, and only a competent person should carry out the work or examination;
- there should be adequate clear space and lighting for the work to be done;
- anyone working close to the machinery should be told what the risks are and instructed in a safe system of work and precautions to take;
- a warning notice should be conspicuously posted.

20.4.9 During temporary interruptions to work e.g. meal breaks, and on completion of a task, equipment should be isolated from power sources and left safely or stowed away correctly.

20.4.10 Where a work operation causes high noise levels, hearing protection should be worn. Where flying particles may be produced, the face and eyes should be protected (see Chapter 4 Personal Protective Equipment).

20.4.11 The vibration caused by reciprocating tools (pneumatic drills, hammers, chisels etc) or high speed rotating tools can give rise to a permanent disablement of the hands known as “dead” or “white” fingers. In its initial stages, this appears as a numbness of the fingers and an increasing sensitivity to cold, but in more advanced stages, the hands become blue and the fingertips swollen. Workers subject to the symptoms described should not use such equipment. Other workers should be advised not to use them for more than 30 minutes without a break, unless the risk assessment indicates a lesser period of use.

20.5 Workshop and Bench Machines (Fixed installations)

20.5.1 Fixed installations should only be operated by competent personnel. The operator should check a machine every time before use, and ensure that all safety guards and devices are in position and operative, that all tool pieces (drill bits, cutting blades, etc) are in good condition, and that the work area is adequately lit and free from clutter.

20.5.2 No machine should be used when a guard or safety device is missing, incorrectly adjusted or defective or when it is itself in any way faulty (see also advice in 20.4.8 above). If any defect is identified, the machine should be isolated from its source of power until it has been repaired.

20.5.3 During operations, personnel should ensure that work pieces are correctly secured in position; machine residues (swarf, sandings etc) do not build up excessively, and are disposed of in a correct and safe manner.

20.5.4 Whenever machinery is left unattended, even if only briefly, the power supply should be switched off and isolated, and the machinery and any safety guards should be rechecked before resuming work.

20.6 Abrasive wheels

20.6.1 Abrasive wheels should be selected, mounted and used only by

competent persons and in accordance with manufacturers' instructions. They are relatively fragile and should be stored and handled with care.

20.6.2 Manufacturers' instructions should be followed on the selection of the correct type of wheel for the job in hand. Generally, soft wheels are more suitable for hard material and hard wheels for soft material.

20.6.3 Before a wheel is mounted, it should be brushed clean and closely inspected to ensure that it has not been damaged in storage or transit. The soundness of a vitrified wheel can be further checked by suspending it vertically and tapping it gently. If the wheel sounds dead it is probably cracked, and should not be used.

20.6.4 A wheel should not be mounted on a machine for which it is unsuitable. It should fit freely but not loosely to the spindle; if the fit is unduly tight, the wheel may crack as the heat of the operation causes the spindle to expand.

20.6.5 The clamping nut should be tightened only sufficiently to hold the wheel firmly. When the flanges are clamped by a series of screws, the screws should be first screwed home with the fingers and diametrically opposite pairs tightened in sequence.

20.6.6 The speed of the spindle should not exceed the stated maximum permissible speed of the wheel.

20.6.7 A strong guard, enclosing as much of the wheel as possible, should be provided and kept in position at every abrasive wheel (unless the nature of the work absolutely precludes its use) both to contain wheel parts in the event of a burst and to prevent an operator having contact with the wheel. (See also 20.4.8 above)

20.6.8 Where a work rest is provided, it should be properly secured to the machine and should be adjusted as close as practicable to the wheel, the gap normally being not more than 1.5 mm (1/16 inch).

20.6.9 The side of a wheel should not be used for grinding; it is particularly dangerous when the wheel is appreciably worn.

20.6.10 The work piece should never be held in a cloth or pliers.

20.6.11 When dry grinding operations are being carried on or when an abrasive wheel is being trued or dressed, suitable transparent screens should be fitted in front of the exposed part of the wheel or operators should wear properly fitting eye protectors.

20.7 Hydraulic/Pneumatic/High Pressure Jetting Equipment

20.7.1 Workers using hydraulic/pneumatic/high pressure systems should have received adequate training and be competent to use such equipment. Manufacturers' operating guidelines should be followed at all times. Equipment should not be operated at pressures which exceed manufacturers' recommendations.

20.7.2 Before starting work, workers should ensure that the equipment and supply systems are in sound condition, and that incorporated safety devices are in place and functioning correctly. Where equipment is defective or suspect, systems should be shut down, isolated and depressurised to allow effective change out or repair. Such repairs should only be carried out by authorised competent personnel using approved components.

20.7.3 Before activating a pressure system, and also when closing it down, the recommended checks should be made to ensure that no air pockets or trapped pressure are in the system, as these may cause erratic action of the equipment.

20.7.4 When handling hydraulic fluid, personnel should ensure the following:

- (a) that the correct grade is used, when topping up systems;
- (b) that spillages are cleaned up immediately;
- (c) that any splashes of such fluid onto skin areas are cleaned off immediately - many such fluids are mineral based;
- (d) that naked lights are kept away from equipment during service/test periods - hydraulic fluids may give off vapours which may be flammable.

20.7.5 Workers using high pressure jetting equipment should wear the correct protective equipment. Such systems may involve use of a heated supply source and operators should therefore guard against splashing and scalding. Warning notices should be displayed on approaches to areas where such work is being undertaken to warn other workers of the use of such high pressure system in the area. Finally, workers should take great care in ensuring that the direction of such jetting is safe.

20.7.6 When compressed air is used, the pressure should be kept no higher than is necessary to undertake the work satisfactorily.

20.7.7 Compressed air should not be used to clean the working space, and in no circumstances should it be directed at any part of a person's body.

20.8 Hydraulic jacks

20.8.1 Jacks should be inspected before use to ensure that they are in a sound condition and that the oil in the reservoir reaches the minimum recommended level.

20.8.2 Before a jack is operated, care should be taken to ensure that it has an adequate lifting capability for the work for which it is to be used and that its foundation is level and of adequate strength.

20.8.3 Jacks should be applied only to the recommended or safe jacking points on equipment.

20.8.4 Equipment under which workers are required to work should be properly supported with chocks, wedges or by other safe means - never by jacks alone.

20.8.5 Jack operating handles should be removed if possible when not required to be in position for raising or lowering the jack.

20.9 Ropes

20.9.1 The safety of the ship or an individual crew member is often dependent on the rope that is being used.

20.9.2 Many types of rope of both man-made and natural fibre are available, each with different properties and with different resistance to contamination by substances in use about the ship which may seriously weaken the rope. The following table is a guide to the resistance of the main rope types but is indicative only of the possible extent of deterioration of rope; in practice, much depends on the precise formulation of the material, the amount of contamination the rope receives and the length of time and the temperature at which it is exposed to contamination. In some cases, damage may not be apparent even on close visual inspection.

Substance	Resistance to chemicals of rope made of			
	Manila or Sisal	Polyamide (nylon)	Polyester	Poly-propylene
Sulphuric (battery) acid	None	Poor	Good	V Good
Hydrochloric acid	None	Poor	Good	V Good
Typical rust remover	Poor	Fair	Good	V Good
Caustic Soda	None	Good	Fair	V Good
Liquid Bleach	None	Good	V Good	V Good
Creosote, crude oil	Fair	None	Good	V Good
Phenols, Crude tar	Good	Fair	Good	Good
Diesel Oil	Good	Good	Good	Good
Synthetic detergents	Poor	Good	Good	Good
Chlorinated solvents, eg trichloroethylene (used in some paint and varnish removers)	Poor	Fair	Good	Poor
Other organic solvents	Good	Good	Good	Good

20.9.3 Ropes should be stored away from heat and sunlight, if possible in a separate compartment which is dry and well ventilated, away from containers of chemicals, detergents, rust removers, paint strippers and other substances capable of damaging them. Mooring ropes should be covered by tarpaulins or, if the ship is on a long voyage, stowed away. Any accidental contamination should be reported immediately for cleansing or other action.

20.9.4 Man-made fibre ropes have high durability and low water absorption and are resistant to rot. Mildew does not attack man-made fibre ropes but moulds can form on them. This will not normally affect their strength.

20.9.5 Polypropylene ropes which have the best all round resistance to attack from harmful substances are generally preferred. However they may be subject to degradation in strong sunlight ("actinic degradation"), and should not be exposed for long periods. They should also be of a type providing grip comparable to that of manila or sisal ropes.

20.9.6 New rope, 3-strand fibre rope and wire should be taken out of a coil in such a fashion as to avoid disturbing the lay of the rope.

20.9.7 Rope should be inspected internally and externally before use for signs of deterioration, undue wear or damage.

20.9.8 When using steel wire ropes it is important that they are properly installed, maintained and lubricated as appropriate to their use. Manufacturer's guidelines and recommendations for use should be followed. Where eyes are formed they should be made by eye splicing or using appropriate compression fittings (using swages or ferrules). The use of Bulldog grips is discouraged, and they must not be used on lifting wires and mooring wires. Annex 20.1 gives further information regarding bulldog grips.

20.10 Characteristics of man-made fibre ropes

20.10.1 Safe handling of man-made fibre ropes requires techniques which differ from those for handling natural fibre ropes.

20.10.2 Man-made fibre ropes are relatively stronger than those of natural fibre and so for any given breaking strain have appreciably smaller circumferences, but wear or damage will diminish strength to a greater extent than would the same amount of wear or damage on a natural fibre rope. Recommendations for substitution of natural fibre ropes by man-made fibre ropes are given in the following table:

Manila		Polyamide (Nylon etc)		Polyester (Terylene etc)		Polypropylene	
Dia	Size	Dia	Size	Dia	Size	Dia	Size
48mm	(6)	48mm	(6)	48mm	(6)	48mm	(6)
56mm	(7)	48mm	(6)	48mm	(6)	52mm	(6.5)
64mm	(8)	52mm	(6.5)	52mm	(6.5)	56mm	(7)
72mm	(9)	60mm	(7.5)	60mm	(7.5)	64mm	(8)
80mm	(10)	64mm	(8)	64mm	(8)	72mm	(9)
88mm	(11)	72mm	(9)	72mm	(9)	80mm	(10)
96mm	(12)	80mm	(10)	80mm	(10)	88mm	(11)
112mm	(14)	88mm	(11)	88mm	(11)	96mm	(12)

Diameter given for 3-strand, size no for 8-strand plaited.

20.10.3 Careful inspection of man-made fibre ropes for wear externally and internally is necessary. A high degree of powdering between strands indicates excessive wear and reduced strength. Ropes with high stretch suffer greater inter-strand wear than others. Hardness and stiffness in some ropes, polyamide (nylon) in particular, may also indicate overworking.

20.10.4 Unlike natural fibre ropes, man-made fibre ropes give little or no audible warning of approaching breaking point.

20.10.5 Rope of man-made material stretches under load to an extent which varies according to the material. Polyamide rope stretches the most. Stretch imparted to man-made fibre rope, which may be up to double that of natural fibre rope, is usually recovered almost instantaneously when tension is released. A break in the rope may therefore result in a dangerous back-lash and an item of running gear breaking loose may be projected with lethal force. Snatching of such ropes should be avoided; where it may occur inadvertently, personnel should stand well clear of the danger areas. The possibility of a mooring or towing rope parting under the load is reduced by proper care, inspection and maintenance and by its proper use in service, but it can nevertheless still happen without warning.

20.10.6 Man-made fibre ropes may easily be damaged by melting if frictional heat is generated during use. Too much friction on a warping drum may fuse the rope with the consequential sticking and jumping of turns, which can be dangerous. Polypropylene is more liable to soften than other material. To avoid fusing, ropes should not be surged unnecessarily on winch barrels. For this reason, a minimum of turns should be used on the winch barrel; three turns are usually enough but on whelped drums one or two extra turns may be needed to ensure a good grip; these should be removed as soon as practicable.

20.10.7 The method of making eye splices in ropes of man-made fibres should be chosen according to the material of the rope.

- (a) Polyamide (nylon) and polyester fibre ropes need four full tucks in the splice each with the completed strands of the rope followed by two tapered tucks for which the strands are halved and quartered for one tuck each respectively. The length of the splicing tail from the finished splice should be equal to at least three rope diameters. The portions of the splice containing the tucks with the reduced number of filaments should be securely wrapped with adhesive tape or other suitable material.
- (b) Polypropylene ropes should have at least three but not more than four full tucks in the splice. The protruding spliced tails should be equal to three rope diameters at least.
- (c) Polythene ropes should have four full tucks in the splice with protruding tails of three rope diameters at least.

20.10.8 Mechanical fastenings should not be used in lieu of splices on man-made fibre ropes because strands may be damaged during application of the mechanical fastening and the grip of the fastenings may be much affected by slight unavoidable fluctuations in the diameter of the strands.

20.10.9 Man-made fibre stoppers of like material (but not polyamide) should be used on man-made fibre mooring lines, preferably using the 'West Country' method (double and reverse stoppering).

20.11 Work with visual display units (VDUs)

20.11.1 Workers should be given adequate individual training in the use and capabilities of VDUs. This training should be adapted to the needs and ability of the person and the type of equipment.

20.11.2 Any worker using VDUs regularly or frequently and for lengthy periods should be given an eye test by a qualified person before beginning

such work and at regular intervals thereafter. If either the eye test or examination by an ophthalmologist shows that the person needs special glasses for this work these should be provided.

20.11.3 VDUs should be so positioned that there is sufficient room to move, as necessary, around the equipment. Care should be taken to ensure that cables and wiring do not cause a hazard by obstructing movement.

20.11.4 Lighting should be adequate for the task, with glare and reflection cut to a minimum, and the display on screen should be clear and easy to read. The operator should adjust the brightness and contrast to suit the lighting. When appropriate the operator should be given short rest periods away from the equipment.

20.11.5 There should be adequate leg room and the chair should be comfortable and stable, with adjustable seat height and back rest. The chair should be adjusted by each user to a comfortable position for working - arms approximately horizontal and eyes at the same level as the top of the screen. The keyboard and screen should be adjusted to a comfortable position for keying and viewing.

20.11.6 Certain forms of medication may impair working efficiency on a VDU. Personnel should be aware of this possibility and should seek medical advice if necessary.

20.11.7 Further guidance on the safe use of VDUs can be obtained from the Health and Safety Executive who produce various leaflets including "Working with Visual Display Units". Leaflets are obtainable from HSE Books, PO Box 1999, Sudbury, Suffolk CO10 2WA Tel: 01787 881165 Fax: 01787 313995 Website: www.hsebooks.co.uk (HSE priced publications are also available from bookshops and free leaflets can be downloaded from HSE's website: www.hse.gov.uk). In addition various publications relating to the safe use of VDUs can be obtained from The Stationery Office.

20.12 Laundry equipment

20.12.1 All workers required to work in a laundry, or use any part of the equipment there, must be fully instructed on the proper operation of the machinery. Where a worker is under 18 years of age they should not work on industrial washing machines, hydro-extractors, calenders or garment presses unless they have been fully trained in the operation of the machine and the precautions to be observed, and if appropriate are closely supervised by a competent person.

20.12.2 Equipment should be inspected before use for faults and damage. Particular attention should be paid to the automatic cut-off or interlocking arrangements on washing machines, hydro-extractors etc and the guards and emergency stops on presses, calenders, mangling and wringing machines. Any defect or irregularity found during inspection, or apparent during operation of the equipment, should be reported immediately and the use of the machine discontinued until such time as any necessary repairs or adjustments have been carried out. A notice warning against use should be displayed prominently on the defective machine.

20.12.3 Frequent and regular inspection, with thorough checking of all electrical equipment and apparatus, is also necessary to ensure the standard of maintenance essential for laundries.

20.12.4 Machines should not be overloaded and loads should be distributed uniformly.

20.12.5 Reliance should not be placed entirely on interlocking or cut-off arrangements on the doors of washing machines, hydro-extractors and drying tumblers etc; doors should not be opened until all movement has ceased.

ANNEX 20.1

BULLDOG GRIPS



1.1 The use of Bulldog grips is discouraged, and they must not be used on lifting wires or mooring wires.

1.2 Do not use where the rope is likely to be subjected to very strong vibrations.

1.3 Do not use with plastic coated wire rope.

1.4 It is important that where they are used, they are installed correctly as per the manufacturer's instructions.

1.5 The "U" of the grip must be placed on the dead end of the rope as illustrated, and the distance between grips being approximately 6 rope diameters. The minimum number of grips is dependant on the rope diameter; after being in service for several hours the grips should be re-tightened, and re-checked for tightness periodically. Correctly fitted grips would be expected to hold at least 80% of the minimum breaking load of the rope.

